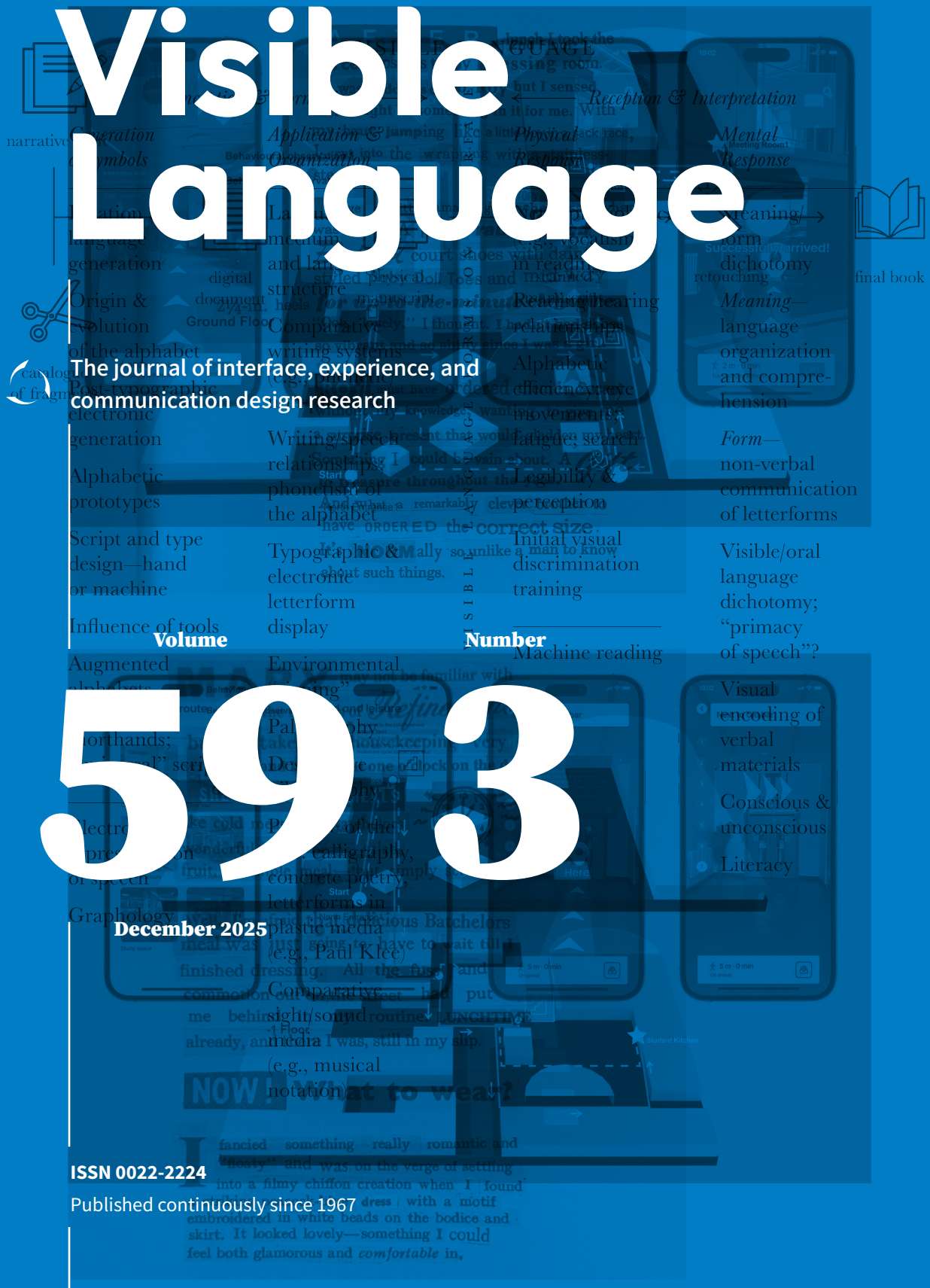
Visible Language

The journal of interface, experience, and communication design research



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EDITORIAL

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Volume 59 Number 3

Word | Image | Space | Materiality | Experience

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Welcome to *Visible Language's* special issue of student research: Word | Image | Space | Materiality | Experience.

We last published a special issue (52.3) devoted to student research in 2018. That issue focused on participant research and encompassed studies of a range of artifacts within typography, illustration and communication design (including: handwriting and branding, posters, maps, eInk displays, resources for people with aphasia, garment label design, storytelling with new digital tools, live art and social media spaces). They shared an engagement with everyday contexts for human-centered design.

This special student issue similarly includes an array of visual communication applications: bilingual cover design, typeface legibility, the hypertangible novel, print and digital newspaper design, textile tickets, and wayfinding. As a collection, they incorporate historical and emerging practices and engage with questions of culture and materiality.

The call for this special issue invited research papers on both participant and collections-based research. Our double-blind peer review process applied to give students and recent graduates an opportunity to experience the publication process, with some concessions made in terms of the number of artifacts or participants expected within the scope of study. Generalizability is often a challenge for design research, as findings from both participant- and artifact-based research are always specific to the materials studied. From a methodological point of view, this collection — through its variety of approaches to literature review, visual analysis, and participant

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research — demonstrates the importance of multiple methods in our field. And the importance of multiple lines of inquiry to explore different facets of visual communication, its evolution and how it is experienced.

The issue also includes two invited memorial tributes, one to James Mosley and the other to Michael Twyman, who both made an immeasurable contribution to typographic research since its emergence as a discrete area of inquiry. We are honored to acknowledge their respective influences on our discipline. We hope the juxtaposition of these tributes alongside examples of research from emerging researchers encourages our readers to continue exploring visual communication design theory, research, methods, and practice.

Our thanks to all the authors, reviewers and the editorial team for their important contributions to this issue.

RESEARCH ARTICLE

Beyond (Type)Face Value: A Systematic Literature Review Examining Design Factors Influencing the Legibility and Readability of Typography

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Abstract: Printed or digital text is a primary communication medium. Reading is necessary for locating, understanding, and using information in our personal and professional lives. The importance of reading makes typography essential to accessibility. The purpose of this systematic literature review was to examine design factors that influence the legibility and readability of accessible typography, resulting in 42 peer-reviewed empirical studies (2000–2025) that report on typeface design, typesetting, and other factors affecting legibility and readability of typography in Latin alphabet-based languages. Key findings include: (1) serifs are not a significant legibility factor; (2) no single type size or typeface optimizes readability for everyone in every situation; and (3) familiarity may be a significant legibility and readability factor. These results suggest that accessible typography guidelines should reflect the complexity and nuance involved in optimizing readability and identify several research gaps. Future research should explore typeface design characteristics beyond serifs within type classifications, the influence of familiarity on readability and reading skills, the potential transferability of familiarity between similar typefaces, the duration of the familiarization process, the persistence of its effects, and whether reader motivation and adaptability can outweigh these effects. Additionally, accessible typography research may benefit from studies incorporating natural reading conditions, materials that better reflect current design practices, more diverse reading measures, and in-depth qualitative approaches.

Keywords: accessibility; legibility; readability; reading; typography

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1. Introduction

Accessibility measures ensure that everyone, including persons with disabilities, can fully participate in society and have equal access to fundamental rights and freedoms (United Nations, 2006). Accessibility is a general term that describes the degree to which the design of a product, materials, device, service, or environment is usable by people with a diverse range of abilities (Harniss, 2014). Although there are many formats for information or communication, printed or digital text remains a primary communication medium. Reading is necessary to locate, understand, and use information and communications presented as text, symbols, or images (Government of Canada, 2024). Reading can also be used to acquire knowledge and learn new skills (Goldman et al., 2016). The importance of reading for communication, social participation, health and wellness, learning, employment, and overall quality of life makes typography essential to accessibility. For the purpose of this study, typography refers to the appearance and style of text and the artistic or technical characteristics of typesetting text (Clair & Busic-Snyder, 2005a). Accessible typography depends on legibility and readability. Legibility describes the degree to which a reader can recognize or identify individual letters or words (Felici, 2012). Readability describes the degree to which a reader can perceive, process, comprehend, and make meaning out of text (Felici, 2012). Legibility depends on typeface design, including features such as letter structure and letterform. Beier and Larson (2013) use the term "letter skeleton" to describe letter structure, which excludes stylistic visual details. In this review, the term letter structure is retained. In contrast, letterform refers to the visual representation of a letter, including its strokes, proportions, and design features. Readability depends on design factors such as typesetting and typeface design, as well as other non-design-based factors, including vocabulary, writing style, environmental conditions, and individual differences (Clair & Busic-Snyder, 2005b).

1.1. Accessible Typography Recommendations

The United Nations (UN) Convention on the Rights of Persons with Disabilities (CRPD) is an international human rights treaty with legal obligations to protect the rights of people with disabilities, including accessibility measures. The CRPD has been ratified by almost all the countries in the UN (United Nations, 2023); this has encouraged an international approach to accessibility, with many governments creating legislation, policies, and standards in compliance with the measures of the CRPD. With consideration of the current global response to accessibility, the most recent guidelines for Latin alphabet-based languages were reviewed from several governments and organizations worldwide. In Australia and New Zealand, these guidelines included the Australian Government (n.d.) and the Round Table on Information Access for People with Print Disabilities Inc. (Round Table, 2022), a group of public and private sector organiza-

tions, institutions, and government departments focused on accessibility. In Canada, guidelines were sourced from both the Government of Canada (2022) and the Canadian National Institute for the Blind (CNIB, 2020), a non-profit organization that supports Canadians who are blind or visually impaired. From the European Union, guidelines were identified from the Publications Office of the European Union (2023) and the European Blind Union (EBU, 2016), a non-profit organization that supports blind and visually impaired individuals across Europe. In the United Kingdom, sources included the Disability Unit (2021), part of the Cabinet Office, and the Royal National Institute of Blind People (RNIB, 2023), a leading non-profit organization that supports blind and partially sighted people throughout the UK. In the United States, guidelines were reviewed from the American Printing House for the Blind (APH, 2022), a non-profit organization that supports blind and visually impaired individuals, and Web Accessibility In Mind (WebAIM, 2020), a non-profit organization from the Institute for Disability Research, Policy & Practice at Utah State University. WebAIM's accessibility tools and recommendations are web-focused and guided by the Web Content Accessibility Guidelines (WCAG). Finally, guidelines were included from the United Nations (2022), which reflect international commitments to accessibility.

The primary typography recommendations in these accessible typography guidelines often concern, as summarized below, serifs, typeface, type style, letter case, type size, spacing (letter and line), and line length.

Serifs. The UN (2022) asserted that serifs may make reading more challenging and interfere with letter recognition. The Publications Office of the European Union (2023) advised that serifs may impede letter identification by distracting from letter shapes and warned that this effect may be further compounded on screen due to display issues such as pixelation. Recommendations such as these may lead to the conclusion that serifs cannot be accessible.

Typeface. Sans serif typefaces are most often recommended for accessibility, with Arial frequently suggested for Clear Print documents. Round Table (2022) recommended using Arial, Verdana, Helvetica, and Calibri. The CNIB (2020) suggested using Arial or Verdana. The RNIB (2023) stated that Arial set at 14 pt is ideal. The repeated recommendations for the Arial typeface may suggest that it is optimally accessible and may support the bias towards sans serif typefaces.

Type style. Many accessible typography guidelines suggest limiting the use of bold or italic type styles for different reasons. Regarding bold type styles, the Government of Canada (2022) recommended using bold type styles strictly for emphasis in print and on-screen applications, and noted that bold text could confuse screen readers. Regarding italic type styles, the RNIB (2023) advised against using italics in print documents. Additionally, WebAIM (2020) warned that bold or italic type styles may

make text more challenging to read on-screen and that each variation of type style requires some adjustment from the reader. These recommendations restrict the use of bold and italic type styles, which may lead to the assumption that these styles are not accessible.

Letter case. The use of uppercase letters is often discouraged in accessible typography guidelines. The Disability Unit (2021) advised, without explanation, that blocks of uppercase letters should not be used in titles or body copy of print documents. The Government of Canada (2022) stated that uppercase letters might confuse screen readers or other assistive devices and make on-screen reading more challenging, particularly for people relying on word shapes. These suggestions may lead to the belief that uppercase letters are not accessible.

Type size. Some of the recommendations regarding type size in accessible typography guidelines are vague. The CNIB (2020) said: "Bigger is better. Keep your text large, between 12 and 18 points, depending on the font" (#3 Point Size section) for documents. The Australian Government (n.d.) suggested 12 pt or larger for documents without further guidance. WebAIM (2020) simply advises against using small font sizes on-screen. The idea, "bigger is better" may be too simplistic to address how type size interacts with other individual or situational factors that affect the readability of textual information.

Spacing. Some guidelines clearly articulate the potential benefits or consequences of spacing, while others are brief or make no mention of spacing. In some cases, letter spacing (tracking) or line spacing (leading) is used to compensate for increased type sizes by fitting more characters per line or more lines per column. The Publications Office of the European Union (2023) cautioned that insufficient spacing may impede letter recognition in both print and on-screen formats. The Disability Unit (2021) suggested accommodating limited space on the page by reducing the amount of information before reducing type size; this suggestion appears to prioritize type size and spacing over content for accessibility. The amount of information may impact the layout, design, and overall accessibility of materials.

Line length. Some accessible typography guidelines directly address line length or indirectly address it with suggestions on whether to use columns. The EBU (2016) and the CNIB (2020) both recommended using columns in print documents to improve readability by reducing eye movement and dependence on peripheral vision. However, the APH (2022) advised against using columns, and stated that shifting from the end of a line to the beginning of the next when reading is challenging for people with low vision, as columns can shorten line lengths and increase the frequency of this task. These contradictory recommendations for line length or columns require some clarification or further contextual information.

1.2. Purpose and Significance of This Literature Review

Given the complexity of the interactions between typography, diverse readers, and contextual factors that influence readability and accessibility, a one-size-fits-all approach to accessible typography may not be possible. However, guidelines suggesting 'best practices' merit exploration. By taking a systematic approach to investigating the research on design-based influences of accessible typography, we can identify main concepts addressed in the literature, and potentially identify knowledge gaps, with the ultimate goal of enhancing understanding regarding inclusive design and communication. Therefore, this review aims to answer the research question: What design factors most influence the legibility and readability of accessible typography?

By exploring the body of work related to the impact of typeface design and typographic variables in modern Latin alphabet-based languages on participants' reading (i.e., legibility or readability of words, not characters in isolation), and applying these findings to address concerns in accessible typography guidelines regarding the accessibility of serifs, typefaces, type styles, uppercase letters, and other traditional typesetting options, this literature review aims to offer insight into design practices that may advance evidence-based guidance on optimizing typography for accessibility. The findings may also highlight typography's significance in everyday life and the potential social impact of design.

2. Methods

2.1. Eligibility Criteria

Table 1. Literature inclusion criteria.

Category	Inclusion criteria
Literature type	Empirical studies using qualitative, quantitative, or mixed methods
Publication source	Peer-reviewed journal articles in English
Publication dates	Peer-reviewed journal articles published from year 2000 to 2025
Study design	Studies examining the impact of typeface design variables and typographic variables in modern Latin alphabet-based languages on participants' reading in print or on-screen, i.e., legibility or readability of words, not characters in isolation. Studies using specialist typefaces were excluded.
Participants	Participants aged 15 to 65, of any gender or geographical location, with normal, corrected to normal, or low vision and individual differences such as dyslexia, who completed studies in native and non-native language contexts.

Literature inclusion criteria for this review (see Table 1) exclusively featured empirical studies using qualitative, quantitative, or mixed methods, published in peer-reviewed journal articles in English between 2000 and 2025. Limiting the publication date to 2000 ensured the articles were current and relevant to modern technology and contexts.

2.2. Search Strategy

A review strategy was developed in consultation with the Social Science, Humanities, and Education librarian at Ontario Tech University. It included search terms focusing on typography and its reading-related effects (see Table 2), search tools (databases and search engines), and search options or limits.

Table 2. Literature search terms.

Category	Search terms
Typography (area of interest)	(typograph* OR typeface OR font)
Reading consequences	(legibility OR readability OR accessibility OR “reading speed”)

The search strategy included four stages. First, searches were conducted on education databases: Education Source via EBSCOhost and ERIC via ProQuest. Second, searches were conducted on multidisciplinary databases with education coverage including APA PsycInfo via ProQuest, and Web of Science via Clarivate Analytics. Third, results from Google Scholar (multidisciplinary scholarly search engine) triangulated database search results. The Google Scholar results were limited to the first 100 due to the lack of advanced search options and the quantity of the search results. Finally, the references in the qualifying articles were hand-searched as an additional search strategy.

2.3. Data Collection Process

A database was created to store and manage the data from the reviewed studies. A multi-step procedure was implemented to populate the database. First, essential study characteristics were documented, including (1) author, (2) year of publication, (3) title of publication, (4) title of journal, and (5) institutional affiliation. Second, participant information such as (6) geographic location, (7) language, (8) age, and (9) participant disabilities (if applicable) were entered into the database. Third, additional information from the reviewed studies was collected, including (10) research objective(s), (11) research methods, (12) key findings/outcomes, and (13) results. Fourth, the (14) data collection tools, (15) independent, and (16) dependent variables were compiled and categorized. Finally, information was collected on the typefaces used in each study, including any findings based on performance, preference, or other outcomes.

2.4. Synthesis Methods

The synthesis process followed several steps outlined in the PRISMA Expanded Checklist (Page et al., 2021). The first step in the process involved data charting the extracted information from the reviewed studies in detail. After the data charting was complete, figures were made to visualize the data and tallied statistics. The columns and categories of the data charts were analyzed for commonalities between the data from the reviewed studies and the information from the existing accessible typography literature and guidelines. The accessible typography literature and guidelines provided context to help identify and organize patterns grounded in design and accessibility. As a graphic designer, and as educators and education researchers, our knowledge and experience in graphic design and typography informed the reflexive approach to thematic analysis. This expertise also facilitated the navigation of sources, and supported the interpretation of findings to address the research question and identify gaps in the literature. The findings were then organized into themes to provide an in-depth understanding of how the typeface design and typographic variables affected people's reading performance and experiences, which may have influenced their perspectives and preferences.

3. Results

3.1. Study Selection

The systematic literature search initially resulted in 802 peer-reviewed papers (see Figure 1). After removing 132 duplicates, the remaining 670 articles were screened using the title and abstract as a guide. As a result, 54 articles met the specific search criteria based on the guiding research question (i.e., What design factors most influence the legibility and readability of accessible typography?) and qualified for full-text screening. Upon completion of full-text screening, 32 peer-reviewed articles met the inclusion criteria as described earlier. These results were cross-referenced with the first 100 search results from Google Scholar, which yielded another 10 articles for screening, resulting in the inclusion of two additional articles. Finally, handsearching the reference lists of these 34 publications resulted in the identification of eight additional articles meeting the inclusion criteria for screening. In total, 42 articles were included in this systematic literature review. Figure 1 provides a visual representation of the study selection process for this literature review.

3.2. Findings Responding to the Research Question

3.3. Reviewed Studies Overview

The reviewed studies ($N = 42$) were published in 26 academic journals with contributions from 103 authors. Appendix A: Empirical Studies on Legibility and Readability

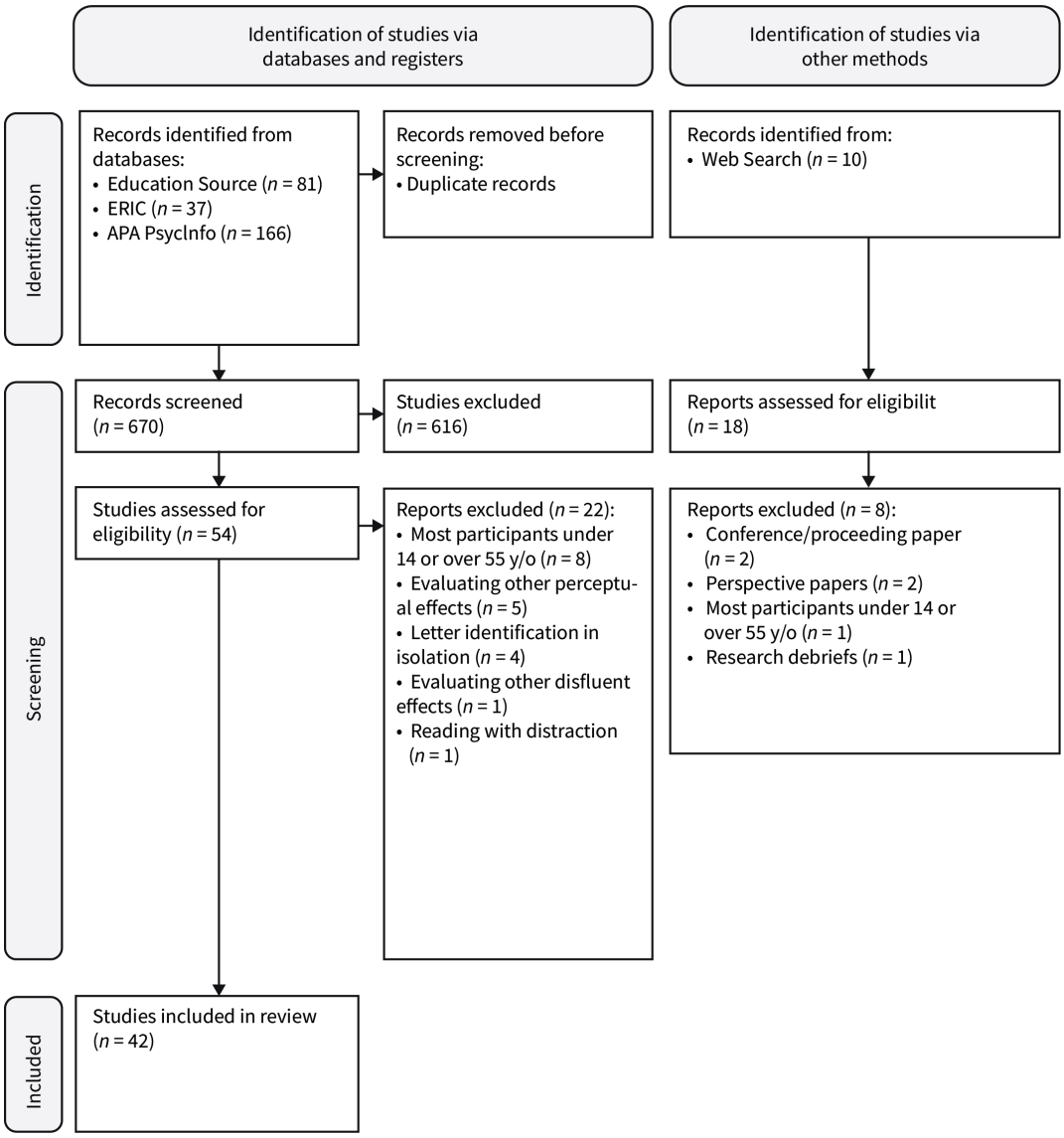

Figure 1. PRISMA 2020 flow diagram.

Using Quantitative Methods (n = 30) and Appendix B: Empirical Studies on Legibility and Readability Using Both Quantitative and Qualitative Methods (n = 12) provide the four data items for the reviewed studies: (1) Participants; (2) Research Objective; (3) Research Measurements; and (4) Key Findings/Results. Half of the studies (n = 21) were published in the past decade (see Figure 2).

Participant Demographics

The 42 reviewed studies were conducted in 10 countries: Belgium, Denmark, India, Iran, Malaysia, Nigeria, Slovenia, Spain, United Kingdom, and the US (see Figure 3). Most of the studies were conducted in English (n = 36), and some were conducted in Danish (n = 5) and German (n = 1).

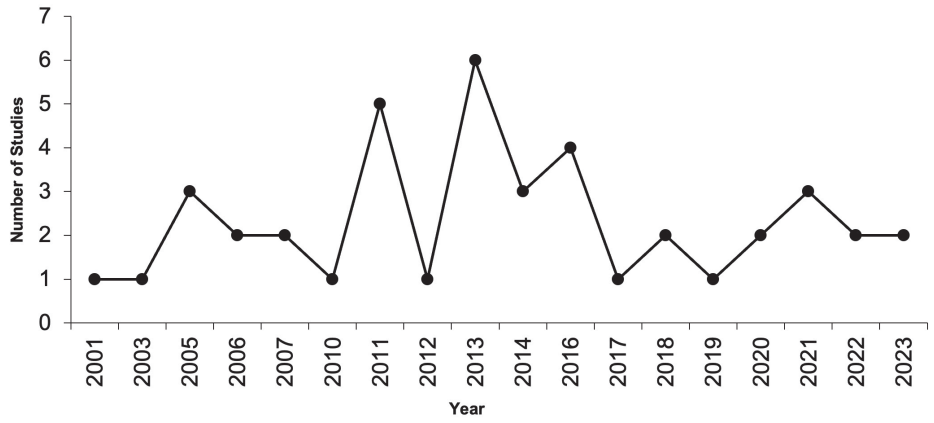

Figure 2. Reviewed studies distribution by year (*N* = 42).

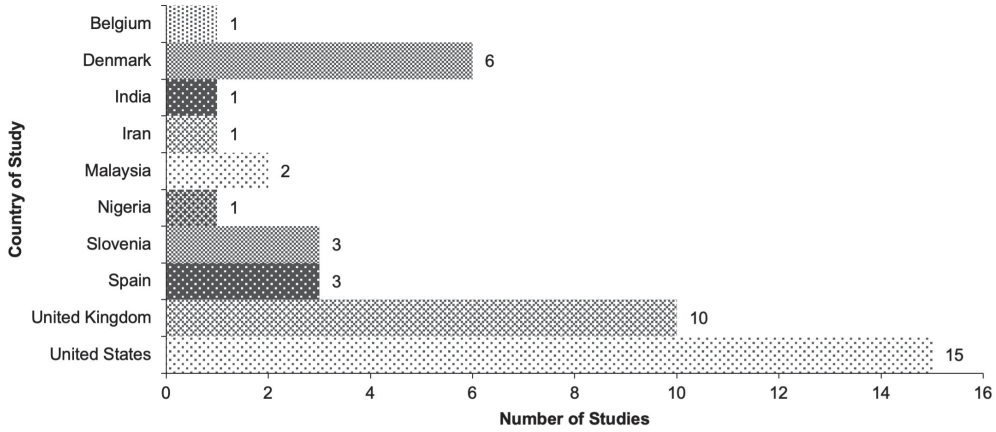

Figure 3. Reviewed studies distribution by country (*N* = 42).

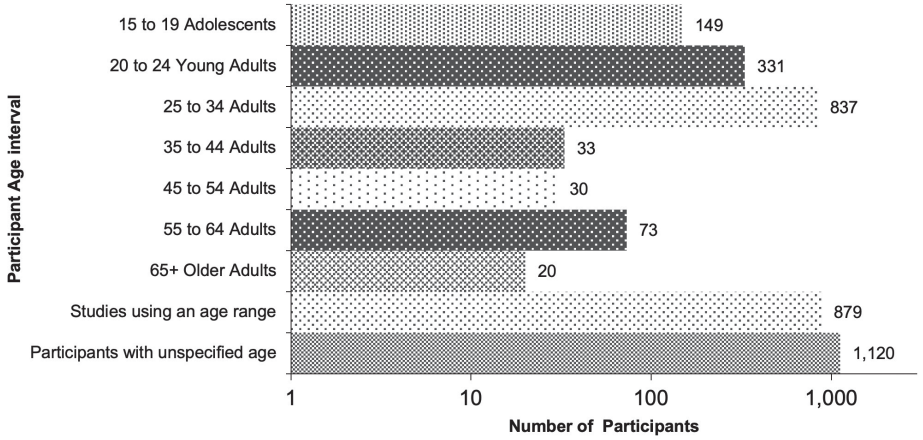

Figure 4. Reviewed studies participant distribution by age (*N* = 3,323).

Note. The age intervals are based on the UN's (1982) *Recommended standard international age classifications,* for reporting a medium level of detail, as outlined in the *Provisional Guidelines on Standard International Age Classifications*. The age categories are based on the UN's (n.d.) definition of "youth" and Statistics Canada's (2023) *Age Categories, Life Cycle Groupings*.

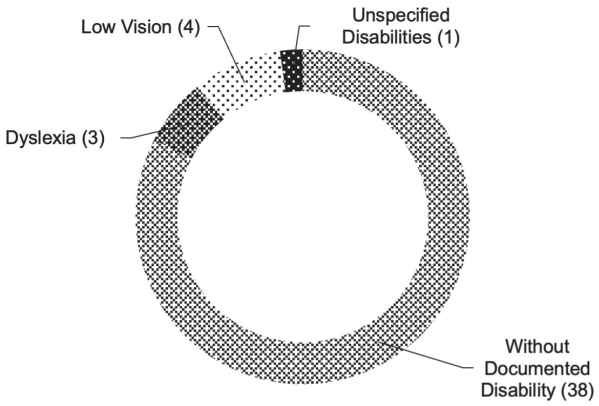

Figure 5. Reviewed studies participant distribution by disability (*N* = 42).

The 42 reviewed studies yielded a total of 3,323 participants. The participants from 26 studies (*n* = 2,203) fit into the age categories: youth (including adolescents and young adults), adult, and senior (United Nations, n.d.; Statistics Canada, 2023) (see Figure 4). Participant age was not specified in 16 studies (*n* = 1,120). Eight studies included participants with disabilities, accounting for approximately 7% (*n* = 238) of the total participants (see Figure 5). Three studies included participants with and without dyslexia (*n* = 53) (French et al., 2013; Krivec et al., 2020; Schneps et al., 2013). Four studies included participants with low vision (*n* = 40) (Arditi & Cho, 2005, 2007; Kanonidou et al., 2014; Minakata et al., 2023), and one included participants with unspecified disabilities (*n* = 145) (Sieghart, 2023).

Reviewed Studies Data Collection Tools

Nine data collection tools were used in the reviewed studies (see Figure 6, Appendix C): eye movement tracking (*n* = 9), questionnaires (*n* = 12), measures of reading accuracy

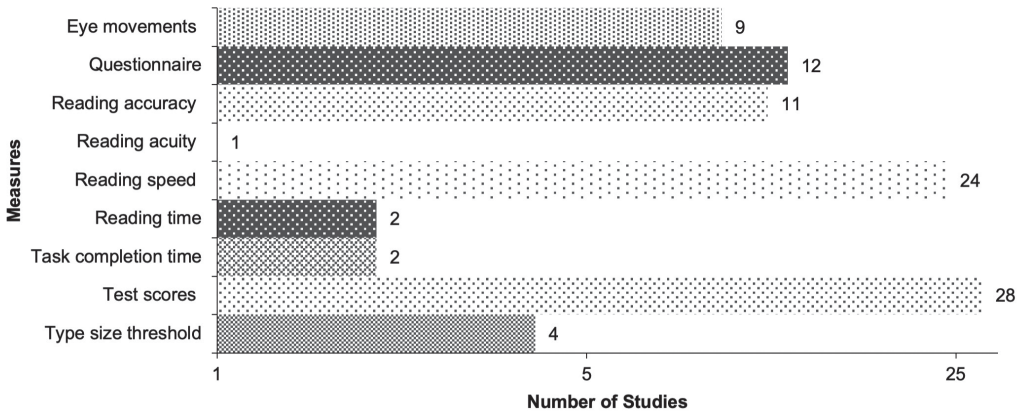

Figure 6. Reviewed studies data collection tools (*N* = 42).

(*n* = 11), reading acuity (*n* = 1), reading speed (*n* = 24), reading time (normal, fast, or glance reading) (*n* = 2), task completion time (*n* = 1), test scores (*n* = 14), and type size threshold (*n* = 4).

Reviewed Studies Independent Variables

Thirty-three of the reviewed studies examined factors of legibility with seven independent variables of typeface design: letter structure (*n* = 3), letter width (*n* = 2), serifs (*n* = 19), stroke contrast (n = 3), stroke width (*n* = 3), typeface (*n* = 28), and type style (*n* = 11) (see Appendix D). Serifs and typeface variation are the two most featured typeface design variables in the reviewed studies.

Twenty-nine of the reviewed studies examined 10 independent typographic variables: color (*n* = 2), columns (*n* = 1), letter case (*n* = 4), letter spacing (*n* = 6), line length (*n* = 9), line spacing (*n* = 8), paragraph spacing (*n* = 4), text alignment (*n* = 1), type size (*n* = 18), and word spacing (*n* = 2) (see Appendix E). Type size is the most featured typographic variable by a considerable margin.

Thirty-two studies featured the following 13 independent non-typographic variables which are briefly described below: age (*n* = 1), devices (*n* = 1), display variables (*n* = 5), dyslexia (*n* = 3), lexical variables (*n* = 4), pre-set/self-set text (*n* = 1), reading time (*n* = 3), study variables (*n* = 1), test variables (*n* = 7), typeface familiarity (*n* = 2), undisclosed disability (*n* = 1), vision variables (*n* = 7), and visual crowding (*n* = 1). Display variables included the number of colors, display format, on-screen position, font smoothing (anti-aliasing), and print or digital format. Lexical variables included high- or low-frequency words, word relatedness, and words/non-words. Test variables included test expectancy, question type, and time intervals between study and testing. Study variables included repeated/non-repeated reading and varied study times. Vision variables included low vision, vision loss, and visual location (normal or peripheral), and reading time describes the time duration for reading. It varied from glance to interlude to long-form reading. Test and vision variables were the two most studied non-typographic variables.

Reviewed Studies Typography

The reviewed studies, in total, involved 52 typefaces (see Appendix F, Appendix G). Two studies did not specify the experimental typefaces (Geller et al., 2018; Risko et al., 2011), and seven studies examined customized typefaces (Arditi & Cho, 2005; Beier & Larson, 2013; Beier & Oderkerk, 2021; Dyson & Beier, 2016; Geller et al., 2018; Minakata & Beier, 2022; Minakata et al., 2023). Wallace et al. (2022) included the most (*n* = 16) typefaces. The most used typefaces in the reviewed studies were Times New Roman/Times (*n* = 14), Arial (*n* = 11), Georgia (*n* = 7), and Verdana (*n* = 6), which is the only one in

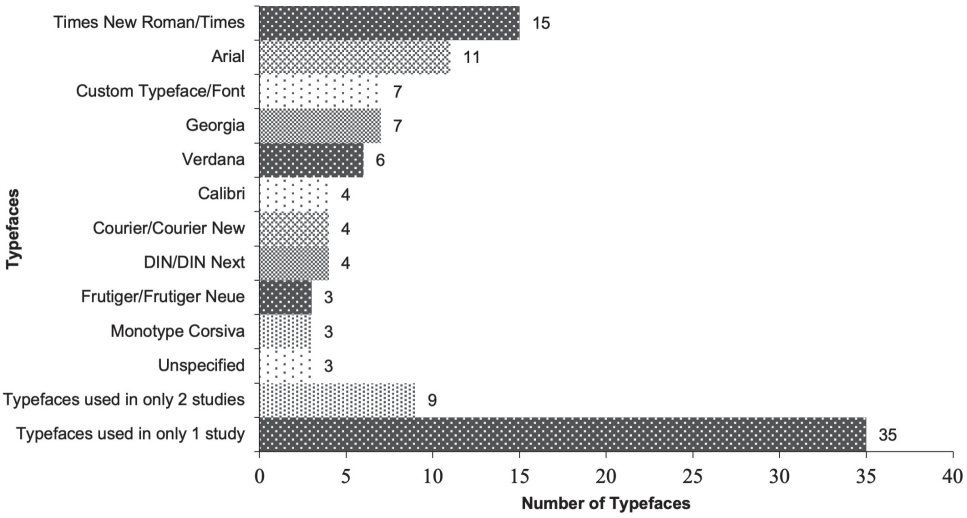

Figure 7. Reviewed studies typeface distribution by typeface (*N* = 42)

Note. Typefaces used in only two studies (*n* = 9): Avenir/Avenir Next, Consolas, Gill Sans/Gill Sans MT, Helvetica, Lucida Sans, Open Sans, Trebuchet, Swiss 721, and Univers/Univers Next Pro. Typefaces used in only one study (*n* = 34) are: Amasis, Andale Mono, Avant Garde, Bembo, Bodoni MT, Bookman, Brush Script, Cambria, Comic Sans, Demos, Eurostile, Franklin Gothic, Garamond/EB Garamond, Haettenschweiler, Harrington, KBH Display/Text Regular, Lato, Lucida, Lucida Bright, Meta Office Pro, Monaco, Montserrat, Myriad, Neuzeit Office, Noto Sans, Oswald, Palatino, Poyner Gothic, Roboto, Tahoma, Thesis, Script MT Bold, Speak Office Pro, and Utopia. For complete information on the typeface distribution in the reviewed studies, see Appendix F and Appendix G.

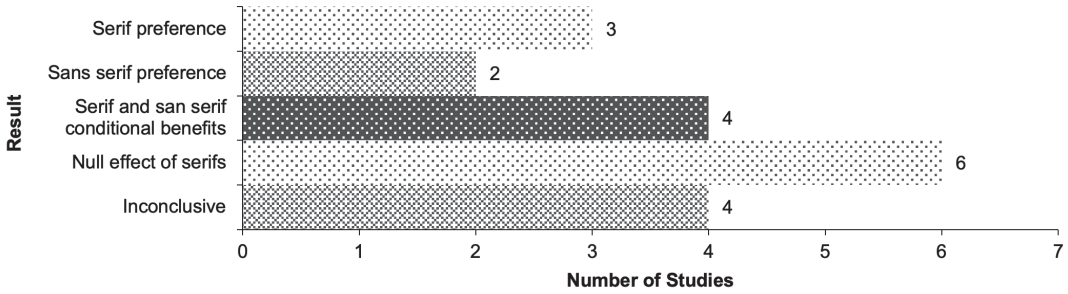

Figure 8. Results from the reviewed studies comparing serif and sans serif typefaces (*N* = 19).

the top four typefaces designed specifically for screen (see Figure 7). Nineteen studies evaluated and compared serif and sans serif typefaces (see Figure 8, Appendix H).

The remainder of the findings of this literature review will address design factors influencing legibility, followed by design factors affecting the readability of accessible typography.

Design Factors Influencing Legibility

Serifs. Serifs are a typeface design characteristic that is a primary legibility concern. However, some studies reported that serifs had no significant effect on legibility or

reading performance measures (Bernard et al., 2003; Minakata & Beier, 2022; Perea, 2013; Sheedy et al., 2005; Soleimani & Mohammadi, 2012); including people with low vision (Arditi & Cho, 2005). Some studies reported inconclusive findings regarding serifs (Ling & van Schaik, 2006; Minakata et al., 2023; Pušnik et al., 2016b; Slattery & Rayner, 2013), while others found conditional benefits for both serif and sans serif typefaces (Banerjee et al., 2011; Sieghart, 2023; Ukonu et al., 2021; Wallace et al., 2022).

Typeface. The reading performance results of serif and sans serif typefaces are inconsistent in the research; nevertheless, sans serif typefaces were often preferred by participants (Banerjee et al., 2011; Krivec et al., 2020; Ukonu et al., 2021; Wallace et al., 2022), though there was no connection between preference and performance (Sieghart, 2023; Wallace et al., 2022). Gasser et al. (2005) found that serif typefaces improved test scores and memory, while other studies found a null effect of typeface (Lonsdale et al., 2006; Slattery & Rayner, 2010).

Type style. Dyson and Beier (2016) found that bold typefaces increased reaction times in a word recognition task when alternated with words in regular weight. They also concluded that bold type styles were more effective than italics for headings (Dyson & Beier, 2016). Italics were found to both have a null effect on word recognition tasks (Dyson & Beier, 2016) and impair reading speed (Slattery & Rayner, 2010).

Letter structure. Beier and Larson (2013) concluded that aesthetics and subjective preferences may influence letter structure more than performance-based concerns. They suggested that increased familiarity with uncommon letter structures could improve their legibility.

Letter width. One study found that reading condensed typefaces led to fewer but longer fixations, while extended typefaces led to more fixations; however, variations in letter width did not significantly affect reading speed (Minakata & Beier, 2021). Similarly, Gasser et al. (2005) reported a null effect on reading performance when using typefaces with varied letter widths. Minakata and Beier (2021) suggested that readers can efficiently and effectively compensate for, and adapt to, differing levels of legibility.

Stroke. One study found that lighter than regular stroke weight impaired reading speed with the Radner Reading Chart (Beier & Oderkerk, 2019). However, Bernard et al. (2013) found that increasing or decreasing the stroke weight had a null effect on reading speed in central vision, while heavier stroke weights impaired reading speed in the periphery. One study reported that bold typefaces with high stroke contrast reduced performance in a letter recognition task (Beier & Oderkerk, 2021). One study found that, in general, typefaces with low stroke contrast were read at smaller sizes than typefaces with high stroke contrast (Minakata & Beier, 2022). Two studies (including the previous one) found that serif typefaces with high stroke contrast and sans serif typefaces with

low stroke contrast performed best in word recognition tasks for readers with normal vision (Minakata & Beier, 2022; Minakata et al., 2023). Minakata et al. (2023) observed the opposite for readers with low vision; serif typefaces with low stroke contrast and sans serif typefaces with high stroke contrast performed best in word recognition tasks for readers with low vision.

Design Factors Influencing Readability

Type size. Type size is a typographic variable that is a primary readability concern, especially for readers with disabilities. Krivec et al. (2020) reported that sans serif typefaces and larger type sizes were perceived as more readable by dyslexic readers according to their subjective judgments captured through questionnaires. However, Bernard et al. (2003) reported no effect of type size on the reading speed of young adults or readers without documented disability. Soleimani and Mohammadi (2012) found no effect of type size on processing time or comprehension and recall test scores, but reported that participants read text set in 12 pt faster than text set in 10 pt. Smaller type sizes adversely affected word recognition for glance readers in one study (Dobres et al., 2018) and reading speed for people with vision loss in another (Kanonidou et al., 2014). Sheedy et al. (2005) found that reading performance increased with type size up to 10 points, which was optimal. Sieghart (2023) indicated that for readers with undisclosed disabilities, 12 pt is optimal.

Letter case. Uppercase text was read faster than lowercase or mixed-case text at smaller type sizes (Arditi & Cho, 2007; Pušnik et al., 2016a) and was more readable for people with vision loss; however, at larger sizes, reading performance was similar across all case conditions (Arditi & Cho, 2007). Arditi and Cho (2007) proposed that uppercase letters, being inherently larger than lowercase letters, maintain greater readability at smaller type sizes. It is possible that the larger and more open form of uppercase letters contributes to them being more easily recognizable.

Spacing. Crowding can be moderated with letter or line spacing. The results of two studies suggest decreased letter spacing may impair reading speed (Beier & Oderkerk, 2019) and increased letter confusion (Liu & Arditi, 2001). Risko et al. (2011) found that increased letter spacing beyond regular induced serial processing and adversely affected word recognition tasks. Schneps et al. (2013) found that normal letter spacing yielded better performance across several eye-tracking measures, including fixation count and regressive saccades. However, increased letter spacing enabled "weaker" readers to perform nearly as well as stronger readers. Slattery & Rayner (2013) found that regular spacing provided their participants the best reading speed and eye movements.

Layout. Four studies found that typographic layouts that had spacing and line length variations were observed to affect reading speed, accuracy, and test results (Lonsdale,

2007, 2014, 2016; Lonsdale et al., 2006). In one study, medium line lengths were read faster than shorter line lengths (Dyson & Haselgrove, 2001). Schneps et al. (2013) reported that both participants with dyslexia and those without documented disabilities preferred shorter line lengths for reading, as indicated by solicited judgments.

4. Discussion

The findings are discussed within the context of this literature review's overarching aim, which was to explore the body of work related to design factors that most influence the legibility and readability of accessible typography.

4.1. The Serif and Beyond: Critical Factors Influencing Legibility and Readability

Based on the 42 reviewed studies, there were no studies that documented significant differences in reading performances between serif and sans serif typefaces due solely to the presence or absence of serifs. Just over half of the reviewed studies that evaluated typefaces with and without serifs found a null effect of serifs on legibility or reading measures, or had inconclusive results (Arditi & Cho, 2005; Bernard et al., 2003; Ling & van Schaik, 2006; Minakata & Beier, 2022; Minakata et al., 2023; Perea, 2013; Pušnik et al., 2016b; Sheedy et al., 2005; Slattery & Rayner, 2010; Soleimani & Mohammadi, 2012); this includes a null effect of serifs on reading for people with low vision (Arditi & Cho, 2005). One study observed better performance for sans serif typefaces in word recognition tasks (Moret-Tatay & Perea, 2011), and another found the same effect in recall tests (Hojjati & Muniandy, 2014), while four studies observed that serif typefaces improved reading speed both on-screen (Banerjee et al., 2011; Slattery & Rayner, 2010; Wallace et al., 2022) and in print (Ukonu et al., 2021). Participants also performed better with serif typefaces in word recognition tasks (Pušnik et al., 2016a) and recall tests (Gasser et al., 2005). Additionally, two studies reported contradictory results, as both the best and worst performing typefaces according to each study's measures of legibility and readability were sans serifs (Sheedy et al., 2005; Sieghart, 2023). These inconsistent results suggest that serifs may or may not be helpful, depending on the reader and context, and that other typeface design characteristics beyond the presence or absence of serifs may also affect reading. They effectively isolated the serif variable using custom-designed typefaces that differed only in the presence or absence of serifs. While these experimental typefaces are not commercially available and do not reflect real-world typefaces, these findings offer a practical foundation for moving beyond the serif versus sans serif debate. The presence of serifs in a typeface may represent design characteristics typical to different type classifications. Currently, there is no universally accepted system for type classification (Clair & Busic-Snyder, 2005c). However, elementary type classifications from the 19th century (Clair & Busic-Snyder, 2005c;

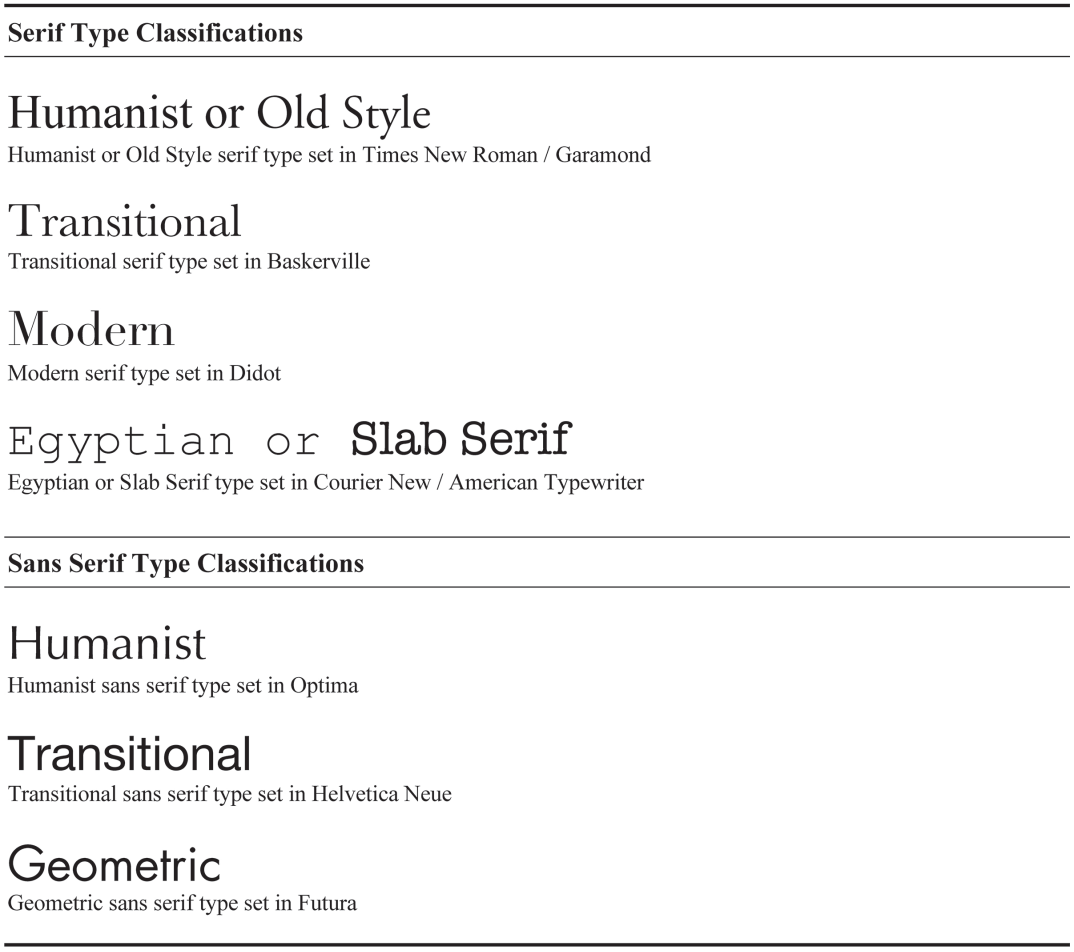

Figure 9. Serif and sans serif type classifications.

Lupton, 2010a) categorize type into broad classes such as serif, sans serif, script and cursive, and display and decorative (Clair & Busic-Snyder, 2005c). The typeface design characteristics of the type classifications are informed by the design influences of historical periods. Primary serif type classifications are humanist or old style, transitional, modern, and Egyptian or slab serif, while primary sans serif type classifications are humanist, transitional, and geometric (Lupton, 2010a). Figure 9 visually displays the elementary serif and sans serif type classifications.

The different type classifications have design characteristics beyond the presence or absence of serifs and could influence the legibility of the typeface. For example, the letterforms, including the typical stroke contrast of an individual type classification may influence the legibility of a typeface depending on the reader. As seen in Figure 9, humanist or old style serif typefaces have organic letterforms, smaller serifs, and low stroke contrast (Clair & Busic-Snyder, 2005c). Transitional serif typefaces have less organic letterforms, more prominent serifs, and increased stroke contrast

(Clair & Busic-Snyder, 2005c). Modern serif typefaces have more geometric letterforms, thin square serifs, and high stroke contrast (Clair & Busic-Snyder, 2005c). Slab serif typefaces have less organic letterforms, heavy square serifs, and low stroke contrast (Clair & Busic-Snyder, 2005c). Humanist sans serif typefaces have some organic characteristics and moderate stroke contrast, transitional sans serif typefaces have fewer organic characteristics and no stroke contrast, and geometric sans serif typefaces have geometric characteristics and no stroke contrast (Lupton, 2010a). The interaction between letterforms and different typeface design characteristics may make some specific type classifications more legible than others.

No single type size is optimal for all typefaces or readers. Type size is a primary concern for readability, and may determine readability for people with low vision (Arditi & Cho, 2007). However, bigger is not always better. Exceeding the optimal type size does not further increase readability (Sheedy et al., 2005), and no universal type size is ideal across all conditions (Sieghart, 2023). Sheedy et al. (2005) identified 10 points as optimal, and Sieghart (2023) reported 12 points as optimal. These results are difficult to generalize, as both studies used point sizes for the type in their experimental materials, and as noted by van der Waarde & Thiessen (2025), comparing typefaces using point size does not yield valid data. Consideration should be given when using point size to describe experimental type sizes, as x-height can vary substantially between typefaces at the same point size (van der Waarde & Thiessen, 2025). When comparing typefaces, a more accurate measure of perceived type size may be x-height in millimetres for print, and visual angle (in minutes of arc) for screen-based text. Nevertheless, the findings may remain valid for the specific typefaces and sizes tested in each study.

Additionally, concerns about the legibility of serifs, in whole or in part, may date back to the limited capabilities of older low-resolution displays. At smaller type sizes, the details of serif typefaces were often reduced or poorly rendered on lower-resolution displays (Bernard et al., 2003). Figure 10 presents serif and sans serif type samples set at 12 pt, 14 pt, and 16 pt, rendered at low (72 ppi) and high (300 ppi) resolution to visually compare the amount of detail reproduced at different resolutions. Blurred or poorly reproduced serif characters may have been more challenging to decipher, and may have influenced past subjective preferences and biases for sans serif typefaces. However, the resolution of some modern displays now exceeds that of high-resolution print, potentially making objective legibility concerns about serifs obsolete. Modern display technology allows faithful reproduction of serifs and other typeface design characteristics across print and digital media without compromising their details and the message of the rendered text, which may increase design possibilities and the accessibility of serif typefaces.

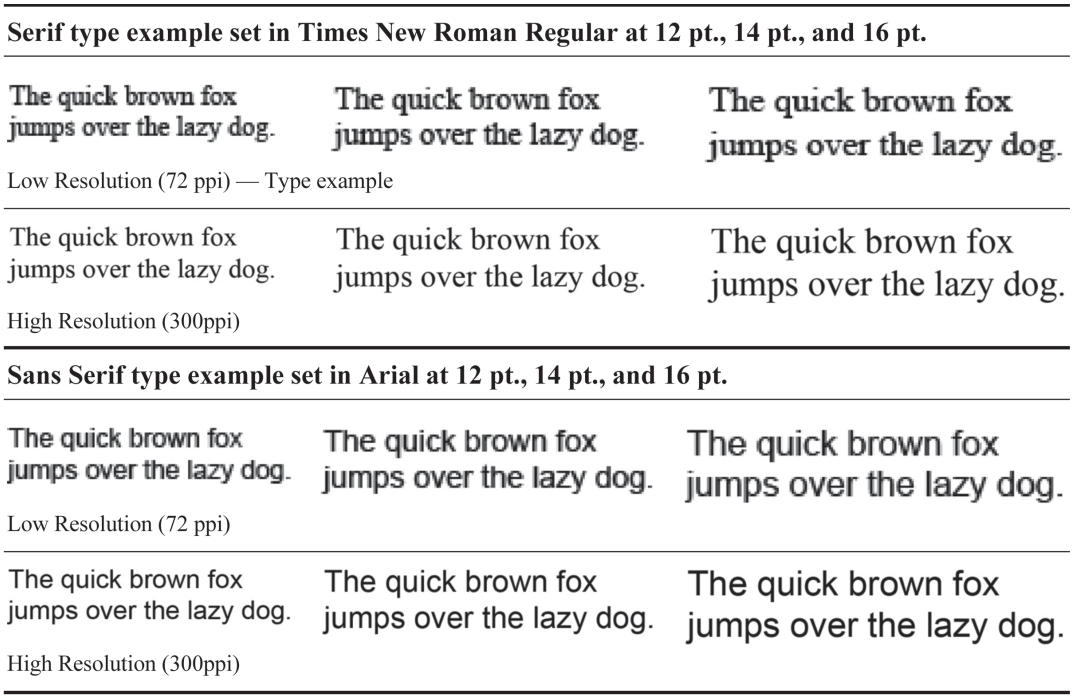

Figure 10. Serif and sans serif typefaces reproduced at low (72 ppi) and high (300 ppi) resolution.

Based on the literature review of 42 peer-reviewed studies, the design factors that most influence text legibility and readability vary for individuals in different situations. Optimizing legibility and readability depends on a combination of the reader, their individual differences and needs, and other environmental or situational factors. Surprisingly, as seen in the findings, the most influential factor in determining individual legibility and readability may be familiarity (Slattery & Rayner, 2010).

4.2. Familiarity

The research implicates familiarity as a major legibility factor (Slattery & Rayner, 2010; Ukonu et al., 2021). Familiarity was found to improve reading performance (Ukonu et al., 2021), although two other studies reported no effect of familiarity (Sieghart, 2023; Wallace et al., 2022). In some cases, the effects of familiarity may be obscured by people's ability to accommodate and adapt to different levels of legibility and readability. People can effectively adapt their reading to accommodate different levels of legibility without affecting reading performance (Minakata & Beier, 2021). However, people tend to read better with typefaces that are familiar (Zineddin et al., 2003). The potential of familiarity as a primary legibility factor raises several questions. First, if familiarity is a major legibility factor, should readers be limited to typography they are currently familiar with, or should they be familiarized with new typography? Expanding and developing familiarity with a wide range of typefaces may be beneficial. Second, does familiarity with more typefaces enhance reading skills? Familiarity with various typefaces may

provide more experience with letter structure variations which may augment reading skills. Third, are the effects of familiarity transferable to similar typefaces? Familiarization effects could apply to typefaces in the same type classification or between those typefaces that are visually similar. How long is the familiarization process? Is familiarization progressive? Does it happen in minutes, hours, days, weeks, months, or years? How long do the familiarity effects last? Is the familiarization process with new typography easier for individuals who are frequent long-form readers? Investigating the familiarization process could improve understanding of how familiarity influences readability and whether familiarity effects are negated by a reader's motivation to access important or pertinent information. This suggests that, in some cases, a reader's adaptability and capacity to accommodate varying levels of legibility and readability may outweigh the benefits of familiarity. Future research on typography and familiarity has the potential to inform new accessibility guidelines by accounting for and leveraging the effects of both familiarity and adaptability on reading performance.

4.3. Towards Accessible Typography

The findings from this literature review suggest that there is no one-size-fits-all legibility or readability recommendation that optimizes the accessibility of typography for everyone in every situation. The lack of consensus in accessible typography research suggests that a typeface's impact is contextual, affecting individuals differently. For example, Minakata et al. (2023) assessed legibility using a word identification task with custom-designed typefaces that isolated serif and stroke contrast variables. They found that participants with low vision performed best with serif typefaces featuring low stroke contrast and sans serif typefaces with high stroke contrast. In contrast, Minakata and Beier (2022), using both a word identification and a lexical decision task with similarly controlled typefaces, found that participants with normal vision performed best with serif typefaces with high stroke contrast and sans serif typefaces with low stroke contrast. In the context of accessible typography, word identification tasks may have limited internal and ecological validity. Word frequency and familiarity may act as confounding factors, and these tasks involve isolated words rather than continuous text, which may not reflect real-world reading. The results from Minakata et al. (2023) and Minakata and Beier (2022) reflect the complex and nuanced interaction between typographic and individual factors, which may be addressed, mitigated, or navigated through design. There are approaches that may address the relationship between the dynamic factors influencing reading experiences, such as personalized typography. However, accessibility depends on design and the individual reader. Design serves as one means to enhancing or optimizing accessibility.

The mixed results in accessible typography research suggest that personalized typography and reading experiences may help to increase accessibility. In this

context, personalized typography refers to text with reader-adjustable typesetting, which may include options for typeface, size, spacing, and other visual characteristics. Personalized typography might address the complexities and nuances of the interactions between typography, individual, and situational factors (Wallace et al., 2022). While personalized typography also accounts for the potential aesthetic, artistic, and emotional resonance of design materials with people, it raises several concerns. First, personalized typography relies on information and communication technology (ICT) and is exclusive of print. Print media remains essential, we interact with and occupy physical environments that require signage, wayfinding, and other printed material for social participation and development. Second, the dependence on ICT-based solutions privileges accessibility, potentially reinforcing the digital divide. The digital divide is the gap between people with and without ICT access (Laufer et al., 2021; Haight et al., 2014; van Deursen & van Dijk, 2019). The digital divide reflects structural social inequalities, including but not limited to income, race, geographic location, age, and education (Laufer et al., 2021; Haight et al., 2014). The lack of ICT access leads to a digital literacy gap, which limits ICT skills and opportunities to benefit from ICT (van Deursen & van Dijk, 2019). Accessibility solutions must not compound inequalities or create barriers to accessibility.

Finally, based on the findings of this literature review, it appears that the efficacy of personalized typography is still being determined. Personalized readability options for type size and spacing may be more beneficial than options for selecting personalized typefaces. Krivec et al. (2020) examined personalized typography by allowing participants to self-set type size, spacing, and alignment using a web-based adaptation of Tinker's reading test (Tinker, 1963) to measure reading speed and accuracy, in combination with a word identification task in which participants detected illogical words within paragraphs. The study found that personalized typography did not significantly affect reading speed but improved comprehension. While Tinker's reading test demonstrates strong internal validity, both it and the word identification task may not reflect typical reading conditions, which limits the generalizability of its findings to everyday reading contexts.

Wallace et al. (2022) conducted an extensive study on personalized typography, which found that selected typeface options improved reading performance. However, participants' chosen typefaces were not always the best-performing (Wallace et al., 2022). The study was conducted remotely with a large and diverse sample size who completed the experiment in natural environments using their own devices. The study controlled for type size by normalizing all typefaces to the same x-height. Although 16 typefaces were included, only three were serif typefaces. Including more serif typefaces might provide greater insight into serifs and other typeface design characteristics. Furthermore, the study may overemphasize reading speed as an indicator of reading performance.

Additionally, personalized typography selections would be informed by subjective readability, which is not always performance-based (Bernard et al., 2013; Ling & van Schaik, 2006; Sieghart, 2023; Wallace et al., 2022). The dynamic nature of personalized typography has the potential to increase accessibility for those with ICT access and skill. However, appropriate accessibility approaches should also consider print media. Physical print media remains essential for accessibility in all areas of life.

Accessibility guidelines make many recommendations based on research evidence. However, based on the findings of this literature review, some of the recommendations could be clarified with more detailed information and context. These recommendations are often taken literally and, in those cases, may adversely affect accessibility and design in several ways. First, these recommendations may influence the general public's perceptions, preferences, and judgments on design and what is considered accessible. Second, these recommendations encourage constrained design, reducing visual expression or hierarchy, which may not necessarily enhance accessibility. Finally, some of these accessibility recommendations limit design and visuals in a way that fails to consider the artistic and emotional aspects of people, especially persons with disabilities. Persons with disabilities may prioritize accessibility, but may also require visually appealing materials that engage, excite, and create interest or provoke an emotional response and connection. Accessibility recommendations, like design, should be human-centred and account for the artistic and emotional aspects of all people and not only focus on their ability or lack thereof.

4.4. Strengths of This Literature Review

This review has several strengths. First, it followed the PRISMA guidelines (Page et al., 2021) for a transparent and replicable search process. Second, the data collection systematically documented the reviewed studies' characteristics, including publication information, research methods, participant demographics, data collection tools, independent variables, and typography. The data was then analyzed and summarized using a reflexive approach to thematic analysis (Braun & Clarke, 2021). Third, the reviewed studies represent a wide range of knowledge and research on typography across multiple disciplines. The studies evaluated the benefits and consequences of typography using cognitive science, psychology, vision science, and education measures and perspectives. Finally, many of the reviewed studies feature large sample sizes and include participants with different disabilities, which provides a wide representation of the population.

4.5. Limitations and Future Studies

The present review has several limitations that warrant further systematic reviews. First, it exclusively features research that evaluates Latin alphabet-based languages.

Examining how languages based on other writing systems or alphabets manage legibility and readability factors may support a better understanding of the influences on reading performance, including familiarity and its capacity to affect subjective and objective legibility, readability, and overall reading performance for people with and without disabilities. Second, research on specialist typefaces was excluded. Including studies that evaluated the effectiveness of specialist typefaces designed to address or accommodate specific disabilities might provide evidence of the efficacy of certain stylistic typeface design features; however, this was not within the scope of this literature review. Third, this literature review included strictly peer-reviewed journal articles and excluded theses and dissertations, which often contain exploratory studies that are not always published in peer-reviewed journals. Including theses and dissertations could provide novel perspectives that may enhance the discussion and interpretation of the current findings. Fourth, only research that explicitly evaluated and measured performance-based outcomes of typography was reviewed. Including research that measured other effects of typography, including but not limited to bias, decision-making, categorization, and other different perceptual outcomes, may illustrate the reach of the potential benefits and consequences of typography. Fifth, although some studies on letter width were included, this factor may not have been adequately represented in our review. Variations in letter width beyond the standard can affect legibility, particularly for readers with low vision. Sixth, the present review exclusively features research with participants aged 15 to 65. Future research with participants beyond these age groups would enhance the research in this area. Finally, this literature review employed reflexive thematic analysis (Braun & Clarke, 2021) to analyze and synthesize the data collected from the reviewed studies, however, other quantitative methods, such as meta-analysis, may provide a different perspective regarding the impact of study size, giving greater weight to studies with larger sample sizes.

The limitations of the reviewed studies provide considerations and directions for future research. First, future research on serifs could consider type classifications given that different serif classifications have considerably different appearances. The typeface design characteristics and traits inherent to different serif typeface classifications may be more influential than the presence or absence of serifs. Second, future research could also investigate the effects of familiarity on legibility, readability, and reading performance. Familiarity may be a key legibility and readability factor affecting reading performance (Slattery & Rayner, 2010) and comprehension. The most popular and familiar typefaces are also the most featured in the reviewed studies: Arial (n = 22), Times New Roman/Times (n = 18), Courier/Courier New (n = 7), and Verdana (n = 6). However, a more comprehensive range of typefaces, or more typefaces per each study, such as in Wallace et al.'s (2022) (n = 22) would provide data on less popular typefaces. Additionally, methods that include participants reading text set in

unfamiliar typefaces may provide insight into the familiarization process. Third, future research could explore more natural reading conditions, practical test materials, and additional measures of reading performance beyond reading speed. Reading tasks used in typography experiments often do not reflect typical reading (Dyson, 2023a). Incorporating more natural reading conditions would strengthen ecological validity and provide more authentic data on cognitive processing. Regarding experimental materials, using materials that better reflect standard design practices would offer a realistic view of how typeface design and typographic variables influence continuous reading, extending beyond isolated word recognition. For methodological consistency within experimental research designs, future experiments comparing typefaces could normalize type by x-height and measure perceived type size by x-height in millimetres for print and by visual angle (in minutes of arc) for screen-based text. Furthermore, relying solely on reading speed as an indicator of performance may not adequately reflect accessibility. Reading speed does not capture comprehension, cognitive load, or represent everyday reading. In typical reading situations, individuals read at different speeds depending on their goals and context. For example, reading for comprehension and learning generally occurs at lower speeds (Carver, 1992). Therefore, readers are unlikely to notice or be concerned with variations in reading speed unless those differences are significant (van der Waarde & Thiessen, 2025).

Additionally, reading speed is balanced by accuracy, and there is usually a trade-off between the two (Dyson, 2023a). This relationship may be further complicated in experiments involving word recognition tasks, such as lexical decision tasks and rapid serial visual presentation (RSVP). In some cases, results may be confounded by external factors such as word frequency; less frequent words may naturally take longer to identify, posing a threat to the validity of these experiments. Further performance measures beyond reading speed, informed by cognitive psychology, education, and neuroscience, may offer better insight into reading outcomes associated with typefaces, typesetting, readers, and reading contexts. This approach may extend the valuable contributions of existing multidisciplinary research and support the translation of findings into real-world design practice. Finally, accessible typography research may benefit from additional in-depth qualitative approaches where participants' experiences and perspectives are examined and analyzed in detail. This qualitative information may provide insights and could offer details on the reading experiences of persons with and without disabilities.

4.6. Implications for Practice and Policy

Lastly, additional recommendations for practice and policy considerations can be made as a result of this literature review. Below are some recommendations that contextualize the appropriate use of serifs, different typefaces, type styles, letter case, and

make suggestions for type size, spacing, and line length. Hopefully, they may provide guidance in creating typography that is visually interesting, meaningful, and accessible in practice and for policymakers to consider.

Serifs. The research indicates that serifs are not a significant legibility factor (Arditi & Cho, 2005; Bernard et al., 2003; Minakata & Beier, 2022; Perea, 2013; Sheedy et al., 2005; Soleimani & Mohammadi, 2012). Serif typefaces may be used appropriately for aesthetic and stylistic value. When selecting serif typefaces for use, consider the intended audience and the appropriateness of letterforms including stroke contrast.

Typeface. In some of the reviewed studies, other typefaces match or outperform Arial in legibility measures (Sieghart, 2023; Wallace et al., 2022). The ubiquity of Arial may influence its perceived subjective legibility. Typefaces other than Arial may be used appropriately; however, display or decorative typefaces should be used moderately (CNIB, 2020; EBU, 2016) and never at small type sizes. When selecting typefaces for use, consider the intended audience and the appropriateness of letterforms including stroke contrast, letter width, and the embellishment of typefaces.

Type style. Bold and italic type styles may moderately reduce reading speed (Dyson & Beier, 2016) but can add hierarchy and organization (Lupton, 2010b), which may provide greater semantic meaning and contribute to increased readability. Additionally, people with low vision often prefer bold type styles for reading (Bernard et al., 2013). Bold and italic type styles may be used for differentiation and to add visual interest, tone, and hierarchy. When selecting type styles for use, consider the intended audience and the appropriateness of stroke contrast and stroke width (weight). Additionally, bold type styles may be helpful for other design-based uses to increase visibility and readability (Bringhurst, 2004).

Letter case. Uppercase letters are typically larger than lowercase letters, and at smaller type sizes, may be more readable for people with low vision (Arditi & Cho, 2007). Many studies have reported that reading text in all uppercase slows reading speed compared to lowercase or sentence case text, and this may be due to greater familiarity with reading lowercase or sentence case text (Dyson, 2023b). The long-standing concern that uppercase letters obscure word shapes, as noted in the Government of Canada (2022) guidelines, persists. However, research evidence does not support the word-shape model of reading (Larson, 2004). Limiting the use of uppercase text may negatively affect how agencies, organizations, and companies present their identity and branding, particularly in advertising and promotional campaign materials. Text set in all uppercase letters may be used for moderate amounts of content to differentiate and add visual interest, emphasis, and hierarchy.

Type size. In regards to type size, bigger is only sometimes better. There is no benefit to exceeding optimal type sizes (Sieghart, 2023). Select a type size that accommodates the appropriate white space within the format of the material. Consider the intended audience and their individual differences and disabilities, larger type sizes may benefit people with low vision.

Spacing. Insufficient letter spacing (tracking) (Beier & Oderkerk, 2019; Liu & Arditi, 2001) or line spacing (leading) (Dobres et al., 2018) can cause visual crowding and significantly reduce readability. Use letter spacing close to normal settings and avoid negative (less than normal) letter spacing. Line spacing in points should be at least the type size in points plus 20 to 30%. In many page layout programs, the default line spacing is set to 20% more than the type size. Be cautious of using less than normal letter or line spacing for copy fitting or to compensate for larger text sizes.

Line length. Line lengths can influence the reader's performance and experience. Multi-column layouts can shorten line lengths and may benefit reading for all readers, but may be especially beneficial for people with disabilities such as dyslexia (Schneps et al., 2013).

These recommendations may guide design practice and encourage consideration of the design context for the appropriate use of serifs, different typefaces, type styles, and uppercase letters while also providing suggestions on type size, spacing, and line length. The results of this literature review may interest policymakers in government, businesses, non-profits, and broader public sector organizations who may consider these recommendations in future versions of their accessible typography guidelines.

4.7. Conclusion

As the research has demonstrated, there is no one-size-fits-all solution that optimizes typography for everyone in every situation. The body of research on accessible typography has inconsistent and sometimes contradictory results which may be due to differences in readers, typefaces, and research methodologies and methods. However, the opposing results from one study may not disprove the findings of another study. Instead, these contradictions reflect the complexity and nuance involved in balancing the design, individual, and contextual factors that influence the readability and functionality of typography. This literature review demonstrates the need for accessible typography guidelines that are practical, grounded in evolving research, and acknowledge that there are different types of reading that serve diverse purposes. Accessibility guidelines must also consider the artistic and emotional aspects of people, and not only focus strictly on their ability or lack thereof. Accessibility is an essential initiative towards social justice and benefits everyone, especially people with disabilities.

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Appendix A: Empirical Studies on Legibility and Readability Using Quantitative Methods (*n* = 30)

#	Study	Participants	Research objective	Research measurements	Key findings/results
1	Al-Samarraie et al., (2017)	• 23 (*M* = 32 y/o) • Penang, Malaysia	Evaluate the reading effectiveness of text online in single or multi-column layouts.	1. Eye movements	1. Three-column layout performed best for repeated reading. 2. One column layout performed best for non-repeated reading. 3. Repeated reading improved performance regardless of layout.
2	Arditi & Cho, (2005)	• 6 (4 normal vision, 2 low vision) • New York City	Investigate the influence of serifs on legibility and readability.	1. Type size threshold 2. Reading speed	1. Serifs did not affect reading speed for any participants. 2. Serifs slightly improved legibility. 3. There was no legibility effect between typefaces that were the same but had or lacked serifs for those with normal, corrected-to-normal vision, or vision loss.

#	Study	Participants	Research objective	Research measurements	Key findings/results
3	Arditi & Cho, (2007)	• 9 (5 normal vision, 4 low vision) New York City	Investigate the influence of serifs on legibility and readability.	1. Type size threshold 2. Reading speed	1. Uppercase text had the lowest size threshold. 2. Uppercase text was read the fastest at smaller text sizes, particularly by individuals with vision loss; however, at larger sizes, reading performance was similar across all case conditions. 3. Results indicated that size is essential to legibility, and uppercase may be more readable at smaller text sizes, especially for people with low vision.
4	Beier & Oderkerk, (2019)	• 42 (22 under 50, 20 over 50) • (*M* = 47.67 y/o) • Copenhagen, Denmark	Test the legibility of Gill Sans Light, KBH Display Regular, and KBH Text Regular with younger and older adults.	1. Reading speed 2. Reading acuity 3. Critical print size	1. KBH Display and Text was more readable at smaller sizes for both age groups. 2. Gill Sans improved reading speed for the older group at larger sizes but impaired it at smaller sizes. 3. Results suggested there is no universally most legible font; legibility depends on the context.
5	Beier & Oderkerk, (2021)	• 24 (*M* = 25.9 y/o) • Copenhagen, Denmark	Investigate the impact of stroke contrast of bold fonts on letter recognition.	1. Reading accuracy	1. Bold fonts with high stroke contrast impaired letter recognition, low or medium stroke contrast did not. 2. Results showed that stroke contrast affects reading.
6	Bernard et al., (2013)	• 6 (17–24 y/o) • Berkeley, California	Investigate the effects of letter-stroke boldness on reading speed in central and peripheral vision.	1. Reading speed	1. Stroke weight only affected reading in central vision once the weight becomes very thin or thick. 2. Reading in the periphery was almost equal for all conditions. 3. Some people with vision loss prefer bolder fonts, these results suggested that preferences may not be connected to performance.
7	Diemand-Yauman et al., (2011)	• Expt. 1: 28 (18–40 y/o) • Princeton, New Jersey • Expt. 2: 222 (15–18 y/o) • Chesterland, Ohio	Test if disfluency, in the form of typography, leads to deeper processing and improves retention.	1. Test scores	1. In expt. 1 and 2, the disfluent conditions yielded higher test scores, and the students outperformed the fluent conditions. 2. Results indicated that small disfluency interventions may significantly impact student performance and retention.
8	Dobres et al., (2018)	• 30 (*M* = 53 y/o) • Cambridge, Massachusetts	Examine the effects of visual crowding, text size, and positional uncertainty on text legibility at a glance.	1. Reading accuracy 2. Reading time	1. Smaller type size, smaller leading, and positional uncertainty had an adverse effect on readability. 2. Additional leading did not improve the readability of smaller text. 3. There was a weak connection of age and legibility thresholds. 4. Results suggested that visual crowding significantly influences readability.

#	Study	Participants	Research objective	Research measurements	Key findings/results
9	Dyson & Beier, (2016)	• 12 • Reading, UK • Copenhagen, Denmark	Determine what type of typographic variation (weight, width, stroke contrast, and italic) and the limits of the variation before compromising legibility.	1. Response time 2. Reading accuracy	1. Bold or expanded type impaired legibility. 2. Italics (used for emphasis) did not compromise legibility. 3. Bold was found to be more appropriate than italic for headings. 4. Results supported using typographic variations to emphasize text effectively.
10	Dyson & Haselgrove, (2001)	• Fast Reading: 12 (18–24 y/o), 6 (25–44 y/o) • Normal Reading: 14 (18–24 y/o), 4 (25–44 y/o) • Reading, UK	Evaluate how line length affects reading on screen at normal and fast speeds.	1. Test scores 2. Reading time	1. A medium line length of 55 characters per line yielded the best performance at normal and fast reading speeds and read faster than shorter line lengths. 2. There may be a more optimal length than 55 characters per line, as the study tested a broad range of line lengths.
11	French et al., (2013)	• 275 (13–16 y/o) • Bristol, UK	Explore if disfluency is appropriate for all students or if it has an adverse effect on students with less motivation or ability.	1. Test scores	1. The disfluent font conditions produced higher test scores. 2. Dyslexic students experienced a more significant increase in test scores than non-dyslexic students. 3. Results found that disfluency may be beneficial to learning and memory recall.
12	Gasser et al., (2005)	• 149 (M = 18.98 y/o) • Cedar Falls, Iowa	Investigate the influence of serifs (or lack thereof) and proportional or monospace widths on memory recall.	1. Test scores	1. Serif typefaces significantly improved memory recall and yielded higher test scores. 2. Character width and spacing did not have an effect. 3. Results found serifs beneficial; however, the increase in performance could be influenced by familiarity.
13	Geller et al., (2018)	• Expt. 1: 30 • Expt. 2 and 3: 36 • Ames, Iowa	Examine how perceptually disfluent typography in the form of cursive handwriting affects memory.	1. Test scores	1. Easy-to-read and hard-to-read cursive performed better for memory recall than type-print; easy-to-read cursive was statistically the best performing. 2. Results found disfluency beneficial but indicated that the level of disfluency and how it is enacted matters.
14	Kanonidou et al., (2014)	• Amblyopes Group: 15 (M = 44.6 y/o) • Control Group: 18 (M = 42 y/o) • Leicester, UK	Investigate the effects of font size on reading speed and eye movements in people with strabismic amblyopia (distorted spatial perception).	1. Eye movements 2. Reading speed	1. Participants with strabismic amblyopia read slower than those without. 2. Reading speeds were average for strabismic amblyopes in the larger text conditions; reading was impaired as the font size decreased.

#	Study	Participants	Research objective	Research measurements	Key findings/results
15	Krivec et al., (2020)	• 82 (16–36 y/o) • 26 dyslexic • Ljubljana, Slovenia	Assess if typographic variables that are self-set by participants improve readability.	1. Reading speed	1. No significant impact of self-set or pre-set text. 2. Results indicated that preferences are not performance-based and typography informed by research may be optimal for most.
16	Minakata & Beier, (2021)	• 25 (18–35 y/o) • Copenhagen, Denmark	Evaluate the effect of letter width on eye movement while reading.	1. Eye movements 2. Reading speed	1. Ultra condensed fonts resulted in longer fixations. 2. Condensed, roman (regular), and extended fonts had comparable reading and processing times. 3. There was no significant effect of letter width on reading speed. 4. Results showed that readers can adapt their reading to accommodate different levels of legibility.
17	Minakata & Beier, (2022)	• Expt. 1: 33 (*M* = 23 y/o) • Expt. 2: 24 (*M* = 26 y/o) • Copenhagen, Denmark	Explore the impacts of serifs (or lack thereof) and stroke contrast on word identification.	1. Type size threshold 2. Reading accuracy 3. Reading speed	1. Typefaces with low-stroke contrast could be read at smaller font sizes than fonts with high-stroke contrast. 2. Sans-serif typefaces with a low-stroke contrast were read at smaller font sizes, and the opposite was observed for serif typefaces. 3. There was no effect of serifs on word recognition.
18	Minakata et al., (2023)	• 19 low vision (*M* = 32 y/o) • Copenhagen, Denmark	Compare the effects of serifs (or lack thereof) and stroke contrast on font size thresholds and reading in those with and without low vision.	1. Reading accuracy 2. Reading speed	1. Low stroke contrast words were read at smaller sizes in serif fonts. 2. For low vision readers, serif fonts with low stroke contrast and sans serif with high stroke contrast performed best; the opposite was true for 'normal' vision readers. 3. Results indicated that typographic variables could interact and produce unexpected results.
19	Moret-Tatay & Perea, (2011)	• 20 • Valencia, Spain	Examine the effects of serif on lexical access.	1. Reading accuracy	1. Sans serif fonts outperformed serif fonts. 2. Removing serifs slightly increased letter spacing, which may have improved reading efficiency. 3. Increased letter spacing reduced visual crowding and improved word recognition.
20	Perea, (2013)	• 24 • Valencia, Spain	Examine the effects of serifs (or lack thereof) on normal reading.	1. Eye movements	1. Serif or sans serif had no significant effect on eye movement measures. 2. Recommendations to use serif typefaces may be based on historical or aesthetic preferences, not performance.
21	Perea et al., (2011)	• Expt. 1: 38 • Expt. 2: 16 • Valencia, Spain	Investigate the effects of letter spacing on word recognition.	1. Reading accuracy 2. Reading speed	1. Letter spacing played an important role in word identification. 2. Results found that word recognition was faster with words that had a moderate increase in letter spacing.

#	Study	Participants	Research objective	Research measurements	Key findings/results
22	Pušnik et al., (2016a)	• 50 (*M* = 25.3 y/o) • Ljubljana, Slovenia	Examine the best options for typeface, letter case, and position of on-screen text for efficient reading.	1. Eye movements 2. Reading speed	1. Georgia (serif) was the best-performing typeface. 2. Uppercase was the best-performing letter case. 3. Upper regions on the screen were the best positions. 4. Results found serifs beneficial and preferred uppercase over sentence case or lowercase letters for legibility.
23	Pušnik et al., (2016b)	• 50 (*M* = 24.3 y/o) • Ljubljana, Slovenia	Determine the difference in word recognition for typeface, letter case, type size, and position of on-screen text for efficient reading.	1. Eye movements 2. Reading speed	1. Calibri (sans serif) was the best-performing typeface, uppercase was better performing than lowercase. 2. Swiss 721 (sans serif) was the worst-performing typeface regardless of letter case. 3. Trebuchet, Verdana, Georgia had comparable performance regardless of letter case.
24	Risko et al., (2011)	• Expt. 1: 56 • Expt. 2: 64 • Tempe, Arizona	Investigate the impairments of increased letter spacing on cognitive processing.	1. Reading accuracy 2. Reading speed	1. Increased letter spacing impaired reading. Words and non-words were equally affected. 2. Results indicated that increased spacing encourages some form of serial processing.
25	Sawyer et al., (2020)	• 73 (*M* = 55 y/o) • Orlando, Florida	Compare the differences in glance legibility of eight sans serif typefaces that are commonly used in interface design.	1. Reading speed	1. Frutiger performed the best, and Gill Sans performed the worst. 2. Generally, typefaces with more open shapes and contours performed better than those with closed ones.
26	Schneps et al., (2013)	• 27 Dyslexic high school students • Cambridge, Massachusetts	Investigate if reading in shorter line lengths, specifically on small handheld devices, is beneficial for readers with dyslexia.	1. Eye movements	1. The smaller device (iPod) with shorter line lengths performed better than the larger format (iPad). 2. Normal letter spacing was preferred over expanded. 3. Results illustrated that minor line length and spacing adjustments can significantly impact reading.
27	Sheedy et al., (2005)	• 115 (18–35 y/o except expt. 4, age was not disclosed) • Expt. 1: 30 • Expt. 2: 25 • Expt. 3: 30 • Expt. 4: 30 • Columbus, Ohio	Identify and measure the typographic parameters that most affect a typeface's legibility on-screen.	1. Type size threshold 2. Visual acuity	1. Capital letters were more legible than lowercase words. 2. Bold was beneficial for capital letters and words; italic had an adverse effect. 3. Lowercase letters were more legible than words. 4. Legibility increased with font size up to 9 px./10 pt. which was found to be optimal. 5. Font size, font type, stroke width all significantly impacted legibility. However, serifs may not be a significant factor.

#	Study	Participants	Research objective	Research measurements	Key findings/results
28	Slattery & Rayner, (2010)	• Expt. 1:18 • Amherst, Massachusetts • Expt. 2: 72 • La Jolla, California	Examine how the legibility of typefaces and font smoothing technology influences eye movements while reading.	1. Eye movements 2. Reading speed 3. Test score	1. There was no effect of typeface on comprehension. 2. Times New Roman was the best-performing typeface, and ClearType was the best-performing format. 3. Low-frequency words were slower reading. 4. Results indicated that familiarity may influence legibility.
29	Slattery & Rayner, (2013)	• Expt. 1: 32 • Amherst, Massachusetts • Expt. 2: 64 • La Jolla, California	Explore the influence of intraword and interword spacing on reading.	1. Eye movements 2. Reading speed 3. Test score	1. Cambria, designed for digital display, consistently outperformed Times New Roman. 2. Words with decreased letter spacing but increased word spacing performed best. 3. Results showed increased word spacing was beneficial, with no negative effects from decreased letter spacing.
30	Soleimani & Mohammadi, (2012)	• 120 (16–20 y/o) • Urmia, Iran	Investigate the effects of font type, font size, and line spacing on reading speed, comprehension, and memory recall.	1. Reading speed 2. Test score	1. Font size impacted reading speed; 12 pt was read fastest but did not impact comprehension. 2. No effect of font style or line spacing was found on reading speed or comprehension. 3. None of the typographic variables affected memory.

Appendix B: Empirical Studies on Legibility and Readability Using Both Quantitative and Qualitative Methods (*N* = 12)

#	Study	Participants	Research objective	Research measurements	Key findings/results
1	Banerjee et al., (2011)	• 40 (*M* = 27.5 y/o) • Delhi, India	Evaluate the effects of font type and size on reading on-screen.	1. Serif or sans serif. 2. Typeface 3. Type size	1. Serifs lead to faster reading times. 14 pt. Courier was the best performing, with 14 pt. Arial trailing closely. 2. Mental workload was best for 14 pt. Verdana with 14 pt. Courier and 14 pt Arial trailing closely. 3. Results indicated that serifs enable faster reading, 14 pt is ideal for on-screen reading, and sans serif fonts may reduce mental workload and were preferred.
2	Beier & Larson, (2013)	• 60 (*M* = 28 y/o) • London, UK	Explore what contributes to familiarity–exposure or common letterforms and how familiarity affects readers' performance and preferences of typefaces.	1. Reading speed 2. Questionnaire	1. Although the uncommon letterforms did not affect reading performance, readers did not like them. 2. Results indicated that the minimal change in letter structures may be due to subjective/aesthetic-based factors rather than performance-based concerns.

#	Study	Participants	Research objective	Research measurements	Key findings/results
3	Bernard et al., (2003)	• 35 (*M* = 25 y/o) • Albuquerque, New Mexico	Evaluate the relationship between typeface, size, and format on-screen. Specifically, objective and subjective differences between serif (Times) or sans serif (Arial), in 10 and 12 pt size, on-screen in dot matrix or anti-aliased formats.	1. Reading speed 2. Reading accuracy 3. Questionnaire	1. There were no significant differences in objective readability (reading accuracy and speed). 2. There was a significant effect of typeface, size, and format on subjective readability; sans serif and larger size were perceived as more readable. 3. Arial, 10 pt anti-aliased was the slowest reading, 4. Arial, 12 pt dot matrix was the most preferred. 5. Results showed the influence of perceived readability on subjective typeface preference.
4	Hojjati & Muniandy, (2014)	• 30 • Penang, Malaysia	Explore the effect of serif or sans serif typefaces and line spacing on reading speed and comprehension.	1. Test scores 2. Reading speed 3. Questionnaire	1. Sans serif outperformed the serif in all conditions. 2. Double line spaced sans serif had the best performance and highest participant preference.
5	Ling & van Schaik, (2006)	• Expt. 1: 72 (44 under 25, 28 26–50 y/o) • Expt. 2: 99 (*M* = 24 y/o) • Keele, UK	Investigate the effects of font type and line length on reading performance.	1. Reading accuracy 2. Task completion time 3. Questionnaire	1. In expt. 1, typeface did not impact search time or accuracy, and longer line lengths had faster searches with reduced accuracy. 2. In expt. 2, there was no significant effect of typeface or line length. 3. Participants preferred shorter line lengths and Arial.
6	Lonsdale, (2007)	• Expt. 1: 32 (*M* = 26.6 y/o) • Expt. 2: 32 (*M* = 25.6 y/o) • Expt. 3: 32 (*M* = 29.8 y/o) • Leeds, UK	Investigate if typographic and layout variables influence examination performance and outcomes.	1. Test scores 2. Questionnaire	1. Typographic layout affected speed, accuracy, and overall performance of participants' test results. 2. Participants preferred the increased legibility conditions. 3. Results showed that typography can significantly impact cognition and test performance.
7	Lonsdale, (2014)	• 32 (*M* = 30.9 y/o) • Leeds, UK	Examine if typographic variables affect examination performance for multiple-choice, location, and comprehension questions.	1. Test scores 2. Questionnaire	1. Typographic layout affected speed, accuracy, and overall performance of participants' test results. 2. Participants preferred the increased legibility conditions. 3. Results indicated that typography can significantly impact cognition and test performance.
8	Lonsdale, (2016)	• 30 (*M* = 29.3 y/o) • Reading, UK	Investigate if typographic and layout variables influence student performance when given a reading task without a time limit.	1. Test scores 2. Questionnaire	1. Typographic layout affected speed, accuracy, and overall performance of participants' test results. 2. Participants preferred the increased legibility conditions. 3. Results indicated that typography can significantly impact cognition and test performance.

#	Study	Participants	Research objective	Research measurements	Key findings/results
9	Lonsdale et al., (2006)	• 30 (*M* = 25.8 y/o) • Reading, UK	Investigate if typographic and layout variables influence examination performance and outcomes.	1. Test scores 2. Questionnaire	1. Typographic layout affected speed, accuracy, and overall performance of participants' test results. 2. Participants preferred the increased legibility conditions. 3. Results indicated that typography can significantly impact cognition and test performance.
10	Sieghart, (2023)	• 145 people with undisclosed disabilities • Hasselt, Belgium	Evaluate the effectiveness of two common east-to-read language (readability) recommendations of a sans serif typeface, such as Arial and 14 pt type size.	1. Reading speed 2. Questionnaire	1. 51.1% read serif typefaces the fastest. Arial was the worst performing typeface. 2. Serifs or lack thereof are not a significant legibility factor. 3. 12 or 12.5 pt was found to be large enough by 93.7% of participants. 4. Subjectively preferred typefaces were not the best performing. 5. Familiarity did not moderate reading speed; unfamiliar fonts were read faster than Arial. 6. Results indicated that the common recommendation of 14 pt Arial may need to be revised. There is no such thing as a single correct font or font size.
11	Ukonu et al., (2021)	• 315 • Nsukka, Nigeria	Examine preference, reading speed, and error detection rates for Times New Roman and Calibri typefaces in print and on screen.	1. Reading speed 2. Questionnaire	1. The average reading speed was higher for Times New Roman. 2. Times New Roman was preferred for print and Calibri for screen. 3. Preference for Calibri may be informed by familiarity, whereas preferences for Times New Roman may be based on the perception it is better for school assignments.
12	Wallace et al., (2022)	• 352 (*M* = 33 y/o) • Providence, Rhode Island	Explore the effects of font choice on reading speed and comprehension (and explore if there is a connection between font preference and performance).	1. Test scores 2. Reading speed 3. Questionnaire	1. Participants read 14% faster in their fastest reading font over their preferred font. Participants read 35% faster in their fastest font than their slowest font. 2. Familiarity was not a factor. 3. Results indicated that no single font or font size improves reading for everyone, reinforcing the need for individuation.

Appendix C: Reviewed Studies Data Collection Tools (*N* = 42)

Research measures (No. of studies)	Studies
Eye movements (*n* = 9)	Al-Samarraie et al. (2017); Kanonidou et al., (2014); Minakata & Beier, (2021); Perea, (2013); Pušnik et al., (2016a); Pušnik et al., (2016b); Schneps et al., (2013); Slattery & Rayner, (2010); Slattery & Rayner, (2013)
Questionnaires (*n* = 12)	Banerjee et al., (2011); Beier & Larson, (2013); Bernard et al., (2003); Hojjati & Muniandy, (2014); Ling & van Schaik, (2006); Lonsdale, (2007); Lonsdale, (2014); Lonsdale, (2016); Lonsdale et al., (2006); Sieghart, (2023); Ukonu et al., (2021); Wallace et al., (2022)

Research measures (No. of studies)	Studies
Reading accuracy (*n* = 11)	Banerjee et al., (2011); Beier & Oderkerk, (2021); Bernard et al., (2003); Dobres et al., (2018); Dyson & Beier, (2016); Ling & van Schaik, (2006); Minakata & Beier, (2022); Minakata et al., (2023); Moret-Tatay & Perea, (2011); Perea et al., (2011); Risko et al., (2011)
Reading acuity (*n* = 1)	Beier & Oderkerk, (2019)
Reading speed (*n* = 24)	Arditi & Cho, (2005); Arditi & Cho, (2007); Banerjee et al., (2011); Beier & Larson, (2013); Beier & Oderkerk, (2019); Bernard et al., (2013); Bernard et al., (2003); Hojjati & Muniandy, (2014); Kanonidou et al., (2014); Krivec et al., (20(20); Minakata & Beier, (2021); Minakata & Beier, (2022); Minakata et al., (2023); Perea et al., (2011); Pušnik et al., (2016a); Pušnik et al., (2016b); Risko et al., (2011); Sawyer et al., (20(20); Sieghart, (2023); Slattery & Rayner, (2010); Slattery & Rayner, (2013); Soleimani & Mohammadi, (2012); Ukonu et al., (2021); Wallace et al., (2022)
Reading time (*n* = 2)	Dobres et al., (2018); Dyson & Haselgrove, (2001)
Task completion time (*n* = 1)	Ling & van Schaik, (2006)
Test scores (*n* = 14)	Diemand-Yauman et al., (2011); Dyson & Haselgrove, (2001); French et al., (2013); Gasser et al., (2005); Geller et al., (2018); Hojjati & Muniandy, (2014); Lonsdale, (2007); Lonsdale, (2014); Lonsdale, (2016); Lonsdale et al., (2006); Slattery & Rayner, (2010); Slattery & Rayner, (2013); Soleimani & Mohammadi, (2012); Wallace et al., (2022)
Type size threshold (*n* = 4)	Arditi & Cho, (2005); Arditi & Cho, (2007); Minakata & Beier, (2022); Sheedy et al., (2005)

Appendix D: Reviewed Studies Typeface Design Variables (*N* = 33)

Study	Letter structure	Letter width	Serif/sans	Stroke contrast	Stroke width	Typeface	Type style
1. Arditi & Cho (2005)			•			•	
2. Banerjee et al., (2011)			•			•	
3. Beier & Larson, (2013)	•						
4. Beier & Oderkerk, (2019)	•					•	
5. Beier & Oderkerk, (2021)				•	•	•	
6. Bernard et al., (2013)					•	•	
7. Bernard et al., (2003)			•			•	
8. Diemand-Yauman et al., (2011)			•			•	
9. Dyson & Beier, (2016)		•		•	•		
10. French et al., (2013)						•	
11. Gasser et al., (2005)			•			•	
12. Geller et al., (2018)	•						
13. Hojjati & Muniandy, (2014)			•			•	
14. Ling & van Schaik, (2006)			•			•	
15. Lonsdale, (2007)						•	
16. Lonsdale, (2014)						•	
17. Lonsdale, (2016)						•	
18. Lonsdale et al., (2006)						•	
19. Minakata & Beier, (2021)		•					
20. Minakata & Beier, (2022)			•	•			
21. Minakata et al., (2023)			•			•	

Study	Letter structure	Letter width	Serif/sans	Stroke contrast	Stroke width	Typeface	Type style
22. Moret-Tatay & Perea, (2011)			•			•	
23. Perea, (2013)			•			•	
24. Pušnik et al., (2016a)			•			•	
25. Pušnik et al., (2016b)			•			•	
26. Sawyer et al., (2020)						•	
27. Sheedy et al., (2005)			•			•	•
28. Sieghart, (2023)			•			•	
29. Slattery & Rayner, (2010)			•			•	
30. Slattery & Rayner, (2013)			•			•	
31. Soleimani & Mohammadi, (2012)			•			•	
32. Ukonu et al., (2021)			•			•	
33. Wallace et al., (2022)			•			•	
Total	3	2	20	3	3	28	1

Appendix E: Reviewed Studies Typographic Variables (*N* = 29)

Study	Colour	Columns	Letter case	Letter spacing	Line length	Line spacing	Paragraph spacing	Text alignment	Type size	Word spacing
1. Al-Samarraie et al. (2017)		•								
2. Arditi & Cho, (2005)									•	
3. Arditi & Cho, (2007)			•						•	
4. Banerjee et al., (2011)									•	
5. Beier & Oderkerk, (2019)									•	
6. Bernard et al., (2003)									•	
7. Diemand-Yauman et al., (2011)	•									
8. Dobres et al., (2018)						•				
9. Dyson & Haselgrove, (2001)					•					
10. French et al., (2013)	•									
11. Hojjati & Muniandy, (2014)						•				
12. Kanonidou et al., (2014)									•	
13. Krivec et al., (2020)					•	•		•		

Study	Colour	Columns	Letter case	Letter spacing	Line length	Line spacing	Paragraph spacing	Text alignment	Type size	Word spacing
14. Ling & van Schaik, (2006)					•				•	
15. Lonsdale, (2007)					•	•	•		•	
16. Lonsdale, (2014)					•	•	•		•	
17. Lonsdale, (2016)					•	•	•		•	
18. Lonsdale et al., (2006)					•	•	•		•	
19. Minakata et al., (2023)									•	
20. Perea et al., (2011)				•						
21. Pušnik et al., (2016a)			•							
22. Pušnik et al., (2016b)			•						•	
23. Risko et al., (2011)				•						
24. Schneps et al., (2013)				•	•					
25. Sheedy et al., (2005)			•	•					•	
26. Sieghart, (2023)									•	
27. Slattery & Rayner, (2010)									•	
28. Slattery & Rayner, (2013)				•						•
29. Soleimani & Mohammadi, (2012)					•				•	
Total	2	1	4	5	9	7	4	1	17	1

Appendix F: Reviewed Studies Typeface Distribution by Study (*N* = 42)

#	Study/typefaces per study (*n*)	Typefaces
1	Al-Samarraie et al., 2017 (*n* = 1)	Times New Roman
2	Arditi & Cho, 2005 (*n* = 9)	Custom fonts
3	Arditi & Cho, 2007 (*n* = 1)	Arial
4	Banerjee et al., 2011 (*n* = 6)	Arial, Courier New, Georgia, Tahoma, Times New Roman, Verdana,
5	Beier & Larson, 2013 (*n* = 6)	Custom fonts, Helvetica, Times New Roman
6	Beier & Oderkerk, 2019 (*n* = 3)	Gill Sans Light, KBH Display Regular, KBH Text Regular
7	Beier & Oderkerk, 2021 (*n* = 3)	Custom fonts
8	Bernard et al., 2013 (*n* = 1)	Courier
9	Bernard et al., 2003 (*n* = 2)	Arial, Times New Roman

#	Study/typefaces per study (*n*)	Typefaces
10	Diemand-Yauman et al., 2011 (*n* = 6)	Arial, Bodoni MT, Comic Sans, Comic Sans Italicized, Haettenschweiler, Monotype Corsiva
11	Dobres et al., 2018 (*n* = 2)	Frutiger, Georgia
12	Dyson & Beier, 2016 (*n* = 7)	Custom fonts
13	Dyson & Haselgrove, 2001 (*n* = 6)	Arial
14	French et al., 2013 (*n* = 2)	Arial, Monotype Corsiva
15	Gasser et al., 2005 (*n* = 2)	Courier, Helvetica, Monaco, Palatino
16	Geller et al., 2018 (*n* = 3)	Custom font, Unspecified
17	Hojjati & Muniandy, 2014 (*n* = 2)	Times New Roman, Verdana
18	Kanonidou et al., 2014 (*n* = 1)	Courier New
19	Krivec et al., 2020 (*n* = 7)	Amasis, Bembo, Demos, Neue Frutiger, Neuzeit Office, Open Sans, Verdana
20	Ling & van Schaik, 2006 (*n* = 2)	Arial, Times New Roman
21	Lonsdale, 2007 (*n* = 3)	Times New Roman, Times New Roman Bold, Times New Roman Italic
22	Lonsdale, 2014 (*n* = 3)	DIN Bold, DIN Regular, Times New Roman
23	Lonsdale, 2016 (*n* = 3)	DIN Bold, DIN Regular, Times New Roman
24	Lonsdale et al., 2006 (*n* = 3)	DIN Bold, DIN Regular, Times New Roman
25	Minakata & Beier, 2021 (*n* = 4)	Univers Condensed, Univers Extended, Univers Regular, Univers Ultra Condensed
26	Minakata & Beier, 2022 (*n* = 4)	Custom fonts
27	Minakata et al., 2023 (*n* = 2)	Custom fonts
28	Moret-Tatay & Perea, 2011 (*n* = 2)	Lucida Bright, Lucida Sans
29	Perea, 2013 (*n* = 2)	Lucida, Lucida Sans
30	Perea et al., 2011 (*n* = 1)	Times New Roman
31	Pušnik et al., 2016a (*n* = 5)	Calibri, Georgia, Swiss 721, Trebuchet, Verdana
32	Pušnik et al., 2016b (*n* = 5)	Calibri, Georgia, Swiss 721, Trebuchet, Verdana
33	Risko et al., 2011 (*n* = 1)	Unspecified
34	Sawyer et al., 2020 (*n* = 8)	Avenir LT Pro 55 Roman, DIN Next LT Pro Regular, Eurostile Regular, Frutiger Neue LT Pro Regular, Gill Sans MT Regular, Meta Office Pro Book, Speak Office Pro Book, Univers Next Pro Regular
35	Schneps et al., 2013 (*n* = 1)	Georgia
36	Sheedy et al., 2005 (*n* = 4)	Arial, Georgia, Times New Roman, Verdana
37	Sieghart, 2023 (*n* = 5)	Arial, Thesis The Serif, Thesis TheAntiqua B, Thesis TheMix, Thesis TheSans
38	Slattery & Rayner, 2010 (*n* = 5)	Andale Mono, Consolas, Harrington, Script MT Bold, Times New Roman
39	Slattery & Rayner, 2013 (*n* = 4)	Cambria, Consolas, Georgia, Times New Roman
40	Soleimani & Mohammadi, 2012 (*n* = 2)	Arial, Bookman
41	Ukonu et al., 2021 (*n* = 2)	Calibri, Times New Roman
42	Wallace et al., 2022 (*n* = 16)	Arial, Avant Garde, Avenir Next, Calibri, EB Garamond, Franklin Gothic, Helvetica, Lato, Montserrat, Noto Sans, Open Sans, Oswald, Poytner Gothic, Roboto, Times, Utopia

Appendix G: Reviewed Studies Typefact Distribution by Typeface (*N* = 52)

#	Typeface/number of studies (*n*)	Studies
1	Amasis (*n* = 1)	Krivec et al., 2020
2	Andale Mono (*n* = 1)	Slattery & Rayner, 2010
3	Arial (*n* = 11)	Arditi & Cho, 2007; Banerjee et al., 2011; Bernard et al., 2003; Diemand-Yauman et al., 2011; Dyson & Haselgrove, 2001; French et al., 2013; Ling & van Schaik, 2006; Sheedy et al., 2005; Sieghart, 2023; Soleimani & Mohammadi, 2012; Wallace et al., 2022
4	Avante Garde (*n* = 1)	Wallace et al., 2022
5	Avenir/Avenir Next (*n* = 2)	Sawyer et al., 2020; Wallace et al., 2022
6	Bembo (*n* = 1)	Krivec et al., 2020

#	Typeface/number of studies (*n*)	Studies
7	Bookman (*n* = 1)	Soleimani & Mohammadi, 2012
8	Bodoni MT (*n* = 1)	Diemand-Yauman et al., 2011
9	Calibri (*n* = 4)	Pušnik et al., 2016a; Pušnik et al., 2016b; Ukonu et al., 2021; Wallace et al., 2022
10	Cambria (*n* = 1)	Slattery & Rayner, 2013
11	Comic Sans (*n* = 1)	Diemand-Yauman et al., 2011
12	Consolas (*n* = 2)	Slattery & Rayner, 2010; Slattery & Rayner, 2013
13	Courier/Courier New (*n* = 4)	Banerjee et al., 2011; Bernard et al., 2013; Gasser et al., 2005; Kanonidou et al., 2014
14	Custom Typeface (*n* = 7)	Arditi & Cho, 2005; Beier & Larson, 2013; Beier & Oderkerk, 2021; Dyson & Beier, 2016; Geller et al., 2018; Minakata & Beier, 2022; Minakata et al., 2023
15	Demos (*n* = 1)	Krivec et al., 2020
16	DIN /DIN Next (*n* = 4)	Lonsdale, 2014; Lonsdale, 2016; Lonsdale et al., 2006; Sawyer et al., 2020
17	Eurostile (*n* = 1)	Sawyer et al., 2020
18	Franklin Gothic (*n* = 1)	Wallace et al., 2022
19	Frutiger/Frutiger Neue (*n* = 3)	Dobres et al., 2018; Krivec et al., 2020; Sawyer et al., 2020
20	Garamond/EB Garamond (*n* = 1)	Wallace et al., 2022
21	Georgia (*n* = 7)	Banerjee et al., 2011; Dobres et al., 2018; Pušnik et al., 2016a; Pušnik et al., 2016b; Schneps et al., 2013; Sheedy et al., 2005; Slattery & Rayner, 2013
22	Gill Sans/Gill Sans MT (*n* = 2)	Beier & Oderkerk, 2019; Sawyer et al., 2020
23	Haettenschweiler (*n* = 1)	Diemand-Yauman et al., 2011
24	Harrington (*n* = 1)	Slattery & Rayner, 2010
25	Helvetica (*n* = 2)	Gasser et al., 2005; Wallace et al., 2022
26	KBH Display/Text Regular (*n* = 1)	Beier & Oderkerk, 2019
27	Lato (*n* = 1)	Wallace et al., 2022
28	Lucida (*n* = 1)	Perea, 2013
29	Lucida Bright (*n* = 1)	Moret-Tatay & Perea, 2011
30	Lucida Sans (*n* = 2)	Moret-Tatay & Perea, 2011; Perea, 2013
31	Meta Office Pro (*n* = 1)	Sawyer et al., 2020
32	Monaco (*n* = 1)	Gasser et al., 2005
33	Monotype Corsiva (*n* = 3)	Diemand-Yauman et al., 2011; French et al., 2013
34	Montserrat (*n* = 1)	Wallace et al., 2022
35	Neuzeit Office (*n* = 1)	Krivec et al., 2020
36	Noto Sans (*n* = 1)	Wallace et al., 2022
37	Open Sans (*n* = 2)	Krivec et al., 2020; Wallace et al., 2022
38	Oswald (*n* = 1)	Wallace et al., 2022
39	Palatino (*n* = 1)	Gasser et al., 2005
40	Poynter Gothic (*n* = 1)	Wallace et al., 2022
41	Roboto (*n* = 1)	Wallace et al., 2022
42	Tahoma (*n* = 1)	Banerjee et al., 2011
43	Thesis (*n* = 1)	Sieghart, 2023
44	Times New Roman/Times (*n* = 14)	Al-Samarraie et al., 2017; Banerjee et al., 2011; Bernard et al., 2003; Hojjati & Muniandy, 2014; Ling & van Schaik, 2006; Lonsdale, 2007; Lonsdale, 2014; Lonsdale, 2016; Lonsdale et al., 2006; Perea et al., 2011; Sheedy et al., 2005; Slattery & Rayner, 2010; Slattery & Rayner, 2013; Ukonu et al., 2021
45	Trebuchet (*n* = 2)	Pušnik et al., 2016a; Pušnik et al., 2016b
46	Script MT Bold (*n* = 1)	Slattery & Rayner, 2010
47	Speak Office Pro (*n* = 1)	Sawyer et al., 2020
48	Swiss 721 (*n* = 2)	Pušnik et al., 2016a; Pušnik et al., 2016b
49	Univers/Univers Next Pro (*n* = 2)	Minakata & Beier, 2021; Sawyer et al., 2020

#	Typeface/number of studies (*n*)	Studies
50	Unspecified (*n* = 2)	Geller et al., 2018; Risko et al., 2011
51	Utopia (*n* = 1)	Wallace et al., 2022;
52	Verdana (*n* = 6)	Banerjee et al., 2011; Hojjati & Muniandy, 2014; Krivec et al., 2020; Pušnik et al., 2016a; Pušnik et al., 2016b; Sheedy et al., 2005

Appendix H: Results From the Reviewed Studies Comparing Serif and Sans Serif Typefaces (*N* = 19)

Study	Serif preference	Sans serif preference	Serifs and sans serif conditional benefits	Null effect of serifs	Inconclusive
Arditi & Cho, (2005)				•	
Banerjee et al., (2011)			•		
Bernard et al., (2003)				•	
Gasser et al., (2005)	•				
Hojjati & Muniandy, (2014)		•			
Ling & van Schaik, (2006)					•
Minakata & Beier, (2022)				•	
Minakata et al., (2023)					•
Moret-Tatay & Perea, (2011)		•			
Perea, (2013)				•	
Pušnik et al., (2016a)	•				
Pušnik et al., (2016b)					•
Sheedy et al., (2005)				•	
Sieghart, (2023)			•		
Slattery & Rayner, (2010)	•				
Slattery & Rayner, (2013)					•
Soleimani & Mohammadi, (2012)				•	
Ukonu et al., (2021)			•		
Wallace et al., (2022)			•		
Total	3	2	4	6	4

Authors

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Dr. Diana Petrarca is a Professor and founding member of the Frazer Faculty of Education at Ontario Tech University. During her time at Ontario Tech University, she has held numerous adminis-trative roles including Practicum Coordinator, Bachelor of Education Program Director, Assistant Dean, and Acting Dean. Her research interests include initial teacher education programs, critical thinking and creativity in initial teacher education and higher education, web-based learning and learning tools, and (un)making teachers.

RESEARCH ARTICLE

Scripts in Dialogue: Reinterpreting *Visible Language* Covers through Bilingual Design Workshops in Kuwait

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Abstract: This study investigates how postmodern graphic design strategies can be critically reimagined — reframed through the lens of bilingual design pedagogy to engage issues of cultural identity, script interaction, and typographic experimentation — within Arabic–English bilingual contexts. Using the *Visible Language* journal (late 1960s–2025) as a foundational reference, the research was conducted over three academic semesters with 90 undergraduate design students in Kuwait. Through a structured practice-led research methodology, participants analyzed historical cover designs and developed original bilingual compositions inspired by postmodern aesthetics. The project addressed typographic challenges, including directionality, visual hierarchy, and the interplay between Arabic calligraphic and Latin modular forms. Design strategies — including layering, fragmentation, and grid disruption — were systematically explored to facilitate visual integration across scripts. Outcomes ranged from cohesive bilingual compositions to instances of double monolingualism reflecting varied levels of synthesis. Cultural motifs and script-specific conventions emerged as influential factors shaping design decisions. The study concludes that adapting postmodern design principles to bilingual contexts requires more than stylistic translation; it entails critical negotiation of cultural identity, linguistic equity, and the visual dynamics of multilingual communication.

Keywords: Arabic–English visual communication; bilingual typography; cultural semiotics; design pedagogy; postmodern graphic design

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1. Introduction: Background and Rationale

For over five decades, *Visible Language* has been a leading platform for experimental and research driven inquiries into typography and visual communication (Wrolstad, 1971; Poggenpohl, 2025). Its evolving editorial direction — and status as the oldest peer reviewed design journal (*Visible Language*, 1967) — has enabled cover designs that reflect postmodern strategies such as disrupted grids, fragmented hierarchies, and layered compositions (Margolin, 1994; Blauvelt, 1994; Cross, 2025). These visual experiments — documented across multiple decades and not limited to volume 59 — challenge conventional standards of legibility and neutrality, positioning typography as a culturally embedded, discursive practice (McCoy, 1994).

In parallel, contemporary scholarship on bilingual and multilingual design has highlighted the cultural and spatial complexities of integrating structurally divergent scripts, particularly Arabic and Latin. Researchers stress that such work requires more than graphic juxtaposition; it is a process of ideological and cultural negotiation (AbiFarès, 2001; Abdel Baki, 2013, 2024; Ashrafi, 2015; Blankenship, 2003). The fluid cursive structure of Arabic offers a contrasting spatial rhythm to the modular form of Latin, prompting reconsideration of how typographic equity can be visually articulated across scripts.

This study investigates how postmodern design principles — such as layering, fragmentation, and spatial disruption — can be reimagined within Arabic–English bilingual typography. Conducted in Kuwait with undergraduate design students, the research draws on *Visible Language*'s archival covers (late 1960s–2025) as both inspiration and critical framework. Students engaged with the archive not as historical artifacts alone but as provocations for visual inquiry and cultural reflection (Weingart, 2000; Hue & Eye, 2025).

The central research question guiding this study is: How can postmodern design strategies be critically adapted to Arabic–English bilingual typography in ways that balance cultural specificity, visual experimentation and pedagogical relevance?

By addressing this question, this project contributes to the ongoing discourse on cross-cultural semiotics (Vanderschantz & Daly, 2023), decolonial design pedagogy (Escobar, 2018; Mignolo, 2000; Tunstall, 2013), and multilingual visual communication (Bassiouney & Walters, 2020; Li & Westland, 2023).

Through a structured pedagogical framework, students were tasked with developing bilingual typographic compositions that reflected identity, legibility, and cultural hybridity. Their responses not only highlight the tensions of Arabic–Latin integration but also demonstrate the value of design as a method of inquiry into complex sociocultural dynamics.

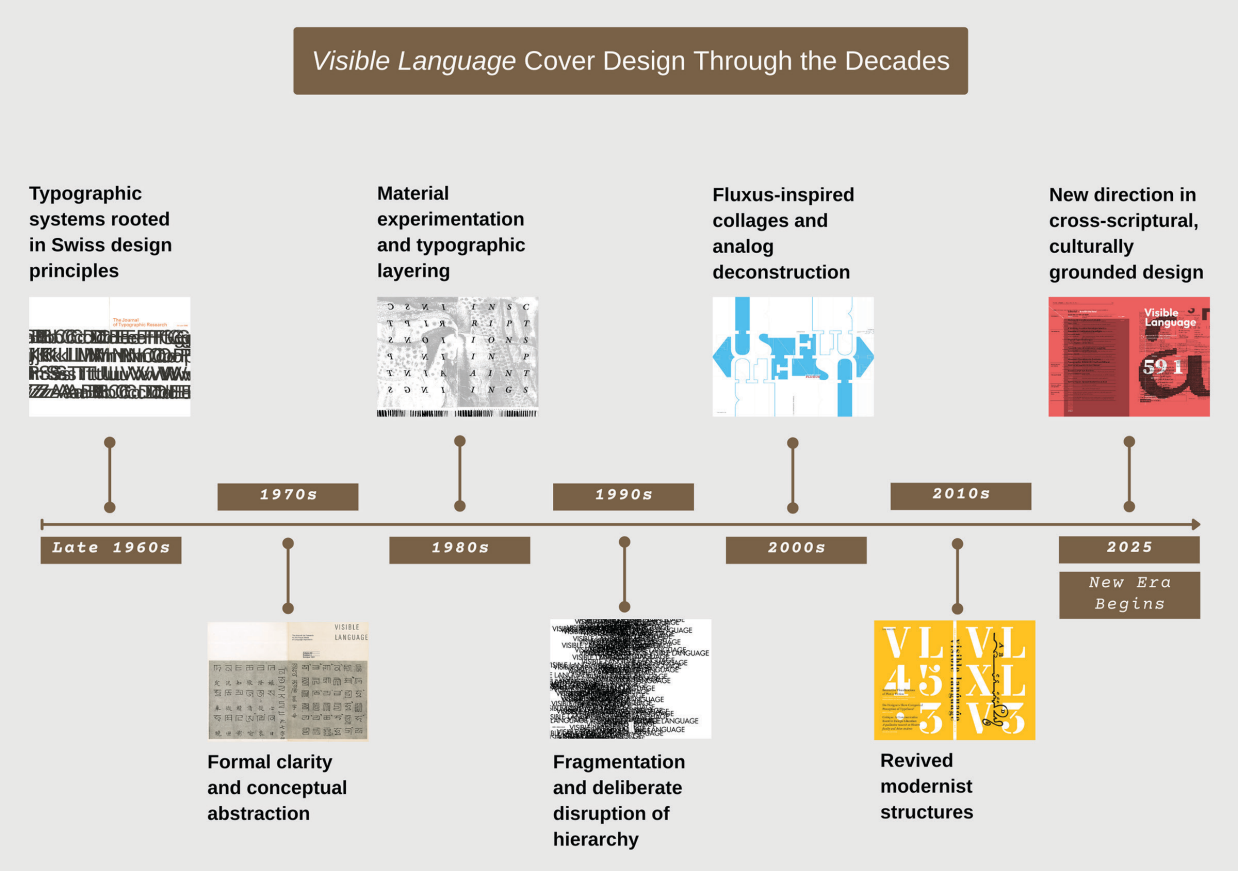

Figure 1. Timeline of *Visible Language* cover designs (late 1960s–2025), annotated with summaries of dominant visual strategies per decade. This visual history served as both a pedagogical prompt and a conceptual framework for the bilingual design workshop. Cover images courtesy of *Visible Language*.

Figure 1 presents a curated timeline of *Visible Language* covers from the late 1960s to 2025, mapping shifts from structural modernism to expressive postmodernism. Annotated with key visual strategies from each decade, this visual chronology serves as both a conceptual framework and pedagogical tool, guiding students' bilingual reinterpretations and demonstrating how archival design can function as a site of critical inquiry and innovation in global design education.

While many scholars place the peak of postmodern design between the 1970s and the 1990s, this timeline deliberately extends into the 2020s to trace how postmodern strategies, such as layering, collage, and typographic disruption, continue to influence contemporary cover designs. Rather than framing postmodernism as a fixed historical period, this study approaches it as a set of visual strategies and critical attitudes that remain in circulation, albeit in hybrid or re-contextualized forms.

2. Contextual Foundations

This study draws on intersecting frameworks from postmodern graphic design, typography as discourse, and bilingual visual communication, situating student-led experiments within a robust scholarly and pedagogical context. These intersections frame typography not only as an aesthetic tool, but also as a medium for cultural negotiation and ideological critique.

The *Visible Language* journal served as both an archive and discursive platform, offering front-cover designs as visual texts for critical inquiry. By analyzing and reinterpreting these covers through a bilingual lens, students moved beyond formal aesthetics to explore script politics, visual equity, and cross-cultural communication.

Conducted within undergraduate design curriculum in Kuwait, a multilingual context, this study reflects students' lived experiences navigating Arabic–Latin typographic systems. Their work becomes both a learning tool and a form of knowledge production, grounded in local culture and informed by global design discourse.

The theoretical grounding is structured around four core themes, each informed by foundational design theory, visual communication scholarship, and educational research:

- Postmodern aesthetics: fragmentation, layering, and disruption provide a foundation for hybrid and nonlinear graphic exploration (Carson, 1995; Heller & Ballance, 2001; Lupton & Miller, 2014; Venturi, 1977).
- Typography as discourse: type mediates cultural values and power, particularly across languages with divergent scripts (Kinross, 2004; Kress & van Leeuwen, 2006; Lupton, 2010; Stöckl, 2005).
- Bilingual and bicultural design: integrating Arabic and Latin scripts requires semiotic sensitivity, respecting both visual integrity and communicative balance (Abdel Baki, 2023; AbiFarès, 2015; Hofmann, 1998).
- Pedagogical practice: design education must address language, culture, and identity. This workshop model emphasizes reflective practice, critique, and iteration as research methods (Barnard, 1998; Dewey, 1933; Gay, 2010; Schön, 2017).

By embedding student work within these frameworks, this study demonstrates how typographic experimentation can become a method of inquiry. It affirms that design pedagogy is a critical site for exploring identity and visual culture in multilingual societies.

2.1. Postmodern Graphic Design: Disruption, Multiplicity, and Visual Discourse

The late 20th century marked a pivotal shift in graphic design, departing from the rationalist clarity of modernism toward the layered, pluralistic aesthetics of postmodernism. Rooted in movements such as the Bauhaus and Swiss International Style, modernist design champions neutrality, order, and universality (Britannica, 2025; Medley Home, 2024). These ideals are epitomized in Beatrice Warde's influential essay, *The Crystal Goblet*, originally delivered as a speech in 1930, which argues that typography, like a clear goblet, should be invisible, allowing content to shine through without visual interference (Warde, 1956). While these principles fostered clarity and functional communication, they also imposed a homogenizing aesthetic that often overlooked cultural specificity.

Postmodern graphic design emerged in critiques of these assumptions, foregrounding fragmentation, hybridity, and subjectivity (Design Reviewed, 2023; Poynor, 2003). Key figures such as Wolfgang Weingart, April Greiman, David Carson, and Katherine McCoy challenged the notion that legibility should be the primary design goal. Weingart's "New Wave" typography disrupted the Swiss grid through layering, dynamic spacing, and nonlinear arrangements (Hue & Eye, 2025; Weingart, 2000). Carson's experimental editorial layouts embrace visual dissonance, treating design as expressive and interpretive rather than transparent (Hue & Eye, 2025). McCoy's pedagogy at the Cranbrook Academy of Art reframed design as discourse, encouraging students to view typography as a site of cultural and ideological negotiation (AIGA Eye on Design, 2023; Cranbrook Center for Collections and Research, 2023; McCoy, 1994).

Within this intellectual milieu, *Visible Language* played a foundational role. As a research-focused journal dedicated to visual communication, it documented and advanced postmodern typographic inquiries. Themed issues such as *Typography: Designing the Text* (*Visible Language*, 1993) and *Cultural Dimensions of Communication Design* reflect a turn toward viewing typography as a discursive and culturally embedded practice (Cross, 2025; Poggenpohl, 2025). The journal's covers, ranging from Fluxus-inspired collages in the 1970s to contemporary digital manipulations, functioned as experimental canvases where visual language was continuously deconstructed and reassembled (Lonsdale, 2025).

This legacy directly informed the present study. By engaging with the *Visible Language* archive, students encountered aesthetic forms and the intellectual ethos of postmodernism. These encounters position design as a form of critique, translation, and cultural expression. In Kuwait and the broader Gulf region, where modernist pedagogies often remain dominant, revisiting postmodern frameworks offers students a critical lens for exploring bilingual typography as an intersection of identity, multiplicity, and visual experimentation.

At the same time, we acknowledge that the term 'postmodernism' becomes increasingly fluid beyond the 1990s. Scholars have debated whether postmodernism persists in the 21st century or gives way to new paradigms, such as metamodernism or digimodernism (Kirby, 2009; Vermeulen & van den Akker, 2010). For this study, 'postmodern strategies' refer to recurring visual tropes — layering, disruption, and hybridity — that persist in contemporary design, regardless of strict epochal classifications. Our aim is not to reassert periodization but to examine how postmodern visual languages are adapted and reinterpreted in bilingual, cross-cultural educational settings.

2.2. Typography as Discourse: From Neutral Tool to Cultural Agent

Contemporary typographic theory increasingly challenges the notion of type as a passive conduit of language. Instead, typography is recognized as visual rhetoric — an active constructor of meaning shaped by formal, spatial, and material decisions (Lupton, 1996; McCoy, 1994). Variations in weight, rhythm, alignment, and density do not merely affect aesthetics; they operate semiotically, guide interpretation, and embed the reader within particular ideological and cultural frameworks (Frascara, 2004).

Rather than being universally legible, typography is culturally oriented. Scholars argue that typographic forms carry historical and political connotations that can either uphold or disrupt the prevailing narratives. For instance, Blankenship (2003) observes that the juxtaposition of Arabic calligraphy and Latin typography can result in either exoticization or empowerment, depending on the context and intention. Building on Bakhtin's theory of dialogism, Ashrafi (2015) frames bilingual typography as a dialogic space in which two distinct visual languages negotiate meaning, each bringing about its own cultural weight, voice, and visual logic.

Visible Language has long advanced this view of typography as discourse. Since its inception, the journal has published work exploring how typographic forms intersect with politics, culture, and systems of knowledge (Cross, 2025; Wrolstad, 1971). This commitment to critical inquiry aligns with the broader discourse presented in *Uncorporate Identity*, which examines how studios such as Metahaven and Experimental Jetset position design as a tool for social critique and ideological resistance (Van der Velden & Kruk, 2010). Typography has become more than a technical solution for spatial balance or readability; it has become a means of cultural mediation. This aligns with contemporary arguments introduced by Murphy, who explored how font design and typographic form shape affective, cultural, and political meaning — framing "fontroversy" as the socially loaded debates surrounding typographic choices (2017, p. 63). For students in this study, this discourse-oriented approach provided a conceptual lens for interrogating Arabic–English bilingual designs. Student projects treat typographic choices as politically and symbolically charged, using type not only to convey content but also to express identity, heritage, and power relations embedded in language systems.

2.3. Bilingual Design: Typographic Tensions and Visual Negotiation

Designing across structurally divergent writing systems — particularly Arabic and Latin — requires critical engagement with visual conventions that have historically centered Latin script as the typographic norm. Arabic's cursive, contextual letterforms, and fluid ligatures operate within a distinct spatial logic that disrupts the modular, left-to-right structure of Latin typography (AbiFarès, 2001; Bouabdallah, 2020). Rather than treating Arabic as a 'complication' within existing typographic systems, this study frames these differences as an opportunity to question and deconstruct inherited design assumptions.

In many global typographic frameworks, alignment, spacing, and hierarchy are built around Euro-American modernist standards that implicitly marginalize scripts such as Arabic. Thus, cross-scriptural design must contend not only with aesthetic tensions but also with the lingering legacies of colonial visual systems. The lack of expressive, widely available Arabic typefaces in mainstream design platforms further reflects these structural inequities and restricts creative agency in bilingual practices (Oliveira, 2023).

This project does not seek to adapt Arabic to fit into postmodern or Western typographic ideals. Instead, it asks how postmodern strategies — such as fragmentation, layering, and spatial disruption — can be critically reinterpreted through the Arabic–English design lens. It explores how visual negotiation across scripts can serve as a decolonial design method, resisting reductive binaries and affirming the cultural specificity of each typographic system.

At the compositional level, typographic hierarchy has become a central issue. Decisions on which script receives visual prominence are rarely neutral and often reproduce broader sociopolitical dynamics. Abdel Baki (2024) describes this imbalance as a form of "double monolingualism", a condition in which two languages coexist within the same layout but are treated as isolated visual systems. In contrast, dialogic approaches, inspired by Bakhtin's theory of polyphony, seek mutual interaction between scripts, positioning bilingual design as a site of negotiation rather than a juxtaposition (Ashrafi, 2015).

Recent studies have explored a range of techniques to mitigate asymmetry and promote visual equity between scripts. These include mirrored layouts, dual-baseline grids, and typographic code-switching, which emphasizes rhythm, relational positioning, and semiotic cues (Li & Westland, 2023; Shaikh, 2007). Vanderschantz and Daly (2023) further argue that readers' perceptions of dominance in bilingual layouts are shaped not only by size and weight but also by the spatial choreography of elements across scripts.

Efforts such as the *Multilingüe* conference (Typeroom, 2023) have emphasized the global urgency of developing thoughtful bilingual design practices. In the Arabic–English

context, this urgency is intensified by the script's deep religious, historical, and cultural significance. Experimental manipulation of Arabic forms must be approached with cultural sensitivity, as distortions can unintentionally offend or misrepresent sacred traditions (Bassiouney & Walters, 2020). As such, designers must balance innovation with respect to calligraphic and linguistic heritage (Communication Arts, 2023; Li & Westland, 2023).

In this study, the students directly confronted these tensions. While employing postmodern techniques such as layering, fragmentation, and disruption, they simultaneously embed culturally specific references, including motifs such as the keffiyeh and Kufic-inspired calligraphy. These design choices reflect an understanding of bilingual typography not merely as a functional tool for translation but also as a semiotic and cultural interface, where identity and form are co-constructed.

2.4. Pedagogical Context: Typographic Workshops as Reflective Practice

This study was conducted over three semesters within a structured pedagogical setting titled the *Visible Language* Typographic Workshop. Grounded in practice-led research, the workshop integrated theory and making, enabling students to explore design as both a method and output. Practice-led research conceptualizes creative practice not merely as an illustration of existing knowledge but as a generator of new understanding through visual inquiry (Rust et al., 2007). In this context, design becomes a form of epistemology — producing insight through doing.

The pedagogical framework draws from Schön's (2017) notion of the "reflective practitioner," in which learning occurs through a recursive process of making, critiquing, and refining. This model treats design not as a linear progression from problem to solution but as an iterative cycle in which reflection-in-action and reflection-on-action shape creative outcomes.

Studio pedagogy, which is widely recognized in design education, supports this model by fostering critical literacy, conceptual depth, and research integration. According to Biggs and Büchler (2008), studio projects gain academic rigor when students are prompted to articulate both theoretical frameworks and practical design intent. In this workshop, students were encouraged to interrogate the historical *Visible Language* cover archive not as static design artifacts, but as culturally situated texts open to reinterpretation. Their task was not replication, but critical translation — recasting typographic strategies from a postmodern, bilingual perspective.

This approach aligns with collection-based methodologies that emphasize the pedagogical potential of archives. *Visible Language* covers were positioned as both design resources and cultural documents, fostering curatorial sensitivity and contextual awareness (*Visible Language*, 1993). Thus, students' reinterpretations became acts of

informed transformation, engaging questions of identity, authorship, and cultural specificity.

In the Gulf region, where design education remains in an emergent phase, such pedagogical models represent a critical intervention. Traditional curricula often prioritize technical proficiency over cultural inquiry. By embedding the workshop in themes of bilingualism, decoloniality, and typographic discourse, the course challenged students to reconceptualize design as a mode of cultural production. Their work addressed not only the aesthetic integration of Arabic and Latin scripts but also the ideological tensions surrounding visibility, language hierarchy, and heritage in a globalizing design landscape (Benkharafa, 2013).

Ultimately, the workshop fostered a reflective and critical design ethos. It encouraged students to see bilingual typography as more than a spatial or formal task; it became a vehicle for exploring cultural negotiation, linguistic representation, and the politics of visual form.

3. Methodology

This study employed a practice-led design pedagogy approach grounded in a practice-led research framework (Candy, 2006; Niedderer & Roworth-Stokes, 2007), using typographic experimentation as a means of inquiry. Conducted across three consecutive semesters (Winter, Spring, and Summer 2025) in the Department of Art Education, College of Basic Education in Kuwait, the *Visible Language* Typographic Workshop involved 90 undergraduate students enrolled in a typographic design studio course. The workshops were designed as an immersive sequence of research-based studio projects in which students critically reimagined selected cover designs from *Visible Language* (late 1960s–2025) in Arabic–English bilingual forms.

3.1. Workshop Structure

The workshops were scaffolded across three phases:

1. Historical analysis: Students studied selected *Visible Language* covers from the journal archive, identifying postmodern characteristics, such as layering, distortion, type fragmentation, and grid disruption.
2. Bilingual reinterpretation: Each student created one or more bilingual typographic reinterpretations using Arabic and English, integrating visual experimentation with cultural and linguistic negotiation.
3. Critical reflection: Each student submitted a process book and a written reflection that explained design decisions, typographic choices, and challenges encountered in bilingual integration.

3.2. Archival Source and Timeline

Students worked with *Visible Language* journal covers spanning the late 1960s to 2025. This timeframe reflects the publication's evolving engagement with typographic experimentation, from early modernist compositions to more layered and fragmented postmodern strategies. Covers were selected from the institutional archive based on their typographic diversity and relevance to postmodern themes.

To contextualize this progression, the covers were curated into a visual timeline (Figure 1) that illustrates how aesthetic approaches have shifted across decades. This timeline served not only as a historical reference but also as a stimulus for critical reinterpretation within bilingual design settings. To support students' analytical and creative inquiry, the workshops were supplemented by theoretical readings of postmodern aesthetics (Lupton, 1996; Poynor, 2003), bilingual design and Arabic typography (Abdel Baki, 2023; Shaikh, 2007), and design pedagogy (Tselentis, 2011).

3.3. Phases of Research

The project unfolded over three interrelated phases that structured the workshops' inquiry-based pedagogy:

1. Analytical phase: Students conducted a critical analysis of selected *Visible Language* covers, examining typographic hierarchy, spatial logic, and hallmark postmodern features such as layering, fragmentation, and deconstruction. Group discussions explored how these characteristics might be adapted within bilingual contexts, particularly in relation to script contrasts, directionality, and cultural semantics.
2. Creative production phase: Building on these insights, the students created original bilingual cover designs using postmodern strategies. The visual outcomes ranged from integrative, dialogic layouts to instances of "double monolingualism" (Abdel Baki, 2024). Designs were iteratively refined through critique sessions and feedback from peers and instructors.
3. Reflective phase: Each participant composed a short written reflection (300–500 words) that articulated their conceptual intent and evaluated the cultural, aesthetic, and linguistic tensions encountered in their design process. These written accounts provided valuable qualitative data for subsequent thematic coding and analysis.

3.4. Data Collection, Selection, and Analysis

This study analyzed three types of data collected during the workshops:

- Visual artifacts: 90 bilingual cover designs were produced across three semesters, of which 12 are highlighted in Figures 2–13.

- Process documentation: Student sketches, drafts, and design iterations provided insights into developmental thinking.
- Written reflections: 300–500 word essays by each student explaining their design rationale and discussing cultural and linguistic challenges.

A multistage review process was followed to select the 12 featured spreads:

- The instructional team identified a preliminary shortlist of 25 designs based on conceptual clarity, typographic execution, and visual experimentation.
- These were then analyzed using thematic coding (Saldaña, 2021) to ensure representation across four analytical categories: dialogic integration, double monolingualism, symbolic divergence, and hybrid disruption.
- The final selections aimed to balance the diversity of bilingual strategies, script interaction, and aesthetic style.

Analysis focused on:

- The application of postmodern design strategies in bilingual contexts
- Patterns of script integration versus separation
- Cultural motifs and semiotic layering in typographic decisions

The findings were triangulated across the visual outputs, reflective essays, and classroom discourse.

3.5. Analytical Framework

Student designs were interpreted as critical visual arguments using a hybrid thematic coding approach (Saldaña, 2021). This analytical framework includes both predefined (*a priori*) and emergent codes.

A priori codes (derived from relevant literature and initial research questions):

- Polyphonic integration (Abdel Baki, 2023; Bakhtin, 1981)
- Double monolingualism (Shaikh, 2007)
- Postmodern layering and typographic disruption (McCoy, 1994; Weingart, 2000)
- Typographic mimicry as a method (Biggs & Büchler, 2008; Candy, 2006)

Emergent codes (identified during analysis of student reflections and process books):

- Symbolic divergence
- Vernacular resistance (e.g., integration of keffiyeh, Sadu, or calligraphic motifs; AbiFarès, 2010)
- Mimicry as learning (Niedderer & Roworth-Stokes, 2007)

Coding was applied to both visual outputs and accompanying reflective essays, offering insights into each student's design intentions, cultural background, and evolving understanding of postmodern design.

While a single primary researcher conducted the coding, consistency and interpretive reliability were strengthened through iterative peer review sessions with the teaching staff. These collaborative reviews served as informal triangulation, ensuring that thematic interpretations aligned with pedagogical objectives and student contexts. Although this approach lacked a formal second coder, it allowed for critical feedback loops and increased analytical trustworthiness.

3.6. Ethical Approval and Considerations

In the absence of a formal institutional review board at the college level, the study adhered to the ethical guidelines established by the British Educational Research Association (BERA, 2018) and the American Educational Research Association (AERA, 2011), which emphasize participant welfare, informed consent, and data protection, respectively.

Ethical approval was granted by the academic department overseeing the course, which reviewed the study design and approved its implementation within the curricular framework.

All students were informed about the research component at the outset of the workshop series and were given the option to decline participation or opt out of having their work included in the study without any impact on their academic standing. Written consent was obtained from all participants whose work was featured in this study.

4. Findings and Analysis

The analysis of 90 student-designed covers revealed four overarching themes in how postmodern aesthetics were reinterpreted within bilingual Arabic–English contexts: (1) dialogic visual integration, (2) double monolingualism, (3) cultural symbolism and vernacular reference, and (4) Variations and Hybridity Across the Sample.

Figures 2–13 illustrate representative examples of these categories.

4.1. Dialogic Visual Integration

Several students pursued strategies that actively integrated Arabic and Latin scripts into cohesive dialogic compositions. These works resisted conventional script segregation by employing layering, fragmentation, and modular grids to construct visual relationships grounded in hybridity and disruption.

Figure 2. Student cover design inspired by *Visible Language* issue 59.1 (2025), *In with the New!*. This bilingual reinterpretation mimics the original cover while integrating Arabic "اللغة المرئية" and English "*Visible Language*" through pixelated layering and typographic fragmentation. Both scripts are given equal visual prominence, reflecting dialogic hybridity within the postmodern design framework. Here, mimicry functions both as a technical exercise and a critical lens, exposing the challenges of adapting Latin-centric design strategies to Arabic typographic structures.

Figure 2 exemplifies this approach through pixelated typographic layering, in which Arabic *"*اللغة المرئية*"* and English "*Visible Language*" gain equal prominence. Directionality and form were intentionally destabilized, allowing both scripts to interact without being hierarchically fixed. Ambiguous typographic flow aligns with the postmodern aesthetics of fragmentation and spatial disruptions.

Importantly, this design mimics the typographic logic of *Visible Language*, Vol. 59.1, positioning imitation as a pedagogical strategy. Through close stylistic alignment, the student engaged deeply with the visual language of a contemporary postmodern model, emulating strategies of layering, opacity, and grid disruption. Yet, this imitation also exposed the limitations of transplanting Latin-centric design grammars into Arabic script. While Latin typography was mapped more seamlessly onto the original grid-based system, Arabic's cursive and contextual forms resisted direct adaptation. This tension highlights the cultural and structural biases embedded in postmodern design methodologies that are often tailored to Latin typographic conventions. Thus, mimicry served both as a means of technical exploration and as a critical lens for interrogating visual norms.

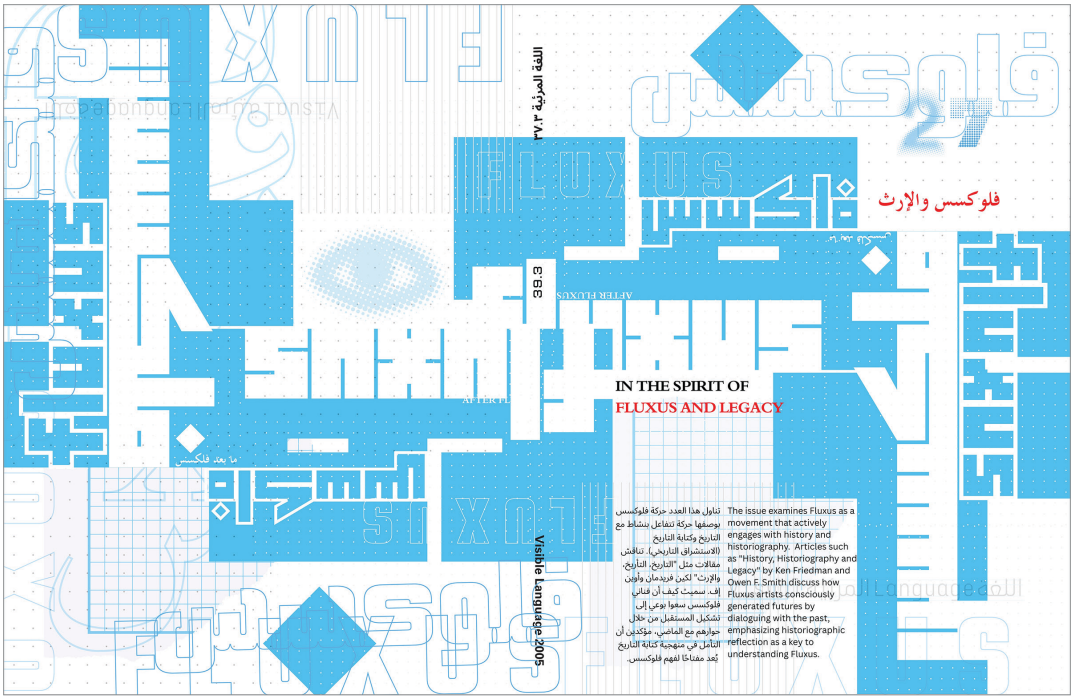

Figure 3. Student cover design inspired by *Visible Language* issue 39.3 (2005), *In the Spirit of Fluxus and Legacy*. This bilingual reinterpretation references the original modular composition while introducing Arabic and Latin scripts in a layered configuration. Through mirrored disruption, transparency, and visual rhythm, the student creates a dynamic interplay between scripts that reflect postmodern hybridity and bilingual negotiation.

By contrast, Figure 3 reinterprets the aesthetics of *Visible Language* Vol. 37.3 through modular structuring and rhythmic composition. Translucent Arabic letterforms intersect with bold sans-serif Latin typography, creating a layered visual field that foregrounds dialogic exchange. Rather than imposing a dominant reading order, the design encourages interpretive navigation across spatial planes.

These works resonate with Bhabha's (1994) theory of the "Third Space," where hybrid meaning emerges through negotiation rather than synthesis. Typography, in this view, becomes a site of encounter between linguistic and cultural systems — less of a vessel for transparent communication than a platform for semiotic play. The use of spatial layering, opacity, and nonlinear structure echoes Derrida's *différance* (1981), which emphasizes deferral, instability, and multiplicity of meaning. Viewers must oscillate between scripts, engaging ambiguity as a generative, not obstructive, condition.

However, these hybrid strategies do not eliminate the asymmetry. As Spivak (2008) warns in her critique of "double monolingualism," even integrated designs can reinforce underlying hierarchies, where Arabic may be visually present but semantically peripheral, while English anchors legibility. These tensions reflect Mignolo's (2000) articula-

tion of design's entanglement with colonial logic, in which aesthetic hierarchies mirror the global structures of knowledge and power.

4.2. Double Monolingualism

While some student designs aspired to hybrid integration, others embodied what Yildiz (2012) described as "double monolingualism" (pp. 2–3), a condition in which two languages coexist spatially but remain visually and semantically segregated. These designs do not seek fusion between Arabic and English but rather maintain distinct formal systems, reinforcing the autonomy of each script even within a shared composition.

One student's reinterpretation of *Visible Language* 54.3 (2020) (Figure 4) exemplified this approach. Arabic and English elements were arranged in parallel, divided by a central axis, and differentiated using bold chromatic contrast and scale. Despite occupying similar visual weights, the two scripts functioned independently and coexisted without interaction. This juxtaposition stages bilingualism as co-presence rather than integration.

While Figures 2 and 4 share a surface-level symmetry and typographic balance, they fundamentally diverge in spatial logic and script interaction. Figure 2 emphasizes

Figure 4. Student reinterpretation of *Visible Language* Vol. 54.3 (2020). Arabic and English scripts are juxtaposed along a central axis, emphasizing contrast through typographic scale, color, and orientation. Rather than integration, this design foregrounds parallelism, staging bilingualism as visual co-presence rather than synthesis.

dialogic integration: Arabic and English intersect visually and conceptually through layering and mirrored disruption, promoting mutual influence. In contrast, Figure 4 enacts double monolingualism: the two scripts are displayed side by side without visual interplay, maintaining linguistic autonomy. These examples illustrate that visual alignment alone does not imply integration; instead, integration depends on interscriptual exchange and the breakdown of spatial segregation.

Simultaneously, elements of both strategies can coexist within a single composition, suggesting that dialogic integration and double monolingualism may operate along a continuum rather than as binary categories.

A second example (Figure 5) reimagines the typographic density of *Visible Language* 24.3 (1990) using the monospaced Courier typeface across both Arabic and English. Here, shared typographic structure does not produce visual fusion. Instead, each script adheres to its own spatial rhythm and typographic behavior. Although the same grid is used, it becomes a neutral scaffolding that preserves separation rather than encouraging dialogue. This symmetrical division echoes Spivak's (2008) warning that inclusion efforts can inadvertently reinforce hierarchical or exclusionary dynamics.

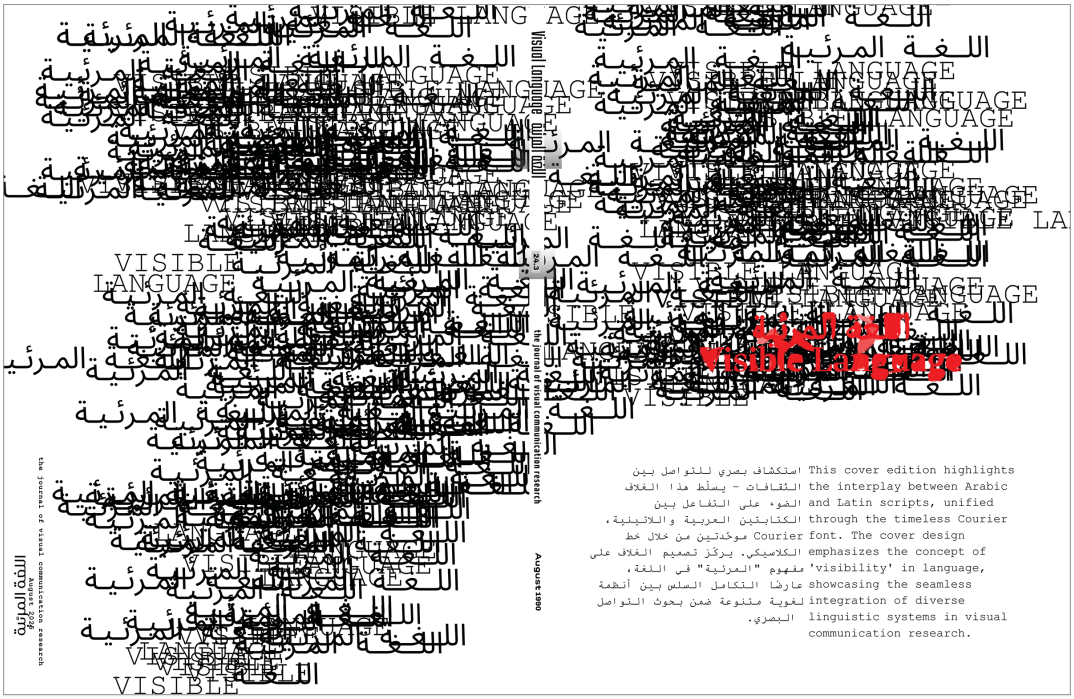

Figure 5. Student design experiment inspired by *Visible Language* Vol. 24.3/4 (1990), using the monospaced Courier typeface in both Arabic and English. Although the two scripts share a unified grid and typographic scaffold, they remain graphically autonomous. The composition reflects spatial proximity without visual or conceptual integration, illustrating a parallel rather than a dialogic relationship between languages.

Figure 6. Student redesign of *Scripts in Dialogue* (2025). Although the composition aspires to visual harmony, Arabic and Latin alphabets are carefully paired without typographic merging. The design reflects structural complementarity rather than integration, underscoring the persistence of visual separation in bilingual projects.

Together, these examples demonstrate how bilingual layouts can visually affirm linguistic pluralism while still falling short of integration, underscoring the conceptual tension between coexistence and hybridity in typographic practices.

Another student's response to the *Scripts in Dialogue* theme (Figure 6) approached bilingual design as a structural pairing rather than a merged typographic entity. Arabic and Latin letters were aligned with precision, creating formal harmony without integration. While the composition gestures toward dialogic balance, it preserves the autonomy of each script. This suggests that even when visual equilibrium is achieved, the default mode often remains typographic parallelism rather than hybridity.

A final example revisits the archival 1971 issue *Littera Scripta Manet* (Figure 7), reinterpreting its historical sensibility through sepia textures, layered manuscript marks, and typographic anatomy. Here, Arabic and Latin scripts appear as neighboring artifacts, coexisting yet unmerged. Each script retains its visual logic and historical references, signaling respect for typographic distinction rather than an attempt at fusion. This composition frames bilingualism as a dual historiographic narrative, rather than a unified discourse.

Figure 7. Student reinterpretation of *Littera Scripta Manet* Vol. 5 No. 1 (1971). Evoking archival aesthetics and typographic anatomy, the design presents Arabic and English as historically resonant yet visually distinct systems, positioning bilingualism as parallel rather than integrated discourse.

Together, these examples underscore the persistence of *double monolingualism* in student work, even within contexts explicitly themed on integration. Despite efforts to create a visual dialogue, many bilingual compositions default to discrete spatial zones, script-specific aesthetics, and compositional symmetry. As Yildiz (2012) and Mignolo (2000) argue, true hybridity requires more than juxtaposition; it demands critical rethinking of inherited linguistic and visual hierarchies.

Although Figures 3 and 5 both use shared grids and spatial overlap, their treatments of bilingual interaction differ significantly. In Figure 3, integration is achieved through layering, transparency, and mirrored disruption — visual strategies that promote interdependence between scripts and invite active interpretations. In contrast, Figure 5, although built on a unified typographic scaffold, maintains graphic separation; the scripts coexist spatially but do not visually or conceptually engage with one another. This suggests that proximity alone does not constitute hybridity. Rather than assigning value judgments, we frame these differences as varying degrees of semiotic entanglements. To support a more objective analysis, future studies might incorporate concepts such as “reciprocal disruption” or draw on cross-cultural frameworks (including — but not limited to — Gestalt principles) while remaining attentive to their epistemological biases.

4.3. Cultural Symbolism and Vernacular Motifs

A third cluster of student responses emphasized the symbolic dimension of bilingual typography by embedding cultural references, vernacular aesthetics, and traditional forms into their visual language. These projects position design not merely as linguistic mediation, but as a conduit for cultural memory and visual identity, articulated through postmodern strategies.

One student's design (Figure 8) integrated Diwani calligraphy into a disrupted modular layout, forming the body of a peacock through Arabic and English letters. The design merges the ornamental elegance of historical script with postmodern abstraction, staging a temporal dialogue between tradition and experimentation. Here, decorative flourishes function more than embellishment — they articulate a visual rhetoric of hybridity grounded in cultural specificity.

Although Figure 8 employs recognizable forms, its postmodern abstraction lies in the visual treatment: fragmented layering, disruptive color contrast, and nonlinear composition undermine straightforward representation. The imagery resists singular interpretations, functioning more as a collage of cultural signifiers than as a narrative illustration.

Figure 8. Student integrating Diwani-inspired calligraphy into a modular composition. Arabic and English letterforms form the body of a peacock, staging a temporal dialogue between tradition and experimentation. The juxtaposition of ornamental script and fragmented layout underscores the cultural resonance and symbolic potential of bilingual typography.

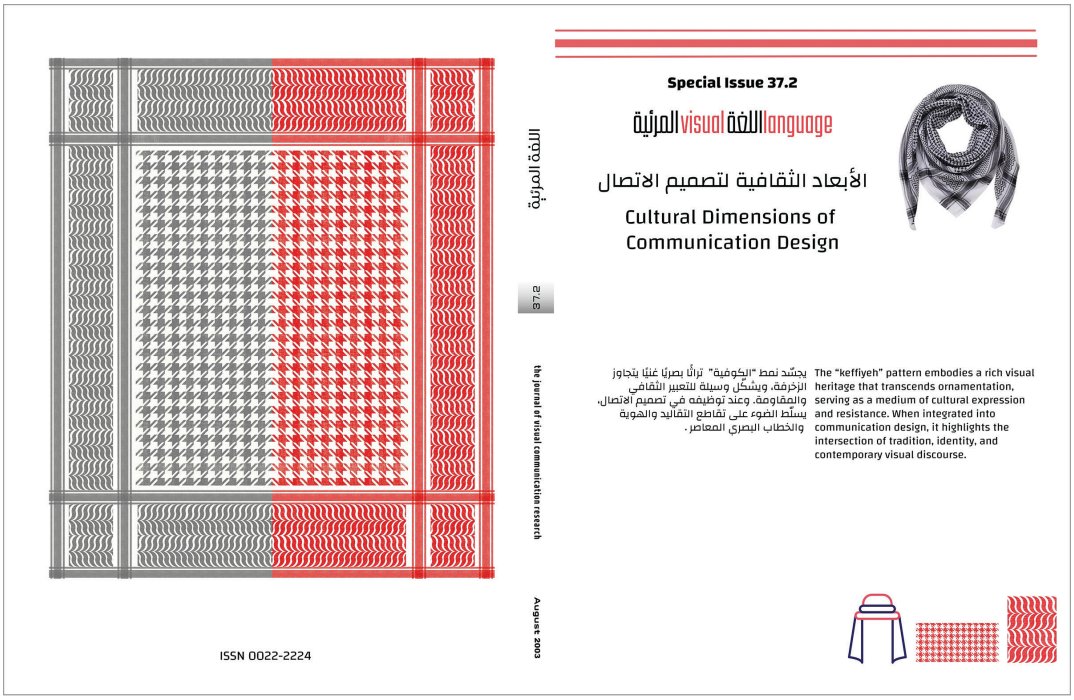

Figure 9. Student cover design reimagining *Visible Language* 37.2 (2003) through a reinterpretation of the keffiyeh pattern. Minimalist Latin typography is layered against a dense vernacular weave, foregrounding indigenous ornamentation as a communicative surface. Design situates textile heritage within the formal language of postmodern design education.

In another example, a student reimagines *Visible Language* 37.2 (2003) by transforming the iconic keffiyeh textile into a layered, typographic surface (Figure 9). Juxtaposed with minimalist Latin type, the design blends indigenous symbolism with grid disruption, reframing craft not as nostalgic decoration but as a living semiotic system within bilingual visual communication. This visual strategy foregrounds the keffiyeh not only as a cultural motif but also as an aesthetic statement.

A third design, titled *Form and Meaning*, leverages the gestural energy of Arabic calligraphy to form the head of an Arabian horse (Figure 10). Interwoven with modular English typography, this composition moves beyond the legibility of visual metaphors. In this context, Arabic script becomes both language and image — an embodiment of movement, identity, and cultural poetics. The design illustrates how typography can be animated to represent not only linguistic meaning, but also embodied cultural narratives.

In Figure 8, layering is achieved by overlaying Arabic calligraphy on English headlines, producing visual tension through opacity shifts. Figure 9 juxtaposes typographic grids with organic pattern motifs, while Figure 10 fragments both scripts by slicing and reassembling them in modular clusters that disrupt reading flow.

Figure 10. Student reinterpretation of "Form and Meaning," using Arabic calligraphy to shape the head of an Arabian horse. Gestural strokes and typographic abstraction transform script into metaphors, whereas modular English text anchors design. This composition exemplifies how a script can function simultaneously as a word, image, or cultural signifier.

Together, these examples localize postmodern formal tools such as layering, juxtaposition, and fragmentation within Kuwaiti cultural and visual traditions. They demonstrate that bilingual typography is not solely a functional task, but a symbolic practice that negotiates histories, aesthetics, and identities.

4.4. Variations and Hybridity Across the Sample

While previous sections identified key typographic strategies — dialogic integration, double monolingualism, and cultural symbolism — several student projects defied these boundaries, enacting hybridity as a fluid and dynamic condition. These works resist fixed categories and explore visual language as an open system of negotiation.

One striking example reinterprets *Visible Language* 49.3 (*Critical Making: Design and the Digital Humanities*) using a flow map of bilingual keywords (Figure 11). English and Arabic terms circulate through a network of directional lines, evoking systems thinking and data visualization. Language here becomes cartographic, a visual structure of interconnection, not simply transmission. This design transforms bilingual content into an information landscape, emphasizing semantic and spatial hybridity.

Another cover design draws inspiration from *Visible Language* 53.3 (2019), pairing the Arabic letter "غ" with the Latin letter "g", both rendered in pop-art halftones and layered

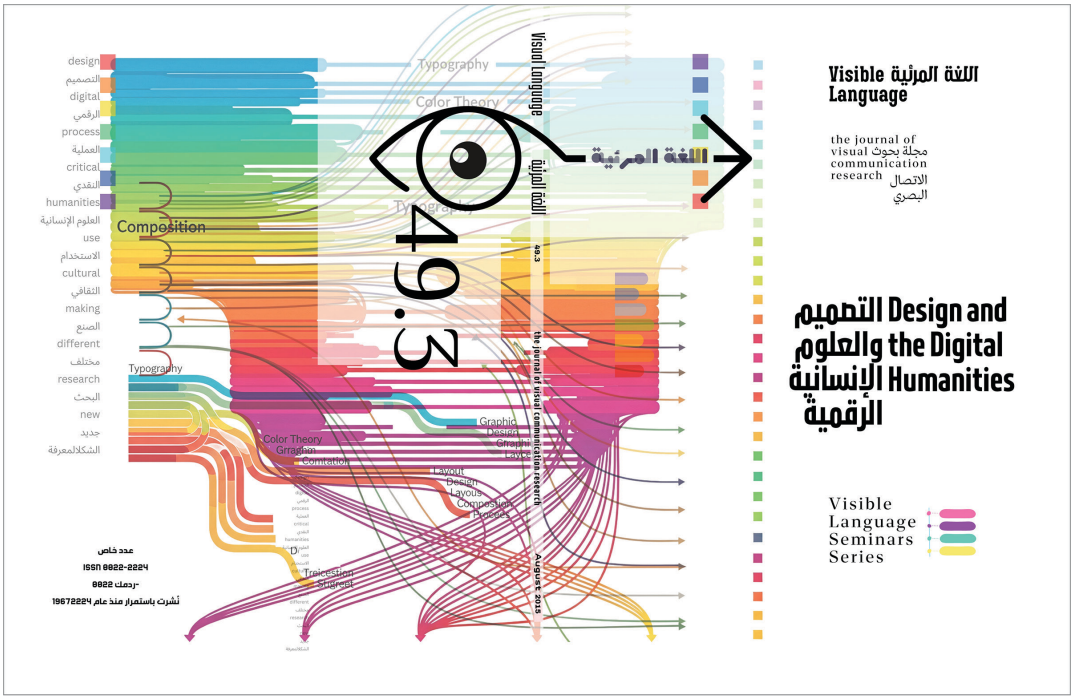

Figure 11. Student response to *Visible Language* 49.3 (2015), mapping bilingual keywords through directional grids and color-coded flows. The composition references data visualization and systems thinking, rendering bilingual typography a network of spatial and semantic interrelations. Language is a dynamic cartography of meaning.

textures (Figure 12). Rather than clarifying meaning, the work embraces opacity and abstraction, foregrounding near illegibility as a critical design gesture. This tension between legibility and expression challenges typographic norms and invites viewers to reconsider the communicative limits of form.

Finally, a reinterpretation of *Visible Language* 52.3 (Student Special Issue) combines modular English typography with graffiti-style Arabic lettering (see Figure 13). Arabic calligraphy, formed from the faces of actual students involved in the project, anchors the design in local voice and resistance. The composition evokes an urban manifesto aesthetic, aligning bilingual design with activism, youth culture, and postmodern disjunction. Rather than simply imitating the original, the student issue becomes a site of assertion, where form embodies both message and identity.

Taken together, these projects suggest that hybridity in bilingual design is not merely the blending of scripts but the active negotiation of difference — linguistic, cultural, and aesthetic. By testing and bending typographic legibility conventions, students revealed that bilingualism in visual communication is both a design problem and a cultural proposition.

Figure 12. Student cover inspired by *Visible Language* 53.3 (2019), pairing the Latin "g" with the Arabic "غ" in layered halftone textures. The resulting surface embraces ambiguity, challenging the legibility of the foreground typographic form as a critical expression. This pairing highlights linguistic differences while creating a shared visual rhythm.

5. Discussion

This study reveals the layered negotiations involved in adapting postmodern design strategies for Arabic–English bilingual contexts. While postmodernism is broadly associated with fragmentation, layering, and the disruption of formal conventions (Foster 1996; Jencks 1989), its application across structurally divergent scripts reveals not only its aesthetic potential but also deep cultural and linguistic tensions. The student work demonstrates that translating Euro-American postmodern aesthetics into bilingual typographic design is not merely a stylistic endeavor; it requires engagement with cultural identity, linguistic equity, and semiotic complexity. Through typographic juxtaposition, layering, and hybrid compositions, students produced layouts that operated across multiple registers of meaning. This semiotic complexity emerges from the interaction of visual signs — scripts, motifs, and spatial configurations — each embedded with cultural and communicative significance. As Kress and van Leeuwen (2006) argue, such visual communication is inherently context-sensitive and requires interpretation shaped by cultural perspectives.

Figure 13. Student reinterpretation of *Visible Language* 52.3 (2018), combining modular English text with graffiti-style Arabic calligraphy. Featuring portraits of the students themselves, the cover channels a manifesto aesthetic rooted in youth identity and cultural voices. This design merges postmodern fragmentation with vernacular resistance.

5.1. Postmodernism and Bilingual Visual Discourse

Scholars have emphasized postmodernism's capacity to destabilize fixed hierarchies of meaning (Harvey, 1997; Hutcheon, 2003). In this study, students who pursued dialogic visual integration (Figures 2–3, 9) enacted this destabilization by hybridizing Arabic and English scripts through layering, opacity, and disrupted grids. These designs resonate with Derrida's notion of *différance* (1981), in which meaning arises not from individual elements but through a relational interplay across a fragmented visual field.

These approaches also prompt a reconsideration of the binary distinction between 'Western' and 'non-Western' design traditions. While postmodernism is often linked to Euro-American contexts, its visual strategies, such as layering, fragmentation, and spatial disruption, have long intersected with global artistic practices shaped by colonial encounters and cross-cultural exchange. By reinterpreting these strategies through an Arabic–English bilingual design, students challenge the framing of postmodernism as a Western export and foreground its potential for recontextualization. This reflects broader calls in design studies to move beyond fixed geographic binaries and to recognize the plural and entangled histories of visual culture.

In complicating legibility, students surfaced the productive tension between form and meaning, echoing typographic experimentation found in earlier issues of *Visible Language* (Buchanan, 1985; Poynor, 2003).

However, not all projects embraced this hybridity. Designs categorized under double monolingualism (Figures 4 and 5) reinforce Spivak's (2008) critique of bilingualism as a superficial juxtaposition of isolated systems. These compositions maintained clear typographic boundaries while mimicking postmodern tropes such as asymmetry and disruption. Their persistence within the sample suggests that the visual politics of bilingual design may have resisted total integration. As Kress and van Leeuwen (2006) and Mirzoeff (1999) remind us, design is always embedded within broader dynamics of power, identity, and representation.

5.2. Cultural Symbolism as Pedagogical Strategy

Student works incorporating vernacular motifs and regional calligraphic traditions (Figures 6–8, 10, and 13) suggest a localized reworking of postmodernism. The inclusion of textile patterns, Kufic and Diwani scripts, and urban signage demonstrates how design functions as a conduit for cultural memory, and not merely as formal play. These projects reflect Barnard's (2005) and Skov and Melchior's (2010) arguments that design is never culturally neutral.

Such localization also complicates postmodernism's anti-foundational claims. While grid disruption and layering typically aim to unsettle meaning, culturally anchored works suggest that heritage and experimentation can coexist. Calligraphy, in particular, is not used as a pastiche but as a critical device to foreground cultural specificity. These insights contribute to global debates in design history (Margolin, 2015; Triggs, 2011) by reframing postmodern aesthetics as tools for expression within non-Western frameworks rather than as stylistic imports.

5.3. Implications for Bilingual Design Pedagogy

This study has several important pedagogical implications. Teaching design in multilingual contexts demands not only technical instruction but also critical awareness of the politics of language, culture, and representation. Through reinterpretations of *Visible Language* covers, students navigated both global design legacies and local linguistic realities. This reflects Lupton's (1996) view of typography as a cultural practice and supports Tselentis' (2011) argument that typographic experimentation should be central to critical design education.

Moreover, the emergence of dialogic integration and double monolingualism within the sample reveals unresolved tension between integration and preservation. Hybridity can risk collapsing the integrity of distinct scripts, whereas separation may preserve

identity but reify the division. These pedagogical challenges echo broader debates in cultural and translation theory around the visibility of differences versus the dangers of homogenization (Bhabha, 1994; Venuti, 2018).

Ultimately, the application of postmodern strategies in bilingual design sheds light on the underlying questions of hierarchy, representation, and pedagogical responsibility. Far from being a neutral aesthetic toolkit, postmodernism has become a lens for negotiating identity in design education. By engaging with these tensions, this study contributes to the scholarship on typography, visual culture, and multilingual pedagogy, offering a model for how design education might foster awareness of linguistic justice and cultural hybridity within a globalized design landscape.

6. Conclusion

This study examined how postmodern design strategies — fragmentation, layering, and grid disruption — can be reimagined in Arabic–English bilingual design education. Through the analysis of *Visible Language* covers spanning six decades and the creation of 12 student reinterpretations, participants engaged with the structural and cultural tensions inherent in adapting Western-derived aesthetics to multilingual contexts. The results revealed a continuum of design approaches, from dialogic integration, in which Arabic and English functioned as interdependent elements, to double monolingualism, in which the scripts remained visually and semantically separate. Many students also embedded cultural motifs and calligraphic forms, suggesting that postmodern experimentation can be localized as a vehicle for cultural expression, rather than being deployed as a stylistic import.

While postmodernism provided the initial conceptual lens, its application was not regarded as a prescriptive ideal. Instead, students critically engaged with its limitations — particularly its Eurocentric assumptions — and reinterpreted its strategies in culturally grounded ways. This reinforces that Arabic–English bilingual design need not conform to Western typographic models but can instead generate its own paradigms through reflective, situated practice.

6.1. Contributions

This study contributes to three overlapping areas of research. First, it expands postmodern typographic theory by demonstrating how design strategies born in the Euro-American context can be critically reinterpreted in the Global South. Second, it advances discourse on bilingual design by showing that cross-script integration involves more than technical execution; it is a negotiation of cultural identity and linguistic equity. Third, it offers a pedagogical model that integrates historical analysis with practice-led experimentation to foster critical reflections among design students.

6.2. Limitations

This study has several limitations. Conducted at a single academic institution in Kuwait and involving 90 undergraduate students over three semesters, its scope, while sufficient to identify patterns, limits generalizability across all bilingual or multilingual design contexts. Furthermore, the evaluation relied on qualitative visual interpretation rather than quantitative metrics, such as legibility, usability, and audience reception. Future research should incorporate user studies to better assess how different audiences engage with dialogic and monolingual design strategies.

6.3. Future Directions

There are several promising directions for future research in this area. First, applying the same practice-led framework to other script pairings, such as Arabic–French in North Africa or Chinese–English in East Asia, could yield comparative insights into multilingual design practices. Second, longitudinal research could track how exposure to bilingual postmodern designs shapes students' professional trajectories over time. Third, the increasing presence of digital tools and generative AI in design education opens a new terrain, and future studies could critically explore whether and how these technologies can accommodate and respect the cultural and linguistic nuances of cross-script typography.

Ultimately, this study affirms that postmodern design principles remain vital in design education — not as fixed stylistic formulas, but as adaptable strategies for interrogating language, culture, and power. When applied to bilingual contexts, these principles compel both students and educators to confront the politics of visual communication and cultivate a design practice that is at once experimental, culturally grounded, and critically reflective.

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RESEARCH ARTICLE

Constructing the Hypertangible Novel: Writing and Design as Process

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Abstract: As the printed book co-exists with the influence of the digital, narratives become hybrid and are transformed into documents in which the content can very easily flow from one form to another. As a result of this, the first decades of the 21st century have seen the emergence of publications that challenge traditionally orthodox reading practices. This article examines the response to the digital development in novels that foreground the material dimension of the narrative and are print-specific. These works do not reject the digital realm but absorb its characteristics and expand the possibilities offered by the material dimension of the book. By analyzing Graham Rawle's *Woman's World* and its process of creation through the collage and cut-up techniques, this article aims to show how design can contribute to foreground the physical dimension of literature in novels with hypertangible qualities. This examination draws attention to design being embedded in the writing process that constructs both material and narrative dimensions. Findings show that these novels can be a product of a 'designwriting' process, in which design serves both as a tool to shape a narrative, and as a process that expands it and creates an object that offers an embodied reading experience. Ultimately, this highlights the importance of physical reading in the age of digital media.

Keywords: book design; creative process; hybridity; materiality; print

1. Introduction

As David Thorburn and Henry Jenkins explain in *Rethinking Media Change* (2004), the emergence of new media activates a complex process in which older technologies

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develop and adapt to the functions brought by emerging media. These two realities influence each other as part of the convergence culture, characterized by a collaboration between media, and in which the functions of the previous analogue technology are reshaped by the more recent digital one. In this context, according to Kiene Brillenburg Wurth (2020), readers inhabit analogue and digital dimensions simultaneously, moving in a sort of continuum that embraces both technologies together. Both the material and the immaterial are part of a feedback loop, in which they are not opposites but points that mediate each other.

The shift from paper to digital format disassembled the fixed primacy of the printed word and generated a lack of physical presence.* Information, which until the second half of the 20th century was thoroughly associated with the physicality of print and paper, lost its dependence on the material medium; and as Alan Liu (2009) notes, immateriality subordinated everything to the digital. Books, films, music, etc., are now documents or files. Texts are documents, Liu explains: "Once we wrote or read books, stories, and poems, that is, but today — no matter the genre — everyone just writes and reads documents" (2009, p. 505). Information, and thus also literary works, have acquired a fluid dimension that can be shaped in any form and direction. Therefore, Liu also argues that documents (and thus texts) are "deformational forms" (2009, p. 505). This means that they are atomized into very small parts, in a digital deconstruction, which makes them very easily prone to change, re-adaptation, and shift from platform to platform. This aligns with Zygmunt Bauman's (2000) position that information, under the influence of the digital, follows the patterns of liquids and gases, and its form is continuously subjected to changes, unable to keep the same shape for a long time. In consequence, documents deform easily and can adapt to any digital shape or platform because of the liquid quality of their atoms, which cannot hold the shape when subjected to stress.

As the printed book co-exists with the influence of the digital, the shift in media and physical presence has a significant impact on narratives, and novels in particular, which are transformed into documents with content that can very easily flow from one form to another. As digital technology develops, the reading of novels (and of books) becomes disassociated from its printed form, and the material embodiment of a document becomes irrelevant. From this perspective, the new conventional novel can be seen as fluid, changeable, and immaterial. Readers can nowadays read a novel simultaneously on different platforms: one can start by reading a book in print, shift to the laptop

* Several authors have reflected on the disembodiment provoked in society by digital media, which evidence that immateriality is one of the experiences brought by digital technology: Boom, 2010; Landow, 1996; Liu, 2009; Plate, 2020; Renfrew, 2003; Tolva, 1995; Wurth, 2020.

screen, continue scrolling on a tablet and finish reading on the constricted interface of smartphones and smartwatches.

Consequently, and according to the convergence culture defined by Jenkins and Thorburn (2004), in the digital age books become complementary to new information technologies. As Irma Boom (2010) argues, books become something else and enable information to be spread in a different way by using their physical potential. Due to this, in the first decades of the 21st century, it is possible to identify an emergence of a type of novel that resists the elasticity and immateriality of fluid reading practices, as Katherine Hayles (2002, 2013) and Jessica Pressman (2009, 2020) have identified when analyzing the transformations in literature that result from the evolution of digital technology. This article addresses this response to digital development and aims to gain understanding of the novels that foreground the material dimension. To describe the fact that these works are born under the digital influence, created with digital means, but nonetheless exist only in print, a term is proposed: 'hypertangible'. The 'hyper-' prefix illustrates the fact that the tangible quality of these novels is enhanced and made possible by the digital realm.

The scope of this article is not to offer a complete definition of this term but, through the analysis of one significant example that foregrounds the materiality of the novel, it aims to explore the concept and gain a deeper understanding of how design can contribute to the integration of materiality and narrative in books that resist immateriality in the digital age. Using *Woman's World* by Graham Rawle (2005) as a case study, this article combines close reading, visual analysis, and material from an online conversation with the author (2023). *Woman's World* is a novel created using cut-up and collage techniques: the author cut fragments from women's magazines from the early 1960s and put them together to compose a new narrative. Although the study is limited to the analysis of one novel, the example was chosen because it is a novel born in a digital context, it uses the materiality of the book to expand the narrative, and illustrates a way in which design can contribute to create hybrid and embodied narratives. Despite its limitations, it serves as an example of "the permeable boundaries between designers and writers", defined by Alexander Starre (2015, p. 171) as a result of the convergence between print and digital worlds.

Woman's World also helps to explore and define the term 'designwriting', introduced to identify the creative process of this type of novels: an active involvement of writers, who think about materiality from the first stages of the writing process and employ design methods along the way. The significance of *Woman's World* for this study is related to the fact that it thoroughly foregrounds the role of design and openly exposes the concept of 'designwriting' employed in its creative process. Findings show that hypertangible novels can provide a vehicle for understanding what reading print means in a digital

era, and that design serves not only as a tool to shape a narrative, but as a process that expands it and creates a unique object that offers an embodied reading experience that also fosters slowness and attention. Finally, it also foregrounds the importance of physical reading in the age of digital media.

2. Context and Specific Terminology

2.1. Defining the Hypertangible Novel

Archaeologist Colin Renfrew (2003) explains that the electronic impulse has replaced the material object that held a central position in the 19th and 20th centuries (i.e., banknotes, newspapers, bus tickets), and that through a process of dematerialization, the physical material reality is disappearing. In consequence, and as a reaction to this, emerges a 'new materialism' that focuses on the increasing importance of material objects and their role in social life. The fluidity and immateriality of the digital dimension have brought a renewed interest in the object, in the physical book. As Liedeke Plate argues, disembodiment of digital content has induced the emergence of a "material turn", which aims "to rethink the role of things in social life [...], in their concrete, material, and physical dimensions" (2020, p. 112–114). Plate also observes that "empirical oblivion has dominated literary studies" (2020, p. 112–114), which mainly focus on the semiotic dimension and pay less attention to the material form. This view matches with Katherine N. Hayles' (2002) viewpoint that materiality has generally been treated as a secondary element in literary studies. However, the material turn also has its influence on literature and design: it opens new ways to rethink the materiality of texts and the act of reading. This is consistent with Bruno Latour's (2005) position, who has studied the agency of objects in depth, and sees materiality as fundamental when performing an action: the physical medium influences and defines the activity.

Therefore, books, as objects that were once invisible because of their essential functional role, become more perceivable. According to Wurth, the book moves from the background into "the role of figure: an object to be seen and encountered in an electric sphere" (2020, p .6). This development has enabled a distancing from the printed book. Information is not dependent on print anymore, and thus it can be looked at from a detached perspective. As George Landow already notes in 1996, the book is not the only existing medium to access content anymore, which means the object does not need to be put completely at its service. Instead, it opens up the opportunity to look at it again, studying and rethinking its value:

> ...we have already moved far enough beyond the book that we find ourselves, for the first time in centuries, able to see the book as unnatural. [...]. We find

> ourselves in the position, in other words, of perceiving the book as technology (Landow, 1996, p .214).

This points to the fact that as books become more visible, they could offer a physical reading experience different to that of the digital. This renewed interest in the physical book is connected to a trend that has developed since the start of the 21st century, and which Jessica Pressman (2009) defines as the "aesthetic of bookishness". In *Bookishness: Loving Books in a Digital Age* (Pressman, 2020, p. 1), "bookishness" is referred to define the creative acts that use the physical dimension of the book within a digital environment. Within this trend there exists a focus on bookbound novels that use their physical dimension as an essential part of their narratives: they include their embodied nature, that which the digital lacks, into the reading experience.

These narratives are characterized by highlighting print qualities through the use of digital strategies: they include characteristics of digital media to enhance the materiality of the printed object and also create an artefact with multimedia qualities (such as the readers' ability to decide what and how to read, the lack of a primary axis of organization, the possibility to combine different narrative elements, etc.). In these works, readers need to manipulate and interact with the printed object in order to complete the reader experience. Novels such as Mark Z. Danielewski's *House of Leaves* (2000), Steve Tomasula's *VAS: An Opera in Flatland* (2002), Salvador Plascencia's *The People of Paper* (2005), Graham Rawle's *Woman's World* (2005), Steven Hall's *The Raw Shark Texts* (2007), Jonathan Safran Foer's *Tree of Codes* (2010), J.J. Abrams' *S.* (2013), Rubén Martín Giráldez's *Magistral* (2017), Vivian Abenshushan's *Permanente Obra Negra* (2019), or Rian Hughes' *XX* (2020) aim to challenge and foreground the role that materiality can play in their reading experience.

It is necessary here to acknowledge that novels that bring materiality to the fore and integrate it within the narrative are not a new thing of the 21st century. These kinds of works have a rich lineage and, although it is beyond the scope of this study to examine all the previous significant literary pieces, it is important to mention examples such as: Laurence Sterne's *The Life and Opinions of Tristram Shandy, Gentleman* (1759–1767), Stéphane Mallarmé's *Un coup de dés* (1897), Marc Saporta's *Composition No. 1* (1963), Raymond Queneau's *Cent mille milliards de poèmes* (1961) B.S. Johnson's *The Unfortunates* (1969) or Jacques Derrida's *Glas* (1974) (to name but a few of the most relevant), that already in the 18th and 20th centuries experimented with the materiality of reading.*

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* Artists' books also focus on the materiality of reading and works by Dieter Roth, Bruno Munari, Ulises Carrión, Keith Smith and Alison Knowles (to name but a few) have a significant influence on literary works concerned with materiality. However, due to practical constraints, this article cannot provide a comprehensive analysis of them.

The difference between these pre-digital examples and the novels published in the 21st century is the fact that the latter are created in a digital context, and thus embrace and react to the immateriality and disembodiment brought by it. In contrast to the new conventional reading that can happen across many platforms and media, these novels use the material dimension of the book to create embodied reading experiences that put physicality at the front of the narrative. These works resist the fluidity and immateriality of digital reading practices, and work best on the medium for which they are created: print-specific novels choose to work only in print and resist to be translated into other mediums*. This is achieved by generating a physical interaction of readers with the body of the book and forcing them to rethink the act of reading and of holding the object: for example, in *House of Leaves* readers are meant to turn the book in different directions; in *Tree of Codes,* the die-cut holes create different connections between the pages; in *S.*, the handwritten text on the margins and the loose pieces within the book slow down the reading and force readers to pay close attention to how they hold the object; in *Permanente Obra Negra,* the different sections create an open narrative to be constructed by the reader. These works are built by considering the materiality of the printed object as an integral part of narrative development.

Print-specific novels re-evaluate the conventions of the printed book in convergence with the digital environment and raise questions about the status of contemporary writing and reading practices. They constitute a reaction to the digital realm and also an acceptance. Julia A. Galm uses the term "hyperprint" to define texts that "both utilize and reject the digital by embracing the use of reading strategies and habits that form due to interactions with electronic media, while simultaneously exploring print materiality" (2019, pp. 1–2). The term could broadly be used to define the novels mentioned above, especially the prefix "hyper-" in reference to a "physicality that insists on a more tactile interaction with the reader than either digital or traditional print texts call for." However, due to the fact that these kinds of novels put the emphasis on the resistance to change form with ease and by doing so they foster physical and tangible interactions, this article proposes the term 'hypertangible' to define narratives that foreground the material dimension and create an embodied reading experience that works exclusively in print and resists being translated into an online environment. Besides, as Hayles (2008) states, in the 21st century all literature is computational, not only because the majority of the narratives and texts are written, designed and produced with digital technology, but also because they are thought and developed in a reality immersed in it.

* The majority of the examples mentioned above do not have a digital counterpart; or if they have an e-book version, it lacks some parts that can only be offered by the printed edition (e.g. the loose ephemera in *S.*).

2.2. Designwriting Print-Specific Narratives

In "To write: an intransitive verb?", Barthes (1966) identifies two types of writing roles: the author (*écrivain*), who just focuses on the writing without aiming to take readers anywhere beyond those words, and creating what can be labeled as a passive connection, author-reader; and the writer (*scripteur-écrivant*), who effectively aims to engage readers in an active way and make them part of the text. Thus, the latter is the producer of writerly texts.

The idea of the 'writerly text' can mean different things depending on the context in which it is applied. According to Glyn White (2005), Barthes focuses on the creation of meaning and regards the medium of print as a secondary device. He is not writing about design and does not refer directly to the physical dimension of literature. Yet, the context of this discussion is a consideration of how Barthes' theory could be interpreted as a design situation and what it means in terms of book layout and design. The distinction between passive and active writers and texts can be applied to the context of hypertangible narratives: writers become active agents who not only conceive the narrative as text but also take the material dimension into account.

It is important to recognize that authors (them being *écrivains* or *scripteur-écrivants*) can be involved in the way their texts look, this is not a unique aspect to novels that put an emphasis on materiality. The difference appears to lie in the intention of that involvement. What the writers who concern themselves with the material dimension are striving for is the creation of an active form of reading, one that is intentional and differs from a 'traditional' authorial interest. In this respect and for the purpose of this article, a further distinction seems appropriate in order to include the idea of the design interest, a sublevel to the writerly texts that is more specific to the consideration of book layout and design.

Zoe Sadokierski uses the term "designerly" (2010, p. 3) to define the way in which writers combine words and images, borrowing from the working modes of designers. This definition adds up to a new dimension of these kinds of novels and creates a connection with design methods. However, describing the designerly process as a combination of words and images would be to oversimplify a complex creative process and give it an ornamental signification, which would also transform the writing of this type of novel into a gimmick. In a process of design, there is a need to understand the contingency that the text designers are working with in order to create its graphic dimension. Therefore, authors can explore, in a more integral way, the dynamic idea of the narrative, by concerning themselves with layout and typography. This is in line with Starre's term of "writer-designer" (2015, p. 169), which he uses to describe authors who not only care about the look and feel of the book, but "in their texts, the components

of form, content, and medium converge into a tightly knit signifying structure whose parts cannot be interchanged without altering the overall effect."*

In the novel *Circular 22* (2022), in a section written as an experimental sort of diary†, Vicente Luis Mora explains that his subconscious has been, for two days, thinking about the novel he started "designing" in July and of which he only has some sketches and a rough "design" for several chapters (Mora, 2022, p. 601). This is not a random choice of words. In 2012, Mora already stated that the contemporary novels born in a digitally connected world need not only to be written, but also need to be designed. The term 'design' in this context does not literally refer to the arrangement of images and text of the editorial piece but, using the definition from the *Oxford English Dictionary* (2025), to the "purpose or planning that exists behind an action, fact, or object." This does not mean that writers nowadays need to have a thorough knowledge of graphic and book design to be able to create a novel. The term 'design', in this case, refers to a writing process that looks beyond the mere inscription of words on a paper or digitally, and considers the material level as essential for the development of the novel. This idea is explored in more detail in Section 3, which focuses on the creation process of *Woman's World* and explains the significance design had in the writing process of the novel.

As Mora argues, in novels that are born in a digitally connected world "design happens prior to the text, it means a reflection that goes before the actual writing and develops in parallel to literary creation" (2012, p. 101). Therefore, the introduction of design emphasizes the role of the writer as the active agent who constructs the narrative structure from an integral point of view. The process that combines writing and design strategies may be defined as 'designwriting', a practice in which writers consciously employ design strategies to produce works that consider narrative and material dimensions during the creation process. This connects with Steve Tomasula's claim that "at this early date in the 21st century, it seems that the novel [...] is once again a design problem" (2012, p. 445). Novels in the 21st century with hypertangible qualities appear to reflect the influence that the digital realm has on the construction of literature. As the following sections show, in the process of constructing these works, and

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* There exists scholarship that reflects on the definition and implications of the designer-as-author, such as Rock (1996) and Lupton and Miller (1994). However, the purpose of this article is not to define the role of the designers as authors in these narratives, but to understand how the authors can incorporate design strategies into their writing processes to foreground the material dimension of the work.

† The writer explicitly defines this experiment: "The procedure is simple: a discontinuous writing, held for a month and based on two rules: first, write about the present, about what is happening at the time of the very act of writing; the second rule consists of the fact that what has been written can be corrected, but not retouched" (Mora, 2022, p. 519). All citations of the author included in this thesis are translations from the original.

thus of making the page visible, giving authorial agency to readers and changing the role of the author, the role of design also becomes more relevant and gains importance as a writing strategy.

2.3. Foregrounding the Role of Design

In Section 2.1 it was said that materiality in novels has a rich lineage. Likewise, in most of the novels mentioned in that section, the authors appear to have thought about the materiality of the narrative from the first stages of the creative process. Sterne planned and oversaw the production of every single detail of his *Tristram Shandy* (Curtis, 1935; De Voogd, 1988; Williams, 2021), manipulating every visual device on the page to generate a specific reaction on readers. Saporta was interested in the idea of creating a narrative like an Alexander Calder mobile in which the elements of the structure can move and be influenced by the interaction of readers, and thus wrote *Composition No.1* on unnumbered pages and put them into a box (Knapp, 1976). For B.S. Johnson, the novel was a device for solving literary problems which cannot always be overcome through the verbal dimension but need a visual and embodied outcome to push the limits of the novel beyond conventions (Johnson, 1973). In *The Unfortunates*, he uses the unbound chapters to represent the unreliability of memory. Johnson describes the process in this way: "The key stage is finding the form. That happens between the first idea (the 'Ah!') and the filling-into-sections. Between those two points I work out the form suitable to the material I have in my mind" (Burns, 1981, p. 88).

In the 21st century, novels with hypertangible qualities are very much indebted to previous literary and artistic explorations: they explore materiality and narrative boundaries, and are also a product of an active author involvement in integrating material and narrative dimensions. The difference with the pre-digital novels is precisely that very word: digital. As Mora (2012) argues, writers cannot ignore the digital practices that surround books and reading, as they live surrounded by the influence of screens, social media, visual distractions, etc. Thus, similarly to the authors that in a pre-digital era explored materiality unconventionally by breaking established writing, production or printing ways of their time, 21st century writers may incorporate digital conventions and include them in their narratives to then challenge them, thus creating new print-specific reading experiences.

This is well-illustrated in the case of *Woman's World*. The novel constitutes a relevant example of a hypertangible narrative because it puts design at the centre of the creative process. Even 20 years after its publication, the novel is a significant example of how graphic design is turning out to be "the missing link between medium and content" (Starre, 2015, p. 171). As the next section explains, in *Woman's World* the author acts simultaneously as writer and designer, and constructs the physical dimension of the

narrative while also writing it. Graham Rawle creates a reading artefact where narrative and material dimensions are purposely woven together as one.

Writing a novel is a complex process. Yet, designwriting a novel that brings materiality to the front may demand a greater effort from the authorial figure as it adds an extra layer of participation to the process. It involves thinking about materiality and conceives the physical reading experience from early stages, perhaps even before any words are written, as the construction of *Woman's World* shows. However, this does not mean that for creating these kinds of works a writer needs to have design skills or even knowledge of the process of book design. Not every writer can have an artistic background or the willingness to work with collage as Rawle. Other examples, such as Jonathan Safran Foer's *Tree of Codes* or J.J. Abrams' *S.* show that materiality is present from the beginning of the writing process, although the authors were not involved in their design. In the case of *Tree of Codes,* a die-cut novel born out of another novel, the narrative was constructed as a collaboration between writer and designer (Sara De Bondt), and the work of the latter was fundamental in shaping and expanding its material dimension. *S.* is also a case of collaboration of different creative figures and processes, although it is a big production and is treated as such, with a big team that includes a producer-director, a writer, a production company (Bad Robot), a design firm, external collaborators, publishers, etc. In this case, even if materiality is taken into consideration from the start, design comes 'externally' and is not involved in the process from the very first stages of the project.*

Despite the difference in design processes, the aim of design in the writing process of hypertangible novels is to give specific solutions to specific problems: to integrate the narrative with the material dimension through a designwriting process. *Woman's World* indicates that design is not only a tool to give shape to a narrative, but a process that expands it. By weaving together narrative and materiality, it can create a unique object that offers a particular and embodied reading experience. As Roger Chartier claims:

> .. in contrast to the death of the author, according to Roland Barthes's expression, it emphasizes that the author can play, along with others (the publisher, the printer, the typesetters, the editors) in the always collective process that gives texts their materiality (2004, p. 148).

3. *Woman's World:* Writing and Design as Process

Woman's World recounts the life of Norma Little, a woman from the 1960s who lives in a small British town and appears to have built her character by constantly reading the

* See Ferrer (2024) for an expanded description and analysis of these novels.

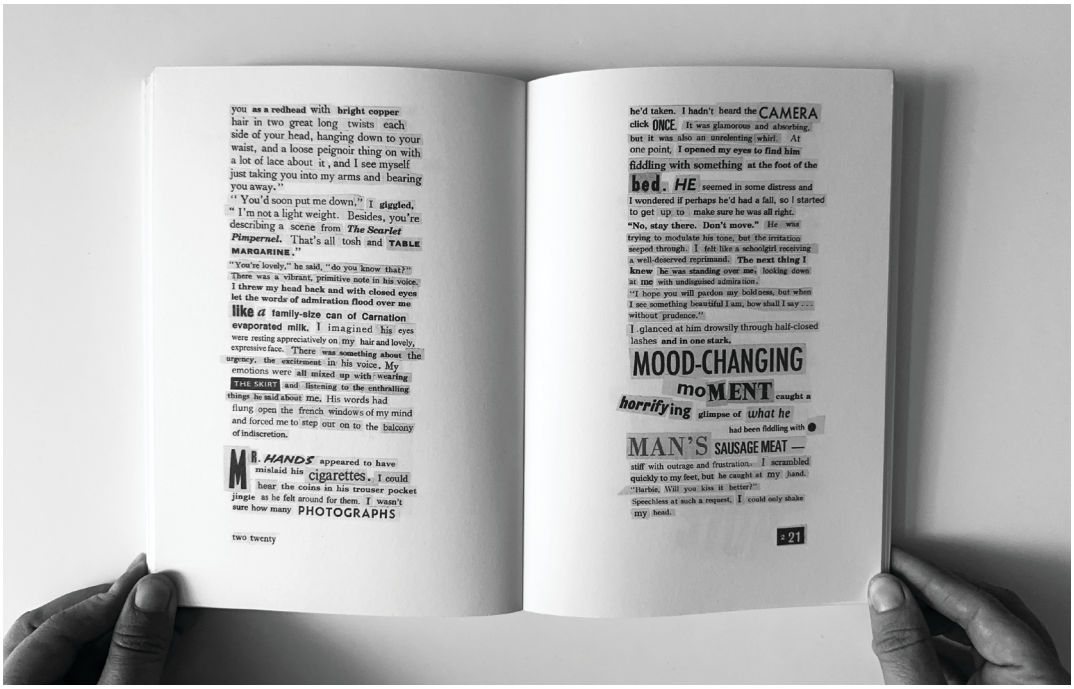

Figure 1. A typical spread from *Woman's World* by Graham Rawle (2005, pp. 220–221).

women's magazines of her time. As Figure 1 shows, this is visually represented in the cut-up and collage techniques used to construct and write the narrative, with actual material from magazines of that time.

The novel is written in the first person, narrated by Norma. As Rawle explains in an unpublished conversation with the author,* "the women's magazines were the perfect pool of material because they have such a strong voice. They are very self-righteous and opinionated, very dogmatic about how women should conduct themselves to be perfect in the world", without mentioning real issues or daily problems. Gradually, as the story develops, it becomes clear that Norma is in fact attached to her brother Roy. Attached, in the sense that she only exists as part of his personality. He is a man trying to be a woman: "Norma is born out of that idea of a woman caught in the shortfall between her own life and the expectations of the magazines." Also, as a man, the only available way for Roy to create a female persona is through the source material of the magazines, which leaves a big gap of information. A gap that is indeed reflected in the cut-up style of the pages, which gives the feeling that thoughts have been left

* Online conversation between the author and Graham Rawle, 11 September 2023. The conversation is unpublished, but Rawle has given his consent to use extracts for the purposes of this research. All direct quotations in this section are citations from the conversation unless otherwise stated.

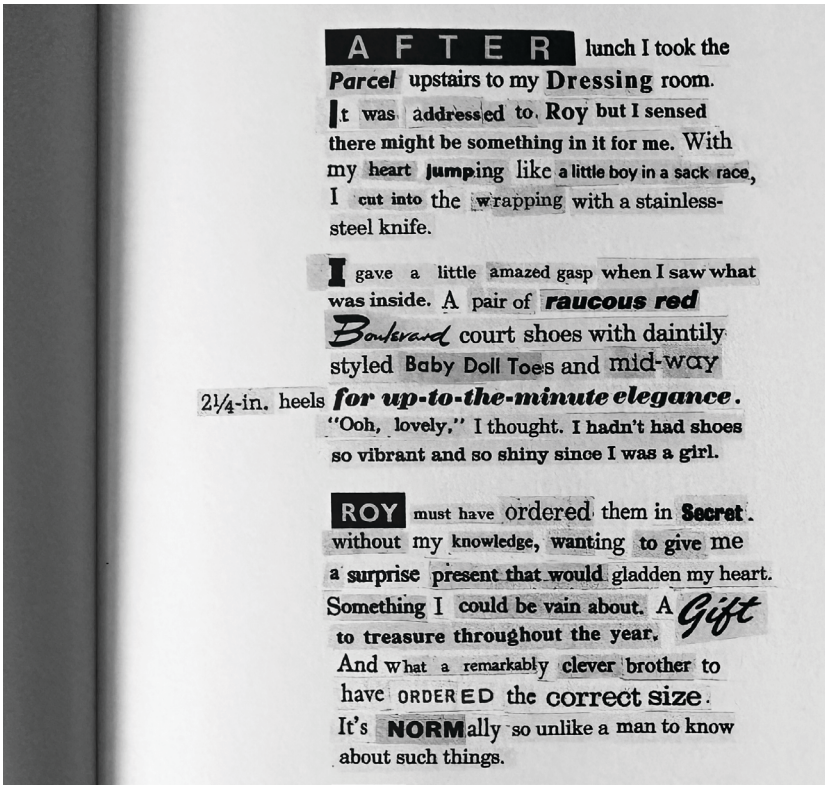

Figure 2. Close-up from *Woman's World* (2005, 23). The collage of the different fragments brings the self-righteous voice from the women's magazines of the time into the narrative.

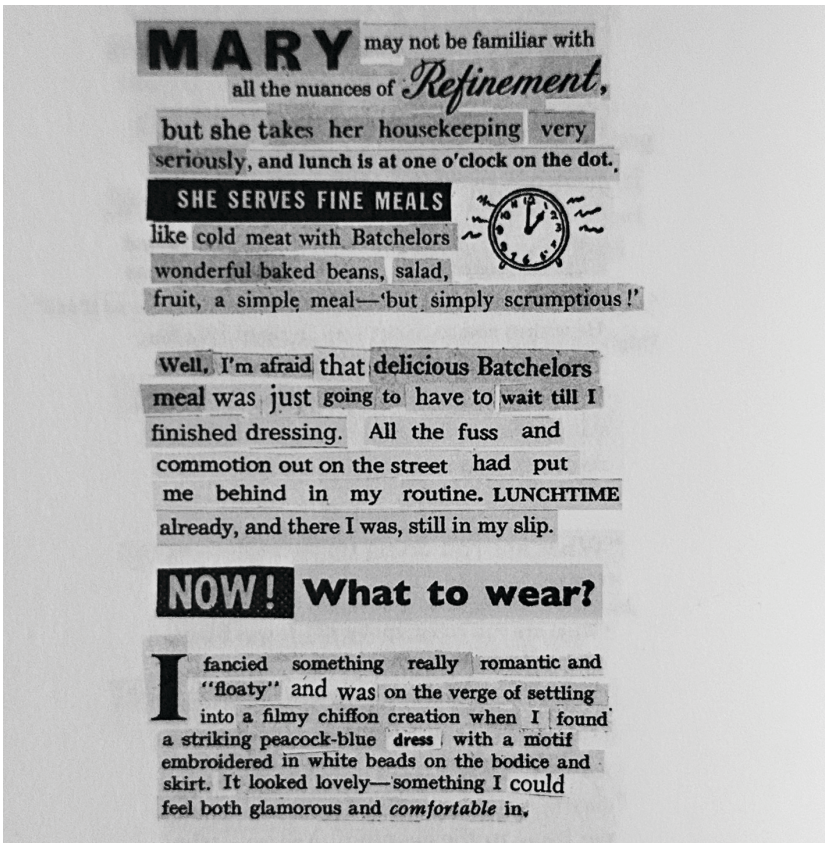

Figure 3. Close-up from *Woman's World* (2005, 18). The novel is made of fragments which are at some points, as the image shows, intervened with single words or elements from other fragments to provide continuity in the narrative.

unsaid and that at the same time contrasts with the triviality of the text, charged with the frivolous tone of vintage advertising. As seen in Figures 2 and 3, the novel plays with the limit between the light-hearted narrative, the informal structure of page composition, and the seriousness of what can be guessed beyond the collaged words. It is important to understand that the novel is not built out of single cut up words, which in a way would have been easier, but from fragments. These consist of entire paragraphs that enable the narrative to adopt the tone of voice and turn of phrases from magazine's articles and advertisements. These fragments eventually needed to be crafted or intervened with single words or elements from other fragments to provide the text with the adequate emphasis and blend it with the narrative.

3.1. Design and Writing *Woman's World*

Woman's World is the product of a complex development that combines narrative and material dimensions, each one simultaneously influencing the other. The idea originates with Rawle's previous work, *Diary of an Amateur Photographer: A Mystery* (1998), which is also built using bits of text and images, this time from 1950s books and magazines:

> I discovered that you could take the text out and make it into his [the main character] voice. [...] He is investigating a murder and using little bits of text that he was finding and introducing that text into his own journal. So he was cutting bits out of magazines and books that he was reading.

In this process, Rawle discovered that these fragments bring a voice over from the time in which the magazines were published, thus generating a deeper connection with the characters and the narrative.

The creation process of *Woman's World* started with the decision to work with women's magazines. The first step after that was to write the manuscript on the computer and, at the same time, to collect bits from the magazines that could be useful:

> Anything I read in the magazines or any typography that was interesting, but mostly things that I knew could have something to do with a scene from the manuscript I started to create as a Word document [...]. As I was writing it, if I found a phrase that I though I could use, I would take whatever original line I had and drop that in. But with a number reference so that the number of [the] reference relates to the actual physical text which is tipped into a series of scrapbooks.

Thus, while writing, Rawle generated a catalogue of fragments that allowed him to reference and consult while developing the narrative. This transformed into another digital document in Word in which narrative and fragments converge: each time he found an appropriate piece from the physical catalogue, he replaced the original text

in the digital document with the one from the magazine. Progressively, the narrative changes and evolves guided by the found text, shifting in ways that could not have been expected when writing the first draft. In this process, Rawle sometimes found it difficult to locate a specific piece from the magazines that fit the narrative, then it became necessary to go back to the draft to understand what the original intention of the narrative was, and adapt it to be able to include the most fitting bits from the catalogue. Initially, Norma and Roy were twins within the narrative, but gradually, in the process of gathering pieces and rewriting, the two characters transformed into the same person:

> Once I realized they were the same person, it was a much better story and also gave much more agency to the idea that he was constructing his story [...], he was plucking the words from the magazines and trying to assemble a narrative. [...] I think at that point I realized the form and the content had become one.

By simultaneously constructing form and content, the narrative evolved and was influenced by the design process that built the materiality.

Even if the gathering of the magazine fragments was manual and handmade, this first part in the creation of the novel was focused on building the digital manuscript. At some point in the process the initial text disappeared from the document and was replaced by the new text from the fragments, with numbers that reference the actual pieces in the physical catalogue (Figure 4). Once the manuscript was reviewed and finalized, the process of building the physical manuscript began. He worked directly, without previous sketching or storyboarding, on one side of loose pages that matched the size of what would be the printed book. He started with just a piece of paper and a column drawn in it to represent the type area. He had not tried to put together the pieces until this moment and so the visual dimension of each page appeared progressively as a surprise for him: "You don't really know what that's going to look like because you don't know all the original source material, you haven't seen it all together, so I could adjust as I went." This approach gave Rawle the creative freedom to play with the position of specific details and choose the best option for each composition and even play and surprise readers by creating an unexpected emphasis on a particular sentence, as Figure 5 shows with the oblique train cutting through the text:

> It was like tiling a bathroom. Really. It's like a mosaic. You just start at the top of the page and you have no idea what's going to happen. Slowly, you start to lay the tiles and you start to see. You start to push things out of the grid, you get a choice.

The last stage of the process consisted of scanning all the pages, which Rawle did himself, and using Photoshop to finalize some details, such as giving a bit more breathing space to some of the text:

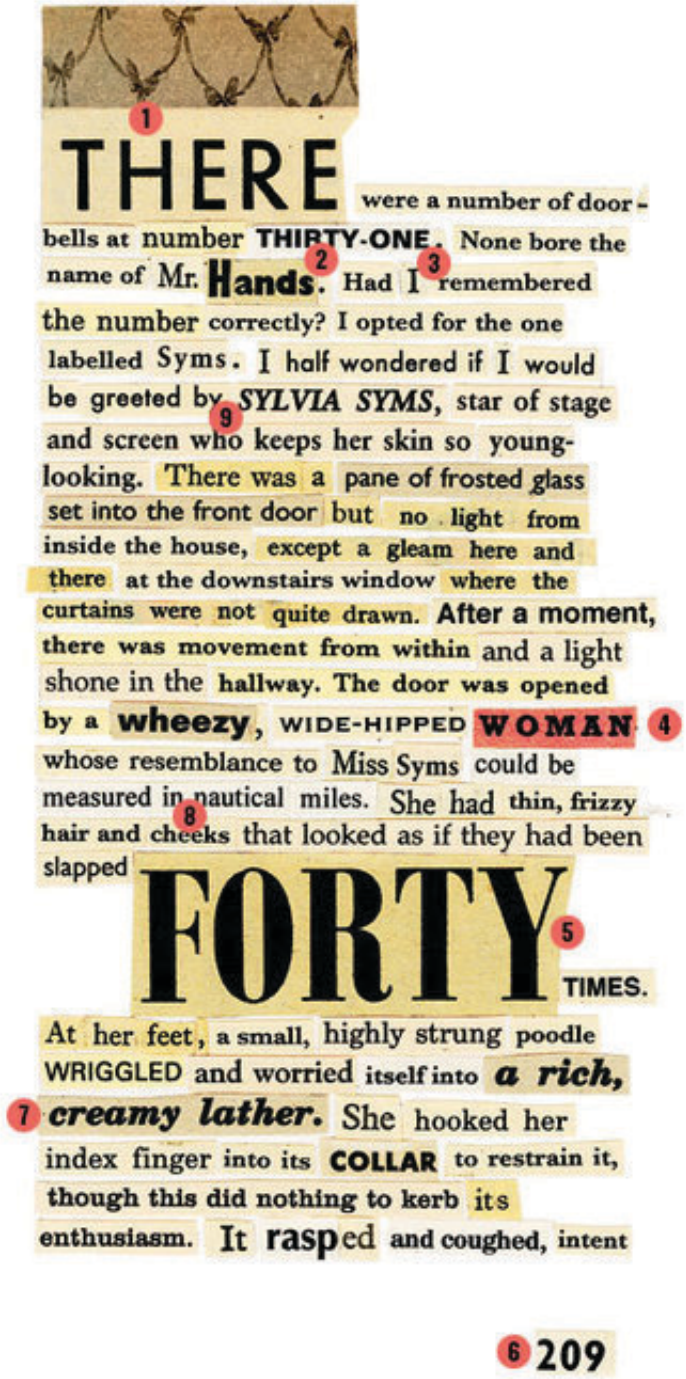

Figure 4. Original collage from one of the pages of *Woman's World* (2005) that shows the variety of colours from the different fragments and magazines. Image provided by Graham Rawle.

Figure 5. Spread from *Woman's World* (2005, pp. 264–265). While Rawle constructs each page, he plays with the composition and experiments with layout options to find the right visual emphasis for the narrative.

> I'm just on a piece of paper. It's very primitive, just stuck down. Later I had to Photoshop some little bits. A lot of the postwar women's magazines use very tiny type and also they set it quite solid and with very little lead.

Figure 6 shows a close-up detail from one of the fragments in which the extra space between the letters and words can be recognized. A deliberate and important decision at this point was to remove the color from all the pages and turn them to black and white. Removing the color meant stripping the pages from a layer of information that does not necessarily add anything to the story, and that could confuse and distract readers rather than foster a close reading:

> The idea was always for the book to be black and white. There was a kind of conscious decision to do that. I think it was for two reasons. When I put it into black and white, I could adjust the contrast so that it just slightly calms down, it's less distracting. The other reason was that it would make the book cheaper to produce.

The purpose of the project was to create a novel and not an artists' book or a unique expensive visual piece. Rawle wanted the novel to work on two levels: one is the fast reading of being engaged with the narrative, and the other is the slow reading and

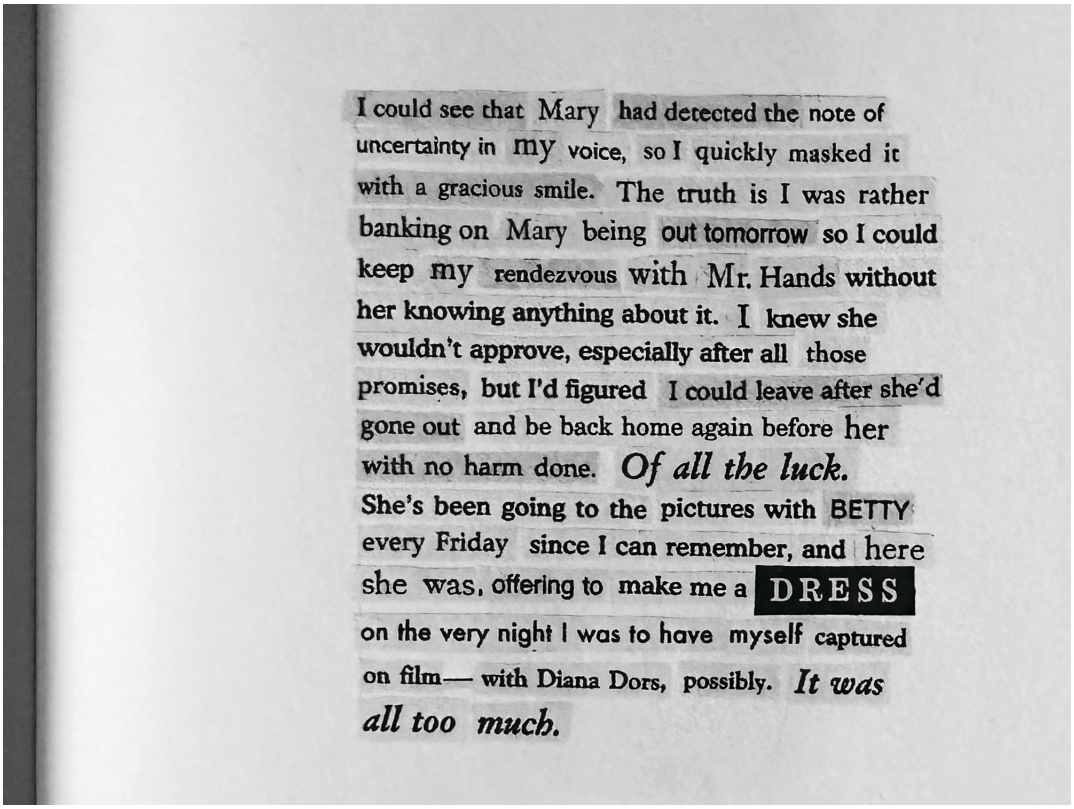

Figure 6. Close-up of page 121 from *Woman's World* (2005). Once the pages were scanned, the author used Photoshop to remove the colour and give more space to some pieces of text that appear too tight.

figuring out how the novel has been created as an artwork and what the source material might have been. The focus was put into creating a work that has a narrative and that can be read rather than just looked at. Therefore, finding a balance between narrative and material dimensions was essential.

3.2. Resistance to Change in *Woman's World*

The creation process of *Woman's World* gives sense to the concept of "deformational forms" stated by Liu (2009, p. 505). This is a hybrid work that combines analogue and digital techniques simultaneously. It starts off as a digital text that is influenced by fragments of print, the digital manuscript is then transformed into a physical document crafted by hand by the author, who scans the resulting pages and brings the document back to a digital format to be finalized and prepared for printing, as the diagram in Figure 7 illustrates. The result is a novel that represents the convergence culture in which analogue and digital media co-exist and influence each other, put to work together through a designwriting process, creating a piece that integrates narrative and material dimensions in a unique reading experience.

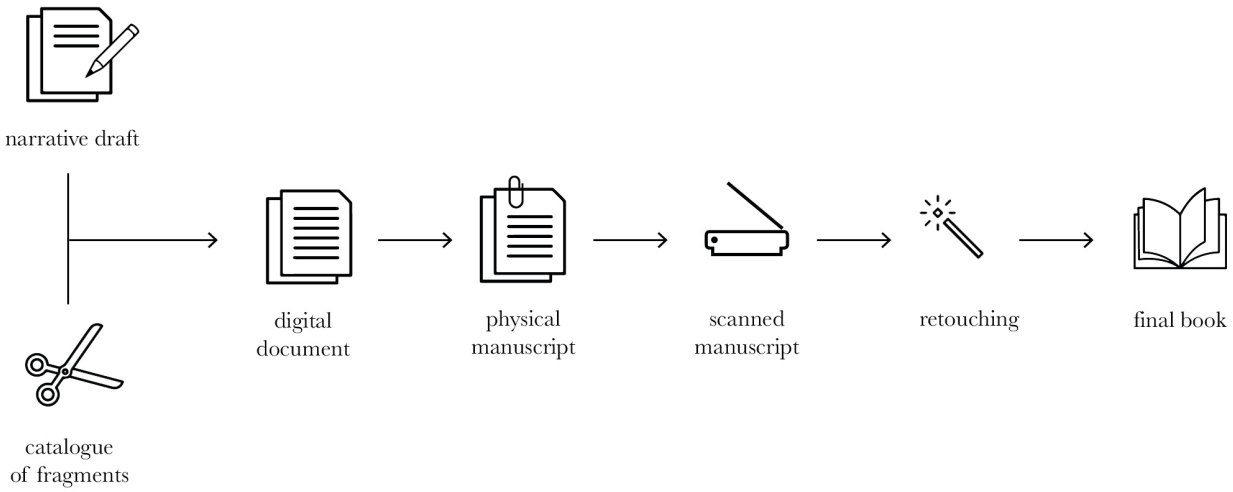

Figure 7. Diagram that illustrates the analogue and digital techniques employed in the creation process of *Woman's World* (2005).

Even if the cut-up and collage technique is not a novelty in the literary arena (as other examples such as William Burrough's *The Nova Trilogy,* 1961–64, or Tom Phillip's *A Humument,* 1970–75, evidence), the creative process of *Woman's World* reveals an intentional choice to prioritize the physical object by combining analogue and digital techniques, which could be considered an essential characteristic of hypertangible narratives. Through the many deformations suffered by the text, at both digital and analogue levels, the outcome is locked into its final form. The resulting pages work as images (as JPEGs even, to make more evident the hybrid nature of the novel), and therefore the text they contain is not fluid or responsive. It does not adapt flexibly to format changes or scaling as a conventional fluid and digital text would do. The text is created specifically to be contained within a defined page format, in combination with other words and layout elements that are also fixed. *Woman's World* is a novel that demands an effort because hinders automatic linear reading. Due to its nature as 'image', it takes a greater effort for the eyes to run through the words on the page (text changes continuously in size, shape, style, etc.), and thus the reading requires a slower pace to take in all the changing details of the page. If adding this to a digital experience through an e-book, the result would be an even more strenuous reading.

At the time of the conversation with Rawle, he was working on a film version of the novel. Rather than directly adapting the book into film, the idea is to adapt its creation process. For this purpose, Rawle uses an archive of clips from film footage to create a collage film. This process makes it problematic at some points to find specific clips that replicate word-for-word the details from the narrative. For example, there is a moment in which the main character breaks the heel of her shoe. The difficulty in

finding footage with the appropriate content (it was never the appropriate shoe or the correct shot), made Rawle understand the need to go back to the original narrative. In order to translate the novel into film, it becomes necessary to go back to the initial idea: rather than looking at the final text, he should look at the intentions of the narrative and see how the shoe moment (to continue with the example) can be replaced by another element that conveys the same sense of tension or despair intended with the original scene.

To conclude, *Woman's World* appears to work mainly in print and resists to move to another medium. The hypertangible quality of the novel can be recognized in the fact that it creates a resistance to change format. To do this, the narrative would have to undergo one more time a process of designwriting, as in the case of the film adaptation (which also means deforming the narrative once more), and thus integrate narrative and materiality specifically for the new medium. Besides, as *Woman's World* demands an attentive reading, it points to another quality of print-specific novels: slowness as a reaction to the speed at which information moves within the digital realm, which is made possible by using design as a writing process and bringing materiality to the front. Novels like *Woman's World* foster slowness and physical awareness, a thing that the digital world lacks.

4. Conclusions

The purpose of the current study was to examine the response to digital development in novels that foreground the material dimension of the narrative. As has been identified, while common narratives are exposed to a deformational status and shift platforms indistinctly, novels that bring materiality to the front make an intentional choice by using print as their primary medium. These novels have a hypertangible quality because they are a product of the digital, and at the same time put the emphasis on the resistance to change form with ease and by doing so they foster physical and tangible interactions. This reaction to hybrid and fluid reading practices comments upon the immateriality of information, the fast-paced virtual environments, and the permanent connection to digital devices. Today print is a choice, and the authors of these novels choose to put it at the front in order to integrate narrative and material dimensions as one, generating embodied reading experiences that cannot be obtained on any other medium. They represent a statement of the essential role print can still play in literature.

The article is limited to the study of one novel, *Woman's World,* which presents the characteristics previously described. Notwithstanding this limitation, the case study offers insights into print-specific novels that bring materiality to the front as both a response and acceptance of the new forms of reading and writing resulting from the

convergence of analogue and digital worlds. Rawle's novel uses the intricacy of the collage to build a visual narrative that hinders automatic reading. It forces readers to pay attention not only to the words but also to the page and the book. Reading it requires a slower pace to absorb all the changing details on each page. It fosters slowness and physical awareness, and emphasizes this aspect as a counter-reaction to the speed at which information moves within the digital realm.

The analysis of the case study also contributes to provide further understanding of the role of design in the writing process of novels that use their materiality to expand the narrative. Certainly, design has always been a part of the editorial process, but rather 'invisibilized' and generally at the service of the printed content. The fact that novels like *Woman's World* require design methods and professionals to integrate narrative and materiality speak about the significant part design plays in them. This foregrounds Mariano D'Ambrosio's claim that "the development of new digital printing technologies gives the writers easier access to explore the countless possibilities of page design, while also make it less expensive for the publisher to actually put to print such [explorations]" (2018, p. 87). Likewise, novels with hypertangible qualities appear to point as well to a shift from the side of the writers, who, in order to build integrated and embodied narratives, need to include materiality and design within the early stages of their projects.

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RESEARCH ARTICLE

Sensational Design: Layout and Display Typography in the Visual Rhetoric of Information Disorder

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Abstract: Political communication in the United States today is often characterized by 'information disorder'. However, studies of information disorder do not take into account the role of design in contributing to this phenomenon. Through a visual analysis of American political communication, specifically 19th-century sensational newspapers and 21st-century post-factual websites, this paper addresses gaps in current studies by analyzing two design elements: layout and display typography. In doing so, this study demonstrates how it is possible to use visual analysis to uncover the various presentations of the visual rhetoric that characterizes information disorder. This paper begins by situating sensational design within literature on design theory and visual rhetoric, sensationalism, and political aesthetics. The paper then examines layout and display typography in case studies of American political news from both 19th-century sensational newspapers and 21st-century post-factual news websites, two periods of 'information disorder' in American media, to understand how the visual rhetoric of 'sensational design' manifests differently in the two eras of 'information disorder'. The paper concludes with a discussion of how layout and typography 'act' as elements of visual rhetoric, how design can be incorporated into current conceptions of political aesthetics, and the implications of such a relationship.

Keywords: display typography; layout; newspaper design; sensational design; visual rhetoric

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1. Introduction

In the last decade, one of the most popular news topics has been the news itself. The terms "fake news", "mis-" and "disinformation", "post-truth politics" and "information disorder" are often used to characterize our fractured, largely digital media ecosystem, where false and misrepresented information is widely circulated. Of particular concern are the effects of this on democratic systems of governance. In the context of the United States, the geographic and cultural focus of this study, information disorder contributes to political polarization and can create feelings of anxiety, isolation and socio-political vitriol in the populace (Kavanagh & Rich, 2018, p. 6). This has the potential for disastrous and violent effects on American political norms. However, studies about information disorder and "fake news" (Andrejevic, 2020; Benkler et al., 2018; Corner, 2017; De Cock Buning, 2018; Grimm, 2020; Lazer et al., 2018; Tandoc et al., 2018; Wardle & Derakhshan, 2017) largely do not consider the role of communication design in this phenomenon. I argue that a visual focus on the issue of information disorder is warranted, given that "an average reader perceives 80% of graphic elements and 75% of photographs in newspapers and notices 56% of headlines while being aware of just 25% of the newspaper text, of which only 13% is read in detail" (Moses, 2000, as cited in Ozretić Došen & Brkljačić, 2018, p. 2), indicating that visuals play a key role in readers' perception of news information.

This paper explores information disorder from the perspective of visual analysis, combining research on visual rhetoric and political aesthetics. It builds on existing studies of news design (Barnhurst, 1994; Barnhurst & Nerone, 2001; Ozretić Došen & Brkljačić, 2018; Sissors, 1965; Stark, 1985), online news design (Barnhurst, 2012; Ihlström & Lundberg, 2004; Knox, 2009a,b, 2017; Li, 1998) and news design in political contexts (K. Barnhurst, 1993; Conboy, 2014; Schindler & Müller, 2018), while exploring the aesthetics of political news within a "mediasphere" (Hartley, 1996, p. 13) characterized by information disorder.

What is the visual rhetoric of American political communication in a mediasphere characterized by information disorder? By analyzing the design elements of layout and display typography in 19th-century sensationalist newspapers and contemporary 'post-factual' news websites*, I demonstrate how it is possible to use visual analysis to uncover the various presentations of the visual rhetoric of information disorder, which I collectively term 'sensational design'. In doing so, I broaden the scope of what counts

* This paper uses the term 'post-factual websites' to describe 21st-century case studies. This term, like 'information disorder', describes the socio-political environment in which news is produced and disseminated rather than attempting to define the truth value of the news itself.

as political aesthetics and contribute a design-focused perspective that sees sensational design as a rhetorical force in the 'disorder' of political communication.

Key to the visual rhetoric of sensational design is the way design elements capitalize on affect to appeal to readers' emotions — the *sens* in sensational, as well as how design forms can carry their own ideologies and cultural connotations that can affect the way news is mediated and consumed (Barnhurst & Ellis, 1992; Schindler & Müller, 2018). Rather than being defined by a consistent visual style, "sensational design", as a visual rhetoric, is characterized primarily by the way it can elicit affective responses from readers, and plays on different "genre characteristics" of news forms (Ihlström & Lundberg, 2004, p. 51). Appeal to affect may be accomplished through numerous visual means, and the genre characteristics displayed by a paper or website may vary. Therefore, I would like to emphasize at the outset that this research does not intend to define a uniform visual style, but explores some examples in which design, as a visual rhetoric, is used to shape political communication in mediaspheres defined by information disorder.

Though I focus on newspapers and websites here that are understood as 'sensational', it is important to note that sensational design's visual rhetoric may not be confined *only* to what scholars understand as sensational outlets. It is beyond the scope of this paper to conduct a full comparative analysis between traditional, legacy news outlets and 'sensational' media. That said, the visual relationship between legacy outlets and sensational outlets is one of the key aspects to understanding how sensational design, particularly in the 21st-century, plays on "genre characteristics" (Ihlström & Lundberg, 2004, p. 51). Whereas in the 19th-century, sensational reporting was associated with a sensational visual grammar (Campbell, 2001, pp. 7, 8; Olson, 1930, pp. 318–319), in the 21st-century, these distinctions break down. A modernist visual grammar for news design was promoted in manuals for newspaper designers throughout the 20th-century, characterized by balanced, symmetrical and grid-based layouts, and later, sans serif typography* (Allen, 1929; Allen, 1947; Garcia, 1993; Hurlburt, 1978; Moen, 1989; Olson, 1930; Sutton, 1948). This modernist visual grammar became associated with the "established vocabulary of newspaper authority", according to historians of news form Kevin Barnhurst and John Nerone (2001, p. 21). Today, web templates or user interface designs often include visual elements styled within a 'functional/modernist' or 'traditional' genre, elements which might historically be associated with objectivity

* This is not to suggest that all 20th-century newspapers adopted sans-serif typography, or that sans-serif typography is the only defining element that qualifies a 20th-century newspaper as "modern" in style. Rather, I include this to note the way in which typographic families played role in the creation of a modernist grammar(s).

or legitimacy. However, they can be imbued with content and imagery* by those who take advantage of online communication mediums to "do something beyond (or even counter to) its apparently genuine aims" (Gillespie, 2020, p. 378). Because it can adopt existing design grammars, the visual rhetoric of sensational design cannot be typologized and generalized in the same way we might understand 'modernist' or 'post--modernist' design styles. It is contextual, and the purpose of this paper is to demonstrate some of the contexts and forms in which it appears.

Further, this paper reveals that sensational design is not a visual rhetoric necessarily purposefully chosen and orchestrated by trained, professional designers. Instead, it seeps into the mediation of political communication through a more intuitive understanding by those creating newspapers and websites about what kinds of visual cues may cause an affective response, is a result of production and dissemination technologies, marketing logics, or (most likely) a combination of these factors. Here, "professional designer", refers to someone who has received training in communication design or otherwise recognizes themselves as the "author" of a graphic project (Rock, 1996). Professional designers are largely absent in the case studies. In the 19th-century, there was no news "designer" as such; design occurred as a result of the combination of the work of composition departments, illustrators, the editors and the print foreman (Barnhurst & Nerone, 2001, p. 101; Sutton, 1948, pp. 99–100, 172). In the 21st-century, designers appear as distant, in so far as they are responsible for designing online templates and setting the visual expectations of online news 'genres'. This raises important questions about the agency of professional designers and way visual rhetoric and communication design "act" in both historical and contemporary socio-political assemblages of political communication (Bennett, 2010).

This paper begins by situating sensational design within literature on design theory and political aesthetics. To note: these sources are drawn from American and European studies, thus delimiting the study's findings to a culturally specific, Western context. The paper then describes the study's methodology. It then examines layout and display typography in case studies of American political communication from both 19th-century sensational newspapers and 21st-century post-factual news websites. This diachronic, comparative approach explores the appearance of sensational design in American political news in different time periods, specifically eras of rising populist sentiments and technological innovation. The paper concludes with a discussion of how layout and typography "act" as rhetoric, how design might be incorporated into the field of political aesthetics, and the implications of such a relationship.

* Though not the focus of this paper, photography plays a very important role in the rhetoric of sensational design. See: Chapter Five in Talley (2025).

2. Contextual Foundations

2.1. Communication Design in the Mediasphere

Ghosh and Nag (2016), in defining "communication design", use the term "meaningful information" to describe the content communication design frames, thus emphasizing the relationship between communication design and information (pp. 272–273). Lozano's (2016) definition of "information design" helps clarify how design mediates content in a value-laden manner. Lozano defines information design as "the process of organizing the content of a message based on a set of values that match some understanding and world order", which draws attention to the idea that there is a set of "principles and codes" that inform the reader's interpretation of the information (p. 199). This concept of information design as carried out via a set of established principles is key to understanding design as a rhetoric that carries with it pre-existing values shaping the content it mediates (p. 199). Combining Ghosh and Nag's (2016) definition of communication design and Lozano's (2016) definition of information design helps to describe the relationship between design and the mediasphere. A "mediasphere" is the "context in which mainstream journalism actually circulates", and it sits between the semiosphere, where meaning is made, and the public sphere, where news information is de-coded and interpreted by reading publics (Hartley, 1996, p. 13). Communication design operates within the mediasphere by acting as the visual rhetoric of news information, shaping the "meanings and relationships" (p. 13) that can be interpreted from that information.

2.2. Visual Rhetoric

Communication design carries stylistic characteristics and ideological foundations that form a visual language affecting the perception of information. Writing specifically on newspaper design, Craig (1990) describes how design practices can be understood as "conventions" and the system of design practices as "codes" (p. 21), making the argument that these codes constitute "semiotic meaning" (p. 22). Craig notes specifically that these codes are created in part through their historical conditioning in design practice, which aligns with Ihlström and Lundberg's (2004) work describing how news genres can be associated with particular visual characteristics.

Craig's argument can be contextualized within a body of literature that argues for the consideration of design as a form of visual rhetoric (Atzmon, 2011; Bonsiepe, 1965; Brumberger, 2003; Buchanan, 1985; Ehses, 1984, 1995; Helmers & Hill, 2004; Kinross, 1985; Patton, 2020; Wyatt & DeVoss, 2018). Rhetoric can be defined as "a corpus of applied methods of persuasion" which can be used to "shape opinions" and, relevant to this study, "specifically political opinions" (Bonsiepe, 1965, p. 24). Visual rhetoric, expressed through elements such as color, images and typography, can be persuasive

in the way it "speak[s] in familiar voices, show[s] concern for commonplace virtues and, hence, seem[s] authoritative" (Buchanan, 1985, p. 15). Atzmon (2011) collectivizes the qualities of visual rhetoric as "design narratives" (p. xiv), writing that these narratives work as rhetoric by appealing to "a worldview or a set of meta-beliefs" (p. xiv). This characteristic of visual rhetoric as appealing to "meta-beliefs" complements Ghosh and Nag's (2016) definition of communication design and Lozano's (2016) definition of information design. The concept of a rhetorical design narrative appealing to certain worldviews parallels the idea that communication design visually organizes content based on established values and understandings of the world. In doing so, communication design can both construct and leverage values that match particular understanding(s) of the world. Thus, communication and information design are inseparable from their deployment as a form of visual rhetoric. Building on the work of design scholars who have addressed the way visual rhetoric is used as a means of persuasion in communication design (Almeida, 2009; Atzmon, 2011, 2015; Bonsiepe, 1965; Buchanan, 1985; Drucker, 2014; Kinross, 1985; Rath, 2020), this paper recognizes that the visuals that form sensational design are not necessarily purposefully chosen by professional designers, but can appear in the design of newspapers and websites through a more intuitive understanding by non-designers about what kinds of visual cues could cause an affective response, as well as emerge from other technological and economic factors shaping the medium by which information is disseminated. Further, sensational design can act on information in ways that belies the existing values associated with certain visual codes, making it a slippery and deceptive example of visual rhetoric.

2.3. Sensationalism

'Sensational design' does not currently exist in design literature as a defined visual rhetoric but is established in this paper as a term to collectivise the visual rhetoric(s) present in periods of 'information disorder'. Sensational design is distinguished from 'sensationalism', the latter being a historical term typically used to describe a genre of journalism characterized by dramatic textual content. Sensationalism in the 19th-century is associated with "yellow journals" or "yellow journalism", a descriptor for newspapers with sensationalist content or "frequently associated with misconduct in newsgathering" (Campbell, 2001, p. 25).* This study sees sensationalism as an early precedent for contemporary information disorder in American media. Existing studies of sensationalism focus on the textual content in defining the genre (Dicken-Garcia, 1989; Francke, 1978, 1985). However, Campbell (2001) atypically defines sensationalism

* This is distinct from the term "yellow peril", describing Sinophobia, which also appears in context of political communication during this period (see: Frayling, 2014).

through both its content and visual characteristics. The visual qualities Campbell identifies include:

- "frequent use of multicolumn headlines that sometimes stretched across the front page" (p. 7);
- "the generous and imaginative use of illustrations, including photographs and other graphic representation such as locator maps" (p. 8);
- "bold and experimental layouts, including those in which one report and illustration would dominate the front page [...] sometimes enhanced by the use of color" (p. 8).

Visually, sensational journalism is historically associated with a "mixed make-up" in front-page newspaper layouts, or those which use differing headline widths and broken columns (Olson, 1930, pp. 314–319). Associating this layout type to sensational journalism is Olson (1930) who, in his guide for the growing field of professional newspaper designers, writes that mixed make-up is the preferred form of sensationalism (p. 318). Olson derides the style as being "a jumble of headlines, boxes, and cuts of all widths and sizes, dumped helter-skelter into the page, each head fairly shrieking for attention", "excitement breeding" and directly cites the Hearst newspapers as an example (pp. 318–319).

Though these visual characteristics of sensationalism do appear in the 19th-century case studies, this paper posits that sensational design can be understood as a visual rhetoric divorced from a particular news genre in a particular period. Rather, sensational design is characterized by a constellation of different formal elements with an underlying appeal to affect, while sometimes also using genre characteristics of particular news forms to appeal to constructed "meta-beliefs" associated with those visual codes.

2.4. Propaganda, Tabloidization, Emotions and Affect

Writing on propaganda, tabloidization and emotional design can be used to explain how the visual rhetoric of sensational design appeals to affect, particularly in political contexts.

In histories of graphic design and visual culture, studies of propaganda are numerous (Aulich, 2011; Clark, 1997; Moore, 2010; Philippes, 1982). This study differs in that it focuses on the design of 19th-century newspapers and websites, revealing how certain characteristics of propaganda, such as appeals to affect through design, can work in a distributed visual rhetoric, as opposed to systematized operations. Sensationalism also appears as a characteristic of the "tabloid style" in studies on tabloidization (Zelizer & Bird, 2009). Tabloidization is understood as a term describing a "serious decline in journalism discourse" in the 20th-century and "framed in terms of increasing trivialization" (Zelizer, 2009, p. 41).

What connects sensationalism, tabloidization and propaganda is that they often desire to appeal to a publics' emotions.* Bernays refers to the emotion throughout his 1928 book *Propaganda*, particularly in reference to propaganda in a political context (Bernays, 1928, pp. 93, 102). Appeal to emotion also appears in White's (1971) analysis of "five forms of persuasion" (p. 26), and when describing the principles that an analyst can use to examine techniques of propaganda, Jowett and O'Donnell (2006) list the "arousal of emotions" (pp. 304–305). In the tabloidization of news, sensationalism is understood as an emotional dimension, connecting affect with news reporting (Zelizer & Kitch, 2009).

The affective qualities of design is the focus of the interdisciplinary field of emotional design, which seeks to connect design and its potential to "evoke emotions" and "patterns of behaviors and attitudes" (Damazio, 2016, p. 359). Much of the literature surrounding emotional design is in reference to product design, rather than visual communication (Chapman, 2015; Norman, 2004). Nonetheless, Norman's recognition of an "affective component" in the emotional processing of design relates emotional design to scholarship around affect and emotions, which informs the case study analysis (Ahmed, 2014; Dean, 2010; Johnson, 2018; Norman, 2004, p. 25).

Together, literature on visual rhetoric, propaganda, tabloidization and affect help establish a common base, 'affect', underlying the many visual expressions of 'sensational design'. Sensational design is distinguished from propaganda and tabloidization in that it is not a defined visual-verbal design *system*, as in propaganda, or *process* of news transformation associated with particular content, as in tabloidization, but rather, it is a visual *rhetoric* that can appear across news genres and at different moments in history.

2.5. Political Aesthetics

The aestheticization of politics is defined by its dialectic with (idealized) "rationalist" modes of politics (Corner & Pels, 2003, p. 8). Aestheticization refers to "performativity, style and spectacle" as applied to political communication, which is otherwise defined by its "commitment to substantial debate" (Aiello & Parry, 2016). Manipulation is a characteristic of the aestheticization of politics (Aiello & Parry, 2016). The definition of "manipulation" in the context of information disorder is drawn from Tandoc et al.'s (2018) classification of "manipulation" as one of the typologies of "fake news". Specifically referring to photographs, Tandoc et al.'s (2018) definition of manipulation is one that creates a "false narrative" that may use some facts, but overall has "no factual basis" (pp. 144–145). This definition, though based in discussions of photography, can be applied to other studies of visuality in the context of information disorder, such as this one. Much work on the aestheticization of politics (Corner, 2003; Corner & Pels,

* 'Publics' here is used to recognise that there is no monolithic news reading 'public' (see: Warner, 2010).

2003; Wahl-Jorgensen, 2000; Zoonen, 2005), and the way it manipulates communication, builds on work of Edelman (1971, 1995, 2002) who linked semiotics and political behaviors. Understanding the aestheticization of politics as verbal and visual helps center communication design's role as influencing the mediation of political news.

The narrativity of the aestheticization of politics works to create a sense of order or coherence in the political sphere by targeting the beliefs of certain publics, as opposed to the "disorder, murkiness, and contradictions that characterize much of everyday experience" (Edelman, 1995, pp. 4, 117). In the 30 years since Edelman's observation, the sense of national and global disorder has only increased due to the interrelated systemic risks to contemporary planetary ecosystems and social cohesion, summarized as "polycrisis", which is exacerbated by modern technologies (Tooze, 2022). This context makes the function and effects of political aesthetics all the more important to study. This paper asserts that sensational design should be considered a form of visual rhetoric within political aesthetics. Further, focusing on visual rhetoric emphasizes the way communication design works to manipulate political communication in mediaspheres characterized by information disorder.

3. Methodology

The study can be understood as a contemporary design history of visual communication in so far as it critically considers design and design practice as affecting present events, while also using a diachronic approach to elucidate the historical trajectory of contemporary phenomena (Teasley, 2019, p. 13).

An integrative literature review into newspaper design, sensationalism and contemporary information disorder in the United States provided the historical and theoretical context, informing the selection of cases (19th-century newspapers and websites), sub-cases (specific front pages and home pages) and graphic units for analysis (typography and layout).* Front pages and home pages were studied in relation as they are the most equivalent to each other, and there is precedent in studies of web news design to use home pages as a "metaphor" for front pages (Li, 1998, p. 355). Studies exploring newspapers' effect on voting behavior, relevant to this paper's focus on political communication, also use front page stories as a metric for determining newspapers' ideological leaning (Gerber et al., 2009, p. 40).

* This paper does not discuss illustrations and photography, which play a key role sensational visual rhetoric. However, a comprehensive study is the subject of the author's PhD thesis from which this paper is drawn (see: Talley, 2025).

Case studies were chosen using purposive sampling (Emmel, 2021, p. 5). Due to the limits of scope for an academic article, this paper presents a schematic of cases that were analyzed as part of a much larger study (Talley, 2025).

The *New York World* and *New York Journal* were selected as exemplary cases as they are the most referenced newspapers cited as popularizing sensationalism in academic studies of the subject (Campbell, 2001; Stevens, 1991). Front pages of the *Journal* were downloaded from the Library of Congress digital collections and front pages of the *World* were downloaded from Newspapers.com. Dates ranged from between 1893 and 1900, a period constituting the rise of sensationalism and the 'circulation wars' between Hearst and Pulitzer. Most analysis has been conducted on material collecting starting in the year 1895, after Hearst's acquisition of the *Journal*, and what Campbell (2001) defines as the beginning of the era of sensationalism (p. 6). Front pages were sampled on the basis that they contained national political news in a headline. This news was understood as relating to presidential elections, the passage (or failure) of federal congressional acts, strikes, wars, economic depressions, recessions and territorial annexations. A focus on national political news was chosen, rather than local news, as post-factual news websites today tend to discuss national news items, even if the website purports to be from a specific locality. This survey resulted in a corpus of 380 front pages from the *Journal* and 397 from the *World* that had at least one mention of national political news as a headline item. Front pages were then coded for political stories using both open coding and selective coding (Holton, 2022), based on the list of historical events and populist rhetorical themes from Kazin's (2017) *The Populist Persuasion*. This focus on populist rhetoric for coding was chosen as both the *World*, *Journal*, and post-factual online news outlets are understood as appealing to populist socio-cultural narratives (Müller & Schulz, 2021) and aligns with the study's focus on political communication.* Populist rhetoric, like sensationalism, is characterized as appealing to affect (Demertzis, 2006) and, importantly for this study, is specifically associated with information disorder (Tumber & Waisbord, 2021). Therefore, populist rhetoric is used here as a coding criteria to select examples of political communication within the sub-cases on which to then conduct visual analyses. However, it should be emphasized that sensational visual rhetoric is not *only* apparent in populist political communication. The pages were coded using the "regions" feature in NVivo, selecting, by area, headlines and illustrations. Pages with approximately more than 50% of their total front page coded as having populist political content (determined by total area of coded regions within the front page) were then selected to create analysis memos (Corbin & Strauss, 2008, p. 117; Holton & Walsh, 2017, p. 77). These memos formed the

* Other possibilities outside political communication might have included focusing on rhetoric around crimes or celebrities, for example.

basis of formal visual analysis, with notes highlighting aspects such as bold headlines and common layout strategies.

Post-factual websites were chosen from BuzzFeed News' "Top Fake News" articles from 2016 and 2017 (Silverman, 2016, 2017)* and from Melissa Zimdars' (2016) "False, Misleading, Clickbait-y, and/or Satirical 'News' Sources" list. The sources in these lists were then matched to websites mentioned in other academic studies or news articles on mis- and disinformation, indicating they had some significance in information disorder discourse. Sites were then evaluated to determine which examples had been scraped by the Internet Archive with enough detail to capture significant visual elements. In the case of the technical limitations imposed by poorly archived websites, there were periodical evaluations to determine how well certain cases that might have been considered at the outset were not fit for analysis. This resulted in a corpus of 17 post-factual news websites, with screenshots taken from archived versions of these sites on the Internet Archive's Web Archive. This final selection has the caveat of potentially inflating the impact of certain cases in terms of their overall influence on information disorder in American media. However, the study is not concerned with evaluating the significance of individual cases, rather, it is interested in investigating the visual rhetoric to which the cases collectively contribute. Like the focus on populist rhetoric within the 19th-century examples, post-factual websites were chosen based on their right-wing political leaning, which today is associated with an appeal to populist narratives (Rhodes-Purdy et al., 2023). This decision to focus on right-wing outlets also aligns with previous research that analyses the strong influence of right-wing media on information disorder in the US media landscape (Benkler et al., 2018) and studies that demonstrate the abundance of right-wing mis- and disinformation (Allcott & Gentzkow, 2017; Guess et al., 2018; Silverman et al., 2016). Though this study examines right-wing populist narratives, I ultimately argue that sensational design is ideologically agnostic, and future studies might look to see how the rhetoric appears in reportage across the political spectrum.

In the visual analysis, the front pages of newspapers and home pages of websites are broken down to analyze two design elements: layout and display typography. These elements were chosen as they receive particular focus in literature on newspaper and web design and are considered "immutable graphic elements" in news design (Ozretić Došen & Brkljačić, 2018, p. 5). They are also graphic elements listed as part of Campbell (2001) and Olson's (1930) description of sensational news. Finally, they are comparable across eras. The separation of design elements and their analysis is

* Buzzfeed used the communication marketing tool BuzzSumo to survey 96 "fake news" websites (compiled from a list drawn from the sites' own investigations and the online tool Hoaxy) to identify top-performing Facebook content.

informed by previous studies on newspaper design and layouts which combine methods of multimodal analysis with socio-historical research (Barnhurst & Nerone, 2001; Knox, 2007, 2009a,b, 2017). In particular, this study follows Barnhurst's (1991) analysis of newspaper form, which focuses on headline size, width, typography and layout.

3.1. Cases' Historical and Cultural Context: 19th-Century Sensational Newspapers and 21st-Century Post-Factual Websites

This paper examines case studies from two of the most infamous 19th-century sensational newspapers, the *New York World*, published by Joseph Pulitzer, and the *New York Journal,* published by William Randoph Hearst, as well as examples from several 21st-century post-factual websites between 2016 and 2017, years around the Donald Trump-Hillary Clinton election. The two eras of comparative case studies are characterized by information disorder in the American mediasphere, appeals to populist narratives in political communication, political polarization and technological innovations that effect news production, mediation and distribution, which is why they have been selected for comparison. By eras of information disorder, I mean points in American history where the mediasphere is characterized, in popular and scholarly discourse, by an increase in manipulated political communication at the point of production, mediation and distribution. I expand Hartley's definition to include non-mainstream 'journalism' in the 21st-century, which is affected by the same technological, economic and political drivers as traditional news outlets.

New York City in the 1890s was dealing with many of the same socio-economic complexities, including market downturn, a rise in immigration and nativist backlash, political corruption, influx of new technologies, globalization, that the entire country would be facing 110 years later. Indeed, New York can be considered both a microcosm and a canary in the coal mine for many of the issues facing the American mediasphere as a whole today. Both eras evidence the same populist rhetorical themes (Kazin, 2017), including religious speech, producerism*, xenophobia and nationalism, evident both in text and visual motifs. These periods are also characterized by great leaps in technological innovation for news publishing, such as the invention of color printing presses in the 19th-century, and in the 21st-century, the use of template software to produce news webpages and the web as a medium for news dissemination. Further, these periods both have a body of contemporary discourses and secondary literature historicizing and criticizing new production and dissemination technologies, socio-political and economic conditions, and design and journalism practice. As this study is concerned with understanding the phenomena of information disorder as it relates to

* Defined as the conviction that "only those who created wealth in tangible, material ways [...] could be trusted to guard the nation's piety and liberties" (Kazin, 2017, p. 13).

sensational visual rhetorics of political communication over time, a comparative case study approach allows for the evaluation of similarities and differences of design and political aestheticization in two periods characterized by information disorder in the American mediasphere.

4. Findings

The following section considers two design elements from 19th-century sensational newspapers and 21st-century post-factual websites: layout and display typography. Conducting a visual analysis, the section reveals how these elements exhibit "genre characteristics" associated with certain news design codes, and/or appeal to affect. Although each element is analyzed individually, the overall visual rhetoric of sensational design is supported by Gestalt theory as applied to communication design (Lupton & Phillips, 2015; Moszkowicz, 2011). This argues that elements within a graphic composition are visually read as a whole, rather than as distinct units, subject to the ways in which viewers interrelate individual elements to order visual information.

4.1. Layout

Layout refers to the underlying logic of the composition of elements. For post-factual websites and newspapers, layout creates salience hierarchies, emphasizing or de-emphasizing certain design elements. "Salience" is a term used to describe the way different elements in a composition "attract the viewer's attention to different degrees" (Kress & Van Leeuwen, 2021, p. 182). The term "salience hierarchy" describes the "path" a viewer reads a visual text from the most to the least salient element (p. 211). There are two main ways these hierarchies are created in the case studies: use of the fold/scroll and the variety/constancy of layouts employed. However, layouts do not only work as an underlying structure to create salience hierarchies, but themselves represent a visual rhetoric. Understanding layouts as rhetoric is supported by previous studies of news design, which note that in "socio-semiotic and perceptual psychology, visual space is seen as a semiotic space", an aspect of visual grammar structuring information (Ozretić Došen & Brkljačić, 2018, p. 4).

4.2. Use of the Fold/Scroll

One of the ways salience hierarchies are created is by placing some elements "above the fold" or "above the scroll" and others "below the fold/scroll", as in what could be seen when the newspaper was folded on a newsstand versus when the front page was unfolded, and what a user can see on a webpage before scrolling down. Both newspapers and websites tend to place the boldest headlines and largest images "above the fold" and "above the scroll", creating a strong hierarchy between content that is immediately seen and that which one would need to unfold the paper or scroll down to

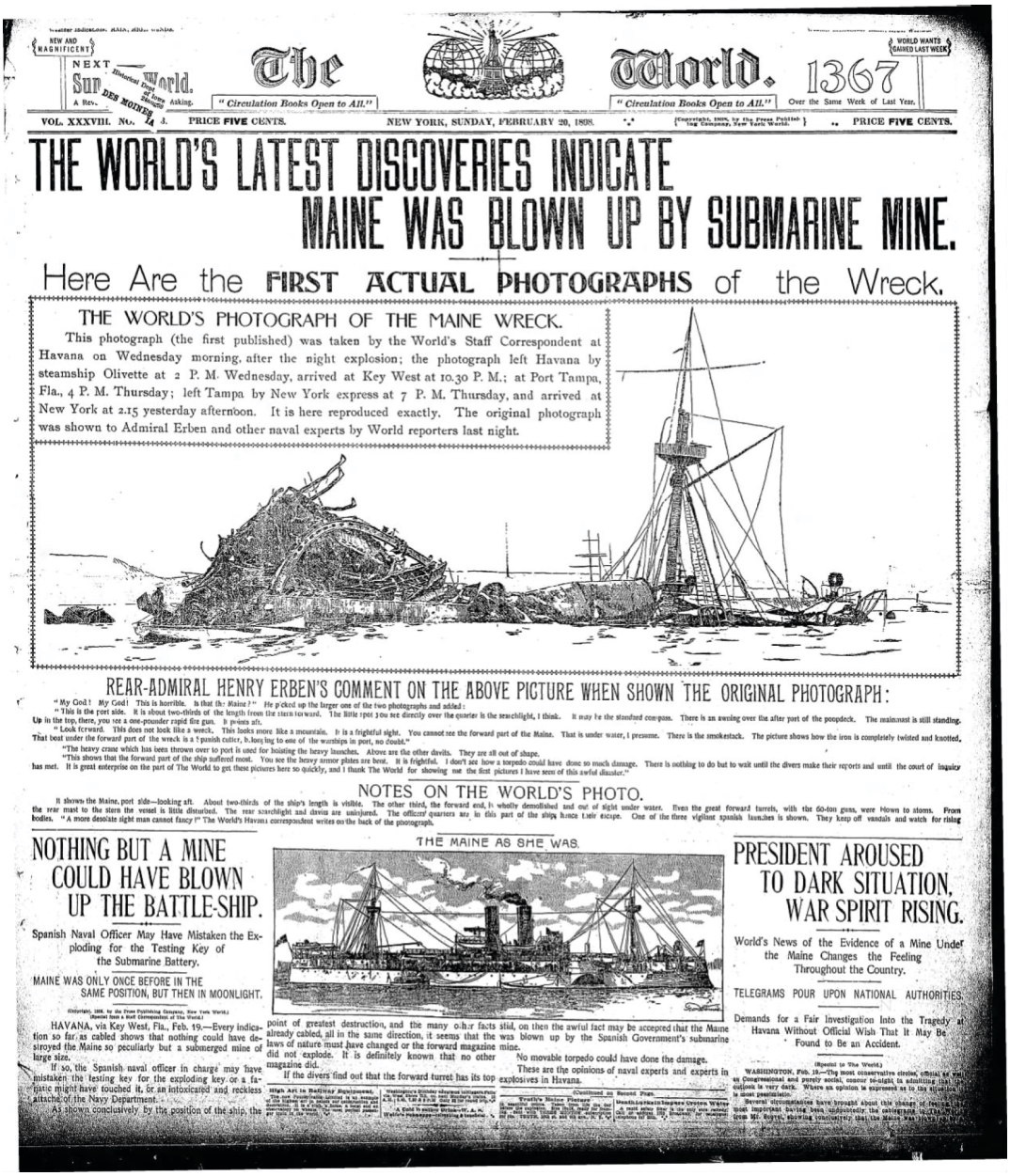

Figure 1. *The World*, 20 February 1898.

see (Figure 1). For most websites, emphasis is placed on the main headline story in the top left or center, with a large headline and image (USA Daily Politics, 2016).* However, newspapers went further than to just use the fold as a frame, sometimes using the fold to create dramatic tension in stories. In the *Journal*, a month after peace was accepted

* Due to copyright restrictions, images of these websites are unable to be reproduced. However, each reference links to an archived version of the website in the Internet Archive's Wayback Machine, where archived versions of the websites can be viewed online.

DAILY AVERAGE FOR SIXTY DAYS. LARGEST EVER REACHED. 1,250,000. A MILLION AND A QUARTER A DAY

LARGEST ON EARTH!

NEW YORK JOURNAL AND ADVERTISER.

NO. 5,739. Copyright, 1898, by W. R. Hearst.—NEW YORK, WEDNESDAY, AUGUST 3, 1898.—14 PAGES. PRICE ONE CENT In Greater New York and Jersey City. Elsewhere, TWO CENTS.

PEACE!—THE WAR IS OVER—PEACE!
SPAIN HAS ACCEPTED OUR TERMS.

As Soon as Minor Details Are Arranged a Declaration Will Be Made and Spain Will Leave All America Forever.

Reply Was Forwarded to Washington Monday Evening, and It Is Expected That a Formal Arrangement Will Be Completed by Next Saturday.

(COPYRIGHTED, 1898, BY W. R. HEARST.)

Special Cable Dispatch to the New York Journal.

MADRID, Aug. 2.--Spain has accepted the American conditions and peace is assured. The rest is merely a matter of detail.

The demands of the United States are here understood to be: 1. The abandonment of sovereignty in Cuba and the immediate evacuation of the island. 2. The cession of Porto Rico and Spain's other West Indian possessions to the United States. 3. The cession of one of the Ladrones. 4. The United States to occupy Manila until the disposition of the Philippines is decided upon.

The Ministers held a long session to-day, and their conclusion was that nothing was left to them but to accept the principal conditions imposed by President McKinley. Their only reservation was with regard to the method of putting the conditions in force.

Until the minor details have been somewhat more fully gone over, the official announcement of the acceptance will not be made, but Spain is in the mood to grant everything, and merely hopes to save herself some slight degree of humiliation. It is probable that delegates to arrange the peace will be appointed before the week is over.

The news of the Sagasta Cabinet's determination to accede to the American demands was permitted to leak out, evidently with the intention of testing the temper of the people. The populace, where not apathetic, seems heartily glad that the strain is over.

By Associated Press.

LONDON, Aug. 3.--The Madrid correspondent of the Daily Mail says:

"The Government has accepted the principal of the American conditions; but the acceptance will not be made public until inquiries to Washington on matters of detail have been settled, thus rounding off the preliminary basis."

Condensed History of the 103 Days' War with Spain.

Hostilities begun, April 21, 1898.
Peace proposal accepted, August 2, 1898.
Number of days of actual war, 103.

Cost in lives to Spain, about **11,000** killed. (No official report of Spanish casualties published.)

Cost to the United States, about **253** men killed and about **1,324** men wounded.

What We Lost: The Maine, with 266 men.

What Spain Lost: Montojo's fleet, Cervera's fleet, Cuba, Porto Rico, one of the Ladrones and possibly the Philippines.

Strength of the United States Army when war was declared, 27,532 men.

Strength now, 278,500 men.

Strength of United States navy when war was declared: Battle ships and cruisers, 14; monitors, 19; unarmored steel vessels, 16; gun boats, 19; torpedo boats, 23.

Strength now: Battle ships and cruisers, 39; monitors, 19; unarmored steel vessels, 31; gun boats, 25; torpedo boats, 25; special craft, 45.

BLANCO BOASTS TO AVERT RIOT.

Declares He Can Whip Our Whole Army and Navy To Pacify Havana.

Key West, Aug. 2.—Letters smuggled from Havana through insurgent sources have arrived here. They state that Blanco has issued a bombastic proclamation with a view of reassuring the inhabitants and averting impending disaffection. He declared that the city is so strongly fortified by land and sea that the entire United States fleet and army combined can be easily repelled.

The Cuban brigadier, Carlos Rojas, of Matanzas Province, reports the landing and safe arrival in the interior of clothes and provisions sent by Captain Rubalcaba, of his command, now in Key West. Lieutenant Brainard, of the Hornet, volunteered to carry the cargo and landed it on July 30. After Brainard had deposited the stores with the Cuban commission awaiting him on the coast he sighted a large trans-atlantic steamer making apparently for Matanzas. The Hornet chased her, firing several shots, but the steamer succeeded in escaping. Sunday night the Mangrove ventured near the coast of Sagua, when a small gunboat came from the mouth of the Sagua River and opened fire. The Mangrove returned the compliment and the Spaniards fled precipitately back to the harbor.

Figure 2. *The Journal,* top half, 3 August 1898.

Figure 3. *The Journal,* bottom half, 3 August 1898.

in the Spanish-American War, an illustration of an angel above a soldier was featured on the *Journal's* front page. The angel was placed above the fold and the soldier below, which would have made for a dramatic reveal upon unfolding the newspaper (Figures 2 and 3). This is a technique not seen in post-factual websites, which tend to keep their most affective content 'above the scroll', reflecting the habit of scanning and immediacy that is characteristic of digital content.

4.3. Variety/Constancy of Layouts

One difference between newspapers and websites is the variety versus constancy of layouts used. The post-factual websites analyzed in this study employ largely unchanging templates that adhere to a consistent grid structure. However, the *World* and *Journal's* layouts changed almost daily (Figures 4–7). In their analysis of typologies of news form, Barnhurst and Nerone (2001) note how what they call "Victorian" newspaper designs reflected the "endless variation and diversity" of news in the period (pp. 81–83). The variety of layout types and creative use of the fold demonstrates how the layout of 19th-century newspapers adapted to the day's news.

This contrasts with post-factual websites, where a template is usually applied. These templates are often described as being suited to news content, modern in style, image-forward and emphasize their ease of use. For example, the template used by *World Politicus* until October 2016 was Themeum's "NewEdge: News and magazine theme", which had a "clean, fresh and modern look", a drag and drop page builder that made it easy to "Build your influential news/magazine site in the shortest period of time" and a "stunning photo gallery" (World Politicus, 2016; NewEdge, 2016). Lack of visual variety is evident in the use of templates across websites, which adhere to a minimalist, functional style.

Further, these minimalist layouts can mimic the design of legacy news media websites, which also follow in the modernist tradition. This is most evident in "news imposter" (PolitiFact Staff, 2017) websites, such as *CNNews3* (CNNews3, 2016). *CNNews3's* design loosely mimicked that of the cable news channel CNN (PolitiFact Staff, 2017). It employed the same black, white and red color palette and had a knockoff *'CNN'* logo in a red box to the left of the menu bar, which was black, as in the original. In terms of structure, the original CNN news website employed a two-column layout, with "Top Stories" and "News and Buzz" in the left column and a large focal image with a headline above on the right. The imposter site included a carousel of images in a section at the top, each with a superimposed headline over the image *CNNews3* used the NewsAnchor template by aThemes for its web design. The NewsAnchor theme was described as "an easy to use magazine theme, great for online news sites that want to have a fresh and modern look" (NewsAnchor, n.d.). The template was released as both a free and a paid version. It appears that *CNNews3* used the free template, suggesting that the ease and inexpensive

Figure 4. *The World,* 12 July 1896.

Figure 5. *The World,* 9 August 1896.

Figure 6. *The World,* 26 August 1899.

Figure 7. *The Journal,* 25 March 1896.

production made the "NewsAnchor" theme an attractive option for the creators. The fact that the creators then spent time to edit this generic template to loosely resemble the real CNN website raises the question: why do so, if many other post-factual sites used templates 'out of the box'? What might these conscious design choices suggest about the real, or perceived, effect of visual rhetoric on the authority or authenticity of information?

4.4. Display Typography

Like layout, display typography is used to create salience hierarchies that can emphasize or deemphasize content through color, capitalization, scale and contrast. Further, typography's style can convey certain connotations. This is described by Noble and Bestley (2005), noting that type is in itself semiotic (p. 63).

Through connotations associated with type families and styles, and by emphasizing affective content through its treatment, typography plays a role in sensational rhetoric. This is true for both 19th-century newspapers and post-factual websites. This section describes two aspects of typography in each case: mastheads/lettermarks and headlines. Though this analysis focuses on typefaces, their treatment, and scale, there are a variety of other features that constitute typographic analysis that might be employed in future studies focusing specifically on typography (see Coles, 2016, for details on such features). In particular, this study calls attention to the different ways in which serif typefaces, those which have strokes at the end of letterforms (the "serif"), and sans serif typefaces, faces without strokes (Evans et al., 2013) might convey meanings associated with genre characteristics of certain news forms.

A turn-of-the-century history of printing notes that, "Were Gutenberg called upon to print his Bible to-day he would find virtually the same type ready for his purpose" (Hoe, 1902, p. 5). Such a statement draws attention to the fact that physical, metal, moveable types, were how newspapers were set at this time. Even with the introduction of the linotype machine, some sizes and faces of type were not available and had to be set by hand (Sutton, 1948, p. 99). Further, types were stored in cases in newspaper compositing rooms, taking up physical space in cabinets (Sutton, 1948, p. 101). The limitations of using physical type can be evidenced in the limited variety of headline types, in a limited size, observed in the *World* and *Journal*, which consistently used Quentell, De Vinne Outline, Gutenberg and Elzevir Gothic. These limitations contrast with web typography, which has experienced an "explosion" of typefaces since the mid-2000s (Teague, 2012). Despite this abundance, in the websites observed in this study, post-factual sites most often use default, sans serif types for headlines.

Figure 8. Masthead of *The New York World*.

4.5. Mastheads and Lettermarks

A masthead is the 'title' of the newspaper, printed at the top of the front page, often in a distinct typeface to the rest of the text. The equivalent of a masthead for post-factual websites is the lettermark. Mastheads are a consistent element of newspaper design and serve as an "ideogram" representing the identity of the newspaper for readers (Arnold, 1981, p. 74). Historically, newspaper mastheads were set in a blackletter type, the boldest type available in the early years of printing (Allen, 1947, p. 102). The connotation of tradition this provides is commented on in several early texts on news design. Arnold writes that blackletter "gives this face a good acceptance by the public" and is associated with "permanence and power," making it a strong choice for papers wishing to convey these qualities to their readers (1956, pp. 106, 109). The *World*, throughout the 1890s, used a blackletter type for its masthead (Mastheads can also be paired with images, and both the 19th-century mastheads and 21st-century lettermarks incorporate imagery. For example, the Journal employed nationalist language and symbols in its masthead. In 1898, the Journal's masthead included an illustration of an eagle imposed over the image of an American flag (Figure 9), and in 1899, the masthead

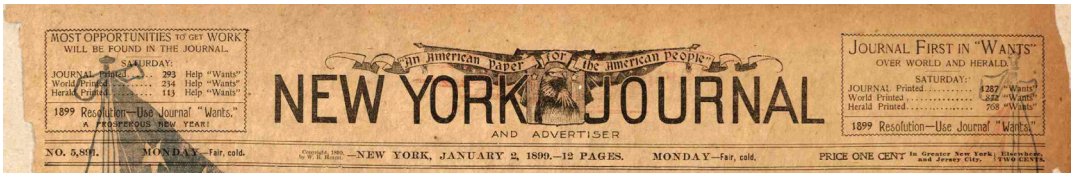

Figure 9. *New York Journal* masthead, 2 January 1899.

Figure 10. *New York Journal* masthead, 6 May 1899.

changed to include an image of a map of the United States, positioned below an eagle with its wings outstretched (An analysis of each version reveals the affective, populist rhetoric of the Journal's masthead. These two versions use the image of the eagle and of the map as iconic signs to represent the United States and the American people, and the banner text aligns the newspapers with an "imagined community" (Anderson, 1991) of American readers. Images showing the US's new territories could be seen as representing conquered peoples, literally under America's wing. This visual/verbal rhetoric establishing an imagined community of the American populace is common in populist narratives and might be understood as a strategy used by news outlets to collectivize their readership.). Underneath the wings float images of four newly acquired territories or spheres of influence, the Philippines, Hawaii, Cuba and Puerto Rico.) and this style is mimicked by some post-factual websites, such as the *Florida Sun Post* and *Washington Evening*, giving them a more traditional connotation (Florida Sun Post, 2016; Washington Evening, 2017).

Mastheads can also be paired with images, and both the 19th-century mastheads and 21st-century lettermarks incorporate imagery. For example, the *Journal* employed nationalist language and symbols in its masthead. In 1898, the *Journal's* masthead included an illustration of an eagle imposed over the image of an American flag (Figure 9), and in 1899, the masthead changed to include an image of a map of the United States, positioned below an eagle with its wings outstretched (An analysis of each version reveals the affective, populist rhetoric of the Journal's masthead. These two versions use the image of the eagle and of the map as iconic signs to represent the United States and the American people, and the banner text aligns the newspapers with an "imagined community" (Anderson, 1991) of American readers. Images showing the US's new territories could be seen as representing conquered peoples, literally under America's wing. This visual/verbal rhetoric establishing an imagined community of the American populace is common in populist narratives and might be understood as a strategy used by news outlets to collectivize their readership.). Underneath the wings float images of four newly acquired territories or spheres of influence, the Philippines, Hawaii, Cuba and Puerto Rico.

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AVERAGE DAILY CIRCULATION FOR MAY AND JUNE: 1,250,000. A MILLION AND A QUARTER A DAY.

LARGEST ON EARTH!

NEW YORK JOURNAL AND ADVERTISER.

NO. 8,710. NEW YORK, TUESDAY, JULY 5, 1898.—16 PAGES. PRICE ONE CENT

CERVERA WOUNDED AND A PRISONER.
WE BOMBARD SANTIAGO AT NOON TO-DAY.

All the Spanish War Ships Annihilated by Our Fleet---1,600 Prisoners Captured or Picked Up from Death in the Ocean.

Four Hundred Spaniards Killed---We Lose One Man and Have One Ship Slightly Damaged---Cervera and All His Officers Prisoners of War in the Cabins of Our Navy---Scenes of Awful Carnage and Destruction.

THE MAINE AVENGED ONCE MORE.

Spanish General Refuses to Surrender Santiago, and Shafter Notifies Him That a General Bombardment of the City Will Begin To-day at Noon. Dewey Planned to Take Manila on the Fourth of July---More Gallant Fighting by Our Army Around San Juan---General Linares and General Vara del Rey Believed to Have Been Killed---Touching Scenes and Incidents in the Fields and Hospitals.

THE Spanish power is crushed. Admiral Cervera, slightly wounded, and 1,300 of his men have been captured, 700 have been killed and his entire fleet has been annihilated. They were sunk or blown up by the American war ships while trying to escape from Santiago. Special dispatches to the Journal tell in brilliant prose the story of the great sea fight.

To-day at noon General Shafter will bombard Santiago unless it is surrendered. General Toral has refused to do this, and the women and children were flocking out of the city all day yesterday. General Vara del Rey has been killed. His body and those of his staff were found on the bloody field of El Caney by a Journal correspondent. General Linares, who was in command of the Spanish, was badly wounded and is believed to have lost his life.

To-day Sampson will try to enter the harbor and assist in the bombardment of the city.

The American troops who arrived at the Philippines have left their ships and were preparing last Saturday, under Admiral Dewey's directions, to seize Manila on the Fourth of July.

The American flag floats over the Ladrone islands, captured from Spain by the Philippine expedition.

The Journal's Editor-in-Chief sends another brilliant story, that of the fighting on Saturday before San Juan.

Many special dispatches from the Journal correspondents in the field and on the sea tell of the splendid and brilliant work during

ISN'T HE A BIRD?

Figure 11. Banner headline in the *Journal*, 5 July 1898.


863,956 WORLDS CIRCULATED YESTERDAY

The World.

"Circulation Books Open to All."

863,956 WORLDS CIRCULATED YESTERDAY

VOL. XXXVIII. NO. 13,330. NEW YORK, THURSDAY, FEBRUARY 17, 1898. PRICE ONE CENT

MAINE EXPLOSION CAUSED BY BOMB OR TORPEDO?

Capt. Sigsbee and Consul-General Lee Are in Doubt---The World Has Sent a Special Tug, With Submarine Divers, to Havana to Find Out---Lee Asks for an Immediate Court of Inquiry---Capt. Sigsbee's Suspicions.

CAPT. SIGSBEE, IN A SUPPRESSED DESPATCH TO THE STATE DEPARTMENT, SAYS THE ACCIDENT WAS MADE POSSIBLE BY AN ENEMY.

Dr. E. C. Pendleton, Just Arrived from Havana, Says He Overheard Talk There of a Plot to Blow Up the Ship---Capt Zalinski, the Dynamite Expert, and Other Experts Report to The World that the Wreck Was Not Accidental---Washington Officials Ready for Vigorous Action if Spanish Responsibility Can Be Shown---Divers to Be Sent Down to Make Careful Examinations.

DRAWN FROM A DESCRIPTION BY EYE-WITNESSES ON THE STEAMSHIP CITY OF WASHINGTON WHO SAW THE EXPLOSION, FOLLOWED BY "A VOLCANO OF FIRE AND SHOWERS OF BOATS, DECKS, IRON AND COAL," CALLED TO THE WORLD BY ITS OWN CORRESPONDENT IN HAVANA, HOURTEEN HOURS.

THE WHOLE STORY OF THE DISASTER TOLD IN A FEW WORDS.

Figure 12. Banner headline in the *World*, 17 February 1898.

Similar to the patriotic images used in the *Journal's* masthead, the lettermark of the post-factual site *USA Daily Politics*, makes use of nationalist imagery and styles. The masthead of *USA Daily Politics* is set in a hollow, black-outlined, Varsity-style slab-serif typeface (USA Daily Politics, 2016). Varsity-style type is connotative of American sports after the popularization of heat-press felt lettering for sports apparel in the mid-1940s (Stahls & Hotronix, n.d.). Further, this association with letterman jackets and high-school varsity sports gives the *USA Daily Politics* lettermark a vernacular*, nationalist aesthetic, compounded by an imposed image of an American flag in the outline.

National symbols such as flags and eagles align with Edelman's (1995) idea of the "kitsch" in political aesthetics. Edelman (1995) describes kitsch as "art that sentimentalizes everyday experiences, or that appeals to beliefs and emotions encouraging vanity, prejudices, or unjustified fears and dubious successes" (p. 29). Kitsch can create divisions through sentimentalizing, appealing to an imagined community of Americans, as much as it can encourage division through fearmongering narratives. In sensational and post-factual news outlets, "kitsch" is often present, such through

* For more on the digital vernacular, see: Howard (2008).

nationalist symbols and typographic styles that appeal to American pastimes, as in the USA Daily Politics lettermark.

The lettermarks above demonstrate how connotations related to imagery and typographic style can create a visual rhetoric that suggests traditionalist or nationalist values. Below, we will see how styles of headline typography also carry connotations, as well as emphasize particular words and narratives.

4.6. Headlines

The other most salient typographic element in 19th- and 21st-century layouts is the headline. From one column to multi-column stories, the *World* and *Journal* used different serif and sans serif typefaces that, due to their decorative styles and dramatic scales and contrast, created visual interest on front pages that shifted from day to day.

The use of full-spread banner headlines was the most dramatic, which Olson (1930) observed was a product of the competition between the *Journal* and the *World*. He noted that the circulation war between the two papers "brought a new idea, that of using the headline to advertise the news to possible buyers, as well as to bulletin it" (p. 214). This resulted in headlines that grew in "size and blackness" with the Spanish-American war in particular giving the papers "a heaven-sent opportunity to try to outdo each other in striking and sensational display" (p. 214) (Figures 11–12).

Like their 19th-century counterparts, large-scale, full-caps headings are used by post-factual websites to draw attention to their headline stories. For example, the use of all-caps in both *World Politicus* and *World News Daily Repor*t echo the "screaming" headlines of the 19th-century (World News Daily Report, 2015; World Politicus, 2016). However, post-factual websites follow in the history of modernist newspaper design, where headlines are set in sans serif faces with contrast created using differences in scale and boldness (Garcia, 1993, p. 33). Like modernist layout designs, these sans serif faces can carry with them connotations, such as their association with objectivity (K. G. Barnhurst & Nerone, 2001, pp. 191–192; Kinross, 1985; Rath, 2020), "default aesthetics" (Etienne, 2002) and ready-made "good enough" design (Engholm, 2010, p. 149). It is also evident comparing pages from template providers and post-factual websites that many creators did not change the default typeface, such as in the case of *World Politicus*, a visual expression of the "default aesthetic" (Etienne, 2002) and Engholm's "good enough revolution" in web design (2010, p. 151). This suggests that the choice to use default type is one of efficiency, prioritizing speed in the production process.

In the case of post-factual websites, the rhetoric of sensational design is not visually matched to its content as obviously as in the 19th-century. Though they may use large sizes or all-caps, which can stimulate an affective response, the typefaces themselves visually appear as "modernist". In this case, the "rhetoric of neutrality" (Kinross, 1985)

of sans serif types belies their often affective language. This demonstrates that visual characteristics of sensational design are slippery and must be understood within a larger socio-cultural context of information disorder, for example, the way in which efficiency and speed in contemporary production impact the visuality of information.

5. Discussion

5.1. How Layout and Typography 'Act' as Rhetoric

Layout and typography in both 19th-century sensational newspapers and 21st-century post-factual websites act as elements of visual language in an overall rhetoric of sensational design.

Layout can also be understood as a rhetorical element in the way it is associated with certain kinds of content. In the 19th-century, there was a responsiveness to the daily influx of information that shaped front page designs, and the visual form of news was specific to its content. Front page newspaper layout was conceived of as a "window" in which type and image created the "personality" of the paper (Olson, 1930, p. 298). In this view, structure is recognized as being used toward subjective ends and became associated with certain types of news. This aligns with Ihlström and Lundberg's work on "genre awareness" as applied to online newspaper design. They describe how "genre characteristics may be copied and refined to reflect resemblance to an existing genre" (Ihlström & Lundberg, 2004, p. 51). Olson (1930) observed that mixed makeup is the "style that lends itself most readily to sensational make-up" and even notes that "It is the type of make-up much used by Hearst newspapers and others making an appeal to mass circulation" (p. 318). This contrasts with post-factual website design, wherein the "neutral", functionalist style of design juxtaposes the dramatized narratives it frames. For these examples, the default is applied consistency, in part due to the low-cost and low-effort application of web templates. These templates are examples of "good enough" design (Engholm, 2010, p. 149), and the design logic on which these web templates operate, "presumes a split between form and content" (Riley, 2010, p. 74). This split becomes problematic, as with these templates, there is a seeping of a modernist design style, historically seen as "objective" and "authentic", into the aesthetics of post-factual news. Further, the fact that many of these templates market themselves as being for news information suggests that the creators of these websites consciously chose their designs to align with a pre-existing notion of what "news" should look like.

Historically, "traditional" or "modernist" news design is associated with a sense of professionalism and authority (Barnhurst & Nerone, 2001, p. 21). Guides for newspaper professionals, which appeared following the professionalism of design in the early 20th-century, demonstrate an interest in perpetuating balanced, symmetrical,

modernist forms (Allen, 1929; Allen, 1947; Olson, 1930; Sutton, 1948). In the spirit of these early guides, books such as Hurlburt's *The Grid: A Modular System for the Design and Production of Newspapers, Magazines, and Books* (1978), Moen's *Newspaper Layout and Design* (1989) and Garcia's *Contemporary Newspaper Design: A Structural Approach* (1993) served as guides for quality in news design, all touting modernist, grid-based layouts. Rather than being emotive in and of itself, as might be the case with a more bespoke 19th-century layouts, these templates frame affective narratives, while carrying a visual metaphor of objectivity due to the layouts' association with modernist design and legacy media news websites. Samara (2017) has recognized the subjectivity and cultural variability of "neutral" grid structures writing, that designers should consider "how various layout conventions may be interpreted on cultural, historical, and associational levels" (p. 60), making the point that all aspects of design, including the layout, can be and are subjectively constructed and experienced. Drucker's (2014) work on interfaces is also instructive: she describes how seeing interfaces with a "humanistic approach" emphasizes that interfaces "have to be defined as rhetorical arguments", recognizing their subjective construction and experience (p. 54).

The concept of "genre awareness" can also be applied to typography. Typography as a form of visual rhetoric was recognized by Bonseipe (1965, p. 40), and previous studies have considered the rhetorical potential of typography (Brumberger, 2003; Wyatt & DeVoss, 2018), revealing how it is possible for typography to carry cultural connotations. Through cultural connotations associated with type styles, and by emphasizing affective content through its treatment, typography acts as an element in sensational design. The typography of both 19th-century papers and 21st-century websites demonstrates how type works not only to draw attention to dramatic language, but also how the type style acts through its connotations. This is evident in the example of the *US Daily Politics* logotype, which incorporates nationalist, kitsch aesthetics, as well as the way in which blackletter type expresses authority and tradition. Other post-factual news websites exhibit typographic consistency due to keeping with the templates' defaults, using almost exclusively sans serif types. These default, sans serif types, like the templates in which they are embedded, project a "rhetoric of neutrality" (Kinross, 1985). However, their modernist treatment lend these headlines a different kind of authenticity: a sense of objectivity, which belies their often purposefully affective narratives. Therefore, though previous studies have seen serif and sans serif typefaces as associated with right/left political leanings in print newspapers (Schindler & Müller, 2018, p. 146), this study reveals how these ideological distinctions dissolve when applied to the visual analysis of online news in mediaspheres of information disorder. This highlights one of the most deceptive characteristics of sensational visual rhetoric in political contexts: its belying of preconceived ideological connotations.

5.2. Design and Political Aesthetics: Implications

Revealing the ideological codes that make up sensational design contributes to studies of visual rhetoric and political aesthetics by revealing how the visual rhetoric of design contributes to the aestheticization of politics in American news media. This design perspective on political aesthetics and political rhetoric builds on previous work that has explored the ways in which symbols (Edelman, 1971), art (Edelman, 1995) and spectacle (Edelman, 2002), though often subliminal, take advantage of pre-existing cultural narratives to play on the emotions of voting publics.

The aestheticization of politics (Corner & Pels, 2003; Zoonen, 2005) is "equated with a potential for manipulation and mystification" in how it combines political actions with performativity, style and spectacle (Aiello & Parry, 2016). The aestheticization of politics through visual rhetoric has the potential to adversely manipulate political information in the mediasphere, the phenomenon of which can be understood as information disorder. This study brings to light the negative consequences of the political aesthetics of communication design, particularly in the context of right-wing, populist narratives. Awareness of this visual manipulation is particularly important in modern politics, where such visual rhetoric can appeal to *ressentiment*, a "moral anger" that is a pervasive emotion in voting publics (Demertzis, 2006, p. 104). Kitsch and vernacular aesthetics appeal to *ressentiment* in the way they can evoke "spurious fears, hatreds, enthusiasms, and victories" that ultimately can shape views on politicians and policies (Edelman, 1995, p. 31). These views, under the influence of such rhetoric, are often "based on doubtful or blatantly false assumptions and contrived narratives", but they nonetheless shape the publics' support for certain politicians and policies (p. 32). Sensational design is implicated in shaping the publics' support for such politicians and policies in acting as a visual rhetoric, appealing to affect and spurring *ressentiment*.

5.3. Limitations and Future Research

Future research should explore how sensational design appears in different geographic and political contexts to gain an understanding of manifestations of sensational design as understood within culturally specific expressions of political aesthetics. This speaks to the limitations of the current data set, which is bounded by its cultural and geographic scope, as well as size, so the findings cannot be generalized. Additionally, because this article focuses on layout and typography, it neglects to include a myriad of other elements, such as typographic elements (sub-headlines, body copy, captions), photographs, illustrations and the use of color, that would inter-relate to form a comprehensive analysis. Further, the present paper is limited in the depth of its analysis of individual elements. Expert focus on component elements of sensational design, such as those mentioned above, would be beneficial to support the study's overall argument.

This paper has focused on the appearance of sensational design as associated with populist narratives. This is to exemplify how the rhetoric of sensational design affects political communication in mediaspheres characterized by information disorder, as many studies of information disorder focus on news with a populist bent, and it is easy to distinguish in the contemporary case studies the rift between charged populist language and the "neutral" rhetoric of modernism. However, per the claims above, the rhetoric of sensational design can appear in various contexts, which means that future studies would do well to look at both left-leaning and what otherwise might be considered "objective" news for evidence of sensational design.

Finally, the commodification of news and the role of advertising as supporting both 19th-century papers (Dicken-Garcia, 1989, p. 188; Guarneri, 2017, p. 22; Stevens, 1991, p. 65) and online news (Boyer, 2013, p. 8; Pickard, 2020, pp. 44, 60) must be acknowledged as an important contributing factor to information disorder. A complete materialist analysis of design and information disorder in America cannot ignore the relation between the aestheticization of politics and the political economy of news.

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RESEARCH ARTICLE

The Visual Language of Textile Tickets in 20th-Century British India: A Collection from B. Taylor and Co.

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Abstract: This essay examines the visual language of textile tickets — small, printed labels used on cotton bales and fabric lengths — produced by British printers for export to colonial India between the mid-19th and early 20th centuries. Emerging amidst expanding colonial trade and advances in printing technology, these ephemera evolved into vivid, ideologically charged artifacts. Focusing on a collection of textile tickets produced by Manchester-based printing firm B. Taylor and Co., this study explores three recurring visual themes: empire, religion, and gender. It argues that these images did more than advertise textiles: they glorified British imperial authority, appropriated Indian religious imagery, and idealized women as passive ornamental objects to enhance appeal in a male-dominated trade. Through visual and contextual analysis, this essay demonstrates that textile tickets — often valued only for aesthetics — also functioned as everyday instruments of colonial control.

Keywords: British Empire; colonial India; design history; iconography; Indo-British cotton trade; textile tickets; visual culture

1. Introduction

In the 19th century, as colonial trade in cotton expanded, an intriguing form of commercial packaging emerged in Britain: the textile ticket. These small printed paper labels were affixed to bales of cotton, bolts of cloth, or cut fabric (Opie, 1987, p. 134; Rickards,

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Figure 1. Textile ticket featuring iconography from Hindu religious practice. The central figure is identifiable as the god Krishna by his blue skin, forehead markings, and peacock feathers. The identities of accompanying figures in postures suggestive of reverence are less certain. The words "Printed in England" are inscribed at the lower left. Designed and printed by B. Taylor and Co., early 20th century. 205 × 265 mm. Reproduced with permission: Centre for Ephemera Studies, University of Reading.

2000, p. 324).* Originally conceived as trademarks, their purpose quickly extended beyond simple identification. Textile tickets featured diverse imagery but rarely depicted the textiles themselves (Figure 1). As with trade labels for other commodities, their role was not only decorative but also communicative — sophisticated visual media conveying broader commercial and cultural meanings. Historically, labels served as sites for displaying aesthetic sensibilities capable of expressing narratives and ideas (V. Geetha, 2006, p. 97).

Visual culture played a central role in imperial propaganda in colonial India, where art and printed images were used to legitimize British authority in everyday life. Scholarship on Indian visual culture in the 19th and 20th centuries — across art, architecture, photography, and print culture — shows how colonial art and print media shaped

* Textile tickets are also known as trade labels, bale labels and shipper's tickets. The *Encyclopedia of Ephemera* (Rickards, 2000, p. 324) refers to them as "textile labels", describing them as pictorial trademarks typically devoid of lettering and printed using chromolithography on high-gloss paper designed to appeal to the tastes of African and Asian markets. The English term "ticket" derives from the Old French word "etiquette", meaning label. In the Indian subcontinent, the tickets were known as "tikas" (Jain, 2017, p. 37). Export merchants catering to niche foreign markets were called "shippers" (Peters, 2020). This essay uses "textile tickets" as the preferred term.

public perception, embedding imperial values within both elite and popular imagery (Chatterjee et al., 2014; Mitter, 1994; Monks, 2011; Pinney, 2012).

Within this field of study, the historical, economic, and cultural evolution of textile tickets has drawn scholarly interest. Art historians have explored their visual characteristics alongside other ephemeral objects featuring popular imagery, such as calendar art and matchbox labels (Datawala, 2006; Jain, 2007, 2017). Collectors' archives often emphasize the aesthetic appeal of textile tickets while downplaying their colonial and ideological dimensions (Meller, 2023; Wilson, 2023). For instance, the Science and Industry Museum in Manchester, United Kingdom, displays a small collection of tickets in its Textiles Gallery with minimal interpretation.* Similarly, the exhibition *Ticket, Tika, Chaap: The Art of the Trademark in Indo-British Textile Trade* (Museum of Art and Photography, 2025) in Bengaluru, India, broadened public exposure to textile tickets but was criticized for inadequate critical engagement with colonial themes (Umachandran, 2025).† Therefore, while both scholarship and archives have examined the history and aesthetics of textile tickets, comprehensive visual analyses connecting these domains remain limited.

This essay examines a unique collection of textile tickets held at the Centre for Ephemera Studies, University of Reading, United Kingdom‡. After situating textile tickets within their historical context, the analysis focuses on three interrelated visual themes: empire, religion, and gender. It employs critical design analysis to explore how visual language — through composition, hierarchy, repetition, and selection or omission of imagery — articulated meaning within the Indian colonial context. Building upon previous scholarship, this study offers a precise examination of how imagery encoded, communicated, and legitimized colonial power in early 20th-century British India.

2. Historical Contexts

Before the 18th century, the Indian subcontinent dominated global cotton textile production, establishing Indian craftsmanship as the benchmark for quality, aesthetics, and innovation. Indian textiles were prized for their comfort, beauty, and durability,

* Based on the author's visit to the museum in April 2024.

† Based on the author's visit shortly after the opening in March 2025. A book of the same name accompanied the exhibition but was not accessible within the timeframe of this study.

‡ Unless stated otherwise, all images featured in this essay are from the Centre for Ephemera Studies, Lettering, Printing and Graphic Design Collections at the Department of Typography & Graphic Communication, University of Reading and are reproduced with permission. Minimal digital adjustments to brightness and contrast have been applied to improve clarity and legibility.

functioning as a form of currency exchanged for diverse commodities. Major manufacturing centers were located in regions corresponding to present-day Gujarat in the west, the Coromandel Coast in the south, and Bengal in the east of the Indian subcontinent (Riello & Roy, 2009, p. 1).

The industrial revolution of the 18th century gradually shifted the locus of textile production from South Asia to Europe in a process that was as political as it was economic. Historian Prasannan Parthasarathi (2023) provides key insights into this transition. By the late 17th century, European demand for Indian cotton was immense. However, while cotton cloth was popular across all social classes, its widespread use threatened existing social hierarchies, triggering public discontent. The high prices of Indian textiles led to a drain of precious metals from trading regions, creating trade imbalances and monetary shortages.

Driven by economic necessity and profit, international manufacturers began imitating Indian textiles to capture lucrative markets. These efforts were pursued most ambitiously in Britain, especially in Manchester. The city's rise as a textile hub was propelled by attempts to replicate the superior quality of Indian cloth, motivating technological innovations: inventions such as the water frame and the spinning mule facilitated large-scale cotton yarn production, transforming global trade dynamics (Parthasarathi, 2023). Manchester became a commercial center for the production, exchange, and distribution of cotton textiles, earning the nickname "Cottonopolis" (Peters, 2020).

By the mid-18th century, this economic shift acquired a distinctly colonial character. Parthasarathi (2023) describes how British companies, fueled by machinery and capital, pursued monopolies over Indian textile imports. Indian manufacturers faced severe restrictions through high tariffs and trade regulations. The expansion of British mills was motivated both by the desire to match the quality of Indian textiles and by a strategic intent to cripple the Indian textile economy and protect domestic labor. These policies displaced long-standing craft communities — spinners, weavers, dyers, and cloth printers — across the Indian subcontinent. British-made textiles flooded global markets that had once relied on Indian cloth — such as North America and the Caribbean — and were ironically exported back to the subcontinent that had once set the global standard for quality (Parthasarathi, 2023).

In this economic and political contest, packaging and branding became particularly important. Colorful labels attached to textiles served as pictorial trademarks and identifiers for manufacturers, merchants, and buyers. Following the Designs Registration Act of 1839 and the Trade Marks Registration Act of 1875 in Britain, textile ticket designs were formally registered to prevent fraudulent copying (The National Archives, 2022; The National Archives, 2025). Around the same time, advances such as chromolithography enabled multicolor printing. This process separated images into color layers

drawn in reverse on limestone slabs treated to attract ink only on drawn areas. Stones were inked and the image was transferred onto paper, repeating the process for each color (Wyeth, 2023). These innovations transformed the humble paper label into a space for visual experimentation, featuring vivid colors, intricate illustrations, and evocative imagery. In 1896, John Mortimer, Chief Cashier of a textile merchant in Manchester, described textile tickets as "a very important feature of the shipping trade, and often a curious artistic production, jealously guarded in its copyright as a valuable trade mark" (Mortimer, 1896, pp. 106–107).

The evolution of such trade imagery reflects broader transformations in branding practices across the Indian subcontinent from the late 19th century onwards. Labels for ordinary commodities — such as matches, cigarettes, and textiles — were conceived not simply as identifiers but as aesthetic artifacts that communicated narratives and situated products within networks of visual and cultural associations. Beyond their commercial role, their imagery enhanced a product's appeal and perceived worth. Circulating through markets and homes, these labels became familiar symbols of shared cultural experience, linking commerce with everyday life (V. Geetha, 2006, pp. 97–111).

By the early 20th century, textile production in the subcontinent was revived through rising Indian nationalism and the Swadeshi movement — a significant campaign in India's struggle for independence that promoted economic self-reliance and the boycott of British goods, including public burnings of British-made textiles (Pinney, 2004, p. 60). Indian mills adopted textile tickets to brand their own products, competing with British manufacturers amid an intensified resistance to imperial rule.

In the midst of these political and economic upheavals, textile tickets acquired the nature of "commodity images" — tickets displayed visual elements that conveyed cultural, religious, and symbolic meanings beyond their functional use, becoming emotionally meaningful images to the consumer (Rajagopal, 2010). Situated at the confluence of art, commerce and ideology, textile tickets embodied a dual role: commercial trademarks featuring attractive visuals and ideological artifacts transmitting specific cultural and political values. Consequently, they became complex sites where themes of empire, religion and gender intersected.

3. Visual Analysis

The textile tickets examined in this study come from a single bound album or 'stock book' comprising over 200 printed paper labels of various sizes (Figure 2). Produced by commercial printers, such albums served as reference catalogs for textile agents and merchants. Despite its worn condition and missing front cover, a logo on the back

Figure 2. Catalog page from the B. Taylor and Co. stock book, displaying four size variants of a single textile ticket design. Images in this essay feature the topmost ticket from such a set. Designed and printed by B. Taylor and Co., early 20th century. Approximately 250 × 340 mm. Reproduced with permission: Centre for Ephemera Studies, University of Reading.

Figure 3. Back cover of the stock book with the logo of B. Taylor and Co., indicating authorship of this collection of textile tickets. Early 20th century. Approximately 250 × 340 mm. Reproduced with permission: Centre for Ephemera Studies, University of Reading.

of this volume attributes it to B. Taylor and Co., a Manchester-based printing firm established in 1828 (Figure 3). Iconography across many tickets — including references to military campaigns, imperial portraits, and global events — suggests a production date in the early 20th century. A similar album by the same firm is dated 1936, placing this one in a comparable timeframe (Meller, 2023, p. 53).

B. Taylor and Co. was a prominent British printer of the 19th and 20th centuries, specializing in textile tickets for export markets, notably India and China (Museum of Art and Photography, 2025). Extensive collections of their work (Meller, 2023; Wilson, 2015) attest to their prominence. According to collectors, B. Taylor and Co. was among at least 12 such enterprises, employing around 20 full-time artists and printing in up to 16 colors (Heller, 2021; Wilson, 2023). Other active firms included John Neill Limited, William Porter & Sons, Norbury Natzio and Co., and Norbury, Snow & Co. (Jain, 2017, p. 37; Meller, 2023, p. 19; Wilson, 2023).

Most tickets in this collection feature a rectangular frame with decorative borders surrounding a central illustration, while a smaller number are die-cut into inventive shapes displaying only an image (Figure 9). Narrow blank spaces within the borders likely permitted overprinting of trade names. The absence of mill, manufacturer, or merchant names suggests such details were added after purchase. The imagery spans imperial symbols, religious figures, royalty, industrial and military references, mythological scenes, idealized women, flora and fauna, and architectural landmarks, with supporting lettering occurring only rarely.

The predominance of image over text reflects the nature of the Indian market in the late 19th and early 20th centuries. Rooted in oral and image-based traditions, Indian visual culture implied a high degree of visual literacy among indigenous consumers. Foreign entrepreneurs recognized these cultural expectations and relied on Indian viewers' ability to identify, interpret, and respond to familiar icons and symbols. They also understood that Indian buyers often based purchasing decisions on memorable pictorial trademarks, and within international trade networks, it was advised that goods bound for the subcontinent carry distinctive images — a visual strategy as decisive for sales as the product quality (Pinney, 2004, p. 17). In this transcontinental exchange, visual communication often outweighed written content, especially given the Indian subcontinent's linguistic diversity. By contrast, tickets for British and American markets were letterpress-printed in a single color and largely contained textual information (Rickards, 2000, p. 324). This distinction underscores British printers' preference for rich visual design in colonial markets and invites reflection on whether such imagery was designed mainly for straightforward recognition or for persuasion with concealed motives.

To study the visual language of these ephemeral objects, the entire stock book of over 200 tickets was surveyed. Selection criteria prioritized clear, legible imagery suitable for meaningful interpretation. From this set, 100 tickets were shortlisted and categorized into 13 themes based on recurring motifs and iconographic features. Three central themes — imperial iconography, religious symbolism, and representations of gender — accounted for 50 of the 100 shortlisted tickets, while the remainder depicting military, industrial, or natural subjects were less frequent or too ambiguous for detailed interpretation. From the selection, 21 examples were chosen for close discussion: eight tickets featuring imperial iconography, five with religious symbolism, and eight depicting women. This subset offered sufficient variety without overextending the analysis.

Iconographic analysis was used to interpret images and symbols within their historical contexts, identifying recurring motifs and decoding their intended meanings through visual and archival evidence. The first theme, imperial iconography, examines power dynamics between colonizer and colonized through a postcolonial lens, focusing on

emblems, portraits, and allegorical forms. The second investigates Indian religious imagery, highlighting cross-cultural exchanges between Britain and the subcontinent. The third analyses depictions of women to understand evolving ideas of gender, femininity, and masculinity. This combined visual and theoretical approach provides insight into the contexts in which textile tickets were produced, circulated, and understood.

An inherent limitation of this study is its reliance on a single printer's catalog. At the time of this research, the B. Taylor and Co. catalog was the only collection of textile tickets at the Centre for Ephemera Studies catering specifically to the Indian market. Although this necessarily narrows the scope of conclusions, the catalog comes from a leading producer of textile tickets and is sufficiently rich to provide meaningful insights. The findings should therefore be read as foregrounding one strand within the broader, heterogenous visual culture of textile ticket production.

3.1. Icons of Empire

Many textile tickets in this collection assert British imperial authority through portraits of monarchs such as Queen Mary and King George V framed by imperial symbols (Figure 4). For Indian viewers, the visual language may have been unfamiliar, but the combination of imposing portraits, ornate framing, and densely arranged motifs conveyed notions of prestige and dominance, implying that British-manufactured textiles were inherently superior and more desirable by their association with empire.

Colonial propaganda is especially evident in elaborate compositions showing monarchs atop a globe centered on the Indian subcontinent, with mounted Indian troops

Figure 4. Set of textile tickets featuring portraits of Queen Mary (a), King George V (b) and the royal crown (c), each symbolizing imperial authority. All designed and printed by B. Taylor and Co., early 20th century. Dimensions: (a) 165 × 235 mm; (b) 165 × 235 mm; (c) 160 × 200 mm. Reproduced with permission: Centre for Ephemera Studies, University of Reading.

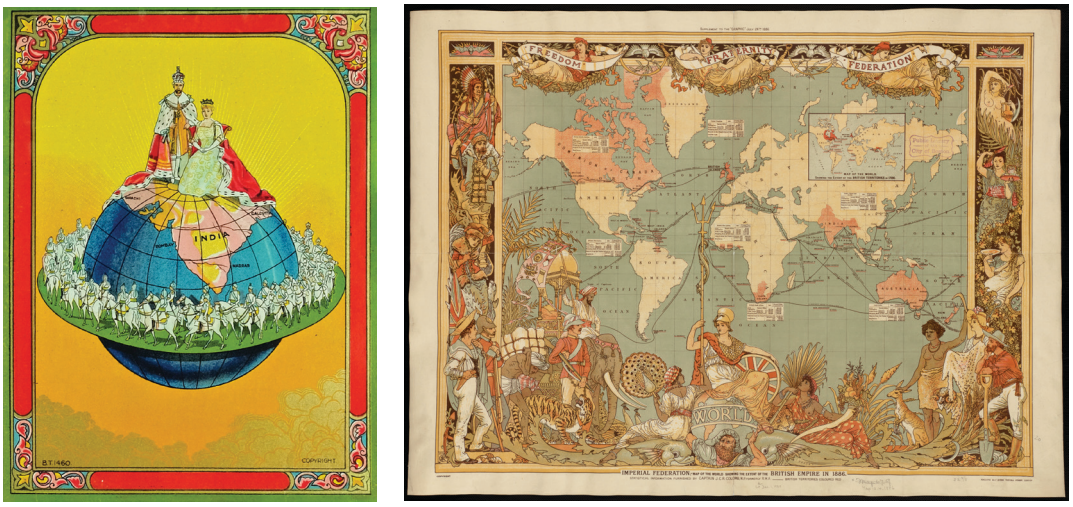

Figure 5. (a) Textile ticket depicting monarchs seated atop a globe, illustrating the territorial reach of the British Empire. Designed and printed by B. Taylor and Co., early 20th century. 130 × 165 mm. Reproduced with permission: Centre for Ephemera Studies, University of Reading. This composition recalls (b) the Imperial Federation map of 1886, designed to showcase Britain at the center of the world. Note the Indian man at the bottom left bending under the weight of cotton bales. Colomb, J. C. R. (John Charles Ready), 1886. Imperial Federation, map of the world showing the extent of the British Empire in 1886. Map. MacClure & Co. Norman B. Leventhal Map & Education Center. 860 × 630 mm. https://collections.leventhalmap.org/search/commonwealth:x633f896s (accessed 31 October 2025) Image reproduction courtesy of the Norman B. Leventhal Map & Education Center at the Boston Public Library.

marching below (Figure 5a). The image serves as a striking metaphor for imperial authority sustained by indigenous forces. The composition recalls the *Imperial Federation* map from 1886, in which Britannia — the female personification of Britain drawn from Greco-Roman iconography — occupies a similar powerful pose while colonial subjects line the borders in implicit homage (Figure 5b). The recurrence of Britannia (Figures 6a and 6b), identifiable by a plumed helmet, trident, shield, and lion, supports myths of conquest and global supremacy (Victorian Web, 2018a).

Some tickets use allegorical imagery to equate authority with sanctity. Cherubs or toddler angels holding a crown — borrowing from Judaic, Christian, and Islamic iconography — flank the monarch, assigning the ruler and, by extension, the commodity, a sacred status (Figure 6b) (Encyclopedia Britannica, 2023). Yet, even within this potent European symbolism, Indian presence remains minimal, relegated to diminutive figures or architectural motifs such as a monument in the background that resembles the Taj Mahal. This marginalization visually reinforces colonial hierarchies.

These images were designed not only to be 'read' but to project imperial power and evoke awe and intimidation. Their effectiveness depended less on legibility than on their ability to create a spectacle — overwhelming indigenous viewers through unfamiliar symbolism. This dynamic is critical in understanding textile tickets as tools of colonial

Figure 6. Set of textile tickets with imperial motifs — crowns, emblems, and allegorical figures — signifying colonial power. All designed and printed by B. Taylor and Co., early 20th century. Dimensions: (a) 130 × 170 mm; (b) 165 × 215 mm; (c) 130 × 170 mm; (d) 95 × 125 mm. Reproduced with permission: Centre for Ephemera Studies, University of Reading.

control. Layering European symbols while marginalizing Indian elements normalized oppression, making imperial hegemony appear inevitable but also natural. Such visual tropes were not unique to textile tickets and were part of a visual repertoire that circulated between the Indian subcontinent and Europe in the 19th and 20th centuries (V. Geetha, 2006, p. 108).

The rhetoric of imperial compassion and Indian allegiance is explicit in Figure 6c, where heraldic motifs intersect with Indian elements. On either side of the monarch, Britannia and an Indian woman — a diminutive figure possibly gesturing in submission — offer laurel wreaths, circular bands of interlocked branches or leaves that traditionally symbolize victory in Greek iconography. Below, the Manchester coat of arms celebrates the city's industrial prowess and Britain's imperial ambitions: the ship references commerce, the antelope and lion signify courage, and the globe encircled by bees symbolizes industriousness, accompanied by the Latin motto, *Concilio Et Labore*, meaning "by counsel and work" (BBC, 2009).

Another example (Figure 6d) shows a robed woman gazing at a dove, recalling Nike, the winged Greek goddess of victory, or her Roman equivalent Victoria (Women in Antiquity, 2020). The dates 1914–1919 anchor this image in the First World War. Laurel wreaths along the border list the Allied nations — Britain, France, and Russia — whose forces included thousands of Indian soldiers who were compelled to serve under colonial rule. Although India and Britain appear together prominently at the top, the ambiguity of India's status — whether as equal partner or subservient colony — reveals tensions in colonial visual narratives. Collectively, these images glorified empire while integrating colonial politics into everyday commerce.

3.2. Sacred Images

In marked contrast, another category of textile tickets features religious imagery drawn from the Hindu pantheon — a visual language deeply embedded in the cultural and spiritual life of the Indian subcontinent. Deities such as the god Krishna, revered for compassion and protection and identifiable by his blue skin and peacock feathers (Figures 7a–c), and the god Shiva, the creator, preserver, and destroyer, recognized by a crescent moon and coiled serpent (Figure 7d), appear with their familiar attributes. The predominance of Hindu deities in this collection is notable, as imagery associated with other religious traditions of the subcontinent — such as Islam, Christianity, Buddhism, and others — is evidently scarce or entirely absent. This imbalance suggests a selective visual strategy that privileged Hindu iconography over the region's broader religious diversity.

While sacred figures likely resonated with the Indian masses, their use was not simply decorative. Their presence sought to invoke trust, familiarity, protection, and legiti-

Figure 7. Set of textile tickets depicting Hindu deities. Tickets (a–c) portray the god Krishna, identifiable by blue skin and peacock feathers: (a) infant form; (b) portrait with floral decorations; (c) bust with radiating rays suggesting divinity. Ticket (d) shows an anglicized portrayal of the god Shiva, with crescent moon and serpent. All designed and printed by B. Taylor and Co., early 20th century. Dimensions: (a) 130 × 165 mm; (b) 100 × 130 mm; (c) 175 × 220 mm; (d) 100 × 126 mm. Reproduced with permission: Centre for Ephemera Studies, University of Reading.

macy; these deities appear to 'bless' the goods they marked, thereby transforming foreign-made textiles into objects enveloped in indigenous values and compatible with Hindu religious practice. As art historian Kajri Jain notes, foreign firms viewed religious imagery as an "instant cipher of Indianness", relying on Orientalist stereotypes of Indians as inherently devotional or superstitious, while capitalizing on the proven commercial value of sacred images (Jain, 2007, pp. 126–132).

A noteworthy example is a ticket featuring the goddess Saraswati, deity of knowledge, wisdom, and the arts (Figure 8a). This image replicates a chromolithograph of a painting by Indian artist Raja Ravi Varma, whose realist art style blended Indian themes with European techniques, reshaping visual traditions in the subcontinent. Chromolithographs of his paintings circulated widely after the establishment of the Ravi Varma Fine Art Lithographic Press in 1894, and a copy (Figure 8b) appears to have crossed geographical boundaries before being imitated by British printers. Although both works are chromolithographs, the textile ticket (Figure 8a) is considerably simplified: while the goddess retains her posture and attributes, the realism and subdued palette of Ravi Varma's original are replaced by flatter lines and brighter colors.

Figure 8. (a) Textile ticket depicting the goddess Saraswati, copied from an oil painting by Raja Ravi Varma. While posture and attributes are retained, the image is simplified and anglicized. Designed and printed by B. Taylor and Co., early 20th century. 150 × 210 mm. Reproduced with permission: Centre for Ephemera Studies, University of Reading. (b) Chromolithograph of Ravi Varma's oil painting of the goddess Saraswati. Raja Ravi Varma, late 19th century. Sarasvati with her sitar and peacock. Chromolithograph. Ravi Udaya F.A.L. Press. Wellcome Collection. 500 × 700 mm. https://wellcomecollection.org/works/r7r6snbs (accessed 31 October 2025). Image reproduction courtesy of the Wellcome Collection.

This simplification reveals the anglicization of such imagery by artists at B. Taylor and Co., who sought to both imitate and adapt devotional figures to suit colonial aesthetics and commercial needs. These alterations changed both appearance and meaning, transforming sacred imagery into decorative designs for trade. This trajectory — from sacred art to colonial commodity — illustrates the interplay of cultural appropriation and economic strategy.

Until the 1930s, entry to Hindu temples in many parts of the Indian subcontinent was restricted by caste and class hierarchies — practices that, in some contexts, persist even today — limiting exposure to sacred imagery for large segments of society. Chromolithography transcended these barriers, widening public access to devotional images. In this way, textile tickets depicting deities could function simultaneously as objects of veneration and tools of commerce (Jain, 2017, p. 37; Shivaswamy, n.d.).

Compared with imperial motifs, the religious imagery in this collection displays distinct changes in tone and complexity. Deities are rendered as static, anglicized portraits with recognizable attributes but little narrative depth, whereas imperial allegories are dense, multi-layered compositions designed to awe and overwhelm. This contrast may reflect the B. Taylor and Co. artists' limited understanding of Indian religious iconography but also suggests a deliberate choice to preserve cultural specificity while altering form and meaning. By maintaining core iconographic features — posture, gesture, and symbolic objects — yet modifying color and expression, these artists produced images that appeared culturally authentic but were recontextualized for commercial appeal. If imperial imagery sought to naturalize British supremacy and conquest, religious imagery cloaked colonial intent in a veil of cultural familiarity.

Amidst growing anti-colonial resistance and competition from Indian textile mills in the early 20th century, the use of Indian religious imagery on textile tickets by B. Taylor and Co. could be interpreted as a final strategic attempt to appropriate local visual idioms to maintain relevance and market share.

3.3. Depictions of Women

Images of women occupy a unique visual space within this collection, distinct from those of monarchs or deities. Notably, Indian cultural and visual traditions have long accommodated complex and nuanced ideas of gender, in contrast to Western binaries (Pattanaik, 2020). However, the women depicted on the B. Taylor and Co. tickets — whether Western or Indian — embody fixed gender roles. They are idealized as aesthetic objects: fair-skinned, adorned with flowers and jewelry, carefully dressed, and captured in romanticized poses, often engaging the viewer with a confident expression (Figure 9). In this collection, portrayals of women far outnumber those of men, who appear almost

Figure 9. Set of textile tickets, including die-cut varieties, depicting women in stylized settings that reflect British ideals of femininity through posture, costume, and floral decoration. All designed and printed by B. Taylor and Co., early 20th century. Dimensions: (a) 200 × 260 mm; (b–d) 205 × 260 mm. Reproduced with permission: Centre for Ephemera Studies, University of Reading.

exclusively as powerful rulers, representative of empire. This discernible imbalance reinforces gendered hierarchies and suggests a largely male audience.

This treatment of women parallels artistic movements from late 19th- and early 20th-century Europe. British artists such as Walter Crane and Henry Ryland portrayed women amidst natural and ornamental settings (Encyclopedia of Design, 2025; Lapada, n.d.). Similar visual influences came from the Indian subcontinent, where Ravi Varma's realism and the ornamental intricacies of Mughal painting (16th–18th centuries) shaped portrayals, particularly in costume and floral embellishment (Victoria and Albert Museum, n.d.).

Especially noteworthy is the impact of Art Nouveau from early 20th-century Europe, characterized by curvilinear motifs, botanical ornamentation, and representations of women as embodiments of purity, beauty, and seduction. The work of Alphonse Mucha — one of the most influential exponents of the style — mystified the female form, substantially shaping public perceptions of femininity and transforming commercial ephemera into collectible art (Henderson, 1980, pp. 9–14).

Art Nouveau aesthetics are also evident in the flowing, translucent fabrics and draped silhouettes of Indian women's attire on textile tickets. In the early 20th century, urban Indian women began replacing cotton cloth — particularly hand-spun *khadi* fabric, itself a political symbol of the freedom struggle — with textiles such as chiffon. This preference reflected the cultural aspirations of the urban elite and the growing influence of colonial aristocracy, European fashion, and modernization projects (Jain, 2017, pp. 41–42). Such convergences likely inspired the B. Taylor and Co. artists to blend European and South Asian visual idioms, producing hybrid aesthetics that idealized femininity (Figure 10).

These images reflected not women's lived realities but conservative fantasies designed to captivate a predominantly male clientele. The early 20th century witnessed significant shifts in women's roles in Europe: in Britain, women entered the workforce during the First World War, secured the right to vote, and replaced the extravagant fashion of the Victorian era with more practical, liberated attire — markers of new-found independence and agency (Marly et al., 2023). Yet, the women on textile tickets remain suspended in an idealized, ethereal world, jarringly disconnected from social realities.

A similar dissonance characterizes portrayals of Indian women. Although patriarchal structures predated colonial rule, British claims of advancing women's rights were often superficial; in practice, gendered divisions persisted and continued reinforcing unequal power structures (Liddle et al., 1985, pp. 73–74). These images operated both as objects of male desire and as visual references for urban Indian women experimenting with fashion and self-expression (Jain, 2017, p. 42). Nevertheless, for the primary audience

Figure 10. Set of textile tickets displaying decorative details merging European and South Asian motifs. All designed and printed by B. Taylor and Co., early 20th century. Dimensions: (a–d) 130 × 170 mm. Reproduced with permission: Centre for Ephemera Studies, University of Reading.

— male merchants, agents, and buyers — women were reduced to decorative, commodified objects, rather than active subjects.

Through such imagery, female subservience and passivity were normalized within prevailing political and visual ideologies. These depictions upheld conservative ideals of purity and seduction, concealing women's agency and participation. Ultimately, they expose the complex cultural exchanges of the colonial era, where femininity served both commercial interests and imperial ideologies.

4. Discussion

This study of textile tickets across the themes of empire, religion, and gender demonstrates that within the examined B. Taylor and Co. collection, these modest, colorful labels were in fact complex sites where global politics, print technology, and colonial ideologies converged. Emerging as by-products of the transcontinental cotton trade, the tickets used chromolithography to produce vivid, detailed imagery, evolving into a distinctive niche within print culture.

In this collection, compositions featuring British monarchs, allegorical figures, and imperial symbols asserted and normalized imperial authority while marginalizing indigenous presence. Religious imagery, meanwhile, masked foreign textiles with cultural familiarity, integrating commerce with spiritual symbolism. Yet, these appropriations were also exclusionary: Hindu iconography overshadowed depictions of other faiths, constructing a false vision of the subcontinent's religious diversity. Depictions of women appeared idealized and passive, while men were conspicuously liberated from such portrayal, embodying a masculinity defined by authority and control. Together, these compositions point to broader colonial visual strategies that reduced complex and diverse cultural identities into recognizable, marketable tropes. These images thus transformed the routine act of buying cloth into an encounter with imperial hierarchies — an everyday channel through which colonial propaganda entered popular consciousness.

The visual language of the B. Taylor and Co. tickets drew from local, colonial, and global sources, often blurring the boundary between creative inspiration and cultural appropriation. Their motifs were part of a wider colonial visual repertoire — stereotypical yet popular imagery that circulated through posters, postcards, matchbox and cigarette labels, and other forms of ephemera exchanged between the Indian subcontinent and Europe. B. Taylor and Co. artists similarly reinterpreted familiar iconography to build trust within the Indian export market, turning acts of commerce into moments of cultural exchange.

As visual commodities, these tickets quietly perpetuated social and cultural hierarchies in the mundane locales of the market. Their imagery thus operated on two levels: primarily commercial but deeply ideological — manipulating desire, shaping consumption, and sustaining imperial authority through objects as ordinary as cloth.

This study, however, acknowledges its limitations. Focusing on a single printer's catalog — albeit an important one — offers valuable insights but carries the risk of overgeneralization. Moreover, this inquiry excludes tickets produced by local printers in the Indian subcontinent, particularly during a period when print culture became an important site of anti-colonial resistance. These constraints highlight the need to situate such material objects within wider colonial and postcolonial visual cultures. Further research integrating multiple perspectives, particularly those amplifying indigenous visual languages and strategies of resistance, can offer a more holistic understanding of textile tickets as cultural artifacts.

The study of textile tickets from the B. Taylor and Co. collection demonstrates that these ephemera — often only celebrated for their aesthetic appeal — were potent artifacts of colonial capitalism. This study shows how art, design, and print culture actively upheld ideological frameworks of empire and deepens design history's understanding of how profoundly imperial politics permeated even the most ordinary objects.

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RESEARCH ARTICLE

Augmented Reality for Campus Wayfinding: Enhancing Navigation Efficiency and Student Social Engagement — A Case Study of Leeds University Union

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Abstract: This study designed and evaluated a user-centered augmented reality (AR) wayfinding prototype for Leeds University Union (LUU), aiming to improve student wayfinding efficiency and encourage social exploration within a particular campus environment. A site-specific field study involving photographic documentation of existing wayfinding aids, such as signage and maps, was conducted to investigate the current design. Five semi-structured interviews were carried out to gain students' experiences and opinions, complemented by behavioral observations of three participants navigating the LUU with existing wayfinding aids to explore common challenges and dilemmas. Results showed that the existing design did not consistently support effective navigation, with participants relying on assistance from others. Furthermore, all of the students reported using the LUU mainly for social and recreational purposes, indicating that integrating navigation with real-time event information could enhance campus community engagement. In response, a prototype mobile navigation application named LUU MATE was developed that integrated AR with social exploration features to enhance both wayfinding and engagement in campus life. The iterative optimization of the prototype was based on usability tests conducted by four participants. Subsequently, a second behavioral observation was conducted with three participants using LUU MATE to assess its navigation effectiveness and potential to foster social engagement. Comparative analysis with earlier observations showed that LUU MATE reduced the time required to complete the navigation tasks and stimulate participants' interest in campus life. This study indicates that both navigation efficiency and social engagement are essential considerations in campus wayfinding design. Future research should involve larger and more diverse participant groups and apply the design across varied campus sites to validate its broader applicability.

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1. Introduction

This study aims to design an augmented reality (AR) campus indoor navigation solution to solve the wayfinding challenges encountered by students in Leeds University Union (LUU) and evaluate whether the AR navigation system can affect indoor wayfinding efficiency. Most importantly, the study seeks to use AR navigation as a means of encouraging exploration, engagement, and connection with the rich social lives of the students.

To achieve these aims, it is essential to consider the role of user interface (UI) design in AR environments. UI design is particularly crucial in AR scenarios, as AR interfaces must operate within a hybrid environment, effectively overlaying digital content onto real-world scenes in real time, enhancing users' intuitive understanding of information and ease of interaction (Chen, 2024). These unique requirements impact the application's visual design, interaction patterns, and user understanding and perception. Effective AR interface design needs to be able to adapt flexibly to different environments and not obstruct the view of the real world. This requires consideration of how digital information is presented in different scenarios (Cao et al., 2023).

As universities expand, the working environment of university campuses has become more and more complex. Currently, most campuses rely on global positioning system (GPS) technology, such as Google Maps, for outdoor navigation, but this often has difficulty covering the interior of buildings, resulting in a disconnect between indoor and outdoor campus navigation (Rajagopal et al., 2025; Tahir & Krogstie, 2023). Indoor wayfinding relies heavily on traditional wayfinding methods (such as paper maps and mounted signs) that have been shown to be inefficient (Rajagopal et al., 2025). These traditional methods are usually limited by the finite guidance that can be displayed, requiring users to actively discover navigation cues (Iftikhar & Luximon, 2022). In addition, many of these methods rely on a single language which may cause wayfinding difficulties for international students (Iftikhar & Luximon, 2022). In complex, multi-level spaces with diverse functional areas, wayfinding is not merely about reaching a destination, it is also about discovering what the space offers along the way. This is particularly relevant in environments centered on student life, where navigation naturally overlaps with opportunities for social interaction, discovery of new activities, and engagement with community resources.

LUU exemplifies this challenge. As the main hub of student activity and interaction at the University of Leeds, it houses a variety of services, catering facilities, and event

spaces that support both academic and professional development while also fostering students' personal growth and sense of belonging. Beyond dining and relaxation, it serves as a venue for organizational activities, club engagement, and informal social encounters. Its design potentially facilitates opportunities for social discovery, as students navigating the space may come across events or societies they had not originally known or planned to explore. Here, navigation and social exploration are intertwined, and a system that supports both can improve spatial accessibility, accelerate students' integration, and strengthen engagement with campus resources.

This study, therefore, aims to explore how the designed AR navigation prototype can improve students' wayfinding efficiency while promoting social exploration and participation among students within the LUU. The research question of this study is:

> How can an AR navigation mobile application be designed to improve wayfinding experience for students within the LUU?

The sub-questions are:

1. What wayfinding challenges do students experience within the LUU, and how do they interact with existing wayfinding aids when navigating the building?
2. In what ways does the AR wayfinding prototype influence users' navigation behaviors and their engagement with the LUU resources?
3. What roles do AR interface design features play in enhancing the wayfinding experience and supporting social exploration?

2. Contextual Foundations

2.1. Complexity of Modern Campus Wayfinding

Wayfinding is a process in which personal attributes (such as cognitive, perceptual, and spatial abilities) interact with the characteristics of the surrounding environment (Farr et al., 2012). Wayfinding is mainly divided into three steps: confirming the destination, finding the correct route, and using auxiliary navigation tools (Farr et al., 2012). People use the surrounding natural environment or navigation tools to find their destination (Zolkefil & Talib, 2022).

Wayfinding presents particular challenges in higher education settings. University campuses are often composed of multiple buildings spread over large, open areas and organized in complex spatial configurations (Iftikhar et al., 2020). Students, staff and visitors often need to move between libraries, cafeterias, and administrative offices, requiring them to interpret a wide range of navigation cues. These cues play a key role in the wayfinding process and include external environmental cues — such as building facades, outdoor signs, and trails — as well as internal navigational instructions — such

as corridor signs, room numbers, and floor guides (Jamshidi et al., 2020). New students or first-time visitors are more likely to experience this complexity because they have limited familiarity with the building layout and signage system. The frequent need to transition between indoor and outdoor environments further increases the complexity of campus navigation (Tahir & Krogstie, 2023).

Although GPS technology (such as Google Maps) is widely used for outdoor campus navigation, it cannot provide accurate positioning support indoors (Torres-Sospedra et al, 2015). GPS signals are often weakened or blocked by building structures, leading to reduced positioning accuracy or signal loss. Many studies have explored various ways to address indoor wayfinding difficulties, including using Bluetooth Low Energy (BLE) beacons, Wi-Fi fingerprinting, and radio-frequency identification (RFID) systems (Kunhoth et al., 2020; Saradha et al., 2025). However, the cost of implementing these technologies is often relatively high, and they are heavily dependent on personalized configurations, making them difficult to scale and apply across wider contexts (Tomažič, 2021).

The spatial characteristics of facilities inside university buildings often exacerbate these difficulties. Academic buildings typically feature repetitive architectural layouts, such as long corridors, uniform doors, and similar room numbering schemes, which can make it difficult for users to differentiate one location from another (Major et al., 2020). In addition, these buildings often span multiple floors connected by complex networks of staircases, lifts, and transitional spaces, which are not always well-integrated into signage systems (Li et al., 2023). These networks lack visual coherence. If building signage systems are not displayed in the appropriate location or sequence, it can make people feel uneasy (Kim et al., 2015). Academic building navigating can be further complicated by the absence of multilingual support, and a lack of intuitive wayfinding cues for first-time visitors or international students (Zolkefil & Talib, 2022; Bridgeman, 2023). Unlike outdoor environments, where landmarks and open sightlines can provide orientation, indoor environments often lack prominent reference points, making spatial awareness harder to maintain (Kim et al., 2015). In addition, there are individual differences in humans' abilities to process visual spatial information, which may involve factors such as gender, spatial cognition level, and cultural background (Verghote et al., 2019). Students' wayfinding decisions may also be influenced by their individual understanding of wayfinding aids and spatial information (Iftikhar et al., 2020).

Furthermore, academic buildings are not only important places for learning, but also important student exchange communities with important social and cultural exchange values (Cheng, 2004). Students generally desire a sense of belonging and identity on campus. This is a basic psychological need, the satisfaction of which affects students'

behavior patterns, motivation, and school participation (Osterman, 2000; Cheng, 2004). In educational settings, a sense of belonging is not only supported by building positive social connections with classmates and faculty, but is also fostered through active interactions with friends, participation in clubs, and informal extracurricular activities (Kelly et al., 2024). Research has shown that in higher education, students' sense of belonging is positively correlated with their learning motivation, academic confidence, and overall learning satisfaction, and that students with a stronger sense of belonging are less likely to drop out (Pedler et al., 2022).

In academic environments, navigation is not solely a functional activity aimed at reaching a destination. Dalton et al. proposed the concept of "social wayfinding", which states that the process of wayfinding, while seemingly an individual decision-making act, is often influenced by the presence and behavior of others (2019, p.2). In other words, wayfinding can be considered a form of exploration, not only related to getting from a starting point to a destination, but also a form of social exploration (Willis, 2009). While moving through space, people may discover new people, activities, or opportunities out of curiosity or serendipity, such as encountering club recruitment, attending impromptu gatherings, or other recreational activities at school (Willis, 2009). These serendipitous encounters increase the likelihood of spontaneous participation in campus life.

2.2. AR Wayfinding

Following Apple's release of AR support for third-party developers through the iPhone 3GS in 2009, which introduced a digital compass and improved motion sensing enabling early forms of mobile AR, the Yelp app became one of the first AR-enabled applications to debut on the iPhone (Manjoo, 2009). Its Monocle feature allowed users to point their phones toward nearby restaurants and instantly view star ratings overlaid on the live camera feed. This demonstrates one of the earliest mainstream applications of mobile AR. Since then, advancements in mobile AR have substantially expanded its capabilities for wayfinding and spatial understanding. AR navigation systems overlay guidance information, such as arrows, paths, and points of interest, onto a user's real-world view. For example, Google Maps launched the Live View feature in 2019, offering real-time AR-enhanced walking guidance through spatially aligned arrows and directional cues. This approach has been shown to support more efficient and accurate wayfinding (Khairy et al., 2022) and create more intuitive navigation experiences (Dong et al., 2021; Qiu et al., 2025). Additionally, AR has demonstrated benefits in helping users visualize spatial relationships and dimensions (Ahsani et al., 2025; Shamsuddin & Din, 2016).

Recent advancements in AR navigation technologies are prioritizing markerless AR navigation systems. For example, Placenote tracking combined with the A* algorithm (Shewail et al., 2022) enables users to navigate without GPS and the QR-code-based

approach (Santi et al., 2023). HUDs project information directly into the user's line of sight, enabling continuous access to guidance cues without requiring the user to look down or shift attention away from the primary field of view. Recent studies demonstrate that AR-HUDs can enhance navigation performance and reduce user errors (Chauvin et al., 2023), while also lowering cognitive load during driving tasks (Xu et al., 2025). In addition, AR is increasingly being used not only for functional guidance but also to enrich the overall user experience. In tourism, Akbar et al. (2024) developed GWIDO, a mobile app that blends AR navigation with multilingual historical storytelling, helping users explore cultural sites more meaningfully through real-world object tracking and bilingual instructions.

Table 1. Comparative Analysis of Different AR Campus Navigation Systems

Study	Design goals	AR Solution	Remaining Challenges
Dirin and Laine (2018)	To assess user familiarize themselves with environment.	Using a virtual tour achieved through floor function descriptions (rather than pathfinding guidance).	Lack of navigation details (e.g., maps, place names). Insufficient support for spatial learning and wayfinding.
Kuwahara et al. (2019)	To help campus visitors understand paths more easily.	Using AR avatars (cartoon style) to lead users along real-life path and present directions in real time.	Possible confusion due to lack of sync between the character's movement and the actual path. Absence of usability testing.
Golestanha and Satterfield (2022)	Help students and faculty, especially those with navigation difficulties, get to their destinations more easily and quickly.	It provides two modes: 2D map and AR navigation, based on landmark guidance.	Absence of usability testing.
Divya et al. (2024)	Improve the efficiency with which students or visitors navigate buildings, facilities, and pathways around campus.	Use AR technology to overlay virtual path guidance, building labels and 3D campus feature virtual elements on the user's mobile phone camera view to achieve an immersive navigation experience.	No detailed prototype and usability testing were provided; the accuracy of the position of virtual elements in the interface; there is room for expansion of the interaction form.
Saradha et al. (2025)	Help students understand the facilities both inside and outside the campus.	Create an AR campus map system to provide students with seamless indoor and outdoor path guidance and point-of-interest displays.	Lack of exploration of UI design and user experience.

However, despite these expanding technological possibilities, such advancements have not yet been widely applied or validated within campus environments. Table 1 lists several studies that examined the use of AR navigation within the specific campus context for varying purposes. Table 1 indicates that most reviewed studies focus primarily on technical implementation and navigation performance, with limited attention to AR interface design and its impact on usability and user experience. Existing research has mainly examined methods of route guidance and information presentation, but studies specifically addressing design and validation in complex indoor academic settings remain limited. Only a small number of studies report usability testing to validate their solutions. Therefore, based on the literature reviewed in this study, aligning AR interface design with user needs in complex indoor campus environments and validating its effectiveness through systematic usability testing represents an area that warrants further investigation.

AR interface in mobile navigation applications. The user interface (UI), the point of interaction between a computer system and its user, enables the completion of tasks and achievement of goals (Stone et al., 2005). Effective UI design aims to provide a seamless and engaging user experience, and its quality is closely linked to the success of an application (Ayada & Hammad, 2023). A well-designed UI should ensure ease of use, practical functionality, and efficiency, which in turn influences user experience and loyalty (Chen et al., 2021). While UI design has been extensively studied across various digital applications, research focused on AR interfaces is still quite limited.

AR interface design is recognized as a key factor affecting the effectiveness of AR wayfinding (Xu et al., 2024). Even with accurate navigation technology, poorly designed interface can reduce usability and user experience. Incorporating usability and learnability into the design process is therefore essential to ensure effectiveness in real use (Granic, 2017). However, the absence of unified AR design standards, coupled with the limited applicability of existing UI theories, makes AR interface design a unique and underexplored area of research (Börsting et al., 2022). For example, the Google Maps AR deployed at Zurich Airport provides only localized, turn-by-turn prompts rather than a continuous path overview. In the real navigation scenarios, this lack of path continuity has been shown to increase the likelihood of users becoming disoriented (Hölscher et al., 2006). This issue could become even more pronounced on university campuses, which spatial layout are more irregular, destinations are dispersed, and movement patterns are social driven. These challenges collectively underscore why focusing on AR interface design is crucial for developing wayfinding solutions that genuinely support users in navigating dynamic settings.

In summary, integrating indoor navigation with social interaction, while simultaneously improving wayfinding efficiency and campus engagement, remains an emerging area of research, particularly in understanding the role the AR interface in this process. Using the LUU at the University of Leeds, as a case study, this study proposes and evaluates a solution that integrates AR navigation with social exploration features to validate the impact on wayfinding efficiency, user engagement, and overall user experience.

3. Methodology

This study aims to develop and evaluate LUU MATE, an indoor augmented reality (AR) navigation mobile application prototype for the University of Leeds as a Masters student project. The system was designed with the dual objectives of improving students' wayfinding efficiency and fostering social exploration to enhance campus community integration.

The methodology of the entire design research comprises three key phases, each guiding the development and evaluation of the LUU MATE. Figure 1 summarizes the methods and activities of each phase.

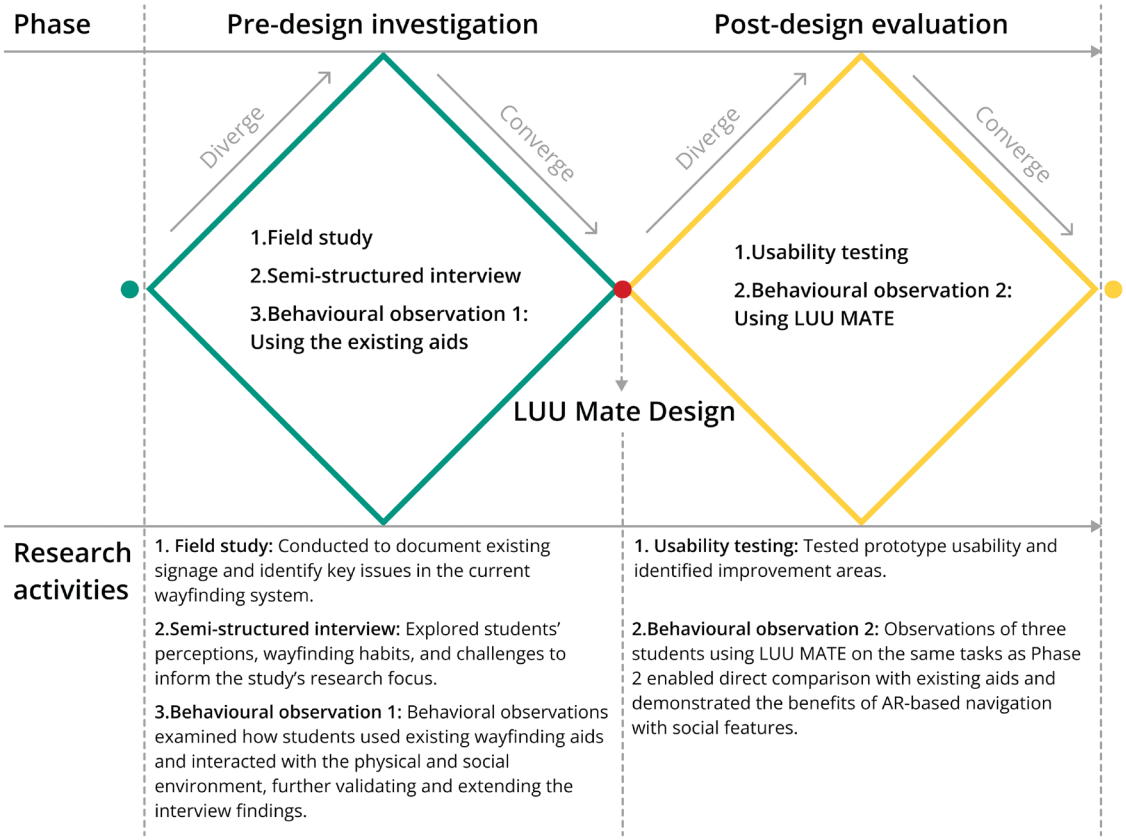

Figure 1. Methodology summary. Designed by the first author.

All participants were current students at the University of Leeds, recruited on a voluntary basis. Different groups of students were involved in the interviews, usability testing, and the two rounds of behavioral observations to avoid familiarity effects and ensure that findings reflected a range of authentic user perspectives. This study was conducted in accordance with the University of Leeds Research Ethics Framework and received ethical approval prior to data collection.

3.1. Pre-Design Investigation

Current wayfinding design in the LUU at the University of Leeds. At the initial stage of this study, a field investigation was conducted in the LUU at the University of Leeds to document the existing wayfinding system and identify key issues within the current system. Photographs were taken to document signage, spatial cues, and key decision points. These photographs were gathered through walkthroughs of major circulation routes during the field investigation.

The LUU's spatial layout includes multiple entrances and interconnected floors, encompassing functional areas such as dining, social, and administrative spaces. However, the similar facilities are scattered across different floors, resulting in an

Figure 2. The floor plan posted near the ground floor entrance in the LUU. Among five entrances, this is the only one that provides a posted floor plan to aid navigation. Photographed by the first author in Nov 2024.

irregular and complex spatial layout that makes it difficult for new visitors to form a coherent mental map. Of the five entrances, only one has a posted floor plan to aid navigation (Figure 2). As a result, new visitors may struggle to form an immediate mental map of the building and often rely on asking for help.

LUU employs geometric shapes on the signage, such as prisms, stars, and circles, to distinguish functional areas (Figure 3). Despite maintaining visual consistency, the lack of explanatory background information makes the system less intuitive, especially for first-time visitors. The map's layout uses horizontally divided floors, requiring visitors to match the list of destinations at the top with corresponding symbols on a simplified floor plan below. This increases cognitive load and hinders rapid spatial understanding. Furthermore, the floor plans are small and have low color contrast, potentially reducing readability. Information about ongoing activities is only available on a single digital screen at the information desk, potentially limiting users' understanding of the union's broader social activities.

These limitations highlight the need for more effective and socially connected wayfinding solutions, for which AR offers a promising direction. AR applications have gradually been widely recognized for its potential in indoor navigation (Dong et al., 2021; Pence,

Figure 3. The floor plan of the LUU using geometric shapes to differ functional areas. The content in the upper row shows the locations of each corresponding shape on each floor, and the lower row is the floor plan corresponding to each floor. Photographed by the first author in Nov 2024.

2011). By overlaying digital guidance directly onto the user's view of the real world, AR can make spatial relationships and dimensions easier to interpret (Ahsani et al., 2025; Shamsuddin & Din, 2016). Recent developments suggest that AR can prompt exploration, highlight social opportunities, and create contextual touchpoints that invite users to engage with events, activities, and peers as they navigate (Wadne et al., 2024). This opens up possibilities for a more integrated approach, where functional navigation seamlessly incorporates social discovery cues into the wayfinding process.

Semi-structured interview and behavioral observation 1. To understand students' wayfinding experiences within the LUU and identify key navigational challenges, five semi-structured interviews were conducted with current students familiar with the building, each lasting approximately 20–30 minutes. Students discussed their daily activities within the building, their wayfinding habits, and the challenges they encountered in finding their way.

To validate and expand these insights, three behavioral observations were subsequently conducted with three additional participants, who used existing wayfinding aids to complete a pre-defined navigation task (Table 2). A 'think-aloud' method was employed to record participants' decision-making processes and moments of confusion as they navigated between floors. Their path selection, key decision points, and moments of confusion were the primary parameters noted during the analysis. These activities collectively provided a better understanding of existing navigational barriers within the LUU and its social interactions.

Table 2. Instructions for three behavioral observation tasks.

Task	Scenario
1. Find a study area	You need to join a group discussion, and your team leader has reserved Meeting Room 1 in the LUU for the discussion. Navigate from the LUU entrance on the Ground Floor to Meeting Room 1 on the Second Floor.
1. Find a public facility	You have just finished class and are going to the LUU to rest. You are very thirsty and ready to look for the water dispenser first. Navigate from the LUU entrance on the Ground Floor to the student kitchen on the Basement Floor.
1. Find the Student Service Center	You want to volunteer at a school. You've learned that Essentials is a support department for students in the LUU and are looking for volunteer opportunities. Navigate from the LUU entrance on the Ground Floor to the Student Services (Essentials) on the M Floor (the mezzanine between the Ground Floor and Level 1).

Overall, the pre-design tasks identified key challenges students are facing using the existing wayfinding system, including complex spatial structures, unclear visual hierarchy of signage, lack of certain location information, and insufficient integration

with social activities. These findings (Section 4.1) provided the basis for the develop of the LUU MATE prototype, which aimed to assist spatial understanding through AR-based cues and promote community engagement by embedding information about ongoing activities into the navigation interface.

3.2. Design and Prototype Development

The LUU MATE prototype was developed to integrate core wayfinding and social engagement functions within a single mobile application. The Home page (Figure 4) featured two functions: 'Find a place' and 'Explore' reflecting the app's dual focus on wayfinding effectiveness and social engagement. The 'Find a place' was designed to help students quickly locate specific locations within the LUU and receive AR route guidance. This feature addressed challenges identified from interviews and observations, where many students reported difficulty locating their destinations upon entering the LUU.

The AR wayfinding interface (Figure 5) provided linear, continuous route guidance using virtual green arrows. A white panel at the bottom displayed navigation-related information (such as distance and an 'Exit' button), ensuring that users could easily track their progress. In addition, floating icons were superimposed near relevant functional areas along the route, enabling students to access information about events or services encountered in route.

The 'Explore' feature (Figure 6) provided themed guided tours to help students systematically understand the building's functional areas and facilities. This feature was partic-

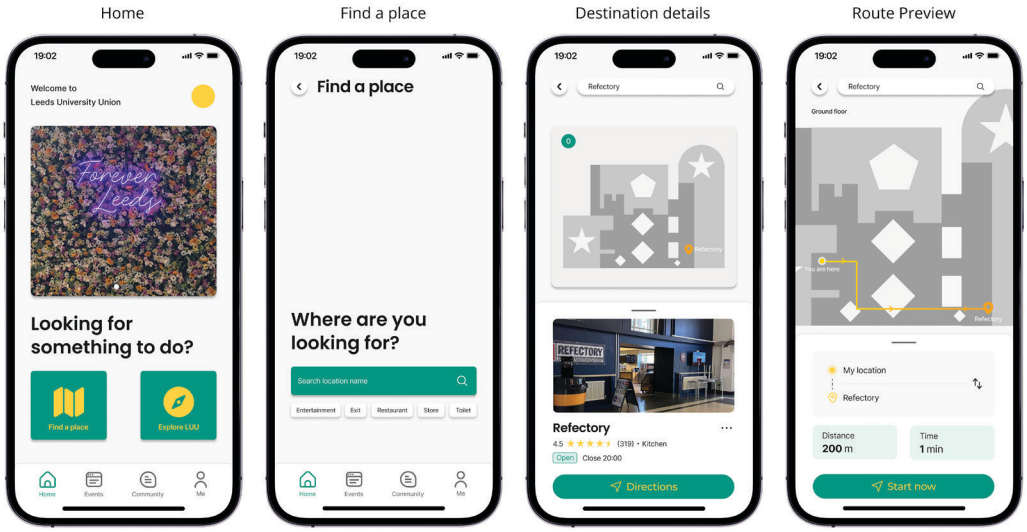

Figure 4. LUU MATE 'Find a place' function flow. The first screen displays LUU MATE's home page, offering two navigation methods: entering your destination for directions and viewing specific guided routes. The second screen shows the 'Find a place' interface. The third screen displays information about the destination after entering it on the previous screen. The fourth screen displays the route to the destination. Designed by the first author.

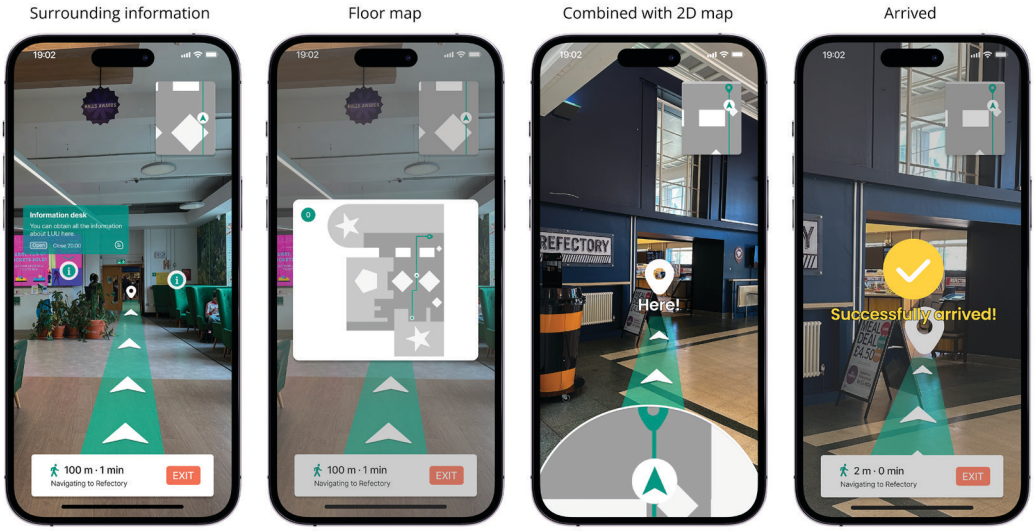

Figure 5. LUU MATE AR interfaces for route guidance. The first screen displays nearby activities and facilities, encouraging students to learn about campus facilities or ongoing campus events during navigation. The second screen displays an overview of the current floor map, providing users with route presets. The third screen shows an AR navigation path overlay combined with a mini 2D map approach when the user reaches a corner, aiding spatial awareness. The fourth screen confirms successful arrival at the destination. Designed by the first author.

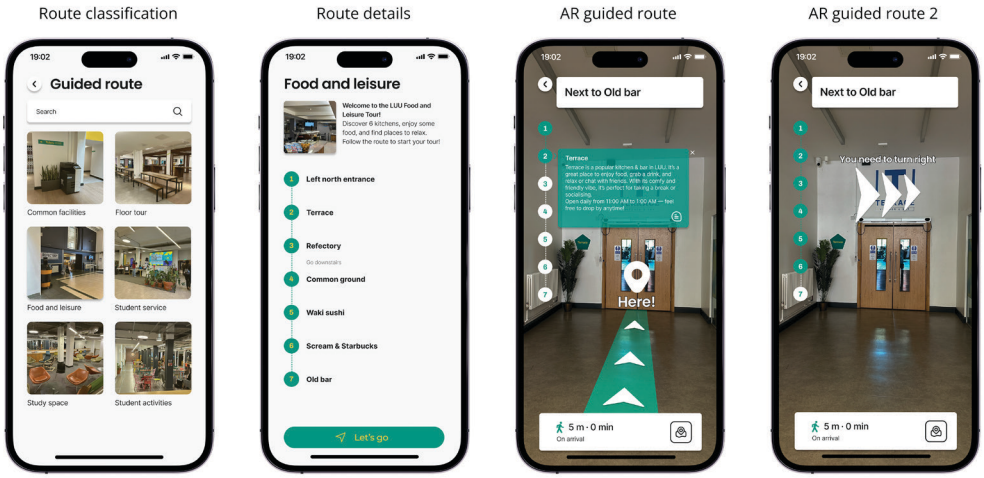

Figure 6. LUU MATE 'Explore' function flow. The first screen displays guided routes on different themes, primarily for new visitors. The second screen provides an introduction and route information for the theme 'Food and leisure'. The third screen shows how to navigate to the second destination on this guided route; users can view destination information on the left side of the screen. The fourth screen demonstrates the interface when heading to the next location. Designed by the first author.

ularly useful for first-time students, providing a holistic understanding of the building layout and addressing the lack of unified functional guidance identified in earlier research (Section 4.1.1), aiming to enhance students' familiarity and confidence in finding their way. Guided tours were categorized based on common students' activities (such as socializing, resting, and dining) and distributed across floors and activity areas. The interface included a progress bar on the left to display the number of stops, track progress, and indicate visited versus unvisited locations. At each stop, a short pop-up description introduced the location's purpose, further supporting users' confidence and familiarity with the building.

The 'Event' feature (Figure 7) showcased upcoming events within the LUU, allowing students to stay updated and access events of interest more efficiently. Integrated with the 'Find a Place' function, this feature also provided route guidance to event locations, bridging wayfinding with social engagement. Complementing this, the 'Community' feature (Figure 7) provided an open communication platform where students could share posts related to daily experiences, interests, or campus activities. This design reinforced the LUU's role as a "student community", encouraging peer-to-peer interaction and strengthening social cohesion on campus.

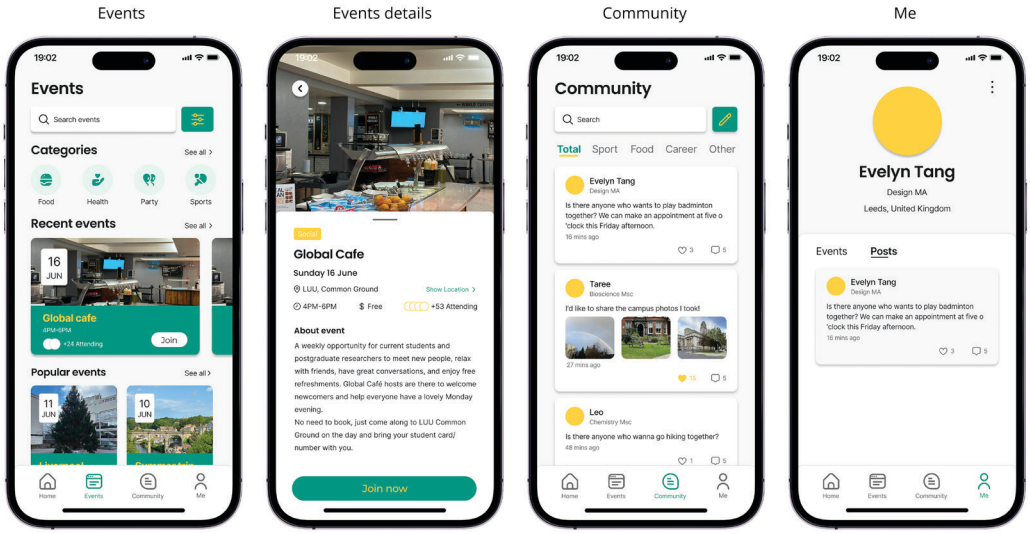

Figure 7. LUU MATE 'Events', 'Community' and 'Me' function main page display. The first screen displays the main interface of the 'Events' feature, providing event categories and push notifications of recent events. The second screen shows the event details displayed after clicking 'Global cafe' within the 'Events' interface. The third screen displays the main interface of the 'Community' feature, where users can post any information, including making friends, new community events, and dining events. The fourth screen displays the main interface of the 'Me' feature, showcasing the user's personal information. Designed by the first author.

3.3. Post-Design Evaluation

Usability testing. After developing the first high-fidelity version of LUU MATE, four students from the university were recruited to participate in usability testing. With participants' consent, all sessions were screen-recorded. A 'think-aloud' method was employed. To gain users' impressions of first-time engaging the prototype, participants first spent five minutes freely browsing LUU MATE without assigned tasks. They then completed three structured tasks corresponding to the app's main functions:

1. Find a place: Use LUU MATE to search for and navigate to 'Refectory'.
2. Explore: Imagine visiting the LUU for the first time and want to explore dining and leisure areas using the 'Food and Leisure' themed tours under 'Explore' feature.
3. Events: Locate details about the 'Global Cafe' and attempt to make a reservation.

Following the task, each participant completed a post session to comment on their experiences about how the prototype might impact their social engagement.

Since the LUU MATE prototype did not implement actual AR navigation, the usability test evaluated a simulated AR experience created entirely in Figma (Figure 8). The

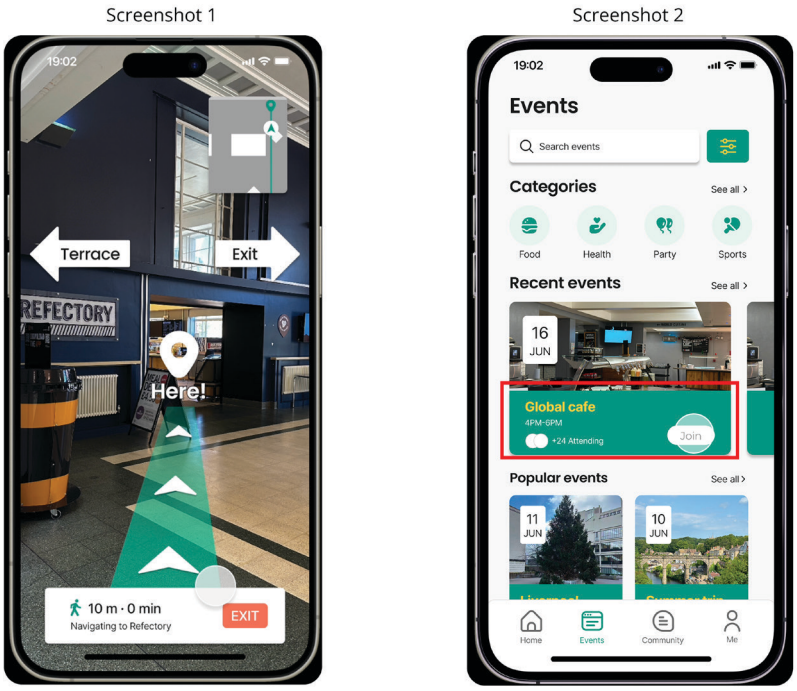

Figure 8. Screenshot of the usability testing materials. Participants used a Figma prototype to complete test tasks, which were conducted face-to-face with the first author. Screenshot 1 shows that the user has successfully reached the destination using AR navigation and is about to exit the navigation. Screenshot 2 shows that the user is searching for and joining the 'Global café'. Provided by the first author.

prototype used pre-recorded environment images and screen-based overlays to represent how AR cues would appear during navigation. The first author conducted all usability tests in individual, face-to-face sessions with each participant. During the test, screen recording software was used to record the process, which allowed the participants to interact with the Figma prototype while automatically capturing task completion time, click paths, mis-clicks, and success rates. After each task, participants provided subjective feedback to assess their perception of interface clarity, ease of use, and overall user experience.

The findings (Section 4.2.1) of the usability testing were used for iterative refinement of the prototype and the final design is presented in Figure 13.

Behavioral observation 2. The second behavioral observation mirrored the first in both tasks and methods to enable a controlled comparison of wayfinding behaviors with and without the support of LUU MATE. Participants were asked to complete the same tasks (Section 3.1.2, Table 2), with the aim of evaluating whether the AR prototype improved wayfinding efficiency and reduced navigation challenges.

Three students who had not participated in the first observation were recruited to avoid familiarity effects. Following each session, a semi-structured post-test interview was conducted to gain their impressions of LUU MATE and obtain suggestions for improvement.

A consistent ‘think-aloud’ method was employed throughout the observations, with participants’ sessions video-and audio-recorded. The researcher followed them to document their verbalized thoughts and wayfinding behaviors. The same observation metrics were used to ensure data comparability across the two behavioral observations. Key metrics included: wayfinding time, decision points, and moments of confusion, which were used to assess the effectiveness of LUU MATE.

4. Findings

4.1. Pre-Design Investigation

Semi-structured interviews. The purpose of the semi-structured interviews was to explore the wayfinding challenges and to understand how navigation impacts students’ social interactions, activity participation and overall experience in the LUU.

A total of five participants took part in semi-structured interviews. Three reported themselves as relatively familiar with the LUU, while two considered themselves less familiar. The most common activities participants engaged in within the LUU included socializing, dining, and studying — underscoring the LUU’s dual role as both a functional

and social hub. For navigation, they primarily relied on memory or existing signage, though some admitted seeking help from staff or passersby when disoriented.

All participants reported difficulties finding their way around the LUU, and the overall impression was that the building felt complex and confusing. As Participant 1 noted:

> I think the LUU has many floors, and the structure of each floor is different. There are many forked intersections, and the wayfinding signages [sic.] are incomplete, which can easily cause people to feel anxious when trying to find their way.

All participants noted that the building lacked clear information about the functions of each floor, making it difficult to determine the correct floor for their destination. Furthermore, existing wayfinding signage lacked comprehensive location information, with some destinations omitted. Icons on the signs were ambiguous and required extra time to interpret. Many participants described feeling confused and anxious when unable to find their destination, especially when under time pressure. Finally, all participants stated that they were unaware of the availability of the LUU's floor plans, which they agreed could have helped alleviate some of these difficulties.

In addition to navigational challenges, participants also mentioned how the difficulty in finding the destination would affect their willingness to explore the buildings or participate in activities. For many students, attending club activities or informal gatherings is an important part of their student council experience. However, several participants described situations where uncertainty about locations prevented them from participating. Participant 2 noted: "I missed an event because I failed to find the correct floor and room in time, and later rarely participated in activities within the LUU".

Participant 3 said:

> I happened to find an event poster in the LUU, but the poster did not provide the corresponding floor information, only the location of the event, and there was a lack of relevant activity indications around, making it impossible for me to participate in the event.

These experiences demonstrate the close relationship between social engagement and navigation. Importantly, participants expressed a desire for more readily accessible information about activities within the space. This insight directly influenced the design of LUU MATE's social engagement features, combining social exploration with navigation functionality.

Behavioral observation 1: Using existing wayfinding aids. The purpose of this observation was to evaluate how students navigate the LUU using only existing wayfinding aids, in order to identify key wayfinding challenges.

Table 3 shows the task completion times (in minutes) for each participant. Overall, navigation tines were long, with an average completion time of 4:03 for Task 1, 3:04 for Task 2, and 5:18 for Task 3.

Table 3. Behavioral observation using existing wayfinding aids. Completion times of each participant (minutes: seconds).

Time	P1	P2	P3
Task 1: Meeting room 1	3:12	3:42	5:16
Task 2: Student kitchen	2:05	3:49	3:18
Task 3: Essentials	6:55	5:58	3:03

A user journey was mapped to visualize participants' navigation experiences (Figure 9). It presents four stages: Start, Explore, Error, and Arrival, which represent the progression from orientation, through active searching, to moments of disorientation, and finally reaching the destination. Analysis of participants' emoji selection data indicated that their perceived emotional state was initially stable, declined during the Explore and Error stages, and recovered once they reached their destination.

Figures 10-12 depict the paths participants took for each task. The three colored lines represent the routes taken by participants. Decision points and confusion points were annotated along these paths.

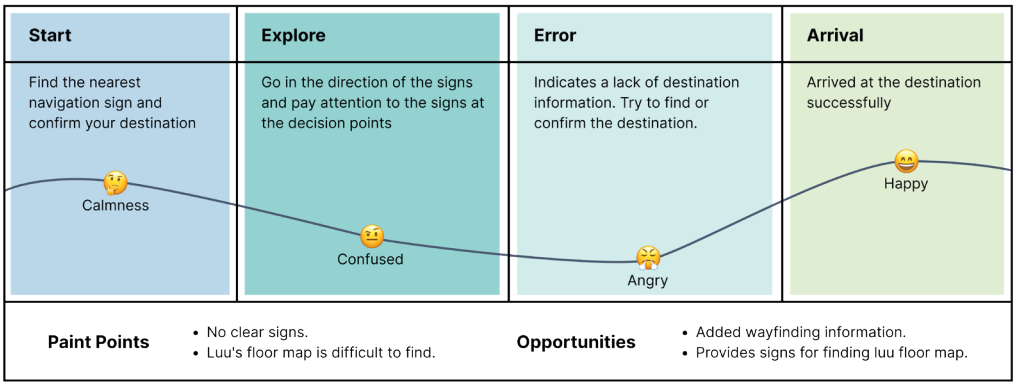

Figure 9. Participants' wayfinding journey map across the three given tasks, showing the four stages of Start (orientation), Explore (active searching), Error (disorientation), and Arrival (reach destination). Drawn by the first author.

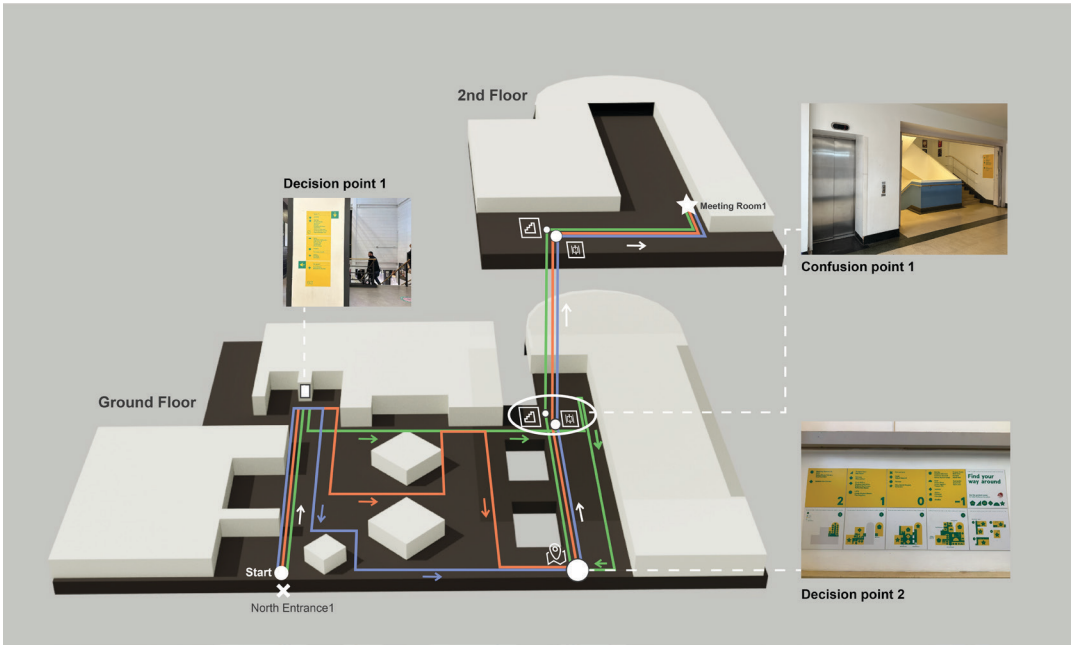

Figure 10. Routes taken by the three participants during Task 1 (Find the Meeting Room 1), shown in three colors. A white square marks Decision Point 1, where participants checked for destination information on labels. A white circle marks Decision Point 2, which shows the LUU floor plans. A white spot marks Confusion Point 1, where participants were uncertain whether to go upstairs or downstairs. Drawn by the first author.

Figure 10 represents the routes taken by participants when tasked with locating Meeting Room 1 from the North Entrance (Task 1). While all participants ultimately reached the destination, their paths diverged significantly on the Ground Floor, indicating uncertainty in interpreting the signage. All three paused at Decision Point 1, the first major signage location, highlighting its role as an initial reference but also its inadequacy in providing clear directions. Decision Point 2, where the floor plan was located, was also consulted, though its limited visibility and small text contributed to hesitation. A major area of difficulty emerged at Confusion Point 1 near the stairwell and elevator, where participants struggled to determine the correct vertical circulation option. This clustering of hesitation at key junctions, which is suggestive of heightened cognitive load, was attributable to insufficient guidance for vertical movement and led to unnecessary detours and longer completion times.

Figure 11 represents the routes taken by participants when tasked with locating Student Kitchen from the North Entrance (Task 2). All participants eventually reached their destination. Initially, they all found the correct direction at Decision Point 1 (the first major signage location) and chose the same path. However, when they reached Confusion Point 2 on the first floor below ground, lacking information about the destination, they hesitated and began to choose different directions. One participant chose a different route from the other two and subsequently encountered Confusion

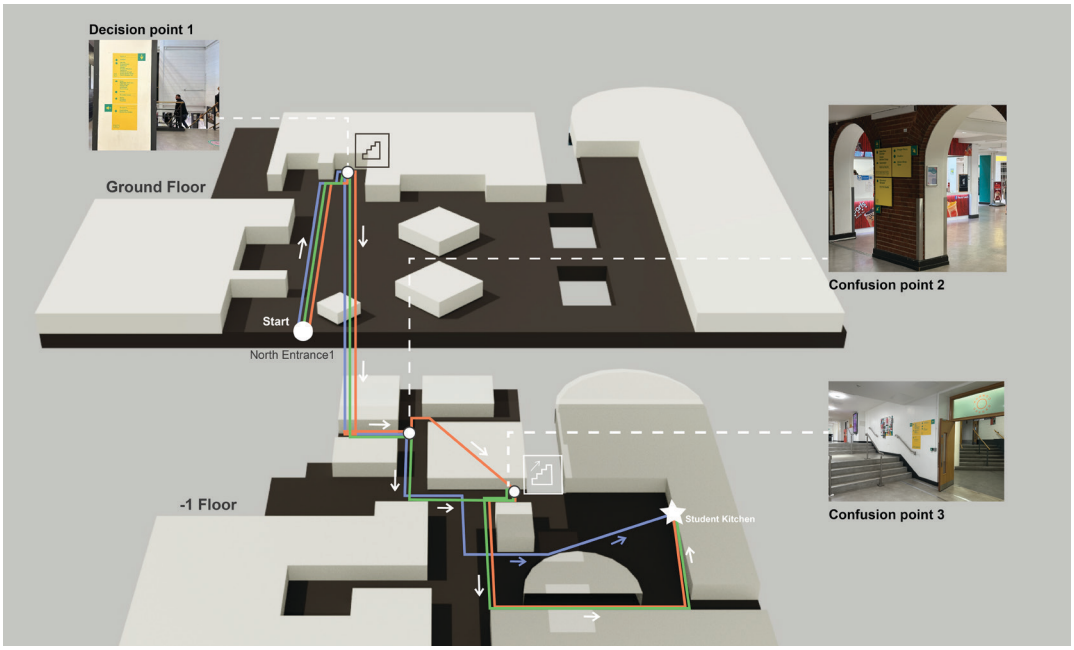

Figure 11. Routes taken by the three participants during Task 2 (Find the Student Kitchen), shown in three colors. Decision Point 1: participants checked destination information on labels. Confusion Points 2 & 3: destination information was lacking. Drawn by the first author.

Point 3. Since no relevant information was provided here, they had to choose a random direction and continue. This demonstrates that when faced with a multi-directional fork in the road, the lack of correct cues can easily lead to incorrect decisions.

Figure 12 represents the routes taken by participants when tasked with locating Essentials from the North Entrance (Task 3). All participants ultimately reached their destination. Initially, two participants attempted to search for destination information at decision point 1 (the first major signage location) but received no guidance. They then randomly chose a direction and continued on, searching for a way up the stairs. Another participant opted to simply search for a way up the stairs. Subsequently, two participants searched for location information at confusion point 4, where the floor plan was located, but received no clues. Because the task only provided information about the floor level of the destination, participants had to reach the designated floor before continuing to explore the target location. The results indicate that the lack of explicit information about essentials within the LUU caused participants to spend more time finding their way.

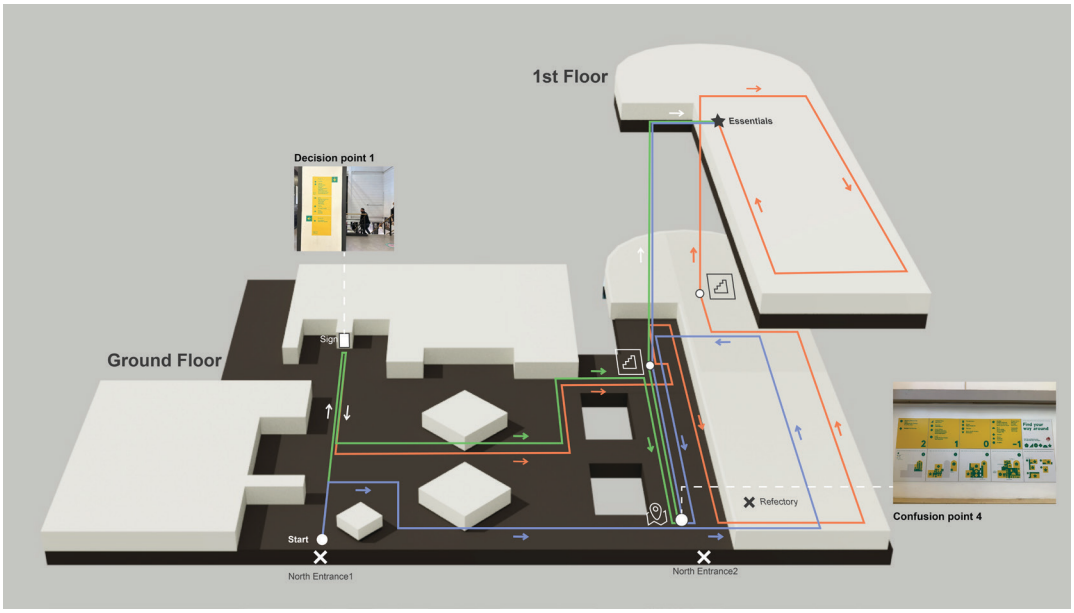

Figure 12. Routes taken by the three participants during Task 3 (Find the Essentials), shown in three colors. The white square indicates decision points 1 where participants needed to check if there is any destination information in the label, while the white circle highlights the confusion point 4 where lack the destination information. Drawn by the first author.

4.2. Post-Design Investigation

Usability testing. The purpose of this usability testing was to evaluate the usability of LUU MATE in the interaction process and the rationality of its interface design, thereby verifying its design effectiveness and provide a reference for subsequent optimization.

Participants were first invited to explore the application freely to form initial impressions. They generally perceived LUU MATE as an app focused on navigation and engagement with activities (e.g., "I thought the app's functions were mainly for finding directions and selecting events of interest"). The overall interface was described as comfortable and clear, with the green and yellow color scheme evoking the interior atmosphere of the LUU and fostering a sense of community cohesion (e.g., User 1: "I found LUU MATE's color scheme reminded me of the LUU and was similar to it"). In particular, the Events page was noted as a space where information could be quickly accessed (e.g., User 3: "I really like the Events interface because it allows me to quickly access information about different types of events").

Following the initial exploration, participants were asked to complete three given tasks (Section 3.3.1). All four participants successfully completed the tasks, achieving a 100% success rate. Table 4 shows the task completion times, which were broadly consistent across participants, with only User 2 requiring slightly more time than the others.

Table 4. Time completion times of each user (in seconds).

Time	User 1	User 2	User 3	User 4
Task 1	50s	80s	63s	77s
Task 2	75s	87s	80s	76s
Task 3	20s	37s	23s	21s

After completing all tasks, participants offered positive reviews of LUU MATE*'s* interface and user experience but also identified areas for improvement. Most participants noted that the app's color scheme felt clear and comfortable, evoking the atmosphere of the LUU and enhancing the sense of relevance. They found the app's layout and functionality easy to understand, and information quickly accessible. Some participants emphasized that "The flat icon design makes it easy to understand what the icons mean", effectively improving readability. When using the AR interface, participants reported that the green virtual path provided clear guidance, enabling them to complete navigation tasks efficiently and with greater confidence. In addition, some participants also considered how LUU MATE could support their social participation in the LUU. User 4 noted:

> Integrating event information into the navigation process could help me discover activities I would not have noticed otherwise, and might encourage me to stop and explore during my journey to a certain destination.

Most of the participants believed that if a social exploration function was provided during the navigation process, they would be able to understand the functions of each area in the LUU more quickly, and they would be more willing to explore the LUU.

The main issues and corresponding suggestions are summarized in Table 5, and the revised prototype incorporating these improvements is shown in Figure 13.

Table 5. Identified usability and interface issues and suggested improvements.

No.	Problems	Severity	Solution
1	There is no confirmation interface after the navigation is completed.	High	Add an end interface.
2	'Find a place' is too deeply embedded in the hierarchy.	High	Place 'Find a place' and 'Explore' separately in the navigation bar.
3	Exit location inconsistent between 'Explore' and 'Find a place'.	Medium	Add a consistent exit button in 'Explore'.
4	Bottom navigation bar icons unevenly spaced.	Low	Modify icon and text size and refine spacing.

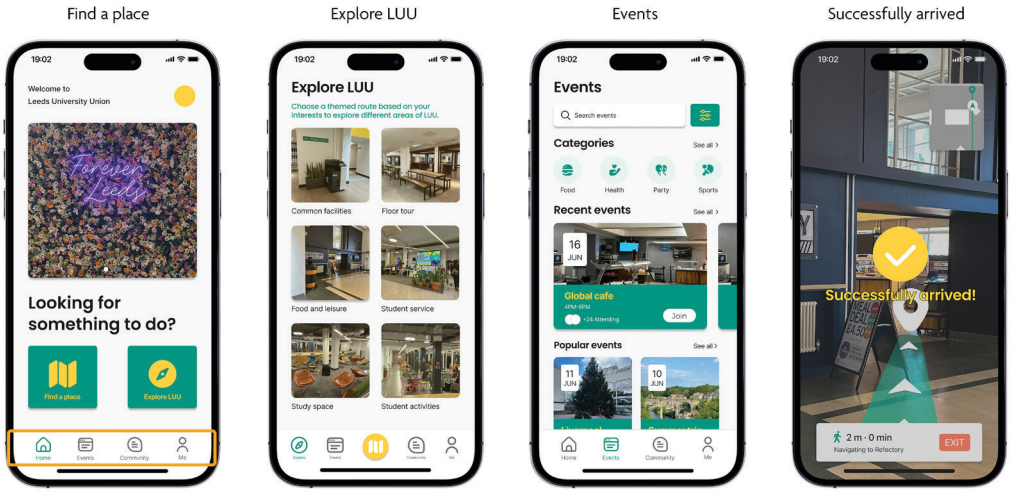

Figure 13. Revised LUU MATE interface informed from usability testing. Key improvements included separating 'Find a Place' and 'Explore' for more direct navigation, adjusting navigation bar spacing for readability, and adding a confirmation screen at the end of navigation to clarify task completion. Designed by the first author.

Behavioral observation 2: Using LUU MATE. The purpose of behavioral observation 2 was to evaluate whether LUU MATE could effectively improve students' wayfinding efficiency within the LUU. Table 6 presents the task completion time for the three participants in behavioral observation 2, while Table 7 compares the average times from both observations to highlight the efficiency gains achieved through the use of LUU MATE. Figures 14-16 compare the paths of each task in the second behavioral observation with the most complex path in the first behavioral observation, to visually demonstrate the changes in participants' navigation efficiency.

Table 6. Behavioral observation using LUU MATE. Completion times of each participant (minutes: seconds).

Time	U1	U2	U3
Observation task1	1:39	1:49	1:53
Observation task2	1:26	1:23	2:12
Observation task3	1:20	1:32	1:14

Overall, navigation with LUU MATE was considerably faster than with existing wayfinding aids, with task times reduced by approximately 46% to 74% (Table 7). During the post-interviews, participants described the AR wayfinding process as clear and intuitive. They particularly valued the path visualization and directional arrows, which they felt improved navigation accuracy and efficiency compared with static signage. In

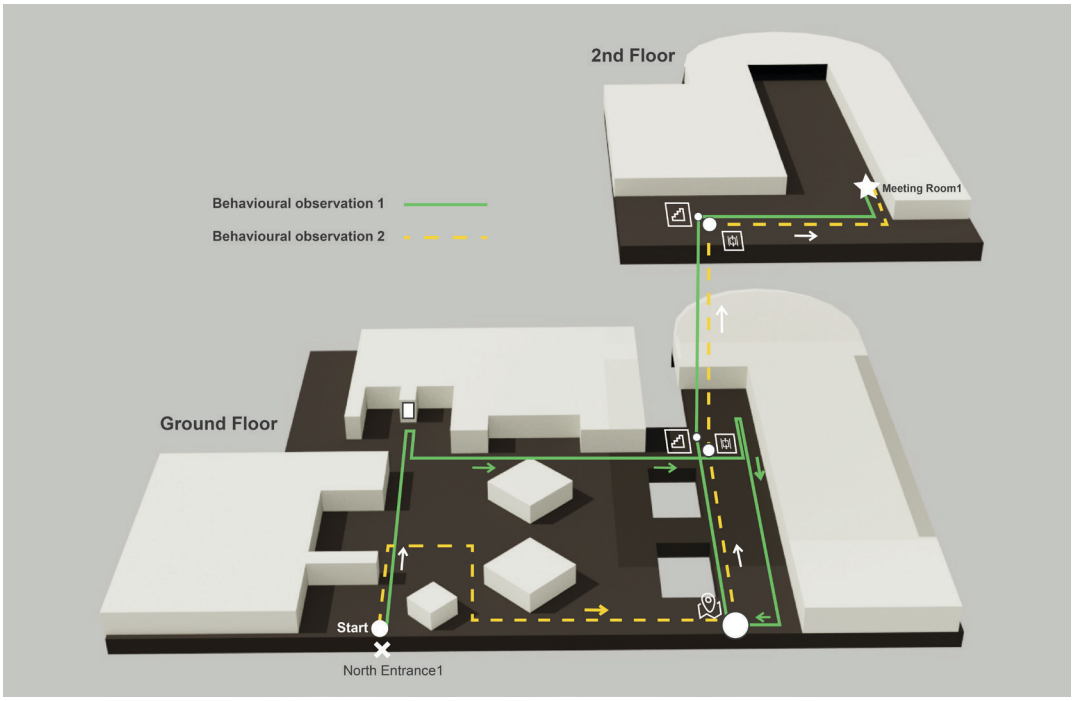

Figure 14. Comparison of the path in Behavioral Observation 2 with the most complex path in Behavioral Observation 1 (Task 1: Meeting Room 1). The yellow dashed line represents the path of behavior observation 2. Drawn by the first author.

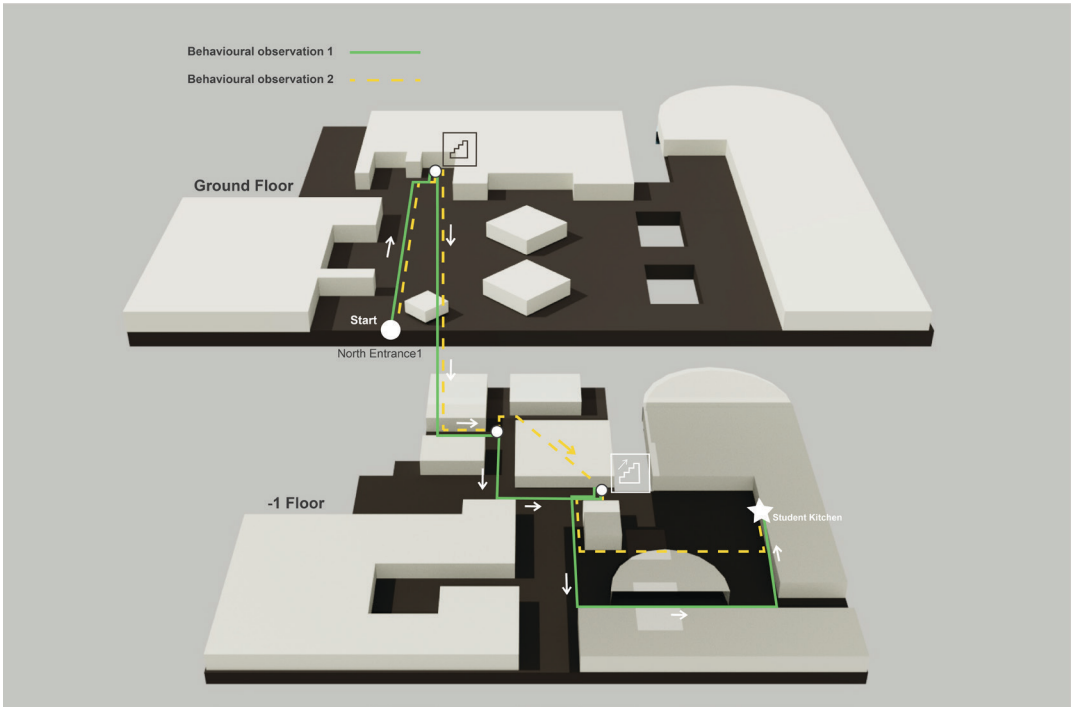

Figure 15. Comparison of the path in Behavioral Observation 2 with the most complex path in Behavioral Observation 1 (Task 2: Student Kitchen). The yellow dashed line represents the path of behavior observation 2. Drawn by the first author.

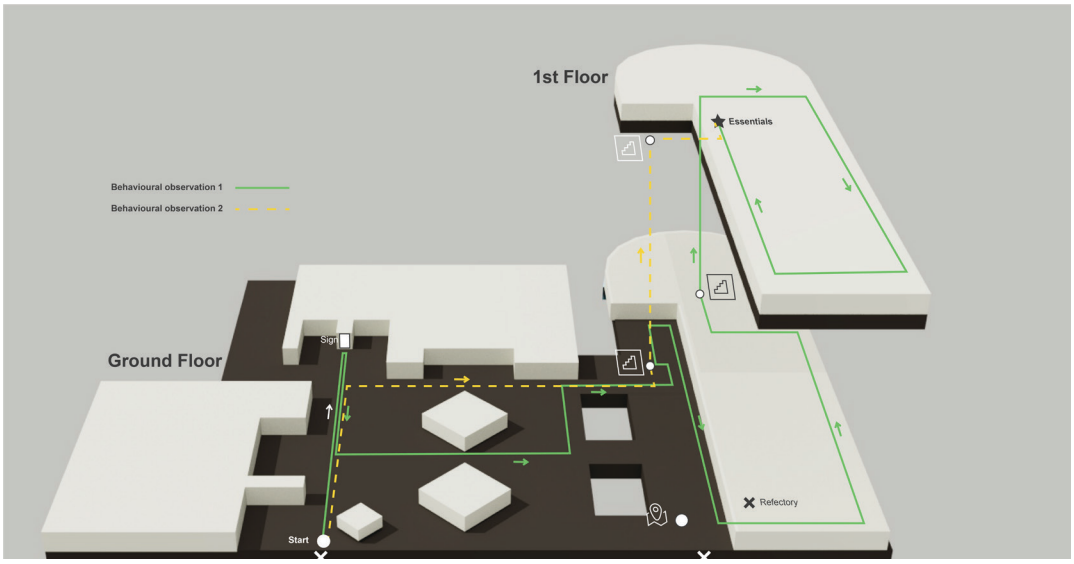

Figure 16. Comparison of the path in Behavioral Observation 2 with the most complex path in Behavioral Observation 1 (Task 3: Essentials). The yellow dashed line represents the path of behavior observation 2. Drawn by the first author.

addition, the surrounding environment guide was seen as a useful feature for promoting awareness of nearby facilities and ongoing activities. However, some participants noted shortcomings in the handling of vertical circulation. Specifically, the lack of explicit floor information during floor transitions caused anxiety. To address this, participants suggested that the system should display indicators of the floor they were heading to.

Table 7. Comparison of average task completion times between Behavioural Observation 1 (existing wayfinding aids) and Behavioural Observation 2 (LUU MATE).

Task	Existing Wayfinding Aids (avg. time)	LUU MATE (avg. time)	Improvement
Task 1: Meeting Room 1	4:03	1:47	-56%
Task 2: Student Kitchen	3:04	1:40	-45.7%
Task 3: Essentials	5:18	1:22	-74.2%

5. Discussion

While much of the existing research on AR navigation in campus settings has explored the technical implementation and performance (e.g., positioning accuracy, tracking algorithms), limited research has examined interface design usability, and the integration of social exploration functions. Moreover, no prior published studies seem to have examined navigation in the context of a Student Union building, a space characterized

by multifunctionality, complex vertical circulation, and high levels of social activity. This study therefore contributes by demonstrating AR interface design can be leveraged not only to improve wayfinding efficiency but also to foster student community engagement with campus life.

5.1. Wayfinding Effectiveness

Combined with the analysis of wayfinding paths (Figure 10-12), it was found that without effective navigation assistance, participants took detours or stopped, increasing their time spent on wayfinding. In summary, the main wayfinding challenges for the LUU were the incompleteness of existing wayfinding signage and the hidden and difficult-to-access location of floor plans, which made it difficult for participants to obtain effective navigation information in a timely manner.

The findings show that LUU MATE achieved high levels of usability: all participants successfully completed the given tasks in both usability testing and the observation 2, indicating that the application was intuitive and easy to use.

The comparative analysis of the two rounds of behavioral observations (Table 7) provides quantitative evidence of efficiency gains. Across all tasks, participants completed wayfinding with LUU MATE in substantially less time than with existing wayfinding aids, reducing average task times by 59% in some cases. For example, locating the Student Kitchen decreased from 5:19 minutes (Observation 1) to just 1:40 minutes (Observation 2). These results align with prior studies (e.g., Diao & Shih, 2018, who demonstrated AR's advantages for pathfinding in dark, unfamiliar indoor settings) that highlight AR's advantages over traditional signage-based navigation. They also confirm that the observed improvements were not only subjective (ease of use, confidence) but also objectively measurable in terms of reduced task completion time.

Beyond speed, participants also reported greater confidence when following the green AR path, describing it as clear, continuous, and well-integrated into the physical environment. This reduced hesitation and cognitive load at decision points, enabling smoother navigation. However, challenges remained in vertical circulation: participants expressed anxiety during floor changes due to the lack of explicit floor-level indicators. This highlights a limitation of AR overlays — they provide strong local guidance but insufficient global orientation. Future AR navigation systems should therefore combine micro-level cues (e.g. step-by-step arrows) with macro-level orientation tools (e.g. mini-maps, floor indicators) to enhance user trust and support wayfinding in complex, multi-level environments.

5.2. Integration with Social Exploration

Another key contribution of this study is its integration of wayfinding with opportunities for social engagement, highlighting the significance of this connection within the campus context. Existing AR navigation research has largely prioritised technical performance or route guidance (e.g., Xu et al., 2024), while overlooking how navigation systems might also facilitate community integration. LUU MATE addresses this gap by embedding contextual information, such as dynamic prompts about functional spaces and community events during the navigation process. Participants noted that these features encouraged awareness of their surroundings and piqued interest in activities they might not otherwise have considered.

This demonstrates that navigation and social exploration are mutually reinforcing: by guiding students to destinations, the system simultaneously exposes them to new opportunities for participation. From a design perspective, this integration transforms navigation from a purely functional activity into a socially engaging experience. It also reflects the role of the LUU as not only a physical hub but also a social ecosystem. The implications extend beyond the LUU: campus navigation tools that incorporate real-time social and event information could strengthen student belonging and participation across higher education settings.

5.3. AR Interface for Wayfinding Applications

Finally, this study underscores the importance of interface design in shaping the usability and effectiveness of AR navigation systems. Usability testing revealed high levels of task success and satisfaction, with participants praising the clarity of the layout, intuitive organisation of functions, and visual consistency of the green-and-yellow colour scheme, which echoed the atmosphere of the LUU and reinforced a sense of place. The flat iconography improved readability, and the Events page was especially valued for its quick access to information. These findings highlight that interface design directly influences learnability and acceptance of AR tools.

At the same time, feedback pointed to areas requiring refinement. Participants found the ‘Find a Place’ function buried too deeply in the navigation hierarchy, and the absence of a confirmation screen after completing navigation reduced clarity. These issues were addressed in the revised prototype (Figure 13), illustrating how iterative user feedback can guide design improvements. More broadly, the results point to a wider research gap: while UI and interaction design theories are well established for 2D applications, their applicability to 3D AR environments remains limited (Börsting et al., 2022). This study therefore contributes by demonstrating how interface principles, such as clarity, consistency, and contextual relevance, must be reinterpreted in the AR context to ensure both usability and engagement.

5.4. Limitations

This study has limitations that open avenues for future research. As this research was conducted within the scope of a master's-level study and under time constraints, the sample size in each phase was small. This limits the reliability and generalizability of the findings. Nevertheless, the study was designed with clear, sequential objectives across all phases, allowing each stage to build cumulatively on the previous one. As a result, the study still generated meaningful insights into students' wayfinding behaviors and their interactions with AR-based navigation concepts. Future research should employ a larger, more diverse participant pool and longer-term field deployment to validate the findings and examine how AR navigation tools perform across varied user groups, scenarios, and environmental conditions.

Although this study emphasized the importance of social engagement within AR-supported campus navigation, its ability to methodically evaluate this dimension was limited. The pre-design investigation revealed a recurring user need for greater awareness of student life and highlighted the unique character of the LUU as a socially vibrant environment, insights that strongly informed the prototype's emphasis on exploration and helping students discover what is happening around them. However, the empirical evaluation focused primarily on navigation efficiency, and the study design did not allow for a rigorous assessment of social engagement outcomes. Only short, qualitative usability testing post-session reflections were collected, which provide suggestive but not robust evidence of social engagement. Future research should therefore adopt a longer-term deployment approach, enabling students to use the system over an extended period and allowing researchers to examine how AR navigation tools influence actual patterns of social participation, event discovery, and informal campus interactions over time.

This study focused primarily on interface design and the optimization of information hierarchy and did not address the technical implementation of AR functionalities. Consequently, potential issues that may arise in real-world deployment, such as insufficient positioning accuracy, device constrains, or AR recognition issues were not evaluated. These technical issues could affect the reliability and overall user experience of the system. Future research could incorporate these aspects, allowing for a more holistic understanding of how technical and interaction components jointly affect usability in the campus environments.

Additionally, only one round of interface design was completed and evaluated, which restricted opportunities to explore alternative interaction methods and visual styles. Nevertheless, the design at this stage still offers insights, revealing how interface clarity and cues influence the user's interactive experience.

Finally, the 'Community' feature designed to promote student social interaction was only partially implemented and not fully tested. While this limitation means its effectiveness remains to be evaluated, initial feedback indicates user interest in the feature, suggesting its potential value for future designs.

5.5. Design Insights and Criteria

The design insights and criteria presented in Table 8 are derived from field research, interviews, behavioral observations, and prototype evaluations. These insights reflect the navigational challenges and social interaction patterns students encountered in the study, and the corresponding criteria provide practical guidance for the design of future AR campus navigation systems.

Table 8. Design insights and criteria.

Design insights	Design criteria
1. When signs are unclear, students will rely on following others or seeking help.	AR navigation should integrate social and contextual information, such as nearby activities or the activities of companions, to assist navigation and promote community interaction.
2. Existing geometric symbols lack semantic clarity, causing confusion for first-time visitors.	Using intuitive icons, labels, and color coding, spatial meaning is clearly conveyed, allowing for quick understanding without prior knowledge.
3. Users experience anxiety when switching floors due to a lack of clear floor instructions.	Synchronize AR navigation with floor information, visualize vertical connections and spatial transitions, and help users maintain their sense of direction.
4. Participants expressed interest in discovering campus activities during the browsing process.	AR navigation incorporates social discovery features, connecting destinations with real-time activities and opportunities, encouraging exploration and a stronger sense of belonging.

The above demonstrates that AR campus navigation can serve not only as a spatial guidance tool but also as a medium for fostering social connections within the student environment. By combining spatial clarity, contextual information, and social interaction, future systems can transform campus navigation into a more interactive and community-oriented experience.

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INVITED ARTICLE

Professor James Mosley, a Memoir

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James Mosley, who died on 25 August 2025, was a historian of letterforms, type, typography, and printing. From 1958 until 2000 he was librarian of the St Bride Printing Library in London, and from 1960 until 2021 he taught at University of Reading in what became the Department of Typography & Graphic Communication. Underpinning both roles was Mosley's peerless scholarship, which was both expansive and distinguished by the particular attention he devoted to cultures of letterforms in Britain and two other countries for which he felt a great affection, Italy and France. As teacher, advisor, and mentor to students and colleagues at Reading, he brought to these roles his knowledge and the exemplary research, writing, and publishing that were features of it. The remarks that follow offer a brief account of Mosley's work at the place of learning where he taught for more than six decades, with the intention of memorializing his contributions and their lasting value.

Mosley's principal work as teacher was his superb series of lectures, "History of letterforms", which eventually comprised some 21 lectures spanning a history that commenced with ancient Roman capitals, concluded with modern typography, and advanced from one to the other by way of manuscript hands, Gutenberg, gothic types, renaissance capitals, humanistic script & roman type, the chancery hand, Aldine types, Dutch type, French type, English type, rocaille & neoclassicism, commercial type, old style type, private presses & William Morris, art nouveau, Edward Johnston & Eric Gill, and Monotype & Stanley Morison. These lectures, with their judiciously chosen images and Mosley's expert commentary, were his great gift to Reading, experienced by innumerable students over the years.

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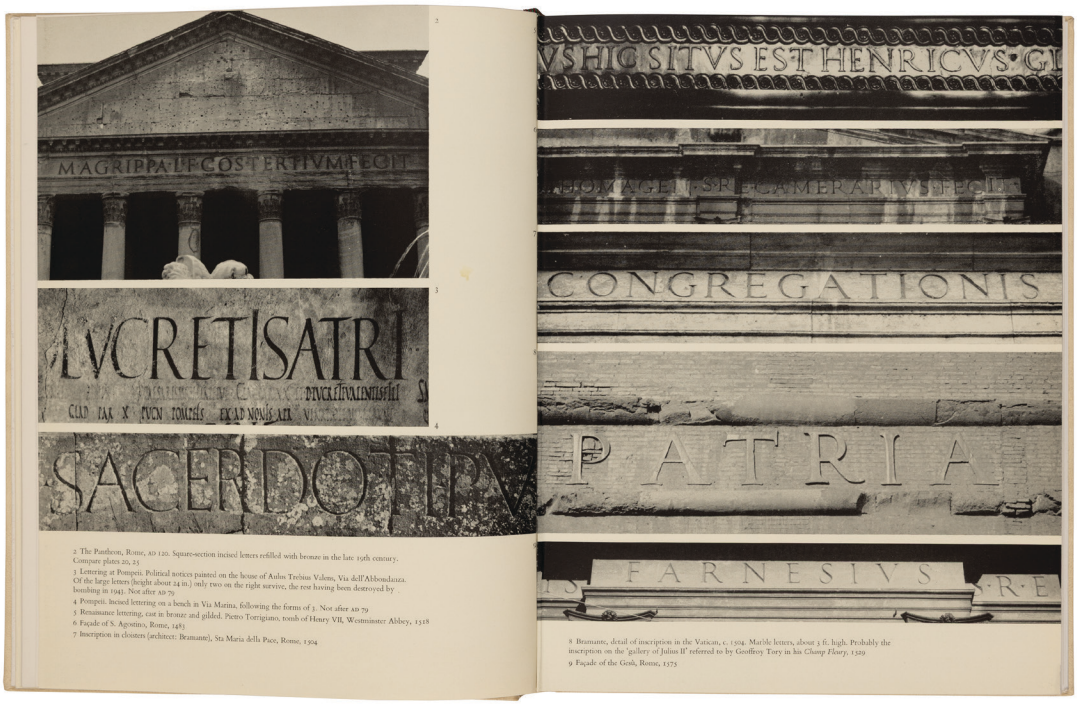

Figure 1. James Mosley, "Trajan revived", *Alphabet* (1964), showing antique Roman inscriptional letters and their later revived forms in photographs taken by Mosley.

Figure 2. James Mosley, "Trajan revived", *Alphabet* (1964), showing revived forms of antique Roman inscriptional letters.

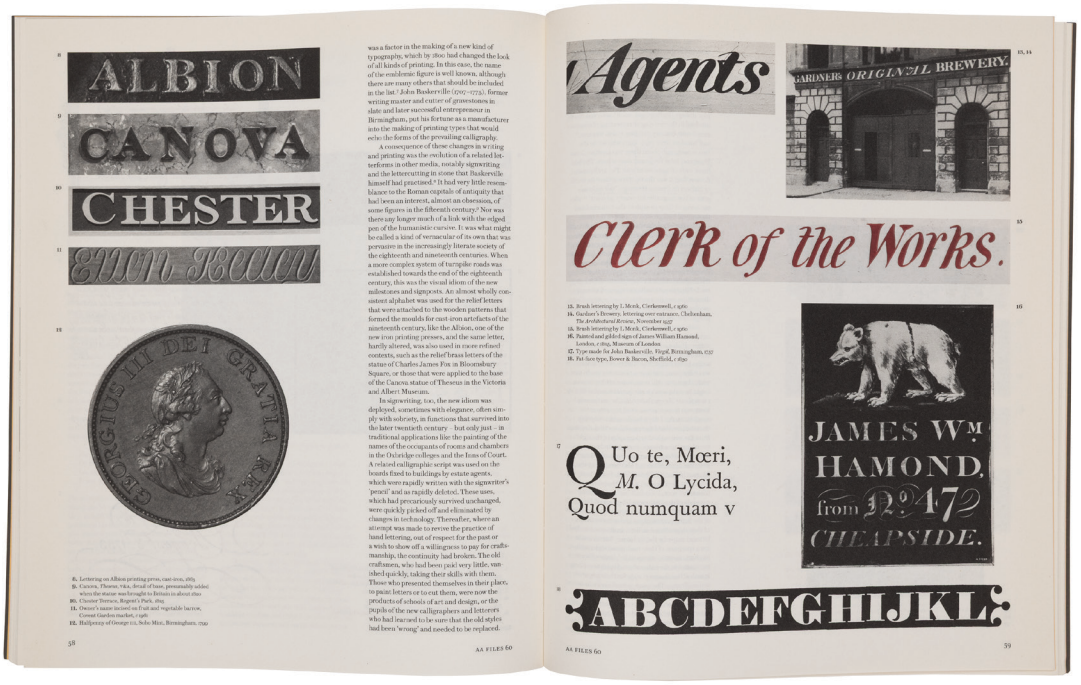

Figure 3. James Mosley, "Naming 'Victory': in search of an English vernacular letter", *AA Files* 60 (2010), showing examples of letters described by Mosley as "English vernacular".

The "History of letterform" lectures were, for Mosley, also a living statement, constantly evolving as new documents came into circulation, new knowledge created, and new literature published, encouraging interpretations of greater nuance. This 'living' quality may have discouraged Mosley from recording or publishing the lectures, not wishing to fix them in time as recording or publishing would require him to do. But as he entered his final years at Reading, Mosley's lectures were at last captured during the Covid-19 pandemic, as voice over images, to make good the loss of in-person teaching. And so this awful event provided the impetus for the lectures' preservation, initially for Reading students and now for everyone following their recent online publication.*

As part of the "History of letterforms" lectures, Mosley produced course materials that reveal in other ways how he sought to represent this history. Among these are his reading lists that confirm the literature he regarded as significant. Of interest, too, are his annual examination papers each with its ten questions, of which students had to answer four. Questions were constructed with deliberateness and exactingly phrased, and are indicative of how Mosley framed salient developments: "How and why was the 'antique letter' introduced in Italy during the 15th century?"; "Early types were derived

* The lectures were recorded in 2020 and 2021, and made publicly available in autumn 2025. See: https://www.youtube.com/playlist?list=PLh8Q6TpPxtgxSG6DEuOrH9iKx9bh6Pr7G.

Figure 4. James Mosley, "Naming 'Victory': in search of an English vernacular letter", *AA Files* 60 (2010), showing "English vernacular" letters.

closely from pen-written forms. Trace the manner in which type moved away from a literal reproduction of writing, and explain why this was found to be necessary."; "The romain du roi is sometimes called the first modern type design. What reasons support this opinion?"; "William Morris commented on the 'sweltering hideousness' of the work of Bodoni. What similarities can be detected in their printing, and what differences?"; or "In his book on modern typography, Herbert Spencer quotes the remark by Guillaume Apollinaire, 'one cannot carry everywhere the corpse of one's father'. How far was the 'new typography' influenced by rejection of accepted standards?". Such questions demanded from students answers that demonstrated not mere rote command of historical facts but an ability to grapple with a complex interplay of ideas and actors, often across time, place, and technology.

As an extension of the "History of letterforms" lectures, Mosley supervised or advised undergraduate, master's, and doctoral dissertations and theses. While not in itself unusual, Mosley brought to this work implicit exemplars for how to locate, assemble, and present historical narratives. These include, foremost, a series of articles published around the time he joined the University of Reading, articles such as "English vernacular" (Mosley, 1963–64), "Trajan revived" (Mosley, 1964) and "The nymph and the grot" (Mosley, 1965). Each, with its evocative title, offered arrays of evidence that variously combined primary texts, contemporary accounts, testimonies and literature, and

well-imaged exemplars and artifacts from astonishingly varied documents, objects, and buildings. Many images — of inscriptions especially — were site-specific, proficiently photographed by Mosley on research excursions in Britain and abroad. Other images, gathered through opportune visits or encounters, confirmed the survival of historical artifacts or present-day continuities of authentic forms and practices.* The articles provided salient demonstrations of scholarly and practical sleuthing, and of textual *and* visual evidence working in close partnership to make compelling arguments, applicable in turn as models for students' research and the documents they created.†

Mosley continued publishing such articles at Reading in *Typography Papers*, the book series launched in 1996 by his colleague, the late Paul Stiff. Mosley was probably the kind of contributor Stiff sought to attract to the pages of *Typography Papers*, which provided space and apparatus for the evidence-intensive illustrated studies that Mosley had already perfected. His articles include a technical study of the *Romain du roi* types (Mosley, 1997), an argument for Giovan Francesco Cresci as instigator of a major change in the form of Western handwriting and progenitor of the baroque inscriptional letter in Rome (Mosley, 2005a), and a finely balanced profile of the French *technologue*, Gilles Filleau des Billettes (Mosley, 2013). Mosley was present in *Typography Papers* in other ways, too, for example when consulting on post-war modern typography in Britain (Stiff, 2009), about which he had first-hand experience; in supplying a translation from Italian of Giovanni Mardersteig's article about Leon Battista Alberti and the 15th-century inscriptional letter (Mosley, 2005b); or in making available from his own research material Des Billettes' description of stencilling that was the basis of two articles (Kindel, 2013a, 2013b).

In looking back at Mosley's teaching and highlights of his scholarship, writing, and publishing, it is possible to identify in them characteristics and values that were of great importance to students and colleagues at Reading, as they surely could be — or should

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* Examples of this kind include, in "English vernacular", 18th-century pattern letters that continued in use at the Whitechapel Bell Foundry in London; or, in "Trajan revived", sets of baroque inscriptional letter stencils still used to lay out inscriptions in the Lavoratorio Marmi in the Vatican City. Many of Mosley's photographs of lettering from this time, of inscriptions from ancient and baroque Rome and renaissance Florence, and lettering of many kinds from around Britain, became part of a photographic collection of applied lettering in the Department of Typography & Graphic Communication; they were also shared with colleagues at the Central School of Arts & Crafts (as was) for accession to its Central Lettering Record.

† The three articles were republished more recently as *The Nymph and the Grot* (Mosley, 1999); "Traiano redivivo" (Mosley, 2001a) and "La ninfa e la grotta: la rinascita dei caratteri senza grazie" (Mosley, 2001b) in *Radici della scrittura moderna*; and "Naming 'Victory': in search of an English vernacular letter" (Mosley, 2010), which repurposed parts of the original 'English vernacular' article and whose publication was facilitated by Mosley's former student, the late John Morgan.

be — to any student of history seeking depth, expanse, and richness in the accounts they construct. Overarching all was a many-dimensioned, cultured, and highly literate engagement with the past, supported by a deep regard for artifacts and survivals, and their identification, collection, preservation, recording, re-use, or reconstruction. For Mosley, too, there was a primacy of language, which took many forms. Among them was the use of language as a tool of historical enquiry, including the close attention he paid to terminology and the meaning of words in their historical context. There was also a command of languages, in which Mosley was fluent in several and had a more-than-working knowledge of more. This enabled him to locate, transcribe, and translate key documents and texts that were foundational to his historical accounts, and powered them. When speaking, he was laconic, measured, and quietly meaningful, if sometimes quizzical or purposely open-ended. When writing, he was knowing, precise, and evocative both in word choice and expression while unfolding historical narratives in revealing, even revelatory, sequences of observations, readings, and conclusions. He placed great value on visual evidence, on gathering telling images in libraries, museums, archives, or in the wild. This says much about a concern to encounter the historical object first-hand, often in its original setting and not just in reproduction. An important by-product of this was his detecting of historical phenomena (and anachronism) in the present by tracing the use of past forms and exemplars over time.

Enduring memories of James Mosley at Reading include the most quotidian: greeting him weekly when he arrived for his lecture, as he did with constancy, year-on-year, discussing with him some aspect of the upcoming lecture or a new image he'd added, hearing about his latest endeavours or current concerns, or asking for his views on some pressing question, newly discovered source, or recently acquired artifact. These encounters were among the best — informal, sometimes droll, always enlightening — and it was this teacher, advisor, and mentor that students and colleagues at Reading could get to know. If such encounters now live only in memory, Mosley's legacy as a historian remains, and while knowledge goes on expanding and evolving, his example can continue to guide us all in how to do history in our field.

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Eric Kindel is Professor of Graphic Communication in the Department of Typography & Graphic Communication, University of Reading. He joined Reading in 1998 and served as Head of Department from 2015 until 2024. After meeting James Mosley in 1995, he twice attended Mosley's lecture series and collaborated with him on a research project to reconstruct the stencilling equipment and method of Gilles Filleau des Billettes.

INVITED ARTICLE

Professor Michael Twyman

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Professor Michael Twyman, who has died aged 91, pioneered the study of typography as an academic discipline in a British university. His vision for the Department of Typography & Graphic Communication at the University of Reading intertwined history, theory and practice in graphic design, typeface design, information design and book design. It was innovative in its interdisciplinarity, drawing on linguistics, psychology, social and economic history and other social sciences and humanities to address 'design for reading'.

Figure 1. Michael at James Mosley's 80th birthday celebration in 2015. Photograph courtesy: Paul Luna.

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As a student in the School of Art at Reading he was inspired by courses in printing, book production, typography and print making as well as European 'grand tours' under direction of the art historian, Leopold Ettlinger. It became clear to Michael that teaching typography needed a rigorous approach not unlike the teaching of architecture that combined history, theory and practice. This required a collaborative approach, and in the early years he drew in particular on the expertise and skills of Ernest Hoch, an Austrian émigré and pioneer of information design; James Mosley, historian, bibliographer and librarian; Ken Garland, a graphic designer of remarkable range; Gillian Riley, book designer and historian; and Cliff Morris, master printer, to establish what was then the Typography Unit. Reading began to award degrees in Typography & Graphic Communication in 1968 (previously they were Fine Art awards), and the Unit achieved full departmental status in 1974.

An important innovation was the Reading PhD, one of the very first in any design field, and which became a springboard for international collaboration and influence on other institutions.

From the late 1970s Michael worked with PhD students to enhance theoretical and historical dimensions of typographic design and graphic communication. His innovative and excellent PhD provision was recognised through external studentships, including from Brazil that led to collaborations and formal agreements with Brazilian universities and individuals, keen to extend the reach of Michael's work.

Michael's commitment to cross- and inter-disciplinarity aligns with this journal. He corresponded with Merald Wrolstad supporting first *The Journal of Typographic Research* and its transition to *Visible Language* in 1971, and then engaged with Sharon Poggenpohl when she became editor in 1987. His contributions to *Visible Language* reflect his interests in the theoretical aspects of typography and graphic communication. His "Typography without words" (Twyman, 1981) remains a key text for explaining typographic hierarchy and differentiation. He contributed to the 1985 discussion about "Graphic design: computer graphics. What do they mean? How do they fit?" — another example of cross-disciplinary engagement (Twyman, 1985).

Michael's extensive range of published outputs reflected the 'history, theory, practice' mantra that had guided him from the outset (see Nash & Twyman, 2024). In the 1970s, he wrote a now-classic milestone of printing and graphic design history, *Printing 1770–1970*, the complex illustrated design of which he also undertook, as well as seminal papers on the theory of graphic language, and important contributions to the pedagogy of design. He wrote many award-winning books and papers about the history of lithographic printing. Michael was honoured to be asked to deliver the British Library's Panizzi lectures in 2000. After his retirement from the University in 1998 he was able to pursue his ambition of writing a book about lithographic printing in

Figure 2. Michael lecturing in 2002. Photograph courtesy: Paul Luna.

colour: *A History of Chromolithography: Printed Colour for All,* (Twyman, 2013). His most recent publication, based on books and ephemera from his personal collection was *Reproducing the Bayeux Tapestry Over Three Centuries* (Twyman, 2024).

Michael believed passionately that his students should engage with and learn from looking at original documents and artefacts. Thanks to him, working in close collaboration with university librarians and archivists, the University of Reading holds outstanding collections in printing, graphic and typographic design, and publishing history and printed ephemera. To define and raise the profile of printed ephemera, Michael initiated and directed the University's Centre for Ephemera Studies, opened by Lord Briggs in 1993, that became a national focus for research into non-book documents, both manuscript and printed. The ground-breaking *Encyclopedia of Ephemera* (Twyman, 2000) led to collaboration with museums and libraries, including the Library of Congress, in developing descriptive frameworks for the cataloguing of ephemera.

'Design for reading' continues to integrate history, theory and practice and remains relevant and significant for students today. Michael believed that to design effectively for reading we need to know how people read and what makes it easier for them to see and engage with text; why people read raises user perspectives — reading for pleasure, learning or information; what people read encourages forays into the past to discover more about readers and document types. His beliefs were exemplified in his research and in his teaching. Students engaged in user-centred research, concerned with how the needs of particular readers might be, using methods derived from psychology and social science. Reading alumni have raised the profile of typographic heritage in their writing and exhibitions drawing on Michael's approach to close reading, analysis, comparison, synthesis and curation.

Michael's legacy is not just the Department he founded but a unique approach to visual communication as rational thinking that is transferable and applicable to any new media or platform, that can respond to the challenge of the digital economy through focused research and relevant application though strong links with industry, and that has developed the discipline through high-quality research, publications and collections. The integration of history, theory and practice distinguished Michael's work. He encouraged ways of looking, believing that learning from the past feeds into the future. He believed that 'thinking about the reader that isn't you' reminds us to think about users, circumstances of use and other contextual factors when we are designing. In an increasingly digital world he championed craft skills and making and that when 'designing for reading', that students be encouraged to make documents to understand their material attributes. Finally, Michael's commitment to and support for doctoral research is something to emulate and encourage, and through this find ways to introduce his work to new generations of scholars.

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