**Institution:** University of Reading

**Unit of Assessment:** 32 Art and Design: History, Theory and Practice

**Title of case study:** Transforming global reading experiences: an approach to typeface design that balances technical and cultural needs

**Period when the underpinning research was undertaken:** 2000 – 2020.

**Details of staff conducting the underpinning research from the submitting unit:**

| Name(s): | Role(s) (e.g. job title): | Period(s) employed by submitting HEI: |
|---|---|---|
| Prof Gerry Leonidas | Professor | 01/10/98 – present |
| Prof Fiona Ross | Professor | 01/10/05 – present |
| Dr Vaibhav Singh | British Academy Research Fellow | 01/09/17 - present |

**Period when the claimed impact occurred:** 2014 – 2020.

**Is this case study continued from a case study submitted in 2014?** Y

## 1. Summary of the impact

Digital font design for writing systems of the world ('non-Latin' scripts) lacked widely applicable, publicly accessible methodologies that integrate language requirements, font technologies, and cultural acceptability. The research addresses all three aspects, making font design widely applicable and replacing proprietary, script-specific, or ad-hoc approaches. The work has influenced policy decisions at leading tech companies, transforming the reading experience of people across the globe. It has directly influenced Google and Adobe's development of software for the visual presentation of world languages and, through application in the design of specific typefaces, established open-source benchmarks and standards for important non-Latin scripts. The research has provided a design methodology that supports the digital restructuring of the type industry worldwide, as more languages require a digital presence. It has directly informed exhibitions and workshops which reach beyond the type design community to shape cultural understanding of world scripts.

## 2. Underpinning research

Leonidas, Ross and Singh's research explores the representation of world languages through their script systems, and how these are represented typographically through changing technologies. The research investigated challenges that arise from the design and distribution of non-Latin fonts for majority and minority scripts. It addressed the presentation of language within digital technologies through an analytical framework that interrogates historical sources together with scripts as typographic systems. Research undertaken by Leonidas, Ross and Singh considers historical, cultural, social, economic, and technical evidence in order to:

- analyse existing forms of scripts;
- establish the constraints of previous mechanical reproduction systems on the representation of those scripts; and
- inform the design decisions for developing new digital fonts.

Ross and Singh considered the technological constraints that have been crucial within a historical context in determining the appearance of text in South Asian typography (used by approximately 20% of the world's population). They scrutinized relevant archives to map the transition of South Asian letterforms from manuscript to foundry type, to digital type, including the University of Reading's Non-Latin Type Collection, to elucidate design decisions that either purposely or unwittingly shaped each stage of typographic practice.

Leonidas's research draws on an analysis of historical forms and particularly the early 19th

century Greek types cut by Firmin Didot, to inform contemporary design processes and feed into standards for digital typefaces. In examining approaches taken by Adobe in developing large typographic families with Greek complements, Leonidas identified design challenges and font engineering requirements for solutions unique to digital technologies, such as the pairing of monotonic and polytonic Greek variants (output 6).

The research finds its application through collaboration with tech companies and the type industry. This has been achieved through projects with designers and type foundries, and through consultancy for tech companies (for example, Ross on Adobe Bengali, Leonidas on Bickham Script Pro). The application of the research is in the creation of fonts and supporting resources for contemporary digital environments across the full range of platforms: printed, screen-based, and environmental (for example, fonts for academic publishers and document design applications, fonts for mobile interfaces, and fonts for signage). This engagement with industry ensures the relevance and applicability of the research to changing font technologies, delivery platforms, and the needs of readers. Ross's research and co-design with Tiro Typeworks of eight Indian-script typefaces for the Murty Classical Library of India (Bangla, Gurmukhi, Hindi, Kannada, Marathi, Sanskrit, Tamil, and Telugu), published by Harvard University Press between 2014 and 2017, resulted in the first set of digital fonts in this range of scripts that meet the latest technological standards while achieving a high quality of visual design that respects cultural traditions.

## 3. References to the research

This research is at least 2* quality. The first three papers listed are double-blind, peer-reviewed in *Philological Encounters*, a Brill journal dedicated to the historical and philosophical critique of philology. The fourth item is practice-based work for Harvard University Press who, in 2012 commissioned typefaces for the prestigious Murty Classical Libraries of India; the research listed here is part of that programme. The 2013 paper is blind peer-reviewed. Ross's 2009 book is an invited second revised edition.

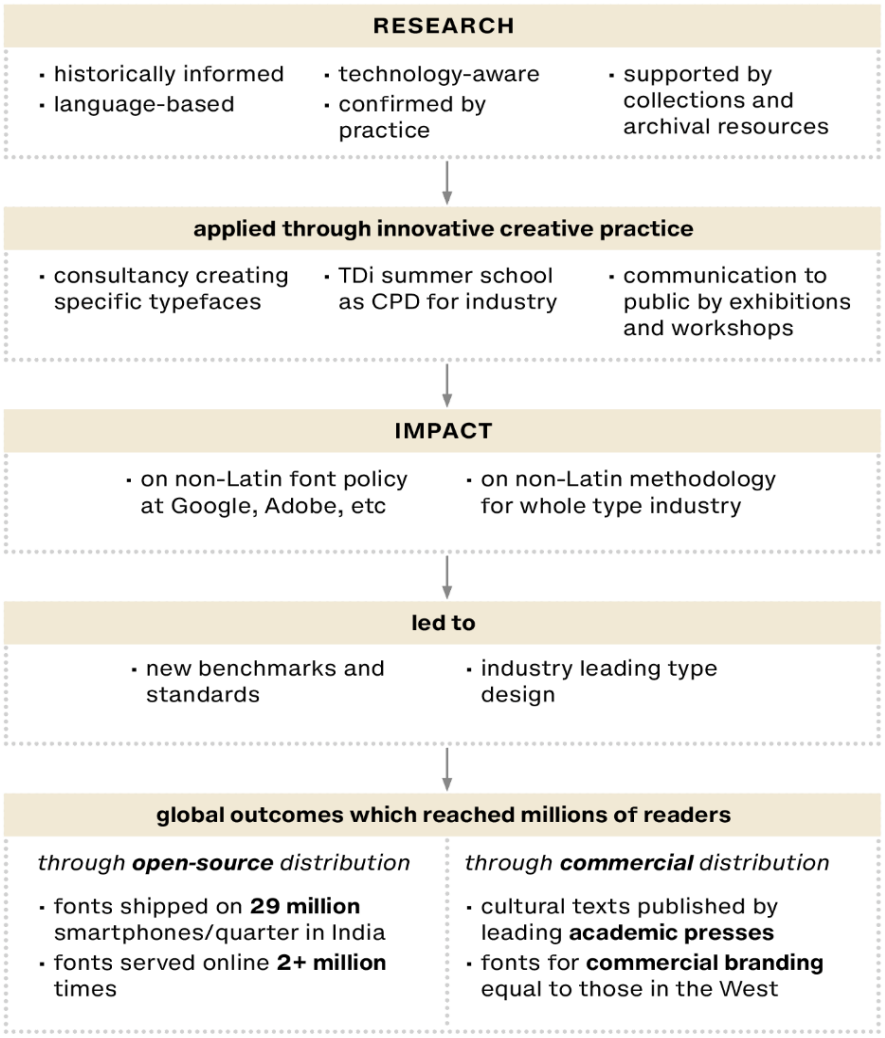

1. Leonidas, G. (2018) Enabling modernity: innovation in modulated Greek typefaces, 1998-2007. *Philological Encounters*, 3 (4) pp. 412-440. ISSN 2451-9197. Doi: https://doi.org/10.1163/24519197-12340055
2. Ross, F. (2018) Historical technological impacts on the visual representation of language with reference to South Asian typeforms. *Philological Encounters*, 3 (4) pp. 441-468. ISSN 2541-9189. Doi: https://doi.org/10.1163/24519197-12340054
3. Singh, V. (2018). The machine in the colony: technology, politics and the typography of Devanagari in the early years of mechanization. *Philological Encounters*, 3 (4) pp. 469-495. ISSN 2451-9197. Doi: https://doi.org/10.1163/24519197-12340051
4. Ross, F. (2017) Fonts for classical texts in a digital age (practice-based output comprising 6 Murty typefaces). CentAUR ID: http://centaur.reading.ac.uk/86578/
5. Ross, F. (2013). Digital typeface design and font development for twenty-first century Bangla language processing. In: Karim, M. A., Kaykobad, M. and Murshed, M. (eds). *Technical Challenges and Design Issues in Bangla Language Processing*. IGI Global, Pennysylvania, U.S.A., pp. 1-15. Doi: https://doi.org/10.4018/978-1-4666-3970-6.ch001
6. Ross, F. (2009) *The printed Bengali character and its evolution*. Shisu Sahitya Samsad, Kolkata, India, pp. 251. ISBN: 9788179551849.


## 4. Details of the impact

The impact of the research resides in the adoption of its methodologies for the design of 'non-Latin' fonts, an area of growing importance as applications increasingly support a larger number of languages and script systems worldwide. The research has been transformative of the approach to digital font design for 'non-Latin' scripts. It has been adopted by major industry players and small start-up foundries alike, thereby improving the reading experience of millions. It has also offered new routes to understanding world script systems through publications, industry engagement, and exhibitions (E1).

**From research in non-Latin type to influencing global reading experiences**

*From research and application to impact*




## Influencing policy

The research has influenced non-Latin font policies at Adobe and Google. These determine how software renders languages across a range of different technologies and document types. The analysis of historical forms has provided the evidence base and examples of best practice required by software developers who would otherwise approach the problem from a purely engineering standpoint. Adobe and Google have embedded insights from the research to systematize their type design processes, and to provide a QA procedure for non-Latin font development through:

- determining required character sets;
- using historical sources to confirm character shaping decisions and correct substitution/placement of characters (script behaviour);
- using document design analysis to confirm the range of font variants required for a script (E2).

The research team has distilled their findings into practical and applicable guidance for the design of specific typefaces in a course run for Adobe and Google engineers and designers called Type Design Intensive (TDi). Since 2008, this summer school, curated by Leonidas, has offered access to the Non-Latin Type Collection and other historic material, and is regarded by tech companies as essential professional development for engineers, project managers, product

managers, and visual designers (E3, E4).

**Establishing and distributing benchmarks and standards**

Production of fonts informed by the research has established typographic benchmarks and standards for non-Latin scripts. Standards in this industry are typically distributed through exemplars rather than stand-alone documentation. The research has directly influenced exemplar fonts that have been shared with and by the font design community. Leonidas' research informed the development of Source Serif 2 through designing character sets for historical and current Greek. Senior Manager for Adobe Type Development commented: "The character sets, OpenType feature code, and other project data that have been developed through this collaboration between Adobe and Reading are shared freely and publicly on GitHub as reference material to help other font developers understand how to build fonts according to the specifications we have tested for ourselves" (E5).

**Cultural reach**

*Making high-quality design publicly available*

The researchers' approach to typeface design has been applied and adopted by major publishers to benefit readers of academic and commercial publications in Indian languages. Ross's award-winning fonts developed for the acclaimed Murty Classical Libraries of India project for Harvard University Press provide historically accurate and culturally relevant fonts for non-commercial use. The fonts use OpenType technology to support the complex shape substitution and positioning required for the correct display of these languages. Updated ('Tiro') versions are freely downloadable for the current Apple MacOS, and Google will offer them through its webfont service. The research is also communicated to design professionals through discussion in professional journals (E6).

*Default operating system fonts read by millions*

Google's Noto typeface family includes scripts for all languages recognized by the Indian constitution (Noto Serif Bengali, Tamil, Devanagari and Gujarati, among others, have input from Reading researchers). Noto is the default for email, SMS, and web browsing on Android phones, which comprise 91% of the 32 million smartphones shipped in India in Q1 2019 (E7). Another default operating system font co-designed by Ross, Microsoft's Nirmala UI, continues to be expanded with South and Southeast Asian scripts (E8).

*Emphasising language and script to ensure cultural resonance*

The research stresses language and script knowledge as the basis of type design. It overcomes arguments that only native speakers can design for their own script systems and promotes the integration of language and script knowledge into the design process. This has been applied by new foundries such as Rosetta, Brand New Type, and Universal Thirst (set up by Leonidas' and Ross's postgraduate students). These foundries rely on international collaboration. Commercially, they are able to offer fonts that are equal in quality and innovation to those used by brands in the West, achieving cultural parity with integrity. Examples are the Dhaka Art Summit 2020 with type designed by Universal Thirst, and new branding for the ABP news media by Brand New Type (E9).

*Enhancing cultural understanding of global scripts*

The research has contributed to enhanced cultural understanding through exhibitions and public-facing events, Ross's exhibition, co-curated with doctoral researcher Izadpanah, "20th-century Persian newspaper types: investigating the design process" (Reading, May 2019) attracted journalists, curators, politicians, and linguists, notably from the Iranian diaspora in the UK. It featured on BBC Persian, which has an audience of more than 13,000,000 Persian speakers worldwide and circulated online to a positive reception (E10). Ross's and Singh's 2019 workshop at the British Library, "Introduction to non-Latin scripts", for a general audience, led one participant to remark that it had led to a "deeper knowledge of Indian scripts"; and Ross contributed an online article 'Two Bengali grammars – a typographic perspective' for the Early Indian Printed Books public-facing website.

## 5. Sources to corroborate the impact

**[E1]** Writing systems of the world: evidence of changes in attitudes to and design methodology for 'non-Latin' type

**[E2]** Document design analysis as a tool in font design

**[E3]** Testimonial to influence on font policy at Adobe

**[E4]** Testimonial to TDi contribution to font policy decisions at Google

**[E5]** Example of open-source documentation

**[E6]** Evidence of engagement with the design profession

**[E7]** Evidence of font use on smartphones in India

**[E8]** Research-informed approaches to typeface design

**[E9]** Evidence of new start-up foundries specializing in fonts for writing systems of the world

**[E10]** English synopsis of BBC Persian video