

Graphic Design Theory Research and Application in Packaging Technology

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Abstract

Graphic design theory research examines how designers can read about and read into designs in order to stimulate growth and change in their own work. It inspires new lines of thoughts and questioning, and opens up new theoretical directions. This study sought to establish the significance and application of graphic design theories in product packaging technology, as packages have minimal time to achieve the goals for which they were created. It therefore generally examined graphic design theories used in day-to-day activities of graphic designers. Adopting a descriptive approach, a sample size of 450 respondents was taken in the Federal University of Technology Akure, with valid responses of 450. Following one hypothesis testing, the study showed a significant relationship between usage and application of graphic design theories and the creation of attractive graphic package designs. The study revealed that creative graphic designers often apply graphic design theories in creating package designs, and that package designs are more appealing or attractive with the application of graphic design theories. It established that graphic design theories guide effective consumer product package designers, both in growth and in practice.

Keywords

Graphic Design, Theory, Packaging, Packaging Technology, Brand

1. Introduction

The major purpose of design is to create products, documents, illustrations, publications and, most importantly, product packages that possess strong visual impact and hold the attention of the viewers or consumers, so as to positively influence their buying behaviour. Product packages perform important roles in

consumers' purchase decisions (Poturak, 2014). It is the main way that products are advertised and identified (Ryan, 2011). It plays a major role in the success of any product or brand, hence, the need for proper packaging of products. However, packaging designs are not just done haphazardly. There are various theories and principles guiding the creation of effective package designs or package technology. This study evaluates, from the consumers' perspective, the extent to which graphic theories and principles are generally put into practice in the creation of packaging designs.

Since theory is any system of ideas that help explain or speculate about why we do the things we do (Cezzar, 2014); therefore, this study views graphic design theory as any system of ideas that helps speculate or explain why designers do the things they do while designing. While graphic design theories are unique to graphic designs, graphic designers, however, regularly read and incorporate theories, or selective elements from such theories, from other areas of study such as art, architecture, economics, anthropology, sociology, technology or science. Reading and writing design theories is how designers speak to each other about the things that matter, and discover commonalities beyond day-to-day questions about business or technique. Theories also shift, and are built with culture and technology, as new relationships, tools and modes of consumption create new questions.

Over the years, despite the vast increase in the number of graphics designers, the world and its design problems have become more complex, and several approaches to solve these problems have proven to be relatively inefficient due to the ineffective use of knowledge or skill gained from experienced graphic designers. Perhaps, this points to the vital role that design terms and figures might have to play in improving the design discipline not only by encouraging continuity in skills and professionalism, but also by fostering future development.

As the graphic design discipline evolves, intellectual issues come into focus, and the outcomes of systematic inquiry grow in importance (Zimmerman & Forlizzi, 2008). Design research is about observing existing and created design practices, formulating design theories and models for describing and improving design practices, and evaluating these design theories and models (Vermaas, Chakrabarti, & Blessing, 2014). However, this study is not aimed at evaluating design theories; instead, it investigates graphic design theories and the very important role they play in packaging technology, as viewed by the students of the department of Industrial Design, Federal University of Technology, Akure. The researchers evaluate the level of adaptation or usage of a collection of selected design theories and practices as evident in design outputs, e.g., product package designs. This was evaluated from the perception of the consumers with appreciable knowledge of design theories and practices. Selected designers and design students possessing knowledge of design theories in the Faculty of Environmental Technology of the Federal University of Technology, Akure, are considered a suitable population to sample by the researchers.

2. Design Theories

Production of effective visual stimuli depends on validated or developed design theories. Various researchers have varying views as to what theories are. For example, [Mautner \(1996\)](#) considers theories as an exploration of a subject matter through the development of propositions. [Weick \(1989\)](#) views it as a disciplined imagination that proceeds like artificial selection, where the researcher defines, conducts and interprets imaginary experiments. Theories influence design practices and further design research, which in turn, dictates design outcomes. We are possibly on the verge of a revolution in design research that can advance beyond current forms of design practice and current research on design methodology ([Dorst, 2008](#)) and theory research. Changes and improvements are thus inevitable as research and practices are improved. Therefore, design theories are not only meant to serve as a guide to existing designers but also the future ones. But, are design theories really helpful in developing upcoming graphic designers? Do they possess any potential to influence future product package design practices?

In Nigeria, for example, many practitioners in the designing discipline claim to be “professional graphic designers” even amongst those without formal education, provided they have little knowledge of the use of one or two computer graphic design softwares like Photoshop or CorelDraw. Most of these self-acclaimed “professionals” obviously lack the appropriate knowledge of design theories, and when there is a lack of the knowledge of design theories, abuse of the elements of design is eminent. These possible abuses are prominent in many product package designs found in Nigeria today. For example, there are products out there whose package designs were made indiscriminately, i.e., not guided by any particular graphic design theory. The researchers herein refer to such package designs as non-graphic design theories-guided package designs. There are also products out there whose package designs were meticulously created and guided by appropriate graphic design theories. This is often obvious in the attractiveness or appealing nature of the packages. The researchers herein refer to such package designs as graphic design theories-guided package designs. The judgment pertaining to a package’s attractiveness or appeal was however left to the discretion of the respondents in this study. These two categories of package designs are compared especially in terms of how they influence the consumption rate or purchase preferences of consumers at the point of purchase.

Package designs are visual stimuli intended to inform, educate and persuade consumers favourably towards targeted products. [Faimon and Weigand \(2004\)](#) consider design as a plan for arranging elements in such a way as to accomplish a particular purpose. This purpose, in packaging, is primarily to stimulate the consumer into favourable buying behaviour. This professional discipline is facing such a time as scholars, researchers, and practitioners are devoting attention to creating categories for design practice and design research, articulating me-

thods and processes and in some cases, building new design theories (Zimmerman & Forlizzi, 2008) in order to achieve this purpose. One of these theories is the Gestalt theory that was developed in the early twentieth century by German and Austrian Psychologists (Graham, 2008). These psychologists were studying mental processes and, especially, how people organize and make decisions when exposed to visual stimuli (Lang, 1987; Graham, 2008). Gestalt theory, for example, provides rational explanations why shifts in spacing, timing, and configuration can have a profound effect on the meaning of presented information (Graham, 2008). While Gestalt visual principles are easy to grasp, they are very powerful. Ignoring Gestalt visual theory may result in unexpected interpretations by a viewer, observer or a consumer (Graham, 2008). In practice, generally ignoring graphic design theories may not only lead to misinterpretation of information, but also misrepresentation and disarrangement which lowers appeal or attractiveness and so on. See **Figure 1**.

Some other theories related to design include:

- 1) The colour theory
- 2) Functionalism
- 3) Symbolic Interaction
- 4) Change theory
- 5) Meaning of Place
- 6) Place Identity and
- 7) Social Cognition theory

Knowing which appropriate design theory to adopt for a design project or package design depends on various factors. For example, clients' needs that relate to function will suggest the functionalism theory, while clients' needs that relate to change in technology and the need to conform will suggest the use of the change theory. Summarily, the specific design theory a designer chooses to adopt depends on factors such as the purpose of the product whose package is being designed and the client's specific needs.

Many of these design theories focus on aesthetic concepts including space planning, lighting, principles and elements of design; they draw on the elements and principles of design. But are graphic designers really guided by these design theories? Are graphic Designers really conscious of them in the process of creating effective package designs?

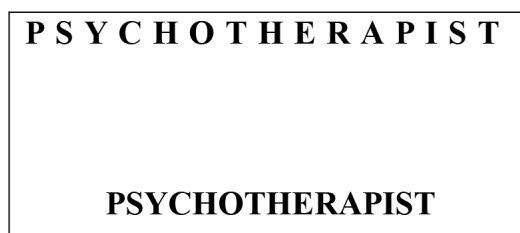


Figure 1. Possible simple misplacement of space and possible misinterpretation.

3. Graphic Design Elements and Principles

An everyday approach to exploring visual communication by graphic designers to unleash creativity and important life skills in order to meet and solve industry problems with solid visual, strategic, conceptual, typographical and technical skills is worth taken into consideration to help expand design horizon and meeting industry demands for graphics designers. Designers entering the field today must master an astonishing range of technologies (including principles and theories) and prepare themselves for a career whose terms and demands will constantly change (Armstrong, 2009). However, there are some elements and principles of design that have stood the test of time. Some of them are:

3.1. Design Elements

Graphic design elements are the building blocks of design. They include:

- 1) Lines
- 2) Shapes
- 3) Texture
- 4) Space
- 5) Size
- 6) Value
- 7) Colour
- 8) Balance
- 9) Rhythm
- 10) Emphasis
- 11) Unity

A simple misplacement of one of these elements may lead to gross misrepresentation or misinterpretation. See the figure 1 below as illustrated by Graham (2008) in the Gestalt theory.

3.2. Design Principles

Design principles govern the relationships between the elements used in the design, and organize the composition as a whole. Successful design incorporates the use of the principles to communicate the intended message effectively. They help designers organize the images and type on the page so that it feels more comfortable to viewers and makes a greater impact. The principles of design are:

- 1) Balance
- 2) Proximity
- 3) Alignment
- 4) Repetition
- 5) Contrast
- 6) White space

The elements and principles of design are universal, but designers have different perspectives towards the usage or application of these elements and principles in creation of effective package designs. Other design factors that influ-

ence the creation of product packages include typography and Illustration. [Pensatorn \(2015\)](#), in listing some of the vital elements that make up a package design, asserts that photos or images, illustration, combination of images and illustration and typography, with or without other elements, are mostly used in package designs. The misuse of any of these factors may result in undesirable outcomes. According to [Roy \(1998\)](#), the brand name Coca-Cola in China was first rendered as “Ke-kou-ke-la”. That phrase means “bite the wax tadpole” or “female horse stuffed with wax” depending on the dialect. Unfortunately, the Coke company did not discover this until after thousands of signs had been printed. Coke then researched 40,000 Chinese characters and found a close phonetic equivalent, “kokou-ko-le”, which can be loosely translated as “happiness in the mouth”. A simple error in illustration or typographical adoption can amount to major misrepresentation and misinterpretation. Illustration and typography were rated by respondents against colour in this study to decipher their level of relevance to product packaging success.

4. Packaging

Packaging can play a very interesting role in the success or failure of a product. Its success depends a lot on how it is designed by its creators. While some may see it as a mere safeguard that has the sole purpose of protecting a product, others argue that the life and identity of the product lies within the package design. It has the power to influence your choices, and its carefully thought-out aesthetics can affect your emotions. It can bring your memories to life with its colours and can shape culture with its form ([Alervall & Saied, 2013](#)).

Researchers may have diverse views of what packaging is or is not, therefore, for the purpose of clarity, this study considers product packaging as any “container” by which or within which a product is offered to the market for sale, or by which necessary information about the product is passed across to the consumer. Packaging is the art, science, and industry of preparing goods for transport and sale. The package of a brand has its effects on the attitude of customers in relation to product ([Parhizgar & Rostami, 2014](#)).

Research shows that consumers make about 50 to 70 per cent of their buying decisions at the point of sale ([Platt, 2012](#)). It is also estimated that shoppers spend less than five seconds looking at a piece of packaging design ([Burke & Leykin, 2014](#)). The main function of packaging is to sell the product at its point of purchase. Therefore, there is the need to think carefully about how products are packaged, as the success or failure of such products depends largely on the effectiveness of their packages.

Packaging performs some major functions:

- 1) Containment
- 2) Protection
- 3) Convenience of handling
- 4) Preservation
- 5) Providing information on product and, most importantly

6) Sales (including motivation)

Perhaps the two most important of them all are providing information on products and promotion of sales. These are best achieved through the principles, elements and/or theories of design, some of which are referred to by researchers as the elements of packaging. Packaging elements include visual elements and information elements. Visual elements include graphic, form, colour and size, while information elements include making information and production (Lehman, 1980).

5. Graphic Design Application in Packaging Technology

Packaging is a multi-disciplinary process that involves professionals from various fields including graphic design. Eight of the most important ones are listed below. The following, as Schueneman and Tolletee (2010) suggest, is a partial listing of some of the professionals involved in the packaging technology:

- 1) Mechanical Engineers to design and fabricate package lines and package fabricating equipment.
- 2) Electrical Engineers for the controls of package manufacturing equipment, filling lines and other electro-mechanical functions.
- 3) Packaging Engineers to design and specify package systems, testing protocols and other requirements for the package.
- 4) Industrial Engineers to optimize material flow, logistics, and similar warehousing functions.
- 5) Chemical Engineers to design and help formulate new polymers and co-polymer systems for more effective barrier properties on flexible package systems.
- 6) Marketing Skills to present the product in the best possible light through the package system.
- 7) Medical Skills to help design and test package systems, medical and pharmaceuticals products.
- 8) The Designer.

The works of all the above mentioned skills or disciplines are, at the end, subject to the skills of the eighth professional involved in packaging technology, the designer, whose graphic skills are needed in creating packaging systems that are most appealing to consumers at the points of purchase. Using colour, shape, form and style, et cetera, packages now provide the primary marketing of most products (Schueneman & Tolletee, 2010). Hence, it is expedient to ask: Are the aforementioned elements of design independent of graphic design theories in achieving the above stated purpose of marketing or sales? Are packaging systems more successful independent of graphic design theories-guided designers? This study aims at providing answers to these questions.

6. Research Questions

The following questions were developed for the purpose of this study:

- 1) Are most graphic designers guided by graphic design theories?
- 2) Do graphic design theories play important roles in packaging design?
- 3) Can packaging be more appealing without graphic design theory guides?
- 4) Is the influence of graphic design in packaging positive?
- 5) Are graphic design theories helpful in developing upcoming designers?

7. Research Hypothesis

One hypothesis was put forward to guide this study:

Hypothesis 1:

H0: There is no significant relationship between usage/application of graphic design theories and the creation of attractive graphic/package designs.

H1: There is a significant relationship between usage/application of graphic design theories and the creation of attractive graphic/package designs.

8. Research Method

The study adopted the descriptive survey research method. Both primary and secondary data were used. Primary data were obtained through structured questionnaire. Respondents were quizzed based on their previous or recent experiences and current buying behaviours. A brief interaction or interview preceded the administration of the questionnaire. Secondary data included information obtained from published works.

The target population for the purpose of this study was selected designers and design students possessing knowledge of design theories, in the faculty of Environmental Technology within the adult age range, in the Federal University of Technology, Akure, Ondo state, Nigeria Census was adopted for the purpose of sampling the population since the population was finite. The sample size of 450 respondents was considered suitable for the study.

Descriptive statistical method was used to analyze the collected data; the method includes the use of frequency to express the number of respondents and their relations in percentages. Data were also analyzed using average mean, variance and standard deviation values to determine the importance of some effects as indicated by the respondent. The percentages and the cumulative percentages of variables of interest were also determined. Percentages help in rating a number of effects according to the degree of importance attached to them.

The indices were calculated as follow:

Mean is expressed as

$$X = \sum fx / N ,$$

where X = Mean, x = number of score, Σ = summation, N = Number of valid responses.

With 3.0 as the computed mean, the decision rule was to accept any factor with a mean of 3.0 and above as positively perceived by the respondents and, hence accepted (A), while regarding any factor with a mean below 3.0 as nega-

tively perceived and, therefore, rejected (R). Chi-square was the statistical tool adopted for the testing of the hypothesis. The decision rule was to reject H_0 if significance level (p-value) is less than alpha ($\alpha = 0.01$, the predetermined significance level).

$$X_1^2 = \sum_{n=1} \frac{(f_o - f_e)^2}{f_e}$$

where X^2 = Chi-square, f_o = Observed frequency, f_e = expected frequency and n = differential factor.

A dichotomous analysis procedure, as used by Oladumiye, Odji, & Adelabu (2016), in which responses were collapsed into two areas—agree and disagree, was adopted for the purpose of testing the hypothesis. The “undecided” was also considered not to be in favour of the Likert items.

9. Data Presentation and Analysis

Questionnaires were distributed at the Federal University of Technology, Akure, to 500 respondents. A return rate of 90% was recorded. Valid responses from 450 respondents were used for the purpose of testing the study hypothesis.

From **Table 1**, 153 and 216 respondents strongly agreed and agreed respectively that graphic design theories play an important role in packaging designs. Only 24 of the respondents strongly disagreed, while none disagreed nor was undecided. With a mean of 3.8, which is higher than the computed mean 3.0, it is therefore accepted that most professional graphic designers, from the perspective of the consumers, are guided by graphic design theories in the designing and production of effective packages.

From **Table 2**, 159 and 267 respondents strongly agreed and agreed respectively that graphic design theories play an important role in packaging designs. Only 24 of the respondents strongly disagreed, while none disagreed nor was undecided. With a mean of 4.19, it is therefore accepted that graphic design theories, from the perspective of the consumers, play important roles in packaging design.

From **Table 3**, only 9 and 72 respondents strongly agreed and agreed respectively that packaging can be more appealing without graphic design guides. 15 of the respondents were undecided, while 132 of the respondents disagreed. 222 of the respondents strongly disagreed. With a mean of 1.92, it is therefore rejected that packaging can be more appealing without graphic design theory guides.

From **Table 4**, 186 and 177 respondents strongly agreed and agreed respectively that graphic design theories play an important role in packaging designs. Only 33 of the respondents strongly disagreed, 54 disagreed while none was undecided. With a mean of 3.96, it is therefore accepted that the influence of graphic design in packaging is positive.

From **Table 1**, 111 and 270 respondents strongly agreed and agreed respectively that graphic design theories help to develop upcoming graphic designers. 69 of the respondents strongly disagreed, while none disagreed nor was undecided. With a mean of 3.8, which is higher than the computed mean 3.0, it is therefore accepted that graphic design theories help to develop upcoming designers.

Table 1. Are most professional graphic designers guided by graphic design theories?

VARIABLE	FREQUENCY	PERCENTAGE 100%	CUMMULATIVE PERCENTAGE	MEAN	DECISION
STRONGLY DISAGREE	81	18	18	3.8	Accepted
DISAGREE	-	-	18		
UNDECIDED	-	-	18		
AGREE	216	48	66		
STRONGLY AGREE	153	34	100		
TOTAL	450	100	100		

Decision: Accept variable as positively perceived if mean is greater than the computed mean 3.0.

Table 2. Do graphic design theories play important roles in packaging design?

VARIABLE	FREQUENCY	PERCENTAGE 100%	CUMMULATIVE PERCENTAGE	MEAN	DECISION
STRONGLY DISAGREE	24	5.3	5.3	4.19	Accepted
DISAGREE	-	-	-		
UNDECIDED	-	-	-		
AGREE	267	59.3	64.6		
STRONGLY AGREE	159	35.3	99.9		
TOTAL	450	~100	~100		

Decision: Accept variable as positively perceived if mean is greater than the computed mean 3.0.

Table 3. Packaging can be more appealing without graphic design theory guides.

VARIABLE	FREQUENCY	PERCENTAGE 100%	CUMMULATIVE PERCENTAGE	MEAN	DECISION
STRONGLY DISAGREE	222	49.3	49.3	1.92	Rejected
DISAGREE	132	29.3	78.6		
UNDECIDED	15	3.3	81.9		
AGREE	72	16.0	97.9		
STRONGLY AGREE	9	2.0	99.9		
TOTAL	450	~100	~100		

Decision: Accept variable as positively perceived if mean is greater than the computed mean 3.0.

Packaging can be more appealing without Graphic Design Theory guide

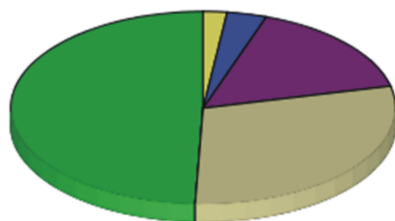
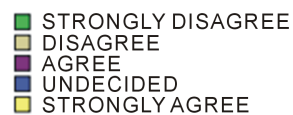


Table 4. Is the influence of graphic design in packaging positive?

VARIABLE	FREQUENCY	PERCENTAGE 100%	CUMMULATIVE PERCENTAGE	MEAN	DECISION
STRONGLY DISAGREE	33	7.3	7.33	3.95	Accepted
DISAGREE	54	12.0	19.3		
UNDECIDED	-	-	-		
AGREE	177	39.3	58.6		
STRONGLY AGREE	186	41.3	99.9		
TOTAL	450	~100	~100		

Decision: Accept variable as positively perceived if mean is greater than the computed mean 3.0.

Table 5. Graphic design theories help to develop upcoming designers.

VARIABLE	FREQUENCY	PERCENTAGE 100%	CUMMULATIVE PERCENTAGE	MEAN	DECISION
STRONGLY DISAGREE	69	15.3	15.3	3.8	Accepted
DISAGREE	-	-	-		
UNDECIDED	-	-	-		
AGREE	270	60	60		
STRONGLY AGREE	111	24.7	24.7		
TOTAL	450	100	100		

Decision: Accept variable as positively perceived if mean is greater than the computed mean 3.0.

Table 6. Descriptive statistics of some selected commonly used Graphic Design Theory/Elements.

	N	MIN.	MAX.	MEAN	VARIANCE
Typography plays an extremely important role in packaging.	450	1	5	3.75	1.046
Illustrations are very much important in Graphic design theory	450	2	5	4.04	0.683
Colour is the most common and important graphic design theory.	450	3	5	4.23	0.364
Valid N (list wise)	450				

Source: Researchers' work, 2017.

10. Hypothesis Testing

The hypothesis below was tested for the purpose of this study:

Hypothesis:

H₀: There is no significant relationship between usage/application of graphic design theories and the creation of attractive graphic/package designs.

H₁: There is a significant relationship between usage/application of graphic design theories and the creation of attractive graphic/package designs.

Respondents were made to rate graphic design theories-guided package designs against non-graphic design theories-guided package designs as a means of measuring the influence of graphic design theories-guided product packaging on consumers' consumption preferences.

From **Table 7**, since the p-value obtained is 0.000075 which is less than the predetermined significance level ($\alpha = 0.01$), the result is significant at $p < 0.01$.

Table 7. Relationship between graphic design theories-guided package designs and non-graphic design theories-guided package designs (with consumption rate/preferences as the parameter).

Variable	Observed N	Expected N	Residual
Graphic design theories-guided packaging	267	225	42
Non-graphic design theories-guided packaging	183	225	-42
Total	450		

N	DF	Chi-Square	Significant	Decision
450	1	15.68	0.000075	RejectH ₀

Rejected at $p < 0.01$.

Therefore, we reject the null hypothesis and, hence, the alternative hypothesis, which establishes a significant relationship between graphic design theories guided package designs and consumption preferences, is thereby accepted.

11. Discussion

From **Table 2**, with a mean of 4.19, it was concluded that graphic design theories play important roles in packaging design with over 94% of the respondents in agreement. This justifies the findings recorded in table 1, which shows that most professional graphic designers are guided by graphic design theories in the designing and production of effective consumer product packages, with 82% of the respondents in agreement. This indicates that most productive and effective designers are guided by graphic design theories. Deliberately or otherwise, they follow the guidance of established design theories, although they are prone to productive flexibility. This, hence, establishes the influence and importance of graphic design theories in consumer product package designing.

However, it is needful to examine if the influence graphic design theories have on package designs is positive or negative in fulfilling the purposes of the created designs or packages. This was established in **Table 4**. With a mean of 3.96, it was accepted that the influence of graphic design in packaging is positive with over 80% of the respondents in agreement. This further reiterates the significance of graphic design theories in the creation of effective graphic designs. This justifies further the result established in **Table 3** which showed that package designs cannot be more appealing without graphic design theories. With a mean of 1.92, over 78% of the respondents rejected the notion that package designs can be more appealing without graphic design theory guides.

The result in **Table 6** shows that colour is more dominant when it comes to applying graphic design theory with the other factors like illustration and typography in product packaging. This effect is, according to **Burchett (2002)**, due to the fact that colour plays an important role in design. It is a trigger to arouse viewers' emotions and a carrier that designers use to deliver information.

The study not only established the significance of graphic design theories in

the creation of effective consumer product package design technology, it also establishes the fact that graphic design theories help in the building up of upcoming generation of designers as established in **Table 5**. Therefore, not only do graphic design theories positively influence today's packaging technology but also how it will be applied in the future. The hypothesis proposed and tested established a significant relationship between the usage or application of graphic design theories and the creation of effective and attractive package designs.

12. Conclusion

Although there are several graphic design theory elements used across the world, there, however, are still major elements that are uniform which guide every graphic designers towards achieving a clear and major goal—solving problems. This study, in conclusion, hence established that graphic design theories guide effective consumer product package designers, both in growth and in practice. It also established the significance of design theories in packaging technology, indicating that graphic design theory research has both direct and indirect implications on packaging technology when applied effectively. Without effective graphic design theories application, the efforts of most, if not all, professionals involved in packaging technology will be relatively futile. Hence, packaging systems are more successful when dependent on Graphic Design-theories.

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