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Review Article

Gender differences in colour representation of legal and illegal scenarios

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Abstract

This paper outlined the relevance of drawing in learning processes activated during a training aimed at sensitizing values related to the concept of 'legality'.

Two independent judges classified drawings of 186 children as 'legal' or 'illegal' considering the content and the description provided. We analysed gender differences in using bright and dark colours and within-group differences between bright and dark colours in legal/illegal scenarios. Girls used brighter colours than boys in both scenarios. Moreover, girls used darker colours for illegal scenarios, whereas boys used darker colours for both scenarios. These results suggested that girls depicted illegal scenarios on negative feelings towards the concept of illegality, whereas boys did not seem to be affected by the feeling towards the drawn topic.

Keywords: Drawings; Bright; Dark; Civic Education; Emotions

Introduction

In psychological context, research suggests that drawing should be explicitly recognized as a key element in science education (Coates & Coates, 2006, 2011), that is as a window into ongoing learning (Ainsworth et al., 2011; Fan, 2015; Hubber et al., 2010). Drawings and drawing-like activities are carried out in primary and secondary education, and various programs featuring these forms of visual tools are implemented in learning contexts (Farmer et al., 2016). From this point of view, drawings correspond to representations of children's conceptions and involve selective representations of learned concepts and contents, such as about earth (Ehrlén, 2009), river basin, which is related to the water cycle (Dove et al., 1999), scientific phenomena of human internal organ (Reiss & Tunnicliffe, 2001), and so forth. Labintaha, and Shinozakia (2014) developed a very interesting approach in relation to environmental learning experiences and preferences. Children were involved in an environmental education program spending one day in a wetland mangrove reserve. Afterwards they were asked to make drawings to depict the mangrove environment. This means that drawing can provide opportunities to reflect upon information introduced during classroom settings as well as during formal training activities.

However, despite the wide range of applicability of drawings in educational contexts, no study has investigated the extent to which it can be used for children's civic education, with a particular focus on the concept of 'legality', which is based on the compliance with the norms that are laid down by the law. Thus, in the present study, children of primary school classrooms took part to a training program based on 'legality', being exposed to both examples of compliance with the norms and examples of the lack of respect of norms. After the training program, children were instructed to draw contents that represented their idea of legality or illegality. The products of this activity was evaluated in terms of colours in order to specifically investigate gender differences in colour preference.

The rational for such a study is two-fold. Firstly, the support for civic education appears to be crucial since developmental age in light of both the increasing disengagement of citizens from civic participation (individual or group activity addressing issues of public concerns), and the increasing levels of social and ethnic tensions (Isac et al., 2011). The implementation of civic education can contribute to develop legal obligations and key skills that are associated with leadership, teamwork and participation, as well as reduce exclusions and connect individuals with controversial issues of society (Gaventa, 2004). Secondly, using drawing as an educational tool, civic education can be also defined and improved in light of gender differences in children's colour preference. This would help to understand how to exploit the pedagogical value of coloured drawings for implementing educational programs, especially with children, who use it as a preferential means for expressing concepts and emotions.

Focusing on gender differences in children's colour preference, several studies found that girls prefer bright colours, whereas boys dark colours (e.g., Boyatzis & Varghese, 1994; Pranckeviciene et al., 2009). However, the reasons that lead girls to prefer bright colours, such as pink, are still matter of discussion (Frassanito & Pettorini, 2008). According to some studies, biological basis should be considered, because girls would better discriminate red wavelengths, as if they developed an in born preference for such a colour (Hurlbert & Ling, 2007). According to other studies, psychological basis are more important, given that children were found to start to develop gender-stereotyped colour preferences when they began to learn about their own gender, that is when they were 2-3 years old (Zosuls et al., 2009).

One important issue of the psychological perspective relies on the extent to which children's colour choice is affected by the feelings that they hold towards the drawn topics (e.g., Golomb, 1981, 1992; Picard et al., 2007; Winston et al., 1995; for a review, see Burkitt, 2008). Some studies revealed that children use a more preferred colour when they feel positively towards a person, but not when they have to draw a

figure that they feel negatively towards (Burkitt & Barrett, 2010; Burkitt et al., 2003; Burkitt & Newell, 2005). Children would tend to use lighter colours for positive figures and darker colours for negative ones (e.g., Brechet et al., 2009; Picard et al., 2007; Burkitt & Newell, 2005).

Therefore, basing on the focus of the present study, given that colour preference is also determined by the object represented (Jonauskaite et al., 2016) it is also possible that, regardless of the gender colour preference, children generally use more reassuring and bright colours (e.g., hues of pink, light orange, light blue, light green, light yellow, etc…) for legal scenarios, and more alarming and dark colours (e.g., grey, black, dark violet, dark blue, etc…) for illegal scenarios (for the classification of colours see: Bonaiuto et al., 1996). Indeed, playful and bright colours were found to promote a decrease of conflict and the acceptance and facilitation of incongruities, whereas alarming, serious and dark colours were found to produce an increase of conflict perception that generates the perceptual defence (Bonaiuto et al., 1996). In this vein, legal scenarios are supposed to foster a decrease of conflict on the basis of the understanding and acceptance of norms, whereas illegal scenarios are supposed to increase the conflict on the basis of the violation of norms.

The hypotheses were formulated as follows:

1) regardless of the scenario depicted, girls were expected to use more bright colours than boys;
2) regardless of the scenario depicted, boys were expected to use more dark colours than girls;
3) regardless of the gender colour preference, children were expected to use more bright colours for legal scenarios and more dark colour for illegal scenarios.

Method

Participants

A sample of 186 Italian children (mean age: 9.44 ± 0.54 years – range 8-11 years - 93 girls and 93 boys) without reported learning difficulties or other neurodevelopmental diseases (as reported by their teachers or families during an informal interview) participated to the study. The age range of 8-11 years was chosen in order to have children of primary school sufficiently able to understand the aim of the training program. With children 6-7 years old the risk was to get an unsuccessful training program. The two groups (girls and boys) did not differ in terms of age [$F(1, 184) = 1.86$, $p = 0.17$]. All children were pupils of four different primary schools located in Rome (Italy). Children showed no primary visual or hearing impairments, no neurological, emotional or behavioural problems. All children had normal or corrected to normal (glasses) vision, and the parents did not report any inheritance of colour perception defects.

This study was approved by the local ethical committee of Department of Psychology of "Sapienza" University (Rome, Italy) in accordance with the Declaration of Helsinki. A signed written consent form was obtained from parents and assent was obtained from each child.

Instruments and procedure

All children participated to a two hours formative meeting with policemen and psychologists in order to get familiarity with the concept of legality and law compliance in supporting civic education activities. This approach moved from a sociocultural and constructivist perspective, aimed at promoting learning within classrooms using collaborative activities (Morcom, 2014), taking advantages of the presence of professionals. Indeed, communication across a classroom gives the opportunity to discuss issues, support cooperation, build self-esteem and social skills, that allow participants to solve problems collectively (Hennessey, 2007). In the present study, children acquired the definition of the term 'legality' (from the Latin word *legalis*). This concept was basically presented in terms of individual's compliance with the norms that attribute rights and establish duties; thus, as a human behaviour that involves the exercising of a right and the fulfilment of an obligation in the manner and forms established by the law. In practice, children were provided with simple and also more complex examples of compliance with the norms (e.g., respect for property and do not steal; the payment of the car insurance gives the possibility to drive on the road because in case of accidents and damage caused to third parties the insurance can pay on behalf of the driver), as well as with examples of consequences for failure to comply with norms (e.g., the lack of respect for property and stealing can lead people to gale; not-payment of the car insurance does not give the right to drive on the road). The presence of policemen was aimed at strengthening the concepts of legality (respect of norms) and illegality (violation of norms). In addition, the presence of psychologists was aimed at supporting teachers, given that children feedbacks could help teachers to reframe their beliefs about the classroom environment, and open new possibilities to enhance learning.

After the meeting (one week later), children were contacted during the lesson time with the school head's permission. Small groups of 4-5 children were formed in order to avoid confusion and have the possibility to carefully monitor all children while they were drawing. Children received the following oral instructions: "*Draw whatever comes into mind when you think of legality; alternatively you can also draw whatever comes into your mind when legality is violated (illegality)*". This instruction emphasized the possibility to represent the concept of legality also using examples of failure to comply with norms. Thus, children could decide to draw a legal or an illegal scenario (only one drawing). Children were provided with a white A4-format sheet of paper, a regular pencil (HB), an eraser, a pencil sharpener and a box of coloured pencils, and they were told that they could freely use the materials provided. A large panel of colours was used in order to match the classification of bright and dark colours, as well as to give children the opportunity to express their ideas at their best. Given that brightness is the light-dark dimension of the colour (Jonauskaite et al., 2016), pencils were chosen in order to cover both bright (light: blue, brown, green, orange, red, red orange, yellow, purple, plus pink) and dark colours (no-light: blue, brown, green, orange, red, red orange, yellow, purple, plus black and grey). Children were also given a sheet on which to write their age and gender along with a short verbal description of their drawing; they also indicate if the drawing was an "legal" or "illegal" scenario. There was no time limit. The full session lasted approximately 30 min per group.

Data Scoring

Two independent judges (one male and one female) classified drawings into legal and illegal scenarios according to the content depicted and the verbal description provided. When conflicts between content and description were detected, drawings were discarded by further analysis. However, only a few exceptions were found. Using these criteria, 91 drawings were judged as 'legal', whereas 95 were judged as 'illegal'. A general inter-judge agreement was computed. The agreement was satisfactory (Cohen's K = .82). The chi-square (χ^2) test of independence showed that girls and boys produce a comparable number of legal [χ^2 (1) = 0.55, p = .46; girls = 48, boys = 43] and illegal drawings [χ^2 (1) = 0.53, p = .47; girls = 45, boys = 50]. Afterwards, for each drawing, the two independent judges evaluated the presence (coded as 1) or the absence (coded as 0) of 'bright' and 'dark' colours. Also this evaluation met a satisfactory general inter-judge agreement (Cohen's K=.85) (see Figure 1 for example of drawings).

Figure 1. A. An example of a legal drawing characterized by bright colours (up left); an example of an illegal drawing characterized by dark colours (up right). B. An example of legal drawing depicted by a girl (bottom left) with bright colours; an example of illegal drawing depicted by a girl (bottom right) characterized by dark colours. C. Examples of bright legal (on the left) and dark illegal (on the right) drawings depicted by boys.

Results

The chi-square (χ^2) test of independence was used to assess gender differences in bright and dark colours (present = 1; absent = 0) in both drawings depicting legal and illegal scenarios (see Table 1-A).

Regarding drawings depicting legal scenarios, the analysis showed gender differences in terms of 'bright colours' [χ^2 (1) = 10.40, p = .0013]: girls (20) produced more legal drawings with bright colours than boys (5). No differences were found between girls (28) and boys (38) in terms of 'dark colours' [χ^2 (1) = 2.35, p = .13]. Regarding drawings depicting illegal scenarios, the analysis showed gender differences in terms of 'bright colours' [χ^2 (1) = 7.27, p = .007]: girls (7) produced more illegal drawings with bright colours than boys (0). No differences were found between girls (38) and boys (50) in terms of 'dark colours' [χ^2 (1) = 3.11, p = .8].

In addition, the chi-square (χ^2) test of independence was used to assess within-group (girls or boys) effects in both drawings depicting legal and illegal scenarios (see Table 1-B). Regarding girls, drawings depicting legal scenarios showed no difference in the use of bright (20) and dark (28) colours [χ^2 (1) = 1.80, p = .18], whereas drawings depicting illegal scenarios were produced more frequently with dark (38) than bright (7) colours [χ^2 (1) = 28.17, p< .00001]. Regarding boys, both drawings depicting legal scenarios [χ^2 (1) = 32.94, p< .00001; 38 vs 5] and drawings depicting illegal scenarios [χ^2 (1) = 68.38, p< .00001; 50 vs 0] were produced more frequently with dark than bright colours.

Table 1: Frequencies for bright and dark colours (1 = present; 0 = absent) divided by legal and illegal drawings and by gender. Part A: between-group comparisons for each type of colours. Part B: within-group comparisons of types of colours.

PART A				
Legal drawings				
Colours	**Counting**	**Female**	**Male**	**Tot**
Bright	1	20	5	25
	0	73	88	161
		93	93	186
Dark	1	28	38	66
	0	65	55	120
		93	93	186
Illegal drawings				
Colour	**Counting**	**Female**	**Male**	**Tot**
Bright	1	7	0	7
	0	86	93	179
		93	93	186
Dark	1	38	50	88
	0	55	43	98
		93	93	186
PART B				
Girls - Legal Drawings				
Colour		**1**	**0**	**Tot**
Bright		20	73	93
Dark		28	65	93
		48	148	186
Girls - Illegal Drawings				
Colour		**1**	**0**	**Tot**
Bright		7	86	93
Dark		38	55	93
		45	141	186
Boys - Legal Drawings				
Colour		**1**	**0**	**Tot**
Bright		5	88	93
Dark		38	55	93
		43	143	186
Boys - Illegal Drawings				
Colour		**1**	**0**	**Tot**
Bright		0	93	93
Dark		50	43	93
		50	136	186

Discussion

In the present study, 8-11 years-old children's colour preference (bright or dark) in drawings representing legal or illegal scenarios was analyzed in terms of gender differences. Specifically, both between-group comparisons for each type of colours and within-group comparisons of types of colours were considered. Results partially confirmed the working hypotheses, given that girls tended to draw more frequently than boys both legal and illegal scenarios using bright colours (first hypothesis); no specific differences were found between girls and boys in terms of dark colours, regardless of the scenario depicted. In addition, girls produced illegal scenarios using more frequently dark than bright colours, whereas boys used more dark than bright colours regardless of the scenarios depicted.

These results are consistent with physiological accounts. On the one hand, the view that since birth girls perceive a more coloured world and above all they tend to prefer some wave-lengths (Hulbert & Ling, 2007), such as bright colours as compared with boys (e.g., Boyatzis & Varghese, 1994; Pranckeviciene et al., 2009) is supported. In this direction, LoBue and DeLoache (2011) demonstrated that girls showed preference for pink around the age of 2.5 years, that is when children begin to seek out gender-related information (Zosuls et al., 2009). However, girls were also found to use more dark than bright colours when depicting illegal scenarios. This means that although girls are more prone to use bright colours than boys, they allegedly acquired the concept of illegality more negatively than the concept of legality and ultimately used dark colours when representing illegal scenarios to communicate negative feelings towards the illegal issue. In other words, basing on the evidence that children's colour preference in drawing changes according to the emotions felt towards the object depicted (e.g., person) (Brechet et al.,2009; Burkitt & Barrett, 2010; Burkitt et al., Burkitt & Newell, 2005; Picard et al., 2007), it is possible that girls better identified the risks linked to illegality, and by consequence expressed their negative feelings using not preferred darker colours when making drawings depicting illegal scenarios.

On the other hand, the view that boys prefer dark colours (e.g., Boyatzis & Varghese, 1994; Pranckeviciene et al., 2009) was also confirmed by the evidence that they used more often dark than bright colours when drawing both legal and illegal scenarios. The idea that boys felt negatively towards the concept of illegality is ruled out because they used dark colours also for legal scenarios. Rather, this finding suggests that boys do not seem to be affected by the type of content, as if they did not identify the difference between legality and illegality, at least in terms of colour preference. That is, children might be prone to accept illegality as well as legality, or confound the two concepts and behave exclusively according to their tendencies, in this study as expressed by their colour preference.

Although more study is necessary to clarify the issues just discussed, taken together these results suggest that colour preference in drawing can be used as an indicator of the progresses done with children in civic education. Colour preference appears to be affected both by gender and by the content depicted. In particular, girls appear to be more sensitive to the content/object depicted, as if they understood the civic education program (in this experiment based on legality) according to their level of emotional involvement with the topic itself. The idea alleged here is that girls understood differently than boys the concept of legality-illegality and ultimately better differentiated the two faces of the same coin using more appropriate colours when representing them by drawings.

Limitations of this study rely mainly on the method used. Firstly, although the idea to introduce the concept of legality by a formal education program might be a strength, the development of the concept was not enhanced in classroom. Secondly, children's understanding of the concept of legality was not assessed by a formal interview, that could have been used in combination with drawings. In future, these issues should be better addressed. Children could be also asked to make two drawings, one depicting a legal scenario and one depicting an illegal scenario. This would better allow to compare the two types of drawings and test whether there is a change in colour according to the drawing type in the same children. Results could be confirmed by using a control task such as spontaneous drawings. Finally, factors supporting possible influences of education (e.g., parental) should also be addressed by means of specific questionnaires.

In conclusion, these results can have implications for civic education in developmental age, supporting the implementation of programs that take into consideration gender differences in children's colour preference expressed while drawing and the inner meaning that it conveys. The hope is that through this study professionals will get useful indications for colour applications in both pedagogic and therapeutic settings, with the aim to plan actions that promote

the culture of legality, designing environments that may be more comfortable for children in accordance with their gender.

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