

Objective measures of design typicality

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Design typicality shapes consumers' aesthetic product preferences. Hence, methods for assessing a product design's typicality are vital to enable predictions of a design's market potential. In this research, we introduce four objective measures of design typicality (two based on Euclidian distances between feature points and two based on pixel-wise image correlations) and demonstrate their capability of capturing a subjective typicality experience. Furthermore, we validate the measures in the context of automobile designs with consumer ratings of aesthetic liking and experienced processing fluency by analysing 77 car models from four segments. Our findings identify the most promising approach to quantify design typicality and endorse the use of this measure in future scientific research and in managing product design in business practice.

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Keywords: aesthetics, product design, automotive design, information processing, design typicality

Visual typicality is a general principle of product design aesthetics, and ample research suggests that consumers prefer prototypical designs over atypical ones (e.g., Graf & Landwehr, 2017; Hekkert, Snelders, & van Wieringen, 2003; Veryzer & Hutchinson, 1998). The link between typicality and aesthetic preferences has been demonstrated in various stimulus domains such as human faces (Langlois & Roggman, 1990), abstract visual patterns (Martindale & Moore, 1988; Winkielman, Halberstadt, Fazendeiro, & Catty, 2006), paintings (Purcell, 1993), and automobile designs (Landwehr, Labroo, & Herrmann, 2011; Landwehr, Wentzel, & Herrmann, 2013). Design typicality also plays an important role in consumers' perception of product trendiness (Blijlevens, Mugge, Ye, & Schoormans, 2013) and in the evaluation of fit between a product and the context of the product's presentation (Blijlevens, Gemser, & Mugge, 2012).

However, studies showing a link between typicality and aesthetic preferences have been criticized for the possibility that the two constructs are circularly related and mutually influence each other (Boselie, 1991). In particular, whenever participants are asked to subjectively rate a product design's typicality, they may simply rely on their experience of beauty as a heuristic cue to answer the typicality question (Hekkert et al., 2003). Hence, if one is interested in the true typicality of a product design, directly asking people about their

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www.elsevier.com/locate/destud
0142-694X *Design Studies* ■■ (2017) ■■–■■■
<https://doi.org/10.1016/j.destud.2017.09.004>
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subjective typicality perception may be a biased measure because the answer is partly driven by peoples' aesthetic preferences.

Accordingly, the purpose of the present research is to introduce several objective, unbiased measures for design typicality and to compare their ability to predict known consequences of design typicality. In particular, prior research suggests that design typicality facilitates the perceptual processing of the design (i.e., an experience of processing fluency), which is hedonically positive and enhances the aesthetic liking of the design (Reber, Schwarz, & Winkielman, 2004). Furthermore, objective design typicality should, of course, also be reflected in subjective typicality ratings. In the empirical part of the present paper, we indeed show in the context of automobile designs that some of the proposed measures predict ratings of aesthetic liking, processing fluency, and subjectively perceived typicality by analysing car models from four segments ranging from subcompact cars to SUVs. In doing so, we contribute to research on product design by providing algorithmic, objective approaches to assess design typicality that can be used by scientists and business practitioners alike.

The remainder of the paper is structured as follows. First, we discuss recent theoretical and empirical insights in the fields of design typicality and processing fluency. Next, we introduce four objective approaches that measure design typicality and describe their computation. We then present the setup of our empirical study and report the statistical analyses. Finally, we discuss our results, provide ideas for future research, and present scientific and managerial implications.

1 Theoretical background

When people are forming first impressions, they prefer prototypical stimuli. This 'beauty-in-averageness' effect was initially reported for ratings of facial attractiveness (Langlois & Roggman, 1990). In particular, these authors found that people prefer an average face that is created as a morph of several individual faces (i.e., the visual average of several exemplars) over the individual faces making up the morph. Evolutionary theories explain this preference pattern by the reproductive fitness signalled by typical faces, which are characterized by perfect symmetry and a very smooth skin surface (Rhodes & Tremewan, 1996). However, subsequent studies demonstrated that this effect also holds true for stimuli that are not associated with a reproductive advantage. Halberstadt and Rhodes (2000), for example, showed that prototypical drawings of dogs and birds and photos of wristwatches were also perceived as more attractive than atypical counterparts. This relationship between typicality and attractiveness is also reflected in ratings of aesthetic liking, defined as 'the sensation that results from the perception of attractiveness (or unattractiveness) in products' (Crilly, Moultrie, & Clarkson, 2004, p. 552; Graf &

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