

Design of Translation: Reflections on Linguistic Practices in Design Research

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This article proposes a discussion about the linguistic and cultural frictions in design research from a French design research perspective. The DRS2018 conference provided a shared space to observe the diverse practices of design research in different countries and to question the reach of non-native English-speaking design researchers' voices as well as their strategies for adapting to a mainly anglophone research community. The first part of the article builds on two concrete examples that question the use of English as the normative framework for disseminating research: the policy of research dissemination in France and the semantics of the word design across languages. The second part of the article looks at young design researchers' strategies to discuss the different "academic bricolages" (academic makeshifts) they design to insert themselves in a globalized context. This article, written by a group of design PhD candidates, whose work cross the boundaries of other disciplines, aims at contributing to the continuous reflexion about design research and its practices.

Keywords: *translation; linguistic; format; research accessibility; epistemology*

1 Introduction

For a decade, a growing body of research practices has emerged in the domain of design in France. This growing community has crafted and developed a common language and common resources that meet academic norms inherited from the different disciplines from which the francophone design research community stemmed. In France, the English language has not been adopted in a uniform way by all academic disciplines and this creates some issues when it comes to sharing the research internationally. This article formalizes the reflections of a group of young French design researchers who presented their research at the DRS2018 international conferences. Organized by the Design Research Society, this conference was held at Limerick in Ireland from the 25th to the 29th of June 2018. During the plenary sessions, organizers had chosen to use the participatory tool sli.do (figure 1), to encourage participation from the crowd. This tool lets the audience share questions and reactions using their smartphones. Several times, the "#whyisdesignsowhite" hashtag appeared on the screen. That intervention aimed at questioning a design research perceived

as performed by and for privileged researchers. Even if the hashtag itself was focused on skin colour to evoke the de-colonialist approach to design research, it was opening a larger debate on several forms of dominations at stake in the practice of design research. For us, this debate sparked a second one: the question of linguistic domination in a discipline that keeps looking for the “multiple voices of design”.

The conference, originally organized by an anglophone association, happens entirely in English but brings together participants with very diverse origins: from South America to South-East Asia and the Caribbean, to name only a few regions. As one’s culture is intimately related to one’s mother tongue (Tornay, 1978), the cultural debate led to linguistic claims. One extract of the discussion on the platform (see figure 1) showed that using one’s mother tongue to debate in a mainly anglophone crowd is a strong identity statement, a sign of protest against a perceived domination.

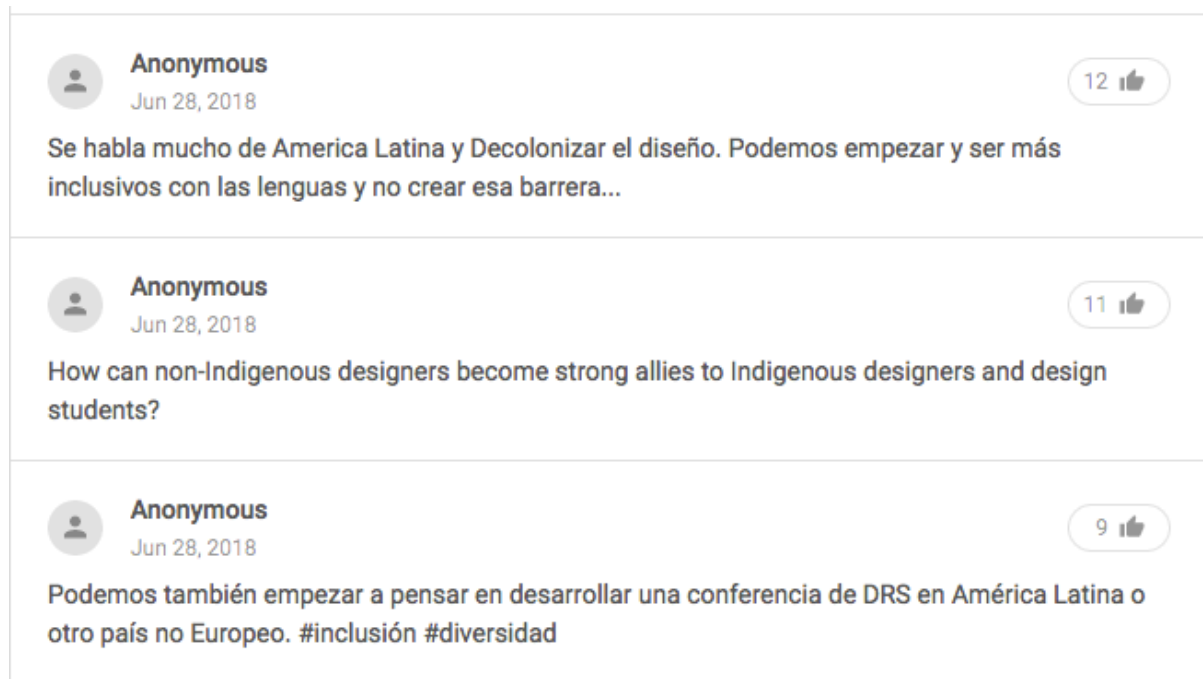


Figure 1: Screenshot of “sli.do”, an audience interaction tool, during the Social & Public panel (2018/06/28).

« Anonymous (June 28, 2018): People talk a lot of Latin America and decolonization. We can start by being more inclusive with languages and not create this barrier.

Anonymous (June 28, 2018): We can also start thinking about developing a DRS conference in Latin America or another non-European country. #inclusion #diversity »

As French-speaking researchers, this debate resonated with us and from the question #whyisdesignsowhite, and the reflections it sparked (see figure 1), we grew an interest in its variant #whyIsDesignResearchSoEnglish. The question of why design is so white has a strong historical dimension that calls for a debate about neo-colonialism and its effects on an international discipline. Here, our aim is not to compare profound racial issues with those linked to language, nor do we want to frame the French language as a victim of this issue. However, we argue that the so-called universality of design research materializes itself through the form of a language whose mastery of grammar and culture reveals strong

inequalities. In this article we explore the possibilities of plurilingual design thinking and its impact on the francophone design research community.

The first part of the article proposes a survey of the cultural and linguistic diversity of the DRS2018 conference. We contrast this survey with two use cases that question the adoption of English as a normative frame for research publication and dissemination: the politics of research dissemination in France as well as the culturally diverse acceptations of the word design. In the second half of the article we report on young design researchers' strategies to insert themselves in a context of localized but internationalized research. This article more broadly aims at contributing to the on-going reflections about research and its practices.

2 An overview of linguistic practices in design research

The Design Research Society defines itself as “a learned society committed to promoting and developing design research” (DRS, 2018). Established in London in 1966, it is the oldest interdisciplinary and international association in the design research community. A survey of participants at the DRS2018 (2018) offers a glimpse into geographical distribution of design researcher at an international level (see figure 2): 35 countries were represented through the laboratories of origin of the researchers for a total of 615 participants.

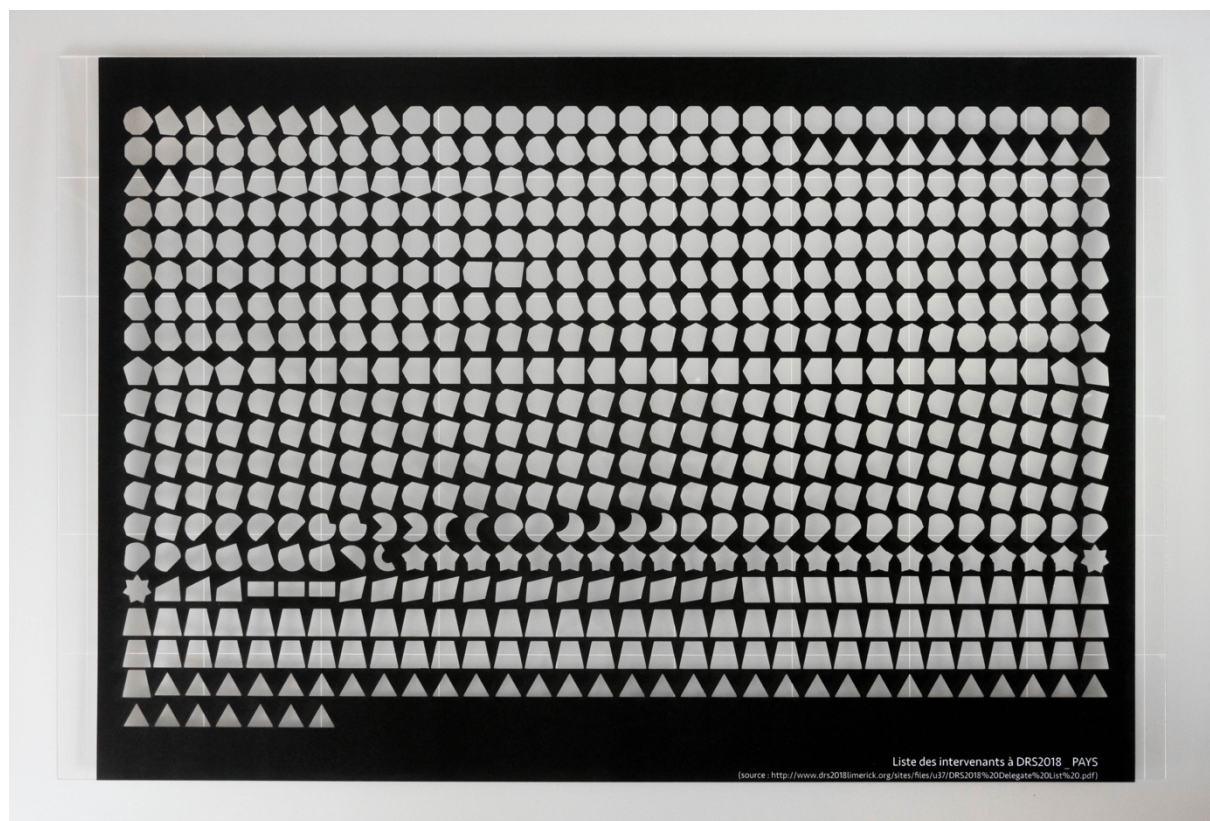


Figure 2: The 615 delegates at DRS2018 (and PhD by design conference) sorted by country. Each country is associated with a shape. Each country shape is unique but deliberately hard to distinguish from a distance, simultaneously providing an overview while revealing the plurality of origins.

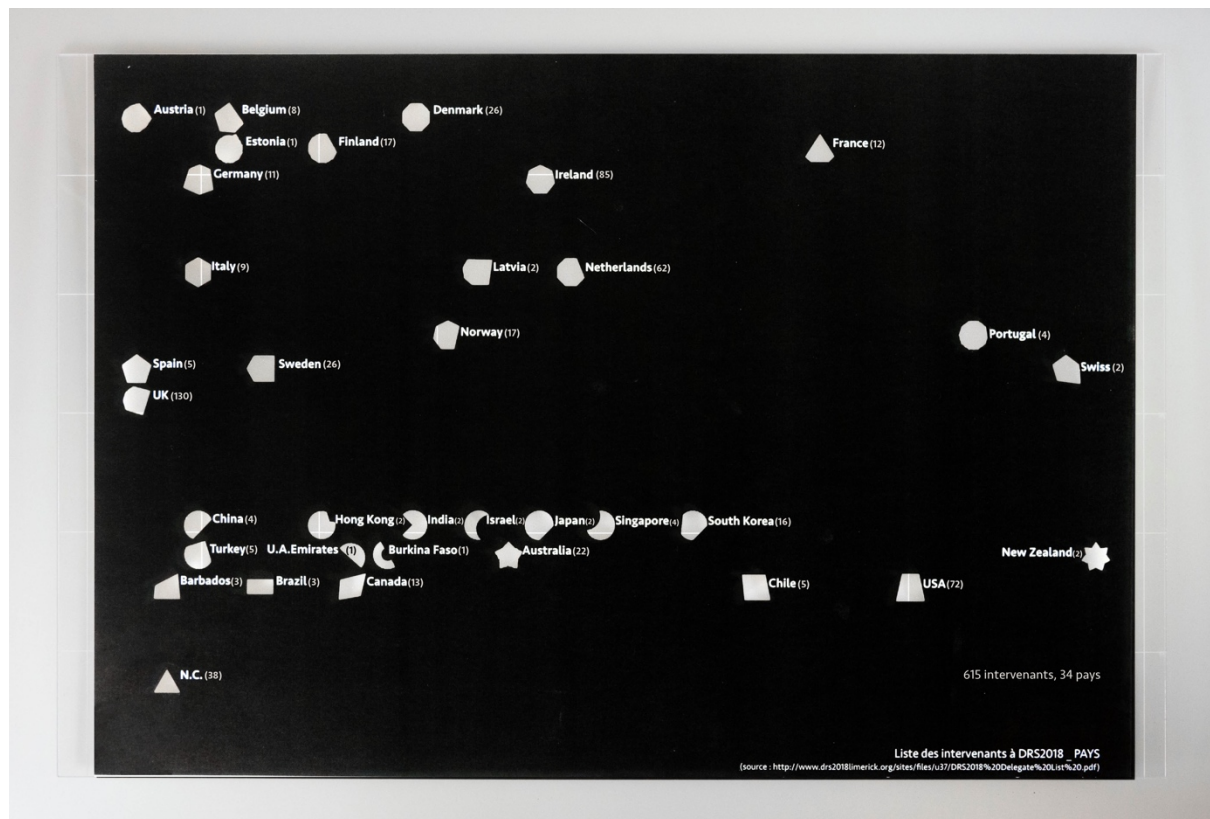


Figure 3: The 34 represented countries.

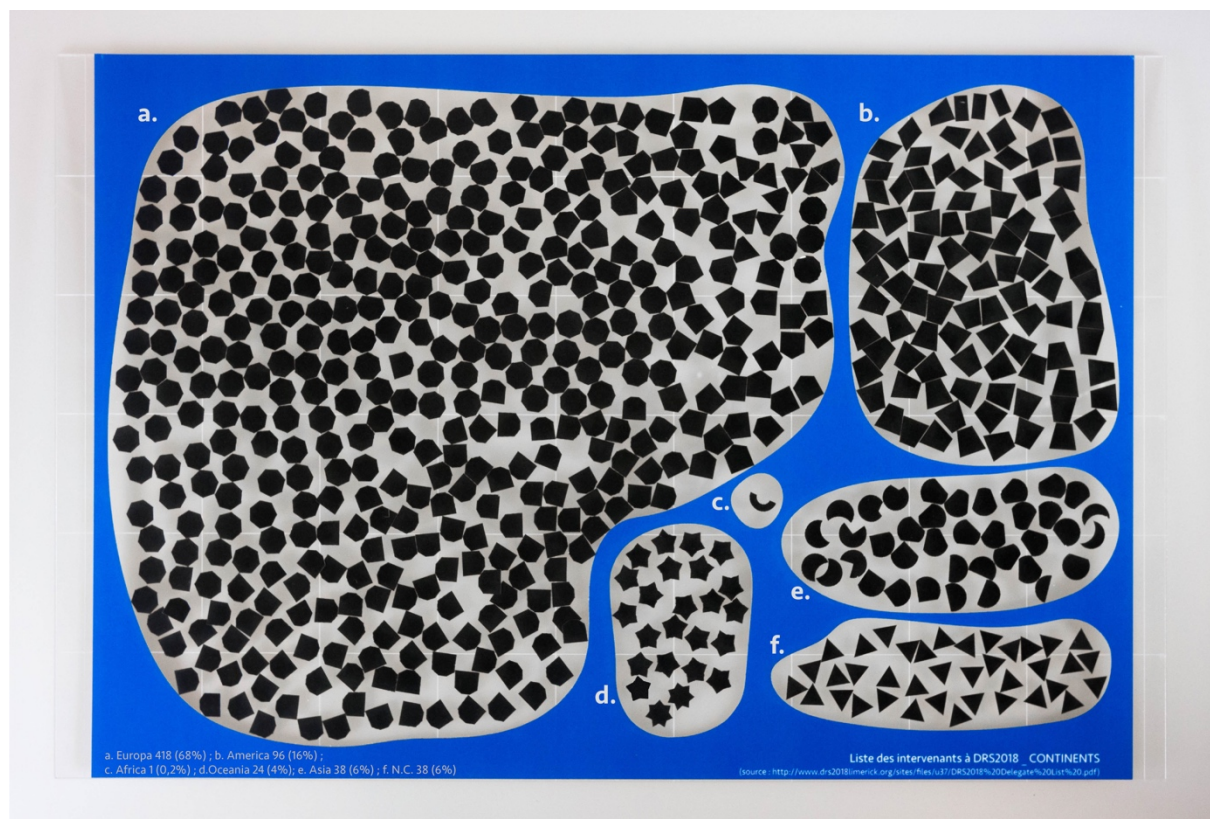


Figure 4: DRS2018 delegates sorted by continents. Europa 418 delegates (68%); America 96 (16%); Africa 1 (0,2%); Oceania 24 (4%); Asia 38 (6%) and Unknown 38 (6%)

Because the conference happened in Ireland and the Design Research Society being of English origin, the European Union community was the most represented (68%) (see figure 3 & 4), with 215 participants from the UK and Ireland. We can see that northern countries like Sweden, Denmark, Finland and Norway provided a total of 86 participants, to compare with 12 for France (with a much larger population) or 9 for Italy.

We found that English, used during the whole conference (scholarly articles, oral presentations and informal discussions) is the native language or the working language of 54% of the conference participants. It can be used daily by approximately 80% of participants in their professional context when we include researchers from Scandinavia or the Netherlands. Most countries (79%) represented at the conference speak a language of Germanic origin - English, but also German, Dutch, Swedish, Danish and Norwegian. Even if this can also partly explain the predominance of the English language in the conversations, a survey of geographical location of the laboratories revealed that 21 mother tongues were represented (see figure 5).

This predominance has implications, as we will see later, on the epistemological framework of the conference and questions the stance of a design research conducted in “minority languages”.

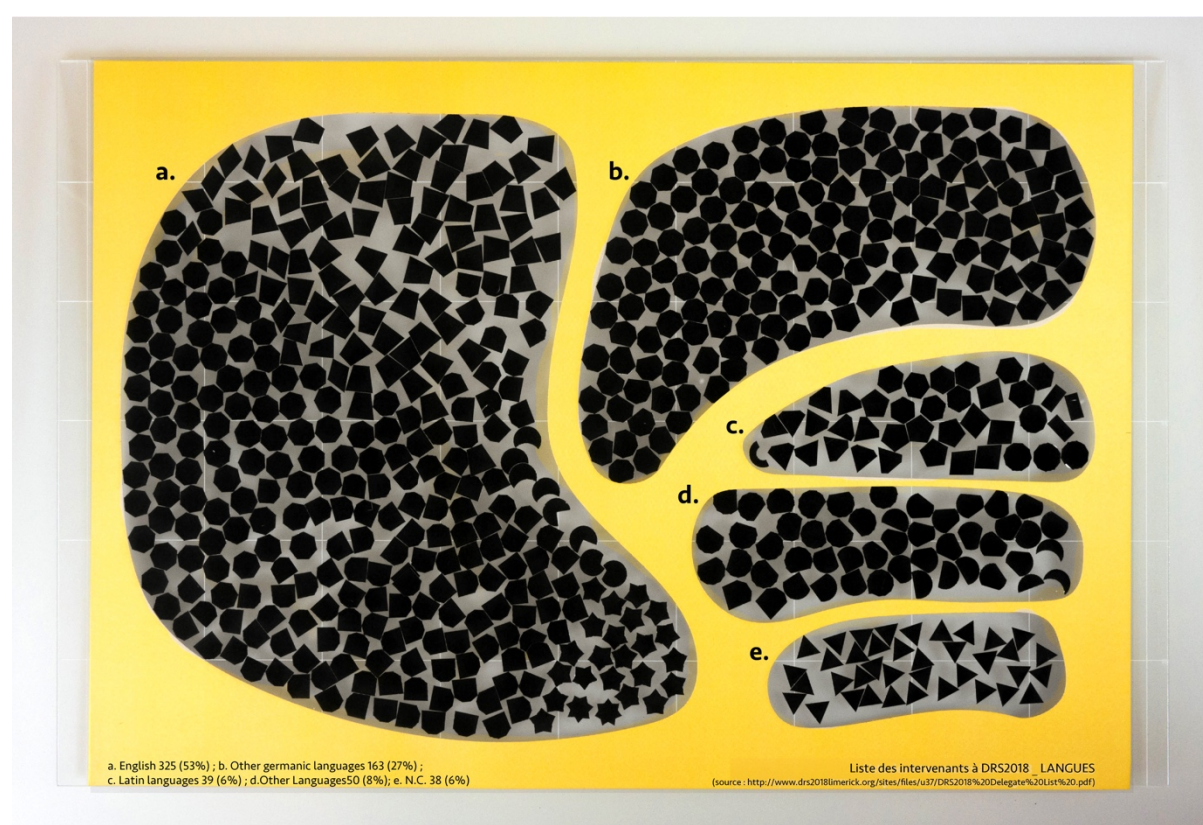


Figure 5 : DRS2018 delegates sorted by spoken languages. English 325 delegates (53%) ; Other Germanic languages 163 (27%) ; Latin languages 39 (6%) ; Other languages 50 (8%) ; Unknown 38 (6%).

2.1 The choice of language in the dissemination of research in France

The linguistic issues of French design research exist within a larger set of concerns that are transversal to all disciplines. In the context of the hegemony of the English language, the

linguistic situation of French doctoral theses reveals tensions about the choice of publication languages. Against the establishment of English as *lingua franca*, the proponents of an international influence and visibility of the French culture and language keep on debating. In 1994, the “Toubon” law (Conseil constitutionnel, 1994) established French as the language of teaching, business, commerce and public services, but did not forbid using other languages. Since its introduction, exceptions have been introduced for higher education as well as research in order to facilitate scientific partnerships and international degrees. Between 1987 and 2000, less than 3% of PhD theses are written in another language than French. In 2015, despite the Toubon law, the number of theses written in English amounts for 30%. Theses written in languages other than French and English remain rare (3%) and it is systematically for international theses (ABES, 2018)

The rapidly growing number of English theses reveals a choice influenced by academic constraints and internal logics (Slowe et al. 2018) to publish in Anglophone journals (such as Science [AAAS], Nature [NPG] for hard sciences and journals such as Design Studies [Elsevier] or Design Issues [MIT Press] for design). Because these journals have an international audience, they can display a higher impact factor and become a logical choice for young researchers like us.

This system pushes for publishing in English in order to facilitate peer recognition and to satisfy the criteria of research management. However, the choice of the language of the publication influences the way the research is going to be conducted, and especially the references that can be mobilized. Far from being trivial research practices, the choice of citation reveals multiple uses. “from a simple rephrasing in the context of knowledge dissemination to scientific endorsement, but also the promotion of the person citing through the exhibition of external signs of wealth” (Milard, 2012). It is logical, or even necessary to prioritize articles written in English as references for an article written in the same language, reinforcing once again the attractiveness of that language. However, choosing to write in a certain language brings forward another issue: that of the role of language in the inclusion of the people for whom the research is conducted. Most of design research in France is conducted with and for people who are generally francophone. In that case, it is a real contradiction to write in English as it amounts to deprive these same people from the knowledge they participated in creating and that concerns them first.

This issue also raises the question of open access in scientific publication. Many European countries, including France, have recently passed laws to institute a right to freely publish research results (Robin, 2017). The case of PhD theses illustrates this interesting paradox of open access publishing. After the defence, the author - the doctor - authorises the open access publication of his/her thesis on the dedicated portal theses.fr allowing academic databases such as Google Scholar or HAL to index their work. This theoretically allows everyone to access and enjoy the research, but when this research is written in English, how well a francophone audience can really appropriate it? On the other hand, if the research is only written in French, isn't it losing a large audience it could appeal to at an international level? This issue is especially crucial in design because the word design itself and the practices behind it are understood very differently across languages and cultures.

2.2 Polysemy of design, in French, English, Japanese and Chinese

During the DRS2018 conference, the strength of the linguistic unity obstructed cultural disparities around the situated nature of design practice. It led us to question the different

understandings of the word “design” and the ways it could influence design research around the world. First used in English, this word coming from latin (Midal, 2013 ; Vial, 2010) regularly brings confusion in France because it is used in a polysemous way in daily French. This plurality of meanings has for example been discussed by the French translator of British Anthropologist Tim Ingold (Ingold, 2017), explaining about the necessary semantical appropriation from one language to the other.

“To these meanings of the word “design”, Tim Ingold adds many others in the text, taking advantage of the semantic richness of the word in English. Because French language does not have an equivalent word, we chose to translate differently the word depending on the context in which it appears, trying our best, as often as necessary, to refer to the english word in parenthesis. The verb “to design” was thus translated depending on the context, as “concevoir”, “former”, “créer”, “dessiner”. The substantive “design” was translated, depending on the contexts, by “design”, “forme”, “dessin”, “modèle”, “maquette”, “dessein”, “projet”, “plan préparatoire”, “dessins préparatoires”, “conception”. The substantive “designer” was translated, depending on the context, by “créateur” or “designer”.¹ (H. Gosselin & H.-S. Afeissa, Trad. 2017).

Beyond the sole French case and because of different histories of adoptions, design does not refer exactly to the same activity in different languages and cultures. In English, because the term is both a verb, a noun and a substantive, it is largely used by all disciplines concerned with “conception” (one of the French translations of design when used in engineering, architecture, industrial sciences, etc). However, the adoption of the term and the concept of design in other languages was accompanied with semantic adjustments. For example, the English term of design was directly imported in Japanese (デザイン, design, pronounced /dezain/), but it had to position itself in relation to pre-existing words in the language, especially 設計 (sekkei, pronounced /sekkei/). This original term has taken the nuance of design as performed by engineers, while the term of design (デザイン) used in Japanese has acquired a more aesthetic dimension by contrast. In Chinese, where the term design has not been imported from English, it is the term of 設計 (pronounced shèjì) that is today used to talk about design in a much broader way, therefore maybe in a closer fashion to the English term of design.

This diversity in linguistic nuances can become a resource for the practice of design research itself. For example, in 1981, designer Tadori Nagasawa grouped and studied a set of artefacts that we would be describing using many different words in French or English (map, diagram, musical score, plan...), but that can all be described by the concept of “図”

¹ « À ces significations du mot “design”, Tim Ingold va en ajouter de fort nombreuses dans la suite du texte, en tirant le plus grand parti de la richesse sémantique du mot en anglais. La langue française ne disposant d’aucun mot équivalent, nous avons choisi de traduire diversement le mot selon le contexte dans lequel il apparaissait, en nous efforçant, aussi souvent que nécessaire, de renvoyer entre parenthèses au mot anglais. Ainsi, le verbe “to design” a été traduit, selon les contextes, par “concevoir”, “former”, “créer”, “dessiner”. Le substantif “design” a été traduit selon les contextes par “design”, “forme”, “dessin”, “modèle”, “maquette”, “dessein”, “projet”, “plan préparatoire”, “dessins préparatoires”, “conception”. Le substantif “designer” a été traduit, selon les contextes, par “créateur”, ou “designer” » Ingold, T. (2017). *Faire: anthropologie, archéologie, art et architecture*. (H. Gosselin & H.-S. Afeissa, Trad.).

(Zu, pronounced /dzu/) in Japanese. This term “covers almost all forms of two-dimensional graphic representation, other than pictorial images and straight prose”. The designer used this concept to explore a new approach to graphic design in his master thesis written in English at the Royal College of Art. (Nagasawa, 1981).

It seems to us that those divergences in the understanding of the word and the practice of design, far from being benign, should instead have a central position in design research as an object of research in its own right. For this, we need to take into account the necessity of a dissemination of research in several distinct linguistic areas. In the second part of this article, we question the issue of translation in design and we explore the connection they can have with the making of design research as a discipline in a French context.

3 Examples of linguistic configurations in research in design

If the translator neither restitutes nor copies an original, it is because the original lives on and transforms itself. The translation will truly be a moment in the growth of the original, which will complete itself in enlarging itself. [...]. And if the original calls for a complement, it is because at the origin it was not there without fault, full, complete, total, identical to itself. (Derrida, 1985)²

Derrida (1985) presents here the act of translating as a growing creation, performing a transformation of the original text by completing it, enriching it. In the foreword section of Alessandro Mendini's text collection (Mendini, 2014) Pierangelo Caramia also describes this process of mutation of the initial text. He tells the journey of the translation he is proposing and the questions that inevitably arise when transposing the words of an author from one language to the other. He explains that the act of translation is to be considered as an “architecture and design project in its own right” that gives access to non-italophones to Mendini's project. If research aims at sharing and disseminating the knowledge it is producing, then the act of translation could be one of its shapes. Answering the questions raised during the DRS2018 conference, we chose to reference and discuss noteworthy initiatives set up by francophone researchers in order to facilitate multilingual research.

3.1 Between language and context, “façons de faire” (ways of doing) in design PhDs

We noticed that francophone researchers generally need to balance between several languages and make their own translations. These choices are guided, among other reasons, by the affiliation structure, the discipline but also the environments of her field work.

Some disciplines historically require English as working language for publication. It is especially the case for PhD thesis in human-computer interaction, like the research work of Nolwenn Maudet, computer science doctor at INRIA (Maudet, 2017). Even if most participants she worked with were francophones, her PhD thesis, *Designers Design Tools* was entirely written in English, allowing an anglophone audience to read about the practices of French designers. The text is also accompanied by drawings illustrating their actions.

² « Si le traducteur ne restitue ni ne copie un original, c'est que celui-ci survit et se transforme. La traduction sera en vérité un moment de sa propre croissance, il s'y complètera en s'agrandissant. [...] Et si l'original appelle un complément, c'est qu'à l'origine il n'était pas là sans faute, plein, complet, total, identique à soi. » Derrida, J. (1985) « Des tours de Babel », dans : *Difference and Translation*, Ithaca, Cornell Press, Joseph Graham. p. 222

Some design researchers immerse themselves for a prolonged time in the environments they are studying. They are sometimes facing anglophone fields even if their whole work is produced and disseminated in French. It is the case for Camille Bosqué (Bosqué, 2016), doctor in aesthetic at Rennes 2 University who conducted a field inquiry in Fab Labs, hackerspaces and makerspaces in India, Norway, the United States and in France. Even if the interviews were partially conducted in English, the field notebook and personal notes of the researcher are written in French. In order to integrate the interviews in her PhD thesis, she chose to translate them in French in the body of the text and to put the original verbatim as footnotes.

This choice allows readers to appreciate subtleties of the language and potentially making their own translation to avoid interpretation biases. This choice also allows the researcher to take into account the context of the interview as well as her experience with the field in her choice of words for the translation. She also decided to accompany interviews with sketches that visualize the spaces discussed and contribute to their understanding, beyond words.

3.2 Translation as a contribution to design research

In his thesis conducted at Paris 1 University, Anthony Masure (2014) considers the act of translation as a pedagogical project and proposed the first translation of a Vannevar Bush text (1945) in French. This text, written in English, was a critical reference for the structuration of his thoughts. Translation could be considered a contribution to the field of design research. Passing from one language to another implies a meticulous work to render the complexity of an author's thoughts while simultaneously considering the heritage and the production context, be it disciplinary, historical or cultural.

Design journals try to propose solutions in order to universalize their content and thus grow a larger audience. It is the case, for example, for the bi-annual journal *Azimut* (2018) that is distributed both in France and abroad with bilingual content. A similar accessibility effort is also visible in *Back-Office* (B42, 2018) a journal dedicated to graphic design research. In the case of the later, a translation and definition work of originally English words or notions that do not have French equivalent has also been conducted. The issue of translating from one language to another in order to disseminate and spark discussion is not only a francophone endeavour. For example, the special issue "Design Research in Germany", (Chow et al, 2015) published in 2015 in *Design Issues* suggests an interesting direction. The issue presents in English recent Germanophone design research perspectives as "most of these perspectives are seldom known outside of Germany—mainly because of the language barrier."

It is why, in this article, we chose to systematically propose as footnotes the original versions of the non-English citations we used to make our translation work visible. This article was originally written in French, for a French design research audience and we translated it to disseminate these ongoing reflexions with the anglophone community.

4 Conclusion: beyond words

Taking as a first stepping stone our common experience during an anglophone design research conference, we explored the impact of language on our research practices. As we were exchanging and writing this article, numerous examples and situations appeared to be

relevant to the conversation and the list of topics we wanted to explore seemed dizzying. We thus removed parts, discussed again and chose to question language across two different axes: words and disseminations. These themes can be seen as two extremes of the researcher work — the choice of words while writing and the dissemination method of the finished project —, they are also at the heart of issues that young researchers need to tackle.

This overview leads us to say that language diversity, beyond its role in cultural growth, has a role in dissemination that design researchers need to question. In our experiences as design practitioners, we did not feel the language barriers as strongly as in design research. Using images and objects in this profession appears to us as a source of inspiration to integrate in our research work. Because language can sometimes appear as a normative constraint that penalizes research, going beyond words is a promising avenue.

Following the Annotated Portfolios (Gaver & Bowers, 2012) or Pictorial format established in some conferences (DIS, 2018), initiatives try to question the role of images in scientific knowledge production. Far from being anecdotal, these questions of form within the community are real opportunities to seize. As Emeline Brulé and Anthony Masure (2015) mentioned in their article about thesis formats, designers' experiment with many different formats, but it is still hard to get institutions to accept these formats as legitimate research artefacts.

As for English, young researchers often feel torn between the will to renew ways of doing in their disciplines and the incentives to respect established norms to exist in the globalized research ecosystem, but we hope that this work will contribute to showing the many possibilities given by a *design of translation*. Indeed, it seems that designers, often at the interface between several field, could bring some news perspectives on translation in research works.

5 References

ABES (2018, 11 September) Every PhD thesis. Retrieved from <http://www.theses.fr/?q=>

Azimut. (2018) La revue Azimut. Retrieved from <https://www.esadse.fr/fr/la-recherche/171012-la-revue-azimuts>

Bosqué, C. (2016). *La fabrication numérique personnelle, pratiques et discours d'un design diffus : enquête au coeur des FabLabs, hackerspaces et makerspaces de 2012 à 2015 (Personal digital fabrication, discourses and practices of diff use design : A survey into FabLabs, hackerspaces and makerspaces between 2012 and 2015)* (PhD thesis). Université Rennes 2. Consulté à l'adresse <https://tel.archives-ouvertes.fr/tel-01292572/document>

Brulé, É., & Masure, A. (2015). Le design de la recherche : conventions et déplacements du doctorat en design (Research Design, conventions and displacement of design PhDs). *Sciences du Design*, 1(1), 58-67.

B42 (2018) Back Office. Retrieved from <http://www.revue-backoffice.com/>

Conseil constitutionnel (1994, 4 august). Loi n°94-665 du 4 août 1994 relative à l'emploi de la langue française. Retrived from <https://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000000349929&dateTexte=20110513>

- Chow, R., Jonas, W., & Romero-Tejedor, F. (2015). Design Research in Germany? *Design Issues*, 31(1), 3-6. https://doi.org/10.1162/DESI_e_00303
- Derrida, J. (1985). *Difference and Translation*. Ithaca, Cornwell Press, Joseph Graham.
- DIS. (2018) Call for DIS 2018 pictorials. Retrieved from <http://dis2018.org/submi/pictorials.html>
- DRS. (2018, 19 June) What we do. Retrieved from <http://www.designresearchsociety.org/cpages/home>
- DRS. (2018, 11 September). DRS2018 Limerick delegate list. Retrieved from <http://www.drs2018limerick.org/sites/files/u37/DRS2018%20Delegate%20List%20.pdf>
- Gaver, B., & Bowers, J. (2012). Annotated portfolios. *Interactions*, 19(4), 40. <https://doi.org/10.1145/2212877.2212889>
- Ingold, T. (2017). *Faire : anthropologie, archéologie, art et architecture (Making, Anthropology, archaeology, art and architecture)*. (H. Gosselin & H.-S. Afeissa, Trad.).
- Masure, A. (2014). *Le design des programmes, Des façons de faire du numérique (Program design : ways of doing digital)* (PhD thesis). Université Paris 1 Panthéon-Sorbonne, École doctorale d'arts plastiques et sciences de l'art., Sorbonne. Retrieved from <http://www.softphd.com/>
- Maudet, N. (2017). *Designing Design Tools* (PhD thesis). Université Paris-Saclay, Paris. Retrieved from <http://www.designing-design-tools.nolwennmaudet.com/>
- Midal, A. (Éd.). (2013). *Design: l'anthologie (Design, the anthology)* ; [1841-2007]. Genève: HEAD.
- Milard, B. (2012). Les autocitations en sciences humaines et sociales. Pour une analyse de la dynamique des collectifs cognitifs (auto-citation in humanities and social sciences, for an analysis of the dynamics of cognitive collectives). *Langage et société*, 141,(3), 119-139. doi:10.3917/lis.141.0119.
- Mendini, A. (2014). *Écrits d'Alessandro Mendini : architecture, design et projet (Alessandro Mendini's writing : architecture, design and project)*. (P. Caramia & C. Geel, Trad.). Dijon: Les Presses du réel.
- Nagasawa, T. (1981) *An enquiry into graphical representation based on the Japanese concept "zu" as a basic study for informational graphic design*, (Master Thesis), department of Graphic Information, Royal College of Art.
- Robin, A. (2017) Valorisation de la recherche scientifique, propriété intellectuelle, innovation (scientific research dissemination, intellectual property, innovation), *Cahiers Droit, Sciences & Technologies* [En ligne], <http://journals.openedition.org/cdst/568>
- Slowe, S. Cole, G. Tennant, J. Rapple, C. (July 3rd, 2018) Making research evaluation processes in Europe more transparent [LSE impact blog]. Retrieved on September 11, 2018 from <http://blogs.lse.ac.uk/impactofsocialsciences/2018/07/03/making-research-evaluation-processes-in-europe-more-transparent/>
- Vannevar, B. (1945) As we may think. *The Atlantic Monthly*, Washington.
- Vial, S. (2010). *Court traité du design (A Short Treatise on Design)*. Paris : PUF.
- Tornay, S. (1978) *Voir et nommer les couleurs (seeing and naming colours)*, Nanterre, Laboratoire d'ethnologie et de sociologie comparative.

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Acknowledgement: We started working on this project as members of the young French design researchers' association. We thank Nacho Avellino for translating the Spanish extract in the intro and to Guillaume Foissac for reviewing an earlier draft. We also thank the University of Troyes for partially funding this project.