

WHEN LIGATURES
TOUCH LITERATURE



THE IMPACT OF PERSO-ARABIC LIGATURES
ON PERSIAN EDITORIAL DESIGN

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Thesis / Research Article originally submitted in partial fulfilment of the requirements for the MA Reading Type and Typography (READSEARCH), University College PXL-MAD (Media, Arts & Design) School of Arts, 2023.

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WHEN LIGATURES TOUCH LITERATURE

Research, Text, Ligatures and Book design
by Niaz Mirmobini ©2023

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READING, LIGATURES, READING HABITS, TYPE DESIGN, PERSO-ARABIC, ARABIC TYPE DESIGN, VISUAL COMPLEXITY, FAMILIARITY, FLUENCY, CALLIGRAPHY, TYPOGRAPHY, LITERATURE, EDITORIAL DESIGN

ABSTRACT

The Perso-Arabic writing system is semi-connected and allows certain character sequences/strings to be replaced freely by more compact forms, here called ligatures.

To investigate the potential effect of ligatures on reading measures: engagement, accuracy, and fluency, 445 Naskh Style two letter groups ligatures were designed and tested with Persian readers in 3 different editorial texts and thus different levels of contents: Magazine (easy level), Newspaper (intermediate level), Essay (difficult level). Ligatures were found to influence reading fluency, and participants were more critical of unusual letter shapes. Readers had different preferences for reading ligatures in different editorial designs, leading this design study to categorize reading materials based on where ligatures could potentially be used.

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GLOSSARY

ACCURACY

focusing attention on the comprehension process to better remember the text.

ARABIC SCRIPT

is the writing system used for Arabic and several other languages of Asia and Africa such as Malay, Persian and Urdu. It is the second-most widely used alphabetic writing system in the world. Arabic is written and read from right to left. There is no distinction between upper- and lowercase letters, though shapes of letters usually vary depending on whether they are in an initial, medial, final or isolated position in a word.

DYNAMIC NASKH

it is used here to denote typefaces that almost completely emulate the behaviour of the Naskh manuscript. The style brings about the full complexity and intricacy of word formation of the Naskh style (Chahine 2012: 50). (Figure 1).

EDITORIAL DESIGN

is the art and practice of designing printed publications such as magazines, newspapers, journals, and books. It encompasses everything from layout and typography to content curation and photo editing.

MACRO-TYPOGRAPHY

the macro level is looking at the text as a whole (black and white), with specific graphic qualities as the texture/text colour; it is about the shaping of the space, so typeset and layout design: leading, column width, margins, density of the text etc.

MICRO-TYPOGRAPHY

the micro level refers to the visual comprehension of the letter shape (in a classification of these in relation to the text line in Perso-Arabic script: head, body, eye, tooth, neck, cup, ascender, descender, etc); it is about looking at the single black element of typography.

NASKH

it is a style meant for small text sizes that is characterized by an even distribution of round and straight elements and is quite clear to read. Naskh derives from the Arabic verb to copy. It is still being used for copying the Holy Quran. The Naskh writing style has seen considerable technical progress in its typographic history. Nadine Chahine classified in her PhD dissertation “three typographic variants of Naskh based on word formation are: Traditional Naskh, Dynamic Naskh and Simplified Naskh (Chahine 2012). These characterizations are the only distinction version of the visual forms, not based on the technical features.

LEISURE READING

also known as recreational reading, pleasure reading, free voluntary reading, and independent reading, is independent, self-selected reading of

a continuous text for a wide range of personal and social purposes. It can take place in and out of school, at any time.

PERSO-ARABIC

is a writing system based on the Arabic alphabet, modified to match the demands of being a writing system for the Persian language. The Persian alphabet consists of 32 characters, 28 are similar to Arabic and 4 additional ones are exclusive to Persian: (Peh)"پ", (Jeh)"ج", (Gaf)"گ", (Tchah)"چ". Persian is an Iranian language within the Indo-Iranian branch of the Indo-European languages. It is primarily spoken in Iran, Afghanistan, Tajikistan, and countries that has been historically under Persian influence.

Persian is a pluricentric language and its grammar is similar to that of many contemporary European languages (Unesco, n.d. 2023).

PERSO-ARABIC SCRIPT FEATURES

as the Arabic script evolved into a connected script, it developed an elaborate system of assimilations and dissimilations between adjacent letters. Within a word, most letters form connected groups. Arabic writing manifested two types of letter connections: horizontal (right to left) and vertical (top to bottom). This characteristic Arabic tendency emerged very early: all styles of Arabic writing, from the austere hieratic writing (e.g. kufic) to the more cursive styles (e.g. naskh), share this feature (Milo 2002: 114).

READING ENGAGEMENT

being fully immersed (intellectually and emotionally) in a text. Feeling connected to the text. Enjoy differences from current reading habits.

READING FLUENCY

the ability to read accurately at an appropriate rate while understanding the text.

READING HABITS

are calculated as how much a person read, how often do they read, when do they read and what do they read.

Reading can be summarized as a habit that involves books, printed articles and electronic materials. It varies differently of how each material can affect their reading habits.

SIMPLIFIED NASKH

it is a typographic interpretation of Naskh developed by Linotype in the mid 1950s in which each letter has two representational forms instead of the usual four. This simplified the typesetting of Arabic and the subsequent style became the default typeface of newspapers in the Middle East. The style is also used in book production, though not as frequently (Chahine 2012: 46). (Figure 2, 3).

TRADITIONAL NASKH

in this typographical Naskh style the individual character structures and shapes follow those of manuscript Naskh, but the stacking order is generally simpler. The stacking order is horizontal from right to left, and can be manipulated into a more complex order via a set of extra ligatures. The typefaces of this category vary in the number of ligatures that they support.

This varying number of ligatures serve to emulate, to a small degree, the feel of manuscript Naskh. This interpretation of Naskh was used in both hand setting and hot metal technologies. It is also the basis of the digital interpretation of almost all contemporary Arabic typefaces. This typographic style is quite commonly used in book and magazine production (Chahine 2012: 45-46). (Figure 4).

TYPOGRAPHIC CULTURAL IDENTITY

the identity associated to the appearance of the typography in a specific culture that it generated by the characterising/identifying features: like specific visual qualities, as word formation, text color, letter forms.

VISUAL DISCREPANCY

morphing complexity of manuscript forms (Figure 5) to metal-set ones via Latin technology and structure, indicates role of technology in technical progress of Naskh writing style in its typographic history. As maturity and complexity of word formation have removed or got simpler through the typographical adaptation journey, this visual discrepancy defines typographic visual culture of Arabic script world today in different languages (Figure 6).

Fig 1. Surat-al-adiyat in the 1827 Quran printed in tehran. Izadpanah. Borna's collection. "Persian and Arabic Printing in Qajar Iran". Nemeth, Titus. *Arabic Typography History and Practice*. Niggli.2023. Figure 34. page 130.

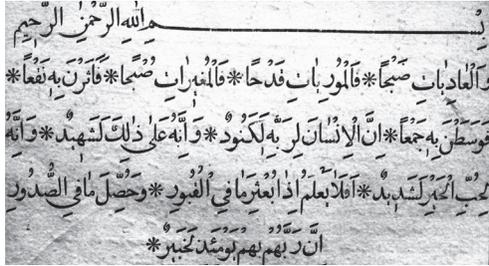


Fig 2. Mrowa Simplified Arabic, published in 1954, was the predecessor of Linotype's Yakout. Linotype Matrix. Chahine, Nadine. *Reading Arabic: legibility studies for the Arabic script*, Ph.D dissertation, Leiden University, 2012. Figure 2.11. Page 40.

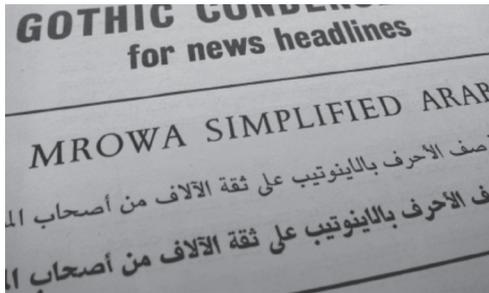
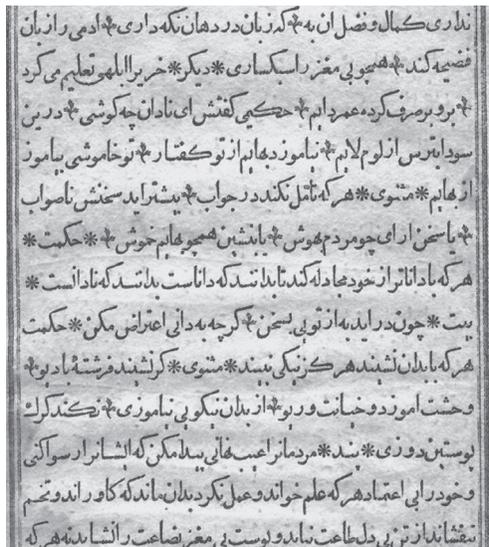


Fig 3. Simplified Persian or Ittilaat (1968-9). Izadpanah, Borna. "Persian and Arabic Printing in Qajar Iran". Nemeth, Titus. *Arabic Typography History and Practice*. Figure 54. page 147. Niggli.2023.

میرزا علی اصغر خان امین السلطان

Fig 4. Page 127 (unnumbered) of the first Tabriz edition of Gulistan of Sadi. Border dimensions 14.4x7.8 cm. Izadpanah, Borna's collection. Borna Izadpanah, Early Persian naskh of Iranian presses. "Persian and Arabic Printing in Qajar Iran". *Arabic Typography History and Practice*. page 122. Niggli.2023. Figure 18. page 112.



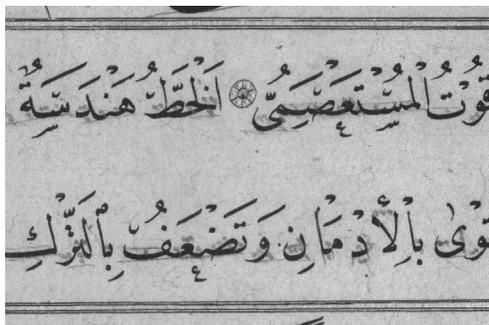


Fig. 5. Şevki Efendi, Mehmet. *Mehmet Şevki Efendi'nin Süslüs-Nesih Hat Meşhurleri*. 1829-1887. Introductory texts: Uğur Derman; Prepared by: Said Kasımoğlu. Research center for Islamic History, Art and Culture. 2010. The image displays Naskh style of writing in manuscript.

تعداد زیادی از این‌ها را خورد؛ در مورد من شصت دانه یا بیشتر. و قوه‌ی تصور نویسندگی‌ام را هم به کار انداخته بودم. داشتم فکر خانه‌ی بزرگ سنگی و اتاق‌های سنگی بزرگش با سقف‌های بلند این حدناچیز در من باقی مانده؟ من آن جا دنیا آمده بودم. آن جا راه مجسم کردم که در تخت خواب کوچکی خوابیده‌ام، میله‌میله و با توجه سلول زندان، و صدای پاهای گنده‌ای را می‌شنوم که تق و توق روی می‌دانستم که کف اتاق‌ها سنگی بود و تک و توک فالیچه داشت، پنج و کوه‌ها از میان‌شان پیدا بود و زمستان‌ها خانه سرد بود. تخت غیر از این نمی‌توانست باشد و بچه‌های کوچک هر صدایی را با گونه خود می‌شنوند، راه را بر هیچ چیز نمی‌بندند، آن طور که بزرگسال

Fig 6 . Example of current literary novels in Iran showing the visual discrepancy between contemporary typography and manuscript (Figure 5). 2023. Photographed by author. In Iran most books have typefaces that conforms to the traditional Naskh.

PERSONAL STATEMENT

Persian calligraphy is one of the revered arts throughout the Persian history which is part of fine Islamic culture and as a Persian designer calligraphy has always been a great personal passion. Following up my passion and merging it with my skill of painting and Persian literature, I gained experience of significant impression in experimental calligraphy. Script as a visual language, which is an advanced means of communication via forms, has always been a main trigger throughout my artistic and design experiences. However, through the adaptation of technological typographic evolution, often determined by Western standards, many of Perso-Arabic script features have been removed creating discrepancies between the manuscript form and its typographic development. While technology has taken a favorable turn and it is possible to return to manuscript forms I was triggered to explore how the reading experience in several editorial categories can be altered by the presence of ligatures (in a quantitative way) in running text.

Perso-Arabic is by nature a cursive script meaning that connected letters assimilate with each other and make a rich set of ligatures (Figure 7). Some of the ligatures are mandatory

while others are optional and exist only for aesthetic reasons, legibility or justification. Cursivity also implies four different forms for the same letter (initial, medial, final, and isolated) which is selected based on the context (Azmi & Alsaïari 2014: 179). Undoubtedly, giving the identical Latin script typesetting structure to the Perso-Arabic script had significant challenges throughout the typographic history which has been studied by some scholars like Nemeth (2017, 2022), Izadpanah (2018, 2022), Afshar (2017, 2018), Milo (2002, 2011), Chahine (2012), Conidi (2017, 2018), Yacizigil & Milo (2015) from a historical, a cultural, a designedly and technical point of view that attributed to the typographical cultural identity of Arabic script for different languages.

In Latin typography the ligature is an aesthetic feature to improve the rendering of a few troublesome letter combinations. In Arabic, however, connecting letters is not the exception but the rule” (Milo 2002: 123). (Figure 8). Calligraphic variation of letter group combinations in early Persian printed books, inside and outside of Iran, indicates that designers tried to stay close to the calligraphic writing style and it shows that the sample of handwritten books or manuscripts followed the Naskh style (Figure 9,10). The Naskh term, some write, “is used as a generic name for a variety of Arabic scripts used for many centuries, mostly for the copying of books and later for printing” (Chahine 2012: 30). “Since letters do not sit side by side, they often climb on top of each other and to remedy this, the punchcutters resorted to adding ligatures that give the sense of fluidity seen in manuscripts. The more ligatures, the more fluid the design” (Chahine 2012: 41).

The first four centuries of Arabic typography were dominated by increasing

complexity to setting type to give a better impression of calligraphic manuscripts, but in the fifth century the roles were reversed and economy and speed prevailed. When technology made it possible to have huge character set in type design, the calligraphic Perso-Arabic typefaces based on traditional calligraphy appeared in variety of style. Here ligature is a feature that designer can control for maximum effect depending on the task at hand.

Although all available technical features and styles can evolve into great designs that enrich the typographic repertoire, it is no longer an issue of subjective preference but of needing to know where and when to use these styles features. Accordingly, I have always been interested in legibility research and was thinking ahead to what the impact of type design might be on the reading behavior. I was triggered, as well as excited, to conduct a legibility experiment during my second Master Reading Type & Typography to discover the impact of ligatures on today's Persian reading performance. However, during a one-year Masters, it is extremely difficult to conduct an in-depth study with many participants. Therefore, I see this MA as a stepping stone to a doctoral research project involving visual aspects and speech parameters central to reading comprehension to promote deeper processing to support learning.

Having the privilege of working as an intern at READSEARCH alongside my studies made me want to study multidisciplinary and explore my design research in a real environment. Expressive fonts within the Arabic script¹ is part of a series of extensive studies and research within READSEARCH research line of visual prosody led by Prof. Dr. Ann Bessemans (2019). In 2021 this Arabic project, wherein

1. Expressive typeface (extended solutions with Arabic Script) project, selected and showcased in Prototype for Humanity 2022 in Dubai. <https://www.prototypeforhumanity.com/project/expressive-typeface/>

speech features were visualized in fonts to improve not only expressive reading, reading comprehension and reading confidence, but also reading methods and reading enjoyment, was one of my main and beloved internship projects. This project was an in-depth experience to begin a journey of discovery at micro and macro levels of typography and to see how these phenomena can be adapted to improve the reading process for demanding purposes. It shaped my Masters' project methodology.

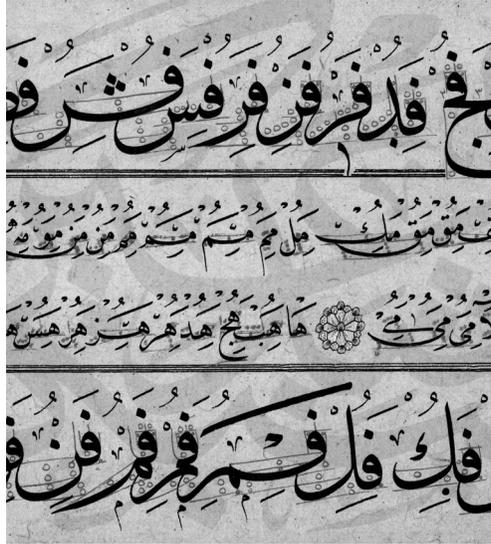


Fig. 7. Şevki Efendi, Mehmet. *Mehmet Şevki Efendi'nin Sülûs-Nesih Hat Meşikleri*. 1829-1887. Introductory texts: Uğur Derman; Prepared by: Said Kasimoğlu. Research center for Islamic History, Art and Culture. 2010.



Fig. 8. Latin ligature vs. Perso-Arabic ligature

beh.init+khah.medi

PROBLEM STATEMENT

The current situation of typography technology allows the Persian-Arabic script to become visually complex in terms of morphing the manuscript style as well as the typographic one (Chahine 2012), paving the way for such an approach to legibility research that combines visual culture with reading behavior.

Most of the existing research on legibility focuses on Latin writing rather than Persian-Arabic writing, but Arabic writing is increasing significantly compared to Persian one. Regarding the understanding of Persian/Arabic legibility, most knowledge is directed toward psychologists, engineers or reading specialists (Azmi et al. 2014, Elarian, et al 2015, Azadfalsh et al. 2017, Rostaminezhad et al.2014) which is based more on testing hypotheses with a problem-solving approach without any knowledge of the design aspect of typography. As a designer, to meet the typographic needs of a society and give style to your work, you must be involved with social representations to design for them (Afshar 2019). Therefore, it is very important to improve the reading efficiency and readers satisfaction by integrating cultural reading habits into the type design process.

What we can emphasize here is that typographic cultural identity is distinguishable between Arabic and Persian design. According to Titus Nemeth, who spoke at Atypi 2016, type that is more akin to manuscript form is more likely to be seen as Arabic, and types that are more typographic (simplified without set of ligatures) are more likely to be seen as Persian. His solution to design the Nasim font (the official font for BBC Persian and Arabic) more Arabic was therefore to add a series of ligatures. This decision was a result of feedback he received after the launch of the BBC Persian website, stating that the Nasim Persian font feels like Arabic. During his research to address this issue, he was confronted with a document from Etefaat publication manager in Tehran to Linotype in November 1967 that provided the company with a catalogue of the typefaces they wanted modified to make Persian simplified (Nemeth 2016). In general, the style of the drawing for Persian Simplified is further removed from the manuscript form than is typically the case with similar Arabic designs and contributes to a distinct typographical appearance (Nemeth 2017: 300). Although the discrepancy between the visual identity of Arabic and Persian script has been exploited by some scholars and designers, there is a growing trend to design ligatures in Persian letter design. Therefore, it is also an urgency to explore on a designedly way how to introduce and more important ligatures via a systematical approach. So, This research attempts to investigate their functionality in editorial design and their influence on reading function.

Another research which magnified the typographic culture of Persian readers through history is conducted by Borna Izadpanah (2022 : 75-151) which fill many gaps in Persian

typography history. He grabbed attentions on Persian Naskh style in early printing materials in Iran: “Persian Naskh, which is hardly discussed in current typographic discourse, was commonly used in Iran for different genres of text production, from manuscript to letterpress printing, and later lithographed publications. The use of Persian Naskh gradually diminished after the introduction of mechanical typesetting and the simultaneous simplification of writing, to give way to the abstract and simplified form of the Naskh style that characterised Iranian typography in the 20th century” (Nemeth 2022: 148). (Figure 11).

At Atypi (2017) and Istype (2019), Sahar Afshar, also a research designer with a technical and cultural approach, related the current preferences of Persian typography and the aesthetic conditioning of Persian readers to the Nastaliq calligraphy style that developed in Iran and was characterized by rounded, soft letterforms. Like today, typefaces in Iran are slightly softer and slightly rounder. These types of studies open many doors for more investigations in calligraphy and use new technology to solve some of the problems that exist in Perso-Arabic typography since print technology. To provide solutions to the most demanding design challenges of the Arabic script world, Tasmeeem provides a platform for both modern and traditional Arabic, using the accumulated expertise of past calligraphers and typographers as a plug-in for applications such as the Middle Eastern version of Adobe InDesign. For typesetting Arabic, Tasmeeem is far more versatile than anything OpenType can offer (Milo 2009).

سبب هیچیک از علایم را اشدین و فضیلهای متقدمین در این

واعلان شعایر کفر و انحراف کلمه اسلام دیگر چه ایدست

شب قدری قدری بهیبت تکریمت معلی بدخشان بودی بهیست

و شما از خون آنکرو صبر چهل از عاقله جلبله رانما شده کردین شاد بر کشتند اما ذوالقرنین بس و بجا

خدا ناک اندر قهر صبا هر چه در باهمن زمین همکین شیعی کرد در کس جام و جاه او حبشید

شما حیات و اسبقناکم ما عرفانا و بل یومئذ للمکذبین انظفوا

از قرآته و قبل از میل کردن بر کوع بوده باشد بعد از آن ترک آن

حرمات همین حال را دار دو بتا بر این ذکر عبادات را به بجهت اهمیت آنها

در میان زبانی در شمن و غیران نیست و اگر مقرر شود از برای او نکلدن

Fig 11. Early Persian Naskh of Iranian presses. Izadpanah, Borna (photographer). *Arabic Typography History and Practice*. Figure 55, page 149. Niggli, 2022. From top to bottom: *Jajadiyyah* (1818, Tabriz), *Jahadiyyah* (1819, Tabriz), *Gulistan 1st ed.* (Tabriz), *Hayat al-qulub* (1824, Tehran), *Abwab al-jinan* (1825, Tabriz), *Quran* (1827, Tehran), *Vajizah* (1830, Isfahan), *Risalah-i Sumiyah* (1834, Hamadan), *Nukhbah* (1837, Tehran).

This Master research project approached the issue of legibility for adult Persian native readers from a design context. The research is an attempt at bridging the gap between calligraphic and typographic model of the Perso-Arabic script and Persian cultural reading habits. In Perso-Arabic script calligraphers treat the composition of text in a specific way where certain letters can be stretched while others can be compressed. To justify a line, the calligraphers compose some ligatures to get a narrower text, or decompose some ligatures and extend certain letters to get a wider text. This process occurs according to the available space in the line (Azmi et al. 2014). In the development of the test material in current study (check methodology section), the focus was on ligatures' design and applying them in different editorial design for leisure reading. Parameters in designing ligatures are shape characteristics that add calligraphic/handwriting feelings to some letter group combinations.

In an attempt to find the answer for "*Does ligatures have impact on reading process?*", the focus of investigation is on two area: (1) visual complexity of ligatures, (2) familiarity effect of uncommon letter shapes in typography.

VISUAL COMPLEXITY OF LIGATURES

While technology is no longer such an obstacle in Perso-Arabic typography, Chahine (2012) examines the role of word form complexity based on dynamic features of Naskh's calligraphic style in reading Arabic texts. Chahine presents a new definition of legibility rooted in the models of eye movement research and argues that legibility is relative and depends on the characteristics of the visual stimulus, the viewer, the distance between them and the task. In Chahine's study, the complexity of word forms increased as the typeface moved closer to dynamic calligraphic shapes at the expense of word processing (Figure 12). This proved that complexity is detrimental to reading, but it also led to the understanding that there are cases of design where you want to slow the reader down (Chahine 2012: 225). For example, my current design research, focused on leisure reading where reading speed is not as essential as in educational reading tasks, or where you want the elegance of the letterforms to shine through, such as in a Holly book where slow reading is a convention. Accordingly, the text complexity level can vary via adding dynamic calligraphic visual characteristic features to the typeface. Here, ligature is one of the stylistic feature to control the reading function based on the task at hand.

2. We use the term disfluency/fluency to align with psychology literature and because we discuss issues related to visual aspects of typography but also a reader's impression of a text based on those visual aspects (Thiessen et al. 2020: 801).

This possibility which is entirely a design choice to cater specific needs is in line with disfluency theory² in which texts that are seen to be challenging in relation to perceived cognitive effort, can be considered as disfluent. However, this rationale is counterintuitive to typography, where the aim is typically to facilitate conditions that support reading with minimal effort, these harder to read texts are not always seen to be undesirable in cognitive psychology (Thiessen et al. 2020: 801). The initial research (Diemand-Yauman et al. 2011) suggests that hard-to-read fonts can improve memory. This theory states that when we perceive that something is hard to read, we put greater effort that helps us learn the material by processing it more deeply (Dyson et al. 2021). Such phenomenon is a concern for typographers who aim to support reading by reducing the cognitive burden on attention and working memory processes (Unger 2007). Importantly, impressions of difficulty like those associated with disfluency are very likely to impact one's motivation to engage with a task (Oppenheimer 2008) and this preference for typography likely develops early in the literacy development process (Walker et al. 2003).

Using difficult to read typefaces, which likely increases attentional load in experimental disfluency studies is operationalized through a range of different typographic manipulations, including variations to content or visual/stylistic changes (Thiessen et al. 2020: 804).

In this study hard to read is based on visual complexity and uncommon shapes of ligatures in reading materials. Since they elicit more attention, disfluent typefaces can be associated with conditions of desired difficulty (Bjork and Bjork 2011). Cognitive research shows that texts set in typefaces that are visually

complex are harder to identify by readers than ones that are simpler (Beier et al. 2017; Pelli et al. 2006). Thus, to control the desirable difficulty of text in this study ligatures should not exceed two letter groups combination.

To support using mildly difficult to read typefaces (Galler et al. 2018) investigate the effect of handwritten scripts compared to the font Courier³ on memory and suggests there may be a threshold at which point novelty or visual complexity ceases to be beneficial to memory. However, to current design research practice, disfluency as an opponent of the creative suggest that whether or when applying ligatures are desirable depends upon content and editorial design from designer view.

3. The monospaced nature of Courier may affect its readability, and thus, the results reported in the Geller et al. study. A collaborative approach with typographic researchers can uncover such problems. (Thiessen et al. 2020: 809)

FAMILIARITY EFFECT OF UNCOMMON LETTER SHAPES

Ligatures in Persian typography are intertwined with Persian culture because they exist in handwriting, calligraphy, urban typography and... in everyday life apart from literatures. So, this study by unfamiliarity or uncommon shapes refer to the lack of presence of ligatures in reading materials such as novels, magazines, newspaper, etc.

Some typographers have proposed that typeface familiarity is defined by the amount of time that a reader has been exposed to a typeface design while other typographers have proposed that familiarity is defined by the commonalities in letter shapes (Beier & Larson 2013 :16). Iran's current typography demonstrates that range of ligatures in Persian literature are limited, therefore, contextual and cultural reading habits consideration in this typography

research support these two hypotheses that exposure time and commonalities of letter shapes affect the reading process (Figure 13-15).

Describing the effect of familiarity, Gerard Unger (2007) points to the fact that when we always do things the same way, we no longer have to think about the action. In regards to reading, this makes it much easier to focus on the content and switch to the unconscious automatic form that is an essential element of a successful reading experiment (Beier 2009: 111). This phenomenon makes it possible to perform reading task without being conscious of it, a mode that can be interrupted by an unexpected event, such as an unusual ligature. Typographers believe that typeface familiarity plays an important role in the reading process and use this theory to improve design practice. Thus, which typefaces are Iranian readers accustomed to nowadays is important factor, as this study focuses more on the visual than the linguistic nature of text. Nadine Chahine (2012) and Sofie Beier (2009) mentioned in their PhD dissertations Licko's statement that "people read best what they read most". This seems relevant for this study. And so it is important to take note of current typographic culture, because it forms the basis for the collective visual memory in the minds of Iranian readers today. According to Licko, Iranian readers are not familiar to read text with ligatures, because of its infrequent use. Research carried out by Zineddin et al. (2003), Chahine (2012), Beier et al. (2013) supports the hypothesis that people read more efficiently with typefaces that they read frequently.

I believe that this study opens many doors for more investigation to fill the gaps between theories and practices in Perso-Arabic legibility research, as the effect of

reading environments, evaluating reading comprehension, expression and the effect of exposure period remain unanswered.

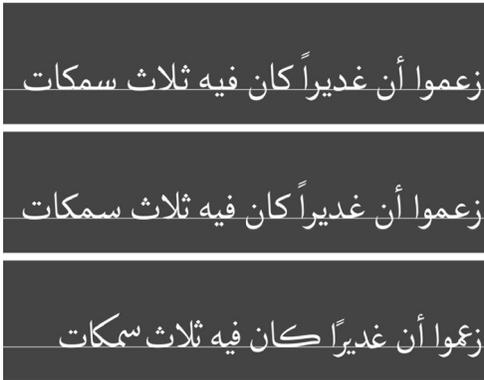


Fig 12. Chahine, Nadine. Three different style of Afandam From *Reading Arabic: legibility studies for the Arabic script*, Ph.D dissertation, Leiden University, 2012. Figure 01. Page 16. From top to bottom: Simplified, Traditional, Dynamic. As font style gets more dynamic and calligraphic shape, it gets more visually complex.

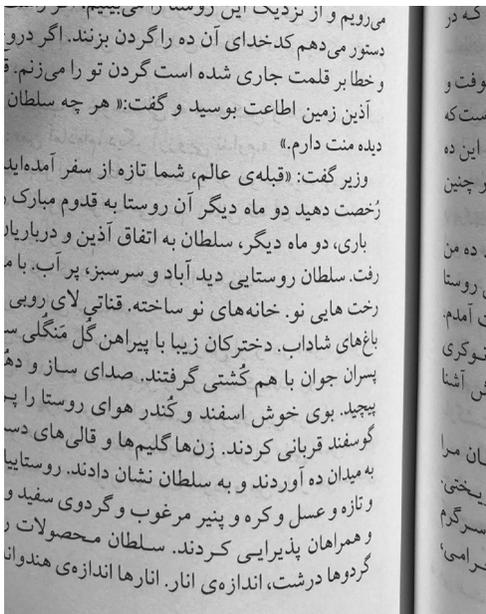
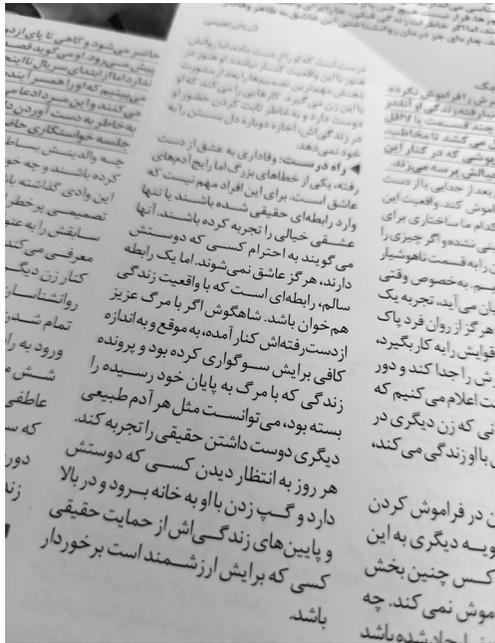


Fig 13. Example of current literary novels in Iran without ligatures. 2023. Photographed by author. In Iran most books have typefaces that conforms to the traditional Naskh description. Nazanin, Badr, Zar and Lotus are the most popular book typefaces in Iran.

Fig 14. Current newspaper typography relies mostly on Nazanin font Style. Photographed by author. 2023. Back to history of Persian typography, "this typeface was designed exclusively for Keyhan Press in 1978 by Hossein Abdollahzadeh Haqiqi, who before that designed Etlalat simplified and created the Persian Typography tune. Mitra and Nazanin became two of the most popular and widely used typefaces in Iran, creating the visual culture and typographical identity of Persian design. Today the Keyhan newspaper still uses both typefaces prominently in its printed edition."(Nemeth 2017, 318).



Fig 15. Current Magazines often use traditional Naskh style without ligatures in typography. 2023. Photographed by author.



OBJECTIVES TO INVESTIGATE THE POTENTIAL EFFECT OF LIGATURES ON READING

The objectives of the research usually differ across disciplines and these can determine the methods used. The current research starts from the hypothesis that, the unusual letter shapes as ligatures in contemporary Persian literature in micro level would have impact on reading measurements like fluency, engagement, and accuracy. As William Addison Dwiggins (1947) stated that a reader should never be conscious that the page is made up of letters, and that if any single character presents itself to the reader as a single character, it will interrupt the flow of the reading. Dwiggins also stresses that: "A type that stops you in the middle of a sentence and asks you to admire its smartness is a bad type" (Dwiggins 1928: 17) (Beier 2009: 110). The hypothesis supporting this position is that since Persian readers are not used to reading literature and non-religious books with ligatures, it could be proved that readers are critical of the text with ligatures and, consequently, the reading flow could be altered by visual forms of text. Moreover, the main consideration of this design research is the needs of readers and how they might respond in light of different typographic genres and individual preferences. And all of this, triggered by designing new approaches to ligatures.

4. Typographic genre is related to how texts are categorized by readers base on broad visual features, e.g. newspaper compared to novel. Readers develop expectations that can influence their reading strategy based on how a text looks (Moys, 2013, 2014).

Undoubtedly, a reader's impression of texts based on how it looks⁴ can influence how difficult or convoluted the content appears, how time consuming it is to be understood, or whether it is trustworthy (Song et al. 2008, 2010) (Thiessen et al. 2020: 800). Based on that, this study follows up by testing the hypothesis in macro level within the different editorial design, using different micro typographic elements as parameters, under more realistic reading conditions like home laying on a sofa or behind the table the places where Persian adult readers, read different materials in their spare time.

This investigation tries to explore: Do ligatures have an impact on the reading process? Does the visual appearance of text affect readers' perception of reading text with ligatures? What is appropriate editorial design that suites the implementation of ligatures? And how? Which parameters in leisure reading are important to categorize editorial design for using ligatures?

The innovative aspect of this research is that ligature as a typographic feature, identifies basic reading performance that can lead to useful design recommendations for continuous reading tasks in printed text formats and layouts for improving the reading performance of leisure reading materials such as magazines, books and newspapers in Persian. This is realized by the presence of ligatures as well as applying them in different content and editorial design for familiarity and disfluency theory investigation.

A problem in many of the studies focused on continuous reading is the countless numbers of variables to be controlled. The isolation of one variable for testing is not an easy matter

material, because variables frequently interact with each other (Beier 2009: 26). Therefore, the current research focuses on the perceptual effect of ligatures in different contents and layouts as interactive variables for ligatures in the reading function. Although ligatures are examined as visual stimuli in the reading function to establish design guidelines for Perso-Arabic text, the search for the possible location of ligatures in the text adds a linguistic layer to this research. Ultimately, it is worth noting that the manuscript forms of Perso-Arabic script were developed with the specific intention of giving value to what is being written, while the typographic version of that script accommodates the simplicity of visual features and forms with the faster and broader conveyance of information. Therefore, as a designer, it is important to look back at the history and origins of writing, make use of visual data and find solutions to contemporary needs regarding status and reading habits.

METHODOLOGY

DESIGNING MATERIALS IN A MICRO AND MACRO LEVEL

To convey information expressively through a text, the writer, the reader and the text itself are three factors that play a significant role in obtaining a great level of reading function. To answer the study's questions and test the hypothesis, the first step is to create a system for classifying and analysing the ligatures that determine the desired level of difficulty by design. Since most of the available Perso-Arabic fonts support limited ligatures and thus are not suitable for this research purpose, I relied on an existing type (Vije)⁵ that is based on modern Persian visual culture, easy to read and versatile. Next, all exciting ligatures were reviewed and a broad set of ligatures based on the Persian Naskh was designed and added to the Vije font. To define the desirable difficulty and keep typographical characteristics feeling of contemporary text in the design of 445 two letter group ligatures in 4 positions that include initial, middle, final, isolated forms the homogeneity between calligraphy and typography in both form and feel has been examined (Figure 16-19 b). Therefore, most of the glyphs confined to initial and final forms, as the medial and isolated forms bring more calligraphic fluidity to the design according to the incoming and outgoing connectors' behaviour and energetic baseline.

5. Vije is contemporary Perso-Arabic typeface Designed by Damoon Khanjanzadeh based on 'Naskh' Style.

Medial

ﺚ	ﺕ	ﻝ	ﻙ	ﻩ	ﺭ	ﺏ	ﻁ	ﻤ	ﻆ	ﻱ	Initial
ﺚﺕ	ﺕﺕ								ﺚﻱ		ﺏ
	ﺕﻝ								ﺕﻱ		ﻝ
ﺚﻝ	ﻝﻝ								ﺚﻱ		ﻝ
ﺚﻱ	ﻱﻱ								ﺚﻱ		ﻱ
											ﺏ
	ﺕﺭ								ﺕﺭ		ﺭ
	ﺕﻩ								ﺕﻩ		ﻩ
ﺕﻙ	ﻙﻙ	ﻙﻝ									ﻙ
ﺕﻱ	ﻱﻝ								ﺕﻱ		ﻱ
	ﺕﺭ								ﺕﺭ		ﺭ
	ﺕﻱ								ﺕﻱ		ﻱ

Fig 16. Initial form of two dotless- letter Groups ligatures. Designed for this project.

Medial

þ	ǫ	l	ʃ	è	ɛ	þ	ɔ	u	ɹ	ɿ	Medial
þ	þ										þ
											ɹ
ru	ru										u
ɔ	ɔ										ɔ
											þ
											ɛ
											è
ʃ	ʃ	ʃ									ʃ
	l										l
											ǫ
											þ

Fig 17. Medial form of two dotless- letter Groups ligatures. Designed for this project.

Final

ع	ط	ص	س	ر	د	ج	ب	ا	Medial
					بر				بـ
									جـ
									دـ
									رـ
									صـ
									طـ
									عـ
									فـ
								كا	كـ
								لا	لـ
									مـ
									هـ

Fig 18 a. Final form of two dotless- letter Groups ligatures. Designed for this project.

Final

گ	ه	و	ن	م	ل	ک	ق	ف	Medial
گی				می					ی
									ر
سی				می					س
صی				می					ص
									ط
									ذ
									ف
کی					کل				ک
				لم					ل
									م
									ن

Fig 18 b. Final form of two dotless- letter Groups ligatures. Designed for this project.

Final

ع	ط	ص	س	ر	د	ح	ب	ا	Initial
						ح			ب
						ح			ح
				س					د
				ص					د
									ط
						ع			ع
									ف
									ك
									ل
						ح			م
									ه

Fig 19 a. Isolated form of two dotless- letter Groups ligatures. Designed for this project.

Final

گ	ه	و	ن	م	ل	ك	ق	ف	Initial
بی				م					ب
حی				م					ح
سی				م					س
صی				م					ص
									ط
عی				م					ع
فی				م					ف
کی				م					ك
لی				م					ل
				م					م
هی				م					ه

Fig 19 b. Isolated form of two dotless- letter Groups ligatures. Designed for this project.

The Vije font has open counters and wide proportion with exuberant tooth proportion, which means that in order to avoid the unevenness of ink blobs and tight characters by adding ligatures and to maintain the highest level of legibility, the parameters such as stroke behaviors, modulation, contrast, structure, baseline energy and proportion should all remain as constant as possible.

Without a doubt, the merging of two letters into an independent character relatively affects the interior space in letters, which was one of the biggest challenges in designing ligatures for this project. In general, tighter inter-character spacing and visual composition of letters in word formation would deviate from the manuscript tradition, because here we have a typographical approach to only one of the cursive features of Perso-Arabic script. Since Perso-Arabic is a semi-joined script to check how characters and ligatures interact, word formation testing played an important role in the design process to check the relationship and space between characters. The ligatures were then tested in a paragraph, focusing on clarity and evenness of proportion and colour (figure 20).



Fig 20. Design process tests in text and individual words.

According to visual complexity the visual characteristic of ligatures are:

1. Movement: ligatures move along the y-axis and feel more energetic and dynamic than word formation without ligatures (Figure 21).

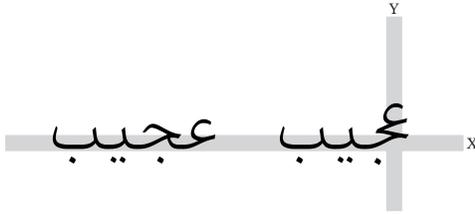


Fig 21. Word formation with (right) and without (left) ligatures showing ligature's movements along Y-axis.

2. Rhythm: by adding ligatures in a text, some characters are very close to one another, and others are quite spaced out which have direct effect on rhythm (Figure 22).

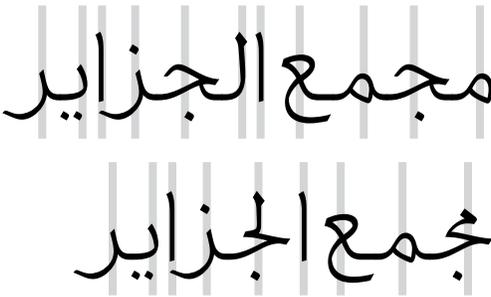
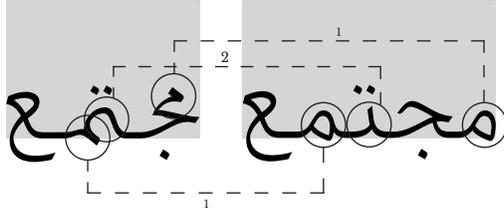


Fig 22. Word formation with (down) and without (up) ligatures showing ligature's rapid rhythm.

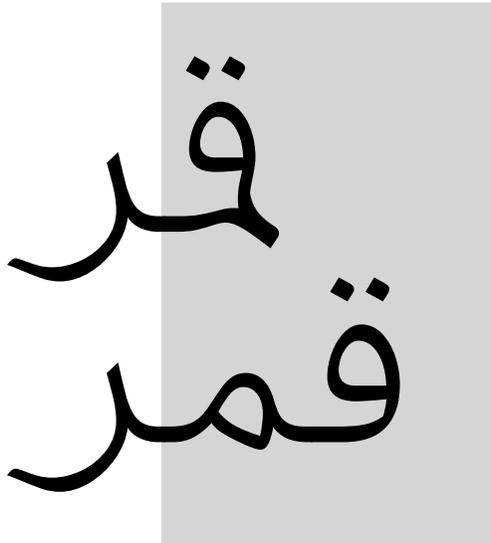
3. Word length: Merging two letters in Arabic scripts means that two letters' skeletons would change. These changes forming by climbing one character on the successive one, transforming teeth to small raise in the stroke, losing meem inner space and turning from circular form to a small stroke. Thus, all these transformations affect word length (Figure 23).

Fig 23. Shorter word length in the word with initial and midial ligature (left word). Lines number 1 indicate the letter meem formation change from circular form in right word without ligature into small stroke in left word with ligature. Line number 2 displays teeth stroke transformation of letter Teh in the right word to small raise in the left one.



4. Stacking order: Ligatures exhibit a more complex relationship of characters within the words. Characters combine in many different stacking orders. They climb on top of each other. Latin characters sit on the same baseline and are visually consistent with their linguistic position, so the stacking order does not play a role. In Perso-Arabic script most characters are attached to their neighbor ones. Characters are written in the same order as they are spelled in a word. However, because of the rounded styles, complex ligatures can occur where characters move around to create quite complex strings (Chahine 2012: 45). (Figure 24).

Fig 24. Letter positioning and stacking order has been changed in word formation by ligature (up). In the first word, letter meem positioned to the bottom right of the qaf which is sharp contrast to the spelling order. Experienced readers are trained to recognize these ligatures.



5. Space saving: applying ligatures in text takes up less horizontal space (Figure 25).

آن لحظه که جهانی دیگر را احضار می‌کنیم در حالیکه روی پلی در قاره‌ای دیگر یا در میدان یک شهر جنگ‌زده ایستاده‌ایم، دقیقا کجا هستیم؟ چیزی که باید دنبالش می‌رفتم این جنس مواجهه بود. چیزی که می‌توانستی اسمش را سفر در سفر بگذاری. اسمش چندان مهم نبود. آن مواجهه هرچه بود، آرام‌آرام به من فهماند که قبل از آن روز قبرستان به آب‌ها فکر می‌کردم. خیلی قبل‌تر. اولین شاهدش فصل بعدی است. و بعد پای همهٔ این‌ها بی‌سرو صدا به همزیستی مکتوب نوشتن رسید. همه چیز شبیه جواب سؤالی بود که مدام داشت گمراه‌تر و منحرف‌تر می‌شد اما جواب‌های شوق‌انگیزتری هم به دست می‌داد.

آن لحظه که جهانی دیگر را احضار می‌کنیم در حالیکه روی پلی در قاره‌ای دیگر یا در میدان یک شهر جنگ‌زده ایستاده‌ایم، دقیقا کجا هستیم؟ چیزی که باید دنبالش می‌رفتم این جنس مواجهه بود. چیزی که می‌توانستی اسمش را سفر در سفر بگذاری. اسمش چندان مهم نبود. آن مواجهه هرچه بود، آرام‌آرام به من فهماند که قبل از آن روز قبرستان به آب‌ها فکر می‌کردم. خیلی قبل‌تر. اولین شاهدش فصل بعدی است. و بعد پای همهٔ این‌ها بی‌سرو صدا به همزیستی مکتوب نوشتن رسید. همه چیز شبیه جواب سؤالی بود که مدام داشت گمراه‌تر و منحرف‌تر می‌شد اما جواب‌های شوق‌انگیزتری هم به دست می‌داد.

Fig 25. Comparison of a text with (down) and without applying (up) ligatures.

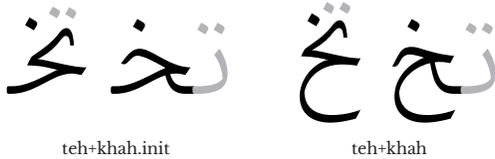
6. Dynamic feeling: Ligatures add dynamic energy to the baseline by diversity of white proportions (Figure 26).

Fig 26: Organic feeling of fluidity and lack of baseline gravity in the word with ligatures (left), compares to the same word (right) without ligatures.



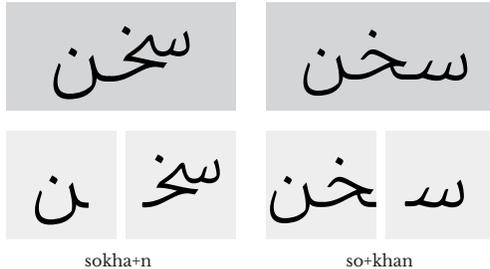
7. Dot positioning: since letters are combined or climbed up, the position of dots changes (Figure 27).

Fig 27: Tight composition affects dot positioning in some ligatures.



8. Phonological “building blocks” of the word, and syllables are visually affected (Figure 28).

Fig 28: Syllable segmentation are visually involved with applying ligatures (left) which can cause complexity in decoding for non-experienced readers.



To control for interactive variables in this study, the second step is to test ligatures at the macro level with different editorial designs and content. At the macro level, design parameters such as margins, leading, number of columns and line length led to testing ligatures in Magazine (easy level), Newspaper (medium level) and Essay (difficult level) from a content and layout perspective in this study. To control for interactive variables in this study, the second step is to test ligatures at the macro level with different editorial designs and content. At the macro level, design parameters such as margins, leading, number of columns and line length led to testing ligatures in Magazine (easy level), Newspaper (medium level) and Essay (difficult level) from a content and layout perspective in this study (Figure 29-32).



Fig 29. Test material,newspaper, in three version.



Fig 30. Test material, newspaper, in three version. Detailed.



Fig 31. Test material, essay, in three version.



Fig 32: Test material,magazine, in three version.

PROCEDURE OF THE INTERVIEW AND EXPERIMENTS AND PARTICIPANTS' COMMENTS

The third step to understanding how ligatures can affect the reading process, after developing and analyzing ligatures at micro and macro levels, is to consider the opinions of text producers (writers) and text receivers (readers). This is because you can discover the outcome of a design through reading experience, which can determine the design principle for favorable functionality of the design. Studies on reader preference focus on the subjective opinion of the participant. Asking the preferences of the target group can generate helpful information when studying whether a font appeals to the public or not (Beier 2009: 32). Since font preference is likely to be influenced by what readers are used to reading

6. Kianoosh Motaghedi: Art Historian. Majid Jalise: writer and Bibliographer. Misagh Zare: Copywriter and actor. Maryam Zeynali: Persian literature and Fiction Writer. Amir Ebrahim Jalalian: Novelist and Critic. Bitā Fallāhi: Script Writer and fiction writer. Nazila Hadiqi: Film Director and Poet. Mahboubeh Zare: Fiction writer, editor and voice actor. Roham Shiraz: Curatorial Writer. Erfan Mojbib: Translator. Behnaz Mashatian: Children's Author and children's book publisher.

and by their personal views on aesthetics, a different approach to that in this study is to take into account writers' views based on genre, writing style and their knowledge of their target audience's preferences (Figure 33).

Questions asked in interview with 11 writers⁶ in different genres:

1. Are there any preferences in choosing font?
2. If yes, why you choose that specific one?
3. Do you think if you use ligatures in fonts that are close to calligraphic style, your message comes across impressively or not?

"It can better show the style of writer and be welcomed by museums where must have their own identity like Tehran Museum of Contemporary Art. The other place where these kinds of fonts can be used are artistic books, books that galleries and art institutes published." —Kianoosh Motaghedi

"This kind of font should be available in the most legible, aesthetic and functional manner that writers and Publishers can use but there are not exist with this quality." —Majid Jalise

"Audiences are not familiar with the text by this format. It can use in titles or in quotations, the sections where currently designed in smaller size or in italic, bold or condensed for making the part of the text highlight to show the quotation or give other information." —Misagh Zare

"In current literatures in Iran you rarely seen text with ligatures or calligraphic style. In Persian literature this type of font can have high potential to use, and I assumed that has impact on readers' experience. Since

Fig 33. Quotations from interview with writers

publishing book is extremely expensive in Iran, it is not affordable for publisher to expend money on new fonts with this feature." —Maryam Zeynali

"I would use ligature, If this kind of font is available In order to boost ease of reading and engaging experience to my audiences. Using ligatures is not yet common in our society may be in near future we would face with more in literatures."

—Amir Ebrahim Jalalian

"My audiences are not familiar with this type of font. In my genre rather than beauty of typeface, the beauty of text is important. I have not seen any book in Iran with calligraphic features like this except classic poems I have never faced with ligatures in any text. Publishers are the ones who decide about fonts and layouts not writers." —Bitra Fallahi

"I would rather using ligatures in my poems than my screenplay. I assumed that text with ligatures impressively impact on conveying intimacy to the content which can impact on better visual connection between audience and text and feel like casual speaking to me. In Visually point view it like ABBAS Kia Rostami works it is familiar and intimate to me."

—Nazila Hadiqi

"Inevitably using ligatures have impact on the reading flow and feeling of content. The point is literature taste and reading habits of audiences in a society should not be overlooked. Although I have not feel huge differences between the word shapes in texts with and without ligatures, it can impact on comprehension and interest of reader to continue reading." —Mahboubeh Zare

"I think font choice brings expression to the text according to its genre. I think ligatures causes difficulty in reading process and the reason behind

this might be the fact of reading habits which we are not used to read literatures by ligatures. In headlines, book covers there are possibility to use ligatures."

—Erfan Mojib

"The curvatures in ligatures bring some negative space which beside other white space empowers the texture of the text and make distance from being merely a text, moreover it makes visual gravity. The question that I ask here is that doesn't any text need this visual gravity? Form my experience when you increase the texture of the text on the wall the readability gets higher and its more interesting for audiences to read." —Roham Shiraz

"Beginner readers face with some letters and word shapes like ligatures you have designed which is close to cursive handwriting style and it is up to their level of visual literacy. In publishing books for children, I have never used hand writing style because we do not have font diversity, which is suitable for this group age aesthetically and functionally and we have limitation in font choose." —Behnaz Mashatian

Ligatures' effect on reading process were tested in three editorial design by 21 skilled adult native Persian readers, aged 25 to 50. Participants were divided into three groups and each of them tested three different texts (Figure 34-36).

Questions posed to the participants:

1. Did you notice any differences in the text? If so, what were they?
2. How much do you like it?
3. What do you like or dislike? And can you describe why you don't like it?
4. Can you describe the situation in which you would appreciate more?

5. Within the flow of the text, did you find yourself remembering what was the text about? Or did the flow limit your ability to remember the text because you were too focused on the shapes of the letterforms? If so, what were you thinking about?
 6. Was there a place in the reading flow where you had to reread a word or sentences? Did you have regression? If so, what was the reason for that? Where was it?
-

"like the font and I think it was readable. But the newspaper in my eyes was more difficult."

—Mahboubeh Malekmokhtari

"Newspaper was second in easy reading, but I don't like the content. And I did not like to read it."

—Milad Mohammadi

"like the font and I think it was readable. But the newspaper in my eyes was more difficult."

—Mahboubeh Malekmokhtari

"Reading the newspaper paper section by section makes it easier to read. Letter forms didn't bother or distract me. The newspaper was the easiest to read. I didn't notice the ligatures and font differences. In my mind the spacing was better." —Iman Javadian

"The newspaper font was too weird for me, and I have never seen anything like that. In the newspaper, my eyes move faster than the text and I had most of regression there. The newspaper feels like Arabic text to my eyes. It felt like I was reading the Holy Quran book. In the newspaper my eyes move faster than the text and I had most regression there. The newspaper was the least easy to read." —Shadi Laki Shirazi

Fig 34. Group A: Read an article of newspaper with many ligatures, an article of magazine with balanced use of ligatures and a spread of an essay without ligatures. Quotations from Group A experience while reading an article of newspaper with many ligatures

"I read the newspaper so easily and fluently. It was easy to remember." —Saeed Saedi

"I read the newspaper so easily and fluently. It was easy to remember." —Saeed Saedi

"Newspaper was second in easy reading, but I don't like the content. And I did not like to read it."
—Milad Mohammadi

"In newspapers the headlines, titles and the layout navigate me to read differently. I noticed the differences in the fonts and didn't like the newspaper because it looked like handwriting which was the most the most complex to read. The newspaper was not fluent, the eyes didn't move forward. I was more distracted in reading newspaper and needed to reread, I think it was because of font and content."
—Hanieh Kazerooni

"There is time differences in them. In my opinion the newspaper was older. Word length was longer and it feels like the text is more and longer than it is. Difficult. I had Regretion. I believe the font was dominant over the text and I was distracted."
—Helia Kazerooni

"The font in the magazine was interesting, and I enjoyed reading. I think some word shapes were different from what we normally see every day for example LAHZEH word was one of them that grabbed my attention, but it was readable and not difficult to read. They were just a bit strange. I like its reading experience." —Mahsa Ebrahimi

"The magazine was the easiest to read and most fluent. I like it more than the two others."
—Niloufar Neyestani

Fig 35. Group B: Read an article of magazine with many ligatures, a spread of an essay with balanced use of ligatures and an article of newspaper without ligatures. Quotations from Group B experience while reading magazine with many ligatures.

"Magazine was easier to read because font style was smoother and more homogenous the other and another reason reason was layout and two columns. I appreciate it more." —Shaghayegh Mohammadi

"I like the magazine more than the two others and it was easier and more enjoyable for me to read. I moslyt remember the magazine and believe its font is suitable for adult readers." —Sanaz Mirmobini

"Some words were strange for me, like (IJAD) because it was the first time that I read text in these shapes form. Dots positioning was in different level. My focus was more on the word shapes. I remember the most from the magazine. I took a pause when I saw ligatures, I was focused more on words with ligatures. IJAD and EJTEMEI. like." —Sareh Zarghampour

"I took a pause when I have reached to these forms because it was interesting and strange. Generally, the ligatures are highlighted in the text. some words Like BEHZISTI, EJTEMAEI were interesting to me. It was easy to read." —Hadi Hasanzadeh

"BEHZISTI and IJAD were the words that were strange because I used to write like this. But I read the magazine more fluently than the newspaper and the book. I remember the letter forms and they caused me to pause because I noticed the difference that I do not see this form in normal text. I like to read text. I appreciate the experience of reading magazine."
—Helia Talebi

"The font was different and caused me to read the novel more accurately. the letter shapes where different somewhere in the novel. I appreciate more the reading of the the novel because I liked more the."
—Hassan Ghods

Fig 36. Group C: Read a spread of an essay with many ligatures, an article of newspaper with balanced use of ligatures and an article of magazine without ligatures. Quotations from Group C experience while reading a spread of an essay with many ligatures.

"The novel was easier to read. It was more fluent. And I like it. It was more cursive." —Nastaran Taheri

"The font in the novel was small and difficult to read. I had regressions during reading. I had to focus a lot during the reading." —Esmaeil Mirzaghali

"I remember the most the from the novel. The font style in the novel is more literary that matches with this kind of genre. Reading essay was not clearer than two others and caused me to read it longer and having pause in couple of times." —Faezeh Afsharmanesh

"There was different baseline in the novel. It was handwriting style. The connection of YEH_ MEEM. final it was close to calligraphy and teeth of letters in combination to other letters were inspiring with calligraphy and typography. It reads fluent and has an easy readability. It caused me to focus more on shapes than content." —Solmaz Niazi

"The novel was difficult to read. Content was difficult. I had regressions in the novel because I could not imagine the story due to the flashback and flash-forward of the narrative. The punctuation in novel lead me to read expressively and I had to concentrate on punctuation to understand how to read it and continue reading. The letter forms had no impact on remembering. I do not remember specific letter or word shapes. I remember most of the novel."
—Soheil Goodarzi

"The novel was a bit vague; the font was different from what I have read so far. It was more difficult to read, and I had regressions. It reminds me of old books. I paused in some section of reading the novel to understand the content. But I remember it most."
—Shadi Mazhari

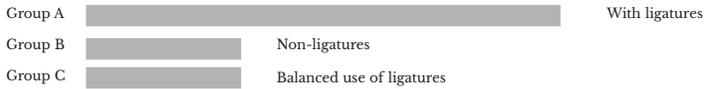
Subsequently, interview with 11 writers in different genres support the hypothesis that uncommon letter shapes impact on the reading function since audiences are not used to reading texts with ligatures on a daily basis. They also suggest that the audience should slowly get used to reading text with ligatures via some literatures like poetry or artistic books.

General view on reading texts with high level of ligatures:

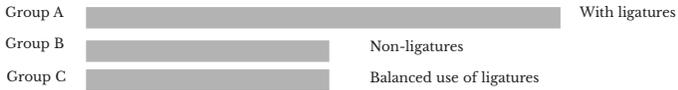
- Essay (Novel): It was difficult to read, it requires more focus during the reading than two other materials, they like it, they remember more both content and letter forms due to their uncommon shapes which support disfluency theory. According to this experience reading a text intensively requires great mental effort and focus. Therefore, it should be considered to read texts that are interesting and short, to read only short periods of time, and do so when you have the most mental energy (Figure 37).
- Magazine: It was easy to read and needs more focus. Readers experienced pause by letter shapes because it was first time they see and feel like handwriting, they like it, recall both content and letter shapes. In conclusion, based on this experience ligatures are best for when you read longer and easier texts that are interesting, with appropriate level of difficulty and moderate length to read, when you can dedicate longer blocks of time (Figure 38).

- Newspaper: It was difficult for the participants to read texts with high level of ligatures, they were distracted by font style during the reading process, and they dislike it (Figure 39).

Engagement in reading Essay



Accuracy in reading Essay

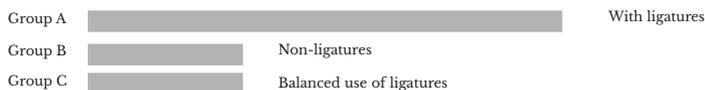


Fluency in reading Essay



Fig 37. Bar chart shows reading measures that were affected while reading essays in this study.

Engagement in reading Magazine



Accuracy in reading Magazine



Fluency in reading Magazine

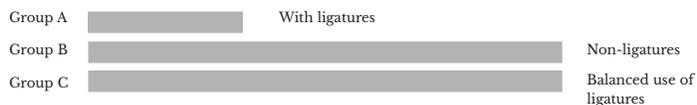


Fig 38. Bar chart shows reading measures that were affected while reading magazine in this study.

Engagement in reading Newspaper



Accuracy in reading Newspaper



Fluency in reading Newspaper

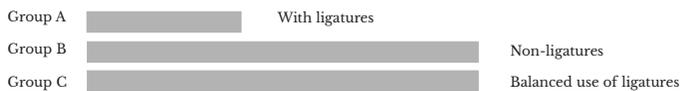


Fig 39. Bar chart shows reading measures that were affected while reading newspaper in this study.

Participants' opinion demonstrate that readers are noticeably more critical about the fonts with ligatures due to uncommon shapes compared to fonts with common/familiar letter shapes, which supports the writers' perspective on the uncommonness of ligatures in literatures (figure 40).



Fig 40. Photo of the procedure of the experiment.

THE ARTISTIC OUTPUT

THE PRESENTATION OF THE ARTISTIC WORK.

Besides designing a set of ligatures and test materials (check the methodology section p41-p53), the current design research builds a functional bilingual book with design guidelines for users of Persian-Arabic script on how to search for the possible location of visual style features such as ligatures based on cultural reading habits and reading context in different layouts. Designed in Persian from right to left and the English version from left to right, this bilingual book contains the information on what this project means by ligatures and the system designed for applying ligatures based on the desired difficulty level (Figure 41-47). In addition, my approach in this project is to look back at historical calligraphic features of the Naskh writing style and revive some sets of ligatures to test their functionality and survivability in literatures. Naskh is the main model for Persian literature typefaces which is adaptable and versatile for newly designed typefaces and ligatures. This writing style has seen considerable technical progress in its typographic history. Naskh's three variants based on word formation are included in this book to clarify the visual complexity of word

formations based on their characterisations. Regarding to typographical cultural identity discrepancy between Persian and Arabic design this book refers to some evidence to emphasize the goal of this study to respect the cultural reading habits. In order to identify the Persian visual identity in this book we take a quick look at current Persian literatures in Iran.

Furthermore, the structure of the design process and design parameters are visualized and documented at book pulse test materials of design research. By combining design knowledge with experimental methods, the project takes another step forward towards a better understanding of how ligatures can affect the reading process. This experience is included extensively in the book as a report of the test and interviews with participants and authors. Finally, the content of the book comes together in two languages through letter examples of ligatures designed in the centre of the book. Each ligature is shown with its variants and non-ligature form with four colour-coded characters based on their word positioning.

This book is designed to familiarize type designers with multidisciplinary legibility studies to seek solutions to bridge gaps between design practice and empirical design research.

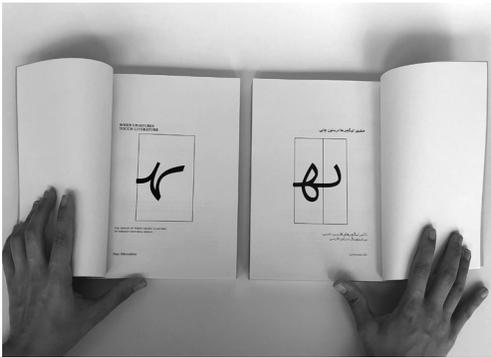
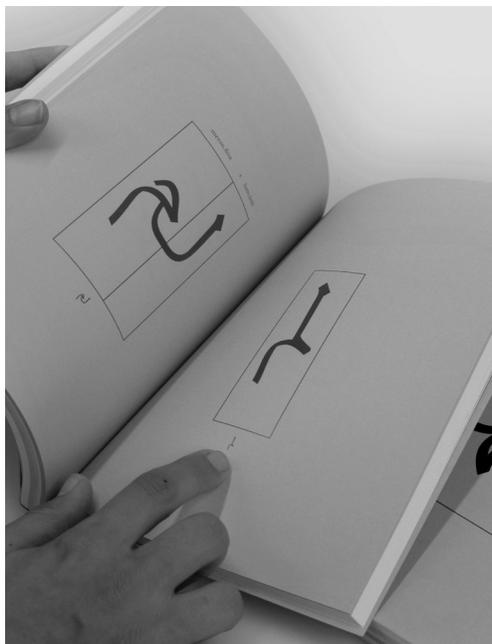


Fig 41. Bilingual guideline book.

Fig 42. Bilingual guideline book, type specimen, initial ligature (right page) and non-ligature (left page) characters.



Fig 43. Bilingual guideline book, type specimen, isolated ligature (right page) and non-ligature (left page) characters.



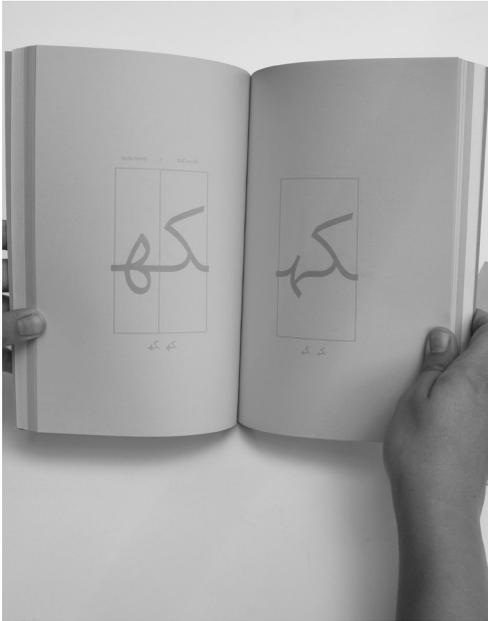


Fig 44. Bilingual guideline book, type specimen, medial ligature (right page) and non-ligature (left page) characters.

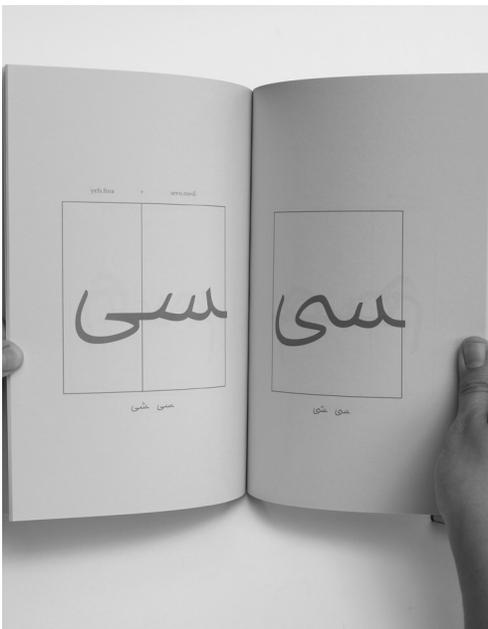


Fig 45. Bilingual guideline book, type specimen, final ligature (right page) and non-ligature (left page) characters.

CONCLUSION

We discussed the implications of ligatures in different editorial designs, as well as the perspective of text producers and adult readers who benefit from certain visual qualities of typefaces. Despite the importance of the existence of these letter groups in Perso-Arabic script to represent stylistic and aesthetic features, they increase control over text space. Ultimately, this has direct implications for our spending in print publications.

The concept of variables in design, such as ligatures that add complexity to the text, is a design element that allows a designer to control the functionality of the reading task. Reading is influenced by the linguistic qualities of the text, the reader's reading ability and the visual characteristics of the text. Therefore, the level of visual literacy of writing and reading habits, typographic cultural identity and context must be taken into account when using ligatures.

Although this study focused on leisure reading, the use of ligatures led to deep rather than superficial reading. Regarding the experiment of this study, the appearance of the text and the content affect readers' perception of reading texts with ligatures, thus the editorial design categories proposed based on this

study are: Content level: Novel, Educational books, Historical book, Islamic art history book, Prose & Poem. Macrotypography level: Newspaper, Magazine, Marketing material.

According to this study, speed is one of the most important factors in reading, which is why the use of ligatures is not recommended in newspapers and educational books. This study examined only reading skills: engagement, accuracy and fluency, based on the visual complexity and familiarity of the text by adding ligatures. These three hypotheses were tested by measuring participants' fluency and preferences. According to the test, reading fluency was most affected by ligatures contributing to pauses during reading and causing participants to be less motivated to read the paper. This study certainly leaves many doors open for further research, such as evaluating reading comprehension, speed and expression and the effect of exposure period.

BIBLIOGRAPHY

- Afshar, Sahar. "Considering the old, designing the new", ATypi 2017 Montreal, Consulted on June 6th 2023. <https://www.youtube.com/watch?v=SBCPP-vxMBs>.
- Afshar, Sahar, and José Miguel Solé Bruning. "On expanding connections (AKA making it fit)", TYPO Labs 2018, Consulted on 6th June 2023. <https://www.youtube.com/watch?v=MYLtwQWjTW4>.
- Afshar, Sahar. "Muses, methods, and thereafter". istype2019. Consulted on June 6th 2023. <https://www.youtube.com/watch?v=bphuPVfSzm8>.
- Azadfalsh, Nafiseh, Masoud Sharifi, and Mahmoud Heidari. "The effects of word length and font type on eye movement (fixation, saccade, regression) during reading familiar and unfamiliar passages." Contemporary Psychology, Biannual journal of the Iranian Psychological association. Vol.11, no.2(11-2017). 2017. pp.67-80.
- Azmi, Aqil M., and Abeer Alsaiani. "A calligraphic based scheme to justify Arabic text improving readability and comprehension." Computers in Human Behavior, vol.39, 2014, pp.177-186.
- Bessemans, Ann, et al. "Visual prosody supports reading aloud expressively." Visible Language 53.3 2019.
- Beier, Sofie. *Typeface legibility: towards defining familiarity*. PhD diss Royal College of Art (United Kingdom), 2009.
- Beier, Sofie, and Kevin Larson. "How does typeface familiarity affect reading performance and reader preference?." Information Design Journal, vol.20, no.1,2013, pp.16-31.
- Beier, Sofie, Katrine Sand, and Randi Starrfelt. "Legibility Implications of Embellished Display Typefaces." Visible Language ,vol.51, no.1 2017, pp. 112–132.

- Bjork, Elizabeth L., and Robert A. Bjork. "Making Things Hard on Yourself, but in a Good Way: creating Desirable Difficulties to Enhance Learning." *Psychology and the Real World: Essays Illustrating Fundamental Contributions to Society*, vol. 2, 2011, pp.59–68.
- Chahine, Nadine. "Reading Arabic." *Legibility studies for the Arabic script*. PhD diss university of Leiden. 2012.
- Conidi,Emanuela. "Researching The Origins of Arabic Typography". istype2017. Consulted on May 12th 2023.<https://vimeo.com/233706813>.
- Conidi,Emanuela. "Uncovering Arabic type history, informing design". Atypi2018. Consulted on May 13th 2023.<https://www.youtube.com/watch?v=GkHAgysQvS4>.
- Diemand-Yauman, Connor, Daniel Oppenheimer, and Erikka Vaughan. "Fortune Favors the Bold (and the Italicized): Effects of Disfluency on Educational Outcomes." *Cognition*, vol. 118, no.1, 2011, pp. 111–115.
- Dwiggins, w.a. "Mss. by WAD: being a collection of the writings of Dwiggins on various subjects Some critical, some philosophical, some whimsical", New York: The Typophiles, 1947.
- Dwiggins, w.a. "Layout in Advertising", New York: Harper and Brothers Publishing, 1928.
- Dyson, Mary, David Brezina, "Exploring disfluency: Are designers too sensitive to harder-to-read typefaces?" *Design Regression.com*, 2021. Consulted on March 7th 2023. <https://designregression.com/research/exploring-disfluency-are-designers-too-sensitive-to-harder-to-read-typefaces>.
- Elarian, Yousef, et al. "Arabic ligatures: analysis and application in text recognition". 2015 13th International Conference on Document Analysis and Recognition (ICDAR). IEEE, 2015.
- Geller, Jason, Mary L. Still, Veronica J. Dark, and Shana K. Carpenter. "Would Disfluency by Any Other Name Still Be Disfluent? Examining the Disfluency Effect with Cursive Handwriting." *Memory & Cognition*, vol.46, no.7, 2018, pp. 1109–1126. doi:10.3758/s13421-018-0824-6.
- Izadpanah, Borna. "Early Persian printing and typefounding in Europe." *Journal of the Printing Historical Society*, vol. 29 2018, pp. 87-123.
- licko, z. "Typeface design", *Emigre*, 15, 1990, pp. 8-13.

- Milo, Thomas. *"Arabic script and typography: A brief historical overview."* Language Culture Type: International Type Design in the Age of Unicode (2002): 112-127.
- Milo, Thomas. *"DecoType, ACE and Tasmeem, Font technology, Layout-engine and Showcase"*. The 4th DTL Font Master Conference, Type [&] Design 2009. Consulted on May 7th 2023. <https://av.tib.eu/media/21968>.
- Milo, Thomas. *"The role of Dutch Arabic typography in Middle Eastern printing."* ATypi 2011 Iceland. Consulted on April 13th 2023. <https://www.youtube.com/watch?v=1ljsfUQ-qqw>
- Moys, Jeanne-Louise. *"Investigating Readers' Impressions of Typographic Differentiation Using Repertory Grids."* Visible Language, vol.47, no.3, 2013, pp. 96–123.
- Moys, Jeanne-Louise. *"Typographic Layout and First Impressions—Testing How Changes in Text Layout Influence Readers' Judgments of Documents."* Visible Language, vol.48, no.1, 2014. pp. 40–67.
- Nemeth, Titus. *"Arabic type-making in the machine age: The influence of technology on the form of Arabic type, 1908–1993"*. vol.14. Brill,2017.
- Nemeth, Titus et al. *"Arabic typography: history and practice"*. niggli, 2022.
- Nemeth, Titus. *"There is nothing Arabic about the Arabic Script"*. ATypi 2016 Warsaw. Consulted on May 4th 2023. <https://www.youtube.com/watch?v=Gz34Ff2hzNE>.
- Oppenheimer, Daniel M., and Michael C. Frank. *"A rose in any other font would not smell as sweet: Effects of perceptual fluency on categorization."* Cognition, vol. 106, no.3, 2008, pp.1178-1194.
- Pelli, Denis G., Catherine W. Burns, Bart Farell, and Deborah C. Moore-Page. *"Feature Detection and Letter Identification."* Vision Research, vol. 46 , no. 28, 2006, pp. 4646–4674. doi:10.1016/j.visres.2006. 04.023.
- Persian "Silk Roads Programme"*. (n.d.-b). Consulted on 20.05.2023 <https://en.unesco.org/silkroad/silk-road-themes/languages-and-endanger-languages/persian>
- Rostaminezad, M.A, et al. *"The effect of font types on reading speed, accuracy and comprehension of textbook readers."* University textbook; Research and Writing, Quarterly Journal of the center for research and development in the Humanities, SAMT, vol.18, no.34, Autumn 2014, pp 51-66, ISSN 1735-0999

- Song, Hyunjin, and Norbert Schwarz. "*If It's Hard to Read, It's Hard to Do: processing Fluency Affects Effort Prediction and Motivation.*" *Psychological Science* ,vol.19 ,no.10 ,2008, pp.986–988. doi:10.1111/j.1467-9280.2008.02189.x.
- Song, Hyunjin, and Norbert Schwarz. "*If It's Easy to Read, It's Easy to Do, Pretty, Good, and True.*" *The Psychologist* ,vol.2, no.2, 2010, pp.108–111.
- Thiessen, Myra, Sofie Beier, and Hannah Keage. "*A review of the cognitive effects of disfluent typography on functional reading.*" *The Design Journal*, vol. 23, no.5, 2020, pp.797-815.
- Unger, Gerard. "*While You're Reading*". New York: Mark Batty Publisher. 2007.
- Walker, Sue, and Linda Reynolds. "*Serifs, Sans Serifs and Infant Characters in Children's Reading Books.*" *Information Design Journal*,vol. 11.no 3, 2002, pp.106–122. doi:10.1075/idj.11.2.04wal.
- Yacizigil, Onur, and Thomas Milo. "*The pivotal role of Arabic script grammar in the transition*". Granshan 2015. Consulted on March 18th 2023. <https://www.youtube.com/watch?v=NO7Xxitxr3k>.
- Zineddin, a.z., garvey, m., carlson, r.a. & pietrucha, m.t. "*Effects of Practice on Font Legibility*". *Proceedings of the human Factors and Ergonomics Society 47th Annual Meeting*, 2003, pp. 1717-1720.

VISUAL REFERENCES

- Chahine, Nadine. *"Reading Arabic: legibility studies for the Arabic"*. script, Ph.D dissertation, Leiden University, 2012. Figure 01. Page 16.
- Chahine, Nadine. *"Reading Arabic: legibility studies for the Arabic"*. script, Ph.D dissertation, Leiden University, 2012. Figure 2.11. Page 40.
- Farahani, Mirza Abol-Qasem Qa'em-Maqam. *"Jahadiyyah"*. 1818. First page. National library of Iran. Izadpanah, Borna (photographer). *"Arabic typography: history and practice"*. 2022. Figure 7. Page 92. Photograph of first page from *"Jahadiyyah"*, National library of Iran. Page 1.
- Izadpanah, Borna (Izadpanah's collection). *"Arabic typography: history and practice"*. 2022. Figure 18. Page 112.
- Izadpanah, Borna (Izadpanah's collection). *"Arabic typography: history and practice"*. 2022. Figure 34. Page 130.
- Izadpanah, Borna. *"Arabic typography: history and practice"*. 2022. Figure 54. Page 147.
- Izadpanah, Borna (photographer). *"Arabic typography: history and practice"*. 2022. Figure 55. Page 149.
- Şevkî Efendi, Mehmet. *"Mehmet Şevkî Efendi'nin Sülüs-Nesih Hat Meşkleri."* 1829-1887. Introductory texts: Uğur Derman; Prepared by: Said Kasımoğlu. Research center for Islamic History, Art

WHEN LIGATURES TOUCH LITERATURE

Research, Text, Ligatures and Book design
by Niaz Mirmobini ©2023

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PXL-MAD (Media, Arts & Design) School of Arts
2021-2023

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