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THE PRINCIPLES OF BOOK DESIGN FOR ELECTRONIC AND PRINTED BOOKS

ABSTRACT

The aim of this study is to introduce the structural diversity between printed books and e-books; and to demonstrate the way the design of the book changes due to transition from printed media to electronic media and the factors that caused these changes. The book design processes and the limitations of the media are varied as well as the reading experience. The design experience in printed books acquired in centuries is insufficient for e-books in terms of obtaining the best reading experience. It is not possible to have the same approach of book design for these two media because medium, preservation, distribution, page layout, reading direction, display and description of a page show differences. In this context, the change in book anatomy and the evaluation of the way the changes in organs of the book are reflected in its design are important in terms of the future of book design. While book replaces itself in new environments, the meaning of the word 'design' has also changed especially in terms of book design.

Keywords: E-Book, Book Design, Design Principles,
Printed Book, Book Anatomy

ELEKTRONİK VE BASILI KİTAPLAR İÇİN KİTAP TASARIMI ÖZELLİKLERİ

ÖZ

Bu çalışmanın amacı, basılı kitap ve elektronik kitabın yapısal farklılıklarını ve kitabın basılı ortamdan sayısal ortama geçişinde kitap tasarımının nasıl değiştiğini ve bu değişime sebep olan faktörleri ortaya koymaktır. Okuma deneyimleri kadar kitap tasarım süreçleri ve ortamların sınırlılıkları da farklıdır. Basılı kitap için yüzyıllar içinde edinilen tasarımsal deneyim e-kitaplarda en iyi okuma deneyimini elde etme noktasında yetersiz kalmaktadır. Metnin taşıyıcısı, korunması, dağıtımı, sayfa düzeni tasarımı, okumanın yönü ve hatta sayfanın tanımı farklı olan, sayfaların izlenmesi/görüntülenmesi farklı yoldan gerçekleşen bu iki ortam için kitap tasarımının aynı yaklaşım ile yapılması mümkün değildir. Bu bağlamda kitabın anatomisindeki değişim ve kitap organlarındaki bu değişimlerin, tasarımına ne şekilde yansıdığına değerlendirilmesi kitap tasarımının geleceği açısından önemlidir. Kitap ortam değiştirirken tasarım kelimesinin anlamı da kitap tasarımı özelinde değişmiştir.

Anahtar Kelimeler: E-Kitap, Kitap Tasarımı, Tasarım Özellikleri,
Basılı Kitap, Kitap Anatomisi

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1. INTRODUCTION

Today, books, magazines, and newspapers are widely read from electronic media as well as printed media. This status can be defined as a period of transition from reading through the paper to reading through electronic media. This transition starting with reading newspapers and other periodicals as well as e-books through desktop and laptop computers in early stages of reading from electronic media has advanced in favour of the electronic reading environment with the popularization of the use of the dedicated e-book readers and multi-functional tablet computers and smartphones. These tools increase their popularity among users due to their advantages of being more portable than other computers, ability to be lighter than a single book and store hundreds of books and the ability to access to the online reading resources. The design criteria of the reading material have started to change in conjunction with the change in reading medium and habits because of the developing technology. The shift of reading to a new media means change of the many accepted design principles in the field of graphic design though the fundamental principles of desktop publishing remain constant. Although the design of the text on a medium independent from paper eliminated many of the limitations of printed media, limitations of the new electronic media were added to book design criteria. As a result of the savings for more than 600 years of reading experience (Bath, 2012:1), printed book remains to exist in its current form. The design rules for printed books resulting from these experiences have not been fully achieved for digital reading media. Well-accepted design rules of printed book cannot be fully applied to digital reading interfaces due to different aspects of the reading experience in electronic books (Taşçıoğlu, 2013:167).

The form of the book continues to change depending on the medium and it is not finalized yet. The largest-ever change in the formal evolution of the book has begun to emerge with the distribution of electronic books as an alternative to the printed book in the recent past. While the changes of the previous period have occurred depending on physical material and its usage, today book moved away for the first time from its physical structure and began to exist in the digital world of computers based on 0 and 1 (Labarre, 1994:4). The transformation of the book form has begun to take shape in accordance with the new rules according to the opportunities and limitations of this digital medium. As book design is directly associated with book form, each change of the format brings a change in design principles. While the opportunities and limitations of the new materials and media lead to the emergence of new problems and solutions, the disappearance of conditions specific to the old material leads to disappearance of some principles. It is known that different forms of the book are in simultaneous use in many periods. When a new form emerges, the previous form continues to function for a while and continue to exist as a collection item even after being replaced with a better alternative. This parallel process makes book design approaches true for a single form and incomplete or dysfunctional for another form. Thus, it becomes difficult to talk about general design principles of book design independent of form. Nowadays, though book design for physical and digital media may seem to be identical at first glance, two media have different problems and solutions compared to the differences of the different forms in previous periods. The production of electronic and printed book, their features in terms of usability, storage and distribution of the media etc. and comparative examination of the design of the book for these

book formats are critical for the introduction of the actual principles of book design in a wide range.

2. RESEARCH SIGNIFICANCE

As a result of the book being in a new form, design features and approaches to book design have had to be updated as well. It is important to distinguish between the common features of book design for printed and electronic environments and the form-specific features of digital or printed, in order not to approach the design of the digital book as a traditional book and to limit new opportunities that digital media can offer. The aim of the study is to determine common and form specific design features for both book forms.

3. METHOD

In this study, document review as one of qualitative data collection methods was conducted in order to determine the current situation regarding the design principles for electronic books and printed books. In-depth information has been tried to be gathered for the comparison of these mediums in terms of production and design features.

4. E-BOOK FILE FORMATS

Today, there are various e-book file formats that can be read with different applications and e-book readers and have different capabilities. It will not be possible to talk about a single universally accepted file format in the near future. Contrary to the expectations of the provision of a standard format, the number of the file format in use in 2001 was 21 and this number has increased to 27 in 2013 (Walters, 2013:195) (Figure 1).

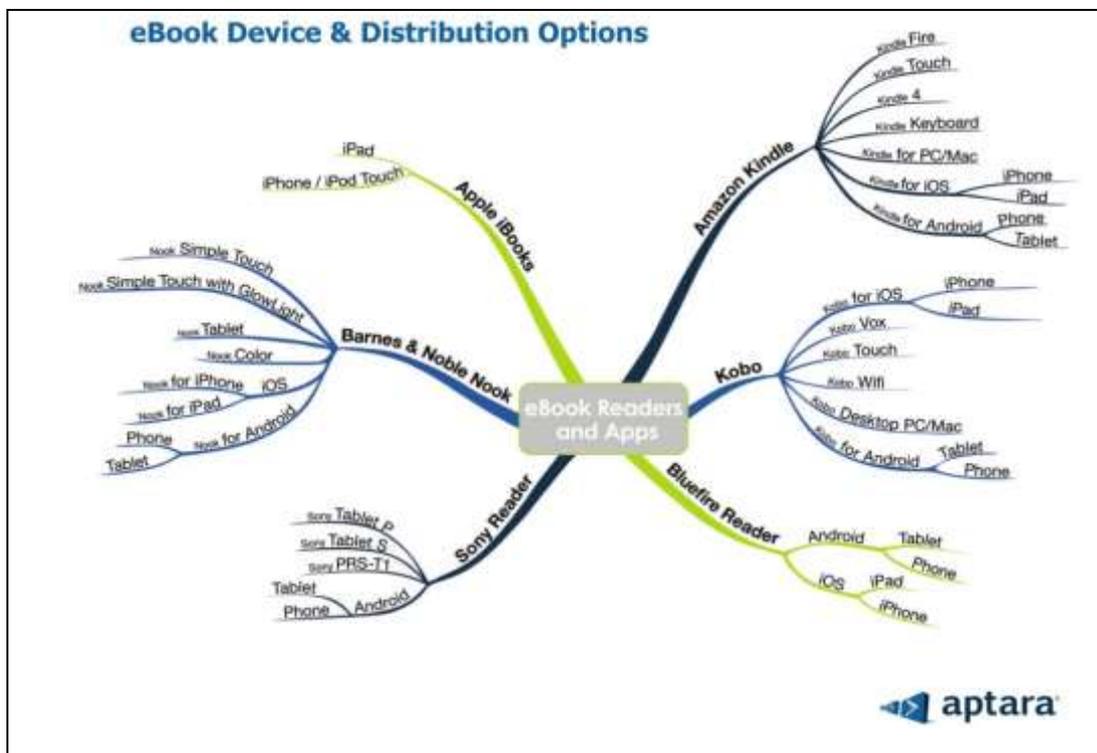


Figure 1. Aptara's infographic of different eBook readers and apps options (Bartram, 2015)



Variety of formats raises various challenges for users such as to find content that is relevant to their readers and conversion to the appropriate format. Although it may seem that there is no universal agreement on file formats, there are cases such as the PDF file format considered as the universal standard for online magazine articles. Each format is more or less different from others in terms of its own unique design, coding features and so on. For instance, technologies used to create e-book in E-Pub format are similar with technologies used for Web development and design. The style-sheets that are used for the formatting and the visual layout in Web page format are used in EPUB format (Teicher, 2010:8). However, technologies supported by all formats are not the same as each other in this way. The design features of the most popular formats are given in comparison in Table 1.

Table 1. E-book formats and design features
 (Firebrand Technologies 2015)

	Mobipocket	KF8	ePub2	ePub3	ePib	iBooks Author	PDF
Extensions	.prc, .mobi, .azw	.prc, .mobi, .azw	.epub	.epub	.epub	.ibooks	.pdf
Reflowable Layout	Yes	Yes	Yes	Yes	No	Yes	No
Fixed Layout	No	Yes	No	Yes	Yes	Yes	Yes
Device/App Support	Kindle system	Kindle system	B&N, Apple, Sony, Kobo, Google, etc.	Limited support in Apple iBooks and Kobo devices	Nook Color, Nook Tablet, Nook apps on iPad	Apple iBooks	Most devices support PDF file display in some way. Support will be limited with DRM applied
Base code/Style sheets	HTML3ish/ Limited	HTML4 (X)HTML 5, XHTML 1.1, / CSS3	XHTML1.1/ CSS2	(X)HTML5, CSS3	XHTML (similar to ePub2) / N/A	XHTML 1.1 with extensions (similar to ePub2) / CSS3	PDF/N/A
Release Date	2000	2011	2010	2011	2010	2012	2008
Comics	No	Yes	Yes (limited)	Yes (limited)	No	No	No

5. THE ORGANS AND DESIGN OF THE BOOK

5.1. Page Layout

According to Gavin and Harris who described the emergence of online media as a migration from page to screen, the basic function of online page layout design is the same as the printed page. Design should be configured in order to get a specific response, give information, and entertain or to guide to the reader (Gavin and Harris, 2013:174). Before moving on to the page layout-related issues, it will be useful to reassess what the term page expresses for both environments. While the page is a piece of paper bearing the inscription in the printed book, (Taşçioğlu, 2013:90) in electronic book, it refers not to a surface as a medium of inscription but instead to a frame that display content on the screen similar to the page in printed book (Taşçioğlu, 2013:90). However, it is very difficult to define the page layout for flowing text blocks offering

uninterrupted reading for online media contrary the digital reading interface of e-books in PDF format. Indeed, only a portion of the page can be displayed on the screen and the portion displayed as a page changes all the time after scrolling. The page layout is the arrangement of design elements according to a general draft in relation to the space they covered. This is also called the management of format and space. The initial purpose of the page layout is to present visual and textual elements to the reader in such a way providing perception with minimal effort. A reader can be guided between quite complex environments in printed and electronic medium with a good page layout (Gavin and Harris, 2013:8).

While design criteria were previously affected by technologies such as paper sizes, printing systems, they had to be retooled according to the opportunities and limitations of electronic devices with screens in various technologies and sizes. The paper size as one of the most distinctive factors in terms of the size of a book and its aspect ratio have given way to the screen sizes/aspect ratios and the resolution. While Fixed Layout is used in the design of the page layout for a certain size in printed book, this raises several problems because of the variety of screen sizes. The same page can be displayed differently in various screens. The reader is forced to choose between the scaling to full screen or displaying the page partially on a page designed using Fixed Layout. In this case, features affecting reading directly such as font size and spacing will vary depending on the screen. However, according to Bath (2012); "the font size and spacing selected for best readability design must remain in appropriate size for reading with the way they were designed free from the screen size." (p.63). However, font size and spacing negatively change according to the screen due to the scaling. The partial display of the page negatively affects the continuity of reading.

Although the page layout can be designed in a full control with fixed layout, it has one major drawback of the changing of the readability because of the diversity of devices due to the lack of a standard in terms of deployment and the variety of devices. In the digital media, reflowable layout that allows rearrangement of content layout according to the display screen is used as an alternative to the fixed layout (Figure 2).



Figure 2. (a) Designed with fixed layout, (b) Fixed layout on smart phone screen, (c) Reflowable layout on smart phone screen (Çoruh, 2017)

This layout has benefits over fixed layout such as readability in any-book device such as e-readers, tablets, apps, setting of the

font size by the reader, displaying images bigger with double click. However, disadvantages of this system are the settings for hyphenation and the arrangement of orphans lines depending on the user's settings, difficulty of text wrap, the necessity of the use of images centered and the obligation of general layout to be very simple. While the design for best readability reaches all the readers in the same format, it is still not possible to reach such a standard for a book in digital media whether with a fixed or reflowable layout (Figure 3).



Figure 3. Same page design for different devices with reflowable layout (Moss, 2015)

This situation also affects the margin. Margin is defined as the free space around the text block including the header and the footer that extends to the binder for inner edge and to the trimmed part for the outer edge of the page. While the physical properties of the margin were left behind through transition from printed books to e-books, its aesthetic properties found a partial place in e-book design. The inside margins left on the side of binder due to the nature of binding lost its importance with the disappearance of the binding. The space at the top of the page between the text block and the trimmed section where the reader puts his thumbs and the free space used for page turns are also redundant in the eBook because the reader does not have to keep the computer monitor while reading the book. EBook readers and tablet computers have their own frames in order to handle from outside of the display area. While the pages in a printed book have side-by-side format, pages of online books and eBooks are in portrait continuous flowing format with a few exceptions. Therefore, page flip in the horizontal direction in the traditional sense has been eliminated in eBook. Thus, the physical properties of the margin lost its importance depending on the necessity of reader's put his fingers in the pages (Mothersill, 2005-2006:50). The display sizes of reading devices directly affect the margins and text blocks. While the number of text blocks decrease depending on device, "device itself comes into the margin" (Mothersill, 2005-2006:50).

and it is not possible to obtain different sizes of margin.

As Mothersill (2015-2016) quoted, Jan Tschichold insisted that the innovative design of margin "... transforms an ordinary book into a well-designed one." (p:49). However, the margins' potential of transforming a book into a well-designed book seems to have been eliminated. Margin's melt away between the limitations of digital reading interface negatively affects the readability of the text. The

outer margin that provides a contrast backdrop for the text block and surrounding the text block is important for an eye to scan the lines in the correct order. In addition, it functions as an area that separates the physical environment where the reading takes place and in a sense avoids the visual chaos due to other visual elements beyond the text by ensuring for the eye to stick with the text. In reading media such as e-book readers where the margin is reduced to a minimum, this area is provided with partly a small amount of margin and partly the physical framework of the e-reader. Gavin and Harris (2013) also stress that "a significant difference between pages in a physical book and an online page is that a printed book consists of right and left pages and pages are separated physically with the binding." (p:174). In a printed book, right page (Recto) and left page (Verso) appear at the same time, and this creates the open version of a book (p:18). The printed books provide an advantage over e-books in cases of parallel text editions and facing-page translations where two-page is needed. The digital reading interfaces such as Amazon Kindle and Kobo, which usually provide single page format in portrait layout, are insufficient in this sense. (Bath, 2012:5). While typographers were designing folios together, single page design of banners, advertisements and so on were being provided by graphic designers (Bath, 2012:5). Now the book pages are designed for single-page view. The number of displayed pages, the layout and flow direction of the text in digital reading interfaces and, as Taşçioğlu (2013) also mentions, "reading habits and navigation have changed through transition from scroll to codex and then digital screen (Figure 4), and these new habits make people search for different design and solution" (p:166).

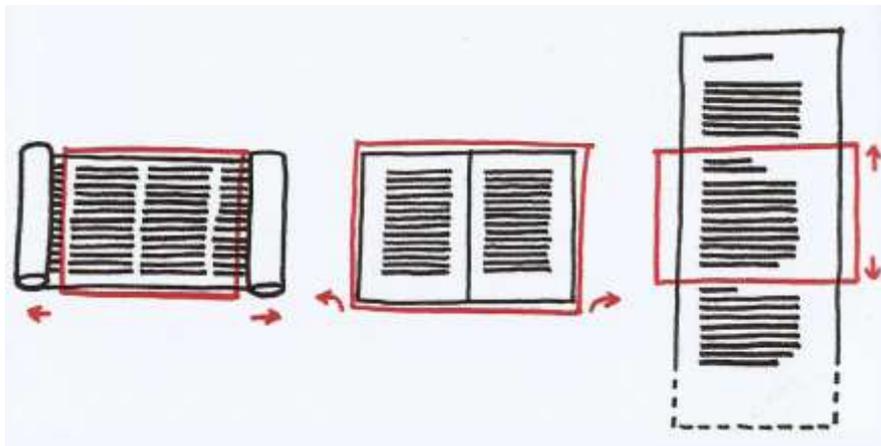


Figure 4. The text flow for Scroll (a), Codex(b), and the Digital Reading Interfaces (c) (Taşçioğlu, 2013:166)

If the printed sheet of a printed book is folded in certain parts, it is referred to as forme (Taşçioğlu, 2013:78) layout of the sequence and position of the pages are identified by the forme plan before being cut, folded and, trimmed (Gavin & Harris, 2013:18). Thus, the number of pages and layout are determined according to that plan. Practical matters such as forme plan do not affect the number of pages and the order in e-books. The number of pages does not have to be an even number in e-books as in printed books because of the paper folding logic (4, 8, or 16-page formes). While it is attempted to collect color pages in the same formes as consecutive pages to reduce costs, it is not necessary to be considered for the design of the e-

book. Color and black-white pages can be lined up with the desired sequence in e-books. Color content is displayed as colorful on devices that support colored display and displayed as monochrome on devices that do not support colored display. Apart from display size and aspect ratio of the screens, toolbars, scrollbars and icons of the operating system and the software used to read the text causes narrowing of the reading area. In this case both the typographic design and the use of the margin are adversely affected and it means the further downsizing of the area that will be designed for reading.

5.2. Typographic Design

Regarding the usage of typography in the period before e-books; while there was a debate on the tension between uninterrupted readability concern of typographer and the aesthetic concerns of graphic designer, as Bath mentioned "topics related with inserting multimedia elements into the e-book took precedence over typographic issues such as font spacing" with the introduction of digital reading interface (Bath, 2012:4). Compared with the evolution of the printed book; this period of digital reading interface still in its infancy filled with typographic inability can be compared to the period of book publishing between the 17th and 19th centuries when typographic quality were considered below a certain level of quality by many British academics (Bath, 2012:2). The technical problems of that era such as typeface cutting, paper quality, printing, etc. has been replaced by the diversity of today's e-book reader, e-book formats, screens and display technologies and issues that originate from these.

One of the major problems of e-book formatting is different web browsers' interpretation of code and styles in the ePub file. Because all apps and devices vary little in way of working, the same file might look different in iBooks, Kobo or Sony Reader (Teicher, 2010:8) (Figure 5). Another obstacle in front of the standardization of the format for each reader is the necessity to appeal to e-book readers and the computer screens with different display sizes and resolutions. According to (Bath, 2012:2) screen size variability is one of the main causes of the absence of design as needed.



Figure 5. E-book readers and tablet computers with various display size and Technologies (Bartram, 2015)

The modern fonts based on Bodoni and Didot styles were preferred to fonts such as Garamond and Caslon because of consuming less ink compared to old-style fonts and thus providing faster results due to the invention of new printing technologies during the first half of the 19th century such as steam plate and the printing press (Bath, 2012:3,4). The digital technologies of digital reading interfaces play an important role in the selection of fonts as well as changes in printing technology. Due to the nature of the digital screen, use of the font differs from printed surface (Figure 6).

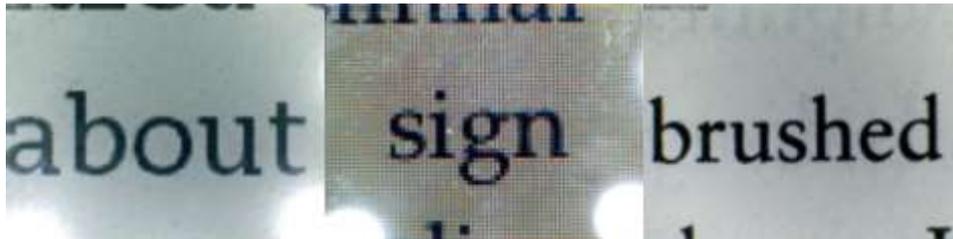


Figure 6. (a)Kindle, (b)iPad, (c)Printed Book (Fry, 2010)

This difference depends on the quality of the display such as resolution, dot pitch, and so on. Many screens do not show the small-sized serif fonts in full quality (29) (Figure 7). In order to provide readability and prolonged reading in electronic media, fonts should be selected large enough and even there should be options for the user to choose font size and style. If small font size is going to be used, sans-serif typefaces should be used and the use of italic should be avoided. The use of text color providing sufficient contrast with the background color positively affects the recognition of the article (Ruth and Landoni, 2002:29).

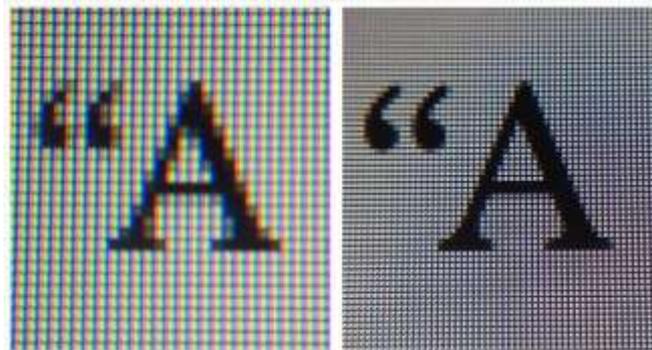


Figure 7. Comparison of Displays with Different Resolution
(Technology Source, 2013)

Though digital reading interface needs to support the basic typographic features, lines and space can be adjusted in electronic reading environments in such a more superficial way than printed text. While space can be adjusted letter by letter on paper, this is not possible in digital reading interface due to technical reasons (Bath, 2012:4). For the most ideal case; when preparing an e-book in ePub format special coding is required for the string to be seen properly. As this process requires a lot of budget, it is difficult for every book especially during the transfer of traditional books to ePub format (Teicher, 2010:9). Another limit for the selection of fonts is the possibility that the font used in the text of the e-book is not installed on the user's computer. In this case, in order to guarantee

reaching of the book as it is designed, the designer should be contented with facilities of a limited number of fonts installed on the user's computer (Bath, 2012:2).

5.3. Orientation

Reader may have intuitive perception of position in the book by comparing the thickness and weight of the pages read and the pages to be read. It is important for the reader to be aware of place in the book in electronic books as in printed books. For this reason, it is necessary to provide navigation in a clear fashion for e-book interfaces (Ruth and Landoni, 2002:26). New features have been added to some software such as MS office that navigates the reader to the last displayed page of the previous session. So, the software's remember of the page for the reader has been raised. The deficiencies of the orientation in the early stages of electronic media are being compensated with the new solutions appropriate to the nature of the media.

5.4. Resolution

Another difference between paper and screen design is the resolution. The resolution of the printing paper comes from limitations such as print quality of the printing machine and paper property (weight, texture, etc.), and resolution of on the display screen comes from display screen technology. First, the resolution for digital design media and printing media are not the same. Display is formed according to the alignment of small points on the surface. While printing machine-generated points are referred to as dots, their equivalent that make up the image on the screen is referred to as Pixel as the abbreviation for picture-element. Therefore, they are not defined with the same resolution unit. In printing, DPI (dot per inch) unit is used as the percentage of dot per 1 inch square and in the screen, PPI (pixel per inch) is used as a resolution unit for percentage of pixel per 1-inch square (Figure 8). Dot is not the direct equivalent of pixel for the paper. The printers regenerate an image composed of pixels by spraying small dots formed by the mixture of CMYK color on the paper. The number of dots corresponding to a pixel will change depending on dpi resolution and the length of the print. For example, when an image with a resolution of 75 ppi on the screen is printed with 300 dpi resolution, a pixel consist of 16 dots ($300\text{dots}/75 \text{ "pixels"}=4 \text{ rows of } 4 \text{ dots per "pixel"}$). In addition, printing quality varies depending on the different machine standards in terms of dot size and shape.

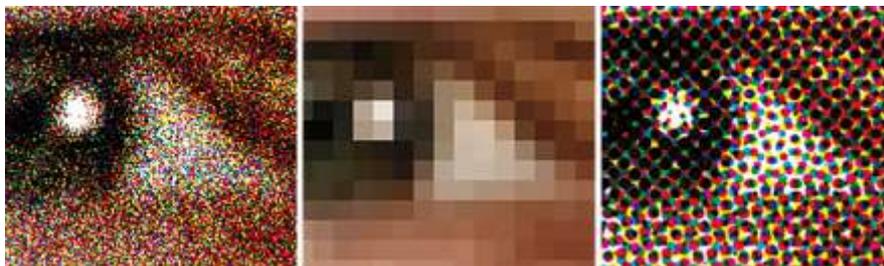


Figure 8. (a) Inkjet, digital (DPI), (b) Pixels, display, web (PPI), (c) Offset color printing (DPI+LPI) (Stackexchange, 2015)

The textual content and the visual content of the book such as illustration, graphics, painting, and photography should be printed at a particular resolution in order to be read clearly. Although the term

DPI is essential for printing, PPI is more important considering the pixel-based design on a screen. The designer actually works on the image by seeing a display resolution between 67 and 130 ppi whether the image resolution is 72 ppi or 600 ppi. As two images with web-based 72-ppi and high quality 300 ppi resolution will have the same quality on the screen, designers often feel that they are both ready for print. This is a matter of design in digital media for print. At the first glance, it may come to mind that problem ceased to exist for e-books as they are both designed and displayed in digital environment. On the contrary, this issue continues in the e-book design in parallel with the diversity of the pixel density in screens (Figure 9). While many LCD screens support relatively low 67-130 ppi resolution, results closer to print can be obtained with e-ink screens for the Kindle with 167-212 ppi, e-paper screens with 212-300 ppi and LCD screens with a resolution of 216-339 ppi (Bigman, 2015).

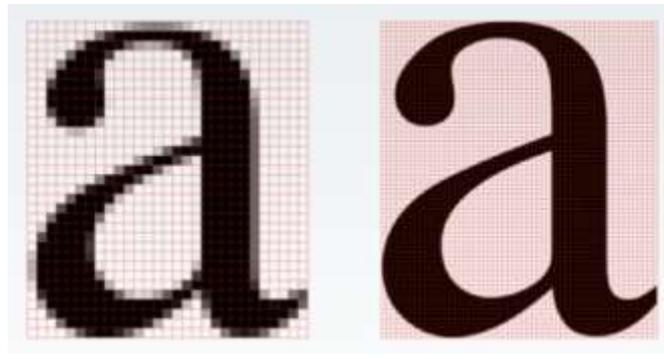


Figure 9. Different pixel density (a)163 ppi, (b)326 ppi
(Whatsbestforum, 2012)

Apart from these, image quality differences are possible to occur in the digital reading interfaces, depending on whether the page is landscape or portrait, because of several bugs arising from the screen technology of the device used. The subpixel rendering bug of Kindle Fire can be an example to this. While there is no problem in reading landscape with this device, undesirable color shadows occur in the other positions.

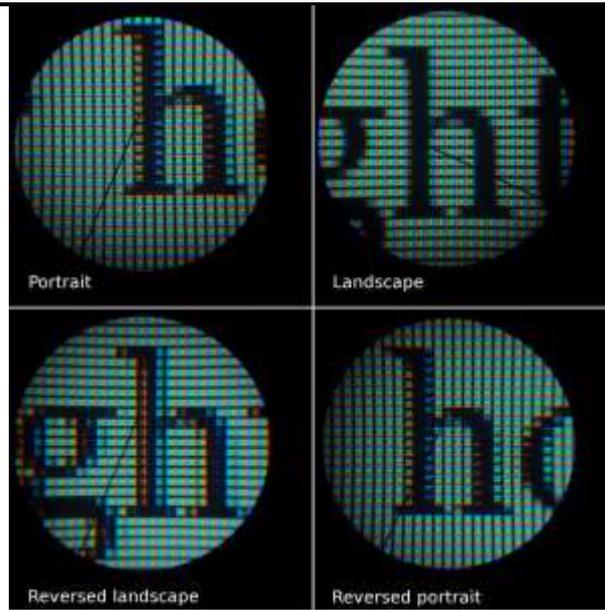


Figure 10. Kindle Fire subpixel rendering bug (Mobileread, 2004)

In reversed landscape, there are red shadows and blue shadows adjacent to the left vertical edges and right vertical edges of letters respectively. Likewise, in Portrait and Reversed Portrait positions, an orange color shadow that is the combination of green and red subpixels are seen adjacent to the left vertical edges of letters (Figure 10).

5.5. Color

While dot in offset printing consists of a blend of pigment-based Cyan, Magenta, Yellow, Black (CMYK) colors; pixel on the screen is a mixture of Red, Green and Blue (RGB). Therefore, color gamut printed on the paper and the color gamut displayed on the screen are actually different from each other. A more open expression is that as there are colors common in the two color spaces and colors that only exist in one color space, it might not be possible to see the same color tone in both printed and electronic book. Both color model cannot provide all color tones in visible light (Figure 11).

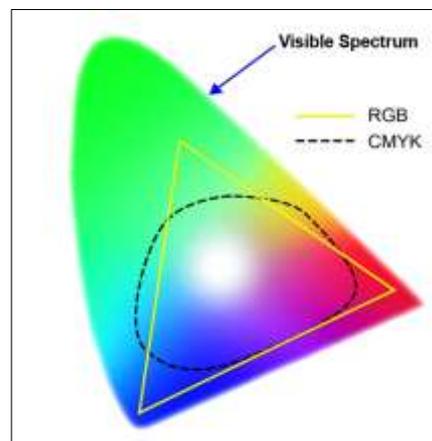


Figure 11. RGB and CMYK color gamuts in visible light (Scrimgeour, 2015)

5.6. Cover

While the cover of e-books maintains their descriptor feature, they lose protective feature. The book is no longer on the shelf but displayed on the internet, stored in a digitized environment and read from the digital interface. The cover of the book in existence for the protection of the text has front cover, back cover and spine due to the benefits of its natural form and these features have been used for the presentation of the book since 20th century. Some gift books are sold with a cardboard sheath for protection during 1820 and 1830s(Figure 12). However, the first modern paper cover is believed to be invented by British Publisher Longmans for 1833 Edition of Charles Heath's Keepsake (Sonzogni, 2011:17). While the covers functioned only as something to protect the book until reach to the reader thrown away by the reader after buying the book during early period of mass production of books in 19th century, they have been the face of the book by functioning as a poster since 1920s (Polat, 2015:82).



Figure 12. Codex cover (Libros Antiguos, 2017)

The protective function of the cover seen as a packaging that covers and increase the sales of a book since 20. Century has completely disappeared with the introduction of the e-books, however publicity role of front cover continues in electronic libraries and websites of online booksellers because cover design affects the reader's perception of the value of the text (Agresta, 2012:69) (Figure 13). The cover attached to the e-book will significantly influence the perception of the book as one-piece consisting of pages, the experience of enjoyable reading and recognition of the book after returning to electronic library (Ruth and Landoni, 2002:8) (Sonzogni, 2011:16) (Ruth, Landoni and Gibb, 2002:326).

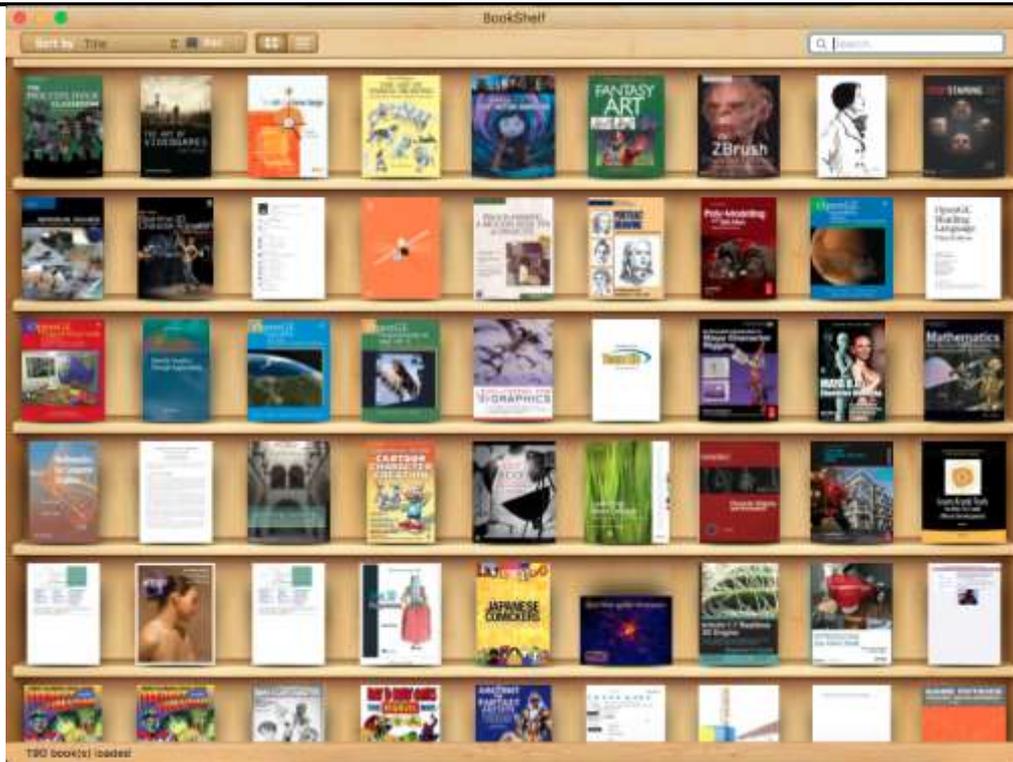


Figure 13. E-book front cover samples on BookShelf (Çoruh, 2017)

The use of different covers in different countries for the same book both in printed and digital media is an indication of the use of covers for the purpose of publicity like the banner (Polat, 2015:82). As many of the early e-books were created by transferring of the printed books to digital medium, back covers are also located in the e-book. However, back covers have been eliminated in an attempt to begin of the book design only for digital media.

5.7. Spine

The section of the book referred to as "spine" is the part that keeps the book standing (Taşçioğlu, 2013:73). The dimension of the spine is directly related with the dimension of the book (Figure 14). Weight of the paper and the number of pages determines the thickness of the book thus the spine. Similarly, the vertical height of the pages affects the height of book and the spine. Depending on the binding, the height of spine can vary as height of the page and binding overflow.

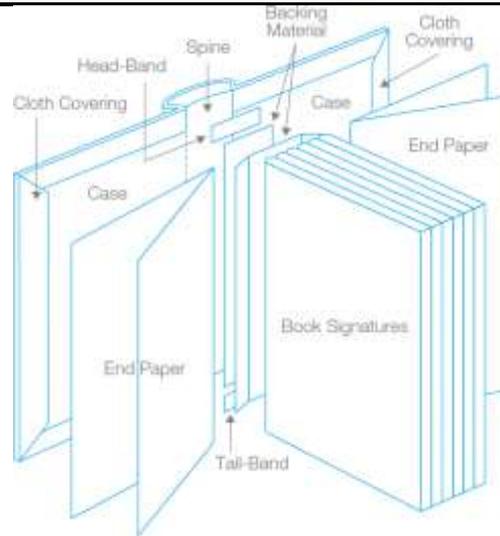


Figure 14. Anatomy of Hardcover Book (Designers Insights, 2017)

The spine has been eliminated in the e-book because e-books do not have a thickness depending on the number of pages. Similarly, elements to solve physical problems of the book such as binder, inside cover and dust jacket are no longer needed due to the nature of the e-book.

5.8. Binder

Binder is a covering made of leather, fabric and cardboard in order to make it easier to read the book and store in a protected format (Öcal, 1971:115). While binding referred to covering with leather at times when the book covers were binded with leather, later this term started to meet all of the methods of putting together the book (Taşçioğlu, 2013:75) (Figure 15). Though books were previously being housed within wooden sheath or box, the main development of binding has been after the discovery of the paper (Öcal, 1971:115). Various binding methods such as American binding, saddle stitching and spiral result in different physical properties requiring different solutions in the final product. Thus, the binding method directly affects the page layout. A larger internal margin is required for American hardcover books because the pages of the book tighten towards the spine. As the publications with spiral binding will be pierced in the process of binding, there should be no content in the middle margin (Gavin and Harris, 2013). As e-books have a single page view and binding is not in question for the eBook, the layout of the content and the margins are not affected by the case depending on the material, such as binding.



Figure 15. Book Binding (ibookbinding, 2017)

5.9. End Sheet

The end sheet is the first surface lid when the reader opens the book. It provides the merger of the body of the book with the binder (Taşcıoğlu, 2013:90). The end sheet losing its physical function in digital medium continues its importance in the transition from cover to the inner part of the e-book in terms of providing influence and integrity (Figure 14).

5.10. Appendix with Horizontal Folding

A sheet of folded paper added to a publication that can be opened horizontally is defined as Appendix with Horizontal Folding (Gavin and Harris, 2013:152) (Figure 16). It is a way to add content that does not fit in the size of the page of the book. It is possible to add pages in different sizes and even horizontal and vertical layout within the same document in e-books. However, as the screen of an e-Reader cannot be shrunk or stretched by folding or opening, either a portion of the content will be shown on the screen or the content will appear smaller than the original. Thanks to hyperlinks to other content in e-books, the requirement of a larger area for the desired content has been eliminated.



Figure 16. Appendix with horizontal folding (Woodward, 1866)



6. CONCLUSION

A completely new definition of the book should be done with the introduction of e-book format. The point reached in the evolution of the book goes beyond the change of the physical form of the book and provides a change in the medium of the book. Although new media is carried by a physical entity, the book is no longer a physical object and has evolved into the reality of the digital media with its distinctive rules and functioning. Thus, the utilization of the physical properties of the book as a design issue and the usage of the book as a design/collection item is no longer in question. The transformation of the medium of the book directly influenced design studies of production processes emerged from the material of the printed book. As the process of the physical material of the conversion of text in to a book is no longer required, prepress stages such as color separation in terms of material, forme assemblage, molding, and post press stages such as parceling, trimming and binding of the pages printed on layer paper, varnish, celephon, embossing and partially different implementations of materials (translucent paper, hole area etc.) no longer exist. The disappearance of these procedures makes trimming and binding margins, cutting and the use of the guidance signs for four-color printing unnecessary. While designing the book, issues such as how to be displayed in digital interface come to the fore instead of practical issues such as the cost of four color printing (Bath, 2012:1).

While some of the organs of the book such as the book cover maintain their importance, some of them such as the page maintain their existence with a change not in terms function but meaning. However, many of the book's organs such as spine, binder, dust jacket, endpaper, appendix with horizontal folding have malfunctioned in this process. A part of the design of the book has been eliminated by the disappearance of dust jacket as part of the book design and spine as a benefit of the book thickness. Regarding design of the layout of the page, the main headings of the new situation include single-page layout due to the structure of the e-book devices rather than double-page, vertical reading direction and the lack of the implementation of the traditional design principles. In a digitized medium, text blocks and the use of the margin had to change. The impact of page design on the reading have been ignored on behalf of the diversity of devices. The font size, color, font type were left to the reader's choice for the layout to be reflowable and therefore page layout design with typographic arrangements such as multiple-column use, alignment, hyphenation have become impossible.

Another factor that makes design of the e-books difficult is the fact that e-book formats support different design features. This requires separate design of books for each device. When e-book design for device-specific version of the book such as Amazon's Kindle or Kobo is made, page design is possible on the fixed layout as printed on the sheet as the page size, display resolution, supported technology is known. High quality reading experience for e-books will be provided only in these conditions. In this perspective, the problem of page design stems from getting the lowest specifications as the base in the end while trying to make a design for a non-specific media. Concerning the solution of the problem, Bath (2012) argues that "improving the quality of e-book design is possible with the conciliation of traditional and new methods" (p:6). However, on the other hand, the designers may partially achieve this until the hardware and software technology of display devices support the level of design proficiency. The difference between print and web fonts is



no longer required if display technologies give a result in print quality. So far, although it is limited with e-ink and e-paper technologies, different font usage for both media will be eliminated by the introduction of screen resolution close to print resolution.

Regarding color and resolution, colors printed using the CMYK color model differ from colors displayed using the RGB color model. This is because the RGB and CMYK color gamut do not correspond fully in visible light. Although the colors displayed by both color models in visible light have majority, both models have colors that do not exist in other one. This means that the reader cannot see some colors in CMYK color space in e-books and instead it will be possible to display colors in the RGB color space previously unseen in printed media. This is actually advantageous eliminating concerns of designers in terms of conversion from RGB color mode to CMYK color mode.

It is possible to consider approximately $\frac{1}{4}$ reduction in LCD screen through transition from print resolution (300 dpi) screen resolution (72-96 ppi) in terms of resolution affecting images and especially typography except for the e-paper and e-ink technology. This requires doing careful selection in terms of font type and size to provide a high quality reading experience due to the display capacity of many screens. Although it is hard to adapt traditional book design principles of this new design medium, new medium has a dazzling set of skills considering with their characteristics. The design and publishing process are much shorter than the printed book, production processes such as color separation, printing, binding, form, installation, lacquer/film laminating applications has replaced with a workflow that a single person can do on a computer. These developments in the field of the publication has given way to the concept of self-publishing. Thus, the author/designer can publish an e-book by designing it from start to finish on a computer with the appropriate software and technical information.

The designer has the opportunities to enrich content design by using new audiovisual elements for book design thanks to multimedia elements such as pictures, animations, video and audio clips. Beyond these opportunities, the designer can use a wide variety of design elements due to the availability 3D and interaction formats for eBooks. The use of kinetic typography, scrolling of text blocks or use as a flowed text provides new opportunities for layout design. It is likely that the design of the book will be more practical due to the advantages deriving from the fact that the medium in which the e-book is designed and displayed are the same for which significant advantages exist in terms of preservation and distribution though lacking common standards. Although the uses of electronic and printed books intersect at several common areas in functional meaning, they cannot enter each other's domain in terms of several other usage areas, as a return of different skills. Within the borders of the opportunities they provide to the reader, the preferences of the people have revealed which medium is more suitable for which work, and the book format has been continuing to exist for that work.

For instance, that a researcher saves labor time by searching a keyword among the e-books on the screen instead of scanning hundreds of articles line by line manually plus the facilities such as being able to access such databases from anywhere in the World cause that the e-book formats are preferred in the research area. In contrast to this, can a tablet screen make the same contribution to a child's creativeness, imagination and excitement as a fairy tales book the unfolded pages of which reveal a three dimensional forest or animals as the child's parents, sitting beside his/her bed, turns them one by



one before the child falls into sleep? Besides, while the discussions on damage of the screen backlights on sleeping patterns and eye health continue, it seems rather impossible, at least for now, for the parents to prefer e-book to printed books, which are not limited to tablet screen size, and have very colorful and different design features.

Aside from the situations in which they have such net advantages to each other; the advantage of e-book such as being able to carry and read multiple books on your smartphone without feeling their weight onboard a transportation vehicle on your way from job to home and the advantages of printed book such as their never-ending charge, being able to fold it while reading laying sideways, not worrying about falling asleep with a book in hand, or being able to guess where we are from the thickness of the read part race against each other. Finally, even though the people are reading through the electronic media today, they still share only the cover of a printed book they have read in the social media.

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