Curriculum Vitae

Research Statement: a narrative on your scientific career in past, present and future

- **Short CV**

I'm prof. dr. Ann Bessemans, **award-winning designer and legibility specialist** within my research lab **READSEARCH** (°2015) at PXL-MAD School of Arts (MAD-Research) and Hasselt University (UH) in Belgium. Within READSEARCH, I am supervising an international team: PhD (5, 1 double degree), postdoc (1), research assistants (2) and several interns (variable #) to gain insight within the field of **practical legibility research**. At READSEARCH we profile ourselves as **design researchers**: typographic designers who combine scientific research with design. This means we base design decisions on results of accurate and traceable research, linking the objectivity of scientific research with the sensitivities of design, creativity, intuition, and visual judgment. In other words: **connecting the artistically reflective and scientifically analytical**. READSEARCH is included in the UHasselt Data Science Institute because of our vision on **data driven design and interdisciplinary approaches** (Art & Science).

At PXL-MAD School of Arts, I teach typography and type design to Bachelors and Masters (35%) in an **educational programme** in Graphic Design. Since 2016 I am also the programme director of the international Master 'Reading Type & Typography', because the subjects match READSEARCH's research lines. These masters are often awarded which proves the quality of the work as well as the urge for the interdisciplinary approach in the field of practical legibility. Next to my academic and teaching activities I am a member of the reflection group Art, Science and Technology at the Royal Flemish Academy of Belgium for Science and the Arts (**KVAB**) (2017 onwards) and an educational committee member and lecturer at the **Plantin Institute of Typography**. I act as an advisor (2021 onwards) for **Learning A-Z, a Cambium Learning® Group** Company. Since 2022 I'm an advisory board member for the journal **Visible Language**. In the past, I was: 1) an elected member of the Young Academy (2016-2022) and within the same organization a voted board member for the workgroup Art & Science (2017-2019) 2) an active member (October 2014 – October 2018) in a European COST Action *Evolution of Reading in the age of digitisation* (E-Read) 3) a steering and advisory board member (2017-2019) for the renewal of the printing department at the 'Industriemuseum' in Ghent 4) a member *SIG (Science Interest Group) on Type & Science* founded by ATypI (Association Typographique Internationale) (2009-2014).

- **The road to the current position (ZAP 1: 1/10/2018–present & Docent/Hoofddocent 1/02/2017 — present) in light of fundamental research:**

I studied **graphic design** at PXL and graduated summa cum laude with an awarded project (MA in 2005). At the University of Reading (2009) and at the Plantin Institute of Typography (in association with AP University of Applied Sciences and Arts) (2010), I took intensive courses in **type design** and obtained the highest distinction. Since 12/2005, I have been teaching typography, type design and graphic design at 50% employment that I combined with the Ph.D. program (12/2005 — 25/10/2012). I have not only dedicated myself to the Ph.D., but also to **improving the teaching line of typography as well as renew it within an interdisciplinary legibility view**. I have founded typographic masterstudio's and co-founded two new curricula at PXL-MAD and am again active in the third reform.

In 2012 (25/10) I successfully defended my Ph.D. dissertation, supervised by famous type designer Prof. dr. Gerard Unger (1942-2018) and co-supervised by prof. dr. Bert Willems, **'Type Design for Children with a Visual Impairment**' (Leiden University & Hasselt University). The font '**Matilda**', the artistic output, is currently used in children's books (publisher Lannoo, books 'Vos & Haas'). From January-May 2013, I had the opportunity to consult **Monotype & MIT AgeLab** on

practical legibility studies and enrol in my postdoctoral trajectory (2013-2017). In 2014 the team of **Microsoft Advanced Reading Technologies** contacted me to establish an interdisciplinary collaboration around expressive speech where creative artifacts are the driving force for innovation. Our reading researches are fundamental for the development of Reading Coach and One Note learning tools (Microsoft). Since 2015 until present I have been **yearly granted** for my innovative and groundbreaking proposed legibility projects within **visual prosody**, a feature that helps readers understand the expression and emotional layers in the text through type design. Helping readers see the expression in text results in improved reading comprehension. In addition to the implementations envisioned by Microsoft, the **expressive fonts** are currently being used in a reading method of the leading educational publishers in Belgium (VAN IN). In 2021 I acted as **visiting professor** for Graphic Design in the Reading Experience course at the Academy of Fine Arts, Katowice, Poland.

Recognition for my work has been granted through: 1) **over 40 invited speaker lectures** 2) similarly being invited to give workshops 3) being involved in the organization of conferences, exhibitions and lectures 4) being asked to review articles for several journals including 'Cognition' 5) being selected as a finalist in the New Scientist Wetenschapstalent 2015' and the Johnson & Johnson Women in STEM2D award (2018) 6) being invited by the Belgian King and Queen for a Palace concert in which they honored young talents (2017) 7) being part of the Review committee for the annual lectures at the ATypI (Association Typographique Internationale) conferences (2018-2020).

- **Career path: Research Focus, Research Agenda and Research Vision**

Research Focus — My research focus has evolved out of eye-opening confrontations and experiences encountered during my Ph.D. I came across **interdisciplinary aspects of typography and scientific legibility** studies which proved essential to my future work. It was due to this pioneering approach **where the gap between the field of typography and scientific disciplines was closed**, that prof. dr. Unger selected my project to supervise, as well that I was granted twice by Microsoft Advanced Reading Technologies during my Ph.D. Program. Fundamentally rooted in type design & typography, I introduced the importance of the concepts of **internal and external validity** in test materials in my Ph.D. and highlighted the need for **high-quality controlled test material (fonts) by means of parametric designs** in order contribute in a meaningful sense to knowledge on legibility: **isolating causal factors and avoiding confounding variables**. Within READSEARCH, we use these key-concepts described above on a daily basis and throughout our various research lines. Comprehensive legibility/readability research considers both the requirements of **scientific methods and typographical practice**. Doing so, it guides a **methodology from both a designer and scientific point of view**. In that sense **data-driven design** holds a unique approach for practical legibility research and the development of innovative tools.

Research agenda — In light of the aforementioned focus, I have defined four research lines (**Visual Prosody, Rhythm, Moving Type & Typography, Navigation**) that are currently explored by READSEARCH in a successful manner. Connections are developed between research lines and their subdivisions through collaborations (internal and external) on **interdisciplinary levels** to create long-term interaction that secure the **sustainability of the research program**. In this way, **a network is created and dots are connected to ensure a more inter/multidisciplinary and sustainable way of working**—not only in our research program, but also in related fields of study. We continue to work passionately to raise the awareness needed to bring the added value of **typography, as a vehicle of science**, to the forefront of the scientific field of legibility.

Research vision — READSEARCH's projects are pioneer work and are an **important contribution** to the legibility research and the international typeface design and typography. In this kind of research, the added value is in the combination of the fine arts design and the sciences through typography. In the past, these worlds functioned mostly separate from each other. This kind of research can be extremely useful because it can **guarantee practical applications** in the form of better reading

material, methods and even ways of studying reading. My studies **give the practice of typeface and typographic design a better scientific foundation and provide interesting data, which typeface designers and stakeholders can use to accommodate the needs of the reader, both normal as well as impaired**. READSEARCH's aims are embedded within the **creation of typographic tools to improve the reading performance of people in different communities and/or environments**.
Implementation of Agenda and Vision — To valorise our research vision and agenda, we have several projects (from PhD to postdoc and collaborative research, as well as with Guest prof. Perrondi from the University of Venice), in which the **parameterization of typographic design processes** are explored with the aim of better **understanding which formal characteristics influence reading behaviour.** Noteworthy is the ongoing collaboration with Microsoft Advanced Reading Technologies since 2015, collaborations with Prof. dr. Ann Dooms on automatization and deep learning neural networks, and other interdisciplinary projects with the field of machine learning (e.g. Bragg et al., 2017; PhD Guidotti). Results of such projects **have already found their way into learning tools, reading methods and implementation of font use in books**. This shows our success in bringing together interest groups and industry in which the crossover between art and science is decisive for innovation.

Skills, experience, and approach with regards to the project application. I have undergone training to develop a state-of-the-art expertise within **practical legibility research**. This expertise is defined by **(a)** exploring the limits of legibility within typography for different audiences/reading environments, **(b)** developing practical and typographic legibility research within a new conceptual and interdisciplinary framework that utilizes typographic design research, **(c)** methodologies where design decisions for test materials are based/inspired by results from (scientific) literature within an interdisciplinary framework, **(d)** and where the final design (design parameters) is based on accurate and traceable research that ensures that makes our data-driven design possess a unique methodology, **(e)** where data collection informs decision-making in the development of innovative tools and guidelines to improve reading performance in a variety of contexts and a variety of readership and reading environments, and **(f)** finally, the skills acquired as type designer to enable to comprehend the practicalities (both in terms of technology and theory) of typeface design to contribute towards the field of applied art.

Moreover, all our practical legibility research has a **direct social impact**, as the typographic tools we envision can ensure better reading materials, inspire new learning methods and/or pave the way for a more controlled and improved form of type design creation. These, in turn, guarantee a **better future in a reading society and enriches typeface creation**. It is the knowledge regarding the **creative artifacts/visual input that can stimulate research into applied innovative ways and new technologies to improve reading and design type**. One needs to be aware and understand that incorporating the practicalities of **letters and typography is key** to create an impactful output (e.g. specialized font) aimed at a reading society.

Within the proposed project that aims to use machine vision and deep learning to help establish (through the understanding of parameterized typefaces) deep generative networks for producing 'real life' vectorized typefaces, it is **essential to have an understanding of the practice and interdisciplinary field** that affects typography and type design. **Deep learning techniques trying to address some of the challenges in type design research cannot be successful without the expertise of the typographer, or practical legibility researcher, involved**. This is an interdisciplinary research topic that has previously been unsuccessful because of the complex nature of both typography (specifically via understanding and utilizing design parameterization via/into vectors) and deep learning. **This proposal belongs to both the practicing field of typography and the sciences.** This interdisciplinary approach should provide insight into both the technical and the more artistic nature

of the problem statement. Therefore, prof. dr. Iñigo Bermejo Delgado and myself see the need to unite our skills and expertise. This project benefits from Galli's approved PhD '**Improving legibility research through parametric typeface design**' that I am supervising. We consider this collaboration a significant strength, as it enables us to **identify type features** that may lead to new, unintuitive discoveries throughout the process. Moreover, by involving **expert judgments from type design researchers throughout the entire process**, rather than solely reviewing the end product, this project ensures a comprehensive and thorough exploration of the subject matter.

Five main publications and/or achievements All peer reviewed. • Sieghart, S., Rohles, B., Bessemans, A. 2024. Empowering Independence Through Design: Investigating Standard Digital Design Patterns For Easy-to-Read Users.. In Proceedings of the CHI Conference on Human Factors in Computing Systems (CHI '24), May 11–16, 2024, Honolulu, HI, USA. ACM, NewYork, NY, USA, 18 pages. https://doi.org/10.1145/3613904.3641911 • Bessemans, A. , Renckens, M., Bormans, K. ,Nuyts, E., Larson, K. (2019) "Visual prosody supports reading aloud expressively." *Visible Language*, 53.3 (pp 28-49). • Bessemans, A. (2019) 'The gap between science and typography.' in Mastoridis, K, Sioki, N., Dyson, M. C. *Design for Visual Communication Challenges and Priorities*. (pp 21-36). Cambridge Scholars Publishing. • Walker, S., Black, A., Bessemans, A., Bormans, K., Renckens, M., Barrat, M. (2018) "Designing digital texts for beginner readers: aspects and processes." In Barzillai M., Thomson, J., Schroeder, S., van den Broek P. *Learning to Read in a Digital World*. (pp 31-57). John Benjamin's Publishing Company. • Bragg, D., Azenkot, S., Larson, K., Bessemans, A., Kalai, A. (2017) 'Designing and Evaluating Livefonts' Proceedings of the 30th Annual ACM Symposium on User Interface Software and Technology. • Bessemans, A. (2016) "Matilda: a typeface for children with low vision" In Dyson, Mary C. & Suen, Cheng *Digital Fonts and Reading* (pp 19-36), World Scientific Publishing Co.

Other scientific output and impact

I am the initiator of a Blended Intensive Program (BIP) entitled Design for Digital Reading. In this BIP, new ways of digital reading (whether for a specific readership or not) are thoroughly studied, questioned, experimentally developed, and elaborated through creative typographic artifacts. In sum, predictions will be made of how typography can creatively unfold in a rapidly changing technological reading environment. • I was involved in the organization of conferences (ATypI 2018, Antwerp), exhibitions (OVERLAP. The no man's land between Art & Science (2021-2022), Rite de Passage 2018, Antwerp, TDC 61 2016) and lectures series (A series of case studies into experimental typography, ATypI (2020). • Implementation of creative artifacts into educational tools: research based typefaces. 2021: The implementation of typeface Matilda (research based typeface) in 'Vos en Haas' children's reading books by publishing house Lanoo. Note: the fonts were already made available for visually impaired education in the Netherlands and Belgium after the defense of the Ph.D (2012). 2018: implementation of the Prosodic Typefaces in reading materials of the learning Method 'Lees TALENT' by Educational Publishing House VAN IN. Age group 7-11 • Bessemans, A., Doom, M., Merkx, F. & Wynants, N. (2020). *OVERLAP. The No Man's Land between Art & Science.* A book publication by The Young Academy of Belgium (Flanders) & uitgeverij KOMMA.

List the representative and substantial fellowships, projects and any other kind of research grants you obtained within the five years preceding the submission date of this project application.

2018: Awarded 75.000$ research gift from Microsoft Corporation Advanced Reading Technologies USA / 2019: Awarded 75.000$ research gift from Microsoft Corporation Advanced Reading Technologies USA / 2020: Awarded 75.000$ research gift from Microsoft Corporation Advanced Reading Technologies USA / 2021: Awarded 75.000$ research gift from Microsoft Corporation Advanced Reading Technologies USA / 2022: Awarded 75.000$ research gift from Microsoft Corporation Advanced Reading Technologies USA + Dpt. Culture & Heritage Flemish Government 'Meester-leerling' traject (29.999,7 Euro) /2023: Awarded 75.000$ research gift from Microsoft Corporation Advanced Reading Technologies USA