

The Visual Language of Virtual Product Design: The Semiotics of Colour and Shape in Smartphone App Icons

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A product's colour and shape conveys crucial information about what the product is, what it does, and how well it performs (Kumar & Noble, 2016). Colour and shape function as a kind of visual language that conveys messages to the consumer about the product (Heath, 2012). Product appearance research has focused on physical goods, foodstuffs, and packaging. For example, packaging that uses 'natural' colours and muted tones (i.e. greens, browns, and pastels), as well as rounded and smooth shapes, can be associated with notions of health and relate to the organic qualities of healthier foodstuffs. Bright colours (e.g. red, yellow, blue, etc.) and angular edges can be associated with notions of artificiality and engineered aspects of a product that relate to processed foodstuffs (Oswald, 2012: 52-53; Ngo, Piqueras-Fizman, & Spence, 2012).

Many of the products consumers interact with are not physical in nature, but digital. With the app market becoming "a prime example of a digital market", it is important to explore how visual elements colour and shape can operate as informative and persuasive tools for the online marketing of virtual products such as smartphone applications (henceforth apps) (Joeckel, Dogruel, & Bowman, 2017: 621). Consumers search for, download, and use apps on a daily basis on their smartphones (Nielsen, 2014), and often base their download decision on the aesthetic appearance of an app (Bowman, Jöckel, & Dogruel, 2015). The increasing number of apps available making app stores competitive markets means effective icon design is becoming ever more vital. Despite previous app research showing how consumers search and select apps online, not much work has looked directly at the impact of the app icon's visual characteristics.

Combining interdisciplinary insights from linguistics, marketing, and psychological visual search, I present findings from two studies that analysed how colour and shape in smartphone app icons convey meaning as constituent elements of a visual language, and their impact on smartphone users. Study 1 was a corpus analysis of 250 smartphone app icons selected from the top 100 ranked apps in the 'top charts > top apps' list on the Google Play Store for each of the five app categories: Communication, Health and Fitness, Productivity, Social, and Tools. The apps' visual design was analysed from the perspective of semiotics, the study of signs and making of meaning, interested in the relation between the form of a sign – the app's appearance – and the meaning of a sign – the message it conveys (Chandler, 2017: 13).

Creusen and Schoormans (2005: 75) identified six roles that the visual elements of a product's appearance can play in influencing consumer attitude and behaviour (table 1). In their study, Creusen and Schoormans found that two of the most prevalent visual elements participants used to interpret a product's function, competency, and aesthetic appeal were its colour and shape. This product appearance typology informed how colour and shape may be used in different roles of app icon appearance to inform consumers about the app prior to download.

Table 1: Six Roles of Product Appearance for Consumers (adapted from Creusen & Schoormans, 2005: 75)	
Role	Influence on Consumers
Attention-drawing	Engages consumer attention instore
Symbolic	Cues symbolic product associations Communicates brand image/personality
Categorisation	Eases product categorisation Offers differentiation from the product's typical category
Functional	Highlights features and functions of the product Cues information about the product's technical quality
Ergonomic	Highlights parts for consumer-product interaction Shows consequences for using external aspects of the product
Aesthetic	Serves as a basis for aesthetic appreciation and appropriateness Suggests suitability with the environment

The relationship between colour and shape and consumer behaviour was assessed by app downloads instore and study 2, which recorded smartphone user responses to app icons varying in colour and shape with regard to their attention-grabbing, aesthetic values, and categorisation values. In the view of reproducibility and transparent analysis, all raw data (.csv files) and R scripts for studies one and two are available on the Open Science Framework repository accessible via the following URL:

https://osf.io/dwv5j/?view_only=d03b841510e24adcada6cc880acbe8c9.

Overall, colours tended to play attention-grabbing, aesthetic, and symbolic roles that created visual contrasts and coherence in app icon design, and served as identifiers for the app's brand, category, and function. Shapes were found to convey more specific information about the app's category, function, and ergonomic value, as they related to objects and structures we recognise in our environment. The figurative and distinctive uses of colours and shapes did not reliably connect with higher download rates as expected. The limited impact of colour and shape on smartphone user responses suggests that these visual

elements may require additional cues to contextualise them in app icon design and make them more meaningful to consumers.

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