The future of print design relies on interaction

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Abstract: Graphic design's history is connected with print technology since almost all known examples result from printing methods. Still, the context where print design is used nowadays is constituted by a digital technological environment where interaction and user participation are very usual. We compiled a list for both technologies with common media and their respective descriptions. Such explanation helps to establish transitions of digital interaction and user involvement, for print media. In order to verify this effect, we developed a graphic design project. It was designed to allow a different use, based on experiences taken from digital artefacts. Though confined to communication needs, the result provides details on structure, organization and handling. All these features seem identifiable with some digital media. The project final production, along with its visual record shows an object available for users, to browse, to select information and to participate in its final presentation.

Keywords: Print design, Graphic design, Interaction, Print technology, Digital

1. Introduction

Graphic design has been an area concerned with creation and organization of information, so certain objects can fully communicate an intended purpose. Such intention has alternated between client’s anxieties and individual expression concerns of designers themselves. In the remainder of this arrangement rests most objects produced by print technology, which are not generally subject to significant change. Designers tend to rely on print technology and on its known potential to assure a materialization, distribution and connection with final users.

This procedure leads to stable results that cause several prejudices and create expectations about the shape of graphic communications. Thus, making material experience in graphic design a difficult moment in terms of conception and innovative creation, since each project ought to be a specific solution. Objects than become groups, which in turn have precise names and assignments. Projects approaching such groups differ from each other by visual composition and by exchanging graphic
elements, but they rarely provide a difference through their behaviour or possible distinctive use. In an almost opposite way, digital technologies engage users, mainly through action-reaction moments.

An inevitable comparison between print design and digital artefacts within interactive systems exists. Whether emphasizing transitions from one technology to the other or just because potential users, able to efficiently manage all available digital artefacts are accumulating such experience much earlier in their lives.

However unfounded the comparison might be, it draws attention to the need to rethink or adapt print design towards their users, which are facing a change and therefore also challenging objects around them through different prospects.

By understanding digital interactive media and how they present themselves, it is possible to recognize a situation for analysis and consideration that interferes with users of print design. Consequently, affecting graphic designers work process in conception stage. For this purpose, digital interaction, user participation and customization concepts are stated in relation with graphic design. These notions will serve as approaches to apply in objects produced by print technology and usually entrusted to graphic designers.

2. Print technology and graphic design

Graphic design is closely linked to a specific technology, printing (Bonsiepe 2012). Printing, not only as a production technology, but above all as a means of communication, is a necessary component to understand graphic design projects. From its invention, movable type printing defined most characteristics and effects for objects made therefrom. Movable type printing also marked a passage from medieval technology to modern technology and dictated a condition of reproduction and product (McLuhan 1962). It determined in fact, a passage between what was the use of several senses for a dominance of vision. This preponderance of vision is reflected today in an increasing importance graphic designers establish for it, when developing their projects, which consequently forms an interpretation of their own activity. An elaborated work to be seen, without behavioural meaning to stimulate an experience (Cooper et al 2007; Neves 2016a).

Printing technology has undergone changes and additions over time. Lithography, invented at the end of the eighteenth century, allowed a better reproduction of images, especially illustrations, which boosted a growth of periodicals in late nineteenth century (Satué 1994). Photography, which emerged from late nineteenth century and was used to create images, with its impact based on detail, was also important as a method for reproducing texts. These continuous transformations altered, at the moment in which they arose, the daily work of commercial artists. The medium they used for their work, had in some way a social and political implication, which mirrored effects of employed technology (Hollis 1997).

Although industrial procedures of large-scale reproduction influence object conception and designers practice (Forty 2000), effects of graphic design’s preferred medium, printing, predates nineteenth century - which marks industrial revolution - and was already established by another large-scale reproduction phenomenon, the press with movable type. Consequently, graphic design arising from industrial possibilities, already owes its capacity to communicate and influence, largely, to graphic legacy rich in text-image relations of previous centuries.
The future of print design relies on interaction

3. Print design

Attention focused on visual elements detracts from concerns about media and their implications. Historical reports of graphic design projects are usually descriptions with chronological and geographical incidence, where objects are mentioned by their obtained graphical constitution (Satué 1994; Hollis 1997; Meggs 1998). Also, work methods instituted in graphic design professional activity almost never differ and are focused on graphic composition. As noted, "new forms are nurtured in response to commercial pressures and changing technology, yet at the same time graphic design continues to feed off its own traditions" (Hollis 1997). Therefore, practice becomes dependent on production of forms, which will serve only as containers for information. By taking certain contents, graphic designers place them in an object with a predefined format, production and purpose.

Established contact between objects – resulting from these circumstances – and their users, in most cases, does not encourage new ways of assimilating information or engaging attention and interest of those involved in receiving communication. Concern with formal composition inhibits emerging alternatives, where solutions could be more interesting than the original purpose (Redström 2005).

We present in table 1 a list with general explanation of most common object designations in graphic design, with intention of print production. Along with a small description for each one, adapted from reported categories by Tschichold (1998), Newark (2002) and Bonsiepe (2012).

Table 1. Print media designations and their description.

| Print media | Description |
|-------------|-------------|
| Letterhead  | - Printed on two occasions (in large-scale production and subsequently in its use);  
- Implies bending the paper in most cases. |
| Envelope    | - Restrictions for placement of graphic elements due to shipping by postal services;  
- Use of standard formats, relatable with stationery. |
| Postcard    | - Two-sided printing;  
- Reverse divided into two areas. |
| Business card| - Usually in a reduced rectangular format. |
| Poster      | - Ephemeral in most cases;  
- Used for communications with a small amount of information and reception in a short time;  
- Usually presented in standard formats due to paper sizes. |
| Newspaper   | - Informative development;  
- Periodical publication;  
- Existence of digital versions reduces the number of prints;  
- Market is filled with competition from free newspapers. |
| Magazine    | - Little variation of material elements;  
- Production and distribution according to processes common to the entire market. |
MARCO NEVES

| Book                  | Flexible format;                                      |
|-----------------------|------------------------------------------------------|
|                       | Entire market shares a similar system of access to information. |
|                       | Designed according to established rules and standards. |

| Leaflet               | Detailed information;                                |
|-----------------------|------------------------------------------------------|
|                       | Expandable formats through folds.                    |

| Catalogue             | Object to be consulted, in form of a book;           |
|-----------------------|------------------------------------------------------|
|                       | Focuses on images;                                   |
|                       | May become incomplete.                               |

| Packaging             | Focuses particularly on product differentiation;      |
|-----------------------|------------------------------------------------------|
|                       | Packing, protecting and transporting products.        |

| Signage               | Communication for immediate effect;                  |
|-----------------------|------------------------------------------------------|
|                       | Guidance system;                                      |
|                       | Permanent presence.                                   |

These are typical print media, still in line with our common acceptance of such objects, based on a linear and sequential handling. As visual creations, they can all become very exciting, however, as media to be experienced, they follow repeated solutions. They have become static, not only in their material presence, but also and mainly in their approach to users.

At the same time, they distinguish themselves from and compete with digital electronic technologies.

**4. Digital interactive systems**

If, on one hand, there is a concern for formal organization in print design – which results from graphic designers practice – so that all graphic elements combined may produce meaning or provide attitudes (Frascara 1988), digital artefacts are inherently interactive (Bolter and Gromala 2003). In other words, they are a dynamic achievement in a context (Dourish 2001) for message transmission to occur. Even if this interaction is afforded, not by a digital artefact itself, but by an intermediary, such as a computer, with a concrete material existence. Interaction is then associated with a large capacity to host and transmit enormous amounts of information (Nunberg 1993). Interaction also stipulates another main characteristic of this kind of objects, user participation. Digital artefacts are used in a certain period of time where transmission of messages is alternated and requires requests of information from users. Artefacts derived from digital technologies respond to human requests and change their contents or behaviour in response to such requests. Programming sets out how information appears to be available, covering all options considered to be taken.

Most digital artefacts have their initial functioning based on ideas developed during the 1960s and 1970s of twentieth century and later adapted to market and users. Each one of these digital artefacts remains nevertheless dependent on its purpose and on a search for meaning (Tapia 2003).

In Table 2 we present a synthesis listing of most frequently produced and used digital media, with a brief description of them.

*Table 2. Digital media designations and their description.*

| Digital media | Description |
|---------------|-------------|
### Operating system
- Allows users to operate computers;
- Software from which other software can be used.

### Search engine
- Access and classification of information;
- Aid for web browsing;
- Possibility of customization.

### Website
- Network organization;
- Browsing structure dependent on hyperlinks placed in each place of visit;
- Allows personal choice of information and to establish an order of access different information;
- Allows assimilation of different levels of information, controlling time and quantity.

### Blogs
- Accessible publication;
- Easily upgradeable;
- Personalization;
- Easy integration of visual contents (texts, images, videos, audio).

### Microblog
- Publication for small information;
- Gathering of selected and updated information.

### Online social network
- Gather contacts with personal information;
- Possibility of restricted access;
- Individual exposure through multimedia.

### E-mail
- Timely communication;
- Fast and economical messaging;
- Allows to group contacts and associate them with messages;
- Online access or through own software.

### E-newsletter
- Targeted disclosure at no cost to sender.

### Chat room
- Direct communication at a distance, in real time with a person or a group;
- Information exchange through files.

### Instant Messenger
- Information exchange in real time;
- Integration with e-mail.

### Internet forum
- Facilitated moderation;
- Information gathering on the same theme.

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1. As a category of objects it is very broad. There are several types of website, not only by different contents, but also by different formats they adopt. So a blog or a social network can be a website as well. These, however, have specific functioning and justify a separate characterization.

2. It is simultaneously a kind of website and a social network, as it presents itself with a simple connection structure and promotes grouping around common factors.

3. It is a type of e-mail, which allows for a layout where relationship between text and image is superior to traditional e-mail, where simple text is used.
E-book
- digital version of book contents;
- ease of transport on digital media;
- easy distribution over the Internet.

CD-ROM/DVD
- interactive organization;
- may allow Internet access to complete information;
- accompanied by printed matter.

These media have an indirect influence on our experience of printed matter, as we can see other ways in which objects can be presented to their users. As Blauvelt (2008) notes, the relational practice they demonstrate, both performative and programmed, attempts to go beyond the object itself.

Electronic presence then rises ideas about the end of print (Nielsen 2000). However, its effect can be translated into a search for an increased interactive capacity in any project, which acts nowadays in a digital technological context. This may change assumptions we have on graphic design work processes. This established immediacy between objects produced by printing technology and digital technology, shows concerns about the moment of their use. Digital media, increasingly closer to their users by allowing interaction and participation, become a resource to observe, so that a set of alternatives may be extracted and later applied in printed matter.

5. User participation

In order to better understand a connection of interaction with user participation and its application to a graphic design project, it is important to distinguish between participation in a design process and participation in an experience of an object – result which derives from designer’s work. What we are trying to understand and develop are levels at which a user can contribute, in order to complement or customize the object in question. And what influence this anticipation of participation has in designers’ process at conception level.

This justifies moving away from participatory design, which includes potential users in a design process, and focus on use of artefacts. Digital technologies suggest different opportunities for users in this perspective. User participation can be synthesized in small details, through a reduced amount of creativity (Moggridge 2010), in details which represent change when conceiving objects (Giaccardi, 2003), or a variety of options to choose from (Negroponte 1979).

It is true we can also recognize various levels and forms of participation in graphic design. Communication process presumes an object is only useful when it is received (Barthes 1964; Joly 2007); objects are designed with human factors as condition, such as notions of scale, readability, cultural codification, among others (Dreyfuss 1960, Muller-Brockman 2012); or acquisition of certain objects constitutes an act of consumption. But this transmission is unidirectional, because it can not handle a response from the object. There is presence of people, but not the possibility of interaction. The only thing expected from users is an action, which will be expressed by adherence to a particular event, idea or purchase. Beyond this limitation, potential for participation in printed matter has not been properly explored. This, although user participation was already a sensed need (McLuhan and Fiore 2001). Not only by a desirable extension of designers’ attention to scope of action (Maldonado 1999), but also a call for understanding use (Margolin 1997), which can find opportunities in reconversion of objects and in the way users act on them.
One way to allow user participation is customization, understood as an attempt to convert mass production into individually adapted objects. This goal is something difficult to achieve, since what makes an object personal, can not be thought of in an exhaustive way previously, in a project destined for a large number of individuals (Norman 2004). Customization began to be generally understood as a way to provide a set of options, thus becoming a process which only increases alternatives (Mugge, Schifferstein and Schoormans 2004). Therefore, a difference can be made between what is customized and what is personalized (Norman 2004).

In digital environments, the idea of customization was quickly implemented and created distinct habits in users: “people like to change things around to suit themselves. Even beginners, not to mention perpetual intermediates, like to put their own personal stamps on a program, changing it so that it looks or acts the way they prefer, uniquely suiting their tastes” (Cooper, Reimann and Cronin 2007: 555). This phenomenon happened in such a way, it surpassed the horizon of personal computers: “Net Geners have grown up customizing everything – from their iPods to their ringtones” (Tapscott 2009: 161).

The possibility of individual choices, through customization, personalization or co-creation has become a pleasant factor (Cooper, Reimann and Cronin 2007), but it can also act as a facilitator when using certain objects. Users encounter a level of familiarity which may assist in accomplishing certain tasks.

By inflicting modifications on objects’ appearance or functionality, each person invests energy in it, which is then used for individual expression. This level of individual expression influences how close an object will get to a person and may determine greater likelihood of convenient use (Mugge, Schifferstein and Schoormans 2004). At the same time, it is a possible act to distinguish between what is produced indistinctly: “supporting personalization is a powerful and graceful way to acknowledge and celebrate difference” (Laurel 2001: 51). And to be able to serve in print design, as it is seen to serve in digital artefacts (Moggridge 2010).

6. Graphic design project

In order to develop a graphic design project, we should establish an understanding, in which no printed material is interactive by itself. The project we developed had the purpose to explore in print design, favourable or unfavourable circumstances, for implementation of user interaction and participation, as listed from digital technologies.

A fold out (which also functions as a small brochure) was designed for the 10th edition of the MSc in Science and Geographical Information Systems (C&SIG), for the Higher Institute of Statistics and Information Management, New University of Lisbon, Portugal. It is a promotional object for this master’s degree, which was taught in classroom and in e-learning. All information was divided taking these two aspects into account. A number of 1400 copies were produced, in four-color offset printing. The final version is shown in figures 1 and 2.
As in a website, there are areas based on how hyperlinks work, which allow browsing between various information. Rectangles were placed on each section with indications of respective available information. In this way, when viewing each section, users always know what comes before or after. These rectangles function as links, which can be used to access various sections, according to what users consider to be the most appropriate order. Its use as a brochure becomes reversible, i.e. there is a symmetry in the divider structure of sections which allows to reach the last page of one side and immediately start accessing pages on the other side. This kind of use is simulated in figure 3.
The future of print design relies on interaction

Its use as a fold-out requires users to place it in a certain position, and it is up to them to complete some of the information. Such information is divided and available in alternating sections and only accessible through handling, as evidenced in figure 4. This condition to complete follows blended learning pedagogical direction. Accordingly, one side has a map for physical access and the other side has an access to its virtual place, its website.
The main concern was to design a portable and practical object to be handled, which would include a system of permanent access to all necessary information. Different sections were considered in a scheme by which they could be consulted without a pre-established sequence.

We tried to adapt visual elements creation to the masters’ message and its several contents. Both mapping and frequent use of IT tools in geographic information systems guided graphic decisions. We developed layouts for the first page and for interior sections in a vector drawing software. Photographs were taken of the computer screen using a grid along with the software interface (figure 5), with selection of all elements in the layout to capture work experience in such areas.
Meanwhile, we prepared a file to originate folding for production in a page layout software, where an identification side placement scheme for each section was created based on Neves (2016b) and corresponding to each kind of information (figures 6 and 7).

![Figure 6. Preparing fold out structure.](image)

![Figure 7. Placing information in the fold out.](image)

Project outcome allowed to verify some advantages, available to people who would use this fold out/brochure. Besides production and portability benefits it presented throughout the process. Each
user can choose between two different uses, accessing information in two ways, although condensed into a single material existence. Users are also given opportunity to complete some of the information, making such action as sighting of more content.

7. Conclusion

The fold out/brochure project constitutes a practice-based method where two distinct technologies contrast, seeking a symbiosis to benefit graphic design practice. On the one hand graphic design, whose history, tradition and practice are deeply related to printing technologies, which condition most results of such project activity. On the other hand, the production of interaction, which by widespread dissemination of information and communication technologies, is now present in a large number of digital artefacts.

Having served as a basis for digital development, printed matter has allowed itself to be only timidly contaminated by an explosion of concepts and possible involvement with a binary system. As processes of digital interaction increase, it is necessary to safeguard proximity of printed matter, resulting from graphic design projects, with people who actually uses it, at the risk of letting it become inadequate for lack of reinvention.

Interference of technologies causing interaction – communicative and time-based concept – in graphic design, involves discussion of printed matter behaviour, and how can it give something back to their users. It presupposes, therefore, changes in conventional design process. And by conventional we mean the one which ends when a final form is determined for an object. This differs greatly from anticipation of a gesture or a request and consequent transformation of interfaces, as happens in most digital creations.

This supposed "final form" of a graphic design object indicates the existence of a set of interdependencies which seems to surround the activity. Conceiving design objects depends heavily on users, their needs and wants, but, in a reversible way, users are only constituted after an object exists. Something which has been followed insistently, without connection to users’ current capacities. To search for some innovation, we must try to challenge users and not restrict visual communication to contemplation. Because users already have knowledge and skills to decide on innovation. In this challenging context, interaction rises as common feature by involving people's participation. As a consequence, permission to participate in objects completion depends on an interactive sequence designed for such purpose.

Printed matter has been prepared for a given and specific production process, which is the role graphic designers have also been prepared for. As it is for a programmer to anticipate demands of users of digital devices. But exploration and development of a set of actions and reactions differs from what is found in printed matter. Objects meant for print production generally determine a unidirectional communication, they are large-scale reproductions without possibility of customization or participatory permission.

The result of this study questions a current understanding of graphic design and its technological dependence, in its existence as practice and as an innovative procedure. It places emphasis on constitution of objects and their experience by users, as it also questions repercussions on technological use and on graphic designers’ work process.

From here on, it concerns graphic designers to establish paths without technological restrictions, through which it may be possible to actively contribute to establish new, perhaps better, ways of communicating and relating to people.
The future of print design relies on interaction

References

Barthes, R. (1964). Rhétorique de l’image [Image Rhetoric]. Communications, November. Retrieved from <http://www.oasisfle.com/doc_pdf/roland_barthes_rhetorique_image.pdf>

Blauvelt, A. (2008). ‘Towards relational design’. Design Observer, Retrieved from <http://www.designobserver.com/archives/entry.html?id=38845>.

Bolter, J., & Gromala, D., (2003). Text rain: the digital experience. In Windows and mirrors: interaction design, digital art, and the myth of transparency. Cambridge MA: MIT Press.

Bonsiepe, G. (2012). A Step Towards the Reinvention of Graphic Design. in Downs, S. (2012). The Graphic Communication Handbook. New York: Routledge, 8-13.

Cooper, A., Reimann, R., Cronin, D. (2007). About face 3: the essentials of interaction design. Indianapolis, Wiley Publishing.

Dourish, P., (2001). Where the action is: the foundations of embodied interaction. Cambridge, Massachusetts, London, England: The MIT Press.

Dreyfuss, H. (1960). The measure of man: human factors in design. Whitney Library of Design.

Forty, A., (2000). Objects of desire: design and society since 1750. London: Thames & Hudson.

Frascara, J. (1988). Graphic Design: Fine Art or Social Science?. in Margolin, V. & Buchanan, R. (eds.) (1995). The Idea of Design, a Design Issues Reader. Cambridge: MIT Press, 44-55.

Giaccardi, E. (2003). Principles of metadesign: processes and levels of co-creation in the new design space. PhD thesis, University of Plymouth, Plymouth. Retrieved from <http://x2.i-dat.org/~eg/research/publications.htm>

Hollis, R. (1997). Graphic Design: a Concise History. London: Thames and Hudson.

Joly, M. (1993). Introduction à l’analyse de l’image [Introduction to image analysis]. Paris: Nathan.

Laurel, B. (2001). Utopian Entrepreneur. Mediawork. Cambridge and London, MIT Press.

Maldonado, T., (1999). Design Industrial [Industrial Design]. Lisboa: Edições 70.

Margolin, V., (1997). Getting to know the user. Design Studies, 18, 227-236.

McLuhan, M. (1962). The Gutenberg galaxy: the making of typographic man. Canada: University of Toronto Press.

McLuhan, M., Fiore, Q. (2001). The medium is the massage: an inventory of effects. Corte Madera: Gingko Press. (Original edition: 1967).

Meggs, P. B. (1998). A History of Graphic Design. 3rd Edition. New York: John Wiley & Sons, Inc.

Moggridge, B. (2010). Designing Media. Cambridge and London, The MIT Press.

Mugge, R., Schifferstein, H., Schoormans, J. (2004). Personalizing product appearance: the effect on product attachment. Delft University of Technology, The Netherlands. Retrieved from <http://static.studiolab.io.tudelft.nl/gems/mugge/MuggeDE2004.pdf>

Müller-Brockmann, J. (2012). Grid Systems in Graphic Design. Switzerland, Niggli Verlag.

Negroponte, N. (1979). Books without pages, Retrieved from ACM Digital Library.

Neves, M. (2016). Printed Matter as an Interactive System. in Marcus, A. (Ed.): Design, User Experience, and Usability: Novel User Experiences DUXU 2016, Part II, LNCS 9747, 625–637.

Neves, M. (2016). Enhancing User Experience in Graphic Design: a Study in (unusual) Interaction. in Rebelo, F., Soares, M. (Eds.) Advances in Ergonomics in Design. Advances in Intelligent Systems and Computing, 485, 801-810.

Newark, Q. (2002). What is graphic design?, Mies: Rotovision.

Nielsen, J. (2000). Electronic books: a bad idea, Retrieved from <http://www.useit.com/alertbox/980726.html>

Norman, D. (2004). Emotional design: why we love (or hate) everyday things. New York, Basic Books.
Nunberg, G. (1993). *The places of books in the age of electronic reproduction*, Retrieved from <http://www.uc.pt/diglit/DigLit%20Ensaios/Ensaios%202003-2004/Ensaio01.htm>

Redström, J., (2005). Towards user design? On the shift from object to user as the subject of design. *Design Studies*, 27, 123-139.

Satué, E. (1994). *El Diseño Gráfico: Desde los Orígenes hasta nuestros días* [Graphic Design: From its Origins to our days]. Madrid: Alianza Editorial.

Tapia, A., (2003). Graphic design in the digital era: the rhetoric of hypertext. *Design Issues*, 19(1), 5-24.

Tapscott, D. (2009). *Grown up digital: how the net generation is changing your world*. New York, McGraw Hill.

Tschichold, J. (1998). *The New Typography*, Berkeley, Los Angeles, London: University of California Press.

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