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Academic Research Into Typographic Design at the Beginning of a New Era

Ann Bessemans

In Europe, academic studies in design and the arts were regulated by the Bologna declarations in 1999. As a side effect of these declarations, architecture and art programs were linked to a university partner and a new field of research was born—namely, "research in the Arts." This was a logical consequence of the new European educational model, and means that a professional bachelor degree directly addresses the labor market, whereas an academic master has the ambition to offer students a broader horizon not only by means of practice, but also of theory. An academic master enables the students to further explore and innovate within their own field alongside reflective thinking, critical awareness, and creation. In addition, students with a master's degree were now able to start a third cycle—namely, to aspire toward earning a PhD. In turn, this—given the social role of the Arts—necessitated the development of an active and sustainable research environment.

Consequently, artistic and design research gained an equal place alongside the humanities, social sciences, natural sciences, and exact sciences. This position provides a complementary framework for exploring the complexity of reality in a pluralistic academic context. Yet, this does not mean that the integration within the academic context has by now become completely self-evident. Artistic and design research not only captures other forms of knowledge acquisition, but also knowledge transfer. The problem has always been and still is the concrete translation of this research into the established channels of scientific output. As a result, this "new" academic framework often manifests itself in debates about how "research in the arts" should or should not be conducted, how quantifiable output should or should not be communicated, whether through traditional and non-traditional channels, and all too often how it is different from the sciences.

During these developments, I was one of the first MA students with an ambition to continue her studies by enrolling in a PhD program to do research in typographic design at PXL/Hasselt University and Leiden University in 2006. This PhD was supervised by Dr. Gerard Unger and co-supervised by Dr. Bert Willems (experimental psychologist). The influence that Dr. Unger had in the establishment of the important role of typography in reading research, typography as an object of study, or in reference played an enormous role that is, in my belief, of inestimable value for the continuous growth of the academic development of typographic design (research). Dr. Unger's research is presented in his book, *Typography as a Vehicle of Science*, which was published in 2007.

In 2006, Leiden University invited Dr. Unger to apply for the job of Professor of Typography at the Faculty of Arts. In May of the same year, he was awarded the title of first Professor of Typographic Design at the Faculty of Arts at Leiden University, a collaboration between the university and the Royal Academy of Art in The Hague—a chair established by the Dr. P.A. Tiele Foundation at the request of the Royal Library and the

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Museum Meermanno. It seemed as if people were waiting for this, because as soon as he was assigned the position, candidates came forward to accomplish a PhD under his supervisorship. I was one of them.

I first wrote him an email in order to find out if he showed interest in acting as a supervisor of the inter- and multidisciplinary project *Type Design for Children with Visual Impairment*. In December 2006, Dr. Unger enthusiastically agreed to become the promoter of my legibility research, which he described as pioneering work within the typographic and scientific field. In order to test the legibility of typefaces, there would need to be a perfect balance between the typographic practice and scientific methods. Dr. Unger applauded the connection of the artistic reflective with the scientific analytical side. And this was not so obvious because conducting methodological-based legibility research was something that many designers were skeptical about. Previously, there had been a rather poor cooperation between the typographic practice on the one hand and scientific disciplines on the other. From a typographic point of view, over time, fundamental objections—rightly or wrongly processed—had arisen against scientific legibility and reading research. The main frustration for typographers was the limited typographical knowledge and the creative skills of the scientists in the experimental test set-up. Besides, there were many legibility experiments that did little more than confirm typographical practice. In addition, there was also a fear that results from these scientific studies would dictate rules and hinder the creativity of designers. But Dr. Unger never saw or experienced this in that way. He has numerous typefaces to his name and has always had an eye for the legibility of frequently used typefaces. Within this, he was fascinated by what details mattered to readers for the reading experience. Therefore, he was very eager to learn and curious to know more about the effects of the practical side of typography in relation to the reading behavior. In his opinion, this could be done through methodological-based legibility research.

The Birth of READSEARCH

A PhD track in typographic design research meant being exposed to various interdisciplinary facets that dealt, directly or indirectly, with social design and type design. At that time, I was not accustomed to dealing with and bringing interdisciplinary facets in relation to each other with the aim of developing theory and practice in the spirit of practical legibility research. So, the biggest challenge has been to evolve, from the formation of a graphic designer—yet with a huge interest in (questioning) legibility aspects—to a design researcher. *Type Design for Children with a Visual Impairment* was a design study that examined legibility and conducted methodological, practical legibility research in the interest (both in objective and subjective ways) of

the intended target audience (children ages 6–11). From this research, the need for a meaningful sense of legibility was determined in the context of visual impairment (and therefore, also indirectly within normal vision) and has verified which design parameters within a font can positively influence the reading of visually impaired children and those without impairments.

During my PhD program, I came across interdisciplinary aspects of typography and scientific legibility studies, which proved essential in order to further conduct this and coming research in this field in a thorough manner. Moreover, through the work completed during my PhD program, I established a theoretical framework that can derive intrinsic properties of typography that influence legibility and/or readability. These can be described and studied in terms of form, rhythm, and movement heterogeneity and give rise to new knowledge that can also be used to strive for innovative ways in designing and teaching, both within graphic design and typography and type design.

Furthermore, my PhD work also explored a novel "method" where typographic design is the engine in its component parts. All of this was such an eye-opener to me that I, during and after my PhD, decided to take my professional routes in an academic direction because I would no longer feel at home in the classic image of the (typo)graphic and type designer. The development of a hybrid profile in which design research assumes a full-fledged, intertwined place alongside the design practice is no longer a unique phenomenon. In general, the research conducted within such a profile focuses both on the discipline itself (for example, research in the Arts into new techniques, new materials, or concepts) and on other knowledge domains (Pint, Bessemans & Aerts, 2021). Research in the arts explores how specific methods, practices, and knowledge of artistic/design research can also be used within and studied further in other knowledge domains. In particular, a person can approach reading research not only from a cultural, scientific, or historical perspective, but also from the perspective of the typographic practice, or how novel typographic methods can be applied in, for example, exact sciences (and vice versa).

As a cumulation of the above, I founded the typographical research group READSEARCH in 2015. At the time, it was a risk to wriggle out of successfully running research groups in design research at my home institute and branch out as a loner. However, thanks to grants already received during my PhD and a future grant from Microsoft Advanced Reading Technologies, the conviction and confidence to push for an independent, yet sustainable, typographic research group dedicated to reading research and without a gap between the worlds of practice and science emerged. *Within all of this, it is important to mention the name Dr. Kevin Larson, who, similar to Dr. Unger, pushed this pioneering work in practical legibility research. As an experimental psychologist and researcher for Microsoft's Advanced Reading Technologies, he works closely with type designers,*

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psychologist, pedagogues, and computer scientists to improve the reading expe-rience. Over the course his career, he has been working on the theme of reading and is intrigued by the topic of legibility. This makes him, within this pioneering work, invaluable. There are only a few practical legibility studies in which he, as a supervisor, advisor and/or researcher, is not involved over the past 15 years. The financial support, or "investment budget," which is an enormous mental endorsement, together with the support of my home institute for giving a voice to practical legibility research in an academic context assured the birth of READSEARCH.

READSEARCH started small and was laborious, due in part to all kinds of teething problems (for growth). However, with the necessary perseverance, rigor, and courage to keep an eye on quality within every aspect practical legibility research aims to achieve, the foundations and intended quality of the group have been secured and established. Within one year, the first READSEARCH PhD candidates will have defended and published. For now, READSEARCH is still growing exponentially. It has a wonderful team with talented design researchers from different nationali-ties and genders (currently more female) within a hybrid profile. The team consists currently of one postdoctoral researcher, five PhD students (two of them in double degree), and three research assistants, some of whom are involved on a voluntary basis. Additionally, the team is enriched yearly by several students and graduates who enroll for an internship. As the research coordinator of this team, I am as proud as I could be.

Currently, READSEARCH is part of MAD (Media, Arts, Design)-Research at PXL University College and Hasselt University and since 2019, because of READSEARCH's data-driven design, part of the Data Science Institute (DSI) at Hasselt University. When the DSI was established, it was decided to involve specific research in the arts in the broad domain of data science. The main goal of the institute is to unite scientific data-bound research and prepare society for a data-driven future. DSI strives for commit-ted and innovative research and achieves this by focusing on both funda-mental and applied research on all components of the data science cycle. And within this cycle, applied practical legibility research cannot be missed.

READSEARCH Dismantled: Content, Context, Methodology, and Goals —General Approach

READSEARCH explores in a practical way borders of legibility/readability for various target groups. We aim to develop practical/typographic legibility and readability studies within a new conceptual framework concerning

typographic design research on a micro, macro and/or micro-macro level.[1] Comprehensive legibility/readability research considers both the require-ments of scientific methods and typographic practice. As a fundament, READSEARCH has derived intrinsic properties of typography that influence legibility and/or readability. These can be described and studied—as men-tioned before within the establishment of a framework—in terms of form, rhythm, and movement heterogeneity and push innovation in the field. The current research lines are:

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Visual prosody

There is a great discrepancy between speech and reading. Humans speaking to each other have the disposal of a wide range of communication tools like expression and emotion in speech. Expressive oral reading can be quanti-fied in terms of prosodic variation. These features in prosodic variations, like duration, intonation, or stress, can be of crucial importance in understand-ing exactly what the speaker or narrator is trying to tell us. Type is just not as expressive as our voices. Words composed in a sentence are completely uniform in weight and size, as if to convey a monotone. A monotone voice harms the reading fluency and reading comprehension. In addition, our letters represent several languages (and even dialects), and make use of different phonemes. Visualizing those phonemes more clearly benefits the learner who is studying a new language as it assists with pronunciation. Coming from a background in design and a passion for letters, we proved that type design has the ability to make prosody visual. This is called *visual prosody*. READSEARCH shows that visualizing expression, syntax, semantics, and phonemes leads to improve the skills of reading aloud and compre-hension, both for regular and beginner, struggling, and Deaf and hard-of-hearing readers.

1   Macro level: Knowledge of the basic or complex structure of typographic layouts/systems and the choice and combination of letterforms, typefaces, shapes, and/or images that can be seen within an overall typographic work.* Also involves an understanding of how this knowledge can be used, depending on the tool, medium and target group. *Typographic work/layout is understood within reading on screen, paper, or any other medium that can transmit typography.

Micro-macro level: Knowledge about typographic layout/system that covers a typographic work* and differentiates within the larger scope or creative artefact. This intermediate level mostly differentiates the typographic systems of a more complex work (i.e., book, website/app user interface (UI/UIX)). *Typographic work/layout is understood within reading on screen, paper, or any other medium that can transmit typography.

Micro level: Formal knowledge of the basic letterforms/shapes, typefaces and images (e.g., specific image/illustration usage, symbols, markings) and their smallest details, both in the light of conventional (disappearing letters) and non-conventional (remarkable/striking letters) letters. Also includes the understanding of how this knowledge can be used, depending on the tool, medium, and target group. If desired, the differentiations that the above might offer within a specific part of typographic structure can also be included.

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Rhythm

How letters look and the rhythm of the font play a critical role in the acquisition of meaning while reading. Legibility is the ease with which visual symbols (like letters) are decoded. This all starts with how words are perceived. To learn more about legibility, more information is needed on how the visual system reacts to letters (within a word) in terms of spatial frequencies and visual comfort. The comparison between low and normally sighted people is indispensable to reach a better understanding of the peculiarities of the target group. Within Bessemans' PhD dissertation (2012), she systematically explored and revealed different design parameters to improve the decoding skills for children with low vision (and normal vision). The main goals of the new projects within this research line are to elaborate on the relation between rhythm heterogeneity influencing stripe patterns/spatial frequencies, (visual) comfort, and legibility. READSEARCH will open novel pathways to improve legibility in printed matter for regular readers, as well as those who are struggling or impaired.

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Moving type & typography

The emergence of personal computing devices offers challenges and opportunities for improving reading on screens in comparison to reading on paper by means of typographic/type design. Animation has a lot of potential as support for the redefinition of legibility and reading on digital displays for specific readers. READSEARCH is setting guidelines for animation within letter forms and words themselves. In addition, technologies like the variable font technology are almost far enough along, and browsers are supporting this.

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Navigation

With digital screens and technology becoming increasingly ubiquitous in our lives, the understanding of new ways of reading takes on great importance. Moreover, the complexity, trustworthiness, and growth of information and new media are not only changing the way we read, but also how we read, and how much. For navigation, the aim is to examine how advanced typography can shape and improve the reader's reading skills and development. READSEARCH is searching for improved ways of reading on both micro and macro levels, in order to provide new approaches of (influencing) typographic navigation in non-linear and linear reading with combined advantages of both reading on screen and on paper. The aim is to offer new insights in the design of publications by means of grid systems, reading text, typefaces, and images, as well as their relations in the era of digitization. More generally, we are aiming to improve reading skills and reading fluency,

which is an important factor in enhancing general literacy skills (within new ways of reading) and knowledge of specific topics and/or categories.

Researchers within READSEARCH are design researchers: typographic designers who combine scientific research with design and who base design decisions on means of empiric research. This means that they try to link the objectivity of scientific research with the sensitivities of design: creativity; intuition; visual judgement. Within READSEARCH's various projects, science always forms a great source of inspiration. On the one hand, this is because the research material demands well-founded scientific support; on the other hand, it is because this support induces valid practical applications in the design originating during and after the research. In other words, READSEARCH's design methodology keeps an eye on current literature from an interdisciplinary perspective that helps with establishing a framework for the design process.

Science plays a supporting role in defining independent design parameters to test. It also contributes to defining "legibility" for each specific research project, and setting up legibility experiments in an objective and subjective manner for the envisioned target audience. Further, science drives a methodology from a designer, as well as from a scientific point of view. This enables empiric design research into legibility born out of and resulting in accurate and traceable research and results. In that sense, data-driven design represents a unique approach to practical legibility research. Collecting and visualizing data (data science) define decision-making in the development of innovative tools. Through the interesting data acquired during empiric research, these studies provide a better scientific base for the subject of typographic design and its practical outcomes and applications. READSEARCH's design research can be extremely useful for society, because it can guarantee practical applications in the form of visually improved reading material.

The aims of READSEARCH are embedded within the creation of typographic tools (micro, macro, and micro-macro typography) to improve the reading performance of people in different communities and/or environments. With the results of our research, we want to provide considerable insight into the creation of typographic tools and even typographic guidelines, which would enhance reading performance in a diversity of contexts. Our tools aim to have a positive influence on the reading behavior of our envisioned target audiences and/or reading environments. They can be implemented to improve reading education, or improve digital and/or analog reading. Tools and/or guidelines are not only aimed at the end user, the reader, but also the industry. The latter is understood by means of stakeholders and designers.

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READSEARCH's Praxis as an Example of a Sustained Research Program

The most essential component of a sustained research program is found in its connections. Being part of an academic institute (Hasselt University and University College PXL), and as an independent research lab herein, READSEARCH is established and valued as one of the three main research labs at PXL-MAD School of Arts: MAD-research. Regarding READSEARCH's core activities, connections can be developed between research lines and their subdivisions, and through collaborations on interdisciplinary levels.

Being able to work with multiple core research lines, each having its own subdivisions, allows us to create a long-term vision for our program. Furthermore, those research lines might interact with each other at a later stage, and new research questions/lines could be born out of this. Some of them hold longitudinal approaches that secure the sustainability of the research program. Having interdisciplinary collaborations also feeds back to our core research lines, and vice versa. In this way, a network is created, and dots are connected to ensure a more sustainable way of working—not only in our research program, but also in related fields of study.

In the specific case of READSEARCH, we are defining each research line with a main goal, a set of maximum 15 key words, key elements for research and target audiences. In that sense intrinsic legibility factors (and their according methods) are working bottom-up in which they can be applied for target groups. This allows for being surprised by correlating legibility factors and methodologies which would've been less easily encountered/discovered working in a top-down manner, where the target audience is the main goal or starting point.

In order to find and sustain funding and/or support, being embedded within an academic institute is of crucial importance. Therefore, continuous internal funding must be provided to make the research labs grow by means of PhDs, postdoctoral researchers, research projects, and project assistants.

We also try to find external financing to join forces on specific topics. An example is the collaboration with Microsoft Advanced Reading Technologies USA on visual prosody, which began in 2015. The research line of visual prosody has not been studied to this extent in the past, so this opportunity allows for a long-term collaboration arrangement, where each step in the research process leads to another. The shared wish of Microsoft and READSEARCH is to explore innovative ways to improve reading (digital and/or analog). Our first studies related to readers at the beginner level, and the results proved to be catalysts for other target groups like Deaf and hard-of-hearing people (but are not limited to those groups), which in turn resulted in new research questions. Our follow-up studies are exploring other/new research approaches and methodologies to establish more profound evidence for the efficiency of visual prosody.

Another source of finding external support is by means of governmental support. Currently, we have been successful in finding support for PhD students at the Research Foundation (Fonds Wetenschappelijk onderzoek, FWO) that stimulates and financially supports fundamental scientific research and strategic basic research in Flanders. We have also established a collaboration with the *Industriemuseum* (https://www.industriemuseum.be/en/events/printing-department) to innovate design thinking by means of old crafts in typographic history.

The search for sustaining collaborators has grown from engagement within the academic field where common interests have been discovered between different or similar fields of study. We have done this through networking: attending conferences, engaging with stakeholders, giving lectures, workshops, getting involved in big research set-ups (like E-Read Cost), and through having the opportunity to work interdisciplinarily as a member of the Young Academy member of a working group at Royal Flemisch Academy of Belgium for Science and the Arts, (KVAB: Koninklijke Vlaamse Academie van België voor Wetenschappen en Kunsten), setting up double degrees, participation in doctoral commissions, etc

Through our connection to an educational institution, READSEARCH has a clear influence on how the curriculum is shaped for graphic design. During typographic courses at PXL-MAD School of Arts, members of READSEARCH are implementing scientific approaches into the curriculum. In the BA program, assignments are written out that incorporate aspects of typographic legibility research, powered by active research lines, in an experimental and introductory manner. Undergraduate students get acquainted with the research in the field during the typography courses (theory as well as practice) and explore the role of the design researcher within the field of legibility research. Among our international master of arts programs, the Reading Type & Typography program (established in 2016) is strongly connected with READSEARCH. This degree program is centered on creating a self-initiated or prescribed project in the field of typography in relation to research about legibility and/or illegibility within the READSEARCH research lines of inquiry. Graduate students (internal and external) can enroll as interns in the READSEARCH research lab to experience and to conduct legibility research. The work (theory and practical experiments) created might have the potential to be further explored or embedded into ongoing research lines of READSEARCH.

Education enforced by means of design research is a strong tool for raising awareness and a means of educating academic design students in another way. The benefit of having an academic education lies in the fact that compared to a profession-oriented study, students learn the basic skills and get the necessary framework to be

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able to look critically at one's own work and to reflect on the work of others, whether merely for design purposes or to continue on into more academic fields of study and/or design research. Also, the latter fits directly into the research lab. Typography has many connections with interdisciplinary scientific fields that is of high importance for the various graphic professional specializations in order to broaden horizons and seek innovation. It has only been in the past seven or so years that (the practice of) typeface and typographic design has become an established field of (academic) study, which is also growing in recognition in the cultural mainstream of academic fields and is able to seek academic merit. Furthermore, typeface and typographic design apply the research in terms that the general public can engage with.

Knowledge-Bound Typographic Research as an Investment for the Future

Within an academic context, hybrid researchers are eager to more fully understand legibility in relation to the practice, especially in different contexts. Through their research, they give the practical profession of typography a better scientific foundation. In addition, such practical legibility research provides interesting data that designers, as well as researchers and stakeholders, can use to address the needs of readers—both general and those with disabilities/impairments—and to support new/evolving ways of reading more efficiently. In addition, design researchers are refreshing typographic education, which in the past has been fed primarily by historical and practicing practice and where the scientific interdisciplinary framework that typography provides has often been disregarded.

Unlike before, the interdisciplinary approach, as well as the inclusiveness that practical typographic legibility research encompasses within its studies, guarantees a healthy balance between an appropriate research methodology, valid test material (design parameters), proper reading environment, and readership. Bringing these skills together from interdisciplinary perspectives on equal footing constitutes the future of the scientific side of typography.

Academic design research within typography is pioneering and, as already demonstrated, offers an opportunity for innovation and development, now and in the future. This kind of typographic research pushes all three types of research activity: basic research, applied research, and experimental development.

The design of text, typography, has up until today incredibly relevant, yet it was barely studied from an interdisciplinary perspective before. Universities and colleges play an important role within the academization of typographic research and typographic education. We

should not forget that they also have the potential to create a fertile research environment in which researchers can freely make new discoveries that lead to new and further insights. From there, know-how can be quickly restructured and recombined to explore interdisciplinary challenges within renewed research paths (through the development and flourishing of ground-breaking research lines), and education thus supports the increasing importance of practical legibility research. It is this mindset that will have an impact on talent creation and the social (and economic) importance of reading.

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