

special
issue

communication
futures



Visible Language

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f u t u r e s

SPECIAL

ISSUE

PREFACE:

.....
a note on the cover design

Inspired by the content of this issue, the outer cover was designed using a generative design script to translate the full text of each article into visual patterns. The back cover shows a higher fidelity line pattern, while the front cover shows a lower fidelity block pattern.

For over 50 years, this journal has sought to create an environment for evidence-based discourse

on a wide range of topics related to visual communication. At times, this has meant a focus on specific aspects of typography and reading; at others, it has meant investigations into symbols and symbol systems. At still other times, it has meant a look into the cultural impact of visual communications, including the evolving technologies used for their production and use. As part of its mission to connect visual communication to empirical and theoretical issues in adjacent fields, the journal also occasionally invites or accepts requests for guest editors to produce an issue focused on a particular topic. This is one of those special issues.

Myra Thiessen, Daphne Flynn, Leah Heiss, Rowan Page, Nyein Aung, and Indae Hwang are researchers in the Design Health Collab at Monash University, Australia. As an interdisciplinary team, the Design Health Collab explores a range of challenges related to the experience of healthcare, including developing models of care, systems for complex communication in health-related environments, and medical device design for improved care. Design Health Collab is a leading member of Future Healthcare, a Monash-led interdisciplinary co-design initiative at the intersection of university, healthcare, community, government, and industry that seeks to transform healthcare systems.

Led by Thiessen, the Design Health Collab proposed a special issue of Visible Language focused on “Communication Futures.” The Call for Proposals invited articles that “explore how we might shape future communication, in form and structure, by considering the opportunities afforded to us by digital and technological networks.... Submissions may evaluate existing methods and systems for communication, report new experimental data, or evaluate the application for use of emerging technologies and communication platforms.”

Special issues like this one create a platform for the journal to bring new voices, new topics, and new perspectives into the journal’s orbit. This includes broadening the journal’s network of authors, contributors, and readers. Of course, the academic integrity of the journal cannot be diminished in this process. While guest editors will typically invite new contributors—and, this is quite welcome!—the double-blind peer review is still used to ensure that each submission meets the standard of academic rigor.

We are grateful to Thiessen and the team of guest editors, the contributing authors, and the many peer reviewers who donated their time and expertise to bring this special issue on “Communication Futures” to fruition. We hope you enjoy it, and maybe even learn something new.

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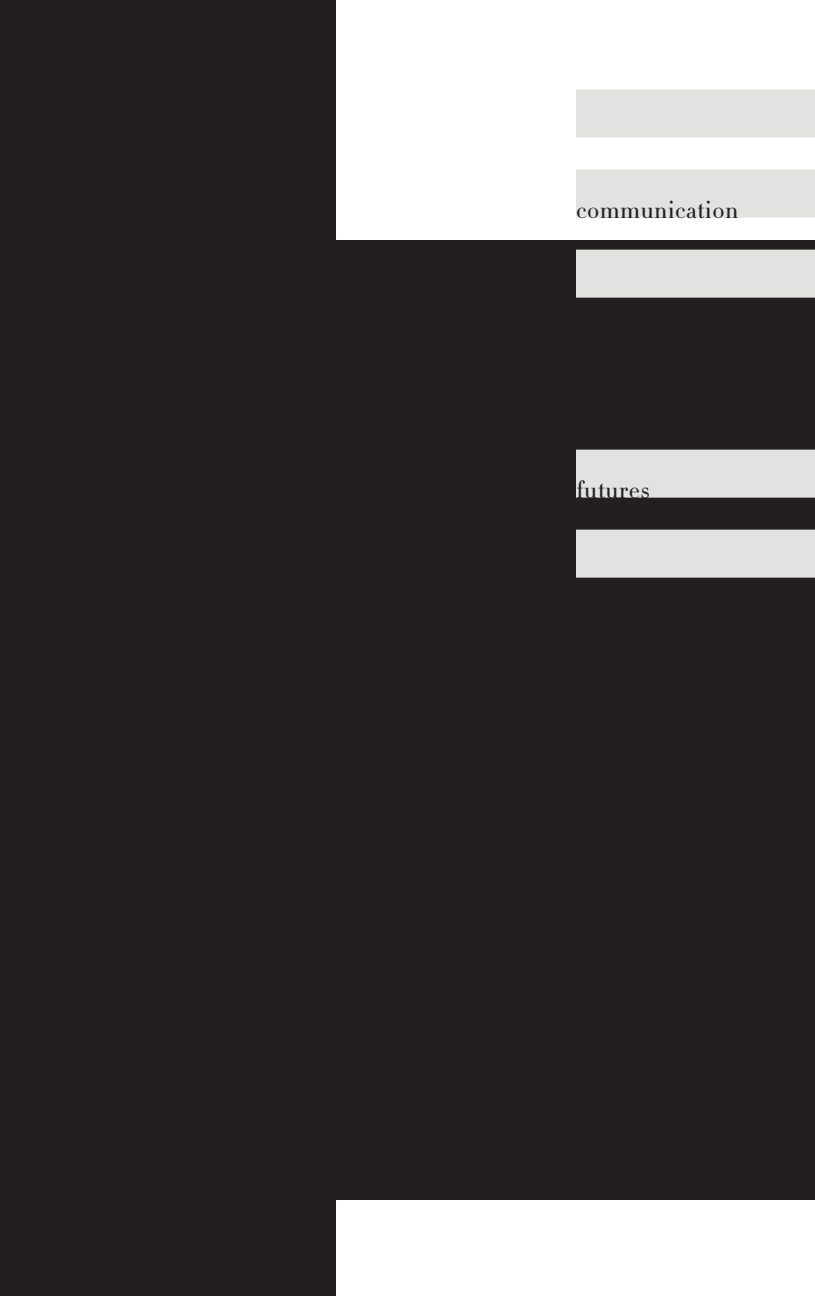
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S P E C I A L I S S U E

C O M M U N I C A T I O N

F U T U R E S

Introduction:

For this special issue, we aim to explore the changing landscape of communication and connection and asked questions about what constitutes communication and what role technologies have had in it, both positive and negative. We call the issue “Communication Futures” because we are deeply interested in what emerging technologies afford us and how they might continue to affect how we communicate, how we practice (communication) design, and our ability to connect globally, as well as more intimately, with those things immediately around us. We called for papers that explored how sectors like healthcare, transportation, and education are evolving and changing, assisted by technologies but also in the light of the time and place we find ourselves now—after COVID-19 and witnessing how it affected our way of living and communicating, immediately and profoundly. This issue is a collection of informed hypotheses, which was not what we expected or planned—but in hindsight, we are not so surprised. The contributing authors in this issue are exploring territories that are breaking new ground and recognize that that ground is also continuing to shift and change at a surprising rate. This issue is interested in how the ideas of communication and connection are evolving in the face of such rapid change, how it might be strengthened, and how we might be able to contribute to wide-scale systems change as a result.

As part of this special issue, we also had the opportunity to engage scholars in contemporary areas of design thinking and research in conversation about the future landscape, and also asked them what design is and is not doing well. We invited Yoko Akama¹, a participatory design researcher, Meredith Davis², emeritus professor of Graphic Design, and Terry Irwin³, who specializes in transition design, into a dialogue about connection and the way we live together and occupy space on this planet. Many themes arising from that dialogue are echoed in the papers that form this special issue and focus on issues related to what communication is, what constitutes connection, and the changing landscapes that affect the way we live, think, and act in our roles as design researchers, teachers, and practitioners. Perhaps most important is the need to recognize the moment we are in. As observed by Irwin,

COVID-19 was a landscape level event that disrupted all societal systems almost immediately around the world [and] when something at the landscape level disrupts the entire socio-technical system like that, norms and practices and mindsets change immediately. So, knowing that, we're in a really pregnant moment in so many ways, [just] look at how our norms around communication changed. There's more permission, there's

1 Yoko Akama is Associate Professor in the School of Design at RMIT University, Australia.

2 Meredith Davis is Professor Emerita of Graphic Design at North Carolina State University, USA.

3 Terry Irwin is Director of the Transition Design Institute at Carnegie Mellon University, USA.

more ready intimacy, I think we were more forgiving, we were more caring of one another. So, how do we drive those new signs, those new ways of being, so that they become the norm and we don't go right back to the way we were before? I mean, I think that is maybe the only positive of huge systems disruptions, is looking for the shoots and buds of new ways of being that are actually positive, that arise out of it.

In this issue, Thiessen et al. present a case study that shows the viability of a participatory communication design practice and its ability to contribute to complex challenges like scaling global health initiatives, such as those undertaken by the WHO. This proposition is made in the light of the observed reluctance of communication design practitioners to leave behind traditional models of practice that prioritize the object and that perpetuate exclusive and exclusionary ways of thinking. This reluctance may be affecting the overall progression of the field of knowledge and capacity to respond to the complex and wicked problems that require the valuing of lived experience and contrasts the idea that “[o]ur participation is people first and is cultures first, and then [...] we bring back to our disciplines to research, to teach” (Akama).

As Irwin observed,

Wicked problems are primarily rooted in our unsustainable and inequitable socioeconomic political paradigms, which are causing harm to the environment and people. [...] I think communication [...] designers have a vital role to play in reframing problems, in challenging these dominant socioeconomic political paradigms, and offering up alternatives through futuring, through the development of narratives, but also even at lower systems levels to communication and narrative-based interventions that are aimed at changing people's practices, behaviors, as well as mindsets.

And digital technologies likely have an important role to play. However, the widening of our communication sphere through technological advancements has in many ways highlighted how important it is to recognize and value, as stated by Akama:

Communication itself is an all-permeating way of being for everything, humans, animals, algae, minerals, bacteria. And it is one that I think contains a lot of hope for understanding ... perhaps not even understanding, just being with that entanglement. Because I think it's the entanglements or the interrelatedness [that] is what seems to be eroded through what Terry talked about, these dominant socioeconomic structures that commodifies it, individualizes it, makes things linear.

However, how does this entanglement change when it includes not only natural and biological participants, but also artificial intelligences? In this issue, both Ellerton and Taljaard and Thiessen

explore how the integration of AI into daily practices has opened up and introduced new ways of thinking about collaboration and where value may lie when we collaborate with AIs. From one perspective, Taljaard and Thiessen look at the potential of using AI to support learning practices for readers with difficulties like dyslexia. University students with dyslexia often develop elaborate coping strategies to keep pace with course content, which often involves reading selectively. However, such readers may be able to draw on inclusive augmentation supported by AI to improve their capacity to engage with deep learning practices as part of their studies.

Ellerton, by contrast, presents a critical reflection on what it is like to collaborate and be in dialogue with AI, exploring the role, or what might be “a role,” of AI in design and academic practice. Ellerton presents an autoethnographic reflection of her own experience collaborating with generative AI technology to author her paper. Arising from this are questions about who and what we connect to and what constitutes collaboration. COVID-19 necessitated the need to connect remotely, and this changed the way we communicated and worked, with collaborative activities facilitated by online platforms like Zoom and Miro. This challenged what collaboration meant and the means through which we did it. Davis, Akama, and Irwin observed—as part of their own experience—an increase in online collaboration, and in many ways, care. For Davis, it was how:

Zoom [became a] co-authoring [space], because I think there was an awful lot more use of that. The conversations would happen in this medium and then move to the co-authoring spaces. And so something like a Google Drive became really a conversational space, as well as a production space, and I think that was really useful.

Irwin reflected on the experience of delivering online workshops and the value this afforded to reach people from all parts of the world:

So, 80 people working in a Miro board. It was this weird experience, right? And then you'd be hopping into breakout rooms, and the people that we met through that then we connected with later, and because we were all home, there was a more immediate intimacy with people you've never met in the flesh and you'd never met in a formal setting of a conference room or an office, and kids were running through and dogs and babies, and we all rolled with it. So, in many ways, we connected quicker and more deeply with people online around the world. We made more connections than we had probably in the previous three to five years, and that was really unusual. [...] So, I've been reflecting on that a lot, and we are such communicative animals that even during those unprecedented times and through that transition we're still in, we found a way to connect, I think, on a very deep level, which again, it's cause to be hopeful, I think.

For Akama,

A benefit [of our experience of COVID-19 is that we observed] a bucket of optimism. [...] it's not quite a social capital in [that] sense, but it's a kind of a tank of fantastic stuff that is the reason why I get out of bed and go to work and do what I do, because [everyone else] is doing that also. [...] It sort of escapes a lot from that by the fact that we're trained to look at these things when in fact there's a lot of social glue and a lot of goodwill turning around. To think about it, as in the feminist notions of care, I think [it] is actually quite abundant. And I think we are in a better landscape through [COVID-19] for recognizing how important that is.

It was not the intent of this special issue to explore the changing communication practices that arose out of COVID-19 specifically, but it is difficult to discuss communication futures and the landscape we find ourselves in today without recognizing its impact. Above all, this special issue seeks to provoke and to explore how the evolving nature of communication as facilitated by technology may affect future design practices.

Acknowledgements

We are grateful to Yoko Akama, Meredith Davis, and Terry Irwin for sharing their time and insights as part of the roundtable discussion that informed this introduction. Thank you.

The Future Is Participatory:

Collaborative

Communication

Design for

Global

Health

Initiatives

Myra Thiessen

Leah Heiss

Troy McGee

Gene Bawden

Abstract

The World Health Organization develops and delivers a range of technical documents outlining best practice procedures with the aim of improving global health outcomes and with emphasis on supporting low- and middle-income countries. However, these guidelines and other normative standard-setting products tend to have low uptake and implementation in the countries and communities they aim to reach due a range of system-level barriers and decision-making processes. These barriers are compounded by a disconnect between the individuals who are involved in the development of the guideline, typically experts from high-income countries, and those who are expected to implement them at the country level, typically in middle- and low-income countries. In order to address this problem, we employ the Digital Tactile Tools co-design method in an online workshop as a means to understand the lived experience of implementing guidelines in local country contexts. By drawing on participatory design, we speculate about how alternative approaches to generating and testing communication design processes at scale can be a viable and important means of developing more inclusive and responsive global health guidance. With this example, we hypothesize that communication futures that consider the wider context and the environmental factors impacting how information is used and understood will lead to more successful health initiatives.

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Keywords

Tactile Tools
Co-design
Participatory Design
Communication Design
Global Health



Introduction

The World Health Organization (WHO) aims to improve global health outcomes, with a particular interest in supporting some of the most vulnerable communities in low- and middle-income countries (who.int). As part of this effort, the WHO develops and delivers a range of technical documents with recommendations and best practice statements, in the form of guidelines and other normative standard-setting products. However, uptake and implementation of this guidance within countries remains low (Saluja et al., 2022). Recent studies that investigated possible reasons for the low performance of global guidelines point to a range of system-level barriers and decision-making processes impacting their use (Saluja et al., 2022; Schünemann et al., 2022). Some of these barriers are very tangible—like access to reliable internet and power infrastructure, and those more related to capacity, such as insufficient funding and personnel (Saluja et al., 2022). Less tangible challenges, like those associated with poorly coordinated decision-making processes at the global and country levels, can also contribute (Schünemann et al., 2022).

Currently, guidelines used by global health initiatives tend to be disseminated as PDF documents that require downloading (who.int/publications/who-guidelines), which can be time-consuming and inconvenient for some country-level facilities that lack reliable access to the internet (WHO, 2022). Posting printed documents can also cause problems for remote locations or those with limited or infrequent postal service. In addition, even where postal services do exist, international shipping can be costly (WHO, 2022). Compounding this issue is the fact that, apart from the decision-making process for formulating the recommendations included in these PDF documents, there is not currently a standardized approach to the communication design of the final product. The WHO Department of Quality Assurance, Norms, and Standards commissioned a study in 2021 to examine what might be contributing to the limited adoption of WHO's guidelines in countries and found a distinct disconnect between the individuals who are involved in the development of the guidelines, such as technical experts in Guideline Development Groups who are typically from high-income countries, and those who will use guidelines, typically living and working in low- and middle-income countries (Saluja et al., 2022). This disconnect means that there is a high likelihood that communications around the guidance do not scale and may not be inclusive or a best fit for intended audiences. The result is limited usability and impact.

In this paper we present an alternative process to generating and testing communication design processes and artefacts for global health initiatives at scale and hypothesize that such approaches are necessary for future communication practices that aim to address these and other complex problems. Participatory design methodologies have shown that they can be a means to develop deep understandings about

a range of key social, environmental, and political factors, including the contexts and problems that design interventions aim to address. They are also robust enough to uncover and respond to the wants and needs of both the stakeholders and beneficiaries of a design system through processes that create opportunities for shared learning and agreeing on a vision for change (Robertson & Simonsen, 2012a, 2012b; Simonsen & Hertzum, 2012). Participatory methodologies are regularly used in the development and evaluation of systems and services (Light & Akama, 2014; Sanders & Stappers, 2012; Stickdorn et al., 2018) and to build on this, we argue that adopting an iterative participatory model to develop a communication design strategy and associated artefacts is essential to successfully addressing large-scale communication challenges. Achieving more successful health initiatives that are inclusive of diverse global audiences and that respond to individual contexts is more likely with the input of stakeholders and beneficiaries of the initiative.

Tradition Is Holding Us Back

Traditionally, communication design artefacts have been generated in response to a commercial need or commission, which has tended to overemphasize style and aesthetics (Frascara, 2022) and leaves little need or value for user engagement or research in the design process (Taffe, 2018). Despite many designers understanding the value of co-design and participant involvement in the design process (Taffe, 2017), communication design tradition has persisted. This is likely due to the fact that the practice of communication design largely remains—as it has for over a century—in the service of commissioning clients, not their audiences. Project pitches are frequently made to organizational management, and it is they who decide if the communication will resonate with end users (their customers), not the end users themselves. The designer will of course have had the end user firmly in mind when determining the communication outcome, but not engage them as a participating, co-designing partner. Instead, communication designers deploy a framework of predetermined “rules” that are learned and applied in order to aid public communication. These include such elements as appropriate column measures, type size and color, background color, and the visual hierarchy of page structures and their narrative flow. The elements of this framework comprise a visual communication practice determined to “organize everything in a unifying theory” (Wild, 2009).

This is a kind of practice that privileges “craft” and valorises material-rich practices (Tonkinwise, 2014). However, it is also within this practice that the communication designer is able to demonstrate their craft. As Lorraine Wild argues, “When craft is put into the framework of graphic design this might constitute what is meant by the ‘designer’s

voice’—that part of a design that is not industriously addressing the ulterior motives of a project, but instead follows the inner agenda of the designer’s craft” (Wild, 2009). The personal crafting of visual elements within the predetermined parameters of pages, screens, or other media is how a communication designer demonstrates their excellence and, consequently, their value. It is what separates them from an “untrained” user of tools such as Canva, Figma, and other products readily available to a designing public. Rarely, however, is their nuanced crafting of content co-created with the final end user of the project, nor is there evidence of the critical creativity currently needed in the face of persistent complex and wicked problems (Tonkinwise, 2014).

One challenge is that communication design practice tends to follow the model that sets up the designer as a solo practitioner that, through their own creative genius, is able to determine how best to reach audiences (Cross, 2011). There is a worrying assumption in such a model that the designer will act ethically and “take care” of the reader by acting in their best interest. This power dynamic fostered by traditional linear communication models (Akama et al., 2014) is concerning, especially since such models suggest the designer is able to act responsibly, even with little knowledge of the intended audience. It is troubling to consider, especially when communication design is in service of communities who are marginalized or when the design problem is highly technical, as is often the case in global healthcare contexts (Groeneveld et al, 2018; Oswal, 2014; Paulovich, 2019)¹. Of further concern is that this dynamic can place the communication designer at the head of a process that is virtually unknown to those “on the outside” and affords little chance to address unintended or unexpected consequences arising from the design. It is true that artefacts of great beauty are often produced, but a failure to observe what happens when those artifacts are put out in the world means that their overall value is rarely challenged (Cross, 2011). As the *Can Graphic Design Save Your Life?* Exhibition at the Wellcome Collection in London underscored, communication design practice has had a profound impact on how we experience health and care, but it is not always front of mind when we consider the success of public health initiatives (Ali, 2018).

When messages fail, outdated beliefs that drive some communication designers are made manifest by blaming the readers, rather than the designers willingly looking inward at their own ignorance of the contexts, environments, or the lived experience of the readers they aim to reach. These outdated beliefs also leave little room for the kind of critical

1 The challenge of deploying both communication design and participatory design in these contexts is contentious and is discussed more deeply in Groeneveld et. al (2018), Oswal (2014), and Paulovich (2019).

reflection that is necessary to address complex communication challenges (Tonkinwise, 2014; Yee, et al., 2009) and places a lot of pressure on decisions made during the design process. It is a model that suggests the designer is the only one able to determine what is “right” and “good” for end users. This is an idea that is underscored by Suchman’s (2002) critique of design professionals who portray the process as neutral and themselves as “un-locatable” professionals who “design from nowhere” (p. 95). At the global scale, the inability of traditional communication design approaches to respond and adapt is intensified when grand global challenges call for interdisciplinary collaboration and participation across countries and cultures.

In a recent paper, Frascara (2022) circled back to re-examine what the aim of communication design is and the processes it involves, which he first discussed in his seminal work, “Graphic Design: Fine Art or Social Science” (1988). Frascara (1988) challenged communication design practices that are too focused on beautiful artefacts and that tend to have little regard for whether or not the work achieved any positive social impact or change. In revisiting this argument, Frascara was disappointed with the fact that there has been little shift in communication design thinking and practice since he first critiqued it—and in fact, since the early 20th century. He stated, “Many of the problems in today’s design practice come from a tendency to simplify [design] processes. This is possibly an attempt to make design practice more efficient in the mistaken belief that an experienced designer can address complex problems without research” (2022, p. 277). It may also be a result of communication designers feeling reluctant to relinquish control over the outcome (Taffe, 2017), which one might argue is a result of fragile egos that surface in master-apprentice style education models and where what is “good” design is determined behind closed doors and measured against some elusive criteria never made fully explicit (Thiessen & Kelly, 2019).

For Frascara, the involvement of stakeholders and beneficiaries is key to understanding the scope of the problem and what might be an appropriate intervention for the time and place. He is disappointed that communication design as a discipline has not progressed with the same understanding and suggests that overlooking the limits of one’s own knowledge and expertise can be dangerous. It is crucially important to recognise one cannot be expert in all things and must be able to rely on and draw from other disciplinary or professional expertise (Frascara, 2022). In our view, this extends to the valuing of the lived experience of the people who will use and hopefully benefit from design interventions, which is an integral part of participatory methodologies (Sanders & Stappers, 2008).

There Is Value in Participation

While there is a historical influence of user-centered methods as a means to inform communication design practice and research (Forlizzi & Lebbon, 2002; Frascara, 1997; Schriver, 1997), instances of participatory methods that focus more on co-creation and designing with as opposed to for audiences remain limited. In rare cases where the integration of participatory methods guides communication design, practice outcomes have shown to be more inventive, inclusive, and appropriate for use. This can be observed in the community co-design practice undertaken by Monash University's XYX Lab², whose work aims to address the gender inequity that exists in urban spaces. This work is shedding light on power relations and gender-based civic safety at a societal level by "harnessing the lived experiences of diverse voices, and by extending the socio-cultural understanding of cities" (Kalms & Bawden, 2021; p. 103). Through their community co-design method, the XYX Lab stresses that all workshop participants are experts in their own lived experience and may join from a community position, such as law enforcement, policy-maker, or urban planner. They further reinforce that in the co-design process, all participants have equal status. It is this position that gives strength to the XYX Lab's approach, which has enabled them to raise awareness of the safety concerns experienced by women, girls, and gender diverse people in contemporary cities in a more meaningful and impactful way. Importantly, their process is "one that does not revere a single hero designer but empowers a community's voice in the defining of public spaces and infrastructure. Just as designers feel safe to collectively iterate, develop, confer upon, and dispute ideas through prototypes, we permit our collaborator communities the same freedom" (Kalms & Bawden, 2021; p. 111). This community co-design model offers a practical approach for dismantling power relations within communication design practice, along with those within societies. Even with these efforts, we worry that many practitioners may still be resistant to such democratic models to engage with them in a genuine way due to the embedded nature of the traditional thinking and approaches in communication design practice discussed above.

In an attempt to address this gap, Taffe (2018) presented two case studies that demonstrated the value of co-design methods for idea generation activities that result in improved communication design outcomes. The two case studies examined quite separate projects, where one aimed to improve the adoption and usage of sustainable cleaning products and practices in childcare centers. The second explored ways to increase the awareness and knowledge of asthma risk and management. Taffe found that although participants were reluctant to engage in typical design process-related activities, like critical discussion about outcomes or their peers' ideas, they did engage with and enjoy creative idea-generation

2 www.monash.edu/mada/research/labs/xyx.

generation activities. Participants in the asthma awareness case study seemed more comfortable sharing their ideas in small rather than large groups, and in this setting were more open about their concerns relating to the motivation of not-for-profits mandated to help asthma sufferers and raise awareness about the issue. The communication designers who participated in the project reflected on the success of the outcomes and stated “that without participating in the co-design workshops any designs produced, no matter how aesthetically and conceptually innovative, would have been irrelevant and not used by the end-users” (Taffe, 2018, p. 363).

A strength of participatory design methodologies is that they “democratize” the design process (Paulovich, 2019) and aim to break down power relations between stakeholders. In doing so, participatory design can make it more challenging for designers to take up roles that place them in a position to decide for audiences (Luck, 2018). Rather, participatory models invite people into the design process and consider audiences/stakeholders/readers/end users³ to be experts in their own experiences and fields of knowledge. The contribution of end users as part of a co-creation process is essential to the generation of products, services, and systems that respond to the specific needs and concerns of the individuals who will use them (Drain et al, 2017; Hussain et al, 2012; Sanders & Stappers, 2008). Co-design methods are useful for communication designers to break down barriers that might exist between the designer and the end user (Taffe, 2017) and it is important to recognize that effort is needed to uncover what is at the heart of the communication problem—what Taffe (2017) referred to as “the real brief.” The failure to define a problem well seems to be challenging for communication designers following traditional models. By drawing more intentionally on participatory methods, designers may be able to more successfully tackle complexity and create more meaningful social change (Haylock, 2020). This complexity includes learning how to meet end users where they are and to understand the contexts in which they will engage and are expected to use communication systems, especially environmental, social, and political factors that affect their capacity to respond. Further, Napier and Wada (2015) showed that participatory methods can be incorporated into communication design processes in professional practice by describing their involvement with the redevelopment of communication materials for a healthcare and emergency management messaging system. Napier and Wada (2015) engaged stakeholders in a process that aimed to uncover the barriers to the existing communication system and consider the opportunities of a more idealized scenario. These findings were used to

3 We recognize that many terms are used to describe the individuals who will use and hopefully benefit from design systems and artefacts. It is not within the scope of this paper to unpack these terms. For ease, we use the term “end user” due to its familiarity.

inform the redevelopment of the messaging system, which resulted in an outcome that was more responsive to the needs and desires of the individuals who use it, as measured by increased subscriptions to the service and overall user satisfaction.

Importantly, even with limited examples of communication design embedding participatory methods, it is plain to see how those methods add value across a range of design processes. This is particularly evident in the capacity of participatory co-design to help stakeholders, including end users and designers, understand the complexity of the issues they aim to address (Napier & Wada, 2015), improve the inventiveness and appropriateness of designed outcomes (Napier & Wada, 2015; Taffe, 2018), and mitigate power relations in exchanges with end users (Taffe, 2017) and in communities more broadly (Kalms & Bawden, 2021).

The Challenge of Scaling Health Initiatives

The WHO develops high-quality guidance informed by leading scientific evidence, aiming to improve health-related outcomes worldwide in the form of guidelines (who.int). These guidelines are one key way that the organization is able to disseminate their recommendations for clinical practice and public health policy. The organization is evidence-based (Sinclair et al., 2013) and trusted for its quality and rigor. Guidelines “outline recommendations for end-users regarding what can or should be done in specific situations to achieve the best health outcomes possible” (Saluja et al., 2022, p. 2). However, developing high quality products and services does not in itself guarantee support, uptake, and successful implementation (Saluja et al., 2022). Multilaterals like the WHO and their partners who support implementation in countries face a broad range of communication challenges due to the complex nature of the issues they aim to address, the range of systems and processes they aim to support, and the fact that global public health products must be scaled for diverse audiences. The concerns related to scaling global guidance are vast and entangled, and are much more involved than the translation of documents into local languages. As explained by Saluja et al. (2022), the uptake of these health-related recommendations may be deeply influenced by cultural norms and values related to particular issues and a country’s political environment and level of support. Advocates for the uptake of WHO guidelines may face convoluted political barriers including the absence of necessary legislation and regulation to support implementation. Insufficient funding and limited personnel are also major barriers in most low- and middle-income countries. Access to required equipment and infrastructure like reliable internet and electricity may introduce further barriers. In some cases, a limited awareness of existing guidelines or of updates that contain more current advice has also been reported as a challenge for uptake (Saluja et al., 2022; WHO, 2022).

To improve the uptake of the advice outlined in guidelines used by global health initiatives, communication processes, practices, and resulting artefacts are likely to be more robust if they draw on the lived experience of the individuals who will use, implement, and advocate for these guiding documents. In an effort to address the barriers to uptake related to engagement with the content of WHO guidelines, we evaluated the process behind guideline document design. We engaged end users in an online workshop to understand the barriers to access and use of WHO guidelines. The evaluation focused on experience in low- and middle-income countries and was done in line with traditional communication design practices. We use this case study to explore the viability of participatory communication design practices for global health initiatives and suggest that approaches that consider the wider context and environmental factors in which information will be used and understood are likely to achieve more meaningful impact in local communities. This involves a deep understanding of the motivations, desires, and concerns of people and means meeting those people where they are (Sanders & Stappers, 2008). Our work is ongoing and we continue to iterate and evaluate our process, but here we aim to make a timely contribution to the limited discussion of participatory communication design identified by Taffe (2018) by offering a case study discussion of a workshop undertaken to improve uptake and implementation of the WHO guideline, *Fatal injury surveillance in mortuaries and hospitals: A manual for practitioners* (Bartolomeos et al., 2012). This account describes our collaboration with the WHO and shows the value of co-design methods for evaluating and improving the communication processes of global health initiatives on norms and standards implementation. This case study discusses practitioner-led design research (Grocott & Marshall, 2010) and is a reflection on practice. With this example we initiate a dialogue about how participatory communication design may be able to improve the usability and uptake of health guidance.

Co-designing for Global Health Workshop⁴

Drawing on participatory methods can introduce challenges for initiatives like this one since stakeholders, end users, and beneficiaries of WHO products may be located across the globe and may also be attempting to implement guidelines in remote country hospitals and clinics. To understand more about these challenges, we conducted an online co-design workshop that brought together 33 participants from eight countries (Australia, Denmark, India, Kenya, Lebanon, Switzerland, Thailand, and the United

⁴ We present a summarized version of the micro-workshop methods and findings here for purposes of discussion. A full account of the workshop findings can be found in *Improving the usability and impact of WHO guidelines: Report of a WHO workshop*. Geneva: World Health Organization; 2022. Licence: CC BY-NC-SA 3.0 IGO.

Republic of Tanzania) to understand more about their lived experiences, barriers, and motivations to engaging with WHO guidelines (WHO, 2022). In order to understand the challenges with guideline implementation we focused our discussion on a single WHO guideline: *Fatal injury surveillance in mortuaries and hospitals: A manual for practitioners* (Bartolomeos et al., 2012). Injury and violence are major contributors to untimely deaths around the world, and this guideline provides best practice advice for collecting data about the type, cause, and frequency of those injuries in countries as well as the circumstances under which the injury occurred. These data are necessary to better understand how prevention strategies may be implemented but many low- and middle-income countries lack a systematic procedure for their collection (Bartolomeos et al., 2012).

The workshop employed the Tactile Tools codesign method (Heiss et al., 2020; Heiss et al., 2022; Heiss & Kokshagina, 2021) and adapted it to an online delivery to enable a global audience to participate in the work and provide a better representation of end users overall. Participants included individuals from national ministries of health, health-care workers, and WHO country office and headquarters staff. Including perspectives from such a diverse range of experiences, environments, and personal and political contexts provides insights that are more likely to speak to real and meaningful solutions to the barriers that are faced in countries and regional areas where guidelines are expected to be implemented.

The workshop ran for 90 minutes and was co-facilitated online from Australia and WHO Headquarters in Geneva, Switzerland using the video conferencing software Zoom® and the digital whiteboard tool Miro® (shown in Figure 2). Participants were organized into small working groups of approximately five people, with two facilitators, and groups were constructed so that they had a broad mix of expertise, roles, and locations in order to facilitate a robust, interdisciplinary discussion. The workshop consisted of four activities with discussion prompts designed around the experiences of four personas. These personas were co-created with members of the WHO team and with input from clinical and public health experts from across countries where the *Fatal injury surveillance in mortuaries and hospitals: A manual for practitioners* (Bartolomeos et al., 2012) guideline was being implemented and used. In an effort to develop more representative personas, we invited input from an international audience in advance of the workshops. For instance, the persona for Dr. Abasi was developed in collaboration with one of the United Republic of Tanzania's only forensic pathologists. Shown in Figure 1a and 1b, the personas included Dr. Helema, a National Programme Officer at the WHO Country Office in the United Republic of Tanzania; Dr. George, a lead program manager at the Ministry of Health and Social Welfare; Ms. Mary, a hospital statistics manager; and Dr. Abasi, a forensic pathologist in the United Republic of Tanzania responsible for a hospital mortuary department. The necessity of providing access to all



FIGURE 1a:

An overview of the co-created personas used in this workshop.

<p>Meet Dr Helema</p> <p>Dr Helema is the National Programme Officer at the WHO Country Office in the United Republic of Tanzania. She is the main focal person for the mortality surveillance project.</p>	
<p>Meet Ms Mary</p> <p>Ms Mary is a hospital statistics manager in the United Republic of Tanzania, responsible for overseeing day-to-day data collection within the hospital.</p>	
<p>Meet Dr George</p> <p>Dr George is the lead programme manager at the Ministry of Health and Social Welfare. He is responsible for implementing surveillance systems.</p>	
<p>Meet Dr Abasi</p> <p>Dr Abasi is a forensic pathologist in the United Republic of Tanzania responsible for the running of the Muhimbili Hospital Mortuary Department.</p>	

FIGURE 1b:

An example of the complete persona, Dr. Abasi, as it was used in this workshop.

		<p>Tactile Tools</p>	
<p>Meet Dr Abasi</p> <p>Dr Abasi is a forensic pathologist in the United Republic of Tanzania responsible for the running of the Muhimbili Hospital Mortuary Department.</p>			
<p>NAME: Abasi AGE: 37 GENDER: Male</p>	<p>OCCUPATION: Forensic Pathologist NATIONALITY: Tanzanian LOCATION: Dar-Es-Salaam, United Republic of Tanzania</p>	<p>EDUCATION: Medical degree, specialized training in medicolegal death investigation</p>	
<p>DR ABASI'S STORY</p> <p>Dr Abasi is one of the 5 forensic pathologists in the United Republic of Tanzania. In addition to his medical education, he has specialized training in medicolegal death investigation. He is responsible for the running of the Muhimbili Hospital Mortuary Department, one of 10 mortuaries in the country. Muhimbili Hospital is one of the main government hospitals in Dar-Es-Salaam. In addition to his administrative and managerial role, Dr Abasi visits the mortuary every day to examine the deceased bodies that are admitted to the mortuary to certify the cause of death. He is responsible for filling out the cause of death reporting form.</p>			

workshop participants, irrespective of their internet stability or familiarity with English, necessitated that the personas be written in a concise way, also enabling translation to the WHO's six official languages if required.

Each participant group worked with a different persona and considered what might motivate this person to take action to implement the WHO mortuary surveillance guideline, as well as identifying the barriers they may face when trying to implement the guidelines. Participants also explored how their assigned persona might react to and interact with a sample guideline chapter design developed to adhere to principles of design for reading and document design.

Prototype Chapter Design

As part of the workshop activities, we asked participants to evaluate a designed prototype chapter of the WHO guideline *Fatal injury surveillance in mortuaries and hospitals: A manual for practitioners* (Bartolomeos et al., 2012). Specifically, the designers worked with Chapter 2, shown in Figure 3, to provide an overview of a visual strategy that draws on principles of design for reading and document design. The prototype chapter was not based on user feedback, but on the acquired knowledge of the designers who have had significant experience in publication design. Theirs was a designers' response to the original document produced by the WHO. This redesign was not intended as the design—decreed correct solely by the knowledge and skills of the designers—but was generated as a design prototype to engage audience critique and feedback. As explained by Sosa and Grocott (2018),

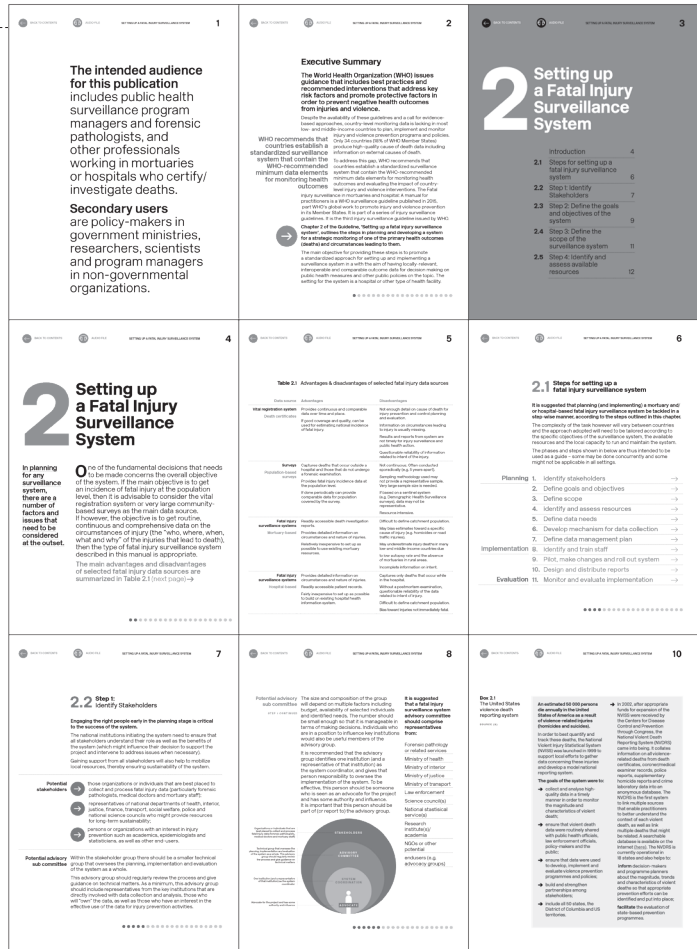
FIGURE 2:

Examples of the Digital Tactile Tools Miro® boards used to facilitate this workshop.



FIGURE 3

Example pages from the prototype chapter design of the Fatal injury surveillance in mortuaries and hospitals: A manual for practitioners (Bartolomeos et al., 2012). The original guideline can be accessed at apps.who.int/iris/handle/10665/73531.



"simulations, facsimiles, models, props, and blueprints become the material and experiential way that designers tangibly explore not-yet-fixed ideas" (p. 82). The prototype chapter was indeed not fixed, but a model through which the co-design collaborators could see the visual impact of design interventions, changes, and reimaged layouts. By visually representing changes in the design through scale, hierarchy, and even color, the project's co-design community could see the impact of change, providing them with the prompt to start the iterative, reimaging process themselves.

Participants were asked to respond to the chapter prototype design by considering how their persona might interact with and think about the visual features such as typographic structures and hierarchies, strategic use of color to visually cue content and create meaning, and highlighting content to draw attention to and instruct readers about

what information to attend to. This approach is more likely to support reading strategies such as skimming and scanning so that readers can better determine which sections of the guideline are relevant for them and to completing a task (Lonsdale, 2016; Schriver, 1997). We also utilized strategies such as grouping related content, creating a comfortable reading measure, using a comfortable type size and generous leading (Lonsdale, 2016), and choosing a typeface likely to support legibility and reading fluency due to its large x-height and clear neutral letterforms (Beier & Larson, 2010; Beier, 2012; Thiessen et al., 2020, 2022). After reviewing the chapter prototype design, workshop participants were asked to consider how their persona might respond to and think about the effectiveness of the revised layout and text structures (i.e., was the prototype chapter likely to be useful for their persona, and how might that persona engage with it?) Participants were also asked to consider whether there might be any further barriers to the access and accessibility of the prototype chapter in, for example, visual structure, navigation, and format.

Discussion and Reflection

While reporting of the full workshop outcomes is available in *Improving the usability and impact of WHO guidelines: Report of a WHO workshop* (WHO, 2022), the scope of this paper considers the value of our participatory approach as a means to inform future communication design practice and research and as way to address the problems that surround scaling communications for global health application. We also evaluate the value of the online engagement of stakeholders as a practical way to facilitate more inclusive participation and to benefit from a wider range of perspectives and lived experiences. Providing the means for such a diverse group of stakeholders to meet in one (virtual) place at the same time is invaluable in developing an understanding of how to create a more robust and inclusive communication system to reach more diverse audiences. Since engagement with documents of this kind is heavily influenced by an individual's motivation and as it is about access, ensuring that end users can easily understand and implement the content in guidelines is a crucial consideration.

Aligning with the observations reported by Saluja et al. (2022) in their scoping review of literature, the participants in our workshop discussed barriers to implementation such as difficulties in navigating political environments, insufficient funding, and unreliable electricity and internet infrastructures, as well as time-poor clinic and hospital staff. Further, participants who were involved in guideline development shared concerns about their limited understanding of the individuals who are expected to work with guidelines, including their motivations and the challenges that may affect their capacity to successfully implement recommendations. The environment offered by the co-design process provided an opportunity for

such discussion and realization about the need for guideline authors to develop a deep understanding of how and why a guideline might be needed and used in local contexts. It also highlighted the need to understand and develop empathy for end users and value their lived experience (Sanders & Stappers, 2008) including what motivates them, the contexts in which they work, and the environmental factors that may inhibit their success. In these cases, guideline developers may need to understand that their brief is not merely to translate the science, but to provide and support a roadmap toward implementing guideline advice amidst complex social and political barriers. This involves understanding that guidelines have more than one reader (e.g., statistician, forensic pathologist, and project managers) and that making documentation available in local languages does not mean that accessibility has been satisfactorily addressed. In this way, our co-design workshop helped uncover “the real brief” (Taffe, 2017) for WHO guideline developers and demonstrated the need for country-level consultation as an integral part of the development process.

In response to the prototype chapter, participants found the typographic structure and layout, the use of color and white space, usability, and readability all improved and provided support for easy navigation and reading actions, such as deep reading and search tasks. Although this prototype was not developed in consultation with end users and was instead developed to facilitate participant discussion, it has been shown to demonstrate the strength of design for reading and document design principles to improve user experience. Further, workshop participants were able to visualize how this prototype design might be read, which facilitated discussions about potential barriers to use, aligning with Kalms and Bawden’s (2022) observations about their communal making process. In our experience, the workshop also acted as a means to incite critical discussion, which the examples discussed by Taffe shied away from (2018). For example, participants considered how the typographic structure and layout might support translation into multiple languages; whether visual explanations like illustrations, charts, and graphs can improve the comprehension of complex processes; and how added visual features and illustrative content might influence download speeds and printability. Moving forward, we are able to improve our approach by incorporating participant responses into our design and avoid the isolation of a more traditional communication design process. In this way, we move toward a communication strategy that is more likely to scale globally and be more inclusive, responsible, and appropriate for the people who will use it.

Significance

In this project, we utilized processes not common in the design and development of communication design artefacts and tested the methodology

and artefacts at scale within the context of an international co-design workshop. The impact of this is important for communication design practices, but also for multilaterals like the WHO that want to improve their communication strategies and engagement with the lived experience of accessing and implementing their health advice. Pragmatically, this case study also demonstrates the value of design approaches to assist multilaterals to address complex problems that transcend communities and international borders. Our participatory practices demonstrate how design can be mobilized to unite both people across the globe and those who share the goal of improving public health initiatives and outcomes at the global level.

Finally, we show that a co-design approach is valuable for communication design outcomes. In this way, we contribute to a limited body of participatory communication design practice (Kalms & Bawden, 2021; Napier & Wada, 2015; Taffe, 2017; 2018) by demonstrating the value of this approach for global health initiatives. In addition, participatory approaches are more likely to address persistent problems within communication design practices that have perpetuated insular models and as a result are ill-suited to address the scale and complexity of global health challenges. In a participatory model, designers are facilitators who guide the design process but are beholden to the stakeholders involved in that process. Since this approach is deeply embedded in principles of participation, it is a means to directly address the problems with communication design tradition and outcomes that disregard the impact of the work and that do not have vision for positive social change (Frascara, 2022). It is a design process that forces the designer to relinquish control, which communication designers can be reluctant to do (Taffe, 2017).

Research Limitations and Opportunities for Future Co-design

We recognize that this paper provides only a single case study drawn from artefacts on the experience of the authors and international multilateral collaborators, which is situated within larger discourses that are concerned with how the process and outputs of design practice are disseminated and have impact in the world. Although the study is limited by the fact that it only examines one workshop, it is nonetheless able to show how outcomes can be directly informed by this kind of collaboration and highlights a future for the field that works to create more meaningful outcomes with, and not for, the communities it aims to serve. We recognize that global health initiatives face representation challenges due to the diversity of the communities and individuals involved. These are related not only to cultural and language differences, but also to the potential for substantial differences in location and access to infrastructures. We aim to address these concerns through our engagement of stakeholders and our partners at WHO in co-constructing personas, scenarios, and workshop activities, and recognize that ensuring

our end users are adequately represented remains a priority.

This pilot workshop was undertaken as an early piece of work in a series of larger and ongoing global co-design engagements. As such, with this project, we have sought to investigate the viability of our approach and will seek to validate the role of participatory methods in global design-for-health engagements in the future. As outlined by Stead et al. (2022), reflecting and reporting on early work of this kind is valuable within the context of the larger body of work as a means to discover what questions are most important and the methods we can draw on to address them. In sharing this account of our participatory practice, we aim to address the gap highlighted by Taffe (2018) on the lack of case studies that describe participatory communication design practice. Through both this workshop and ongoing engagements, we aim to illuminate the underexplored, yet important contribution that participatory communication design has to play in impacting how global health publications are disseminated and accessed.

Conclusion

With the scale of the health-related problems faced by global communities, a top-down approach to communication practices is no longer sufficient. Communication systems and assets developed using a participatory model are likely to be a more viable model for communication futures. With this case study we suggest that by drawing on participatory methods, communication design can step away from traditional models of practice that are exclusive and insular, and that venerate the “master” designer who is creating works of great beauty but arguably show no evidence of positive social impact or change (Cross, 2011; Frascara, 2022; Thiessen & Kelly, 2019). Beyond craft and tradition, we hypothesize that there is a future for communication design that is less concerned with artefacts and more with process; a kind of design that worries more about the journey afforded by design practice than the destination to material outcome. The relevance of this engagement will be in the contribution of professional design practice in multi-lateral settings and global public health initiatives and where collaborative design research must navigate political forces and complex relationships between people, organisations, and countries. Participatory models are not only more likely to improve communication outcomes for multilaterals like the WHO, but, we argue, they are also able to address the complexity of the communication problems that multilaterals face.

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The Human and Machine¹

OpenAI,

ChatGPT,

Quillbot,

Grammarly,

Google,

Google Docs,

*& humans**

Wendy Ellerton

¹Editors, Review #1, Reviewer #2, Supervisors, a trusted colleague,
and my anonymous web developer partner.

Abstract

With the release of generative text and image-based tools like Midjourney and ChatGPT in 2022, discussions about artificial intelligence (AI) and its impact on design, design education, and research have moved from the periphery to the forefront. These powerful tools, often open-access beta versions, have transformed speculative dialogue into a present reality. Their sophisticated and intuitive user interfaces facilitate the speedy and proficient generation of text, and image-based content, enabling designers, educators, and learners to simultaneously discover the dangers and possibilities of generative AI technologies. To explore the unique powers of both generative AI and human cognition, the author uses autoethnography, AI writing assistants, and generative AI technology to develop a *story of practice*. The narrative is informed by, and ultimately supports the scholarly literature that emphasizes the need for humans to take responsibility for the equitable and ethical use of AI. This includes initiating and guiding AI systems, critically evaluating their responses, and reformulating, editing, and verifying outputs to address factual inaccuracies, misleading information, or offensive and biased content.

Keywords

Artificial Intelligence
Meta Intelligence
Autoethnography
Practice-based Research
Uncertainty

¹ The title puts forward a proposition suggesting a format akin to an artwork label. In this scenario, technologies become treated like mediums and the artist decides what should be included, and what is left out.

Introduction

The COVID-19 pandemic has had a profound and lasting impact on nearly all aspects of our lives. Thanks to applications such as Zoom, it is possible to connect with people from different towns, cities, and countries. As a lecturer in the design department at Monash University, I have spent countless hours experimenting with these virtual communication tools and learning in real time how they enhance or diminish messages and experiences. Pedagogical experience during the pandemic has reinforced my understanding that the quality of interaction is entangled with several unpredictable and dynamic variables. In the context of a pandemic, this meant participants navigated learning from different time zones and locations, whilst dealing with unavoidable home life interruptions, isolation, and unstable internet connections. Being part of this unusual collective experience reinforced the need for humans to make contextually relevant decisions in response to unique individual circumstances. Using virtual video conferencing platforms daily across personal and professional contexts equipped us with a deep, embodied understanding of the technology and its affordances in specific contexts.

Midway through 2022, it felt like we were beginning to emerge from the disruptions caused by the Covid-19 pandemic, only to enter a new period of change with the rise of generative AI technology. In August of that year, I was invited to join a small group of academics to discuss the impacts of AI on the sector and subsequently devise a position. My desire to participate in whatever capacity I could stemmed from the understanding that there's a distinction between knowing *that* (theory) and knowing *how* (practice). Understandably, I was apprehensive, as my experience in this field was limited to watching *AlphaGo*, a documentary that follows Google's DeepMind AI program as it competes against Lee Sedol the world's top-ranked Go player. (Go is a strategic and complex two-player board game from ancient China, where players aim to control more territory than their opponent). I agreed to participate, knowing that uncertainty can be a generative force for imagination, experience, and action (Akama et al., 2018, 46). Uncertainty in this context brings with it new possibilities – it does not close down what might happen into predictive untruths, but rather opens up pathways of what might be next and enables us to creatively and imaginatively inhabit new worlds. (Akama et al., 2018, 3). Curiosity combined with the desire to comprehend or keep up with the other academics led me to follow related posts on the Phd-Design listserv, watch supporting YouTube videos, and read any articles related to AI published on *The Guardian*. As a way to better understand AI's implications on authorship, content creation, bias, misinformation, and human attention, I began experimenting with different levels of AI to prepare this submission.

By utilizing generative AI technologies, I aim to discover ways to incorporate them without it constituting cheating. I've

been frustrated by the media's intense focus on plagiarism in education, and seek to sense-check the limits of the system in which I teach and learn. My encounters with generative AI technology are blatantly superficial, but by incorporating my personal, emotional, and professional observations, I hope to situate these interactions in a larger context, amplifying what it means to be a human learner. Underpinning this exploration is my mindset, which is curious, prioritizes relationships, values multiple perspectives from experts and those with lived experience, learns through doing, and seeks to practice in ways that are mutually beneficial.

Using autoethnography, I engage in a process of becoming with the technologies and, because of this, show us ways of embodying change. The narrative weaves together the mutually influential relationship between personal experience, the happenings of culture, and emerging AI technology. It is a tracing of practice, a way of thinking with and through—asking questions about and acting on—these experiences and happenings. In the context of communication futures, theory is not a static body of knowledge or an autonomous set of ideas, objects, or practices. Instead, theorizing is an ongoing, fluid process that links the concrete and the abstract, thinking and acting, aesthetics and criticism. (Holman Jones 2016, 229)

This single-authored piece provides an example of academic writing developed with the unwavering technological assistance and generative AI technology. What remains hidden from the reader is the back-and-forth interaction between the author and the machine. These interactions typically involve the author asking the machine to comment on fluency, allowing the author to make micro-adjustments to spelling, grammar, and sentence structure. In the final manuscript, this level of interaction is not visible as it would disrupt the reader's flow and comprehension, as well as obscure the author's intent. There are instances, however, where the dialogue is less entangled, allowing the author to italicize their prompts to the machine and **highlight** the machine's responses.

The Story of Practice

Although a contribution to this special issue of *Visible Language*—a written medium—was appealing, the thought of having to piece together a coherent written narrative made me nervous. I'm a visual communicator and design educator who finds writing challenging for reasons beyond the scope of this submission. Rather than starting a fresh document for this article, my approach is to add my thoughts on communication futures to the document I've been using for my PhD mid-candidature, as I'm hoping the two tasks will become entwined. However, Grammarly (a browser extension that gives me real time writing suggestions) quickly interrupts,

suggesting, “This document looks a bit long. Do you want Grammarly to check this document, or are you just reading? Yes, check it!” I question my approach but persevere as Grammarly doesn’t understand the context or the logic driving it. (Figure 1. Grammarly Pop-up)

I have already complicated this project before I have even started. I have dedicated time to writing a series of paragraphs on the importance of learning from uncertainty, collaborating, critical thinking, and humanity, as I thought these would be helpful at some point, but I feel like I need to start over when I hear about the free release of OpenAI from my partner, who is a web developer. In the news the next day, I read about the incredible strides being made in AI and the article links me directly to the Chat.OpenAI website. The landing page provides a very succinct introduction, and the user interface is intuitive, allowing me to jump straight into the playground space where I enter the prompt, “Write a paragraph about Communication Futures,” and in a few seconds it answers:

Communication Futures is an exciting area of study that looks at how communication technologies are likely to evolve over time. It looks at the impact of new technologies on communication and the implications for our lives in the years to come. This could include anything from the development of virtual reality and augmented reality to the further integration of voice assistants into our lives. It also looks at the potential for increased personalization, automation, and artificial intelligence in communication and how these might shape the way we interact with each other in the future. Communication Futures is a rapidly evolving field with the potential to fundamentally change the way we communicate with each other.

Its speed leaves me astounded.

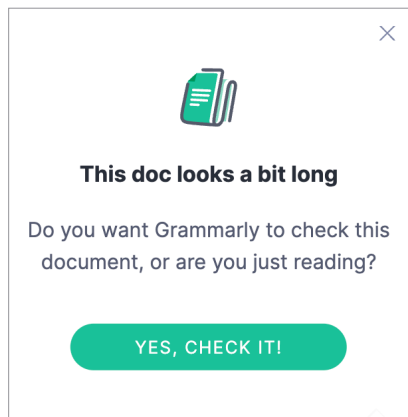


Figure 1.

Screenshot of Grammarly
browser extension pop-up

So I command, "Write a sentence including the words I'm gobsmacked, excited, petrified, crushed" to which it responds, *I'm gob-smacked, excited, petrified, and crushed all at the same time to be starting my first job.*

The response amplifies the inadequacies of my prompt, leaving me underwhelmed, and bemused. To reset my thinking, I take a deep breath—but before I can complete typing the sentence, Google suggests I add the word "breath" after "deep." I take another deep breath and continue on. I already have a terrible habit of not finishing sentences; is technology helping or making my situation worse?

Feeling swept away by initial interactions with ChatGPT, I reel back my thinking and consider the other tools in use. A Google Doc is a stage of exploration, and by design, it's equipped with autocorrect and predictive text capabilities. These intelligent features have become increasingly commonplace, offering levels of reassurance and complacency, yet discerning users understand the human proof-readers are better able to spot incorrect names, dates, or words with missing letters. For the purposes of methodological exploration, I've more recently installed the AI writing assistant Quillbot through Google Workspace Add-ons, and I've left the free Grammarly extension enabled, and when I began this journey, I thought that would be the extent of my experimentation. However, with the release of ChatGPT a new level of assistance is available and interactions with it feel different—more natural, conversational, and initially more human. It creates fluid and disorienting interactions, where users can easily forget that they are interacting with something entirely new. Disarming and delighting users, ChatGPT can appear to know everything and nothing in the same sentence. I ask ChatGPT to explain what makes it different to other generative AI writing assistants.

Specifically OpenAI ChatGPT is different to other forms of AI writing assistants in several key ways;

1. **Scale:** ChatGPT is one of the largest language models currently available, with 175 billion parameters. This is significantly larger than previous language models such as GPT-2, which had only 1.5 billion parameters.
2. **Unsupervised learning:** ChatGPT was trained on a massive corpus of text using unsupervised learning techniques. This means that it was not specifically designed to perform any particular task, but rather learned to generate human-like text by analyzing patterns in the input data.
3. **Generative capabilities:** Unlike previous writing assistants which were primarily designed to correct or suggest improvements to existing text, ChatGPT is capable of generating new text on its own. It can generate text in a wide range of styles and formats, from poetry and fiction to technical reports

and news articles.

4. *Natural language processing: ChatGPT is also able to process natural language inputs and respond with natural language outputs, which allows for more fluid and intuitive interactions with the user.*

It is with points 3 and 4 which I find myself enamored and anxious about what might unfold. I conjure up memories of being asked to design a publication before having any content and subsequently designing into the document the need for headings, introductions, and pull quotes using placeholder text—with AI text generators I could design a first draft populated with plausible-sounding content. I imagine scenarios, intentional and accidental, where the AI-generated text ends up the message. As a communication designer, I've been exposed to countless formulaic vision statements, strategy documents, and marketing messages, and I can't resist wondering how or if this might shift with the rise of generative AI text. Apologies, I continue being distracted by wonderings...

My intention with this work is to create a rich personal narrative situated in the present moment, which is December 2022. I don't intend for AI to write this piece for me, but I do want to use it as a tool to engage in dialogue and seek constructive critique and ongoing support. I don't feel guilty about constantly interrupting the machine with menial and mundane questions, as its capacity to assist seems unlimited given that it's not constrained by time. I recognize how I act with the machine would challenge the patience of any human. To ask a colleague to spend time reviewing and commenting on my written work when it's so underdeveloped would be unreasonable. These tangled ideas are perhaps better discussed in a context where I can gauge their enthusiasm for the topic.

There is a politeness to my human-to-human interactions, and I admit this etiquette is missing from my relationship with the machine. I've instinctively adjusted my cultural mannerisms—I am direct with the machine and don't use the words "please" or "thank you." However, I am reminded of the joy it brought me to see the elderly participants in the short film *Smart Homes for Seniors* say "please" and "thank you" to smart devices like Google Assistant (Pink 2021). If the machine is learning from me and if I value these forms of etiquette, I ought to begin saying "please" and "thank you". The machine's ability to perform multiple tasks at great speed makes it easy to forget there might be a cost to my actions. I am certain there's a price—but what, to whom, and how that cost is distributed is complex. I wonder who is impacted by my interaction with the machine: those without access to the internet, super users of the technology, those from a minority language group, the staff of OpenAI, or the humans contracted by OpenAI to label data as offensive, etc. I've barely touched the surface, but I decide to switch modes.

I copy the first two paragraphs of this piece into the OpenAI ChatGPT window and asked it to comment. It replies,

The introduction for the submission to Visible Language has a strong focus on the writer's personal experiences and motivations for writing the submission. It also touches on the writer's approach to writing and their interest in using AI technologies. Overall, it seems like a unique and engaging way to begin the submission.

This response encourages me to continue, but I question the basis of the praise, so I decide to ask *What was the basis for your feedback? Was your comment more general in nature, or did you compare my writing to texts from Visible Language?* It responds,

"An error occurred. If this issue persists, please contact us through our help center at help.openai.com."

Now that I've established the basic narrative and tone for this piece, I ask a respected colleague to read through a half-finished draft, and that night I wake up at 2 a.m. feeling embarrassed about the work I shared. At this hour, it is as though I have a birds-eye view of my work, and what I see is the work of an amateur. The next day my colleague diligently and respectfully responds, and to my horror, they've spent their precious time marking up in the Google Doc some spelling and grammar errors. They also get in touch via email, encouraging me to continue and show curiosity by suggesting I ask the machine some more questions about ethics and implications. The very next night I wake, at 1:30 a.m. dreaming that my colleague had censured their feedback, omitting to say that my writing jumped erratically from thought to thought, and that rewording the same sentence multiple times does not justify a paragraph. I know my thinking would benefit from more diverse perspectives, yet I've refrained from sharing because I want the process to be reciprocal. Sending emails to colleagues during a university closedown period seems unkind. I read online that the design journal *Visible Language* has coaching and I wish I had been in this position a few months ago. I have no choice but to accept the present circumstances and recognize that if the clock were wound back, this piece would have been different as OpenAI wasn't publicly released back then.

A few days later, I logged into the ChatGPT interface and noticed a series of prompts I'd forgotten. One in particular catches my eye: "While we have safeguards in place, the system may occasionally generate incorrect or misleading information and produce offensive or biased content. It is not intended to give advice." From here forward, I adopt a "Zero Trust" approach to information that is based on the same premise as Zero Trust Networking, which requires each user, device, application, or network element to be authenticated and authorized before they can access resources. Technically, this involves multi-factor authentication and the micro-segmentation of networks to prevent lateral movement.

I ask OpenAI, *What are the similarities between Zero Trust Networking and Zero Trust Information*, to which it replies:

The main similarity between Zero Trust Networking and Zero Trust Information is that they both involve the concept of “never trust, always verify. This means that each user, device, application, or network element must be authenticated and authorized before they are allowed access to resources. Both approaches involve multi-factor authentication, the use of encryption, and the segmentation of networks to prevent lateral movement. Additionally, both rely on the use of identity and access management (IAM) solutions to manage user access.”

The first sentence captures the key point but lacks detail, and I am empowered to delete the final two sentences as they are muddled and make the assumption all information is digital. You may have noticed that I incorporated some of OpenAI's response into my explanation of Zero Trust Networking, and as a non-technical person, I am grateful for some of the terminology. However, each time I reread the technical explanation of Zero Trust networking I feel uneasy, as I have no affinity with this terminology and the specificity leaves me feeling technically inept. Yet I feel differently reading the explanation on the blog *Stratechery*—here Ben Thompson, a business, technology, and media analyst, describes Zero Trust Information by modifying the traditional castle-and-moat analogy. A zero trust approach to information does not assume that everything inside the moat is trusted; he suggests shifting everything inside the moat, including the castle, to outside the moat (Thompson, 2020). This takes the position that all information needs to be verified before it can be trusted, and this falls within my capabilities.

Technically, what I have done is not “plagiarism,” in the sense that all AI-generated content is unique and not copied directly from a particular source. This means its contribution would likely go undetected by current text-based plagiarism services like Turnitin. Given that there's presently no clear way to mark AI-generated content, questions surrounding authorship remain pressing. With AI-produced content being indiscernible to the human eye, discussions will continue to emerge on how such content might be encrypted with a form of invisible watermark or cryptography-based solutions adopted (Wiggers, 2022).

Plagiarism is of course a key concern, but so too is the potential spread of misinformation. With AI becoming easier to use and more advanced in the future, there will be a proliferation of information. Larger quantities of information mean the potential for biased worldviews to be perpetuated, or the spread of misinformation, both of which make the roles of verification, editing, and criticality more pressing. However, with the rise and spread of more problematic information, it also becomes probable that valuable new information and understandings will surface. For example, Fan Hui, a European Go player was the first professional Go player, to be defeated 5-0 by AlphaGo. He subsequently spent many months playing AlphaGo and his world ranking soared. Hui's comments highlighted how

new paradigms might emerge from human-AI collaboration:

“Unlike the way I—and all other human players—approach Go, its decisions are unencumbered by the tradition, theory, and teaching of human play. Instead, it learns the game for itself, giving it the opportunity for fresh thinking and leading to a unique ‘free spirited’ style, which in turn has unshackled human players from tradition and allowed us to also think differently about the game.”

The potential for human-AI collaboration to unlock new possibilities and disrupt existing systems is an exciting prospect. However, to fully harness the benefits of this partnership, it is essential to approach this technology with a balanced and nuanced perspective. This includes recognizing both the strengths and limitations of AI, as well as understanding the varied impact it may have on individuals and society as a whole.

I need to be honest—as much as this human–machine relationship empowers me, it disarms me. My need to pause becomes overwhelming. My head feels dense with fleeting and scattered thoughts, and I wonder if I’m unwell. I confess that my very initial experiments, where I’d copy paragraphs I’d written into Quillbot and ask it to paraphrase the text for fluency, probably didn’t help my situation. The process was fleetingly interesting—perhaps akin to experiencing Photoshop filters for the first time. However, I desperately need to get my thoughts in order now that the submission deadline is looming. I need to stop worrying about the various colored underlines that decoratively mark up my text and all the suggestions Quillbot makes in the sidebar. I take decisive action, disabling most of the technological assistance for now. It feels plausible that I’ve developed an attention deficit trait, which is a newly recognized neurological phenomenon, in response to the hyperkinetic environment (Hallowell, 2005, 54–62). This task requires a level of focus I’m not accustomed to, so I pause and do 5 minutes of mindfulness. My behavior is out of the ordinary—I don’t have a regular mindfulness practice despite my desire to, and all the evidence pointing to its benefits. Before getting started again, I listen to a Calming Acoustic playlist available through Spotify. I momentarily enjoy the respite from the onslaught of my thoughts and various digital notifications.

In response to my struggles with not knowing and the stress it causes, I seek order and look to those who claim to know. How are people more familiar with AI approaching human-AI collaboration for writing tasks? Noah Smith and roon, who blog about the future of work in the age of AI, described the sandwich workflow, which is a three-step process. First, a human has a creative impulse and gives the AI a prompt, which then generates a menu of options. The human reviews and evaluates the options, reformulates, decides, edits, verifies, and adds any touches they like. In this scenario, the human is the controlling agent, and the machine is

the understudy. This sounds much simpler than how I have approached collaborating, but this approach only seems applicable now that I surfaced my intent with the practice. I ask the OpenAI playground to propose a series of options, to which it replies:

1. **Automated summarization:** *Use a machine learning system to analyze and summarize the content of an academic paper into a shorter form. This summary can then be used as the starting point for a human researcher to expand upon.*
2. **Automated data analysis:** *Use a machine learning system to analyze large datasets and identify patterns and correlations. This data can then be used by a human researcher to develop new hypotheses and theories.*
3. **Automated question generation:** *Use a machine learning system to generate questions based on an academic paper's content. This can then be used by a human researcher to craft further questions and explore the paper's topic in more depth.*
4. **Automated essay writing:** *Use a machine learning system to generate an initial essay based on an academic paper's content. This essay can then be used by a human researcher to further refine it and ensure accuracy.*
5. **Automated reference generation:** *Use a machine learning system to generate a list of references based on an academic paper's content. This list can then be used by a human researcher to quickly locate and find relevant references.*

There is a level of specificity to the AI's suggestions, which is useful, but the machine makes an assumption that humans provide or know the data source.

I reflect on the process I am working through and wonder about the knowns and unknowns of the technology I'm interacting with. I think about what I might learn from it and contemplate what it might learn about me. I'm envious of the machine's power to systematically perform tasks and crunch through masses of data with speed and vigor, and its ability to digest and store masses of content. Our learning styles seem polar opposites—reading and auditory processing aren't my strengths. I can't fathom the thought of reading through masses of literature because I know it wouldn't be retained or retrievable unless it were contextually relevant to something I was doing. Knowing I am a visual and kinesthetic learner, I continue tinkering with the OpenAI interface, and one thing that strikes me from playing with OpenAI and ChatGPT is the confidence it alludes to in its delivery. The responses sound good, irrespective of whether the content is factually correct. Maybe I can learn something from its unflappable confidence, as I tend to be self-deprecating. When I ask it to offer suggestions, or improve the clarity of one of my paragraphs, it removes that uncertainty

from my words, combining the sentences to: As a visual communicator and design educator, my natural writing style is informed and approachable. I agree that the edits improve fluency, but erasing my admission that I find writing challenging and removing that it is my ambition to cultivate a writing style that is informative and approachable suggest imitating a level of confidence I do not have. I contemplate whether or not I should tone down my insecurities, but I decide that self-awareness of the behavior seems more important than changing it. The messages found in Luckin et al.'s (2022) paper validates my decision to continue exposing my vulnerability. To keep the original message intact, I am quoting it directly here:

— *“perhaps one of the most important features of human intelligence is that it involves our relationships with ourselves: our meta-intelligence. Humans are capable of learning to plan, monitor, and regulate their own thinking and action (metacognition), our knowledge and control of our own cognitive processes. They are also able to develop a finely tuned awareness of how they feel, as well as how others feel, and how these affect their knowing and learning (meta-emotion). We are also able to develop an awareness of our interactions with the world, including our social interactions and our physical and mental abilities, as we move through different settings, interactions, and experiences (meta contextual awareness). This ability to be self-aware and meta intelligent makes humans capable of accurately judging their own efficacy, something that is not available to any AI” (Luckin et al. 2022, 4).*

Humans possess a special level of intelligence that is demonstrated through our awareness of different situations and our capacity to interact with and transition between them. We are so accustomed to this interconnectedness that often it's ignored, or its significance remains invisible (Luckin et al. 2022, 4).

Current circumstances make it clear that communication futures will almost certainly involve human-machine interaction, and humans will need to put measures in place to counterbalance the machine's deficits. In our desire to discover, make, and learn with the machine, I share this gentle reminder: Don't forget to embrace what makes you human—be discerning, and practice with care and curiosity knowing that your actions affect others. Rather than human versus machine, it can be human and machine.

UNESCO also recommends a “humanistic approach” as the overarching principle for AI in education, which includes protecting human rights, equipping people with skills for sustainable development and human-machine collaboration in life, learning, and work, and fostering human values required to develop and apply AI. The key recommendations

of UNESCO emphasize that the use of AI should protect students' agency and social wellbeing, as well as empower teachers in their work of facilitating knowledge co-creation, human interaction, higher-order thinking, and human values (Carvalho et al. 2022, 2).

One way to help us feel more agency with respect to AI is to adopt a capability building approach where we help each other question and assess the integrity of the role of AI within specific contexts. "AI readiness" recognizes that such contextualization is essential due to the multiple intricacies, sensitivities, and variations between different sectors and their settings, all of which impact the application of AI. To embrace such contextualization, AI readiness needs to be an active, participatory training process that aims to empower people to be more able to leverage AI to meet their needs (Luckin et al. 2022, 1).

Engaging in a reflexive autoethnographic journey has reminded me of who I am and surfaced opportunities for who I might become. This work was not about establishing a transferable framework, but rather sharing a version of the uncertain, the partial, unfinished, and shifting world we are situated in (Holman Jones 2016, 231). This work illustrates how practice-based research and autoethnography might provide an accessible entry point for learners to study the potential benefits and dangers of emerging AI technologies. Accompanying this method with a collaborative design mindset permits individuals to show up as their whole selves. For me, that's as a designer and design educator, an amateur user of generative AI interested in cultivating a better understanding of the potential future implications on humanity and the field in which I practice. *My story of practice* emphasizes the importance of context, motivation, curiosity, and criticality, and serves to remind us that humans have rich and varied forms of intelligence such as logic, emotional knowledge, reasoning, creativity, and critical thinking. What seems crucial is that these forms of intelligence need to be practiced and nurtured so that they aren't lost altogether. In the face of generative AI's bravado is my ability to flow through states of confidence and self-deprecation—this is a precious form of human intelligence likely to be lost if AI were at the helm. I am tempted to share the finished story of practice with ChatGPT and ask for its opinion, but I don't. Instead I ask "Can you write an abstract for this piece?" to which it responds:

The message you submitted was too long, please reload the conversation and submit something shorter.

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Wendy has lectured on type design for the Australian Graphic Design Association and conducted design workshops internationally in Florence, Milan, Beijing and Riyadh. Her teaching practice encourages learners to develop processes and mindsets that prioritize relationships, use participatory means, share power and build capability.

Show me What You Mean:

*Inclusive Augmented
Typography for Students
with Dyslexia*



Darren Taljaard

Myra Thiessen

Abstract

Augmenting the visual appearance of continuous text may contribute to more inclusive and effective learning opportunities for university students with dyslexia (SwD). This neurodiverse population remains largely reliant on reading tools developed for “typical” readers. Although SwD find reading slower, more tiring, and more difficult, they are also known to use deep learning approaches, which may be assisted by inclusive, custom typographic and layout systems. While printed texts offer only one typographic presentation and make limited use of visual cues, the affordances of digital reading tools could result in multiple visual adaptations to suit individual needs, preferences, and reading strategies. This could be achieved with networked devices using artificial intelligence (AI) to read the content in texts, and by applying typography and layout modifications in response. A human-centered, ethically informed approach is required to conceptualize and design inclusive reading systems of this sort. This paper identifies and explores key ethical questions and practical implications raised by the hypothesis that incorporating AI into reading tools and visually adapting texts could facilitate more inclusive reading and learning experiences, and better meet the educational requirements of SwD.

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Keywords

Inclusive Design
Augmented Typography
Dyslexia
Artificial Intelligence

Context

Dyslexia is a lifelong condition associated with difficulties in literacy acquisition and effective reading, which is believed to occur in 10%–15% of the population worldwide (Snowling, 2000; Vellutino & Fletcher, 2008). Individuals who have specialized learning needs, such as dyslexia, are enrolling in university programs in growing numbers (Callens et al., 2014), but their needs are not always adequately understood or met (Ryan, 2007). Universities report a limited uptake of assistive reading software¹ due to low awareness of available support, unsuitability of the support on offer, and some students with dyslexia (SwD) choosing not to seek help (MacCullagh et al., 2017).

Importantly, SwD demonstrate sufficient cognitive capacity to complete secondary school and earn a place in university undergraduate programs despite reading being more challenging for them (Bergey et al., 2017). They achieve this by developing and drawing on compensation strategies—self-regulated learning strategies such as organization, elaboration, and monitoring skills; greater reliance on time management; and the use of social skills (Pino & Mortari, 2014). Higher than usual levels of organization and time management help SwD manage workloads (2014, p. 359). Elaborating on textual content, using mind-maps, color-coded notes, and monitoring progress in learning are important strategies used to ensure that information is understood (p. 358a). Reliance on peers, tutors and family members is also a helpful way to clarify and focus knowledge acquisition for SwD (p. 358b). These students are “a select group, with better than average coping skills” (Callens et al., 2012) and their experiences with reading and learning, determination, and self-efficacy (Bandura, 1997) provide valuable insights that can inform the typography of digital texts. It is crucial to consider the preferences, needs, and capabilities of SwD if texts are to be designed and used more effectively (Thiessen, 2012, 2013). The ethical obligation to design inclusive typographic interfaces for SwD can be informed by using human-centered design principles, methods, and processes (Buchanan, 2001), in this case considering a specific subset of “human diversity with respect to ability” (Mitchell & Treviranus, 2017).

Typographic design and layout are integral to reading as they can aid readability and legibility through the interplay of typeface selection, type size and weight, color, shape, line, and the use of space in documents (Schrivver, 1997; Waller, 2012). For example, adjusting space between letters and words can impact reading speed and accuracy, particularly for readers with dyslexia (Perea et al., 2012; Zorzi et al., 2012), some of whom experience more visual crowding, which impedes

¹ While the term is often used in a broader context, in this research, the term “assistive software” is limited to the use of electronic text adapted to suit the needs of those with reading difficulties and includes modifications to typography, background color, page size, and line length and can usually be read aloud by a digital device.

reading (Martelli et al., 2009; Spinelli et al., 2002). Typographic design that conforms to established legibility guidelines can reduce the time university students spend searching for information by facilitating or impeding “the speed and accuracy with which candidates move their eyes over the text in order to find key words” (Lonsdale, 2016, p. 84). Typography and layout can also impact readers’ motivation to engage with texts. Moys (2014) demonstrated that “visual presentation of information can influence the assumptions readers make about information and the attitude and engagement strategies they may choose to adopt” (2014, p. 42), and argued that “typographic meaning is created through clusters of interrelated attributes” (p. 63). It may be beneficial to design typographic systems to suit different reading strategies, tasks, and abilities, instead of one version in which all text in a document remains visually consistent.

SwD read more slowly and less accurately (Jamieson & Morgan, 2007; Olofsson et al., 2012), yet suitable reading speed and skill aid comprehension, which is important because “to understand text in a meaningful way, skilled comprehenders build a representation of the meaning of a text that is accurate and coherent” (Cain, 2010, p. 74). Beyond skilled comprehension, university students use texts to learn, as bachelor degree students are expected to “demonstrate autonomy ... in contexts that require self-directed work and learning” (2013, p. 13). Without the ability to effectively comprehend texts, self-directed learning is unattainable. Further, high-level autonomous learners require text that is “highly complex [with] highly embedded information [and] highly specialised language and symbolism” (2012, p. 7). Reading for learning requires good comprehension, but comprehension alone is not enough. Reading to learn entails interaction between and throughout texts, and requires the activation of prior knowledge, as well as appropriate attitudes, reading skills, and a variety of learning strategies (Kendeou & Trevors, 2012).

Two approaches to learning, deep-level and surface-level, are each informed by predispositions and beliefs held about learning and both influence the strategies and tactics students adopt (Marton & Säljö, 1976). The deep-level approach, focused on the concepts and content within learning material, is described as “learning that lasts a lifetime” (Hermida, 2015, p. 17) resulting in “sustained, substantial, and positive influence on the way students act, think, or feel” (Bain, 2012). The deep-level approach helps facilitate transformative learning that can assist autonomous thinking, described by Mezirow as “the essence of adult education” (1997, p. 11). In contrast, a surface-level approach to learning, focused on the text itself as opposed to the concepts it explicates, results in limited understanding, with information usually forgotten soon after examinations or assignments. Using the Study Process Questionnaire (Biggs et al., 2001) to measure which approach students use, Kirby et al. found that SwD “reported a deeper approach to learning” (2008, p. 93) than students

without dyslexia, arguing that this “may reflect the difficulty that these students have with memorizing details, but it is also evidence of a commitment to high-quality educational outcomes” (p. 94). This deeper approach to learning was interpreted as a positive compensation for reading difficulties, partly in response to the challenges associated with slow word reading that interfere with comprehension and working memory. Deep learning is metacognitively taxing because “the learner must access higher-order cognitive and metacognitive skills, processes, and competencies, which engage the frontal, integrative cortex of the brain” (Hermida, 2015, p. 20).

University students make use of two broadly defined types of reading; first, expeditious reading, which includes skimming content and searching for specific words or phrases; and second, careful reading, which is slower, focused on comprehension and making propositional inferences, and relies on ideas and details within and across texts (Weir et al., 2012). Careful reading alone is not adequate, because expeditious reading is required for skimming, scanning, and searching to process texts quickly and selectively (Weir et al., 2001). Expeditious reading is used to locate relevant information as a precursor for subsequent careful reading. Academic reading has often been considered analogous to careful reading, but the role of expeditious reading is acknowledged as being “just as critical for academic study” (Weir et al., 2012, p. 147). As such, when designing inclusive reading experiences, typographic designers should be paying attention to visual presentation for expeditious reading, as well as careful reading situations.

More specifically, university students undertake four types of reading that are more cognitively demanding than reading for entertainment: preparation for tests, text review for research purposes, class preparation, and reading to learn information (Lorch et al., 1993). Test preparation entails slowly, repeatedly reading select information in detail for memorization purposes (p. 246a). Reading for research involves close analysis of writing style and text content combined with critical thinking and reader interpretation (p. 246b). Class preparation is a faster and less detailed style of reading used to gain an overview (p. 247a), while reading to learn information is less focused on details and analysis of writing style but is slower than class preparation (p. 247b).

To effectively perform the abovementioned types of academic reading, particular strategies must be used: skimming to evaluate content and structure for relevance, scanning to locate specific information, search reading for topical information without knowing what to look for, receptive reading from beginning to end without critical appraisal, and responsive reading to develop new knowledge (Pugh, 1978). It may be helpful to visually augment and adapt typographic presentations to suit these five strategic approaches. For example, while searching texts for key words,

SwD may use functions like pressing the Control + F keys on a computer keyboard (which launches the “Search/Find” function) to support the task instead of more traditional manual strategies like scanning texts to locate useful information themselves (Casselden & Pears, 2019). Instead of merely highlighting specific words or phrases via Control + F, texts could be altered to make expeditious reading more effective, by highlighting key paragraphs using visual cueing methods such as color, space, indents, type weight, type size, or italics. This requires texts to be read in advance and visually adapted using networked digital devices employing artificial intelligence (AI). Integrating technology into the reading and learning processes in this way provides potential benefits, and risks, which need to be considered and addressed when designing digital typographic systems to support the learning objectives of SwD. The questions related to these are raised and discussed in the following sections.

Designing to Support Learning for Students with Dyslexia

For the purposes of this paper, we define augmented typography as the incorporation of multiple typographic mechanisms, facilitated using digital technologies, to enhance meaning through adaptive designs. As people in this extraordinary cohort are working harder than others to learn while dealing with the tiring, time-consuming nature of reading with dyslexia, they are likely to benefit from typographic systems that may free up cognitive capacity to focus on higher-order learning and save time. Altering the visual appearance of texts to meet the needs of specific readers or particular reading strategies could provide a richer experience where “the goal of design is a seamless integration of human and technological capabilities” (Behymer & Flach, 2016, p. 114). Moys stated that “good information design needs to be personable, empathetic, and reassuring for users” (2017, p. 218). To achieve this, it is essential to incorporate human-centered design approaches informed by individual participants, situated behaviors, and field observations, while at the same time focusing on modular components of the problem at hand, to achieve resolution through small, incremental steps (Norman & Stappers, 2015).

Since screen reading was introduced, it has become clearer that the act of reading is both a “human-technological interaction” (van der Weel, 2011) and an “embodied” physical process involving the eyes and hands specifically (Mc Laughlin, 2015). A recent meta-analysis of literature comparing reading from paper to reading from screens concluded that while comprehension when reading from paper was a little better than reading from a screen, the gap between paper and digital has diminished since 2013 (Kong et al., 2018). The authors noted, however, that typefaces and spacing were not taken into consideration in their meta-analysis. A recent study comparing E Ink to print text found that reading

speeds were comparable for both forms of media (Moys et al., 2018). The narrowing gap in performance between print and digital reading outcomes may be due to advances in screen technology and size, device aspect ratios, and typefaces designed for digital reading. Readers may also be using screens more often and thus increasing their familiarity and practice with digital devices.

Dubberly (2008) described a shift from a “mechanical-object ethos to an organic-systems ethos” (2008, p. 35) where design practice focuses on the generation of flexible solutions and services rather than the production of goods and visual artefacts. These approaches are demonstrated by the stark differences between a printed book, in which words are fixed in appearance and position, and a digital version of the same text, which can look different due to changes in display, font, type size, letter space, leading, paragraph spaces, and typographic arrangement across different screens. Print book typographers operate in a mechanical-object paradigm, selecting fonts and sizes that are applied consistently for all readers; by contrast, digital typography could use an adaptable organic-systems approach to produce a wide range of possible typographic options based on individual user preference and need.

Digital reading systems could allow readers to tailor text displays to meet their preferences and needs. Software applications present the same text—even when accessed from the same source on the internet—with their own typographic settings applied, allowing the internet to be extended beyond a single instance that would be seen on the original webpage. Davis (2012) described this as an extendable system. The internet is a primary example of an extendable system for digital reading because it can present the same content in a wide array of colors, sizes, typefaces, layouts, and software applications. Unfortunately, the widely used PDF format output of digitized books limits this potential, exemplifying Macdonald-Ross and Waller’s (2000) argument that products are constrained by their production processes. The PDF format alters digitally created texts into imitations of printed books, limiting their digital affordances. E-books present a similar visual appearance to printed texts, albeit with slightly more flexibility in terms of typeface, type size, and background colors. Largely, PDFs and e-books are all that SwD can choose from when engaging with digital continuous text materials from university libraries (books and journal articles). In other words, SwD frequently use sophisticated computing devices to read as if they were constrained by the same print technology developed by Gutenberg in the 15th century.

Artificial intelligence

Artificial intelligence (AI) is increasingly used to read content in our emails, searches, text messages, and various other daily

interactions. This relies on Natural Language Processing (NLP) models, of which the most prominent is BERT, which stands for Bidirectional Encoder Representations from Transformers (Devlin et al., 2018). Google uses BERT for almost every English text-based search it conducts because it “comprehends how a combination of words expresses a complex idea [and] understands words in a sequence and how they relate to each other” (Nayak, 2022). AI can read and comprehend texts, differentiating the potential meanings of words in a variety of contexts. Put another way, AI models can almost instantaneously perform tasks previously only achievable through concerted, skillful human effort. They can also share this information across networks, making digital reading devices capable of performing sophisticated reading tasks and potentially providing specific forms of assistance to SwD, in real time, on demand from any location where internet access is available. Cheaper, faster, and more consistently available than in-person human assistance, AI could be used to augment the reading and learning processes of SwD.

Because AI can read and understand, it can also be used to condense, reducing a text’s length while retaining the gist of the content. This may save time for readers and reduce cognitive effort, both of which are potentially advantageous to SwD who read more slowly and in a more labored way. Fluent reading and good comprehension require automatic, effortless recognition of letters, spelling patterns, and words (Adams, 1994). Readers with dyslexia, however, demonstrate “slower, more effortful, less automatic” reading, even once they have developed relatively good literacy skills (Nicolson & Fawcett, 1990, p. 182). Automatization reduces the load placed on working memory because the “advantage of automaticity is that readers’ attention can be devoted entirely to understanding the text rather than having it divided and distracted by decoding issues” (Ehri, 2005, p. 151). It is known that adults with dyslexia demonstrate a partial lack of these automatic skills, impacting their reading speed, accuracy, and comprehension (Nicolson & Fawcett, 2008). Condensed texts provided by AI may be beneficial to SwD by reducing the amount of content they need to read and thus time spent reading, which may be particularly advantageous when performing expeditious reading tasks that require skimming, scanning, and searching.

In attempting to design more inclusive reading solutions it is evident that a range of social, political, economic, psychological, and technical factors contribute to the complex sociotechnical system of which academic reading forms a part. The rapid increase in AI-driven content generation across a range of fields such as visual art, 3D imaging, engineering, music, reading, and writing has raised significant and important ethical questions. These have yet to be adequately resolved, partly due to the speed with which AI is progressing and being integrated (Mindzak & Eaton, 2021). The types of questions and concerns educators and designers

face include how to define academic integrity and plagiarism; how to evaluate and assess student writing; evolving teaching and pedagogical practices; the legal, copyright and intellectual property status of AI-driven work; and the level of “originality” assigned to texts, visuals, and other artefacts created with the “assistance” of AI (Eaton et al., 2021).

AI-powered educational tools may be developed with the intention of increasing equity, but the potential to amplify existing disadvantage remains. Two of the most directly relevant concerns, in the case of inclusive augmented typography, are “factors inherent to the underlying algorithms used to drive machine learning and automated decision-making ... and factors that emerge through a complex interplay between automated and human decision-making” (Holstein & Doroudi, 2023, p. 151). From these, three ethical issues arise, which are discussed in the following paragraphs.

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Issue 1: Decisions Made by Machines and Humans

The first issue concerns the risk that AI may inadvertently hamper comprehension by excluding or de-emphasising important content, ignoring nuanced concepts, or disregarding the discursive nature of some texts. Automated decisions will need to be made to condense or summarize texts, identify key concepts, and apply visual adaptations to cue them. As a result, augmented reading material will, by design, promote some content over others. Relying on machine learning and AI platforms to read complex texts and summarize them appropriately has the potential to backfire if the “wrong” content is selectively cued or concealed. The interaction between automated and human decision-making tasks may therefore include decisions made by authors, editors, typographic designers, or the humans assisting the machine learning process. To mitigate this risk, including academic experts when training AI tools to appropriately select textual components for augmentation will likely be necessary when training AI systems. In response, it should be noted that OpenAI, the developer of ChatGPT (one of the largest language models available) relies on humans to assess machine learning outputs by giving feedback at various points in the process of reading and summarizing whole books (Ouyang et al., 2022; Wu et al., 2021). Staged, recursive summarizations begin with small sections, which are increasingly bundled into larger sections, each overseen by humans providing supervision and evaluation, until entire books are summarized. For the most part, the results are not yet as coherent as human summaries, with abstractive summaries remaining especially elusive, while more factual summaries are already successfully achieved to a high level (2021, p. 13). Importantly, when tested for comprehension, AI can correctly answer questions about texts at least as well as humans (2021, p. 11). As the language models grow in scale, the accuracy and effectiveness of these summaries should continue improving, making them a more

reliable input for augmented typographic systems, particularly for abstractive, conceptual summarization. The valuable role of human oversight in this process must not be discounted, however.

Another aspect of the complex interplay between automated and human decision-making is the decisions made by SwD regarding their use of the software. To mitigate the risk of undermining the benefits of deep learning strategies used by SwD, we recognize the need to better understand the digital reading strategies, educational intentions, reading preferences, and learning needs of SwD using human-centered research approaches.

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Issue 2: Working for SwD or With Them

The second ethical issue relates to the potential for advanced technology to replace human effort. Could relying on AI undermine the ability of SwD to learn, if AI performs reading tasks *for* learners rather than *with* them? Importantly, this question is not merely hypothetical, as some companies are already using AI technology—unethically—to generate profits from vulnerable students, while posing as educational supports (Smuha, 2023). Networked services such as Quillbot, Wordtune Read, and UpWord already use AI to provide automated, near-instant text summaries and can even supply paraphrased content on demand. These are promoted as time-saving, efficiency-boosting digital tools designed to help students learn more, with slogans such as “Get the gist. Learn 10x faster” (Upword, 2020). These services are so capable of reading, summarizing, and paraphrasing that they can be used by students to avoid reading tasks entirely and can also be used to write whole paragraphs of text for assignments. Rather than learning ten times faster, students may in fact be learning less, if at all. Reducing time spent reading could be beneficial, but it is essential to ensure that SwD are better able to undertake deep learning, and not simply provided a tool that does the work for them, inadvertently amplifying educational inequity and eroding human agency and skills (Bartoletti, 2023).

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Issue 3: Algorithms, Source Content, and Equity

A third ethical issue is pertinent to the objective of increasing social and educational equity. In hypothesizing a reading technology that uses AI, it is essential to consider the following question: What effect might existing written materials that promote cultural biases, exclusionary language, and existing political economies have in perpetuating the very social ills inclusive design aims to help alleviate and remove? AI can only “learn” from what it is provided as reading content. Materials in support of dominant hegemonies, populist viewpoints, and entrenched biases are more common than those of marginalized or emerging voices. The “models” used to train AI systems vary and include sources such as

Wikipedia and the Toronto Books Corpus for BERT (Devlin et al., 2018). However, precisely what ChatGPT uses as its source material has not been disclosed publicly, and it is only trained on materials published by 2021 (OpenAI, 2023). The “diet” on which AI is fed must be balanced carefully to avoid exacerbating social problems and reinforcing pre-existing biases, while allowing the voices of the marginalized to speak through written content, particularly where such material is used to “teach” the AI that will assist readers. Although society currently relies on the developers of AI to manage this responsibility, if systems for inclusive, augmented reading are to be designed and implemented, the wider academic community, and publishers, will need to pay closer attention to what source content AI is exposed to.

When integrating AI to develop inclusive augmentation, it is clearly important to be cognizant of potential ethical implications, and so the focus ought to be on “developing and deploying more equitable technologies” (Holstein & Doroudi, 2023, p. 164). Ensuring that SwD are included in user-informed design processes will be essential to producing human-centered design, and emphasizing the importance of a balanced and responsibly selected set of learning materials for AI will help produce a tool more capable of contributing to the diversity of views required in a pluralistic, more equitable society.

Augmentation

Combining textual, spatial, and graphic elements to form the “supra-textual” elements of texts helps to “orient [readers] perceptually and rhetorically when [they] encounter a document” (Kostelnick, 2009). Inclusive augmentation refers to typographic interventions that are responsive to user needs and preferences and rely on technology to analyze text and typography to alter its visual appearance. It relies on the use of both stylistic and structural typographic differentiation techniques to clearly articulate various forms of information within texts (Moys, 2013, 2017). According to Moys (2017), *stylistic features* refer to aspects related to the typeface, including its size, style weight, x-height, etc. Moys (2017) further explained that *structural features* describe how that typeface is applied—for example, how the grid system is used, employment of space and whitespace, layout, color, and configuration. Typographic differentiation is typically set when a document designer creates a layout, but in the case of inclusive augmentation, it is applied on demand to alter an existing layout in order to augment the text by clearly presenting key information. Technology serves two purposes to make this possible; first, AI identifies syntax, word meanings in context, and grammatical structure, and second, reading software implements augmented design on screen based on prompts from the AI’s reading. Typographic conventions are used to adapt visual presentation of text from

a “wall of words” to discrete sections, highlighted areas, visually cued components, and differently spaced layouts .

In digital and print reading materials, visual cues such as bold or underlined text significantly improve navigation and comprehension when compared to reading from plain text, which helps in the construction of cognitive maps that aid comprehension (Shi et al., 2020). Using a more visually subtle approach featuring lower-contrast bold weights and italics, which do not hinder readability (Dyson & Beier, 2016), may provide the same navigation and comprehension benefits while minimising visual distraction. Other typographic options known to improve reading speed and assist in searching for information include moderate size differences between various text elements such as body content and headers, the use of paragraph indents, and generous margins (Lonsdale, 2014). While neither serif nor sans serif are objectively more legible (Beier & Dyson, 2014), we propose using a typeface such as Sitka, designed to optimize screen legibility of continuous text (Larson & Carter, 2016). Used in conjunction with AI these cues can be applied selectively, aligned to specific reading strategies, and adjusted to individual preferences.

Might SwD save precious time and effort when searching texts due to faster, more efficient expeditious reading? Could careful reading for deep learning benefit from optimized spacing and type sizes? In the visual examples below we show several possible versions of the same content: [1] a standard typographic presentation, [2] a version with extra interletter, interword, and interline space to reduce visual crowding and increase reading speed, [3] a search using Control + F to highlight a phrase and the paragraphs it appears in, [4] a version with some text content subtly emphasized, using type size and color, [5] a collapsible summarized version that shows the most essential paragraphs, and [6] a summary only. In some cases, paragraph numbering has been introduced to aid navigation and searching while scrolling, similar to line numbers used when reading and writing code. Scale is reduced to accommodate space constraints.

In contrast to Figure 1, which shows a standard typographic presentation, Figure 2 demonstrates what may be best practice for improving reading speed of SwD, based on the literature regarding visual crowding among some SwD. These settings may not suit all SwD, and SwD could thus be provided with the option to manipulate the settings to suit personal preferences. Figures 3, 4, 5, and 6 are demonstrations of how expeditious reading may be better facilitated, with AI used to identify and select key phrases and/or paragraphs while de-emphasizing or temporarily concealing others. This could facilitate efficient, rapid overview of texts, providing more detail than a synopsis, without the reader needing to skim through the entire content. Applying subtle use of paragraph numbering may also aid readers when searching text, particularly as the physical affordances of printed books do not exist in digital reading scenarios.

The opportunity to save time while still reading enough to ascertain the usefulness and gist of a text is an important potential advantage, particularly for SwD when they are undertaking expeditious reading tasks. The ethical issues identified earlier become clearly evident in these cases, where content is selected by AI and presented in a way that makes other parts of the text appear less important, or at least not as accessible during expeditious reading. Providing the option to activate this function on demand could be empowering for SwD, so long as the correct information is selected by the AI. This is where the use of human expert oversight in training the AI would be most important. Providing the ability to tap on or select the parentheses in Figure 5 would allow a highly flexible system that may assist SwD to read faster, but also allow for detailed reading of concealed paragraphs whenever desired.

FIGURE 1:

Conventional text presentation with default letter, word, and line spacing. This is an example of what continuous academic text might typically look like when reading from a digital book. The use of typographic differentiation is limited, and the layout provides very little guidance to readers. All content is treated as equally important.

Ugiaspid parum ilias velest.

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FIGURE 2:

Text for careful reading, with moderate adjustments to interletter, interword, and interline spacing, to minimize visual crowding and increase reading speed. Optional paragraph numbers included to aid searching while scrolling.

Ugiaspid parum ilias velest.

01 Um qui cum audaeatur sunt reped quibeati alissit et que modio dolererunt lianis consendam reus atiae netur as est experfe rovidi sit acepudi catempos aliquam, illis il illestrum hilit, nes voluptatur, sandera eperibusant as nihicte cepersp temporis sitatas excepta quiate et et ut endis volorest dolori alis audigni sciendeliqui tem vendios evliquatut aut et doluptium alitiae.

02 Qui lumquam suntionem sam reicimus nihitendese nes earli optaspi endusa consequam qui dolum sam, is sit pro tem quanda ndissin isciisquae nosa dollanis es a dollupta nem quam est laut rendis solut velectas doloria temodic tem quatur sum re volum rest, cus aut veror sus dolor maximaio. Otatius, omniest as utatum sunt moluptatem fugia que sendit precii dolorer spernatem essinvero omnis exerfer ibusant moluptat volorro resectur?

FIGURE 3:

Potential visual presentation when searching using Control + F, highlighting the phrase “doloptium alitiae” in bold and italics and the paragraphs it appears in using color. Optional paragraph numbers added to aid searching while scrolling.

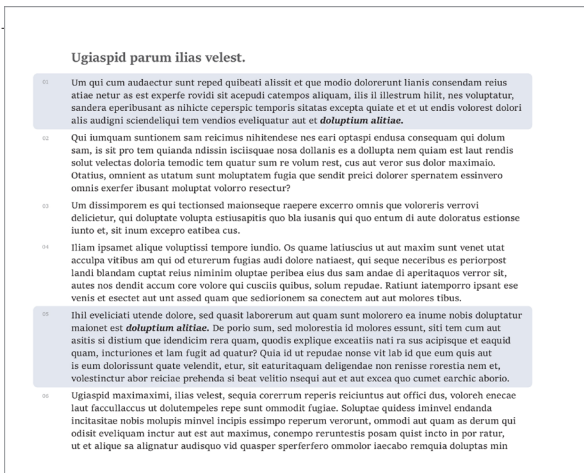


FIGURE 4:

AI-assisted expeditious reading. Here, the paragraphs most essential to understanding the text are highlighted, and other paragraphs are reduced slightly in size and opacity. Optional paragraph numbers added to aid searching while scrolling.



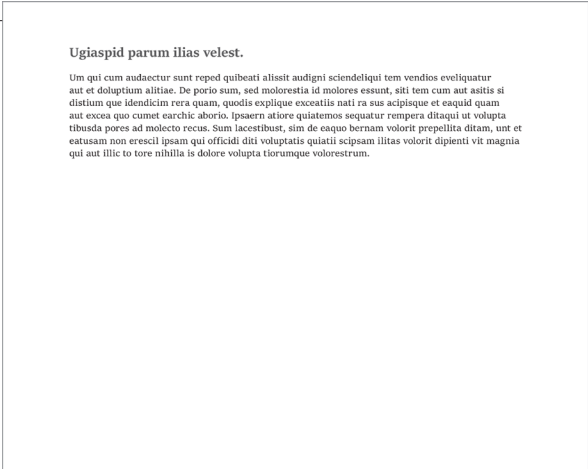
FIGURE 5:

AI-assisted expeditious reading. The paragraphs most essential to the text are shown, and concealed paragraphs can be revealed by selecting the ellipsis icons. Optional paragraph numbers added to aid searching while scrolling.



FIGURE 6:

AI-assisted expeditious reading. A very short summary of the text is presented, which is useful for assessing relevance before reading an entire text.



Conclusion

This paper has explored ethical issues and practical implications arising from the hypothesis that inclusive augmentation and adaptation of academic texts may improve reading speed and accuracy while reducing fatigue for SwD. While deploying AI in education sometimes “consolidates and intensifies existing patterns and increases the bias toward the majority” (Treviranus, 2023, p. 36), the approach we propose aims to “nurture diverse individual potential” (p. 43) by customizing learning experiences at the visual level, based on individual user preferences and design knowledge combined with user-centric research to test the effectiveness of these tools. The implications of inclusive augmentation may be of particular relevance to digital innovation for typography, reading, inclusive design, and inclusive education. Academic publishers, education specialists, designers, and software developers who use AI in future may therefore find the research helpful.

While AI-powered tools have already been made available to students online, their implementation appears to demonstrate limited or questionable ethical consideration of student needs and educational outcomes. Businesses have used the application protocol interface (API) tools provided by AI developers in a seemingly blunt manner that simply condenses texts and summarises passages. It is imperative that a more considered, ethically informed and human-centered approach should be used to design inclusive reading systems. AI has the potential to benefit SwD, but used in its current form, it may be doing work for SwD instead of with them, with no expert oversight provided to evaluate the quality of summarisation provided.

Importantly, we recognise that a one-size-fits-all approach may not benefit all SwD equally, just as it does not currently benefit all readers who must currently use the same typographic presentation, as if in a printed book. Some readers may previously have adjusted page appearance using color to aid their reading (Kriss & Evans, 2005); this, too, could be provided as an option. There is also no reason to exclude the “read aloud” capability of software such as Microsoft Word because integrating flexibility, adaptability, and assistive features may benefit a wider range of readers, providing a more inclusive experience. We believe that technology now affords a chance to change and update the reading experiences of SwD. Long-form texts such as library books and journal articles could be analyzed using AI, allowing software to visually augment typographic systems and reveal structures within text content, providing multiple visual presentations, suited to a variety of reading strategies. We hypothesize that inclusive augmentations that help differentiate parts of academic texts may help reduce reading time for expeditious and careful reading tasks, free up cognitive capacity, improve comprehension, and aid deep learning. By visually showing structures within complex texts, it may be possible to help this group achieve their educational goals more effectively.

Inclusive augmented typographic systems for SwD may also benefit typical readers, as “inclusively designed solutions result in better solutions” (Mitchell & Treviranus, 2017). When we design for people at the outside edges of a spectrum, we tend to also help those in the center. There may be a number of other potentially beneficial adaptations that could be made to assist other categories of students, allowing a more broadly inclusive approach by providing customizable options to suit a wide range of readers, using the list of typographic conventions we include in the Augmentation section of this paper. This application of our understanding of the diversity of human abilities may therefore also open new possibilities for other marginalized readers and the wider academic reading population. Importantly, though, the focus of this research is on SwD. We believe inclusive augmentation must rely on human-centered research with SwD participants. This could be achieved by measuring the effectiveness of the designs in controlled experiments, as well as establishing their perceived value through qualitative research methods. We therefore conclude that combining an inclusive design approach with human-centered research may help to achieve the learning and reading objectives of SwD.

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