ESTUDOS EM DESIGN
DESIGN ARTICLES

Influence of typographic properties on user experience in digital interfaces

Influência das propriedades tipográficas na experiência do usuário em interfaces digitais

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Abstract
The user experience with products, services, and artifacts responds to different user needs and is affected by the design of the interface that mediates this interaction. In the context of digital interfaces, typography plays a significant role in the functionality and personality of the system, as actions and contents are conveyed to users through signs and symbols that inform and provide guidance and feedback. Given these relationships, this paper aimed to identify how different typographic properties are related to the satisfaction of user needs on user experience in digital interfaces. For that, a narrative literature review was conducted, followed by a systematization of the identified connections. As a result, it is proposed a diagram that presents the connections between five user needs – safety, functionality, usability, pleasurable experience, and individuation – and five properties of typography – accessibility, legibility, readability, personality, and customization – detailed in the context of the user experience in digital interfaces.

Keywords: User Experience, Digital Interfaces, Typography, Typographic Properties.

Resumo
A experiência do usuário com produtos, serviços e artefatos responde a diferentes necessidades dos indivíduos e é afetada pelo design da interface que media essa interação. No contexto das interfaces digitais, a tipografia tem um papel significativo na funcionalidade e na personalidade do sistema, pois ações e conteúdos são comunicados aos usuários através de sinais e símbolos que informam e fornecem direção e feedback. Frente a essas associações, o presente artigo teve por objetivo identificar como diferentes propriedades tipográficas se relacionam à satisfação das necessidades dos usuários na experiência de uso em interfaces digitais. Para tanto, realizou-se uma revisão de literatura narrativa, seguida de uma sistematização das relações identificadas. Como resultado, propõe-se um diagrama que apresenta a relação entre cinco necessidades do usuário – segurança, funcionalidade, usabilidade, prazer e individualização – e cinco propriedades tipográficas – acessibilidade, legibilidade, leiturabilidade, personalidade e customização – detalhadas no contexto da experiência do usuário em interfaces digitais.

Palavras-chave: *Experiência do Usuário, Interfaces Digitais, Tipografia, Propriedades Tipográficas.*

Introduction

Technological development and the emergence of digital interfaces provided new possibilities for communication, as screens become the primary means of accessing all types of information, according to Manovich (2001). Bonsiepe (2015) defines interface as the space in which there is an interaction between body, tool, and the action's goal. In this context of interaction, signals, and symbols are necessary to inform and provide direction and feedback (SCHLATTER; LEVINSON, 2013). Therefore actions and content are conveyed to users through visual design (WROBLEWSKI, 2010), and typography – as part of interfaces (KAHN; LENK, 1998) – plays a significant role in the functionality and personality of the system (SCHLATTER; LEVINSON, 2013).

Visual elements are organized in interfaces to facilitate navigation through information and, consequently, provide the best experience for the user (BONSIEPE, 2015). According to Norman and Nielsen (2005), the user experience has as the main requirement to meet the individual's needs through easy-to-use products. In addition, it involves all aspects of a person's interaction with an organization, its products, and its services. Thus, Hassenzahl (2014) explains that the user experience arises from integrating perception, action, motivation, and cognition into an inseparable and meaningful whole. In a more in-depth way, it is known that the user experience with products, services, and artifacts occurs in two dimensions: a pragmatic one – related to ergonomics – and a hedonic one, linked to the pleasure of the interaction (HASSENZAHL, 2007). These two domains of the experience meet different collective and individual user needs (HANCOCK; PEPE; MURPHY, 2005).

It is also known that the design of an interface affects the user experience in the digital context (GRILO, 2019). For example, according to Garrett (2011), the visual design of text and other graphic elements supports the user experience in the sensory plane. In the same direction, Woloszyn, Meürer, and Gonçalves (2019) point out that typography is related to accessibility, as it can improve the interface's adjustment to various devices and the reading experience for different audiences. In the context of books and other digital publications, typography is one of the primary means of message transmission (DICK, 2015; WOLOSZYN, 2018) and has a direct impact on the reading/usage experience since it is linked to the nature of the content (DICK, 2019). Furthermore, for Dick, Vitorino, and Gonçalves (2017), typographic properties such as legibility and readability influence access, evaluation, and usage of information, which can ultimately lead the user to satisfy their informational needs efficiently and effectively.

Considering these relationships, the research question arises: how do different typographic properties relate to the satisfaction of user needs on user experience in digital interfaces? To answer this question, a narrative literature review was conducted (CORDEIRO et al., 2007), followed by a systematization of the connections between these two fields, summarized in the form of a diagram (Figure 1).

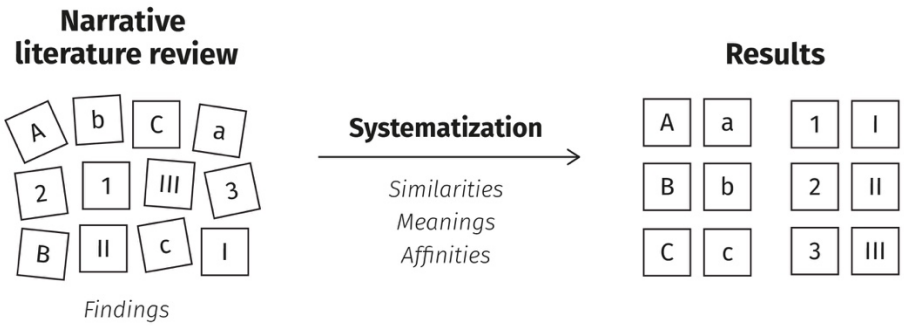

Figure 1: Illustration of the methods used in this study. Source: authors (2023).

In this process, the findings were organized according to their external similarities, establishing relationships based on meanings and affinities in a logical and coherent manner (FREIRE, 2013).

User experience and user needs

The concept of user experience has several definitions provided by various authors that are cited in the scientific community (HASSENZAHL; TRACTINSKY, 2007). However, one of the most common and comprehensive definitions is proposed by the International Organization for Standardization (ISO, 2010). According to ISO 9241-210:2010, user experience corresponds to the individual's perceptions and physical and psychological responses, which are the results of the use and/or anticipated use of a product, system, or service. These results are consequences of different factors related to the context of usage, the user's physical and psychological state, and the properties of the system (ROTO et al., 2011).

Roto et al. (2011) describe user experience as something unique to each individual, influenced by the cultural and social context, the person's prior experiences, and the expectations created based on those experiences. In this sense, Hassenzahl (2007) proposes a model that divides user experience into two dimensions: pragmatic and hedonic. The pragmatic dimension refers to objective matters related to use, that are linked to functional and productivity factors, such as the utility and usability of a particular interactive system or product. On the other hand, the hedonic dimension concerns subjective aspects of the experience that are related to more general needs, such as expression and recognition.

Thus, some attributes of the product, system, or service may relate more or less to each dimension of the user experience. In the design context, Rogers, Sharp, and Preece (2013) cover these dimensions by proposing that the design of interactive systems can be oriented towards usability goals (effectiveness, efficiency, safety, utility, learnability, and memorability) but can also create satisfying, enjoyable, fun, interesting, useful, entertaining, motivating, aesthetically pleasing, supportive of creativity, rewarding, and emotionally fulfilling experiences.

Similarly, Hancock, Pepe, and Murphy (2005) explain that the initial concerns of ergonomics – related to safety and functionality – have gone through a paradigm expansion process. Aspects related to the pleasure of the experience come into play, in which the focus is on the unique characteristics of each person, allowing the design of a more intuitive and personalized

interaction. The authors (HANCOCK; PEPE; MURPHY, 2005) call this approach hedonomics. For them (HANCOCK; PEPE; MURPHY, 2005), technology is already capable of offering the possibility of customizing systems for each individual.

In this perspective, Hancock, Pepe, and Murphy (2005) propose a hierarchy of user needs. According to the authors (HANCOCK; PEPE; MURPHY, 2005), once the system satisfies safety, functionality, and usability needs, it can be designed to meet the needs of a pleasurable experience and individuation (Figure 2).

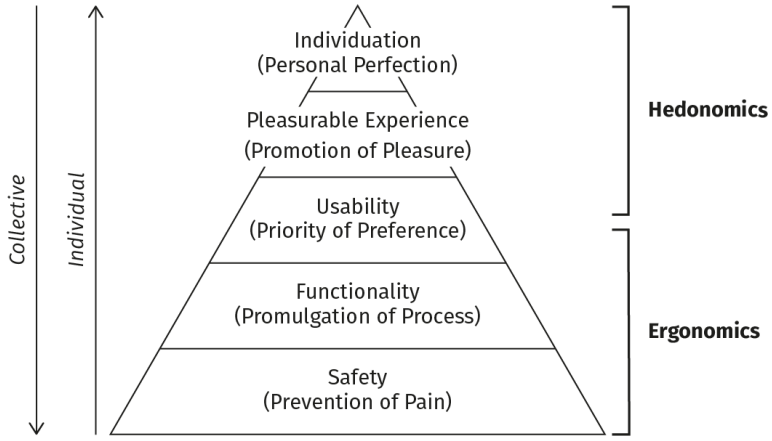

Figure 2: Hierarchy of user needs on user experience. Source: adapted from Hancock, Pepe, and Murphy (2005).

In the model of Hancock, Pepe, and Murphy (2005), safety is at the base. Therefore, ensuring the user's well-being is a mandatory condition before considering other individual needs in the experience. Next, a functional system is necessary to allow the user to achieve their desired goal. Thus, safety and functionality are minimum requirements for system operation. Usability facilitates use, providing basic elements for a pleasurable experience, and serves as a connection between ergonomics and hedonics. The next level encompasses the more subjective needs related to what makes the experience enjoyable for the user. Finally, the last level aims for complete system individuation to adapt the experience to the individual's personality, mood, and other characteristics.

Typographic properties

Typography is the area that studies history, anatomy, development, and use of type, and is an intrinsic part of understanding texts (BONSIEPE, 2015). According to Scaglione (2014), typography is of fundamental importance in design projects, since most informational content requires, to a greater or lesser extent, the use of the written word to fulfill its function. In this context, typography is necessary to systematize writing. In digital interfaces, the relevance of this element is no different. Pamental (2014) states that text is the element that comprehends most of the digital content from publications and websites, responsible for 90% of what is visible on the screen.

In this sense, different typographic properties can be considered to ensure quality in the reading experience. For Kuzu and Ceylan (2010) good legibility and readability of texts ensure that information is transmitted to users efficiently, and quickly. Farias (2013) highlights that legibility

is used to refer to the clarity in the perception of individual characters and letters, and its measure is the speed at which a character can be recognized. On the other hand, readability refers to visual comfort during the reading of a text and is related to the understanding of the information. Its measure can be understood as the amount of time a reader can dedicate to a text segment without getting tired. Therefore, legibility and readability are essential for individuals to be able to identify and understand textual information (WOLOSZYN, 2018). Typography can also contribute to informational accessibility in different contexts – considering users with low vision, autism, dyslexia, acquiring literacy, and belonging to the elderly, among others – through inclusive typographic choices that meet their legibility and readability needs (MEÜRER, 2022).

In addition to the formal aspects of a text, typography also allows for the semantic interpretation of its forms. According to Haag (2010), typefaces carry different meanings, and the interpretation of their characteristics is essential to understand how typography can communicate concepts. Thus, the design of certain typefaces can convey associations and produce a physical presence that can connote feelings (SAMARA, 2010). As an example, for Spiekermann (2011), characteristics of typefaces, such as light or heavy, rounded or squared, elongated or flattened, can express more than the content itself. Thus, the personalities found in typography extend to how the reader interprets the message that a text communicates (AMBROSE; HARRIS, 2012), which reinforces the need for consonance between written information and its graphic form (UNGER, 2018; SPIEKERMANN, 2011; CALDWELL; ZAPATERRA, 2014). In the context of interfaces, for example, typography is an important component of a system's personality (SCHLATTER; LEVINSON, 2013).

With the advancement of technology, computerization, and the use of digital tools, the Typography area has been propelled forward. This has provided significant growth for the field and brought improvements to the composition of texts in digital interfaces. Therefore, font formats have evolved intending to allow greater flexibility of use and larger storage capacity for types. This is the case of the OpenType format – which allows ligatures between letters, alternative characters and endings, swashes, among others (FETTER, 2011) – and Web Fonts – which enable users to view fonts used in digital systems without having them installed on the device (W3SCHOOLS, 2023; PAMENTAL, 2014).

More recently, variable fonts have been developed. These consist of a technology in which different widths, weights, slants, and many other variations can be incorporated into a single file (Figure 3) which gives the end user the possibility of customizing their reading experience (WOLOSZYN; MEÜRER; GONÇALVES, 2019).

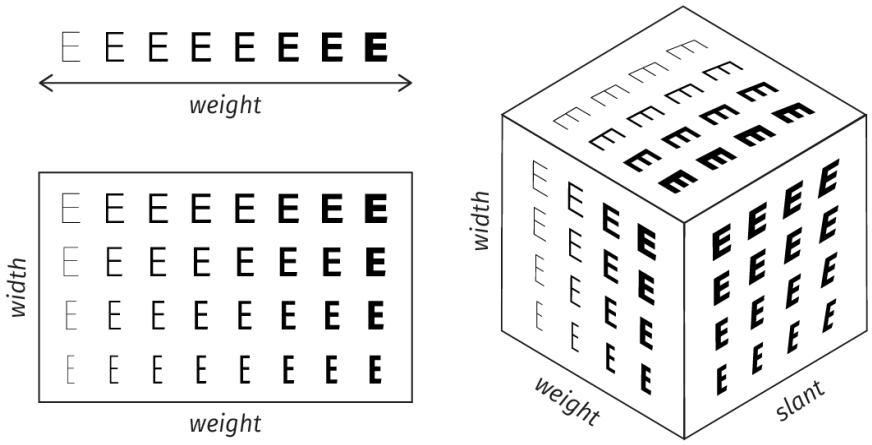

Figure 3: Example of variable font axes. Source: adapted from Phinney (2016).

Variable fonts present several benefits for digital product design, as they can be used in various ways and can adapt automatically to the reading context (BABÉ, 2016). Due to the greater control over font style, text refinement becomes more precise and allows variable fonts to adapt to external factors such as the device's brightness and position (WOLOSZYN, 2022). Thus, these technical specifications have improved the visual quality and adaptability of typefaces to different media, particularly digital ones.

Typographic properties and user needs on user experience in digital interfaces

From the literature review presented in the topics above, it was possible to understand the different dimensions that make up user experience and the individuals' needs in that context, as well as the potential typography has to meet such demands and contribute to the enhancement of interactions with digital systems. Based on the diagram proposed by Hancock, Pepe, and Murphy (2005), it is clear how different typographic properties relate to the satisfaction of users' needs in the experience of using digital interfaces.

For Hancock, Pepe, and Murphy (2005), safety and functionality are essential in system operation and form the basis for usability. Meanwhile, in this proposal, textual information – such as actions and content that inform and provide direction and feedback – must be accessible and have proper legibility and readability to be read and understood by users. On the other hand, the needs for a pleasurable experience and individuation – pointed out by Hancock, Pepe, and Murphy (2005) in this proposal – are connected to the typeface personality – which can express different concepts through letter forms – and the customization of typographic parameters, which can be set according to each individual's needs. Figure 4 illustrates these relations, which are explained in more detail subsequently.

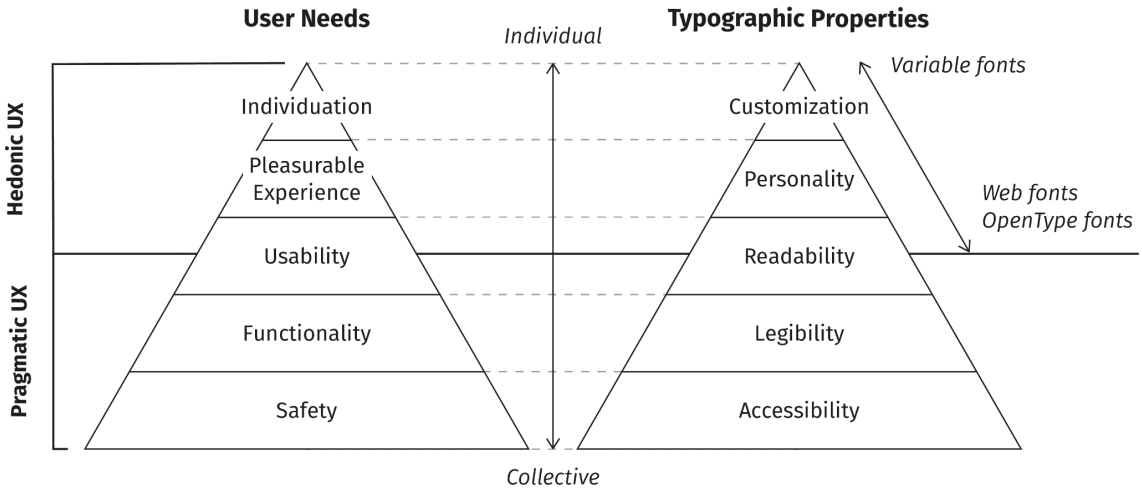

Figure 4: Connections between typographic properties and user needs on user experience in digital interfaces. Source: authors (2023).

The starting point is the needs of pragmatic order, i.e., those linked to objective aspects of the experience. In terms of safety, the minimum requirement for establishing user experience, typography plays a role in making information accessible to different groups of users with distinct visual needs. In this sense, typography can contribute to meeting the individuals' collective need for safety by ensuring access to information for all users without distinction. This includes, for example, defining inclusive typographic parameters, such as a proper configuration of point size, letterspacing, space between words and leading, and adequate contrast between text and background color.

In a second plane, regarding the functionality need that allows the user to achieve their goal during the use of the interface, typography must minimally ensure the legibility of information to make the system understandable and operable. In addition to forms and settings that allow easy recognition of characters, it is important to choose fonts that have a design suitable for the context in which they will be used. Thus, accessible and legible types contribute to meeting the basic needs of users – safety, and functionality – on user experience in digital interfaces[1].

At the third level, typography contributes to meeting the usability need as it allows good readability, therefore helping to make the user experience more efficient. In this sense, as a transition to needs of hedonic order – connected to subjective aspects of the experience –, typographic options and settings that aim to improve reading efficiency come into play. For example, the usage of typographic resources from OpenType fonts, such as ligatures, alternative

[1] It is important to emphasize that in this proposal, accessibility and legibility were considered separately, although they are intrinsically connected and mutually influence each other in the context of typography. Even though it is possible to make typographic choices that make textual information legible in a particular context, this does not necessarily mean that it will be fully accessible. For example, there are fonts or typographic settings that are legible for the general audience but are not entirely suitable for people with low vision, dyslexia, etc. In this perspective, it is understood that in the circumstance of the user experience in digital interfaces, the degree of accessibility of typographic choices contributes to a greater or lesser satisfaction of the user in regards to its safety need, considering the specificities of the different people that may interact with that system.

characters and endings, swashes, etc., as well as the use of Web Fonts, which expand the range of typographic possibilities.

At a fourth level, such resources and possibilities also relate to the typeface personality, which contributes to the fulfillment of the need for a pleasurable experience. This need has a more individual nature than the previous ones and concerns the relationships that people identify in the design of letters and connect to the character of the interface. Consequently, they interfere with the perception of the experience. In this perspective, typography can contribute to experiences that convey different sensations – e.g. serious, relaxed, friendly, sophisticated, fun, etc. –, depending on the characteristics of the letter styles used in the textual content of the interface.

The last level of user needs – the need for individuation – relates to the possibilities of customization that typography offers. In this context, variable fonts or custom typesetting allow for the personalization of typography parameters based on the user's own choices and help to satisfy needs related to unique issues of the individual experience. For example, websites, apps, and digital publications that allow the reader to define the style, size, leading, weight, and other text parameters presented on their device make each person's experience unique and tailored to their individual needs, which also relates to accessibility at the base of the pyramid. Additionally, variable fonts allow the system to automatically adjust the text configuration for the best legibility and readability scenario according to the user's reading device or viewing mode (e.g. dark/light mode) and even based on external factors, such as ambient brightness, geographic location, and device orientation.

Conclusion

Currently, digital interfaces are the primary means of accessing information, being used in different day-to-day tasks. From a Design point of view, these interfaces are developed to provide the best user experience from both an objective and subjective perspective. To achieve this, different needs of individuals must be met, such as safety, functionality, usability, pleasurable experience, and individuation.

Different interface design elements that contribute to meeting these needs, among which typography stands out, as it is responsible for composing and configuring textual information in interactive systems, based on properties such as accessibility, legibility, readability, personality, and customization. Thus, written words are used to communicate actions and content, inform and provide direction and feedback, playing a fundamental role in the interaction.

Therefore, this study sought to connect the different user needs to typography properties, based on a theoretical framework identified through a narrative literature review. As a result, it was possible to emphasize the contribution of typography to the user experience in digital interfaces. The identification and hierarchization of different typographic properties allowed us to give visibility to typographic requirements to improve the user experience in digital interfaces from an objective/pragmatic perspective, as well as to highlight typographic aspects that contribute to the satisfaction of hedonic needs related to pleasure and individuation of the experience. Furthermore, the proposed model makes it possible to clarify how typographic properties connect to the

collective and individual needs of users. Thus, these findings assist in a global understanding and can guide designers and project teams.

Finally, it is worth noting that this study does not exhaust the discussions on the connections between typographic properties and user needs on the user experience in digital interfaces because, in the process of data interpretation, there are several possible attributions of meaning. Initial notes have been made, but it should be indicated that other connections may exist, considering different approaches and theoretical frameworks. Thus, the theoretical model presented in this study can contribute to the development of new research using other methods of data collection and analysis, such as a systematic literature review or a case study, which foster deeper investigations into the same subject matter.

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