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Perceived aesthetics of images in emotional design

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Abstract

Research on emotional design has studied several principles to make visual illustrations more appealing, with mixed results regarding learning outcomes. As no previous study has systematically assessed the effect of these principles on aesthetic judgement, an experimental study was conducted with 100 participants to evaluate the perceived beauty of images varying according to anthropomorphism, colours and dimensionality (2D/3D).

Context

Emotional design proposes to enhance the affective dimension of the illustrations in the educational material, with anthropomorphic and rounded aspects as well as pleasing colours (Um, Plass, Hayward, & Homer, 2012). According to the Cognitive Affective Theory of Multimedia Learning (CATML) (Moreno & Mayer, 2007), these modifications initiate and guide cognitive processing toward better learning, directing attention and enhancing cognitive engagement (Mayer & Estrella, 2014). Furthermore, Plass et al. (2020) indicate that the use of three-dimensional representations rather than two-dimensional ones offers more possibilities to include details in the visual representation, thus improving its emotional value.

Research Question

Despite some studies provided evidence that emotional design benefits learning, there appears to be no consensus in the literature (Brom, Stárková, & D'Mello, 2018). According to Heidig, Müller, & Reichelt (2015) research is needed to identify intrinsic emotional design features that are successful in eliciting emotional states in learners. Surprisingly, no study has yet attempted to assess the aesthetic value of visual illustrations designed according to emotional design principles (see Plass, Heidig, Hayward, Homer, & Um, 2014). The present experimental study seeks to determine whether images resulting from emotional design principles are judged as more beautiful than their counterpart and how much each design factor contributes to the aesthetic value. Three design factors were chosen because of their frequency in the literature: colour, anthropomorphism and dimensionality.

The dimension of anthropomorphism concerns the presence of human attributes in the image, such as rounded facial features like eyes and a mouth, which have been shown to have a positive evocative effect (Um et al., 2012). The colour dimension generally includes the use of pleasing colours, such as warm, bright, and saturated hues. However, regarding hue, the most pleasing interfaces are characterised by the harmony of the colours used (Moshagen & Thielsch, 2010), and similar hues are considered the most harmonious (Schloss & Palmer, 2011). According to them, in general, shades of blue are preferred, while disharmonious colours are those that are the least similar.

The use of three-dimensional representations rather than two-dimensional ones offers more opportunities to include details at the level of anthropomorphism and shapes that positively impact people (Plass et al., 2020). The intensity of detail and dimensionality can be defined in two levels such as schematic representations in two dimensions, and stylized representations in three dimensions (Lucas, 2019).

Material & Methods

Five schematic representations of objects were chosen from an instructional website on the topic of memory. A set of items was designed according to the combination of the three emotional variables (Anthropomorphism: with, without; colours: harmonic, disharmonic, black/white and dimensionality: 2-D, 3-D) leading to 12 variations for the 5 images, or 60 images overall (see table 1 for an example).

The study was set up online with 100 participants who had to rate the 60 images on a 7-point Likert scale. The scale included two semantic differentiators (ugly and beautiful), between which the participants had to position their rating for each image (see figure 1). No time limit was imposed and the items were randomly presented.













The data is currently being collected. An analysis using a multilevel model (following Brown, 2021) with anthropomorphism, colours and dimensionality as fixed effects and the type of object as the random effect will be conducted in order to identify the effect of each variable on aesthetic judgement and their possible interaction. The findings may shed light on previous research using these variables and their effect on learning. Moreover, the results will provide the “best” design option for each dimension for future research on emotional design.

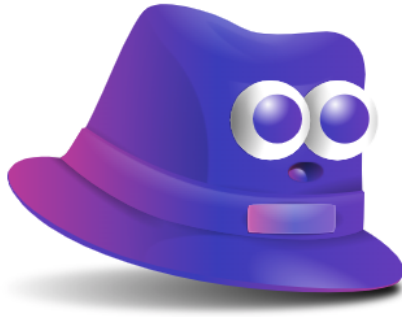
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Table 1. Combination of three variables (Anthropomorphism: with, without; Colours: harmonic, disharmonic, black/white and Dimensionality: 2-D, 3-D) resulting in 12 variations for the image representing a hat

Anthropomorphism					
With		Without			
 1	 2	 3	 4	Harmonic	Colours
 5	 6	 7	 8	Disharmonic	
 9	 10	 11	 12	Black/White	
2-D	3-D	2-D	3-D		
Dimensionality					



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Figure 1. Example of a question evaluating perceived aesthetics of the image representing a hat in anthropomorphic, harmonious colours and 3-D version.