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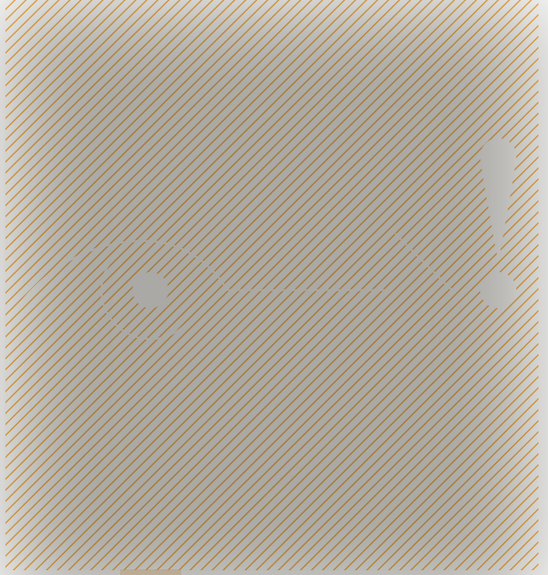

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Student Special Issue

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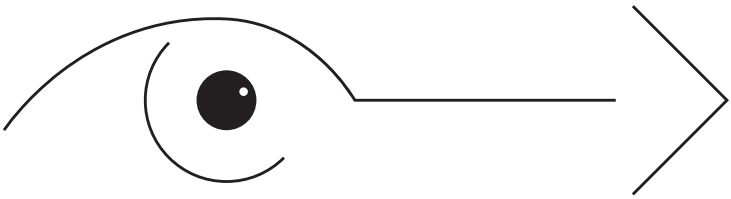

Before there was reading there was seeing. *Visible Language* has been concerned with ideas that help define the unique role and properties of visual communication. A basic premise of the journal has been that created visual form is an autonomous system of expression that must be defined and explored on its own terms. Today more than ever people navigate the world and probe life's meaning through visual language. This journal is devoted to enhancing people's experience through the advancement of research and practice of visual communication.

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website:

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send address changes to:

Mark Hunter
College of Design, Architecture, Art, and Planning
University of Cincinnati
PO Box 210016
Cincinnati, OH 45221-0016

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Student Special Issue

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Guest Editor:
Maria dos Santos Lonsdale

December 2018

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Contents

Editor's note:

All the articles for the Student Special Issue went through our standard double-blind peer-review process. The only concession to our normal research publication standards was occasional allowance for fewer research participants than might otherwise be necessary.

We hope to repeat this student special issue at various times in the future as a way to support our mission of advancing communication design research and scholarship.

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Student Special Issue

Visible Language is happy to present a Student Special Issue that includes articles on student research into Typographic and Graphic design involving user-centered research methods. The importance of focusing on user-centered approaches emerges from a need identified through years of experience as a lecturer, researcher and design practitioner. Design solutions that are driven merely by opinion and intuition, without having involved the target user throughout the different stages of the design process, nor having been tested and developed through several stages of iteration and re-design, might be prone to failure. Design that is developed for the user and with the user stands a greater chance of high and long-term impact.

The objective of the Student Special Issue was to support early career scholars by giving them an opportunity to experience the publication process, and to encourage supervisors/tutors to be involved in the publication process with joint authorship where appropriate.

In this Student Special Issue we have included a wide range of research themes that show the potential of the field of Typographic and Graphic Design to produce novel user-centered design and research solutions that are directly applicable to real life contexts. These include research on: the interrelation between handwriting and personal branding; children's engagement with health and safety posters; the effectiveness of two-dimensional versus three-dimensional museum guide maps; the appropriateness of different styles of illustration for visual resources used in combination with assistive technologies for people with aphasia; the effects of reading from paper versus an eInk display on recall and reading speed; the potential of garment label design and companion information to communicate fashion sustainability issues to young consumers; the application of digital drawing within remote Indigenous contexts; the documenting of live art by locating and empowering the document user.

The publication of this Student Special Issue would not have been possible without the support of Mary Dyson (Department of Typography & Graphic Communication at the University of Reading, UK), the hard work of a strong body of reviewers from various parts of the world, and the patience and skill of Mike Zender, editor of *Visible Language*, in making sure the layout and images were a good representation of the research and design outputs.

Maria dos Santos Lonsdale, *Guest Editor*

Informing personal branding through self-assessed handwriting analysis: *proposal of a supportive online platform*

Laura Bakalka

Catarina Lelis

Despite the abundant existing literature on the psychological aspects of graphology and visual communication, very little research (if any), has been conducted, as to the links of interpreting personal handmade markings on graphic self-branding processes. This research aimed to investigate possible interrelations between fields of handwriting analysis (graphology) and personal branding, underpinning methods and patterns of building graphic personal identities amongst higher education students. Furthermore, it aimed to promote the use of graphology in self-branding processes. This involved secondary sources of information, along with empirical works, totalling 25 semi-structured interviews and the collection of 97 handwritten samples to detect commonalities/differences of handmade markings. Participants included higher education students and instructors from visual communication fields across two cultural contexts: Saudi Arabia and the United Kingdom. The achieved findings were discussed with two professional UK-based graphologists. Given that self-branding is considered complex and time consuming amongst visual communication students, the outcome proposes an online personal brand design platform, innovating current methods of self-related research, yet grounded on current usages of conventional handwriting and providing a visual scope of relevant design applications, considering internal and external influencing factors.

Keywords

Personal Branding
Handwriting
Identity
Personality Traits
Graphology
Online Platform

Research Question

How can handwriting analysis inform visual communication students' personal branding?

Background & Rationale

The research entailed potential psychology-related similarities between graphology and visual communication. Both handwriting and visual communication serve as external representations of internal attributes or concepts (in cases of design). Individuals are prepared to seek new areas of their personalities that are brought to their consciousness, and such information may be of major importance in later life choices, such as in defining career paths and in being translated into personal brand logos that imply meaning and seek uniqueness in demonstrating behaviour among audiences. This study serves those who are constructing or redesigning their graphic identities, by incorporating most applicable personality assets into relevant conceptual visual representations.

Handwriting analysis is used by specialists in various fields, including medical diagnoses, to enable the detection of certain diseases (Kristin and Stansbury, 1980). Although proven useful in different disciplines, graphology is met by rejection in the academic context. Kristin and Stansbury (1980) suggest this may be due to the linear research processes in most academic domains: creative minds are known to use inductive and lateral methods of looking at the overall patterns (idem). Influenced by adjacent European countries, the UK adopted graphology by the nineteenth century. The British Academy of Graphology incorporates professional and academic practice of the field (Nezos, 1992). The visual communication field delivers forms of conceptual messages, depending on the interpreted meaning, profoundly grounded by semiotics. Brand design and the definition of visual-graphic identities are activities that emerge within the broad scope of this field and, similar to handwriting, graphic identities depict specific visual characteristics e.g. style, shape, colour and typeface. Personal inquisitiveness questioned connections, and values handwriting analysis may have on the visual communicative fields. Bannister and Fransella (1980 *apud* Holdsworth, 1982) defined the 'self' as an abstract result of a socially constructed understanding: self is known to include characteristics, which are built of previous encounters, imposing on the individual's values.

Psychometrics are individuality assessments; according to Cattel (1957, *apud* Cooper, 2010) predictions are constructed on behaviour, which are articulated and grounded on factors of 'trait' and 'state'. The author states that traits are most common amongst psychometric tests and are stable behavioural processes. These are divided into three elements: the first factor is 'attainment', which acts as the gained knowledge within a setting; the second is 'ability', which is related to cognitive levels or 'thinking skills'; the third factor is the external influences of the current state of behaviour. Unlike trait, 'state' measures the changing attributes known as mood and biological motivation condition. Therefore, assessments of traits and states differ.

Within the context of personal branding, Osterwalder, Clark, and Pigneur (2012), suggest that core personality traits and interests are stable, as satisfaction is a combination of interest, expertise, talent, and personality. Individuals' occupations are based on personality types and are aligned with skills and performance. Career satisfaction occurs when there is an alignment between work environment and the individual's personality. 'Optimal' experiences, as described by Csikszentmihalyi (2014), are characterized by the psychological mental state of an individual when he/she is immersed in an activity that requires intrinsic interest, full involvement, great motivation, and skilful abilities, that will ultimately provide enjoyment, due to the alignment of the development opportunity it represents and the ability to achieve its goals.

Fishbein and Ajzen (1975, *apud* Szmigin, 2015), in their Theory of Planned Behavior, claim that attitudes are shaped based on experiences defining cognition, feeling, and performance. These factors determine the range of favouring and may change at different periods of one's life, clearly indicating that individuals' identities and ways of behaving change/evolve throughout their lives, anticipating that the methods and resources they use to present themselves will vary. Psychological tests are often used as measurements of ability, skills, cognition, attitude and are constructed and provided in different formats, depending on purposes and measurement systems (Cooper, 2010). Similarly, in visual communication, the extent of logo developments is subjective (Hodgson, 2010). Nevertheless, redesigning any logo includes some parts of the previous characteristics (idem).

According to Aaker (1996), a logo/symbol is the tangible signature element of a brand's personality whilst a brand, according to Wheeler (2009), forms an intangible relationship with its audience, being built on experienced emotions and associations. Brands strive towards differentiation and interaction, often by adapting a certain, preferably unique, visual language. The brand acts as the overall scope that includes visual features of identity (either institutional or individual), along with communicating core values, by building a reputation of its positioning and strategy (Aaker, 1996).

Khedher (2014) states that personal branding is a process of self-marketing. This involves the establishment of brand identity differentiation, brand's positioning through behaviour, communication and symbolism, and the evaluation of the brand's image to achieve personal and professional objectives. Accordingly, Aaker (1996) claims that a brand's identity should represent its purposes and values; the extension of a personal identity must reflect image, behaviour, style and personality. Lin's

analysis framework and findings (2010) focus on the relationship of the user's personality traits and the proposed personal brand disposition. The brand's proficiency and experience impact trust, effecting excursion of brand allegiance. Engagement and accessibility also affect performance of brand allegiance.

Likewise, handwriting is an external expressive form of an individual, a visual mark of communicated existence and emotional state (Nezos, 1992), subject to life experiences. Handwriting is a personal mark of movement embodied onto a surface, manifesting the core components of the quality of writing (Nezos, 1992). Graphology (handwriting analysis) is known to be open to interpretations, but some general rules have been agreed working as simplified models of identity awareness, where the main areas of credibility are: layout, zones, size, baseline, pressure, shape, legibility (Kristin and Stansbury, 1980). Accurate interpretations depend on complex formations of multiple aspects of human traits (Nezos, 1992). It is believed that combinations of signs are infinite, and the simplified-model results are incomplete interpreted indications (idem).

Subject to many modern field requirements, technologic tools are heavily applied within the creative industries (Casey, 2013). In the context of writing, technology has greater speed of processing and predicting words, faster than the common human's speed of cognition. The handwriting expert and forensic document expert Wendy Carlson (idem) confirms that cognition is becoming vulnerable as a result of this phenomenon, adding that cursive handwriting is declining due to technologic communication, reducing performances of both sides of the brain, those of which relate to functions of cognition and movement. According to Mueller and Oppenheimer (2014) multitasking on computers is met with high distraction. Jan Olsen also confirms that writing fulfils the requirements of later recall (Casey, 2013). According to Wheeler (2009), the three elements associated with the sequence of recognition in visual communication are fragmented shapes, colours, and then the complete form (including textual elements), recommending that legibility is a must. Docmail concluded that a significant portion of participants could not make sense of their writings (Casey, 2013). Recent research shows that cognitive performances of computer note-taking methods are lower; dictation is written word for word, rather than processing information in one's own words (Mueller and Oppenheimer, 2014).

Hietajärvi (2012) believes branding trends are shifting towards personal types as an effect of media consumption. Most social network platforms are visual means of self-branding, where basic recognition may be the desired result of what the ordinary public persona defines as 'success'.

Baer and Vacurra (2008) believe that information design is defined as the organisation and decluttering of complex information, implying significant moral standards. The greater the density of intricate information, the greater the need for design. Effective communications carried out in graphic design deliver hierarchy, by specific applications of colour, imagery, type, and symbols. Harris states "Art is about self-expression. Design is self-less" (idem, p. 88).

The process of building the first author's graphic identity faced several alterations and transitions. Her journey of self-discovery altered the visual approach, through which she previously chose to represent herself. Graphology has continually fascinated her. What would be a new area of study within her postgraduate studies challenged and motivated the researchers to proceed with this passionate subject. The stated topic of research was selected as the Master's major project on the MA Advertising, Branding and Communication at the University of West London.

Questions arose of impacts of students comprehending their individualities, and visually representing them accordingly. Assumptions were raised as to the type of attitudes associated with their current identities. The gap identified was the lack of research covering the impact graphology may have on visual communication students, despite its great importance in alternative fields. The overall objective was to detect motivations and goals of the targeted audience in relation to self-branding projects, amongst academic institutions. The investigation also looked into links and commonalities between technologic mark-making tools and the conventional handwriting processes.

An analysis model of concepts, dimensions, and components has been created as a summary of the topics this investigation looked into. Three main concepts are: Graphology, Psychology, and Visual Communication (Design). The most relevant key points of dimensions and components are also addressed in this paper *(Figure 1)*.

FIGURE 1.

The research analysis model

	Concepts	Dimension	Component
Graphologists Interviews + Handwriting Samples	**Anatomy:** Handwriting Analysis (Hand skills & Mark-making)	Graphology	1- Inner Personality: Zones
			2- Energy: Pressure
			3- Outer Personality: Slant
			4- Impression: Size & spacing
			5- Personal Space: Speed
			6- Approach: Movement & shape
			7- Self image: Pronouns & signature
		Literacy	8- Academic Background
			9- Cultural background
Visual Communication Students Interviews	**Psychology:** Visual Communication motives	Fields of Education	1- Visual Literacy
		Performance	2- Motivation Type
			3- Time towards reward
		Academic field of education	4- Identity Brief requirements
			5- Influences
Visual Communication Students + Instructors Interviews	**Design:** Visual Identity / Branding	Self	1- Logo type
			2- Visual Identity / signature (identity)
		Perception	3- Internal
			4- External

Method

A qualitative approach, via descriptive and interpretive analysis informed the exploration of processes and causes of constructing personal brands as a phenomenon. Influenced by inductive reasoning, the method included observations and interviews. Adopted by Rolf Faste, the Design Thinking process will contribute a basis of the research as it concerns user-centered design. According to Brown and Katz (2009) the design process is studied through a structured process and is verified through trial and error routines. This suggests five stages of creative strategies to be applied in project development, based on the user needs, and suggesting methods of innovative problem-solving: emphasize, define, ideate, prototype, and test.

The investigated materials derived from a) a total of 25 semi-structured interviews with both UK based graphologists (N=2) and higher education students (N=18) and instructors (N=5) from diverse subject fields within communication and the visual languages, across Saudi Arabia and the United Kingdom, and b) the collection of students and instructors' visual samples of handwriting (N=97).

An ethics form and declaration were sent to and approved by the University's Academic Research & Ethics Committee: it included a breakdown of the research information, and data management declarations. Consent forms were signed and collected prior to interview sessions. Most meetings were held within university premises, yet external visits and online sessions were also established.

Academic connections across the Middle East and the United Kingdom allowed the researchers to acquire access to two academic contexts. The Saudi-involved institution was Dar Al Hekma University, while the main British institution was the University of West London. Participation was also met via direct access from course instructors and, contingency plans allowed reaching student participants from alternative universities through further connections. In these cases, online interviews, and external meetings were more convenient. As a result, students' participation amongst the UK involved: The University of West London, The Royal College of Art, Chelsea College of Arts, and University of Nottingham.

The one to one semi-structured interview sessions took an average of approximately 20 minutes, focusing on perception of visual identity/branding representation. The involvements were open discussions, maximizing response, e.g. motives and feelings. Handwriting samples would be collected to detect possible similarities and/or differences of writings. These sessions were brief, in which the participants would be provided with a blank sheet of paper and a selection of pens and pencils. The sampling sentence that was dictated to the participants was "The quick brown fox jumps over the lazy dog"; this pangram is widely known within typography development and includes all roman alphabet characters. Samples collected in Saudi Arabia, where English is generally the second language, were from individuals who have mid to high English linguistic capabilities. This is an academic requirement set for applicants. Thus, the educational level provided in the Dar Al Hekma University is of high academic quality, applying international curricula, where classes are delivered in English.

Two graphology workshops were also attended addressing impacts of schooling curriculums on the phenomena of similar handwritings. Another discussion raised, was the comparison of experience and writing qualities between utilizing conventional and technological writing tools. In addition to these, the empirical works included interviewing professional graphologists in the UK, those of whom were associated with the British Academy of Graphology, with over 20 years' worth of experience. The objective was to discuss and validate key findings from observations along with the categorical analysis of collected samples such as writing zones.

Results

Semi-structured interviews

Student's motivations of academic work performances were categorized as purpose-driven, content, achievement, appreciation, credibility, satisfaction, and career orientated. Interests are focused on social aspects of 'competition' and 'belonging' and alternative personal hobbies, such as those grounded on visual style e.g. illustration. In certain cases, individuals compare themselves and their abilities to others. Academic accomplishments' motivations are short-term based, being classified as personal contentment, enhanced student performance thus, affecting results, exhibition of work and upcoming graduation. Students define success using expressions such as 'being financially independent', having developed 'communicational abilities', being 'socially accepted' (belonging), achieving a certain level of 'status' (which is attached to credibility, reputation and recognition) and 'internal fulfilments', linked to ideal perceptions of self, which include contentment and satisfaction, along with morals. Most students who shared their visual identities have not tested them in terms of communicational impact, hence, their personal logo's success each had not been determined. Three out of eighteen students were able to clarify their precise clientele profile in terms of region of provenance, culture, and industry. Alternative responses were broad, being commonly referred to as 'design agencies', yet no significant classifications have been made as to the agencies' types, which stand open to interpretations e.g. digital, design, advertising, etc..

Twenty-two percent of students claimed to have switched

majors during early phases of academic years. A cause affecting this decision is the consideration of desired career paths in current job markets. The interviews also revealed that graphic identities of personally developed logos for students to include in their CVs and portfolios have been created during early academic years. However, redesigns/alterations occur due to indecisiveness, studies dissatisfaction and the personal unsatisfactory result of visual representation of one's self. Indecisiveness occurs mostly as a result of registration timing constraints, and reassurance occurs when satisfactory grades have been obtained and shared for credibility, supporting their identities and self-esteem. The complexity level of branding intangible personas is seen as greater than branding tangible products. Hence, instructors pointed out that design choices amongst students are becoming similar, adhering to logotype approaches, applying textual contents, as opposed to colour and shape based creations. Successful/inspirational visual identities impacts the students had retained from in-class examples. However, only one student described her logo as being based on her actual handwritten signature.

Among students, timing allocations are believed to be unbalanced throughout the whole process of creating their own personal brand identity: more time is spent on self-related research and, as a consequence, creation and execution time is decreased.

Most students claimed their preference in utilizing mixed methods for their executions, using both conventional and technological tools. Students have also agreed on the experiential limitations of utilizing Wacom devices, along with the need for extra tutorials of brush adjustments on Adobe Illustrator, for instance. Processes that require extra time, effort and experience defect the flow of movement.

Early years and stages of creating a personal identity may be developed into a brand during senior levels, where the portfolio module is undertaken, and developments may be built on feedback given during earlier years. Identity developments in portfolio modules may include scaling, bilingual and colour adaptations.

An interviewed instructor expressed her views that self-branding is one of the complex tasks for graphic designers. Many of which, their industry circles along with other professionals' experience complexities when branding themselves. The main issue is that self-branded individuals become unsatisfied, constantly developing designs. Here, change becomes more frequent, as opposed to visual identity changes amongst corporate businesses.

Within the academic contexts, personal identities are undertaken during two semesters: the first, during sophomore or junior year, after which the students are taught design principles and semiotics along with fundamentals of relevant design software. The second, is undertaken during the senior year's semester, as part of the portfolio module. In this, development is vital as experience is gained from industry-work encounters such as internships. One instructor shared that academic standards are elevated

following the summer of which the placement-led module is undertaken.

Lecturers also mentioned that in cases where sketches developed by the students are shared with their instructors, conventional hand marks are becoming less common amongst students in Saudi Arabia as opposed to the United Kingdom. This type of requirement enforcement varies amongst the academic contexts. In most cases, instructors have shared that works are digitally oriented, as opposed to written/sketched formats. Nevertheless, two instructors stated that the conceptual developments are enhanced where conventional tools are used. Other cognitive and intellectuality enhancements are grounded by classroom table distributions and layouts, including discussions. One instructor has shared that creativity is limited when students use technological facilities, as designs are created and edited prior to concept development. As a result, instructors have noticed that verbal and psychical gestures clarify conceptual in-class descriptions. Type-based descriptions are written towards the finalising stages of the process. Another instructor stated that usual requirements amongst some academic institutions are forms of a written documentation, which may be easier to grade. This instructor has stated the enforcement of generating an online presence amongst the visual communication students, due to the further impact leading towards employment.

It was also noted that the requirements are directed towards a theory-based approach, as opposed to industry-related practices. An instructor mentioned that receiving industry accreditation, is a requirement of practice-based projects in Saudi Arabia. It is questionable that the amounts of theory and practice-based outcomes vary amongst the institutions and regions. In cases where enquiries of the grading criteria were raised, the grading features are based around two types of deliverables, being tangible and intangible sorts. Both have received equal amounts of responses. Tangible deliverable includes aspects of layout typography, consistency, execution (includes print), and written (typed) documentation. The intangible deliverable, however, include the delivery of values, along with effectiveness of the communicated outcomes. The grading criteria is flexible, as opposed to the fixed assessment rubric.

In cases where graphologists were interviewed, one shared that there is a noticeable lack of handwriting usages, although the impacts of the analysis graphologists deliver have been preserved and are meaningful amongst the general public. In many cases, they shared that their clients have been noted to praise the outcome of information provided by the graphologists, for their accuracy; word of mouth serves as its successful marketing tool. Graphologists also shared that their clientele profile is commonly companies within the financial sector, being involved with the human resource department and monitoring work performances of employees. Nevertheless, the graphologists also believe that handwriting is becoming a matter inducing negative associations, causing discomfort amongst some members

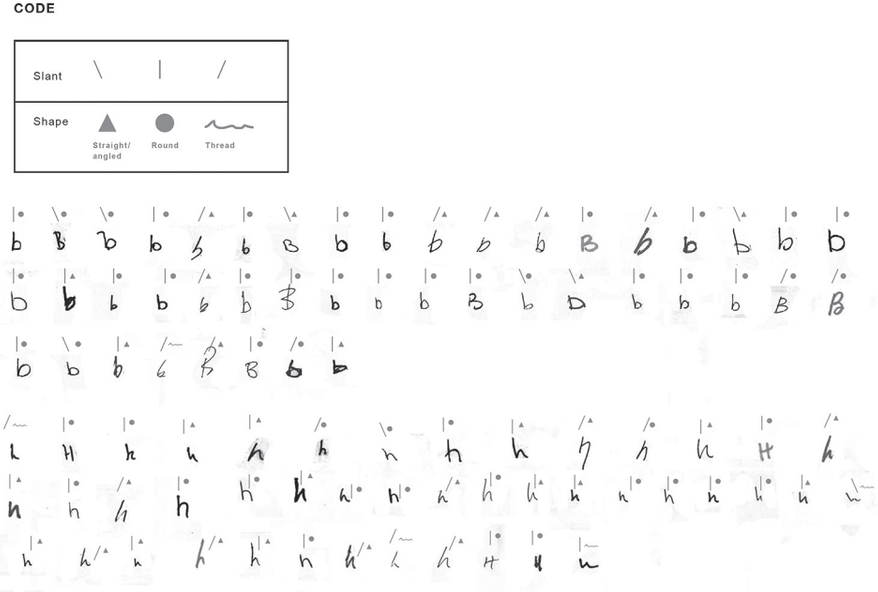
of the public. They have pointed out that this may be linked to a lack of confidence as clients who are asked to provide a piece of handwriting are deeply concerned with the aesthetic value and the accuracy of delivered communication such as spelling. Graphologists believe that handwriting should be introduced in a fashionable manner, thus eventually becoming a trend.

Handwriting samples collection

Comparably, although penmanship varies widely, the collected handwritings are becoming similar *(Figure 2)*: categorizations based on shape and slant are put forward: within the category 'shape' the analysis considered the codes *straight/angular*, *round* and *thread*; as for category 'slant', the coding relayed on left, vertical and right slants, disregarding letter case, thus, grammatical applications. In cases as such, letter cases require further categorical interpretive aspects: size, form and originality (Kristin and Stansbury, 1980). Letter 'B' samples evidence the high usages of round applications, while letter 'H' has an equal amount of round and straight/angular letter approaches. The most common application of slant is vertical. These selected categories would be more credible and reliable within greater sections of writing. However, this method was conducted fulfilling the objective of allocating patterns of assessing letters in a social context, as opposed to individualistic writing interpretations. Furthermore, in alternative cases of assessments, writing would be generalised based on the highest applied hand-drawn

FIGURE 2.

Categorisation of 'B' and 'H' for shape and slant

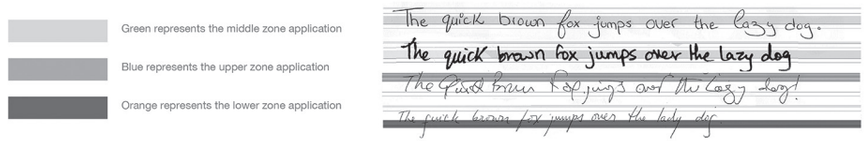


value of letters of each individual. It is to be noted that the 'pencil' was the commonly favoured marking instrument out of other tools that were presented to the participants such as markers, ballpoint and technical pens.

According to McNichol and Nelson (1994), handwriting is set to dominate three areas referred to as 'zones': upper, middle and lower (being the ideal represented by a balanced application of all three. The authors believe that writers dominating the middle zone (also referred to as the 'comfort zone') may be self-centred striving to achieve relatedness and social belonging. The collected samples of handwritings also demonstrated the commonality of commitment to the middle zone *(Figure 3)*.

FIGURE 3.

A sample of the collected handwritings evidencing preference for the middle zone



Graphology workshops

Workshops' sessions detected that handwritings that graphologists come across are becoming more confined to middle zones and it has been pointed that usages of print-like handwritings are becoming more common among people nowadays. In their opinion, this phenomenon may be a result of schooling curriculums promoting the copybook print style, as opposed to the more traditional cursive lettering. From a young age, individuals are taught that enlarging letters to reach top and bottom lines is the correct way of writing; as one progresses through academic years, educational workbooks undergo constant alterations e.g. condensing and/or removing lines. It was also mentioned that in many cases, personal negative attitudes are developed towards one's handwriting. Note should be made that if on one hand some technological devices may promote the use of hand skills, such as Apple Pencil or Wacom Pens, graphologists have highlighted the constraints of using such devices, as opposed to the conventional tools. These limitations that may vary depending on programme tools, functional capabilities and the perceived level of difficulty.

Findings pointed that, during higher education years, handwriting usages have reduced dramatically, as opposed to alternative methods of mark-making such as digital note-taking or drawing devices. Only four students shared that handwriting was incorporated at some point during the personal branding process, for the inclusion of unique details in font/typography-based designs.

Practices utilized in self-discovery in personal branding include self-reflection, utilizing accurate personality type psychometric assessments which are available online e.g. Myers-Briggs (MBTI, 2017), and questioning

others. Self-reflection primarily acts as an overlap and also a connection of past experiences, image, style, and emotions. An important aspect in personal reflection is to look for validity and accuracy and online assessments are considered as a validity resource. Here individuals search for possible links of online results (virtual) to the individual's areas of self-related awareness, regardless of forms and processes required. Usages of alternative online assessments, such as those created for personal interest e.g. 16 Personalities (2017), may be few and far apart, due to the developed ties to inaccuracy. The users define inaccuracy after taking the assessment, in which they become selective as to the provided criteria of results and applications based on the amounts of self traits they are aware of. The reasons for some discontinued usages of alternative online generic personality assessments are their broad results, inaccuracy and scepticism, mostly to their links to horoscope grounded information. Regardless of the degree of acceptance of online assessment results/descriptions, the 'validity' itself is the investigated aspect and it is possible that the cause of this is the lowered self-esteem and confidence this audience may be facing at this stage of their lives.

Finally, during the interviews' sessions, all students expressed high interest in a guiding tool linking self-research and design. Furthermore, some student participants shared they utilized methods of branding and self-related research, including accurate online psychometric assessments of personality, such as Myers-Briggs (MBTI, 2017).

FIGURE 4.

Table of Findings

Total	Profile	UK	SA	Findings
25-Semi-structured Interviews	18 Students	x	x	Short-term goals/motivations
				Difficulty narrowing clientele profiles
				Switches in academic major choices/career paths
				Issues of Indecisiveness
				Complexity of branding intangible personas
				Mixed-media project executions
				Usages of online personality assessments in Personal branding
				Interest in personal branding new self-guiding tool
	5 Instructors	x	x	Academic Requirements
				Logo-type design trend amongst students
	2 Graphologists	x		Discussion of collected handwritten samples
				Middle zone commitment
				Rise of copy-book print style
2 Graphology Workshops	N/A			Middle zone commitment
				Rise of copy-book print style
				Experiential limitation of digital writing
97 Handwritten samples	N/A			Commonality of round shaped letterings
				Commonality of vertical slants
				Middle zone commitment
				Pencil as favoured writing instrument
				No significant contextual differences (shape, zone, style)

Discussion and Proposal

Usages of online personality assessments may be few and far apart, due to inaccurate and/or sceptical results, depending on the assessment's type and purpose. The scale of accuracy is defined by the user after taking the assessment, in which they become selective of results based on the amounts of self traits they are aware of. The assessment accuracy and credibility is commonly gained through word of mouth, which more than often is influenced amongst students.

It became clear that the research detected no significant handwritten differences amongst students from the UK and Saudi Arabia in terms of overall style (shape and slant) and zone. This was due to the type of profiles this investigation approached: as part of both the UK and Saudi Arabia academic institutions' requirements, all involved participants had efficient (mid-high) English linguistic capabilities, being of the written and verbal sorts, namely in the case of Saudi Arabian institutions that strongly rely on British and/or American curriculums. Due to this, early categorizations of collected writings appeared to be similar.

In the collected samples, round lettered applications, such as those found in letter 'B', are interpreted as the desire to avoid conflict. These were very common amongst the analysed handwritings, meaning that these individuals are likely to be easy-going, desiring both efficient communication and acceptance. Individuals are also likely to be approachable, yet there is a constant search for confidence, hence change may be seen as a threat. The letter 'H' consisted of this approach along with straight/angular shapes (Kristin and Stansbury, 1980). Straight/angular letters are indicators of logical thinkers and are demonstrations of dominance and determination. Moreover, they are less flexible individuals: while rounded shapes relate to the physical world, straight letters are associated with the mental domain. The vertical slant is interpreted as present-related and independent. The utilization of the pencil is linked to error correction tolerance, also depicted as fear of permanence (idem).

It is debatable that students may find comfort in writing on lined pages, which are graphologically depicted as both guidelines and barriers (Kristin and Stansbury's, 1980). However, it is also possible that, because individuals have grown accustomed to writing in a straight line, removing the baseline, causes a sense of imbalance. It may be questionable that students are subconsciously following dotted lines of successful visual

identities, possibly resulting in the rising trend of noticeable logotypes.

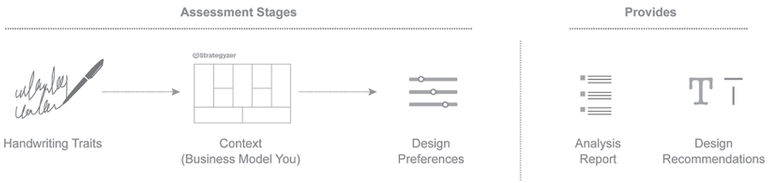
As graphology had little/no previous ties with visual communication, this study introduces an approach in which this human science may be integrated and may be further carried out by linking direct input from graphologists and visual communicators. Similar to the online personality assessments that students are currently incorporating in their self-branding projects, this study also carries out the feature of self-evaluation. This is based on the individuals' approximations, those of whom believe their writings fit the given graphological criteria of samples (Kristin and Stansbury's, 1980). In depth psychological analysis of personality features and alternative fields, such as graphology analysis rely on human resources along with further requirements of funds, time and effort.

Due to the complexity of personal branding amongst the targeted profile, an online personal branding platform is proposed, after an exploratory research of existing supportive online platforms that was conducted in order to assess the innovation of the current and available technologies.

Unlike the current methods of self-branding, the approach presented in this paper promotes handwriting as a tool of self-related research, working similarly to alternative personality assessments. With an approximation of 20-30 minutes to take the assessment, this system provides a qualitative report of the internal (handwriting) and external (context) attributes along with the user's design preferences. Therefore, the system provides a range of possible design approaches that best suit the overall characteristic traits found in the selected material *(Figure 5)*. Narrowing the visual scope of relevant/potential design applications, the user undergoes three stages of the Assisted Design:

FIGURE 5.

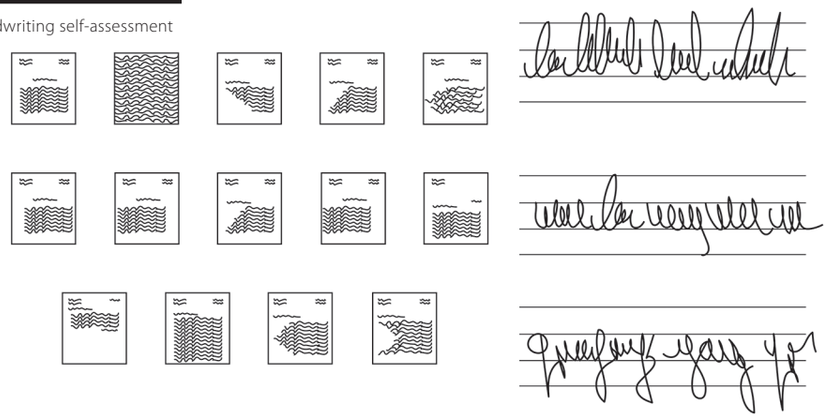
The main interaction structure for self-branding assistance



Handwriting Traits: the user is asked to self-assess their writings based on matching these with simplified sampling criteria that are presented to them in the platform's interface *(Figure 6)*.

FIGURE 6.

Handwriting self-assessment



Business Model You (BMY): Similar to the concept of analysing the Business Canvas, the BMY dissects functionalities of the individual as if he/she was a business, grounded on personal interests, skills, abilities and personality. This acts as a blueprint for professional activities and decisions. Supported on Strategyzer's categorisation, the user is asked to complete his/her individual model *(Figure 7)*. As the earlier findings were of short-term nature, the user's narrowed keywords detect motivations, interests and specified audience segments in relation of their periodic interest.

FIGURE 7.

Business Model You

Source: Osterwalder, Clark and Pigneur (2012)

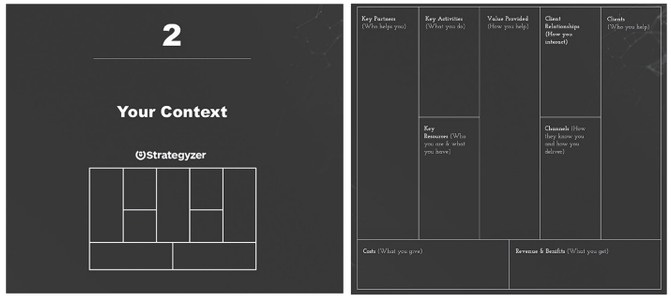
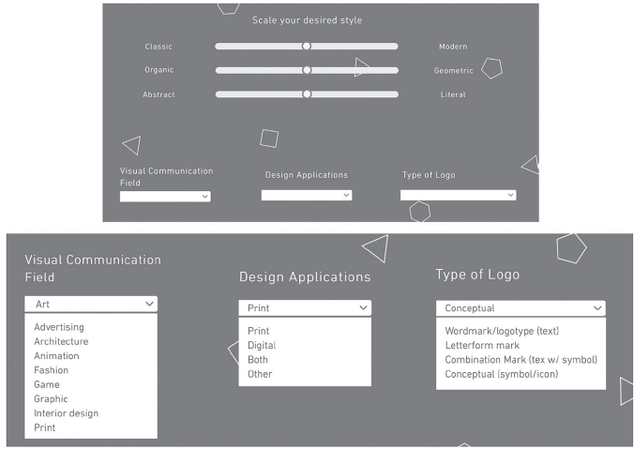


FIGURE 8

Design Preferences



Design Preferences: sets a framework for design options, allowing the user to determine visual style preferences (Figure 8).

After the assessment phase, the user is directed to his/her report page, in which an overview is presented *(Figure 9)*. The handwriting traits are interpreted based on what the individual has selected from the provided templates. The individual's contextual areas are categorised, based on performances and goals.

FIGURE 9.

Sample of a Report page

Finally, the Results stage recommends designs, based on the user's report. In this page, connections of the user's results are depicted as concepts. These connections link several aspects of each of the three stages randomly, so that three concepts are put forward. One or two concepts may be selected for the final visual scoping. Furthermore, this serves as a visual guide of self-representation, without any prescriptive intention. Samples of imagery are gathered from existing and available online material as relevant inspiration *(Figure 10)*.

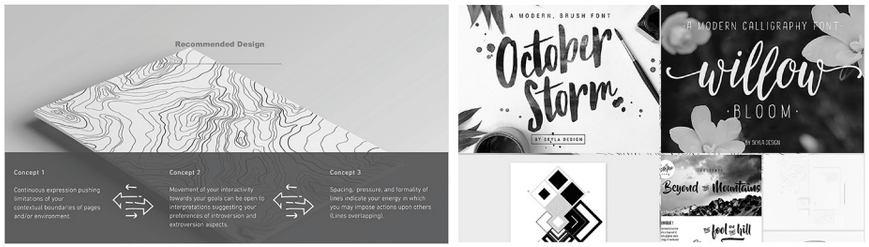


FIGURE 10.

Results area and visual recommendations

The outcome is a mid-fidelity prototype, with fixed functionalities for certain buttons, which was tested and evaluated by two visual communication students, each taking thirty minutes. The evaluated aspects were: clarity, navigation, theme, relevance and results. Participants showed high interest in the theme due to its relevance to their field. More time was required on the BMY section as opposed to other areas. The navigation throughout the platform was linear, yet handwritten templates would require supporting textual clarity.

Implications

It has been noted that structure and contents' variations apply within identity/branding requirements across the students from the international academic institutions that participated in this research. An example of this would be the bilingual considerations of audience profiles of marketing one's self within the Middle East where both Arabic and English are commonly used as opposed to the UK. Another example would be the certain applications of visual styles, e.g. bilingual similar font adaptations. Although comparisons of the specific requirements vary in amounts of theoretical and/or practice-based outcomes, international academic institutions may be shaping and influencing personal desired outcomes, perhaps in similar ways. More specifically, definitions of success vary amongst instructors and the academic institutions. As a result of these conflicts, personal identities may experience later developments and/or changes once the educational priorities and assessments have been completed, meeting the demands of course requirements. It may also be possible that later adaptations are applied after having had work experience.

The proposed online platform assists visual communication students in establishing their personal brands by removing virtual time constraints and innovating the traditional self-research approaches. Such an innovative platform would provide personal insights based on the individuals' self-evaluation of personal handwriting, determined by general elements/features of graphological credibility. As this is a self-based assessment, results are generated based on selected criteria of handwriting and design preferences sections along with type-based keywords in the BMY section. Processed data and selections are grounded by programmed codes of algorithm combinations of the three categories, which are then incorporated as textual summarized descriptions within the Report page. Concepts are formed based on the combined compositions, thus affecting the scope of relevant design manifestations from existing online imagery.

Nonetheless, this service would balance personal marks by incorporating the analysis of certain criteria, e.g. layouts found in student's handwritings in relation to personal goals and design preferences. The research also promotes conventional methods of handwriting – restoring its disposition within the higher academic institutions, thus subsequently enhancing cognitive performances.

An interesting future approach, building on this work, would be the integration of Lin's findings (2010) on the connections between extroversion and amiable personality qualities and characteristics of brand enthusiasm. This may be reflected within the resulting design choices, along with their conceptual and semiotic value. A fully functional version would be necessary for final validation purposes, of which multi-language formats would be addressed, and a broader range of students from a larger variety of backgrounds would be considered as well.

Such a tool could become a helpful resource for the careers offices in universities, or as a supportive mechanism for placement-led modules, in which internships and industry experience is a vital part of the

assessment structure. Also, it would be interesting to verify if such a resource could have any impact in reducing the change of academic fields amongst students. Theoretically, this research raises the question of how relevant penmanship education and practice may actually be, as the findings point out to its possible benefits on personality and attitude definition, without disregarding aspects of representations of culture and tradition.

Should this study find a great deal of interest amongst a wider scope of visual communication students, further adaptations of the outcome may be considered. Such an approach should incorporate human resources such as graphologists. The outcome could introduce a funding area, in which personal branding may be further assisted with in-depth and thorough handwriting analysis, where writings may be scanned and uploaded to the platform for direct input from professional graphologists, for instance. Further considerations of this approach are yet to be investigated in relation to the alternative stages of the assessment along with further requirements of costs, time and effort. It would be interesting to investigate if students would be interested in a service that creates or guides the creation of visuals for their personal identities as opposed to design scoping of existing material. Nevertheless, such a case is debatable, as it raises the paradoxical conundrum of experienced designers designing for student designers.

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Authors

Laura Bakalka

Assistant Professor of Graphic Design, American University in Dubai, UAE
lbakalka@aud.edu

As a graphic designer in 2013, Laura undertook the academic/industry related Internship Placement module held at 77 Media, Saudi Arabia. Graduated from Dar Al Hekma University, Saudi Arabia, she obtained the Certificate of Bachelor of Arts in Graphic Design (Hons) in 2014, in which her projects have been selected and displayed at the Visual Communication Exhibition at the university annually. Laura's illustrations have also won a children's book competition associated with the Visual Communication and Special Education departments of Dar Al Hekma. Her book illustrations were selected to be published. She widened her professional experience by working as a full time graphic designer at PG Integrated, a Middle Eastern multi-disciplinary advertising agency. She is a recent graduate of Master of Arts in Advertising, Branding and Communication (*distinction*), at the University of West London, where her Major Project was also displayed at The End of Year Showcase. During her studies, she was promoting the London School of Film, Media and Design, working closely with Head of School, as a media marketing-assistant for the University during 2016 and 2017. Her previous work and academic experiences within the visual communication industry integrate graphic design and advertising assets. By May, 2018 she was a finalist amongst of the top five Saudi designers for the MEFIC Capital 10th year anniversary rebranding competition.

Dr Catarina Lelis

Senior Lecturer in Branding and Innovation, University of West London

Catarina Lelis began her professional experience back in 1997 as a graphic and software interface designer. She is a certified coacher/trainer since 2003, acting in domains such as design, creativity, branding, illustration and publishing technologies. In 2006, she co-founded both a publishing start-up and the Portuguese Association for Innovation and Creativity in Organisations. She started her teaching experience in 2007. Her research and entrepreneurial ideas were recognised and funded by FCT, the Portuguese national funding agency for science, research and technology. She was the winner of the first edition of IdeaPuzzle Prize, which aims to award the best Portuguese PhD research design created with IdeaPuzzle® software, in 2012. Catarina lead the OurBrand® project, from mid 2013 to early 2015. OurBrand® was an entrepreneurial project, which main goal was the design, development and deployment of a technological/digital solution for the creation of participatory brand centres. With this project, she won a national entrepreneurship contest, which prize took her into a one-week immersion program in Silicon Valley, and her team was selected for the semi-finals of MIT-Portugal Innovation & Entrepreneurship Initiative Building Global Innovators Venture Competition. Her research interests include Participatory Brand Design, Brand-Oriented Ecologies, Dynamic/Flexible Brands, Creative Skills Development, Visual-Digital Literacy, Technology-Mediated Communication and User Experience.

Informative and decorative pictures in health and safety posters for children

Sara C. Klohn

Alison Black

Health and safety (H&S) campaigns for children are often aimed at six to twelve year olds, with the same materials targeted across this age range despite their developmental and cognitive differences. We conducted a study to examine whether three different visual approaches to H&S posters influenced children's engagement with and ability to elaborate from the poster content, and preferences for the posters. The study was conducted with children from two age groups (7-8 and 10-11 years of age). The posters were designed with the same verbal information but we varied the presented pictorial information: Poster 1 had informative pictorial information; Poster 2 had decorative pictorial information; poster 3 had no pictorial information. The study consisted of a written activity and a discussion. The results suggest children from each age group have different responses to the different kinds of posters tested, and particularly age-related preferences for informative or decorative pictures. We describe four responses tendencies that should be considered for further research.

Background and rationale

Although the internet is, increasingly, a source of information for adults and children alike, printed resources are still frequently used to disseminate health and safety (H&S) information to children. Governmental (e.g. UK Department for Transport, DfT) and non-governmental organizations (e.g. Royal Society for the Prevention of Accidents, ROSPA) use printed resources alongside websites for H&S education. This may be justified given Marks et al.'s (2006) finding that print media elicits greater attention and message processing than web media, and their hypothesis that school-aged children may perceive print as a didactic and web resources as entertainment.

While printed posters are widely used in educational settings, there is little research about their content and its effectiveness. In a preliminary analysis[1] of 64 H&S posters for children, gathered from a range of UK and international sources (see, for example, DfT's 'Tales of the road' campaign in Figure 1), we found that posters are, typically, illustrated and tend to be targeted at broad age groups. For example the 'Tales of the road' campaign targets children aged 6 to 11.

FIGURE 1

Example of H&S poster for children, part of the campaign 'Tales of the Road', size A4 (297 x 210 mm), aimed at 6 to 11 year-olds. *Source: Department for Transport, UK 2009.*

1 This analysis is to appear in the first author's PhD thesis, forthcoming.

There are reviews and studies of the relationships between verbal and pictorial elements in communicative artifacts for adults (Houts et al. 2006, Kress and van Leeuwen 2006; Kong 2006; Norman 2010;) and in storybooks and school textbooks for children (Levie and Lentz 1982; Pike, Barnes, and Barron 2010; Feathers and Arya 2012) but we have not yet found studies specifically about the interplay of verbal and pictorial elements that compose informative posters. Existing studies may be limited in their relevance to safety campaigns for children, who do not necessarily respond to information in the same way as adults, and who may have different responses to posters than books. Whereas books may have long texts on a single or several pages to convey a narrative, H&S posters have short texts and aim to influence a particular behavior in a specific, and potentially life-preserving context.

According to Gardner et al. (2000) posters must be brief; in this brevity, verbal and visual elements of posters might be complementary, each contributing their own meaning, so that sometimes one without the other makes no sense. Kress and van Leeuwen (2006) describe an interplay between picture and text, in which one element is not subordinated to the other, but which constructs a message, even if sometimes one mode (pictorial or verbal) prevails over the other. There is some overlap but also, in some cases, lack of consistency among researchers describing the different relationships between pictorial and verbal elements[2] of children's storybooks and documents in general. For instance, for Kong (2006) the term 'Extending' indicates adding new information, while for Norman (2010) it means adding new information by specifying circumstances, which, in turn, is called 'Enhancing' by Kong. After grouping and simplifying similar terms from diverse studies (Norman 2010; Kong 2006; Fang 1996) three generally applicable terms were defined to describe the relationships of pictorial and verbal information in H&S posters for children: *reinforcement*, *addition*, and *decoration*. Reinforcement is used when pictorial and verbal elements carry similar information; addition when they have slightly different information which combine to compose a message; decoration specifically when pictorial elements do not carry information directly connected to the poster's intended central message, but serve to attract the viewer's attention. More generally, pictures in these relationships can be classified as informative (reinforcement and addition relationships) or decorative (decoration relationship), according to their intended function, although not necessarily how viewers will interpret them.

Informative pictures are intended to reinforce and/or add information to verbal information; supporting the comprehension of a mes-

2 Most researchers refer to relationships between text and picture, whereas we are using the terms ***verbal*** to refer to text and ***pictorial*** to refer to pictures, based on Twyman's (1985) classification of types of language. Twyman also differentiates "visual graphic verbal" from "aural verbal." For conciseness, we are simplifying by using "verbal" to refer to the first.

sage (Levie and Lentz 1982; Houts et al. 2006; Pike, Barnes, and Barron 2010). It seems plausible that in H&S posters for children, where a serious message is to be communicated concisely, pictures should be highly informative and not compete or conflict with the poster's message (Pike, Barnes, and Barron 2010). However, our analysis of H&S posters for children characterized pictures as not adding information to the verbal elements in 43% of cases, functioning, instead, as attentional pictures, as defined by Levie and Lentz (1982), or, in our characterization, "decorative" pictures; see also Houts et al. (2006). In 'free reading' situations, according to Levie and Lentz, such pictures stimulate reading by directing the reader to choose texts carrying an attentional picture. Levie and Lentz argue, however, that in learning situations ("forced reading"), pictures are less likely to direct attention and that their function of supporting the cognitive processes of comprehension is more important to the learning process.

In addition to finding a high number of decorative pictures in our analysis of H&S information we also noted the wide age ranges targeted by campaigns, such as "Tales of the Road" (*figure 1*). It seems a distinction is made between information for *children* and for *teenagers*, but none for the different developmental stages within each broad age group. The Tales of the Road campaign, for example, spans the Piagetian stage of Concrete Operations (middle childhood) (see Santrock 2008, 221–223), during which children develop the ability to think and reason concretely, and from which, Piaget proposed, their abstract thinking develops. Educationalists have also observed that children's visual literacy, a variably defined concept (Averignou and Ericson, 1997; but see Ausburn and Ausburn 1978), develops during these primary school years.

While there are many factors about the design of H&S information for children that are unknown, a good starting point would seem to be to examine the contribution and impact of pictorial elements on children's comprehension of verbal messages. Furthermore, given children's cognitive development over the age group typically targeted, it seems appropriate to investigate whether the impact of pictures varies from the younger to older ends of the range. Hence the following study was conducted to examine children's responses to H&S posters with decorative and informative pictures in the two extremes of the 7–11 age group typically targeted; that is, whether the inclusion of pictures of different kinds influences children's engagement with and ability to elaborate from poster content, and preferences for posters.

Methods

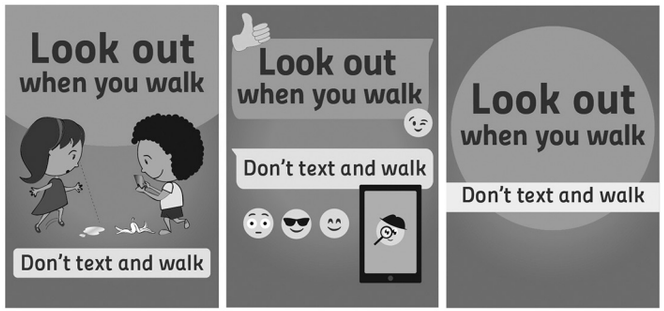
Materials

Posters were designed for testing. The main message of the posters was to warn children to not text on a cell phone while walking. The risks of using a phone while walking have been demonstrated in recent studies (Stavrinos, Byington, and Schwebel 2011; Neider et al. 2010; Hatfield and Murphy 2007) and texting was found to be more unsafe than talking on the phone (Schwebel et al. 2012). Despite being a current issue, this topic is not often addressed in safety campaigns, suggesting novelty for the purpose of the study. Also, this topic was unlikely to put children at imminent risk, nor frighten them. Although SMS communication (i.e. texting) is not typical of 7 and 8 year olds as they usually do not own cell phones nor are adept "texters", many children in these ages use their parents' phones to play games and watch videos, hence are at the same risk as those texting and walking. These posters also work as education about future risks for this age group.

Three posters were designed with features that had been identified as typical in the analysis of H&S information for children; for example, bright colors, sans-serif fonts, depiction of children, synoptic images presented as drawings rather than photographs (*figure 2*). Variants were designed, with the same verbal information and colors, but different pictorial information: Poster 1 had an informative picture, Poster 2 a decorative picture, and, the control, Poster 3 had no picture.

FIGURE 2

Posters used in the study to test different approaches to pictorial information (size A4). From left to right, Poster 1 - informative pictorial information, Poster 2 - decorative pictorial information, Poster 3 - no pictorial information.



The verbal and pictorial elements in Poster 1 reinforce and add information to each other. The girl looking at the puddle and the sentence "Look out" reinforce each other; the boy texting while walking towards a banana skin adds extra information to the sentence "don't text and walk," showing one possible risk of this activity, i.e., slipping and falling over. There is also another possible interpretation that the two children could bump into each other. The picture in Poster 2, is decorative with no relevant infor-

mative function, even though the emojis[3] depicted in this poster relate to the cell phone theme. While there was a potential hazard in using emojis for decoration that study participants might try to read meaning into them, the emojis used in the poster were selected not to have a relevant meaning, either individually or combined, and there was no evidence in children's comments in the study that they had tried to 'read' meaning into them. Poster 3 comprises only verbal information, enhanced by color and geometrical shapes and was used as a control to establish the contribution of pictorial information to responses to the other posters.

We hypothesized that the main message "don't text and walk" would be communicated to children by the three posters, but that there would be differences across conditions. Poster 1 would provide more detailed information, invite extrapolations on the topic and also be participants' favorite because of its synoptic and colorful image depicting children. Poster 2 was predicted to be second favorite, but to be less likely to stimulate extrapolations on the topic than the first poster. In turn, Poster 3 was predicted to be least favorite for participants and less likely to stimulate extrapolations.

Participants

The study took place at All Saints Junior School in Reading, Berkshire in January 2017 with 24 children from Year 3 (age 7–8) and 19 children from Year 6 (age 10–11) participating. Children's gender was not taken into account for this study. Each age group worked in three groups of six to eight children with mixed abilities.

The study received ethical approval from the University of Reading. All children's parents signed a consent form allowing them to participate. Additionally, as the study was introduced in class the children were told that they did not have to take part and could leave before or during the study.

Study structure

The study comprised three stages.

Stage 1

Introduction to H&S topics (5 minutes). The teachers for each grade led the first stage. They introduced the H&S theme by asking questions, such as what is H&S and what the children could do, or should not do, to stay safe.

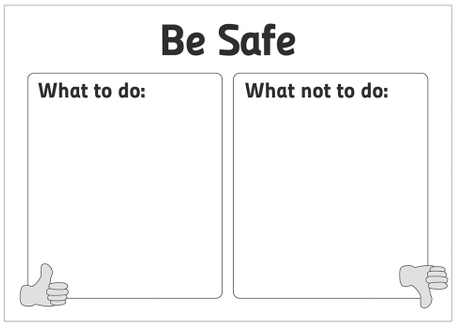
3 Emojis are ideograms used in electronic messages. They derive from emoticons, which are pictorial representations of facial expressions constructed of typographic punctuation marks.

Stage 2

Poster presentation (10 minutes). Following introduction of the H&S theme, each student group received copies of one of the three posters in size A4. The groups discussed the poster they had and ways to be safe. The children then worked in pairs within their groups. Each pair received the Be Safe template shown in Figure 3 and made lists of *dos and don'ts* to be safe in daily activities. They were told their answers could be based on the poster, on the previous class discussion, or any other ideas, trying not to push the children specifically to describe the posters.

FIGURE 3

Be Safe list (size A4) distributed to children to make lists of dos and don'ts to be safe in daily activities.



Stage 3

Discussion with the researcher (20 minutes). In this stage, each group met the researcher in a separate room from the other groups. The researcher initially asked the children: "what should you do to be safe while using a cell phone or tablet?" The children answered this question without looking at the posters. After their answers, the researcher showed all three posters to each group of children and asked which one they liked the most and why. This process was repeated with all groups.

Study circumstances

Although the general method was the same for both grades, there were differences in behavior across the children of each grade, partly due to different configurations of the rooms where the study took place. The children from Year 6 sat with their groups throughout; in contrast, children from Year 3 walked around the classroom during the poster discussion, allowing them to see other groups' posters. Year 6 had a room with table and chairs next to their classroom, where they could talk to the researcher during Stage 3. Year 3, however, had an informal landing area, in which children were walking around and jumping on beanbags placed there. Hence children in Year 3 were more dispersed and less focused on the posters and questions than those in Year 6. It was also evident in the groups that some children volun-

teered more responses than others, although all children were encouraged to respond. Thus, the written task provided a complement to the oral task.

Although it might have been expected that the posters would be presented on walls, discussions with teachers prior to the study revealed that posters are often used as class teaching material, by teachers during regular classes, or through health and safety organisations' visits to schools.

Results

The written Be Safe list provided an overall view of children's interpretation in each poster condition, also allowing a comparison between them. The responses in discussion in Stage 3 corroborated the written interpretation and provided additional information. The poster preference data complemented children's written and spoken responses and helped explain some of the written answers.

Year 3 - written Be Safe list

Children's answers on the Be Safe list were classified according to their proximity to the posters' message, from more related to less related on a six point scale, as follows:

– sentences advising "don't text and walk"
– variations of the posters' verbal information (e.g. "look where you are walking")
– answers related to the posters' topic (e.g. "don't play Pokémon Go")
– answers possibly triggered by the picture (e.g. "look for dangerous things")
– irrelevant information prompted by the picture (e.g. "do not litter")
– unrelated advice (e.g. "don't play with fire")

The analysis is shown in Figure 4 where the responses of the groups of children in the three conditions are represented by the horizontal bars. The classifications of the responses are indicated by the colored sections of the bars. The responses that were most linked to the posters' topic are indicated by the purple and pink (or darker) shading. The darker the color the more related the responses to the posters' subject. Each group in this class comprised eight children, so four pairs of children contributed advice, both positive and negative "Dos" and "Don'ts", in each group. Initial examination of the content of the positive and negative responses did not suggest their scope varied significantly, so the data for the two response types were collapsed in this chart.

Comparing the answers across posters it is possible to see that Poster 1 and Poster 2 had more answers related to the topic than Poster 3, which had only one moderately related answer. With Poster 1 (informative

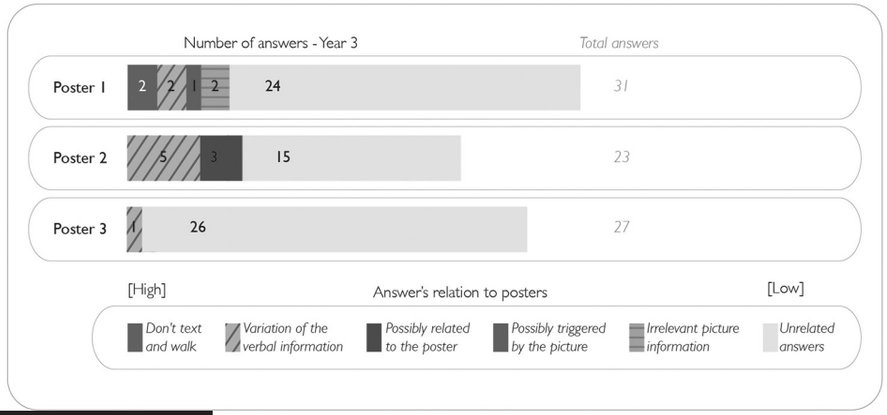


FIGURE 4

Year 3 children's answers on the Be Safe list task, classified according to their proximity to the posters' subject. The darker the color the more related to the posters' subject the answer is.

picture), two of the four pairs of children included "don't text and walk," and a third pair wrote "don't play and walk." The same children also pointed out they should not look at the ground. Overall, however, children in this group wrote predominantly general road safety advice, which was the most common unrelated topic.

In the group that received Poster 2 (decorative picture) two of the four pairs mentioned, "look where you are going." Other advice in this group was also likely to have been triggered by the poster's message; for example, "don't play on your phone when you're playing," "don't look at your phone while you're crossing the road." These children also gave unrelated advice regarding general road safety.

The group receiving Poster 3 (no picture) tended to respond without referring the poster. One pair wrote, "look where you are going," another pair wrote, "look when crossing the road." We cannot be sure whether this last response was related to the poster's message or part of their general road safety knowledge.

Year 3 - discussion task

When the children were asked about what to do when using a cell phone or tablet there were perceptible differences in responses from groups seeing the different posters, although none focused completely on the posters' message. Those receiving Poster 1 said they should take care not to crash into a pole and should not walk with their phone or go on the road with it. These children also talked about internet safety when using a phone. The children who saw Poster 2 talked briefly about safety with phones, saying, at first, that people should put their phone down when crossing the road because they might fall or could be run over. However, they then moved on to talk about general safety, the dominant themes being internet and road safety. In the group receiving Poster 3 one child briefly mentioned they should not walk on the road using a phone because they would not be watching the traffic, but the dominant theme was internet safety.

Groups identified by the poster presented initially	*Poster preferences*		
	1 (informative picture)	*2 (decorative picture)*	*3 (no picture)*
1: Informative picture (n=8)	*0*	*8*	*0*
2: Decorative picture (n=8)	*2*	*6*	*0*
3: No picture (n=8)	2	6	0
Year 3 class (n=24)	4 children	20 children	-

TABLE 1

Year 3 children's preference for posters.

Year 3 – poster preference

Table 1 shows the poster preference of the Year 3 class when shown all posters together.

There was a strong preference, in all groups for the decorative poster (2). Children in Group 1 commented that Poster 1, with the informative picture, was boring and meant for younger children. Children in group 3 were excited about the emojis in Poster 2, saying they liked it because they have emoji toys; one child justified the choice "because the emojis are everywhere (in the poster) and not only on the phone."

Year 6- written Be Safe list

The answers of Year 6 children on their Be Safe list are classified in Figure 5 according to their proximity to the posters' subject, as shown for Year 3 in Figure 4. Note there were fewer participating children (19 in total) in this class. As can be seen, Poster 1 triggered more answers related to the poster's theme than the other two.

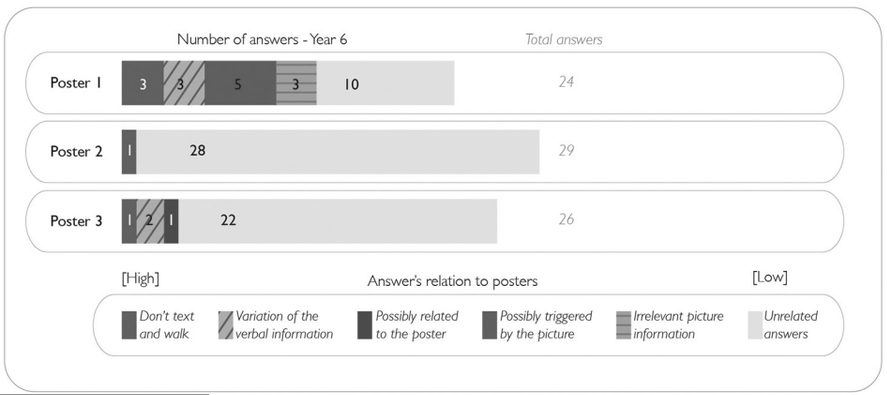


FIGURE 5

Year 6 children's answers on the Be Safe list task, classified according to their proximity to the posters' subject. The darker the color the more related to the posters' subject the answer is.

Seven children worked with Poster 1 (informative picture), forming two pairs and one group of three developing the Be Safe list (*figure 3*). All included the responses that they should not text and walk – or the variation not to text and cross the road – and that they should look where they are walking. Unrelated to the main topic, but to the drawing, children wrote they should not litter, should warn people about things in their way, look out for dangerous things, and be aware of their surroundings. Other unconnected H&S advice also appeared, such as "don't drink and drive" and "keep your sugar levels low."

Six children worked with Poster 2 (decorative picture). Only one pair of children wrote: "don't text while driving, walking." The others wrote about road safety and about unrelated health issues that could not be related to the poster.

All the six children receiving Poster 3 (no picture) wrote general advice about road safety although two pairs of children mentioned "don't text and walk" and the other pair wrote "look where you are going," which is possibly related to the sentence "look out" in the poster.

Year 6 - discussion task

When asked what they should do to be safe whilst using a cell phone, children receiving Poster 1 mostly discussed internet safety. This contrasted with their written Be Safe list, although they also mentioned people should not walk or run with their phone because they could hurt themselves, fall over, or walk into something. Some, however, moderated their responses saying "as long as you're looking at where you're going you can walk and text" or "in your bedroom, for example, you can walk and text." Similarly, children who received Poster 2 initially discussed internet safety. After being encouraged to discuss texting and walking they said they should not do it because they could drop the phone. One child mentioned they should not play Pokémon Go while walking because they could walk into roads or bump into someone, demonstrating some awareness of the issue behind the posters. In the group receiving Poster 3, one child said that if they are texting and walking they are not looking at the cars and cannot see them coming. Others added that they could trip and break their arms; or walk into other people who are looking at their phones and not where they are going. One child said, "if you are walking and texting in a piece of road it is probably a bit OK if you have an occasional look up." Another child counter argued that they could walk into a lamppost. All of these responses related to the poster's topic. Similar to the other groups they also mentioned Internet and general road safety.

Year 6 – poster preference

Table 2, below, shows the poster preference of the Year 6 class.

When looking at the three posters in the last part of the study, most children in Group 1 initially said they "love emojis." However, one particularly vocal student said he preferred Poster 3 (no pictures) because it is big and bold and would attract his attention. In discussion, other children

Groups identified by the poster presented initially	*Poster Preferences*		
	1 (informative picture)	*2 (decorative picture)*	*3 (no picture)*
1: Informative picture (n=7)	*0*	*4*	*3*
2: Decorative picture (n=6)	*6*	*0*	*0*
3: No picture (n=6)	6	0	0
Year 6 class (n=19)	12 children	4 children	3 children

TABLE 2

Year 6 children's preference for posters.

followed his position, with some children saying that Poster 2 would be improved by removal of the emojis. This group also discussed the poster with the informative picture very literally. They thought a banana skin would not be on the floor, and if it were, it would not be such a vivid yellow unless someone had just dropped it. Reasoning from this last statement, one child mentioned that it is not the child's fault (for texting and walking) if someone else has littered with the banana skin. Following the discussion three children gave Poster 3 as their preference, while four preferred Poster 2.

The discussions and preferences in Groups 2 and 3 were very different from those in the first group. Group 2 thought the informative drawing was more obvious and quickly saw that the boy on the drawing could slip over, or both children could bump into each other. In contrast they said that "you wouldn't guess" what Poster 2 was about. They continued discussing Poster 1 and did not reach an agreement over whether the characters would bump into each other or not since the girl could see where she is walking. All six children in the group preferred Poster 1, saying they thought the other two posters were boring. Similarly, students in Group 3 said Poster 1 was self-explanatory whereas they had to read and think about Poster 2. Although they thought "emojis are cool," all six preferred Poster 1. They discussed the scene depicted in it, found it amusing and understood the girl would not fall because she was seeing what was happening around her.

Study discussion

The results of this study indicate differences in poster impact according to picture condition (informative, decorative or control, with no picture) and differences in impact according to children's age. Poster 1 (informative picture) was more effective with older children compared to younger children, stimulating more discussion and extrapolation of the theme. Among the younger children, although two of the four pairs of children seeing Poster 1 wrote not to text and walk, the majority of this group's answers were about a variety of other topics. In contrast, looking at the answers of the groups receiving Poster 2 in both age groups, there is an indication that the younger children gave more relevant responses to it than the older children. Half of the answers of the younger children seeing Poster 2 were related to

the poster's topic, whereas older children seeing Poster 2 had comparatively few related responses and more general road safety advice. Poster 3, in turn, seems to have transmitted information to older children better than Poster 2. For younger children, however, this poster proved to be ineffective. None liked the poster, nor paid much attention to it during the study.

Informative picture, decorative picture, and no picture

The findings suggests that Poster 1 with the informative picture communicated the intended message more effectively than Poster 2 with the decorative picture, although this varied across the two age groups. The richest responses about the posters' theme in both written and discussion tasks were from children of Year 6 who worked with Poster 1. However they also reported some details unrelated to the main poster topic, such as littering. They also commented on the realism of the poster scenario. The younger children working with this poster had a less intense response towards it, worrying less about the realism of the picture. They gave fewer responses related to the poster than the older children and also some messages that were not relevant to the poster topic, such as "don't skip in a wet area."

The finding that both age groups seeing Poster 1 made specific comments about the picture suggests the children acquired information from the picture. Feathers and Arya (2012) showed that when children read storybooks they understand the pictures as part of the plot, and they include the information from the picture when retelling the story they have read. Similarly, in this study children reported some details of the scene depicted in the informative picture that were not necessarily related to the main topic. Mayer and Fiorella's (2014) *Coherence* principle states that learning materials should have words and pictures that are relevant to the instructional objective, or they risk overloading the reader's cognitive capacity. Likewise, Herrlinger et al. (2016) suggest that learning materials with pictorial elements could shift attention from verbal information to pictorial, reducing learning when compared to oral verbal explanations and pictorial information. Note, however, Herrlinger et al. and Mayer and Fiorella write from the perspective of designing learning materials not posters as the present study.

When the three posters were shown together, the older children who had not previously seen Poster 1 immediately understood the scenario depicted, saying that this poster was obvious and self-explanatory without the need to read it, whereas Poster 2 required reading and thinking. In contrast Year 3 children who worked with Poster 2 made more suggestions related the poster message such as "look where you are going" than the other groups from the same grade, and more suggestions related to

phones, such as "don't be on your phone when crossing the road" than Year 6 group working with the same poster. This suggests they paid attention to the poster's verbal information, perhaps led by the presence of the emojis which they liked. Studies have shown pictures can please children and arouse curiosity and enjoyment (Levie and Lentz 1982; Peeck 1987; Fang 1996). Additionally, studies in advertising have shown the inclusion of well-known cartoon characters can influence children's response towards products (Roberto et al. 2010; Neeley and Schumann 2004). The emojis may have had a similar effect here. At a cognitive level the emojis may have worked as contextual cues helping the children associate the poster message with their previous knowledge (Mandler and Robinson 1978; Levie 1987; Pike, Barnes, and Barron 2010; Lesch et al. 2013), with potential to make information more memorable (Bower, Karlin, and Dueck 1975).

Finally, as expected, Poster 3 stimulated less discussion and response about texting and walking, although Year 6 responded to it more than Year 3.

Poster preference

Before the poster tests, we hypothesized that most children would prefer Poster 1 because of its colorfulness and the somewhat humorous scene depicted. However, 24 children chose Poster 2 (20 of them from Year 3) while only 16 preferred Poster 1 (12 of them from year 6). Although three children chose Poster 3 (with only verbal information), this is attributed to the strong views of one child who led others to choose it. The older children's preference for Poster 1 was supported by their comments that it was self-explanatory, while the preference of most of the younger children for Poster 2 was based on their enthusiasm for emojis; the preference pattern was reflected in the children's Be Safe lists, where the older ones seem to have extracted more information from the informative picture than from the decorative picture or from Poster 3 with only verbal information. On the other hand, the emojis showed a small advantage in supporting comprehension of the message for the younger children, possibly by maintaining their attention. Several studies support the idea that pictures have affective impact, eliciting emotions. Positive or negative emotions could influence people's engagement in campaigns (Joffe 2008), willingness to learn topics associated with pictures (Pekrun et al. 2002), comprehension (Um et al. 2012; Plass et al. 2014), and attention to aspects of the pictures (Mayer and Estrella 2014).

Study limitations

Four limitations of this study might have influenced the results.

Small number of participants: the study was conducted in a single, small school, hence the small number of children involved. More participants would have strengthened the findings, enabling more confidence in the trends shown in the data collected here.

Use of one set of materials: using only one set of materials limits the findings since the children only saw one example of each type of poster. Using more posters with some subtle variations across examples could have strengthened the findings.

Study environment was not consistent: as described, children from Year 3 were more mobile and dispersed than those in Year 6 and, notwithstanding differences in cognitive capacity with age, are likely to have been less focused on the test materials. It is important to consider, however, that such differences could be typical in schools, and that potential distraction should be taken into account when designing for this age group.

Group rather than individual interviews: a group interaction was particularly evident in one Year 6 group where one dominant child chose Poster 3 as his preference and others changed their choices to follow him. Talking individually to children would have obtained personally generated opinions, although there might have been a corresponding loss in response breadth, had children not been able to interact with one another. In this study we were fortunate to have data from the children's Be Safe list responses to balance against the group effect in the preference data.

Context setting: the teachers' introduction to H&S as context to the study might also have influenced children's response to the activities. Possibly showing the posters without this orienting phase would have elicited different responses. This could be investigated further in studies of methods for gathering design feedback from school-age children.

Conclusions

The main outcome of this study is that children aged seven and eight appear to have different responses to the posters than ten and eleven year olds. This finding is relevant because H&S campaigns often target an age range of six to twelve, which spans these two groups with the same materials. There might, however, be benefit in using different approaches. The response difference could be a consequence of children's developing cognitive abilities and their visual literacy, as discussed in the introduction, changes which may account for the greater ability of the older children to extract information and extrapolate from the informative picture poster.

Four practical conclusions for designers are drawn from this study, although in each case detailed prototyping and testing would be required to ensure effective (and safe) application.

(1) Older children appear to benefit more from posters with an informative drawing than younger children.

(2) Even older children, however, may be distracted by details in complex informative drawings (such as the banana skin on the ground) that draw attention from the main topic. Therefore designers should be aware that extraneous details might be considered meaningful by children even if they are only intended to attract attention.

(3) Younger children's attention to a poster may be driven by pictures they like the most, regardless of their relevance. The 7 and 8 year olds responded more enthusiastically to Poster 2 with the emojis, than to Poster 1, with an informative picture, even though both groups showed similar understanding of the posters, as far as could be seen by the number of accurate advice in their written responses.

(4) The heightened response to decorative pictures in younger children compared to older children suggests that such pictures may be more effective in engaging younger children with topics compared to older children. However, it might be that only specific decorative pictures – such as emojis – produce this effect.

In order to address some of the constraints of this study further investigation was carried out using modified materials and other children of the same age, and will be reported in Klohn (forthcoming).

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Authors

Sara C. Klohn

s.copettiklohn@pgr.reading.ac.uk, sara.copetti@ufrgs.br

Sara C. Klohn is a PhD candidate at the Department of Typography and Graphic Communication, University of Reading, UK. She is also a lecturer at the Federal University of Rio Grande do Sul (UFRGS), Brazil. Her main area of research is information design. Currently her research interests lie in H&S information for children and how pictures can affect the comprehension and effectiveness of H&S information.

Alison Black

a.black@reading.ac.uk

Alison Black is Professor of User-centred Design and Director of the Centre for Information Design Research at University of Reading, UK. A psychologist by training, she has always worked with designers, both in industry and in academic research, particularly in relation to information products and services. She is co-editor of Information Design Research and Practice, Routledge 2017.

Two-dimensional vs three-dimensional guide maps: *which work best for museum visitors?*

Andrew McIlwraith

This study aims to investigate the relative effectiveness and appeal of two designs of printed map designed for visitors to a museum. The two maps investigated differ in the projection of the building depicted: one is a series of two-dimensional floorplans, the other is a three-dimensional (axonometric) diagram of the museum. The study included a task in which participants were asked to plot a route on the map and then find their way to a predetermined destination in the museum, using one or other of the maps. Their ability to find their way successfully was assessed, and they were asked to describe any problems they encountered following the route. The second part of the study investigated participants' opinions of the map as an aid for planning or undertaking a visit to the museum. Finally, they were shown the alternative map to the one they had tested and asked to say which one they preferred and why. The results show that there are no marked differences in the effectiveness of the two types of map to facilitate wayfinding. Opinions were divided about which type of map was most useful, though almost all participants stated a preference for one or the other. The three-dimensional map was widely considered to provide a better overview of the building as a whole, and how different floor levels were connected. However, the three-dimensional map was also perceived as more complicated by some participants, which, for a minority, made it less preferable.

Museums can be confusing destinations for visitors, who arrive with a range of expectations, understanding of the museum's content, knowledge of its exhibits and cultural backgrounds.[1] Many visitors are first-time or infrequent visitors and therefore have little or no understanding of the physical extent and arrangement of the museum building(s) and spaces. Being unable to fully understand what is in a museum may mean that visitors do not make the most of their visit; and being disoriented in a building can lead to feelings of frustration and stress (Carpman and Grant, 2002). It is not surprising, therefore, that visitors have an "insatiable" appetite for orientation information (Cohen et al, 1977).

Museums provide a range of resources to help visitors plan what to see and how to find it, including, variously, guidebooks, wall-mounted 'you-are-here' maps and directories, paper maps, signs, museum staff and volunteers, audio- and multimedia guides, and smartphone apps. Paper maps are provided by virtually all large museums around the world (and many smaller ones) to visitors (Falk and Dierking, 2013), either for free, at low cost, or as part of an entry ticket price. They are an important part of a museum's navigational resources (Bitgood, 2011), and are widely used by visitors, compared with other resources (Hayward and Brydon-Miller, 1984).[2]

Research into the effectiveness of museum map design is limited. There is a large body of research into wayfinding within buildings generally, including into the effect of building layout on wayfinding ability (Weiseman, 1981), the relative usefulness of wayfinding resources (such as signs and maps) (Hölscher et al, 2007), and on wayfinding problems in particular buildings (Beaumont et al, 1984). More specifically, Cheng and Pérez-Kris's (2014) study of wayfinding in a complex medical environment found that paper maps were effective at facilitating wayfinding, though there were some problems. However, wayfinding is only part of the role of museum maps, and probably the less important role. Conceptual orientation – providing visitors with information about what the museum contains and how it is arranged – is a more important role for maps (while signs, for example, better assist wayfinding) (Cohen et al, 1977).

Some museums and wayfinding designers have tested visitors' responses to prototype map designs (for example, McManus, 2003), which includes maps' ability to aid conceptual orientation, but this research is mostly for museums' internal use only. It is often limited in scale and scope and, therefore, provides limited insights for museum map design more generally.

Since most museum maps convey large amounts of layered information (including, variously, the arrangement of spaces within building(s), the way the displays are organised and categorised, recommended routes through the museum, the location of facilities such as toilets and restaurants, and the location of the museum's highlighted objects), there are many aspects of museum map design that could be investigated. However, a fundamental one that is at the core of how well the map can be understood is the way the museum building is depicted. Many museum maps use three-dimensional projections (axonometric or perspective) instead of two-dimensional floor plans, but the rationale for using one over the other is unknown.

The limited amount of study in this area has provided scant evidence of the relative effectiveness of two-dimensional and three-dimensional projections at aiding understanding of a building's layout, or facilitating wayfinding. Laakso's (2002) study comparing a digital three-dimensional map of an urban area with a two-dimensional paper map found that the two-dimensional map was more effective for navigation, though users found the three-dimensional map more "fun" to use. And the main conclusion of Morris and Alt's (1978) study comparing a floor plan and an axonometric map of part of a museum, was that the axonometric map was a "more attractive form of presentation" because it appealed more to young visitors.

Purpose and design of research

This study aims to provide insight into the relative qualities of two-dimensional and three-dimensional projections of museum maps, in particular, to investigate users' ability to interpret each type to navigate a museum and whether they prefer one type over the other.

Ability to facilitating wayfinding can be assessed through recording how effectively and efficiently undertake a wayfinding task (ie, travelling from one point to another). Conceptual orientation is less straightforward to assess because it is about how well a map can convey information about the extent and layout of the museum building and its displays. And not all visitors will want the same information from a map: conceptual orientation requirements are dependent on individual visitors' expectations, experience and manner of visiting a museum. Therefore, this aspect was assessed according to individuals' opinions of a map, and their views on what they considered useful and not useful aspects of its design.

The study comprised three parts, each involving the use of test materials that comprised a two-dimensional and a three-dimensional map of a particular museum:

— 1. 20 participants undertook a wayfinding task in which they used one of the maps (10 for each map) to plan a route and then find their way to a predetermined destination within the museum.

— 2. The participants then rated how useful they believed the map would be more generally for planning

1 More than half of visits to DCMS-sponsored museums in 2015-16 were from overseas (DCMS, 2017)

2 Also confirmed by studies by McIlwraith for an unpublished doctoral thesis, which includes the research in this article

or undertaking a visit to the museum, and were asked for their reasons for their rating, and about aspects of the map they found particularly useful or not useful.

3. Participants were then shown the alternative map to the one they had used and assessed, and asked to say whether they thought the alternative map would be better than the original one for planning or undertaking a visit to the museum, and to give their reasons.

Test location and materials

The museum chosen as the location for testing was the National Maritime Museum, Greenwich, London, a relatively large building, with a complex environment (partly a historic building, with the addition of a modern wing); it has a varied collection that includes interactive displays and static artefacts of varying sizes and types; and has a non-sequential layout (ie, there is no recommended or pre-determined route through the museum); and it is designed to appeal to multiple audiences (including special galleries for children of different ages).

The museum publishes a map for its visitors within a leaflet (*Figure 1*) that was considered suitable as a basis for the test materials. The map is also available as an A4-sized pdf download from the museum's website. As well as the printed museum map, the other wayfinding and orientation resources in the museum are: wall-mounted "you-are-here" maps (*Figure 2*); wall-mounted directories (*Figure 3*); two information desks; and staff and volunteers throughout the museum who provide advice and directions.

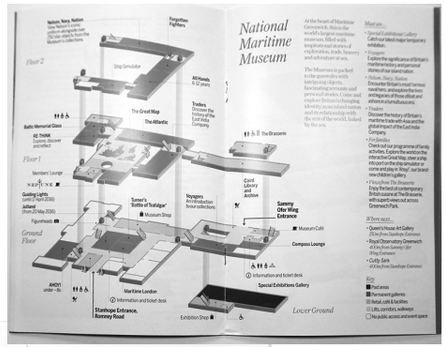
Producing test materials

The existing National Maritime Museum map was considered to have an appropriate design and level of detail to be used as a basis for testing. The map has the following key characteristics:

- It depicts four floor levels, each a different shape and size, in an axonometric projection.
- The levels are depicted as "2.5D", ie, each floor is rendered independently, rather than as a complete 3D rendering of the entire building, with vertical architectural elements such as walls, windows and doors. However, the floors are aligned vertically as they are in the building.
- A five-colour colour-coding system is used to denote different types of space function: paid areas; permanent galleries; retail, café and facilities; lifts, corridors, walkways; and no public access and event space.
- Text labels are used to locate particular galleries, displays, facilities and entrances. Some of the galleries labels also include some descriptive text (see, for example, *Figure 4*).
- Pictograms are used to denote the location of facilities,

FIGURE 1

leaflet



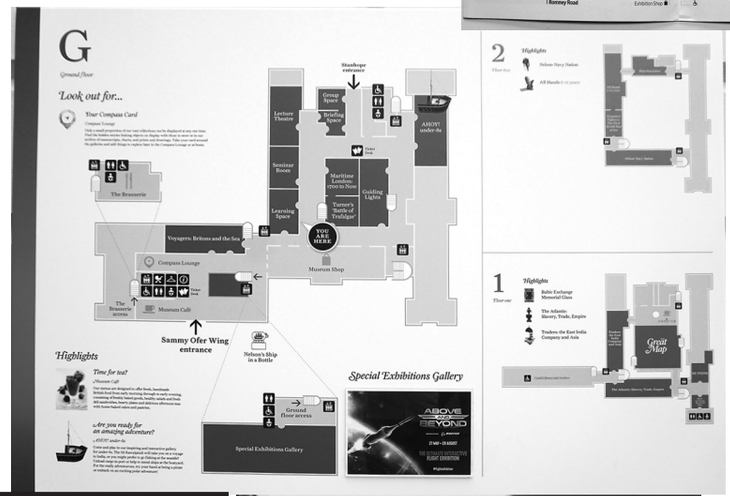


FIGURE 2

"you-are-here" map

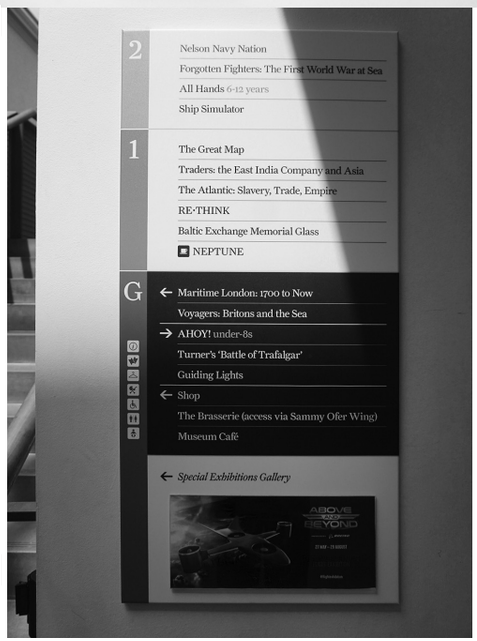
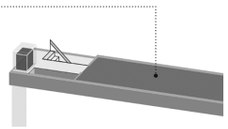


FIGURE 3

wall-mounted directory

FIGURE 4

Nelson, Navy, Nation
View Nelson's iconic uniform alongside over 250 star objects from the Museum's collections



including: toilets, restaurant, café, shop, baby-change area, information, pram/pushchair storage and cloakroom. No key is provided to these pictograms, though a small number are accompanied by an explanatory text label.

The museum's existing map was used as the basis for the design of a two-dimensional map. Since the purpose of the exercise was to make relative judgements about two-dimensional and three-dimensional maps, it was considered important to retain as much graphic equivalency as possible, in relation to the amount and style of information and level of detail. This exercise in itself was also instructive in isolating those elements that contribute to the differences between two-dimensional and three-dimensional building plan projections more generally. The two maps used for testing can be seen in *Figures 5* and *6*. The process of developing the test maps is discussed below.

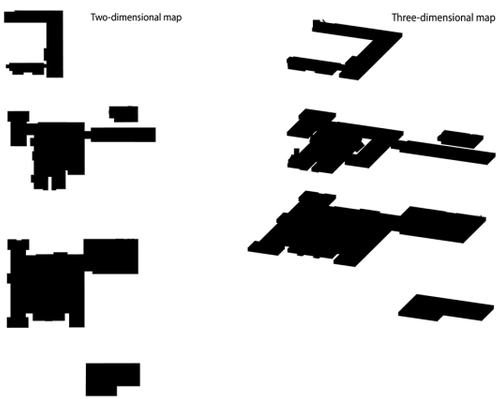
Shape, size and orientation of map

It was considered important that the perceived size and scale of the maps be as similar as possible, in order to remove the possibility that either map could be easier to read than the due to being, or appearing, larger. Since an axonometric projection is not a scaled projection, it was considered the most effective way to do this was to ensure equivalent perceived size. This was done by scaling each map relatively to ensure the surface area of each (the "ink area") was similar (see *Figure 7*).

Showing vertical circulation: lifts

The museum contains five lifts, only three of which connect the main three floors (Ground, Floor 1 and Floor 2). This arrangement, where all the lifts do

FIGURE 7



not connect all the floors, is not unusual in complicated buildings, but it nevertheless creates problems for visitors, who, in the absence of visual cues, are not able to understand the limited destinations of lifts.

In the museum's existing three-dimensional map, lifts are denoted with a simple three-dimensional box-shaped symbol, and partially transparent coloured bands indicate the journey each lift makes (and therefore the floors that they visit) – see *Figure 6*. It is not possible to use this system with the two-dimensional map, because each floor is a discrete graphic element. The box device was replaced by a pictogram for a lift in each case. Further, the two lifts that connect only two floors are labelled with text explaining this, in order to help map users avoid attempting to use those lifts to travel to other floors.

Showing vertical circulation: stairs

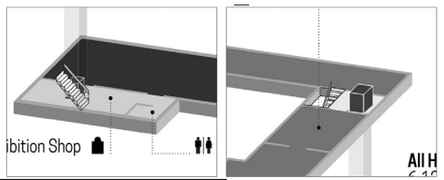


FIGURE 8

The three-dimensional map uses a three-dimensional rendering of each set of stairs to indicate the location, orientation and direction of travel of staircases. This is a more sophisticated visual representation of stairs than the stair symbol on the two-dimensional map, which provides more information (the direction of travel), but it can be problematic at some points, where the symbol is partially concealed by other parts of the map (see *Figure 8*).

Also, despite its detailed rendering, the three-dimensional stairs symbol does not always accurately represent the size, shape or orientation of each stairway. In one case, the orientation of the stairway is not correct, which is likely because of the difficulty in rendering the stairway in the correct orientation at that particular point – this is discussed further in "Research findings: wayfinding".

Another problem is that it does not render staircases that run through more than two levels. The part of the museum depicted in *Figure 9*, for example, has a staircase that links all four levels, though the way this is represented (as four unconnected sets of stairs) means that this may not be clear to the museum visitor.

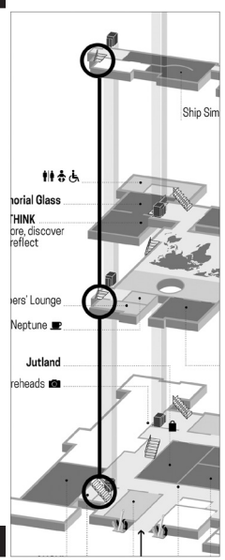
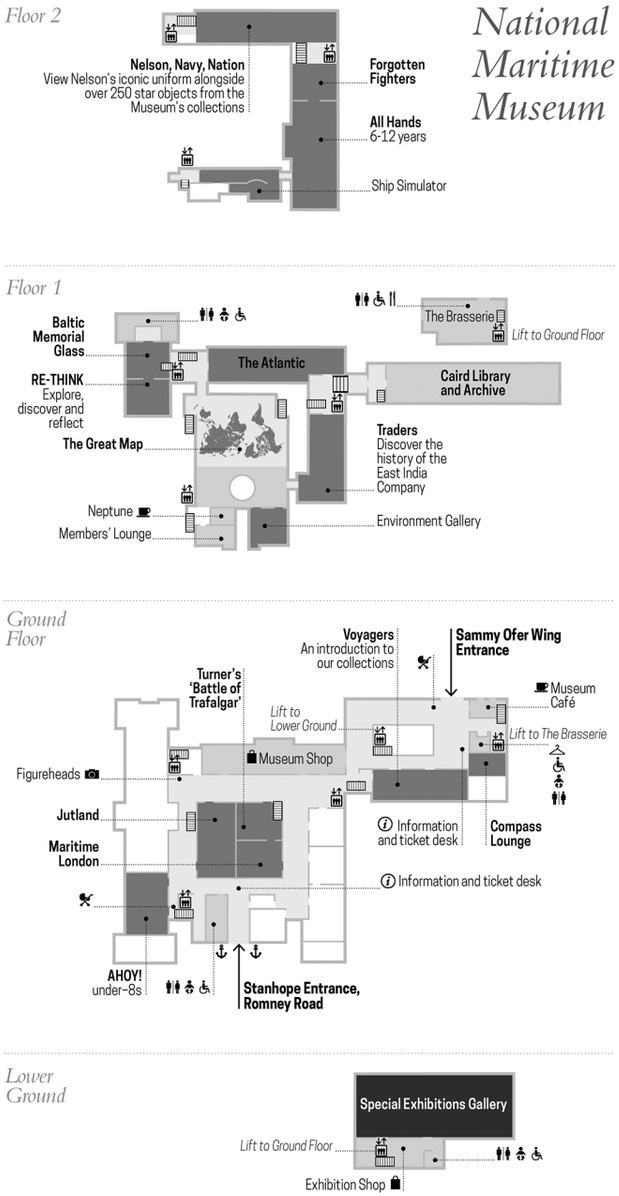


FIGURE 9

FIGURE 5



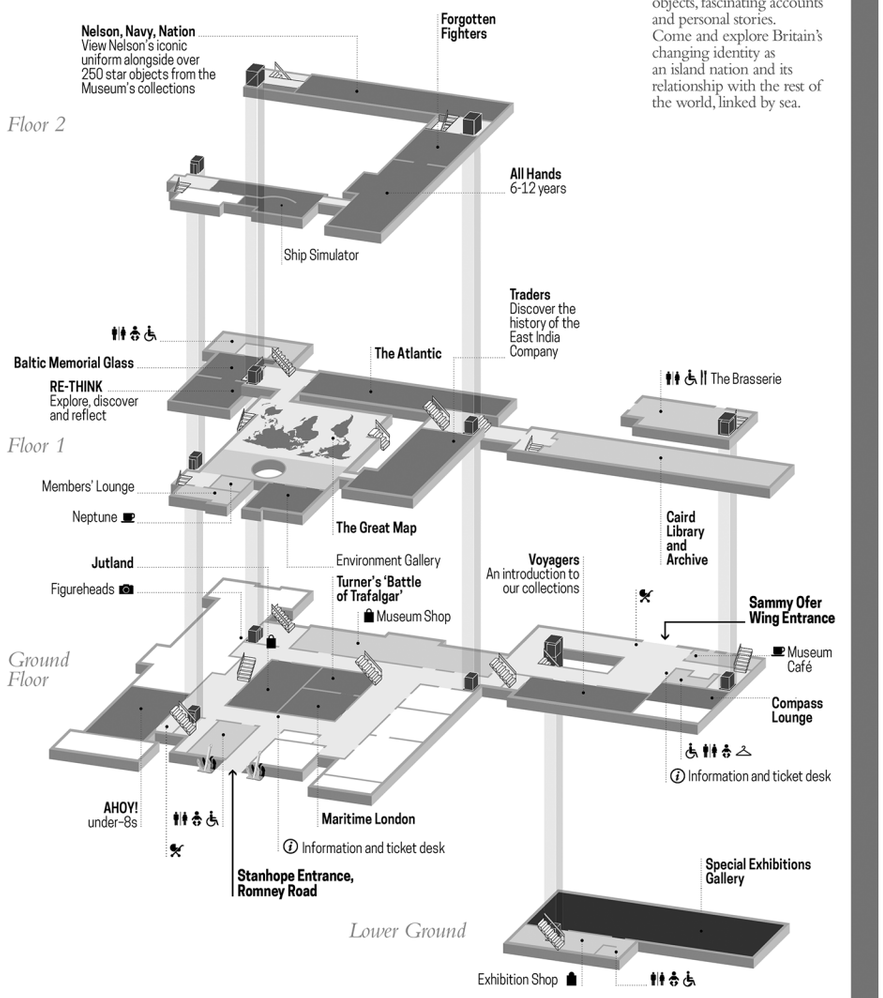
National Maritime Museum

At the heart of Maritime Greenwich, this is the world's largest maritime museum, filled with inspirational stories of exploration, trade, bravery and adventure at sea.

The Museum is packed to the gunwales with intriguing objects, fascinating accounts and personal stories. Come and explore Britain's changing identity as an island nation and its relationship with the rest of the world, linked by sea.

Key
- Paid areas
- Permanent galleries
- Retail, café & facilities
- Lifts, corridors, walkways
- No public access and event space

FIGURE 6



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The Museum is packed to the gunwales with intriguing objects, fascinating accounts and personal stories. Come and explore Britain's changing identity as an island nation and its relationship with the rest of the world, linked by sea.

Research participants

Participants were adults who had volunteered to attend the museum for approximately an hour to take part in the research project outlined in the Information Sheet. Potential participants were excluded from the research if they worked for a museum, or as a curator, museum or exhibition designer or professional guide; or were professionally involved in graphic design, information design, or map-making.

Limitations of this aspect of the research include:

- No attempt was made to include or take account of people with disabilities or special needs, be they mobility-related or perceptual (such as colour-blindness or dyslexia).
- Participants were all resident in the UK and were native English speakers, so there was no allowance for cultural or language differences, for example, from tourists, who are a major museum-visiting group.
- The study tasks were undertaken by participants individually, which may not be their typical manner of visiting a museum (that is, that they are more likely to visit with family members or companions), which may affect their visiting, map use and wayfinding behaviour.

Research procedure

Appointments were made to meet each participant at the museum's Sammy Ofer Wing entrances. They were asked not to visit the museum before the meeting. After confirming that they had read and understood what would be required of them from the Information Sheet, the research process was begun.

- 1. The participant was asked a series of preliminary questions about their museum-visiting habits and behaviour, and, in particular, their use of museum maps. The participant was then shown either the two-dimensional or three-dimensional map, and told that it was a map of the museum they were in, and where on the map they currently were. They were asked to locate and mark on the map a particular gallery that was labelled: half the participants were asked to locate on the map one of two destinations: the Forgotten Fighters gallery or the Baltic Memorial Glass gallery. They were then given a pencil and asked to trace the route they would take from their current location to this destination.
- 2. Having drawn their chosen route on the map, they were told that they should make their way to the gallery. They were told that this task would also be timed, but that they should make the journey at a normal pace. They were told that they did not need to follow the route they had plotted if they could not, or thought there was a better way. They may also make use of any signs in the museum that they came across, but they should not seek or accept any offered help from gallery staff. The participant was instructed to announce their arrival at the destination by immediately calling the researcher's mobile phone.
- 3. Having notified their arrival, the participant was then questioned about their experience of finding their way to the destination, in particular about how well the route they had planned had worked, whether they had followed it and, if not, why. They were then asked to rate how useful, in general, they felt the map would be for a visit to the museum, their reasons for this, and any features or aspects of the map they felt were particularly useful or not useful.
- 4. Finally, the participant was shown either the alternative map to the one they had used, that is, the two-dimensional map if they had used the three-dimensional one and vice versa. They were asked whether they thought it would be better or worse for planning a visit to or visiting the museum, their reasons for this, and for any particular features or aspects of this map that they thought were more useful or less useful than the first map they had used.

Research findings: wayfinding

The participants' first task was to plot a route on the map to one of the two test destinations (the Forgotten Fighters gallery or the Baltic Memorial Glass gallery). Overall, three-quarters of the participants (15) were able to plot a feasible route to the given destinations. Four participants plotted routes that were not feasible (ie, they would not work, for example, because their route moved from one floor level to another at a point where there were no means of doing so) - two each for the two-dimensional and three-dimensional maps. One person stated that he could not plot a route because he could not work out where the stairs were on the map (the two-dimensional map).

Following a route

All of the participants managed to reach the destination in the museum they had been asked to find, in a reasonable time (that is, under 10 minutes) – including the participant who was unable to plot a route on the map. There were only minor differences in times between users of the two types of map, and these cannot be considered significant, due to the study sample sizes.

However, the speed of reaching a destination in a museum is rarely a matter of importance, unlike in certain other built environments, such as airports or hospitals, where the consequences can be critical (de-

layed urgent treatment or missing a flight). Several participants pointed out that they considered the task theoretical or artificial, since when visiting a museum, they would rarely be completely focused on reaching a particular destination and would often stop to look at something on the way that caught their attention.

Although all participants found their way to their destination, and within an acceptable time, most – 13 out of the 19 participants who plotted a route – did not follow the route they had plotted on the map exactly. The number of participants who did not follow their route was slightly higher for those using the three-dimensional map than for those using the two-dimensional map, but the difference cannot be considered significant.

Diverting from a plotted route may not be significant in practical terms, for example, if it does not cause undue delay. However, feeling lost can evoke feelings of confusion, frustration or anxiety (Carpman and Grant, 2002). These kinds of feelings can potentially reduce a visitor's enjoyment of the space they are visiting (Passini, 1966). Alternatively, or in addition, it may cause them to lose confidence in the map or in their map-reading skills, which means that the usefulness of the map as a tool for aiding the visiting experience is compromised.

Of those participants who did not follow the route they had plotted, seven can be considered to have had serious problems following their route (including testers of both types of map). This is because they made lengthy deviations from their plotted route or expressed concern about feeling lost, confused or disoriented, and having to take corrective action to find a route to the destination. For example, one participant who tested the three-dimensional map said:

— *I couldn't orientate myself to begin with, I was confused. I couldn't find the "Traders" gallery on the map. When I started in the wrong direction, I thought any stairs would do, and then realised, when I reached the bistro [Brasserie], that they didn't.*

Another participant, who also tested the three-dimensional map, said:

— *I found a lift past the toilets and took it, but it went only to the first floor, so I came back down and walked back through the shop and saw another lift and took that one, which went to the second floor. I thought I knew what I was doing but I didn't.*

Two of the five participants who used the three-dimensional map to travel to the Baltic Memorial Glass gallery encountered the problem of the incorrectly oriented set of stairs, mentioned earlier (see "Showing vertical circulation: stairs"). Both these participants made relatively lengthy deviations from their plotted routes as a direct result of the fact that these wrongly depicted stairs led them to believe they were facing a direction that was at 90 degrees to their actual orientation. Both said they felt confused during the task, but neither had identified that there was an error on the map until it was pointed out to them in the debriefing session.

Feelings of confusion or disorientation were expressed even by some participants who either made only minor diversions from their plotted route or followed it exactly. This was generally due to parts of the actual museum seemingly not matching their expectations of them from what they were seeing on the map. For example, one participant said:

— *I followed the route exactly, but I didn't know it would look like that -- I didn't realise the lift would be where it was.*

This kind of mismatch may invoke anything from brief feelings of confusion to a more enduring sense of insecurity. For example, one participant said:

— *I followed down the [stairs] next to the Forgotten Fighters gallery and it goes around the edge, not the way it is shown [on the map]. You can't match the illustration with what you're seeing – it makes you feel insecure.*

Research findings: conceptual orientation

Generally, most participants had a positive view of the maps: 14 of the 20 said the map they tested would be "very" or "fairly" useful for visiting the museum. *Table 1* shows the range of ratings for the two types of map. Overall, the two-dimensional map was considered more useful than the three-dimensional map. Analysis of the ratings reveals that only one participant who tested the two-dimensional map gave it a negative rating, while the higher number of negative ratings by testers of the three-dimensional map to a large degree effectively offset the positive ratings. So a more accurate conclusion is that opinions are more divided over the three-dimensional map than the two-dimensional one.

TABLE 1

Participants' ratings of tested maps

Rating	Number of participants	
	3D map	2D map
Very useful	2	2
Fairly useful	3	7
Not very useful	4	1
Not at all useful	1	0

TABLE 2

Participants' ratings of alternative map to map tested

Rating of alternative map	Number of participants	
	3D map testers	2D map testers
Much better	2	5
Slightly better	4	2
Neither better nor worse	0	1
Slightly worse	4	1
Much worse	0	1

Comparative ratings of the two types of map

When asked to whether they thought the alternative map would be better or worse than the one they had tested, overall, participants who had tested the two-dimensional map rated the three-dimensional map more highly than vice versa – see *Table 2*. This would appear to be at odds with the

usefulness ratings of the tested maps, as described above, where the two-dimensional map was scored as more useful overall. However, there are several possible contributory explanations for this apparent discrepancy. First, the sample sizes in this study in both cases, there was a spread of ratings from positive to negative, indicating that preferences vary from individual to individual. Second, the assessments were not symmetrical and directly comparable, since, of course, the alternative map was being rated only in comparison to a different map that they had used to undertake a wayfinding exercise, without prior knowledge of the map, or the route.

There are two particular possible consequences of this, in relation to the ratings given:

— The three-dimensional projection of the building might be considered to have a more "sophisticated" design, and this may be considered more novel or appealing to those participants who had tested the two-dimensional map; conversely the two-dimensional map may be seen as "simplistic" or more basic than the three-dimensional map, to those participants who had tested the latter.

— Having already (successfully) used a map that had many similarities to navigate the museum, and having also familiarised themselves with the museum, those participants who tested the two-dimensional map may have felt more confident and positive about the more sophisticated and (possibly) more complex three-dimensional map than they otherwise would have.

These are just two possibilities about how participants may have reached their judgments. But, as Nisbett and Wilson (1977) have reported, there is much evidence to suggest that people are often unaware of how stimuli in controlled situations affect responses. In relation to this experiment, this means that participants were not necessarily making the rational judgments they might be presumed to be making; ie, on whether the alternative map they are looking at would, in reality, be better or worse for them when visiting a museum in terms of such measures as ease of understanding the layout of the building and how to navigate it, and the displays in the building and how they are arranged. It is therefore not possible to demonstrate how far (if at all) the speculative processes described above affected their overall ratings of them. However, it is clear that there are several possible reasons related to the test method and structure that suggest that the overall relative scores are not necessarily contradictory.

Liked and disliked features of the maps

Having provided overall ratings, participants were asked to explain any features of either map that they would find particularly useful or not useful. Most participants named both positive and negative features of the maps, covering a wide range of themes and points. Those that relate specifically to two-dimensional and three-dimensional projection are discussed below.

Depiction of stairs and lifts

Vertical circulation in a multi-level building can be a major source of wayfinding problems. For example, Hölscher et al (2006) found that staircases were the single most clearly identified cause of wayfinding problems for visitors in a complex, multi-level building. In the maritime museum study, half of the 20 participants made comments indicating that they had difficulty understanding how the stairs and/or the lifts connected the floor levels. One participant, using the three-dimensional map, was even under the impression that there were no stairs in the building.

With the two-dimensional map, some participants said they did not always understand where the stairs led to (to a floor above, one below, or to a different level on the same floor), because there is no information on the map (arrows or text, for example) indicating this.

The more sophisticated stair device used on the three-dimensional map had different problems. Because of the way it was rendered, it could be misinterpreted as an accurate illustration of each set of stairs, rather than a symbolic representation of them, which confused some participants. Comments included:

— *The stairs are at different angles; it doesn't make sense to me.*

— *I find the connections between the floors and how the floors fit together confusing. I wasn't sure why the same stairs were represented twice on different levels to fit them together.*

— *What are the stair symbols? They end mid-air*

The depiction of the lifts provoked fewer negative comments from participants than the depiction of stairs. Two testers of the two-dimensional map said that they were initially unsure where the lifts were because the key did not explain the lift symbol that was used. And three participants said they did not initially understand the symbols denoting the lifts on the three-dimensional map.

However, some participants made favourable comments about the way the lifts and their path of travel were shown on the three-dimensional map.

Orientation of map

When producing a map or diagram of a building, there are important considerations related to how the map is oriented. A two-dimensional map provides an overhead view of the building so, on its own, it can be read from any angle, regardless of the orientation of the page on which it is printed. However, there are two aspects of the design that determine how the orientation at which the map can be read:

— the arrangement of the plan of different floors or levels in a

multi-level building; by convention, the plans for each level are arranged with the uppermost floor at the top of the page and the lowermost at the bottom, as a metaphor for the actual arrangement of the floors in the building, and

— the orientation of labels, text, symbols and images that are on or relate to the plan, which are typically in only one orientation.

One widely accepted convention of orientation maps is that they should be "head up", that is, with an assumed starting point at the bottom of the map, and direction of travel from the bottom to the top of the map (Andrews, 2002-03). In the case of a building, this generally means the entrance. However, Wright et al (1990) found that designing a map so that the building entrance is at the bottom of the map may not be the best to facilitate user orientation, and that it can be better to orient the map according to a space or area (such as a main corridor) from which most of a building user's (navigational) "problem solving" will be done. However, many buildings (including the National Maritime Museum) do not have a single area or point from which such "problem solving" will be done. The museum has two entrances, on opposite sides of the building, and there is no single "starting point" or defined pathway through the museum.

A three-dimensional map is more complicated since it is constructed from a single viewpoint. In the case of the National Maritime Museum, this is the building's eastern corner. Having two entrances on opposite sides of the building creates particular problems for the three-dimensional map. The viewpoint for the museum's three-dimensional map means that the orientation is correct only for visitors who enter by the Stanhope Road Entrance. The other entrance, the Sammy Ofer Wing Entrance is in a "head down" direction, which can make orientation difficult, as one participant noted:

— *If you come in the park [Sammy Ofer Wing] entrance, everything is upside-down – I find that confusing.*

In order to counter this problem, some map users physically rotate the document, even if this has the effect of rendering text and other elements less readable. But this much more problematic with a three-dimensional map – as *Figures 10* and *11* show, it is much more difficult to read a rotated three-dimensional map than a rotated two-dimensional one.

Perceptions of complexity

Many participants made comments relating to perceived complexity or complication in the maps. Comments about the two-dimensional map included:

— *It's pretty muddy to me. I think it has all the information I need. But I think you would need to study it for five minutes to begin with, I don't think it's very clear at all.*

— *It's a bit 'bitty'. There are lots of little bits of information and it looks a bit incoherent.*

FIGURE 10

Effect of rotating the two-dimensional map

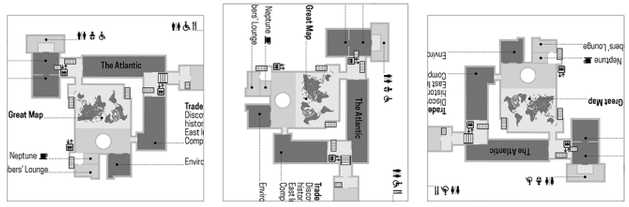
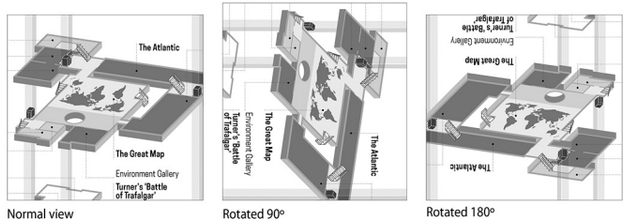


FIGURE 11

Effect of rotating the three-dimensional map



— *I think there is too much in it. The two-dimensional map looks a bit cramped, but maybe that's just an optical illusion.*

Comments about the three-dimensional map included:

— *It's quite busy – it's a random series of headings, and why would you choose one over the other?*

— *The three-dimensional map has added complications that are confusing. Also, the labels on the three-dimensional one are more complicated.*

— *It looks too much like an engineering diagram to me… it just looks so busy.*

Overall, there was no clear consensus that one type of map was considered as more complicated than another. In describing the differences between the two maps, some participants characterised this in terms of being able to take in the whole museum in one view with the three-dimensional map, while the two-dimensional one could only be considered one level at a time. However, there were divergent views about whether one type was better than another – reflecting the ratings given by participants, as shown *Table 2*.

— *I could work with the 2D one, but it's easier to grasp the overall layout of the place with the 3D one.*

— *I do understand better how the museum fits together with the 3D map. This is closer to your experience [of moving through the museum] in some ways… it gives you a better idea of the space.*

— *I feel like you can interact more with the 3D one and imagine yourself walking through the different floors.*

— *In my head, I can compartmentalise the bottom floor, top floor, but [the 3D] map tries to make me think in three dimensions.*

— *It's straightforward and head on. I can work it out straight away. The 3D one has added complications that are confusing.*

Conclusion

Based on the experiences of 20 people who took part in a controlled assessment of two-dimensional and three-dimensional maps of the National Maritime Museum, it cannot be said that one type or the other is superior as a wayfinding and orientation device for museum visitors.

Both types of map proved useful and largely effective wayfinding devices. Most of the participants in the research were able to plot a route to a destination within the museum without significant difficulty. And all managed to reach the destination when seeking it out, though in a few cases participants had some difficulties, and had to rely on other wayfinding devices (signage and landmarks primarily) to complete their journeys. Some participants noted feelings of confusion and disorientation, which can have a negative impact on the museum visiting experience.

As conceptual orientation tools, both maps can be considered successful, since most research participants rated the maps as "very" or "fairly" useful for a visit to the museum. The design of the study does not allow for conclusions about which type may be best. Anecdotally, though, there are mixed findings: overall, testers of the two-dimensional map gave higher ratings than testers of the three-dimensional map, but, when participants were shown the alternative to the map they tested, the three-dimensional map overall was rated better than the two-dimensional one. There are complex possible reasons for this, relating to the research design and to limitations in cognition awareness. For some participants, it may be a case of finding the more sophisticated projection of the three-dimensional map more attractive, or at least more intriguing.

All but one of the participants expressed a preference for one type of map over the other. Participants' comments suggest that many considered the three-dimensional map to be more complicated, though, the ability to take in the building as a whole, and to understand how the lifts connect the floors, was noted by many as an advantage. However, the strongest negative comments were about the three-dimensional map, with two participants stating they disliked the map so much they would not use it if it were given to them.

Limitations

In relation to the wayfinding task in this study, as with any experiment of this type, there are limitations around the behaviour of participants in an exercise they know is being timed and reported on in relation to how they used the map, compared with how they would use a map on an actual visit to a museum.

More important limitations relate to the test location and the test materials. Although both maps were standardised as much as possible such that the focus of difference between the two was their projection (that is, two-dimensional versus three-dimensional), it is not possible to know how other aspects of the design (for example, symbols, labelling and colour-coding) influenced either the wayfinding results or the participants' assessments of the maps.

All museums, including the National Maritime Museum, have unique attributes, not least their physical spaces. Invaluable further insight into the relative positive and negative aspects of two- and three-dimensional maps would be gained by repeating this study in other museums, probably of different sizes and different focuses (for example, an art museum).

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Author

a.j.mcilwraith@pgr.reading.ac.uk

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eInk versus paper:

exploring the effects of medium and typographic quality on recall and reading speed

Jeanne-Louise Moys

Peter Loveland

Mary C. Dyson

This study compares the effects of reading from paper and an eInk display on recall and reading speed alongside the effects of changes in typographic quality (fluent and disfluent conditions). Both medium and typographic quality were between-subject variables resulting in four groups of participants. Each participant was timed while they read one text. They then completed a general questionnaire before answering multiple-choice questions evaluating their recall of the content they had read. Comparable reading speeds for paper and eInk were recorded and these were slower for disfluent conditions. Improved typographic quality significantly enhanced recall on eInk, whereas for paper participants who read the disfluent condition recalled more. These findings suggest that typographic quality has a significant effect on reading, which is also influenced by the medium. Although recall was better in the disfluent paper condition, some caution should be observed in translating this into recommendations that would result in more effortful reading.

Keywords:

eInk
paper
recall
text layout
typography

1 Introduction

In an age where new kinds of consumer display are rapidly emerging in the marketplace and being adopted in educational contexts, a number of studies consider the suitability of particular displays and the visual presentation of materials for learning. The majority of research investigations to date, including many recent studies (e.g. Mangen *et al.*, 2013; Mangen and Kuiken, 2014; Sackstein *et al*. 2015; Köpper *et al.* 2016), have focused on backlit liquid crystal display (LCD) screens, using computers and handheld devices like the Apple iPad. Relatively few studies compare paper-based reading with reading on electronic ink (eInk) devices, such as the Amazon Kindle, Sony Reader, Barnes and Noble Nook and Kobo eReaders.

This is possibly because eInk is still a relatively new form of display technology or 'electronic paper display' (EPD). However, eInk is a potentially more affordable form of display in comparison to LCD devices (both in terms of upfront and running costs). eInk displays may also be less likely to replicate the detrimental effects related to reading fatigue that are associated with backlit displays (Siegenthaler *et al.*, 2011; Jabr, 2013; Flood, 2014; Köpper *et al.* 2016). In addition, from a typographic perspective, eInk merits particular investigation because it is reputed to have a display quality comparable to printed texts (Mitra, 2011; Felici, 2012). Its digital display works by utilising millions of microcapsules, all of which contain positively charged 'white' particles, and negatively charged 'black' particles. If each of these microcapsules is considered as a pixel, type and images can be rendered on a screen whilst, ostensibly, bearing a strong resemblance to the appearance of ink on paper.

Our study seeks to contribute to the emerging body of research that examines reading on eInk displays. In particular, we compare the effectiveness of reading and recalling information in expository texts on eInk and paper in relation to fluent and disfluent conditions of typographic quality. From a psychological perspective, fluency refers to the subjective experience of relative ease with which stimuli are cognitively processed. Although fluency refers to the processing of material, rather than the material itself, we use the terms fluent and disfluent conditions consistent with Diemand-Yauman *et al.* (2011).

2 Background and rationale

A substantial body of research compares learning from digital displays and paper. Reviews (e.g. Dillon, 1992; Noyes and Garland, 2003; Jabr, 2013; Köpper *et al.*, 2016) suggest that findings are sometimes inconclusive but generally show a tendency towards poorer performance in relation to reading from screen than paper (e.g. Dillon, 1992; Nielsen, 2010; Jabr, 2013; Mangen *et al.*, 2013). Studies also highlight that learners prefer reading printed textbooks to reading on screen (e.g. Shepperd *et al.*, 2008; Woody *et al.* 2010; Ackerman and Goldsmith, 2011; Gibson and Gibb, 2011) and that this preference also applies to younger generations, often referred to as 'digital natives' (see: Mangen, 2017). However, an increasing number of studies are establishing either less marked differences between learning from paper and learning from screen (e.g. Noyes and Garland, 2003; Rockinson-Szapkiw *et al.*, 2013) or reporting a significant improvement in learning from screen (e.g. Shepperd *et al.,* 2008; Siegenthaler *et al.*, 2011).

Relatively few studies specifically examine learning from eInk displays versus learning from paper. To date, a range of measures, variables and methodologies have been used so findings are not straightforward to compare.

Siegenthaler *et al.* (2011) compared reading behavior (measured through eye-tracking measurements of fixations and saccades) and reading performance (measured through reading speed and page turns) across five kinds of eInk display and one printed book. They also recorded participants' preferences for reading on each device. They concluded that reading behavior from eReaders and print is similar. However, they recorded significantly longer fixations for printed texts. This suggests that eReaders may provide better legibility because the longer fixations in the paper condition suggest that participants had greater difficulty 'extracting visual and/or linguistic information' (Siegenthaler *et al.*, 2011, p. 272).

In contrast, Mangen *et al.* (forthcoming, see also Flood, 2014; Mangen, 2017) found that participants performed better in comprehension and mental reconstruction tasks when reading a novel on paper than on a Kindle: recalling the plot and answering questions more accurately about the sequence and chronology of the narrative.

This finding could be related to particular affordances of printed and digital texts. For example, in a qualitative study of university student reading and study behavior using eReaders, Campbell, *et al.* (2013) found that the lack of spatial and kinesthetic clues – such as page numbers, headers and physical weight on eReaders – prevented cognitive maps from being created by students. Similarly, in a qualitative study of long-term academic use, Thayer *et al.* (2011) noted that students using eReaders took longer to locate information than they would when using printed resources. They also found that eReaders did not support scanning and responsive reading strategies well.

The interplay between particular genres, typographic structure and the reading strategies users are likely to engage with for specific devices is important to consider. Daniel and Willingham (2012, pp. 1581–1582) note that many current e-books (regardless of device) have a "narrative structure", whereas electronic textbooks are likely to have a "hierarchical structure". Participants in both the Siegenthaler *et al.* (2011) and Mangen *et al.* (forth-

coming) studies read extracts from novels, which are likely to be read as linear texts.

In another study using narrative content, Nielson (2010) compared reading speeds between content displayed on a Kindle eInk screen, an iPad's LCD screen and traditional paper. The results showed the Kindle content was read significantly ($p<.01$) slower than content read on paper, whereas the iPad content was only marginally ($p=.06$) slower than reading from paper. Slower reading from screen compared to paper has been a fairly common finding with older technologies (Dyson and Haselgrove, 2001), although recent studies are measuring increased reading speeds for iPad compared to paper (e.g. Sackstein *et al*., 2015).

Sackstein *et al.* (2015, p. 2) suggest that studies examining the effectiveness of reading from different displays should consider reading as both a 'text-based' and 'knowledge-based' process. Accordingly, they incorporate both reading speed and comprehension as measures in their study. While Sackstein *et al.* did not establish a relationship between reading speed and comprehension, in relation to expository texts and the findings for the specific eInk studies discussed in this paper, it seems appropriate to measure both reading speed and either comprehension or recall accuracy.

An important factor to consider in relation to learning is the relative fluency/disfluency of different displays (Alter, 2013). A growing number of recent studies have compared whether the fluent and disfluent conditions influence learning (e.g. Diemand-Yauman *et al.*, 2011; Kühl *et al.*, 2014) and particular perceptual judgments (e.g. Alter and Oppenheimer, 2009; Manley, *et al.* 2015). For example, Diemand-Yauman *et al.* (2011) have considered how fluent and disfluent typographic conditions influenced participants' recall from paper. They suggest that making typography harder to read results in increased levels of cognitive engagement, which in turn enables better recall of information. The disfluency manipulation would be described by typographers as making the text less legible. In relation to perceptual judgments, Song and Schwarz (2008a) have also found that fluency can influence the assumptions learners make about how easy or difficult a task is and their associated motivations.

Many fluency studies have used changes in typeface or weight – often loosely referred to in research as "font manipulation" (Alter and Oppenheimer, 2009, p. 222) – as an indicator of fluent and disfluent conditions (e.g. Oppenheimer and Frank, 2008; Song and Schwarz, 2008a; 2008b; Diemand-Yauman *et al.*, 2011; Manley, *et al.* 2015). Changing the font is regarded as an easy way to manipulate fluency (Alter and Oppenheimer, 2009). However, it is possible that the distinctiveness of some 'disfluent' typefaces may be a confound in some of these studies (Rummer, *et al*. 2016).

In contrast, and taking on board criticisms of fluency research using typographic variables (e.g. Black, 2011; Luna, 2011), our study keeps the typeface consistent and instead manipulates a defined set of typesetting attributes (including character spacing, line length and alignment) as an indicator of fluent (legible) and disfluent (less legible) conditions. Typographic practitioners consider spacing to be one of the most essential factors that affects the legibility of how a text is typeset and argue the importance of considering the relationships between typographic attributes such as size, line length and interline spacing ('leading') in relation to legibility (e.g. Schriver, 1997; Baines and Haslam, 2005; Bringhurst, 2016).

There is also a substantial body of research that shows how typesetting attributes influence ease of reading and comprehension (e.g. Dyson, 2004, 2005; Dyson and Haselgrove, 2001; Yi *et al.,* 2011; Lonsdale, 2014). More specifically, research has found that tighter than standard character spacing reduces reading speed (Chung, 2002; Yu, Cheung, Legge and Chung, 2007). This is referred to as 'crowding' where adjacent letters jumble the appearance and make letters less visible. The number of characters per line affects the legibility of print. Lonsdale (2014) notes that there is general agreement from both a number of studies and practitioners that lines should not exceed about 70 characters per line. Research exploring line length on older screen technologies has produced mixed results but a line length of around 55 characters seems to optimize reading speed and comprehension (Dyson, 2005). The few studies which have looked at text alignment, justified versus unjustified (ragged right) text setting, have not found differences in reading speed for proficient readers. However, justified setting may introduce inconsistent spacing between words ('rivers') which may be aesthetically less pleasing (Dowding, 1966; Larson, *et al.,* 2006). These typesetting attributes might therefore be considered an appropriate means of manipulating fluency, creating different levels of text legibility.

Another factor that is regarded as a key consideration in fluency research is familiarity (Alter and Oppenheimer, 2008; Song and Schwarz, 2010). Accordingly, our study also considers whether the participants' preferences and prior experience with eInk displays may affect fluency and hence recall.

3 Methods

3.1 Objectives

The primary objectives of our study are to compare (1) the effectiveness of reading from eInk and paper in relation to reading speed and recall and (2) the effect of typographic quality on reading speed and recall for each of these mediums. In addition, our study considers participants' preferences and prior experience with eInk displays to contextualise the findings.

3.2 Research design

3.2.1 Participants

At the outset of the study, two preliminary studies with 11 participants were conducted to inform decisions about the material design. Forty volunteers participated in the main study. All participants had English as their first language to minimize the effects of variations in language familiarity (cf. Yi *et al.*, 2011).

3.2.2 Preliminary studies

The content selected for the study comprised four expository texts (i.e. suitable for textbook content) that provide an introductory overview of a topic and accompanying questions.

In the first preliminary study, a multiple-choice questionnaire covering questions on the factual content of the extract was used to establish which of these sample texts could be considered reasonably equivalent, and therefore used in the study. Extract A was discarded as it received a considerably higher percentage of correct answers than the other sample texts. Participants performed most consistently across Extracts B and D so these were adopted for the comparative tests in the main study. Extract C was adopted as the material for the user preference task in the main study. The three extracts were between 600 and 645 words in length and based on Jeremy Bentham (Everett, 1969); *The Times* newspaper (Encyclopaedia Britannica, 1998); Crystal Palace and the Great Exhibition (Hobhouse, 2002). The texts were written to ensure consistency of style and complexity.

The second preliminary study examined user preferences in order to specify an appropriate ('comfortable') type size that could be used for the eInk display materials. Participants were shown a sample of text on a Kindle in four different type sizes (sizes 2–5) selected from the eight Kindle preset sizes defined by the sample device using a normative range of sizes for reading continuous text (see *Figure 1*). Participants were instructed to hold the device at a comfortable reading distance and indicate their preferred sample size. The most frequently chosen option (size 4 – which can be considered reasonably equivalent to 14pt) was adopted for the eInk display materials developed for the study.

FIGURE 1

Kindle preset sizes evaluated in the preliminary study

3.2.3 Material design for main study

Both paper and digital materials were used for the main study. An Amazon Kindle was used for the digital displays in the study because it is the device participants were most likely to be familiar with. The Kindle Voyage, the most recent model at the time the testing was carried out, was chosen based on its screen resolution of 300dpi – equivalent in rendering quality to that of the laser printed type on the paper materials. The paper text sample was printed on a laser printer at 300dpi on standard 80gsm paper.

Both conditions were presented using standard, 'everyday' document formats that would realistically conform to participants' expectations for that particular medium. The paper samples were presented on an A4 sheet of paper – the UK standard for single-sheet documents and learning handouts. The Kindle has a six-inch screen. However, trimming the paper samples to this size for the paper-based samples could seem unconventional as this size would be much smaller than the majority of printed textbooks and educational handouts that the participants would be accustomed to. Participants were not permitted to adjust the display settings on the digital displays.

All content was typeset in Caecilia (specifically PMN Caecilia for paper and the optimized digital version of Caecilia for Kindle). This typeface is natively supported on the Kindle and so is optimised for the display device. It also renders well in print and has a good legibility due to its moderately large x-height and low contrast in stroke thickness. Using a single typeface at a normative body text size for each medium ensured that typeface and size were systematically controlled in relation to legibility.

It was considered extremely important to not simply have the exact same typographic treatments across the mediums. This would have caused both of the mediums to have sub-optimal typography and so would have been an unnecessary compromise. Suitable typography for each of the specific mediums was therefore used to create a fluent condition for each medium, which was then manipulated in reasonably equivalent ways to create the disfluent conditions. This approach has a precedent in legibility research: Poulton (1967) left the decision to a typographic designer to determine the optimal setting when deciding what size of lower case letters to compare with capitals.

The fluent settings for paper were determined first. Drawing on typographic guidance for normative or 'good' typography from Baines and Haslam (2005), fluent materials were typeset as left-aligned with no adjustments to the default character spacing. The body text was set at 9.5pt on 13pt leading. A column measure of 350pt ensured that the average number of characters per line was within the recommended average (~70 characters). The texts were edited to ensure that they fitted on a single page.

For the digital fluent condition, the text was also left-aligned

with no adjustments to character spacing. Drawing on our preliminary findings, the text was typeset at size 4 with the leading at 130% (a slight adjustment of the default settings). As users would expect to scroll when reading a Kindle, we allowed for this to happen. Forcing the text to fit on a single screen would have substantially compromised legibility and/or reduced the amount of text the participants could read for the recall task. The average number of characters per line was ~45.

Materials in the disfluent condition were: justified (to create inconsistencies in word spacing), typeset with reduced ('tighter') character spacing (paper: -0.120 em; eInk: -0.162 em) and increased ('looser') interline spacing (paper: 22.75pt; eInk: 230%). For the character spacing, em spacing was used to achieve proportionate adjustments for the different typesizes and then adjusted for optical equivalence. The disfluent materials were also presented with smaller margins and therefore a substantially longer line length (paper: between 100 and 120 characters per line; eInk: approximately 80 characters per line – the maximum we could increase without substantially compromising legibility through reducing the character spacing or needing to reduce the character spacing further in the paper condition).

The samples were created in HTML and CSS, and then formatted to the ACZ3 file type. This file type is native to the Kindle and allows for slightly more control in relation to interline spacing and character spacing. This was important to ensure that as far as possible the Kindle did not automatically overwrite the specifications applied to the disfluent condition. For example, it was impossible to substantially reduce the interline spacing for the disfluent condition as the Kindle had a particular range of acceptable measures it would use.

FIGURES 2–5

see facing page...

eInk fluent (top left)
eInk disfluent (top right)
Paper fluent (bottom left)
Paper disfluent (bottom right)
(eInk and paper examples are not shown in scale to each other due to space limitations)

Figures 2–5 show the fluent and disfluent conditions for eInk and paper using one of the extracts (A brief history of *The Times*). Four variations of each of the two extracts (B/D) were developed so that the combination of content (Extract B/D), device (digital/paper) and typographic quality (fluent/disfluent) could be balanced across the study. The conditions for paper and digital in both fluent and disfluent conditions were also applied to Extract C – to create an alternate set of materials which could be used to ask participants about their preferences.

3.3.4 Procedure – main study

The main study used a between-subject design such that each participant read and answered factual questions in only one condition. There were three stages. In stage 1, participants were shown and asked to read one of the sample variants (e.g. paper/eInk and fluent/disfluent) at their comfortable/natural pace. Their reading time was recorded (rather than restricted – cf. Diemand *et al.,* 2011) to provide two measures of the potential effects of disfluency and provide richer data on the effectiveness of reading. In stage

2, following Noyes and Garland (2003) who recommend a delay between reading and testing of recall, participants were asked to complete a short questionnaire. The questionnaire asked participants to indicate:

— How much previous experience they had with an eInk screen (such as a Kindle or similar device) in relation to four options (None / Very Occasionally / Fairly Frequently / Regularly)

— Their age range (16–25 / 26–35 / 36–45 / 46–55 / 56–65 / 66+) and

— Their preferences (A / B) using a paired comparison procedure which paired together each of the four variations of the Extract C so that every possible combination was shown (six pairs).

The order of presentation was randomized across the study to minimize interference from order effects. After indicating their paired preferences, participants were asked to state if they felt they had a preference for either eInk or paper.

In stage 3, participants completed a questionnaire with 10 multiple-choice factual questions based on the text they had read in stage 1. Participants were not permitted to view the original material whilst answering the questions. No time limit was specified, allowing participants to take as long as they needed to recall the content and fill out the question paper.

Results

Table 1 summarises the average reading times in seconds (stage 1) and accuracy of recall (number of correct answers in stage 3) for each condition with SDs in parentheses.

TABLE 1

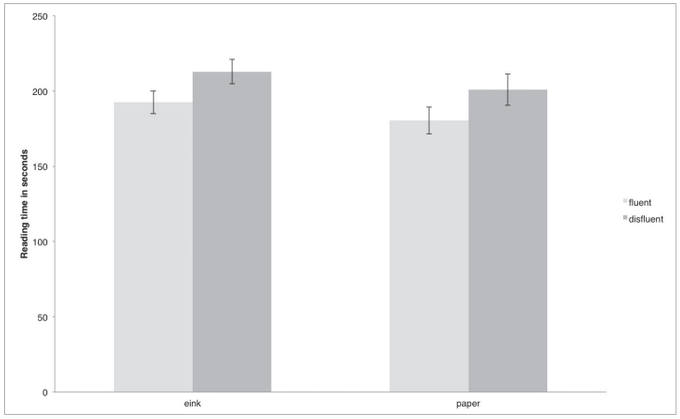
A two-way analysis of variance of reading times found a main effect of typographic quality with faster times for fluent material ($F(1,36) = 5.44$, $p = 0.025$). This was consistent across eInk and paper (*Figure 6*). There is no main effect of medium ($F(1,36) = 1.89$, $p = 0.178$): reading times were similar for eInk and paper.

Reading times and accuracy

	Fluent		Disfluent		Fluent + disfluent	
	Reading times (secs)	**Accuracy of recall**	**Reading times**	**Accuracy of recall**	**Reading times**	**Accuracy of recall**
eInk	192.40 (23.76)	7.30 (0.67)	212.80 (25.46)	4.70 (1.95)	202.60 (26.15)	6.00 (1.95)
Paper	180.30 (27.98)	3.90 (1.29)	200.80 (32.82)	6.80 (1.40)	190.55 (31.49)	5.35 (1.98)
eInk + paper	186.35 (26.02)	5.6 (2.01)	206.8 (29.24)	5.75 (1.97)		

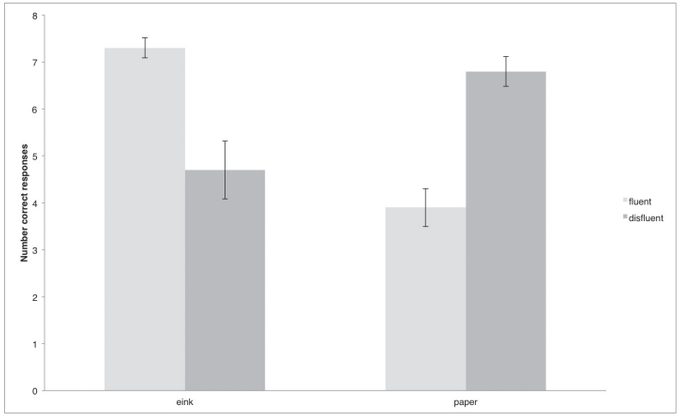
A two-way analysis of variance of reading times found a main effect of typographic quality with faster times for fluent material ($F(1,36) = 5.44$, $p = 0.025$). This was consistent across eInk and paper (*Figure 6*). There is no main effect of medium ($F(1,36) = 1.89$, $p = 0.178$): reading times were similar for eInk and paper.

FIGURE 6



For accuracy of recall, there were no main effects but we found a significant interaction between medium and typographic quality: $F(1,36) = 38.51$, $p<0.001$. Figure 7 illustrates that recall is better for fluent material when reading an eInk display but this effect is reversed when reading from paper. Although disfluent material was read more slowly from both eInk and paper, recall was affected in different ways.

FIGURE 7



In stage 2, 65% of participants reported having either 'Never' (18) or 'Very Occasionally' (8) used an eInk device. As shown in Table 2, there was no clear correlation between age and prior experience with eInk – although it may be that this is related to the relatively small number of participants and some unevenness in the age groups represented.

TABLE 2

Age and familiarity with eInk

Familiarity	Age					
	18–25	26–35	36–45	46–55	56–66	66+
None	10	1	0	4	1	2
Very occasionally	5	0	0	3	0	0
Fairly frequently	3	3	0	1	1	0
Regularly	1	2	0	3	0	0
Total number of participants	**19**	**6**	**0**	**11**	**2**	**2**

Table 3 compares eInk experience with recall, combining the four options on the questionnaire into two to increase the number of participants in each cell. As participants having prior experience with eInk are spread unevenly across the four conditions, it is difficult to draw any reliable conclusions concerning the relationship between experience and recall across the two mediums. However, participants who were reading the eInk fluent material seemed not to be affected by their experience (or lack thereof) with an eInk screen. Whereas the previous (reported) experience with an eInk screen of those who had to read the eInk disfluent material, may have had an influence. With harder-to-read material, lack of experience was detrimental compared with more experience. Interestingly, reported experience with eInk seemed to have a similar effect on reading from paper, although the high level of recall for the paper disfluent condition with more frequent experience with eInk is based on only one participant.

TABLE 3

Average number of correct answers (recall) according to reported previous experience with eInk screen

	eInk Fluent	**eInk Disfluent**	**Paper Fluent**	**Paper Disfluent**
Fairly frequently + regularly	7.20 N=5	5.50 N=4	3.00 N=4	8.00 N=1
None + very occasionally	7.40 N=5	4.17 N=6	4.50 N=6	6.67 N=9

The paired comparison data (Table 4) shows that participants selected examples in the fluent condition more frequently than those in the disfluent condition (eInk 98:26; paper 84:32). This suggests that participants prefer good typography regardless of medium. Although the difference in the ratios in the two mediums is small, eInk does have a greater disparity between fluent and disfluent. This hints at the perception of a slightly greater difference in typographic quality on eInk.

When questioned directly on preference, 15 participants expressed a preference for eInk, 12 for paper and 13 indicated no preference. In comparison to other studies of preference (e.g. Gibson and Gibb, 2011; Shepperd *et al.*, 2008), it is perhaps surprising that eInk was preferred more times than paper, but this might reflect participant's familiarity with eInk. Table 5 compares the number of participants expressing preferences according to their experience of eInk. As might be expected, those who are more familiar with eInk are also more likely to express a preference for this medium.

TABLE 4

Paired comparisons

eInk fluent		**eInk disfluent**		**Paper fluent**		**Paper disfluent**	
	37		3		–		–
	24		–		16		–
	–		7		33		
	37		–		–		3
	–		16		–		24
	–		–		35		5
Total	98	Total	26	Total	84	Total	32

TABLE 5

Preferences according to reported previous experience

	eInk preferred	**Paper preferred**	**No preference**
Fairly frequently + regularly	8	3	3
None + very occasionally	7	9	10

Discussion and implications

Similar to the findings from Diemand *et al.'s* (2011) study, higher recall was recorded for the disfluent paper condition. When reading from paper, the greater effort in the disfluent condition (together with a slower reading speed) may have facilitated recall. However, the same effect was not observed for eInk, with disfluent typography decreasing the accuracy of recall. Despite taking longer to read the eInk disfluent typography examples, participants were not able to recall as much as those who read the fluent condition. There are a number of possible explanations for these discrepant results for paper and eInk. For example:

- Participants may have considered the Kindle device to have more novelty and therefore shown a different level of motivation towards the task
- Different levels of confidence related to participants' relative familiarity with the device may have influenced the way they engaged with the task
- Participants may have different expectations of typographic quality for paper and eInk devices
- Digital and printed texts may have different affordances (Campbell, *et al.*, 2013; Thayer *et al.*, 2011)

Possible better legibility of eInk fluent condition based on paired comparisons data and Siegenthaler *et al.,* (2011, p. 272).

By aiming to optimize the layout for each medium, different typographic presentations were used which may have resulted in varying levels of legibility between paper and eInk (particularly where very tight character spacing may reduce legibility). However, these differences might have been greater if no account were taken of the medium. Although eInk more closely resembles paper than older technologies, print legibility results do not necessarily transfer to screen (Dyson, 2005). The reading speed results across paper and eInk suggest that there may be a similar difference between the fluent and disfluent condition in the levels of legibility on paper and eInk, taking reading speed as a measure of legibility. As participants were not restricted in their reading times (unlike in Diemand *et al.*, 2011), there is the potential for participants to trade off speed of reading and accuracy of recall.

With eInk, the reduction in the amount recalled in the disfluent condition, even when this is read slower, may be due to too much effort going into processing the text (i.e. exceeding the additional cognitive load that is supposed to help), at the expense of learning or understanding or memorizing the content. The less legible text reduced reading speed and was recalled less accurately, so there was no trade-off. This explanation of too great a load seems plausible when considering the likely interplay between recall and familiarity (Table 3). This reinforces the importance of considering issues of conventionality and familiarity when comparing paper and digital displays. It is important to ensure that the results are not distorted by a user's relative familiarity with the device used for testing or their perceived level of confidence or motivation to engage with the materials being tested in a particular condition (cf. Alter and Oppenheimer, 2008; Song and Schwarz, 2010). The overall results for paper are consistent with a trade-off as faster reading of the fluent, more legible text, was at the expense of accurate recall. In this case, greater familiarity with paper may have encouraged less engagement.

The different pattern of results for paper and eInk has been found in a study looking at mathematics problems rather than reading continuous texts (Sidi *et al*., 2016). This study obtained results that mirror our own: i.e. they found no differences in performance between screen and print but did observe differences between the typographic conditions. In particular, Sidi *et al*. found that on screen the problems set in the less legible or less fluent typographic condition resulted in better performance. On paper, they found the reverse: a higher success rate in solving the problems when the font is legible. Our study and the Sidi *et al.* study therefore both have results in different directions for screen and paper but with the mathematical problems, the results for paper are in line with what we would predict from legibility research. Although Sidi *et al.*'s study does not explain what is

mediating these results, it does indicate that the characteristics of the material (e.g. the medium) can influence the results. This argues for much more subtlety in exploring the precise conditions under which legible texts may appear to disadvantage recall or comprehension.

The better recall with more fluent or legible eInk materials provides strong grounds to extend research into the impact of typographic presentation on reading and learning. This result confirms typographers' practice in prioritizing legibility and designing material to support, rather than hinder, ease of reading. Building on research that suggests a reduction in comprehension at faster reading speeds (e.g. Poulton, 1958; Dyson and Haselgrove, 2001) and other aspects of typographic presentation that can aid or hinder reading (e.g. Yi *et al*., 2011), it is important to consider how typographic presentation can contribute to slowing readers down without adding to cognitive load to the extent that this has a detrimental effect on learning. The difficulty with disfluent material also questions whether it is advisable to require readers to put more effort into deciphering text of poor typographic quality, even if recall is improved when reading from paper. Any positive effect may be offset by greater fatigue or irritation and we do not yet know whether reading for extended periods of time also shows gains for disfluent conditions. Given the higher recall for fluent eInk material, we should question the implications of recommending reducing the typographic quality of paper documents.

Engaging with learning materials requires a range of engagement strategies, particularly as instructional texts usually include a variety of different forms of text and images (continuous text, lists, tables, numerical data, graphs, illustrations, etc.). Currently, commercially available eReaders do not have colour displays. As well as restricting the display of images, this also limits the way in which structural and other visual cues are signaled to support reading. Accordingly, typographic presentation may play a particular role in helping readers determine the structure and organization of information, decide how to engage with information and also enable the ways in which they locate information. This is particularly important in relation to materiality and the absence of physical cues in comparison to printed books (Lovelace and Southall, 1983; Waller, 1986; Dillon, 1992; Van der Weel, 2011; Campbell *et al.*, 2013, Flood, 2014; Mangen and Kuiken, 2014; Mangen, 2017). As Mangen (2017) has argued, there is considerable scope for research that explores the ergonomic affordances of digital devices. Furthermore, we would add, that ways in which typographic presentation can support reading processes through navigation and structural cues should be investigated more fully. These issues are particularly important to consider further as new user interfaces and navigational styles are being developed for eReaders (see: Kozlowski, 2012).

The results show that changes between paper and eInk, combined with varying the level of typographic fluency, does affect

learning-related tasks like recall. The results of this study suggest that eInk *can* be beneficial to recall particularly when paired with good typographic presentation and if users have prior experience of the medium.

Overall, the study provides some grounds to consider that eInk readers could be an appropriate alternative platform to consider for educational use, particularly when information is displayed at a good standard of typographic quality. It also raises some interesting considerations for the design and control of typographic test materials through engaging with how norms for 'good and bad' typography may translate across different mediums rather than reproducing equivalent measures that may not be appropriate for all outputs.

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Author

Peter Loveland is a graduate of the Department of Typography & Graphic Communication at the University of Reading (UK). He now works as a software designer for IBM. This paper is based on his undergraduate dissertation research conducted at the University of Reading, which was supervised by Dr. Mary Dyson and has been developed for publication with Dr. Jeanne-Louise Moys.

Exploring illustration styles for materials used in visual resources for people with aphasia

Jeanne-Louise Moys

Carmen Martínez-Freile

Rachel McCrindle

Lotte Meteyard

Holly Robson

Luke Kendrick

Maitreyee Wairagkar

Images are often used in cueing therapy and other kinds of rehabilitation activities for people with an acquired brain injury. This paper presents a small-scale pilot study (part of a larger multidisciplinary project) exploring the appropriateness of different styles of illustration applied to visual resources used in combination with assistive technologies for people with aphasia. The study investigated participants' preferences and impressions of the materials with a view to informing design choices made for resources developed for the larger project. A focus group was conducted where participants were shown examples of materials developed as resources for cueing therapy and lifestyle activities: four sets of illustrations varying in visual complexity – from icons with no context to illustrations with developed backgrounds. Participants shared their impressions of ease of use and their preferences for different levels of visual complexity in the illustrations, as well as changes in format and layout. Findings show that participants preferred simple, icon-style illustrations rather than those with contextual detail. Familiarity with this style of illustration – based on their everyday engagement with mobile interfaces – seems to be the explanation for this preference.

Keywords

aphasia
assistive technologies
cueing therapy
icons
illustration
pictorial language

1. Background and rationale

1.1 Project background

The pilot study presented in this paper considers the role of images used in resources designed to support cueing therapy and everyday communication activities for people with an 'acquired brain injury' – ABI. This includes individuals who live with the long-term consequences of stroke or traumatic brain injury and, in our particular study, people with aphasia – an "umbrella term to cover all types and severities of the language processing difficulty" (Pearl, 2014: 10).

The study is part of a larger, multi- and inter-disciplinary research collaboration involving researchers in Biomedical Engineering, Clinical Language Sciences and Typography & Graphic Communication. This larger project explores how a range of assistive technologies can support the rehabilitation and lifestyle needs of people with an ABI. The project involves the development and evaluation of resources that people with aphasia can use to aid their recovery in hospital or at home. Examples include resources using near frequency communication (NFC) tags with mobile devices and a low cost portable system that uses a Kinect gameplay therapy tool that can be targeted to the rehabilitation needs of a patient (Wairagkar, *et al*., 2017). The tags are used to create responsive cueing therapy boards, information cards that can be placed around the house to help people perform everyday tasks, and functional accessories like key-rings and wristbands that people can wear and use to communicate if they need help. The tags enable individuals to use their mobile phone to activate functions or sounds associated with particular images. For example, they could automatically dial the number of a personal contact or let a carer know they are thirsty by activating a recorded statement.

All of these resources incorporate images. The pilot study presented in this paper considers the appropriateness of different kinds of illustration and changes in visual presentation for people who are engaging in rehabilitation activities for aphasia following an ABI. The aim of the study was to inform decisions about what kinds of images would be most appropriate for resources developed for the wider project, drawing on Houts *et al*. (2006) who recommend including the intended audience in the development of images for medical contexts. In particular, we were interested in assessing participants' preferences for illustrations that differ in terms of visual complexity. The objectives of our study were to identify: (1) what kinds of illustrations participants preferred for a set of illustrations that are similar in graphic style but exhibit different levels of contextualisation; and (2) the appropriate scale and combination of images to use in boards developed for the larger research project.

1.2 Theoretical foundations

A number of studies support the use of pictograms in healthcare contexts such as medicine leaflets and other kinds of patient information. Barros *et al*. (2014) provide an overview of such studies. There are also several examples that have been published in previous issues of this journal (e.g. Zender and Cassedy, 2014; Patton *et al*., 2015). Much guidance for designing pictograms and icons highlights the importance of simplicity and familiarity (Black 2017; McDougall *et al*. 2000). Zender and Mejía (2013) note that it is important to ensure an appropriate level of detail is provided to ensure meaning is clear and unambiguous.

Studies about the use of pictures in healthcare resources similarly suggest that it is important to minimise distracting details within images (Houts *et al*. 2006). However, in particular medical contexts, the appropriate level of detail may vary in relation to the specific needs of the individuals concerned. For example, guidelines for the presentation of visual materials for people with aphasia tend to suggest that images need to be presented in context rather than as decontextualised icons. For example, the Aphasia Alliance (2012: 3) suggest that for activities like making a cup of tea, showing the activity (someone making tea) rather than a picture representing an object associated with the activity (a cup of tea) is more helpful. Icons and very simplified images, according to aphasia-friendly design guidelines, do not give enough information about the concept and therefore can be more difficult for people with aphasia to understand than images with narrative context.

These guidelines are supported by research that considers, for example, what "visuographic features people with chronic aphasia perceive as helpful" (Knollman-Porter *et al*., 2016: 273). Some health communication studies suggest that images with more context or detail can take longer to process (e.g. Ellis and Morrison, 1998). However, Meteyard and Bose (2018) note that studies specifically involving participants with aphasia (PWA) either show no difference between pictures that are more or less visually complex (Nickels and Howard, 1995) or suggest that having more visual detail is helpful and improves recognition (Cuetos *et al*., 2002). Thus, there is variability in the results and recommendations arising from research in this area.

Using relevant images is a general recommendation for health communications for older adults (McHugh Sanner, 2003). In particular, photography is considered to be very effective in rehabilitation activities because it enables the resources to have a high degree of personalisation or "personal relevance" that may aid the "processing of symbolic information" for people with aphasia (McKelvey *et al*., 2010: 32). However, general guidelines for health education resources arising from research suggest that line drawings may be more effective than photographs in aiding comprehension (Rose *et al*., 2011). Thus, Rose *et al*. (2011) suggest that it is important to consider

the appropriateness of different kinds of images for people with aphasia.

Knollman-Porter *et al*. (2016) compared four kinds of colour images: icon, portrait photograph with no context, high-content photograph with contextualising background and low-content photograph with contextualising background. They report that participants in their study indicated a preference for "high context photographic images" (Knollman-Porter *et al*. 2016: 273) that include backgrounds to contextualise an image. However, other studies comparing different styles of visual representation have variable results. For example, Rose *et al*. (2011) found no significant differences between resources with photographs, line drawings or no illustrations used in printed educational materials for people with aphasia, although some participants indicated a preference for photographs (suggesting that these made reading quicker or easier). In comparison, in a study focused on narrative retell, Griffith *et al*. (2014) noted that while participants seemed to refer to photographs more than line drawings, they reported both photographs and line drawings to be helpful.

From a graphic communication perspective, research in this area may not be adequately considering the subtleties of visual and pictorial language. In this respect, some studies may not control the role of colour across different test conditions sufficiently. In the Rose *et al*. (2011) study, for example, their findings could also be related to the presence and absence of colour, as the line drawings were shown in black and white. In other studies, where all materials are shown in colour, the photographs often have more naturalistic, authentic colour palettes whereas the illustrations tend to have very stylised colour palettes with limited modulation of colour (e.g. McKelvey *et al*. 2010; Griffith *et al*. 2014).

In addition, the style of illustrations used in these studies may be relatively stylised and less naturalistic than the photographs they are compared with. Preferences for photographs could also be related to participants' impressions that the style of illustration is patronising, unprofessional or inappropriate (e.g. more suited to children than adults). Thus, even when the inclusion of colour has been controlled in the study, there may also be substantial differences in overall visual style and the level of detail and naturalism that could influence results. For example, the Knollman-Porter *et al*. (2016) study does not include any forms of illustration that could have an equivalent level of detail to the photographs used. In this respect, the icon condition in their study is substantially distinct from the three photographic conditions and may seem like the odd one out.

Overall, it seems that the materials used in many of the studies exploring the role of images in visual resources for people with aphasia often overlook how different styles of visual representation may differ substantially in quality, perceived professionalism or carry particular genre associations. Photographs, line drawings and icons, from a graphic communication perspective, are substantially different pictorial forms. Accordingly, the exploratory study presented here explores PWA preferences for different levels of visual complexity in illustration, with a view to identifying what level of detail we should include in any visual resources developed for the on-going project that considers particular remedial and everyday applications of images.

For the purposes of identifying appropriate images to incorporate into our research materials, we decided to explore whether participants still express a preference for highly-contextualised images rather than icons when all the images shown are illustrations and when these are developed to a higher standard of illustration rather than resembling clip art illustrations. Interestingly, the importance of using images of a professional standard, rather than generic clip art seems to be increasingly recognised as a number of recent studies have included or consulted graphic designers within their research teams (e.g. Kheir *et al*., 2014; Van Beusekom *et al*., 2015).

2. Methods and materials

2.1. Participants

A focus group explored participants' impressions of ease of use and their preferences for different visual examples. The participants were recruited from the patient and public involvement group of the larger research project. In this respect, the participants can be considered to have an on-going interest in the project and in assistive technologies. Three people with chronic aphasia and one care-giver (the partner of a PWA) attended the focus group. The participating individuals with aphasia (all more than three years post-stroke) were able to express their views verbally and with sufficient comprehension to follow and contribute to a group discussion with support.

Given the exploratory nature of the focus group and its relationship to the larger project, the slightly small number of participants is sufficient as a starting point to consider what kinds of materials (in terms of illustrative style and format) to develop for further evaluation. It is also appropriate for a focus group involving people with aphasia – these individuals often find large group conversations very challenging and require support to communicate their ideas. The small sample has precedent in other small studies involving people with aphasia (e.g. Knollman-Porter *et al*., 2016 – six participants; Griffith *et al*., 2014 – four participants) and other preliminary studies conducted as part of this project (Wairagkar, *et al*., 2017 – three participants). However, for any subsequent studies where we may need to evaluate the usability and effectiveness of particular images or are seeking

more generalisable results, we would aim to recruit a slightly larger number of participants or conduct more than one focus group.

2.2. Materials

We considered participants' preferences for three attributes:

- the different levels of visual complexity applied to a set of illustrations
- the number of images presented in combination (six, nine, or 12).
- the size of the boards on which the images were presented (A3 or A4).

Participants were shown a range of illustrations presented in sets to replicate the sorts of boards that could be used in cueing therapy activities or as personal communication aids at home. The boards were presented in combinations of six, nine or 12 images and participants were also given an opportunity to compare A3 and A4 sized resources. In addition, participants viewed some examples of the illustrations used in functional accessories (e.g. key-ring and wristband) and a customisable board *(Figure 1)* which allowed participants to place or remove the images (according to how often they may wish to use an image). This enabled us to consider some of the different visual applications using NFC tags that are being incorporated into the larger research project.

FIGURE 1

The illustrations were applied to resources such as customisable boards in which users can select concepts or functions which they are likely to use more frequently in their daily lives.

All resources were developed and presented in full colour. The materials were printed on a white card stock of 250gsm. This card is resistant but light, ensuring the materials were easy for participants to handle without being either flimsy or heavy.

Two standard sizes were chosen for the boards: A3 and A4. Each participant was given a set of A4 resources to look at and then the A3 boards were displayed to facilitate group discussion.

The use of labels and text presented across all the boards was standardised. The resources were designed with reference to guidance outlined by the Stroke Association (Herbert, 2012) and the Aphasia Alliance (2012) which support: the use of a large font size, using a sans-serif typeface, and having sufficient white space around images to keep each image distinct.

We developed materials including four kinds of illustration, systematically varied and applied to a set of 12 concepts. These concepts were selected from concepts that were already being used in the wider multidisciplinary project; specifically, they all represent functions or recorded statements that NFC tags could trigger for a person using a hand-held mobile device. Individuals became familiar with all concepts at the start of the focus group, through direct demonstration of the NFC technology. The concepts used in the focus group are shown in Table 1.

TABLE 1

Concepts illustrated in the cueing therapy boards used in the study

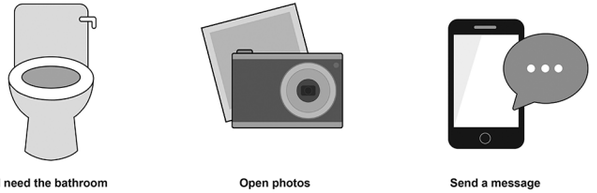
1. Watch TV	5. Look at a map	9. I am thirsty
2. Make a phone call	6. Turn off the alarm	10. I love you
3. Access email	7. I need the bathroom (toilet)	11. Open calendar
4. Send a text message	8. Open a website	12. Open photos

Four styles of visual variation were applied to these concepts:

- **Set A:** An object representing the action, in an icon style (Figure 2a)
- **Set B:** An object representing the action, in a naturalistic style (Figure 2b)
- **Set C:** A hand holding an object representing the action, in a naturalistic style (Figure 2c)
- **Set D:** An object representing the action being used in context, in a naturalistic style (Figure 2d).

FIGURE 2 A

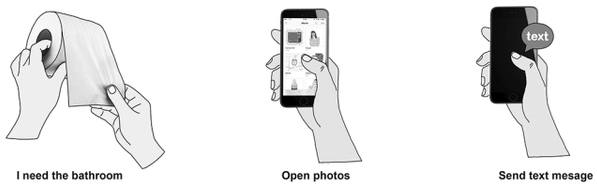
The changes in visual variation applied to the test materials: (a) object in icon style



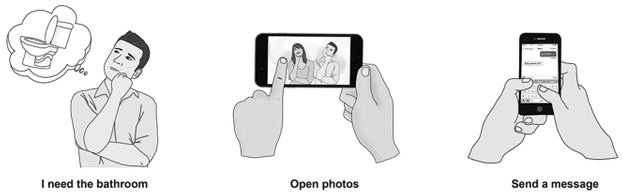
FIGURES 2 B-D

(b) object in naturalistic style,

(c) hand holding object, and



(d) object shown in context.



The only exception was the presentation of "I love you" (*Figure 3*), which was kept consistent in icon style across the conditions given its more abstract meaning. As a frequent phrase that was likely to be used in the resources developed as part of the wider study, our team decided it was important to include this in the materials even though it was going to be controlled across all conditions.

FIGURE 3

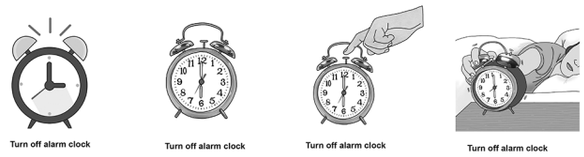
"I love you" – this image represented an emotion so was not varied across the conditions.

Adding in the hands and context meant that the critical object in the illustrations became smaller in these conditions, particularly as we were aiming to keep the overall size of each image reasonably consistent. Our material design process aimed to balance these issues of scale, and ensure that in addition to keeping each critical object distinct, the overall visual weight of the illustrations and amount of white space surrounding the illustrations in each set was as consistent as possible.

As shown in Figure 4, the naturalistic style of drawing was less geometric and stylised than the icon style. The icons also applied colour in a slightly more flat, saturated way (in comparison to the more naturalistically shaded colours in the other examples).

FIGURE 4

The four styles of visual variation used in the study, as applied to the "Turn off the alarm" concept.



2.3. Procedures

The focus group facilitators included researchers who are experienced in working with people with aphasia and could provide a supportive communication environment. This ensured that, for example, the interviewers could provide participants with adequate clarification of questions, confirm responses and facilitate discussion, allowing each participant to contribute equally in a supportive environment.

Participants were introduced to the concepts at the start of the focus group and shown how the phone would be triggered to do things. So, when they were shown the different images to decide upon, they were familiar with what those images needed to represent.

Participants were asked specific questions are well as being given the opportunity to make general suggestions for how the design of the resources could be improved. The group was asked the following questions (in order):

- *What images are easiest to understand? Why?*
- *What do you think the images mean?*
- *What looks better visually? And why?*
- *Which layout do you prefer? And why?*
- *Which would you feel most comfortable using when at home or when out and about?*
- *Is there anything you would change?*

Each individual was given a copy of the questions to refer to, in order to support their comprehension and follow the discussion. For each question, a researcher (LM) presented the question verbally and directed individuals' attention to it on the printed sheet. Responses were then invited from the whole group. If any individuals had not given a response, the researcher asked that individual directly for their opinion. The researcher then presented a verbal summary of what had been said, and asked participants if that were accurate. If not, clarification was sought from the participant. Participant responses were transcribed during the session and the discussion was audio recorded. Responses from the three PWA were summarised against the questions and follow up questions that were asked during the discussion (see Results section). Responses from the care-giver have not been included. This individual took part in the discussion but made clear that since they would not be the one using the icons day to day, they felt their opinion was less important than that of the PWA.

3. Results

What images are easiest to understand? Why?

What do you think the images mean?

Two participants agreed that Set A was the easiest to understand. Participant 1 liked the way this was understandable at a glance and felt they could take all the information in at once because only the most essential characteristics of the objects were represented. Participant 2 noted that the icons on Set A were similar to those they were used to seeing on their mobile phone and therefore the familiarity made these easier to understand. The third participant thought that both Set A and Set C were easy to understand. In particular, they suggested that for concepts that were more complicated the detail of the hand in Set C was helpful.

All three PWA said that they found Set D, the board with the most context to be the hardest to understand. As shown in Table 2, their reasons for this shared observation were similar, with all three PWA indicating that it made it harder to distinguish the main idea being represented.

TABLE 2

Reasons expressed for difficulties with Set D

Participant 1	Participant 2	Participant 3
Said images gave too much information – some of this information was considered unnecessary and had the effect of diluting the intended focus of the picture	Did not know what part of the image to focus on and could not associate the image with one single idea	Thought each image might have been expressing more than one idea and found it difficult to identify the single concept that the picture was aiming to represent

Follow up question:

Are there any images that you think are confusing?

Three examples were identified:

- Participant 1 suggested that the clarity of the alarm clock icon would be improved if it had numbers instead of small dots representing the hours
- Participants 2 and 3 both suggested that the "open photos" image was potentially confusing. Participant 2 suggested that this one was clearer on Set D (the board with the most context) because it looked more like a real photo of two people.
- Participant 3 noted that the map icon (Figure 5) was potentially confusing as apart from the representation of it folding and the location symbol it did not have anything similar to a real-life map (such as roads), while the other boards did include such elements.

FIGURE 5

The map illustration in Set A (icon style).

What looks better visually? And why?

Participants 1 and 2 agreed that they liked the style of the icons in Set A the most. Participant 1 liked the icons because they found these to be clear and they preferred the simplicity of the shapes and colours. Participant 2 noted that they thought the icons in Set A seemed less "patronising" than the images on the other boards. In contrast, Participant 3 expressed a preference for the more naturalistic illustration style of the other materials although they indicated that it was "frustrating" that they did not understand the concepts represented in this. Overall, they preferred the icon board, as this one was easier to understand.

A follow up question was asked:

On which board do you like the style of the illustrations the least?

Participant 1 stated that they did not dislike any of the styles presented but that they found the boards with a more naturalistic style to be more confusing and sometimes patronising. Similarly, Participant 2 suggested they found the board with more context to be potentially patronising. However, they explicitly attributed this to the amount of information shown rather than the style of the illustrations. Participant 3 noted that even though they liked the more naturalistic style on the other boards, the board with more context came across as patronising.

Which layout do you prefer? And why?

Follow up question:

Do you prefer the bigger (A3) or the smaller size (A4)?

All three PWA agreed that the icon illustrations in Set A were sufficiently visible at the smaller size. One participant also suggested that they would prefer them to bigger but noted that the bigger boards were more difficult to handle. One participant suggested that for Sets B–D the bigger size may

be more appropriate, especially for Set D where more context was shown. Follow up question:

How many images do you think we should have on each board?

All three PWA agreed that nine was the appropriate number of images and a more "friendly" approach. They indicated that the boards with only six images on them seemed potentially patronising whereas those with 12 images were overwhelming and made it more difficult to focus on one at a time.

Is there anything you would change?

In response to this question, participants reiterated the suggestions they had made in relation to the images they found confusing. Overall, their suggestions focused on including helpful details to improve the clarity of images at a glance: changing the dots on the alarm clock to numbers, ensuring the photograph behind the camera was not blank, and adding realistic details to the map.

Which would you feel most comfortable using when at home or when out and about? Participants expressed positive responses towards the examples of wearable technologies that they were shown in the focus group. In particular, they all agreed the key ring was what they found more useful for its apparent advantages when carried around as well as its discretion. They agreed the customisable board was more useful in a home environment as it was easy to find. However, they suggested that having to carry this around could be less convenient and uncomfortable. All participants agreed that these objects could help them in their everyday lives.

4. Discussion

Contrary to what we had anticipated based on previous studies, participants expressed a clear preference for Set A – the illustrations that were most like icons and which they said they generally found easier to understand. A potential explanation for this result could be related to how the NFC tags enable people to use cueing therapy, activity or communication resources in combination with their mobile phones. In this context, it is possible that icons that are more similar to those used in mobile interfaces, and therefore have greater familiarity for participants, are perceived as more appropriate. It is also possible that this finding was related to the inclusion of activities that are primarily completed with a mobile phone (e.g. viewing photographs, making a phone call, opening a calendar) and that participants may have different expectations for activities using other equipment (e.g. making tea).

There was a unanimous preference for a small board with nine images upon it. It seemed that this agreement was informed both by participants' impressions that 12 images could be too much for them to process simultaneously and their opinion that the board with only six images was potentially patronising. However, it should be acknowledged that individuals with different levels of aphasia severity or engaging in different kinds of activities at particular stages of their rehabilitation might have different needs or preferences.

Overall, participants' recommendations for improving the examples pointed to the importance of relevant details in enhancing their understanding of images. This finding suggests that contextualising details should be informative details that help clarify the meaning of a graphic rather than details that make an image more complex and potentially more multifaceted. However, given the small sample, the findings are potentially anecdotal and may not be generalisable beyond the scope of this pilot study. It is also possible that in such a small focus group, participants may be more inclined to express agreement.

Nevertheless, from an information design point of view, the difference between our findings and previous studies indicates scope to explore how different levels of visual complexity may have varying levels of appropriateness for different contexts of use and identify what kinds of detail are relevant to include to ensure images are graphically-informative without becoming too complex or distracting. If we are to champion the potential social impact of graphic design, designers need to consider how 'good practice' may be very different in particular contexts of use.

Despite the small scope of this study, it highlights that a 'one size fits all' approach to pictorial language could undermine the effectiveness of visual resources used in real contexts. For empirical research, the arising implications are that research teams need to develop a more nuanced and critical approach to their material design. In this respect, graphic designers and illustrators can play an important role in cross-disciplinary research teams, as can more systematic engagement with the variation and control of materials. This finding is also relevant beyond research for people making tools for others to use, particularly in contexts where people with disabilities need support to achieve basic tasks. While our participants indicated a preference for the simpler, more iconic style of illustration, their comments also suggest that they would find many of the icons more helpful and easier to understand if they included more precise details. This could suggest that previous studies testing icons or clip art style illustrations used images that were not sufficiently visually informative. In this respect, our findings suggest scope in this field to conduct further studies to identify the appropriate level of detail to achieve the appropriate balance between visual simplicity and visual informativeness for people with aphasia.

Our study takes steps towards ensuring a reasonable level of visual equivalence in the test material created for this pilot study. However, we have not yet sufficiently explored considerations such as differences between the representation of different kinds of concepts. For example, the concepts used in the resources created include actions (turn off my alarm clock, open my digital photograph album), needs (I need the toilet, I am thirsty) and the expression of emotion (I love you). The differences in levels of abstraction and concreteness require more systematic consideration (Black 2017; Zender 2006; McDougall *et al*. 2000).

In addition, it is also important to consider the effectiveness of particular visual representations in authentic contexts of use. The actual effectiveness of the visual resources may be different when used in everyday life to how participants imagine they will use them in a research focus group setting. This aspect has been built into the research design of the larger project, which builds on a series of focus group investigations prior to conducting studies with participants in their homes or preferred environment.

The pilot study findings have been useful in providing direction and guidance to help suggest some considerations we need to bear in mind when developing materials for our on-going investigations into how assistive technologies can benefit people with aphasia. As the focus group chose the icons as their most preferred illustration style, this style is now being used in the second phase of the project. Individuals with aphasia are being set up with NFC technology in their homes, and an individualised board is being created for their use.

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Authors

Jeanne-Louise Moys,
Carmen Martínez-Freile,
Rachel McCrindle,
Holly Robson,
Lotte Meteyard,
Luke Kendrick,
Maitreyee Wairagkar

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Garment label design and companion information to communicate fashion sustainability issues to young consumers

Ana Perez

Maria dos Santos Lonsdale

With the rise of fashion consumption and a clear lack of promotional input by retailers on the issues of sustainable fashion, this research shows that there is little awareness particularly among young adults on the issues of fashion sustainability. Therefore, a clear need to inform consumers on how to utilize, care for and dispose of fashion items is necessary to make the important changes to the planet's fashion waste issues. To this end, this research explores ways of how fashion brands can communicate a more sustainable way of consuming fashion to young consumers in the UK. Focus groups were conducted with the objective of identifying the main issues relating to fashion consumption including the lack of awareness and disposal of garments. These were followed by a collaborative workshop involving young consumers, where a fashion brand was created to educate consumers through information and garment label design solutions using innovative communication strategies. To ascertain the validity of these design solutions, usability testing was then conducted, which identified further design improvements. Although conducted with a small set of participants, this collaborative and user-centered research is well positioned to propose innovative solutions to communicate research-based design solutions on how to communicate, educate and change the perception of sustainable fashion among young consumers in the UK.

Keywords

Information Design
Garment Label Design
Packaging Design
Fashion sustainability

1. Background

The fashion industry is one of the largest industries contributing to the world economy. However, it is also one of the most polluting industries. (Gardetti and Torres, 2013). Brands are producing more fashion and at a faster pace, and consumers are purchasing more clothes. Consequently, each year the environmental impact of the fast-fashion business results in more and more waste.

Morgan and Birtwistle (2009) argue that this is particularly an issue with young consumers. Their research showed that one in five young female consumers admits to purchasing a new item of clothing every week. This is significant to retailers who exploit these purchasing habits, and high street brands respond to these fashion trends with high speed and high-volume manufacturing processes. It further undervalues the impact on sustainability, giving emphasis to low cost and high-speed production and ultimately producing inferior quality items (Fletcher, 2008).

The UK fashion industry, in particular, is worth an estimated £27 billion for women's wear alone and is expected to grow 23% by 2020 (Mintel, 2016). The fashion industry therefore makes a great contribution to the British economy. However, it is also the second most polluting industry on the planet after oil (Ethical Fashion Forum, 2014).

Researchers claim that some consumers are starting to show an interest in ethical issues and the impact of the textile industry (Carrigan and Attalla, 2001), particularly after the fire of 2013 in which 1,133 fatalities occurred and many more were wounded in the garment factory Rana Plaza in Dhaka, which produced garments for major high-street fashion brands (Jacobs and Singhal, 2017).

However, although current research shows that consumers might be increasingly aware of, and interested in, sustainable fashion, there is a discrepancy between attitude and actual behavior (Bray et al, 2011). Shaw and Riach (2011) agree that consumers might have good intentions towards sustainable items, but this does not translate into purchasing actions. This is further supported by MISTRA's research (2013) through a survey on purchasing behavior, maintenance and disposal of garments with 1175 participants aged between 16 and 30 years. The outcomes of the survey showed that consumers have environmental concerns, but these concerns do not always convert to an actual purchase of a sustainable item (MISTRA, 2013).

It is argued that the lack of consumer awareness when purchasing garments and the confusing connotations surrounding sustainable fashion needs to be addressed by retailers to have a long-lasting effect. (Moore and Wentz, 2004; Beard, 2008; Thomas, 2008; Gwilt and Rissanen, 2011).

One possible solution given by researchers is the communication of ethical information to consumers through clear garment labels (Saicheua et al.,2012; Joy et al., 2012; Thomas, 2008; Aakko and Koskennurmi-Sivonen, 2013). If sustainable fashion is to reach the mainstream fashion-conscious consumer, a label with consistent and clear information could explain the garment's sustainable attributes, which otherwise might be unknown to the consumer (Sherburne, 2009; Thomas, 2008). Therefore, the ability to access and understand the information on care labels could prevent the early deterioration of clothing caused by the overuse of washing powders, and the incorrect selection of washing temperatures that ultimately affects the environment (McLaren, et al. 2015).

However, research on the design of garment labels from a design perspective is scarce (or even non-existent, as far as the authors are aware). The research available on labels for fashion items seems to focus solely on the content of the labels, such as the material and the source of the product but not on their design (DEFRA, 2008; HIS, 2015; Niinimäki, 2015; Post, 2017).

In conclusion, despite fashion sustainability issues being showcased in the media, there is still a lack of understanding amongst consumers and a need for accessible information. Furthermore, it appears that there is a strong need for educating people from an early age, as this could influence their future buying behavior.

The research proposed here will therefore increase our understanding of the factors behind young consumers' awareness relating to sustainable fashion and contribute to knowledge in the field of information design by focusing on an unexplored area of garment labels, offering new research-based design solutions capable of informing, educating and influencing young consumers.

Therefore, the aim of this research is to establish a relationship between young consumers and fashion sustainability, in today's society, by providing accessible and clear information. Specific objectives are: 1) To categorize young consumers' understanding of sustainable fashion and ethical issues within the textile industry; 2) To identify young consumers' purchasing behaviors and act on these with relevant design and communication solutions; 3) To explore innovative design approaches to garment labels, taking into account information design principles and user needs and expectations.

2. Methodology

2.1. Literature review

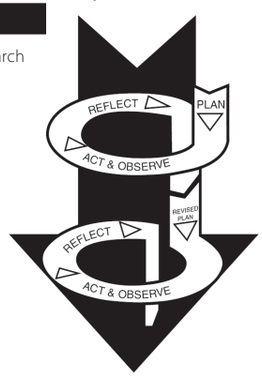
The first stage of the literature review provided a vital source of information to support and broaden a wider spectrum of the research topic, highlighting current sustainability issues within the fashion industry that are vital to evaluate, compare, and proving a critical viewpoint to broaden the research topic. To focus the research further and analyze the differences between the connotations of sustainable fashion, the three primary areas researched were: Eco Fashion - garments produced in a less harmful way to the environment; Slow Fashion – garments produced locally that create a smaller carbon footprint and are meant to last; Organic – clothes that have been created with fewer chemicals and have limited impact on the environment. Ethical issues surrounding the fashion industry were also analyzed, and the five main areas researched were: child labor, low wages, health and safety, the environment, and animal cruelty.

A second stage of research looked at the role information design can have in building consumers' awareness by communicating effectively about sustainability. Areas looked at included: purpose, effectiveness, structure, legibility, text, color, relationship between text and image, unity and consistency, content, aesthetics, attention and recall.

To determine the design ideation of the project the secondary research in this study involved the creation of a research structure based on the action research cycle used by the social scientist Kurt Lewin (Kemmis and McTaggart, 1981) and theories of applied behavioral science and action research (*Figure 1*). The conceptual framework based on the action research theory used by Lewin established the mixed research method for this process involving: observation, focus group, collaborative workshop, interview and usability testing with the ability to link the findings back to the theory and practice (Townsend, 2013).

FIGURE 1

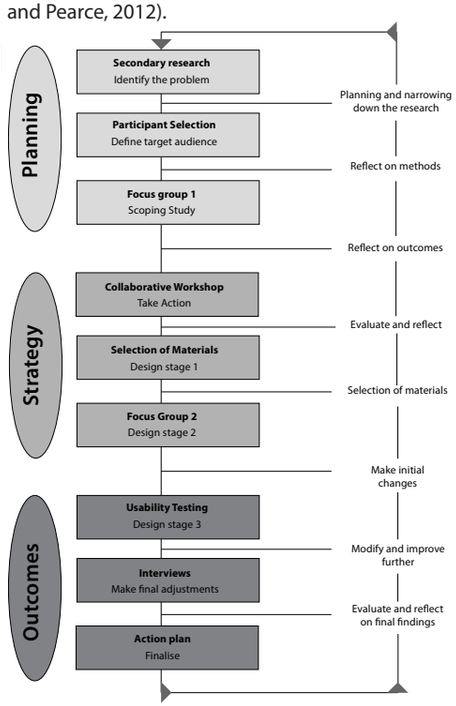
Example of action research spiral by Kemmis and McTaggart (1981)



Once the research questions were defined, a detailed research structure was also created to develop and consolidate the design process (*Figure 2*). This newly developed research structure enabled the researchers to be directly involved in every stage of the research and design phases by working collaboratively with the participants. The objective of this being to: a) gain a deeper understanding of the problem by studying young consumers' purchasing habits;
b) observe and reflect on the outcomes and explore innovative design approaches; and
c) discover new directions in a planned and systematic manner and develop design solutions to comply with the user needs (McNiff et al, 2003; Crouch and Pearce, 2012).

FIGURE 2

Research structure based on the action research cycle



In order to obtain a true picture of young consumers' awareness of sustainability and the use and care of sustainable fashion, a total of 36 participants (22 females and 14 males) between 16 and 19 years of age were carefully recruited for a subsequent series of interviews, participate in the material selection, design and product development carried out in this project, as described next.

2.2. Focus groups 1A and 1B – Preliminary participant selection

To establish an understanding of the target audience necessary for the design intervention ~~a~~ preliminary research with two focus groups (FG) of different ages (FG1A = 16-19 and FG1B = 25-60) was carried out. In action research, this stage is necessary in order to adapt and refine the initial research enquiry and enables access to a deeper understanding of participant views and backgrounds (Crouch and Pearce, 2012; Dawson, 2013).

The two groups were as follows:

— Focus Group 1A: 25 to 65-year old, eight participants, five females and three males.

— Focus Group 1B: 16 to 19-year old, eight participants, six females and two males.

The two groups were seen separately to gain original views and diverse responses (Crouch and Pearce, 2012). A discussion was conducted with each group. The participants in FG1A all had an income and owned their own properties. Participants from FG1B were all students living with parents or a guardian and had a part-time job to support their expenses and travel costs and lacked knowledge as far as sustainability issues were concerned. Ethical guidelines were followed, and the participants age was considered at all times.

The responses of the focus groups were noted and helped to establish the difference in attitudes and understanding towards sustainable fashion, specifically the relationship that young consumers have with the awareness, acquisition, use, care and disposal of fashion. However, the older group (FG1A) was eliminated from the study in the early stages of the research due to their low consumption habits and well-established background knowledge of sustainable fashion compared to the younger group.

2.3. Focus group 2 – Views on environmental and sustainability issues

Once the target audience was selected, a new focus group (FG2) with eight participants (six females and two males) was set up to understand in more detail the views of young consumers aged 16 to 18 years old on environmental and sustainability issues. This focus group was more observational in nature and offered a non-influential insight into how the target audience behaves (Crouch and Pearce, 2013). The responses of FG2 were noted, and this was an important step to establish the target audience's attitudes and understanding towards sustainable fashion in more depth, and in particular, the relationship young consumers have with the acquisition, use, care and disposal of fashion.

2.4. Collaborative workshop

A collaborative workshop was conducted where researcher and participants worked together to identify experience, actions, values and views, as well as possible design solutions and directions.

The aim of the workshop was to understand how to better inform and possibly change the attitudes of consumers and find ways of promoting and sharing fashion sustainability issues. The objective was to define and generate design ideas for a product and possible promotional tools to communicate and engage young consumers on the impacts the fashion industry has on the environment. In action research, this is also seen as a goal for improving design and initiating change (Crouch and Pearce, 2013).

The workshop structure followed a step-by-step process with distinct phases and reflective practices based on the behavioral sciences and collaborative workshop method used by the Design Council (2013 and 2015) also known as participatory action research (Crouch and Pearce, 2013).

The techniques involved a series of discussions, mind-mapping and design ideation to capture the gap in knowledge of young consumers and explore design issues currently found in the fashion industry and generate design ideas to justify design decisions. To avoid repetition of tables, further details are available in the results section 3.4.

The selected group for the workshop consisted of eight male and eight female art college students aged between 17 and 19 years. The nominated group was selected because of their complementary skills and shared working approaches, which are important when conducting action research (Greenwood and Levin, 2007).

2.5. Focus group 3 – Design development and outcomes

A follow-up focus group (FG3) with a semi-structured approach was conducted, which was more discursive and interactive in nature than the first focus group. This allowed for the extraction of further details of the design processes initiated in the collaborative workshop and for gathering further information on the current design and sampling stages (Dawson, 2013).

Six participants (four female and two male) aged 17 to 18 years were chosen from the previously run workshop which allowed for an easy flow of conversation enabling the researcher to establish initial design features and materials which shaped the direction of the design outcomes.

Following this focus group a review period was used to reflect on the progress of the project and which resources to be utilized, and to select the materials to be used for the design development (Crouch and Pearce, 2013).

2.6. Usability testing

The usability testing was carried out with 3 females and 2 male participants from the previous collaborative workshop to participate in the design proposal for the garment labels. Usability testing is a popular technique for designers to explore, observe and acquire a better understanding of how users interact with designs, and consequently informs researchers of the design amendments needed (Nielsen, 2012; Visoky O'Grady and Visoky O'Grady, 2017).

According to Nielsen (2012), testing 5 users is typically enough to be able to identify the most important usability problems in a design. Usability testing is best carried out during the design development stage to allow researchers to be truly aware of participants' needs and to make important changes to the design output as appropriate. With this in mind, in this study usability testing has been applied during the design development in order to assure valid and reliable design solutions.

2.7. Interviews

The last phase of the research process was to ascertain the validity and success of the design outcomes. Semi-structured interviews were conducted with four participants aged 17 and 18 years old to finalize the design development stage (2 female and 2 male). The interview was of an open-ended nature to allow a conversational approach where the researcher asked questions more freely. The researcher was "as unobtrusive as possible" and took the role of an "active listener", making sure not to influence the participants' responses (Crouch and Pearce, 2013, pp113). This form of interviewing also made it possible to expand on further design opportunities for future development and investigation (Dawson, 2013).

3. Findings, outcomes and analysis

3.1. Literature review

Findings from the first stage of literature review showed that there is a lack of consumer knowledge amongst young consumers and a lack of transparency by fashion brands surrounding sustainable fashion, emphasizing the need for clearer garment labelling (Table 1). Consequently, to achieve changes amongst consumers, in addition to sharing fashion sustainability topics, progressive communication and promotional solutions through fashion branding, marketing and information design were also analyzed.

TABLE 1

Findings from the literature review on current sustainability issues

CURRENT SUSTAINABILITY ISSUES

Literature Review	Analysis & Findings	Sources
Young consumers and the perception of sustainable fashion	• Ethical fashion is not a proirity • A belief that ethical fashion is expensive and un-fashionable • Lack of knowledge of the impacts of fashion on the enviroment from production, usage to disposal	Ethical Fashion Forum (2014), Fletcher, (2008), McNeil and Moore (2015), Bear (2008), More and Went (2004), Thomas (2008), Gwilt and Risannen (2011), Morgan and Britwistle (2009) Scheider (2014), Mintel (2016)
Sustainability within the fashion industry	• Little evidence that ethical issues would change consumer purchasing behaviour • Some retailers have implemented transparency within their businesses	McNeil and Moore (2015), Niinimäki, (2015), MISTRA, (2013), DEFRA, (2008),
Garment labelling	• Garment labels unclear and inconsistent • Campaign on ethical fashion is needed, to make consumers aware of the impacts of fashion on the enviorment	Niinimäki (2010), Clevercare (2014), McLaren (2015), HIS (2015), Fletcher (2008), DEFRA (2008), Thomas (2008), Sherburn (2009)

TABLE 2

Findings from the literature review on information design principles

INFORMATION DESIGN PRINCIPLES (GARMENT LABELS)

Design Principles	Analysis & Findings	Sources
Purpose	The main goal in information design is clarity of communication. The message should be accurately designed, produced and distributed for the audience in question, and then correctly understood by the audience	Lipton (2007), Petterson (2010)
Effectiveness	Communication is not complete until the intended users understand the message. Testing the designs with the audience is important	Petterson (2010), Lipton (2007)
Structure	A clear structure and hierarchy for the content should be developed, and the number of levels in the structure should be limited	Petterson (2010), Waller (2011), Lonsdale (2014)
Legibility	Text printed on paper or displayed on screens should be easy to read, and pictures, colour and layout should be clear and accessible	Lipton (2007), Petterson (2010), Waller (2011), Lonsdale (2014)
Text	The following should be avoided: too small type, too short and too long text line lengths, poor contrast between the text and its background; too many font types; too narrow interlinear spacing; etc.	Petterson (2010), Waller (2011), Lonsdale (2014), Tetlan and Marschalek (2016)
Color	Color can be used to enhance perception of the visual message, but not as decoration, and the number of colors used should be limited	Lipton (2007), Petterson (2010), Tetlan and Marschalek (2016)
Text and image	Text and illustrations/images should be presented in close connection, and labels and captions should be clear	Lipton (2007), Petterson (2010), Waller (2011), Tetlan and Marschalek (2016)
Unity and consistency	Similar elements (color, orientation, shape, size, texture, etc.) should be used to show that objects belong together, and the amount of space around elements should be consistent and reflect their relationships	Lipton (2007), Petterson (2010), Waller (2011), Tetlan and Marschalek (2016)
Content	Content should be useful and meaningful	Lipton (2007), Petterson (2010)
Aesthetics	An aesthetically pleasing message is more efficient and more effective and can create a good first impression	Petterson (2010), Waller (2011)
Attention	Information can hold the viewer's attention when: a) clear and distinct typography is used; b) the rhythm, layout, and pace are not predictable nor too boring; c) only a limited number of information elements are shown at the same time	Petterson (2010), Tetlan and Marschalek (2016)
Recall	Typographic cues (underlining, bold and color) can help readers understand and recall information, but must not be over-used	Waller (2011), Lonsdale (2014)

Findings from the second stage of the literature review relating to principles of information design have been compiled in Table 2 and are further referred to throughout the design development as described in the sections below.

3.2. Focus group 1A and 1B

This initial study established a clearer understanding of consumers' basic knowledge and their attitudes toward sustainability.

In FG1A (26 – 65-year old earning an income and with their own properties), all participants were aware of sustainable issues and had bought organic and Fairtrade food in the past. However, they felt that with the current economic climate they could not always afford to buy organic food. All participants purchased clothes from known high-street retailers and felt that they could trust these retailers with their manufacturing and ethical statements. However, only one participant in FG1A admitted to purchasing clothes at a low-cost retailer. All participants in FG1A were aware of recycling and how to dispose of clothes, most of them passing on their unwanted goods to family members or charity shops.

In FG1B (16 – 23-year-old students living with parents/guardian and with a part-time job to support their expenses and travel costs), the response to the question on sustainability differed from FG1A. When asked what sustainability meant to them, none of the participants could give a definite answer. With regard to their knowledge of organic or Fairtrade items, only one of the participants responded confidently.

Further discrepancies were found when comparing responses between FG1A and FG1B related to the disposal of items (Table 3). Five out of eight participants in FG1B admitted to throwing unwanted clothes in the bin. Their justification for this was that the clothes "were cheap and not worth much". In contrast to this, participants showed real concern when buying Fairtrade and organic food. It appeared that all participants in FG1B had a clear understanding on this matter and commented that they would "never eat eggs unless they are clearly marked as being free range". These findings show similar conclusions from previous research findings carried out by Shaw and Riach (2011), which revealed that consumers showing interest in Fairtrade and ethical issues will not necessarily make sustainable clothing purchasing choices.

TABLE 3

Responses from the Preliminary Participant Selection sessions

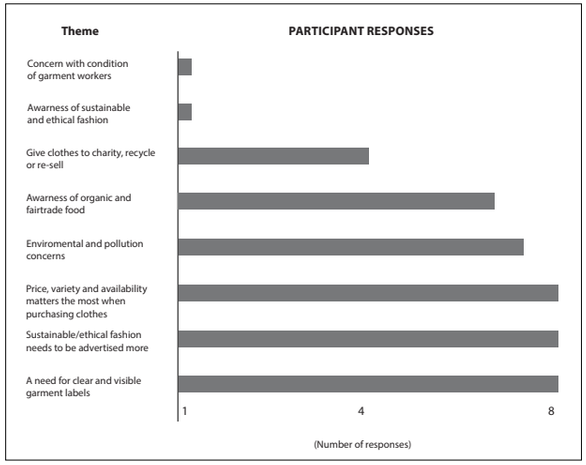
PRELIMINARY PARTICIPANT SELECTION FINDINGS	
FG1-A (26 – 65-year old)	**FG1-B** (16 – 23-year old)
• Concerned with ethical issues • Aware of some ethical options • Knowledge of washing instructions on garment labels • Limited knowledge of where to buy ethical fashion • Believes that ethical fashion is expensive • Give unwanted clothing to chariry or family members	• Not concerned with ethical issues • Limited awarness of ethical issues • Some have thrown unwanted clothes in the bin • Limited understanding of washing instructions on garment labels • Used to online services for shopping and don't watch television often • Use social media to communicate and gather information • Some awarness of recycling options and give old clothes to charity or family members

3.3. Focus group 2

Although six out of the eight participants showed awareness of organic food, the findings confirmed that there is an apparent lack of understanding of sustainable issues related to fashion, as none of the participants were concerned or aware of ethical issues within the fashion industry. The findings also showed areas in which the participants felt that fashion brands needed to improve their communication with consumers. Participants also felt that there was a lack of advertising and garment information within stores and social media in terms of material, care and disposal of clothing. This observational exercise had an impact on the research in terms of deciding which area to focus on for this research study. It transpired that young consumers aged 16 to 18 years, in particular, would benefit the most from information or educational outputs surrounding the environmental impacts of the fashion industry. See the responses in *Figure 3*.

FIGURE 3

Focus group 1 responses



3.4. Collaborative workshop

The first step was to establish the participants' background knowledge of sustainable fashion. The workshop ran for 1 hour and 30 minutes and, as already mentioned, the order was planned through a collaborative workshop method used by the Design Council (2013). The workshop order is shown in Table 4 where the steps of the workshop plan are listed, together with the corresponding action taken by participants and the workshop outcomes.

At the beginning of the workshop participants' basic knowledge about sustainable fashion was limited. Only after a discussion and viewing a short 2-minute documentary of "The True Cost" (2016), did participants finally have the basic knowledge to carry on with the workshop.

The findings of the collaborative workshop support previous research showing that although some consumers might have an awareness of what organic fashion means, the specifics of what sustainability, ethical, Fairtrade or eco mean remain confusing (DEFRA, 2008). The design ideation activity showed that young consumers like to engage with technology,

TABLE 4

Collaborative Workshop structure

COLLABORATIVE WORKSHOP

Collaborative Workshop Plan	Action taken by participants	Workshop outcome
1. Establish the problem	Describe what sustainable/ethical fashion means	Limited knowledge
2. Understand the issues	Discussion on sustainable fashion	Lack of awareness
3. Watch documentary	Watch short film and discuss thoughts	Participants shocked and not aware of the issues
4. Discussion	Discuss new knowledge	Participants understanding and taking it on board
5. Mind map	What does sustainable fashion mean to you now	Participants show awareness and interest
6. Vote for an area to work on	Participants work in groups	Main themes: sustainability and child labour
7. Create a persona	Participants create a persona they are going to design for	All chose a young person as feel these are the people who need most information
8. Vote again	Present to the group	Participants sharing new knowledge
9. Refine	Discuss how to solve the problem	Participants evaluate and discuss their ideas
10. Create the idea	Use paper, pen, scissors	Create ideas on how to promote sustainable fashion with posters
11. Present	Present the big idea to the whole group	Young people need more information and they mostly communicate on phones
12. Improve	Ideas are improved	Social media campaigns and advertising as a medium of communication
13. Evaluate	Discussion and future plans	Ethical fashion needs to be discussed on platforms young people access
14. Discussion	More information is needed to inform consumers	Label on garments need to be clearer. QR codes need to work correctly and efficiently

share information on social media and that garment labels are not informative enough. This therefore reinforces the lack of knowledge among young consumers and the need to be informed and educated about these issues. This supports the decision, as previously noted, to focus the research on this age group and develop informative garment labels with technological outcomes to be shared on social media.

3.5. Focus group 3

FG3 was a follow-up from the collaborative workshop and offered an opportunity to share initial findings and develop more design ideas with the participants. Therefore, the first part of the focus group was a review of the collaborative workshop. This allowed for an examination of how much information shared in the previous workshop had been retained and reflected on by the participants. Results showed that all participants had retained information from the workshop and said they were now actively involved in some way or another with sustainable fashion. As a result of the collaborative workshop the participants were now able to:

- Understand what sustainable/ethical fashion means.
- Make educated decisions when purchasing fashion.
- Share their knowledge with friends and family members.
- Develop further interest in this area.

Although participants admitted that they would continue purchasing clothes from high-street retailers, they also mentioned that, due to the knowledge they had acquired from the workshop, they would be able to make better purchasing choices asking themselves if they really need the item rather than just buying it because they want it. These findings generated ideas to develop the design project and especially showed that education and information sharing is an essential part of changing consumers' perception on fashion consumption.

3.6. Usability testing

3.6.1. Design ideation and development

The design outputs were developed through extensively researching the fashion industry, in particular, high street retailers and their branding and communication approaches to promote ethical issues and the responses gathered from the primary research.

The design development was broken up into three stages. Firstly, the concept for the label and packaging was developed, followed by the design of a T-shirt and lastly the communication pathway which involved the creation of a QR code, a landing page acting as a website and a video.

This investigation into labels and packaging emphasized the colors and type choices that fashion brands select to create brand awareness. Eco brands such as Patagonia, Kowtow, People Tree and Eileen Fisher were also investigated to draw up a comparison with the high-street counterparts. As a result, the high-street retailers offering organic options had labels with green backgrounds and socio-emotional messages.

On the other hand, garment labels from eco brands were simple in design and some displayed humor to draw in the consumer. Therefore, color can be used to enhance perception of the visual message, but not as decoration, and the number of colors used should be limited (Lipton, 2007; Petterson, 2010; Tetlan and Marschalek, 2016).

The main goal of the design was to achieve clarity of communication making sure the text, illustration, images, message and label were accurately designed, produced and presented, and then correctly understood by the audience in question (Lipton, 2007; Petterson, 2010, Waller, 2011; Tetlan and Marschalek, 2016).

Further information design principles were followed, such

as creating a clear structure and hierarchy for the content and limiting the number of levels in the content structure (Petterson, 2010, Waller, 2011; Lonsdale, 2014). To achieve a sense of communication with young consumers through a brand it was vital to link a fashionable product with targeted consumers. This was achieved by creating the "Do I Care?" brand and generating a three-way pathway of product to website to social media options. In addition to this, a packaging concept was introduced to the participants to gain feedback and share ideas. The last item shown was a video to be utilized as a communication tool with consumers through social media. The findings of these are shown below.

3.6.2. Garment Label

The participants were shown a selection of garment label samples where they commented on the size, color, overall look and feel of the label. The garment labels were developed from the responses generated from the interviews and collaborative workshop findings and following good principles of information and typographic design as defined by Lipton (2007), Petterson (2010), Waller (2011), Lonsdale (2014), and Tetlan and Marschalek (2016). These include: structure, layout, legibility, text, color, relationship between text and image, unity and consistency, aesthetics,

A further label was shown which included a QR code. Participants were asked to comment on the readability, understanding and functionality of the QR code. They considered the inclusion of the QR code on the label important, but thought it was vital that it worked on their mobile phones, as many QR codes found in garments do not work especially well after washing.

In addition to this, a packaging concept was introduced to the participants to gain feedback and share ideas. The last item shown was a video to be utilized as a communication tool with consumers through social media. The findings of these are shown below.

The findings showed that overall the illustrations, fonts and simplicity of the labels were considered good, relevant and legible. However, the size of the garment label at this stage was too large and all participants said that they would cut it off once they had purchased the T-shirt. In conclusion, although the design of the label responded to good principles of design and communicated the message, it did not have a practical outcome (Pettersson, 2002).

In alignment with information design principles and sustainable standards, participants chose the labels that were simple and minimal in design, and with clear instructions. The label was re-designed to address these issues, as shown below.

3.6.3. T-shirt and packaging

As the participants commented on the importance of appearance, price and quality when purchasing fashion, a white T-shirt with a slogan was selected as the fashion item to carry the garment label. A white T-shirt is also a timeless fashion item that can be made of eco-friendly materials and known in

fashion history to impart messages and statements that can be worn by male and females which are all important factors when creating sustainable fashion. Furthermore, an aesthetically pleasing message is more efficient and more effective, and can create a good first impression (Petterson, 2010; Waller, 2011).

The outcome and feedback from the interview were positive. To begin with, the participants felt that the T-shirt was well designed, and the chosen brand was tasteful.

A packaging concept for the white T-shirt was also introduced. An important consideration when creating sustainable products is the use of materials. Manufacturing procedures, particularly in the textile industry, can cause water pollution and environmental effects. The environmental impact when choosing materials for sustainable items is therefore a vital factor to consider (Mackenzie, 1991). Assessing the material choices and their impact on the environment throughout their use and taking into consideration the fact that all materials could be recycled and have biodegradable advantages, was vital in the process of the creation of this project. The responses from the focus group gave input to the selection for the T-shirt print and the choice of T-shirt material, which was made from 100% organic cotton with minimal ink impact for the print (*Figure 4* and *5*).

FIGURE 4

FIGURE 5

T-shirt with minimal ink impact (front and back, respectively)

To produce a sustainable outcome for the packaging, eco packaging was researched to gather inspiration and, to follow sustainable standards 100% recyclable card was chosen.

Although participants were positive towards the initial packaging idea, they thought the design could benefit from additional features to create a diverse brand experience for the consumer (Hess and Pasztorek, 2010). However, the choice of material for the packaging created initial concerns for the printing process. The heavy card choice could only be screen-printed to achieve a high print standard. The type font had to be adjusted several times to achieve a good quality and readable print, and to make the pictures, color and layout clear and accessible (Lipton, 2007; Petterson, 2010; Waller, 2011; Lonsdale, 2014).

The packaging was consequently redesigned to become a reusable item to achieve long- lasting visual brand awareness and to replace plastic packaging and unnecessary waste.

Once the packaging was tested on standard recyclable card the final product was cut with a laser cutter to produce a clean cutting line. This process had to be repeated several times to achieve the exact measurements required to be able to wrap the packaging around the T-shirt and then for it to be reused as a coat hanger to hang the T-shirt (*Figure 6* and *7*). All in all, the packaging had a successful outcome and participants mentioned that it could be a good reason to purchase the product and at the same time replace plastic hangers.

FIGURE 6

FIGURE 7

Packaging re-design (folded and hanged, respectively)

3.6.4. Video

The video's purpose was to be utilized as a communication tool with consumers through social media, since this was something that was raised several times in the previous research stages.

At this stage, four existing videos taken from YouTube channels were shown to participants. The videos were all different in terms of content and length, and the participants' comments were that videos need to be short and informative with no animation or comic characters as these would not be taken seriously by the viewers. These findings from the focus group generated further design ideas and were vital for the next stages of development of the design project.

A video was created and went through several modifications making sure that the text displayed on screens was easy to read, and that pictures, color and layout were clear and accessible (Lipton, 2007; Petterson, 2010; Waller, 2011; Lonsdale, 2014). Furthermore, following participants' feedback, the storyline was kept simple and consistent with the rest of the brand, making sure that the information held the viewer's attention when: a) clear and distinct typography was used; b) the rhythm, layout, and pace were not predictable nor too boring; c) only a limited number of information elements were shown at the same time (Petterson, 2010; Tetlan and Marschalek, 2016). For this reason, simple images with clear messages were displayed and, most importantly, some simple advice on how consumers can make small changes to make a difference to the environment was included.

3.6.5. QR code, video and landing page

The final garment label was printed with the QR code, which was created with an online provider. A landing page was also created.

Once the video and landing page were assessed with participants and seemed to be satisfactory, all three elements were linked so they could be accessed via the QR code. The QR code was printed on the packaging and garment label (*Figure 8*), which could be scanned with a mobile phone to take consumers directly to the landing page/website and video (Figure 9). Communication is not complete until the intended users understand the message, so that testing the designs with the audience is important (Petterson, 2010; Lipton, 2007). Once the landing page was tested and activated, the video could be shared through social media or other devices to make sure the "Do I Care?" information strategy achieved maximum exposure.

3.7. Interview

The final interview conducted with four participants (aged 17 and 18 years old) allowed for final modifications on the design outputs.

The outcome and feedback from the interview were overall very positive. To begin with, participants felt that the T-shirt was well designed, and that the chosen brand was tasteful and fashionable, which is an important factor. The choice of creating a white T-shirt was important

FIGURE 8

Garment label with QR code

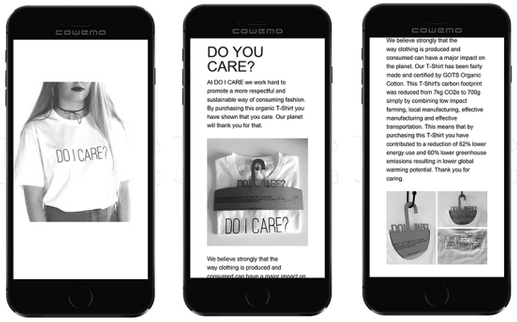


FIGURE 9

Landing page

as it is a unisex item and will not fall out of fashion as it is timeless, which is essential when designing sustainable fashion.

The packaging also had a positive response, with participants mentioning that young consumers would buy the product because of the interesting look and usability of the packaging.

The QR code printed on the garment label worked well from all mobile phones. This was an important factor as mentioned in the previous focus group. The QR code not only helps to link the item to a website, it also reassures consumers that a product is an original and legitimate brand. Therefore, it is vital that a QR code is fully functioning for consumers to experience and embrace the whole product.

Participants were further shown a short video (this time a video developed from scratch and to serve as a companion to the other design outputs), which they found informative, with a good choice of images and text.

4. Conclusion and discussion

This study explored ways of communicating sustainability issues of the fashion industry to young consumers, in order to make a positive impact through information and garment label design approaches.

Previous research findings claim that due to today's marketing strategies of retailers and consumers' engagement with technology, we, as a society have the knowledge base to make sustainable choices (Jalas, 2004). However, the findings of this project reveal an important gap between sustainable fashion offerings and consumer awareness despite all the technological advantages and use of the internet in the UK, one of the most important points being the lack of awareness amongst consumers of the impacts, care and disposal of fashion items (Fletcher, 2008).

The way we grow as individuals and our constant changing taste and appetite for new items affects our values. These constant changes and needs for new things pose a problem for environmental issues. Furthermore, the lack of information and understanding of the meaning and ethics of sustainable fashion support creates confusion amongst consumers, in particular the younger generation (Thomas, 2013). This is problematic because this is the generation that can help shape the future and possibly make considerable changes to society's purchasing habits in the years to come.

The present research study therefore supports the need to educate young consumers and engage them with sustainable fashion. Moreover, this research shows how, once consumers have been educated, they can empower themselves with knowledge and thus change their purchasing behaviors. Thus, for fashion businesses to achieve similar outcomes, greater efforts at transparency and higher levels of communication amongst them and their consumers must be achieved.

The primary research carried out for this study also revealed that impacts on the environment by the fashion industry are not something consumers are aware of or concerned about (e.g. the use of natural resources, water pollution, chemicals used in clothing manufacturing). Thus, such issues need to be shared with consumers to draw attention to the true nature of the problem.

To that end, it seemed important that to communicate and relate effectively with young consumers a brand and a fashionable product that would put the garment label into context, as well as fulfil the target audience's needs and expectations had to be formed. The brand "Do I Care?" was therefore created for this purpose, as well as a T-shirt and respective packaging (both displaying information on sustainable fashion). According to feedback, it also seemed important to include digital companion design outputs that would strengthen the importance of the information on the garment label, as well as entice further the interest of young consumers in information about fashion sustainability. This was achieved through the creation of a QR code that was linked to a landing page/website and a video.

In terms of methodology, the user-centered approach taken during the creation of the design outputs, where participants' input and feedback on materials and final design were considered at all times, was vital for the success of the design solutions here presented. Moreover, such an approach led to further design outputs that were not initially thought of. All in all, this project achieved the aim of educating and informing young people by opening up communication and creating visually engaging information which can be shared with others.

When these issues were discussed and evidenced in the study, the findings showed that by creating short and sharp interactive information the basic knowledge of consumers increases. This validated the research findings and confirmed that with the creation of mediums such as video and social media promotions, designed appropriately for the target audience, they can indeed change consumers' purchasing perceptions

(future research could be conducted to further validate the issues raised in this paper with a wider group of potential users, and feedback could also be gathered from retailers).

The final decision, however, lies with the consumer. Firstly, before embarking on a decision to purchase sustainable items, consumers must break existing habits and embrace the meaning of sustainable fashion. Therefore, to be able to achieve this, a knowledge base and the creation of sources of information to increase that knowledge, for young consumers in particular, where ethical and sustainable fashion is concerned, is crucial. Only then will we be able to make the correct purchasing decisions. In other words, as the political T-shirt designer from the 1960's Katharine Hamnett once said; a successful T-shirt has to make you think but then, crucially, you have to act.

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Authors

Ana Perez

anaperezemail@gmail.com

Ana Perez is a Lecturer in Fashion and Fashion Communication at Harrogate College and visiting Lecturer at Leeds Arts University, UK. She obtained her MA Design in 2017 from the School of Design at the University of Leeds, UK. Her research focuses on the responses of young consumers on sustainable fashion utilising collaborative methods to broaden awareness of ethical issues and cerate discussions and interaction through design solutions.

Maria dos Santos Lonsdale

Dr. Maria dos Santos Lonsdale is a Lecturer in Design at the School of Design, University of Leeds, UK. She received her PhD in 2006 from the Department of Typography and Graphic Communication, University of Reading, UK. She has experience of teaching design theory, design practice and research methods for Design in higher education. Her main areas of research are Information, Instructional, Typographic and Graphic Design, with specific interest in Design for Reading, Design for Learning, Design for Security and Design for Healthcare. Her research is notable in the field of Design, as it involves user-centered research methods and experimental studies to test design solutions to particular problems encountered in real-life contexts (further supported by qualitative methods).

Designing on Ntaria Country: *telling stories with new tools*

Nicola St John

Indigenous creative expressions are ingrained with knowledge, through an inherited visual language of signs and symbols learnt from within culture, grounded in country and identity. The power and strength of this knowledge remains embedded across diverse creative mediums, contemporary tools and technologies. Yet the application of digital drawing within remote Indigenous contexts remains largely unexplored. This research sought to understand a Western Arrernte perspective of digital drawing, through examining the digital creative outcomes of Indigenous youth from Ntaria – a remote community located on Western Arrernte Country in the Central Desert of Australia. Reported here, are findings on the students' use and understanding of these new tools as they moved from analogue to digital drawing for the first time. Introducing design tools to young adults from Ntaria enabled an exploration of digital drawing as a vehicle to develop 'designerly styles' as they re-imagined drawing in a digital way. What emerged from this project was a space for young adults from Ntaria to express their identity and give voice to their contemporary experiences. Ntaria 'designerly styles' are embedded within Western Arrernte cultural practice and reaffirm traditional visual language within a digital landscape. Results further reveal digital drawing can engage and foster the development of design-based creative practices for young people living in remote contexts, as well as longer-term economic and enterprise opportunities.

Background and Rationale

Introduction

Indigenous[1] knowledge and culture is a rich living entity, one that has, and continues to evolve through creative applications. Designs, patterns, and stories take many forms that are reinforced and replicated through traditional ritual, dance, song, body painting, rock engravings and sand drawing - some of the oldest ongoing traditions of art in the world (Morphy, 1998). Contemporary mediums and formats, notably watercolour and acrylic painting, radio, film and new media, have again reinforced cultural and spiritual practice. The integration of these new creative tools, technologies and mediums emphasizes that Indigenous culture, despite significant diversity and change, is simultaneously connected to the past while being engaged with the present (NGA, 2018). The ongoing engagement with new creative mediums within Indigenous communities, documents the development and ownership of creative process and practice that has ensured the longevity and relevance of diverse Indigenous culture into the future (Strehlow 1956; Bardon 1999). New practices emerging from these introduced creative tools have also become sites of agency, resistance and expressions of self-determination for Indigenous people (Eglash, 2004; Verran & Christie, 2007). This research seeks to explore if another creative tool can continue the rich legacy of Indigenous creative production in remote Australia, focusing on a digital drawing tool within the field of communication design.

This research is situated within the discipline of communication design, as a 'visible part of the ongoing living narrative of culture' (Woodward 2008) it offers an approach for inquiry that places cultural, social and aesthetic aspects of design at the center of expressions of communication and storytelling practices. This approach allows us to unpack how young adults from Ntaria understand and utilize digital drawing. As different cultures will have different understandings and cultural representations of design, so too will their appropriation and integration of a design tool. This paper is focused on utilising vector graphics as a digital drawing tool. Vectors are composed of a number of basic geometric objects such as points, lines, shapes, and polygons and can specify, in a resolution-independent fashion, a wide variety of content. Vector graphic applications support the continuous building and changes of files, allowing for distinctive creative possibilities. Their relatively small file size additionally allows for digital transfer across often slow and unpredictable Internet connections within remote Australia. There is currently little knowledge on the use and application of digital drawing within remote Indigenous contexts (Ginsburg, 2008).

1 The 2017 AIATSIS Ethical Publishing guidelines suggest that 'the term 'Indigenous' can be used to encompass both Aboriginal people and Torres Strait Islander people, though preferably not for one or the other when it is known which group is being spoken about'. It is used in this paper where it is possible but not necessary that both Aboriginal and/or Torres Strait Islander people are referred to. As the study site is located in a remote area of Central Australia, those referred to in the study are 'Aboriginal' Western Arrernte people.

Additionally, there is scant information on how young people in remote Australia are shaping the creative, cultural and communication uses of new tools and technologies (Kral, 2011).

Within other colonial spaces, there are a growing number of scholars exploring different cultural understandings of communication design. From North America, Sadie Red Wing, a graphic designer and member of the Lakota Tribe advocates for native designers to practice 'visual sovereignty' in their work by using the visual language that is unique to their specific cultural heritage (Anderson, 2017). In Zimbabwe, Saki Mafundikwa's research seeks to rediscover the visual language of Afrikan iconography (2006). From a South African context, Piers Carey addresses ways that communication design colludes in a process of marginalization of Indigenous people (Carey 2011). Within Australia, Indigenous academics such as Norm Sheehan advocate for 'respectful design' as a way of working with Indigenous knowledge within the design industry (Sheehan, 2011). While influenced by the developing decolonising dialogue both internationally and nationally, this research looks specifically at Western Arrernte representations of design, giving voice to Ntaria understandings and ways of working.

The Australian design industry has historically had limited understanding and lacked influence from the important creative source of Indigenous people. Through looking at the practice of design through the lens of young adults from Ntaria, we can reframe the 'act' of designing in relation to Indigenous ways of being, knowing and doing (Martin, 2003). Additionally, understanding a Western Arrernte approach to design could work to challenge current Euro-centric understandings of how digital drawing tools are introduced, and communication design is taught. Within Ntaria School, there has been a distinct absence of any design education or training, which is mirrored throughout many remote communities. A Western Arrernte approach to communication design education is explored here, through the introduction of digital drawing to young adults in Ntaria. It is hoped these voices from Ntaria can contribute to, and highlight the value of, communication design tools and educational programs being integrated into more school curricula across remote Australia.

Ntaria: People, Place & Culture

The remote Indigenous community of Hermannsburg, known locally as Ntaria, was the physical location of this study. Ntaria is located on the traditional country of the Western Arrernte people, an Aboriginal tribe of Central Australia, believed to have been living on their lands for more than 20,000 years. To try and do justice to this place and its people, a brief history of Ntaria, as well as common factors affecting young people are described below - providing a necessary context for the research. It is also important to acknowledge Western Arrernte history and experience is not static, it is ever present, changing and adapting to contemporary realities.

The Western Arrernte people were forced to transition from a hunter-gatherer society to a local economy centred on a German Lutherman Mission, following European invasion in 1877 (Austin-Broos, 2009). The

violence, dispossession and transition of Ntaria history, has entrenched many of the Arrernte as a fourth world group. This marginalization from wider Australia reinforces experiences of not just cultural difference but also unequal and disparagement within Australian society (Sutton, 2001).

There is also an extensive history of creative practice in Ntaria. The introduction of new tools and technologies have allowed for new modes of expression and a means to express these tensions and changes to social and economic life. The introduction of watercolour painting, acrylic paint, canvas and pottery have allowed the Western Arrernte, 'to reconstruct their evolving identity in positive ways' (West, 1996). The success of the Hermannsburg Watercolour movement and the Hermannsburg Potters is testament to the ongoing cultural practices, economic and community development generated from creative industries.

As this study is set within a school context, it is also imperative to note common social circumstances for Indigenous youth. Young Indigenous people increasingly experience educational and behavioural difficulties. As rising statistics show, this tension and conflict manifests in anti-social behaviour, rising teenage pregnancy, substance abuse and high levels of risky behaviours and violence, poor school attendance, low retention rates and uneven levels of English literacy and numeracy (Eickelkamp, 2011).

Indigenous youth are keen consumers of global youth culture, and now act as intermediaries between old knowledge and new sites of cultural production, particularly through digital technologies. While researchers have explored 'youth media' in remote Indigenous contexts, there is little information on how Indigenous youth are shaping the creative, cultural and communication uses of digital drawing tools (Ginsburg, 2008; Wilson and Stewart, 2008). Research has also predominately focused on the barriers Indigenous people face in mainstream society (Heath and Street 2008). This project seeks to reposition the focus on marginalisation and difficulties and instead look towards understanding opportunities, in this instance, through the use and application of digital drawing.

Ntaria School is classified as a 'remote school' within the Northern Territory and is guided by both state-based and national curriculum. Within the senior years, this is based within the Northern Territory Certificate of Education and Training, which focuses on foundational English literacy and numeracy and an employment pathways program, to provide vocational education and training to students. Although there are no specific art or design programs currently taught within the senior years at Ntaria School, students undertake creative programs through Aboriginal-run art centres and learn watercolour painting and pottery, taught by local Western Arrernte artists. Therefore, the teaching methods between learning English language and numeracy (from non-Indigenous teachers often utilising English as an additional language pedagogies) verses Western Arrernte creative practice (often taught by family members in Western Arrernte language) are considerably different. Introducing digital drawing within Ntaria School therefore needs to recognise that Ntaria students continue to learn in and through their own language and culture, while acknowledging the design workshops are located within a formal educational setting.

Vector Graphics as design tool

The use and application of acrylic painting, new media, radio and film have been defining moments within Indigenous creative production, reinforcing and re-creating new ways to express cultural and spiritual practice. This research is concerned with the use and application of a communication design tool, specifically exploring vector graphics. Scant attention is given specifically to vector graphics within design research, although they are one of the most prevalent, and versatile forms of visual representation. Most literature on vector graphics assume the reader has prior knowledge of the technology needed in order to create digital graphics, and provide little direction on how to use the tools specifically (Harris & Withrow, 2008; Ganovelli et al. 2014; Glitschka, 2010; Elmansy, 2012).

Digital drawing is the foundational knowledge necessary for design, as vector graphics can relate to a wide range of styles, techniques and technical design professions - communication design, product/industrial design and digital media design for example (Glitschka, 2010; Elmansy, 2012). The use of these design tools within remote Indigenous contexts presents more complex layers of cultural and social understandings. How will Ntaria youth make sense of this tool, mediated through Western Arrernte ways of being, knowing and doing?

Research approach

Research questions

The study from which this article is derived sought to understand how Western Arrente young adults imagine and apply vector graphics within a remote desert community.

The following research questions guided this study:

— 1. How do young adults from Ntaria integrate or imagine digital drawing – specifically vector tools - within their contemporary creative practices?

— 2. Can the tools of communication design produce 'designerly' styles amongst young adults from Ntaria?

Methodological Framework

Research within an Indigenous community should be carried out in a manner, which is respectful and ethically sound from a range of Indigenous perspectives. Therefore, the methodological framework is centered from a decolonizing approach; necessary within Indigenous research given the existing social inequities that Indigenous peoples continue to experience. As a non-Indigenous researcher working within an Indigenous community, I needed to ensure the project did more than just follow ethical principles

and guidelines, but that I become a collaborator in projects and processes that respect and promote the aspirations of the young adults from Ntaria involved in the project.

Indigenous methodological frameworks recognise that knowledges are "socially situated, partial and grounded in subjectivities and experiences of everyday life" (Moreton-Robinson & Walter, 2009, p.2). This requires a reinterpretation of traditional Western methodologies and the development of ways of conducting research that are based on Indigenous ways of knowing, being and doing.

From a design perspective, collaborative, participatory and action-based research methodologies are generally identified as being compatible with the goals and emerging reform agenda for research involving Indigenous peoples (Smith 2013; Denzin 1989; Martin, 2003; Nakata, 2011). These approaches, particularly participatory action, are well suited to creative research that requires ongoing participation, collaboration and reflection. As Denzin describes, 'These are narrative, performative methodologies, research practices that are reflexively consequential, ethical, critical, respectful, and humble' (Denzin in Denzin, Lincoln & Smith 2008, p.936).

Through there are many approaches to design and participatory research that could have been used to address the complex methodological realities of this project, Youth Participatory Action Research (YPAR) was chosen. This approach values the voices and knowledge of youth, challenges the injustices that many marginalized youth experience, and empowers participants to make changes in their communities (Cammarota & Fine, 2008). YPAR recognizes that young people are often socially constructed in ways that do not match their realities or potential. It allows young people to 'contest, challenge, respond to, and negotiate the use and misuse of power in their lives' (Ginwright & James, 2002, p.35). Research is therefore conducted with youth; around the issues they find most important in their lives.

This positioning was embedded within an Indigenous pedagogical framework (Yunkaporta, 2009) and how this can be applied to communication design teaching and learning within a remote Indigenous community. The eight-way Aboriginal pedagogy framework (Yunkaporta, 2009) was created to assist teachers in coming to Indigenous knowledge and using it in the classroom. It comprises eight interconnected pedagogies that see teaching and learning as fundamentally holistic, non-linear, visual, kinaesthetic, social and contextualised. The framework involves 'repetition and returning to concepts for deeper understanding' (Yunkaporta, 2009). The creative process, and its inherent reflective nature sits well within an Indigenous pedagogical frame, and lends itself well to a visual approach to learning, through story-sharing, symbols and images. Research Methods: The Ntaria approach

Aware of Indigenous calls for research to be useful and for researchers to be accountable to Indigenous peoples (Bishop, 2005; Marker, 2003; Smith, 2013; Wilson, 2001), the research project was developed in consultation with Ntaria School and the student participants over many months and community visits. This time also allowed me (as the researcher) to become 'known' to the students and allowed space for me to understand the interests of the participants and integrate this into the research. Participants shared their experiences and stories with me only after we became more 'relatable' to each other, through building relationships, spending time and feeling comfortable. The more time I spent, what things were shared and how it was shared further changed and developed.

Design workshops (Martin & Hanington, 2012) were held with 20 Senior Students at Ntaria School, aged 14-18 over a period of 9 months. With the uncertainty of community life and important cultural events, the project molded to fit within its context and the circumstances at Ntaria. This long time frame was critical to give the students the space, freedom and time to explore, learn, collaborate and share their knowledge.

Prior to the workshops beginning, students were asked to share any creative work with the group. It was important to know what kind of drawing and creative expressions participants made before their design workshop experience. This also enabled the comparison of any 'designerly' styles. The comparison, between the aesthetics and outcomes of the students' previous creative work, were conducted through a visual analysis and supported by observations and interviews.

Students were introduced to working with vector graphics predominantly on iPads, utilizing the Adobe range of tablet apps. Students began drawing pencil/marker on paper and used a variety of ways to transfer these images to a digital interface. Apple pencils were also used as a drawing tool on the iPads. Students had previously used the iPads within classroom activities (predominately through literacy and numeracy educational apps, taking photos and short videos), but had not engaged with digital drawing, design or vector graphics.

The workshops were participatory and explorative, usually focused on completing a design task while ensuring work was embedded within local knowledge and storytelling practices. Sessions were often taken out of the classroom, to gather materials such as local plants, and capture colour palettes from the local landscape. These outdoor sessions also had the tendency to turn into 'bush trips': long walks collecting bush foods, sharing stories of being on Country, often many kms in the School 'troopy' or 4WD bus. Perhaps an excuse to get out of the classroom, these adventures instilled a sense of quiet and calm amongst students, having space to think about the meaning and relevance of the signs and symbols they used in their design work and how they related to their contemporary lives. These trips also broke down barriers of teacher/student or researcher/participant and allowed me to become more relatable. This time, not designing, but walking, being, thinking was imperative to the project, my role within it, and the subsequent stories that were shared.

Data Analysis

Two levels of analysis were undertaken to explore the students understanding of digital drawing and development of 'designerly' styles. The participants were involved in different ways in all levels of the analysis. This is not

uncommon in qualitative research or with research with differing language and cross-cultural understandings, as 'the interviewer is understood to work with the respondent in flexible collaboration to identify and interpret the relevant meanings that are used to make sense of the topic' (Reid & Flowes, 2005, p. 122).

A thematic analysis (Clarke & Braun, 2013) was first undertaken, through which key visual concepts (such as the use of traditional symbols and icons, and the non-traditional use of shapes and colours) from the students' design work were identified and compared to narrative concepts (such as storytelling practices, student understandings and perceptions of identity and wellbeing), based on repetitive patterns, themes and ideas. While some scholars debate the validity of visual research as lacking scientific rigour and credibility, Hewson (1991) argues that despite its complexity, much can be gained from the interpretation of visual material. Knowles and Sweetman (2004, p. 7) maintain that visual data can "reveal what is hidden in the inner mechanisms of the ordinary and the taken for granted." Alexander (1994) argues that analyzing visual material requires the researcher to possess an understanding of visual language, the culture in which it is generated, and the conventions of the material they are researching to identify and decode meanings.

The second level of thematic analysis was completed by the Ntaria students, which gave important direction to the initial thematic work. This was an important way of ensuring that important themes were not just identified by one non-Indigenous person. This directed the focus of the analysis to the themes that were collectively decided should be the focus and were particularly important in communicating meaning and understandings in a cross-cultural space (Pringle et al. 2011. p. 21). This analysis happened through both casual and planned interactions, but enabled both myself and the students, as a collective, to discover some important insights by allowing time and giving space to think about the work and what it meant.

Defining Western Arrernte 'designerly' styles

The specific purpose of vector graphics within this study, was designing forms of visual communication. To define the Ntaria digital drawings as developing 'designerly' styles, it is necessary to explore a 'designerly' aesthetic within a specific Western Arrernte cultural understanding.

Firstly, it is important to provide a framing for the Ntaria drawings as communication design outcomes. Jorge Frascara's discussion on communication design as an 'activity' defined by its communication purpose, technology used and social impact provides us with an understanding of how the Ntaria digital drawings can be understood and situated as design outcomes utilizing a 'designerly' aesthetic (1988). For Frascara, design should be 'concerned with the efficiency of communication, the technology used for its implementation, and the social impact it effects, in other words, with social responsibility. The need for communicative efficiency is a response to the main reason for the existence of any piece of graphic design: someone has something to communicate to someone else' (1988, p.20).

Frascara's' framing allows us to situate the Ntaria digital drawings, through their communicative purpose, technology used and their social impact firmly as sites of communication design. The purpose of the drawings was to communicate students' cultural knowledge and contemporary identities, being able to share this knowledge through design outcomes using common tools of the discipline.

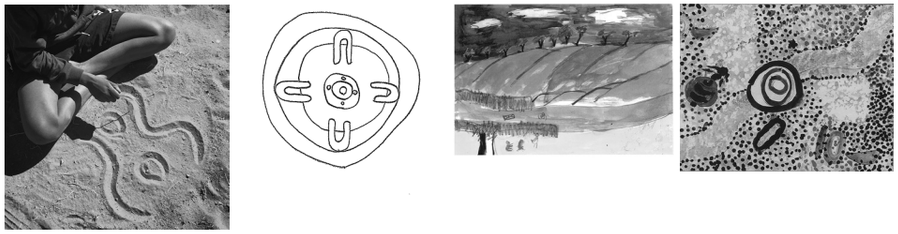
From an aesthetic perspective, a shared definition of a 'designerly' style emerged through the collaborative teaching and learning process with the Ntaria students. Within a Western Arrernte context, a 'designerly' style is understood as one that utilises a design tool (in this instance vector graphics), and produces a different style (use of shape, colour, line, composition, layering etc.) to an analogue drawing or painting (hand drawing, acrylic painting, watercolour painting etc.). The Ntaria students expressed the differentiation of design predominantly through the 'surface' of their digital drawings, as deeper meanings associated with often powerful, ancestral knowledge remained independent of the tool or medium. Additionally, they were positioned as 'designerly' through the 'outcomes' of design, purposely designing t-shirts and posters allowed the students to experiment with contemporary aesthetics and the specific communicative purpose of their outcomes.

Examining 'designerly' styles from a post-colonial lens, Indigenous peoples have been colonized to think that they are artisans and artists, producing artefacts and craft, not designers creating designs (Thomas, 1999; Morphy, 1998). Therefore, defining the Ntaria digital drawings as 'design' is in itself an act of decolonising Euro-centric principles and is an important step in creating more culturally-diverse understanding of communication design (Meggs, 2011).It is expected that working with vector graphics will influence the drawing styles and creative outcomes of the Ntaria students. Drawing in a digital way presents numerous opportunities in creation, adaption and outcomes. Exploring new tools and imagining new digital possibilities introduces students to new ways of working, as they learn and practice drawing with vector graphics.

Results

'With design, you use different shapes': learning design tools

Before the workshop program began, students creative practice centered on sand drawing, hand drawn sketches, watercolour and acrylic painting (*Figure 1*).



A B C D

FIGURE 1

Ntaria students' creative works before the design workshop program began. Their prior creative art education focused primarily on sand drawing (A), pencil drawings (B), watercolour landscape painting (C) and acrylic painting (D). Reoccurring shapes, such as the wavy line, 'U' shape (commonly depicting a person sitting), concentric circles (commonly depicting a meeting place or a waterhole), honey ants (a local bush food), dot painting technique and depictions of landscape are common within a Western Arrernte visual language and depict stories of ancestral creation, hunting, knowledge sharing and local landscapes.

Learning activities within the design workshops focused on vector drawing tools within the Abode Draw and Adobe capture applications on iPads. Activities encouraged students to use a selection process in choosing colour, drawing technique, style and design, which fostered critical thinking and active participation. 'Shapes' were introduced to students as a key design concept, reflected in the Adobe Capture and Adobe Draw software. The 'shapes' provided within the apps: circle, square, triangle, line: although seemingly ubiquitous, were new to the Ntaria students. When drawing by hand, a perfect circle is almost impossible, while the square and triangle are not common shapes within traditional Western Desert visual lexicon. To students, these 'shapes' exist only within these digital interfaces, and they had to learn how to apply them both within a design and a Western Arrernte context. Through exploring the possibilities with drawing digitally, new styles emerged that took advantage of these new digital vector 'shapes' (*Figure 2*).

As students spent more time working with vector shapes and digital brushes, they became aware of the opportunities present within this digital medium, such as the expanded choice of colour, block colouring, layering, and easy shape and colour manipulation. Their hand drawings subsequently changed, as they sketched ideas to recreate within a distinct digital medium (*Figure 3*).

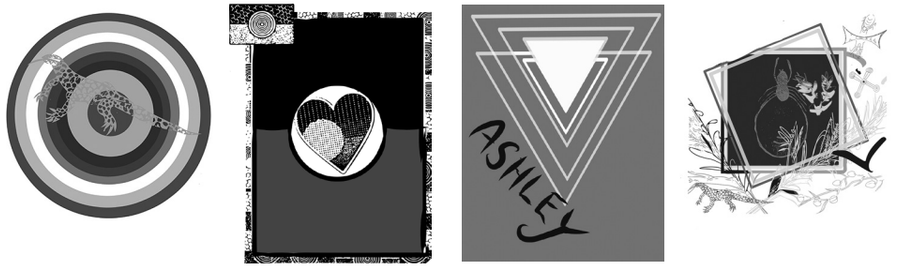
The young adults from Ntaria, described design as allowing you 'to create stuff' as opposed to creating 'art.' Through the design workshops the students 'created' t-shirt designs, which were subsequently digitally printed. These fashionable outcomes enabled students to express themselves within current youth mediums, while experimenting with both traditional and contemporary influences, symbols and styles (*Figure 4*).

— *"Art and design are different, because you can create stuff. The style looks different. Different colours."* (Participant 2)

— *"I like to do designs on the iPad. I like to make shirts or anything. It makes me feel proud. I can put my culture on my t-shirt."* (Participant 3)

Drawing in a digital way, created the freedom for young people to express themselves in their own way, and reveal their lived experiences, influences and identities in contemporary ways.

The transferability of digital drawing skills were also picked up by students:



A B C D

FIGURE 2

Students early experimentations of utilizing new shapes within the Adobe Draw app, including perfect circles (A), squares (B), triangles (C), and vector traced 'shapes' from collected leaves (D), plants (E), hand drawings and photographed hand gestures (F). The use of new 'shapes' are still largely embedded within Western Arrernte iconography, such as the use of local plants and bushfoods. These digital drawings, completed within the first few weeks of the design workshops highlight how the students did not make a total aesthetic departure when working with a new tool, but that new shapes, made possible from working within a digital medium, were integrated within an established cultural and visual language.

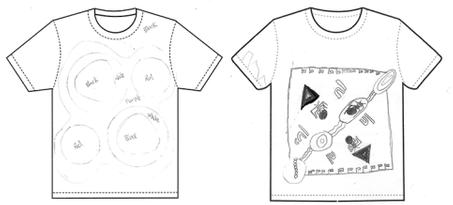
E F

— *"We are all interested in learning to draw new ways on iPad and computers. So we can design graffiti on the streets. So we can design stuff. So I can design stuff for my car, and I can design my car. So we can design clothes and tattoos and stuff."* (Participant 1)

From drawing on an iPad with new shapes and designing t-shirts, students were able to see how these skills could lead to designing their own car. This seemingly large jump, from creating a perfect circle on an iPad to a 3D modelling of a car is testament to the adaptability of vector graphics. More importantly it demonstrates the capabilities of the students as they explore working with digital drawing for the first time. The use of 'design' within their vocabulary is also important to note. While ideas and understandings of art and design often blended together within the workshops, with many students replicating traditional painting on the digital devices, there was an understanding that design was *different* to art. While the students were exposed to the term 'design' as the project was described as a 'design workshop', they were able to adopt 'design' for outcomes outside of classroom activities and outcomes, such as 'designing' tattoos and cars. Their understandings of 'design' evolved through teaching and learning collaborations within the classroom, but also through their own understandings of how 'design' tools and practices could be applied and integrated within their own world.

'It's too hard': user experiences of the pen tool

Transitioning students use of vectors through shapes and brushes on the iPad to working with the pen tool in Illustrator was perhaps an unrealistic



A B

FIGURE 3

Students hand drawings changed and adapted once the possibilities of digital drawing become known and integrated into their practice. Colouring was no longer done by hand (A) and new shapes such as the triangle and square emerged and were integrated within an inherited language of traditional signs and symbols (B).

expectation for students completely new to design and working digitally. Drawing with pencil/paper to Apple pencil/iPad was an intuitive step for most students, yet this did not translate when working with Wacom/laptop or trackpad/laptop. Working in a different design interface with new tools, such as the pen tool, created additional challenges.

The portability of the iPad allowed students to have the device flat on the desk, like a canvas, change orientation, hold it in their lap, change body position, move around the room, or change the distance from their face to device. Designs could easily be shared by holding up the device, or passing it around. Yet working on a computer was fixed, with the distance between trackpad or Wacom and screen so much greater than drawing directly on an iPad screen.

— *"It's harder than drawing with my finger. My fingers easy. But on the laptop it's hard. The lines look different. You have to practice a lot."* (Participant 3)

Students were quick to dismiss the pen tool for the more instant results they were seeing on the iPads. Although both were working in vectors, the more mathematical pen-tool, based in curves, points and paths requires considerable training to master. In addition, the pen-tool involves a process of points and paths to complete a shape. Starting and stopping mid-way through is tricky, especially without considerable technical knowledge and helpful shortcuts. For students, tracing an object with the pen tool was fraught with difficulties, in understanding the nature of curves, learning keyboard shortcuts and being able to easily start and stop. If a mistake was made, it meant having to start again at the beginning.

— *"The hardest part is when you make mistakes. That's the hardest part. Drawing that way. That's hard."* (Participant 4)

The students were proud of the design work they were achieving on the iPad and with the transition to the pen tool not producing as neat or instant results, the students' preference was to continue drawing on the iPad. As they couldn't physically see, nor understand what the benefit of the pen tool was within this context, the general preference was to work with the familiarity of the iPads and work directly finger to screen or with the aid of the Apple pencil.

The benefits of working with vectors are not solely fixed on working with the pen tool. Adobe Draw and Adobe Capture apps allow users to work in a vector format without the need for the mathematically intensive use of the pen tool. Within this remote desert context, the pen tool had little meaning or relevance compared with other digital drawing

A B C

FIGURE 4

Students model their t-shirt designs, printed from their digital drawings. Bold graphic shapes and block colours were now being utilised by students, interweaving their contemporary experiences, such as playing footy (A) and the appropriation of the Aboriginal flag (B). Again, these new influences were located within Western Arrernte visual language, with dot painting techniques being recreated through the iPad and cultural signs and symbols remaining embedded within their designs (C).

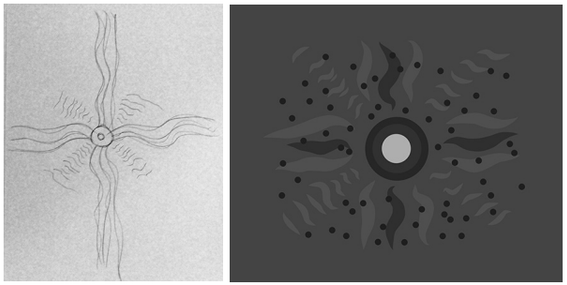
approaches. The students could achieve the aesthetic results they wanted on the iPad surface, without the need of any more advanced techniques. The professionalism of the Illustrator programs on the laptop did not suit the context of use and as such, students maintained a preference to work on the iPads throughout the workshop delivery.

'Design is a little bit different': creating 'designerly styles'

Working with a new creative tool requires making decisions, reasoning, expressing ideas and taking action. Vector graphics acted as a vehicle to explore student's decision making with digital outcomes. Their digital expressions and the way they transfer their knowledge onto a digital medium is a record of the designers' thinking. Students were able to experiment and create 'designerly' styles through the tool kit of the digital medium. The use of flat shapes and blocks of colour enabled new digital styles to develop through the use of vectors, which students often referred to as stylistically 'neat'.

— *"Design is a little bit different. It's a little bit neater. When you paint you use a brush, it's a bit rough … Design is neat for me."* (Participant 2)

These 'neat' lines, shapes and blocks of colour enabled a bold visual style to develop. Examples of the students' digital drawings are shown below, along with their accompanying stories. Through these drawings, 'designerly' styles are emerging, through neat bold applications of colour, smooth line-work, composition, layering, straight lines, perfect circular dots, replicated shapes and contemporary objects, such as footballs and the Aboriginal flag (*Figures 5-7*).



A B

FIGURE 5

Waterhole story, Digital Drawing, 2017. Pencil drawing of waterhole story (A), in comparison to digital interpretation (B). Working within the digital medium allowed this hand drawn sketch to be reinvented as a bold digital drawing. The bright bold colours are a departure from the traditional ochre hues used by students in their previous acrylic paintings. The line work and use of dots conveys a sense of rhythm through its composition and digital brush strokes. The student has recreated the waterhole story to suit the digital medium and made use of shapes, lines and colours available through working with digital tools.

Students were also able to reinforce their cultural identity and knowledge by embedding traditional symbols and signs through digital drawing. In Ntaria, storytelling practices predominately use traditional symbols. For example, a person sitting is drawn by a simple curved U-shape, based on the imprint left by a person sitting cross-legged in the sand. Concentric circles may be a meeting place, camp, a watering hole; a wavy line might be a track, a river or snake. The stories often involve a journey and the combination of story and drawing is required to extract it's meaning. These important signs and symbols, an ongoing traditional based in cultural and spiritual knowledge are being recreated and reinforced within digital drawing practices. Although students are more exposed to global contemporary culture than ever before, the Ntaria students prioritised traditional symbols, which in turn acted to reinforce their distinct cultural identities. The majority of students' designs depict events and stories of ancestral creation and traditional knowledge. Drawing with vectors, allowed a new shape and form of Western Arrente ritual knowledge to emerge (*Figures 8* and *9*).

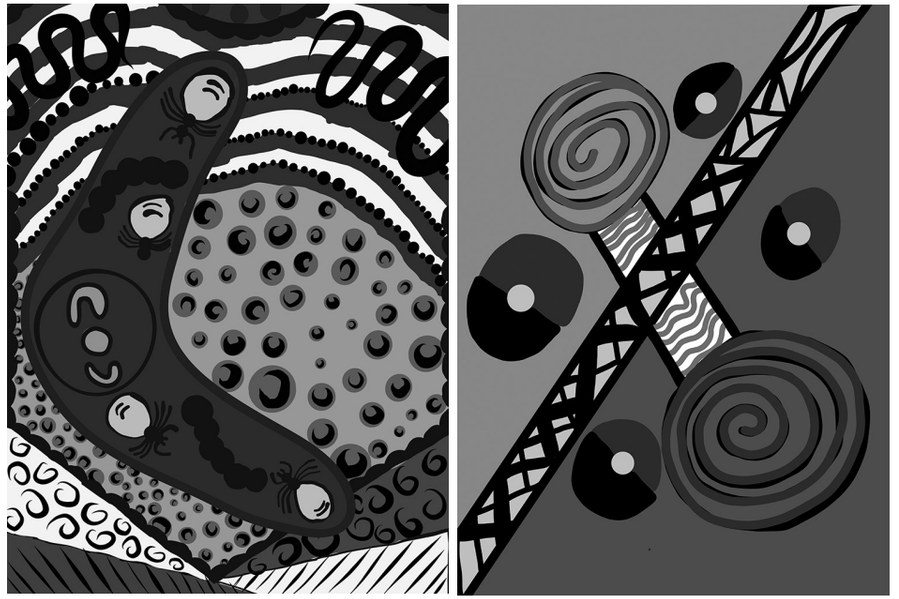
— *"With design, I can make anything. I can tell stories, like sitting around the fire."* (Participant 2)

Drawing with a new digital tool and experimenting with new outcomes meant there was no 'right' way or 'correct' style, with students having to invent what design meant to them within the context of Ntaria. The Ntaria students, while retaining their cultural knowledge, embedded within a rich visual language, were also free to experiment with new aesthetics, influences, and creative practices. The digital drawings gave young adults from Ntaria a voice, having the freedom and creative agency to simultaneously to be able to express their traditional past within their contemporary futures.

Discussion

Implications of tool choice

In response to the first research question, on the Ntaria students understanding of working with vector graphics, what was found was a huge opportunity for students to engage in a new creative practice through digitally mediated mediums. User experiences revealed a preference to work directly on an iPad screen, rather than a Wacom tablet or a track-pad on a laptop. Students preferred drawing in a way where the results were instantly visible, such as drawing directly on an iPad screen. The structure and format of working with the pen tool significantly delayed this instantaneous nature of shape creation and required numerous steps and a complex process. The iPad offered more understandable benefits and a simpler technique for students. Through designing with digital tools, young people are exploring new forms of communication, participation and creative outcomes. It can act as a 'form of empowerment'; giving young people a voice and a new mode of expression (Cammarota & Fine, 2008 p.47).



A B

FIGURE 6

Students continue to express stories of country and Western Arrernte culture and identity through the use of vector-based tools. Digital drawings, 2018. (A) "My design is of different bush tuckers around Ntaria. It's beautiful country. Tjaapa and Yirrampa are Witchetty grubs and Honey ants. When I design I tell stories about my dreaming". (B) "This story is about fishing at the seaside where my mother comes from and telling stories with family. Then when we come back to Ntaria I play footy with the men."

It was clear that the outcomes of the design workshops have potential market currency: students were able to digitally print their design work on a range of materials and sell them within the community. These outcomes also held social currency within the school, as younger students were keen and eager to participate, with older community members interested in what the students were designing, what stories they choose to tell and how it all related back to Ntaria life.

— *"We are learning. Getting new skills. We are designing and making our own things. It's important for people to know our culture. To respect our culture. To respect us."* (Participant 6).

There is increasing dialogue within remote Australian communities around providing alternative solutions through new appropriate tools and new approaches to economic and creative development. There is a desire to develop skills and maintain culture-based creative economies (CAT, Strategic Plan). Communities themselves are now increasingly exploring

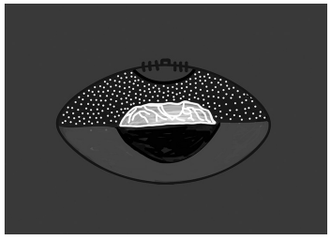


FIGURE 7

Uluru Dreaming, Digital Drawing 2017. "This is a design of Uluru that I used to have a dream about. It's a good place. The red is for the sand, and the sky is full of stars. It is a special place. AFL is also a good sport to me - I like to play. I drew this because I was thinking of my dream."

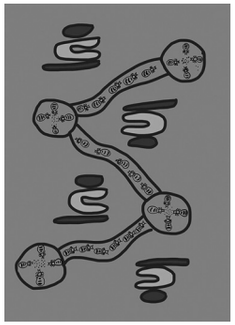


FIGURE 8

Honey Ant Story, Digital Drawing, 2017 "This is a design of people sitting down digging for honey ants. The ants are going to their houses and finding which place they are going to camp. Honey ants are important because they are good bush tucker. They are good to eat!"

FIGURE 9

Bush Tucker Story, Digital Drawing, 2017. "My favourite things to do are sharing stories, going hunting, looking for bush tuckers. My ideas come from the bush. From going out hunting and my Grandparents talking about stories."

new and emerging activities that mesh the traditional and contemporary in an effort to sustain both culture and future.

Emerging voices through design

Regarding the second research question, young people from Ntaria continually show themselves to be adept at integrating cultural forms into digital mediums. The 'designerly' styles emerging from Ntara combine traditional iconography with contemporary realities. Kral argues that Western desert youth remain deeply rooted in their own cultural schema; a schema connected to kin and country and the enduring relationship between place, identity and tjukurrpa (Dreaming) (2011). They perceive significant differences, but also continuities, between digital and traditional modes of communication and, for the most part, are keen to incorporate new technologies into their lives.

As this research is still ongoing, there are limitations to analysing the Ntaria drawings in relation to a Western Arrernte cultural and aesthetic understanding, and thus providing a specific cultural definition for 'designerly' styles and communication design practices. This research hopes to further expand and explore in more detail how Indigenous Knowledge (Martin, 2003) can merge with designerly knowledge (Cross, 2001) within a remote Australian context.

Through the prism of these digital outcomes, we can see an affirmation of Indigenous cultural tradition. Yet it is being told through new shapes, colours and 'designerly' styles afforded through the use of a digital drawing tool. Exploring the possibilities of drawing in a digital way, young people can reinvent their cultural symbols, sings and stories to suit a contemporary youth aesthetic. Western Arrernte knowledge, country, and

histories are rich repositories of narrative that current generations can utilize in new ways of storytelling. Not just by learning to draw in a new digital medium, but by representing their living culture in a contemporary way. Design can be employed as a way to strengthen culture: through telling stories in new ways, learning new skills while developing students' digital literacy. Through the design workshops, students are discovering what Indigenous design means within Ntaria, how the tools of design can take on a new meaning, and the potential of design to create future employment and enterprise opportunities within their community.

Outside of the Ntaria community, this research also hopes to show the value of communication design education in remote contexts. Through exploring the Ntaria students' experiences and understandings of digital drawing and communication design, it is hoped the students' voices can contribute to the development of more locally-informed and culturally relevant design programs within Indigenous schools and communities.

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Author

Nicola St John is a PhD candidate at Swinburne University of Technology, Centre for Design Innovation. Her research explores the transfer and impact of innovative digital technologies on creative practices in remote Indigenous communities in Australia.

How can the principles and practices of information design help us produce useful live art documentation?

a unique user-centered, experience-design challenge

Rosanna Traina

This article presents the background to, and findings of the design development and testing of a prototype Live Art Information Document (LAIDoc), designed to address the desires, needs and preferences of postgraduate live art students researching past live art works. The building and testing of the LAIDoc comprised the final stage of a doctorate study undertaken at the University of Reading, entitled: *An information design approach to documenting live art: locating and empowering the document user* (2017).

Background

Summary of thesis

The doctorate study (titled above) explored the affordances of applying the principles and practices of information design to the task of documenting and sharing information about past live art works experienced by an audience. In doing so, the study raised an unusual challenge for information design practice and research, namely: how to manage, design and present data such that the meaning to be elicited from it remains open-ended and undetermined. In other words, an attempt was made to present information so that readers might explore and apply that information according to their own criteria, context and needs, and where the *knowledge gained is shaped by the end users*. This is atypical in information design projects where design solutions are more likely to be devised for a specific application and/or require a single clearly defined message to be relayed and understood consistently, as is necessary in projects managing wayfinding or relaying information for administering medicines, for example.

The study was centered around the following query:

— What should the content and design of live art documents be like, if they are to meet the desires, needs and preferences of the live art document user, and more specifically the postgraduate live art student researcher?

The study comprised a set of qualitative research activities with postgraduate students, followed by the building and testing of a prototype Live Art Information Document (LAIDoc). As such, the research also reads as a user-centered, experience- design project. From a broader graphic/information design perspective, it also considers the role and contribution of 'subjective experience' as valid, informative data. With this in mind, and in the interests of this journal's concerns, the article focuses on the design development and rationales for the typo/graphic strategies that the LAIDoc finally employed, and discusses the findings emerging from its final testing with postgraduate students.

Broadly, the study findings asserted that despite the very different means by which 'art' and 'information design' may communicate, information design offers us a range of strategies for sharing art works to interested readers that enable us to establish a new, user-driven approach to producing useful art documents. What the study framed most startlingly however was the very powerful extent to which design communication negotiates our understanding and interpretation of the *meaning* of art works for all future interested readers. More specifically, findings from the final LAIDoc testing identified document and data transparency and rich descriptions as key user demands of live art documentation.

Summary of the user-centered challenge

Live art works (also 'performance art works, 'actions', 'happenings') represent a creative discipline that resists definition. Between them, key commentators (custodians, artists, academics, teachers, facilitators) suggest the discipline is better understood through a case by case study, and understand live art as: process over product; representing 'presence'; foregrounding the experimental; being unconstrained by medium; and as not-easily disentangled from its 'audiences' (see Heathfield 2004; Heddon 2012; Keidan 2014; Klein 2012; Sofaer 2014).

The live art community can access information about past live works through a variety of documents and documentation, but it might be argued that it is the *designed printed published* live art document that pervades what is available, and is used by a wide range of live art interested readers (artists, academics, researchers, students, employees within the live art sector). Traditional documents of this kind typically adopt a top-down interpretative approach to communicating a past live work. In other words, they present the 'truth' of a live work's meaning, generally as per the artist's explanations and the document producer's precise agendas, and in line with key discourses on the nature and effects of documentation established by live art academics. The study, by contrast, sought to pioneer an alternative 'bottom-up' approach based on the needs of the postgraduate student user, inspired by post- structural thinking, and established and guided by the principles and practices of information design.

Postgraduate live art student researchers were selected as the key participants primarily for their position within an early career research journey: they were therefore likely to have already been exposed to a diverse range of live art documents, and also likely to be in the process of establishing their academic voice, perspective and preferred methodologies so may have a heightened sense of what would be useful to them in their work.

Groundwork to building and testing the LAIDoc:

1. Reviews

Research leading up to the LAIDoc began with a 4-part review, each part with a different function. These established the entire study's rationale and laid the groundwork for the qualitative research activities and prototype development to follow.

The first stage conducted an empirical review of the varying nature, forms and content of traditional live art documents, focusing on typical approaches in producing designed printed published live art documents – the rationale being that this category represents the most ubiquitous form of documentation exerting the strongest and widest ranging influence on live art interested readers. The review identified that within this

category, documents generally adopt an 'interpretative approach' to relaying information about a past live work. This could be seen evident in the way that live works are described in words (few descriptive details about what actually happened, or the 'materiality' of the work as it was experienced), and in the way that documentary photographs are designed and presented (for dramatic effect and to support relay of concepts, ahead of profiting from their rich descriptive potential). As such, the interpretative approach embodies two characteristics that the review identified as being potentially problematic for the document user, and particularly those undertaking historical research, namely: a lack of descriptive details; and a lack of value ascribed to audience reception and/or commentary. Both of these lacks were directly readdressed within the content-decisions of the final LAIDoc, in order to explore their advantages and disadvantages for the user, as compared with the interpretative approach.

The second stage reviewed live art academics' key perspectives on the notion and effects of 'documentation' on our understanding of live art broadly. While recognising its crucial role of documentation in sustaining the legacy of live works, academic debate has focused on the ideological conundrums of producing it at all, given the nature of 'live' action. One view centres on the notion that a live work (and our experience of it) remains 'in-flux', in the moment, disappearing when the performance ends, while a *document's* content and messages are fixed and enduring, and therefore incongruous to the nature of live art (Phelan, 1993). Others have argued that the live moment itself is mediated as much as any document, and on the basis that 'pure truth' can never be accessed (even perhaps for the artist, in the live moment), we should celebrate the different ways in which live works remain nonetheless (Schneider 2001; Auslander, 2008; Jones, 1997). The debate has inspired both artists and academics to investigate alternative approaches to documenting live works that may be more in sync with the ever-shifting nature of 'live', for instance: through physical traces left in the environment and artist's body after the work has finished, or intangible traces in our memories and shared experiences. Such 'performative documents' or 'living archives' (*Living Archives Symposium*, 2010), are themselves subject to change and transformation over time, and provide more tangential (but nevertheless documentary) material to work with, and often more tacit ways of knowing and understanding a past live work. One early suggestion by Phelan in 1993 anticipated this: she suggested artists and writers suspend their preoccupation with highly visual forms of documentation, such as photography or video, to focus more strongly on subjective reflections, observations and explorations of our live experiences in any mode. This was adopted as an overall guiding endeavor in the LAIDoc, and participants reflected on the usefulness of this approach in the final prototype testing.

These two initial reviews established 2 key observations. Firstly, the co-ordinates through which academics continue to assess the most appropriate documentary approaches are centered around conceptual concerns, not the practical needs of those using live art documentation. How appropriate then, was the dominant interpretative approach for those researching past live works, and for the tasks they wish to undertake? Live art academics Roms and Melrose indeed suggest that the process of interpretative writing is in fact incongruous both to the way in which artist's make work, and the way in which audiences experience them (Roms & Melrose, in Roms, 2010). Secondly, the literature review confirmed a lack of research into live art 'user needs' per se. Some consideration of user needs has begun in universities and institutions needing to manage their own archives of live art documentation (Stephen Gray & the PADS project, University of Bristol, via interview, 2010, and the Digital Dance Archives project at the University of Coventry, most recent web access 2017). While promising, these projects still retain a top-down perspective however, driven by the needs of primary stakeholders such as the artists being represented, or the agendas of the institution driving the project.

The third and fourth stages of the review responded to these observations. The third stage sought to creatively brainstorm potential alternative approaches to the typical interpretative one. Sontag's 1960s text *Against Interpretation* (Sontag, 2009), makes a useful, user-centered argument on the affordances for adopting a descriptive approach to relaying art works (or past live works). The challenges and affordances of such a descriptive approach would be put to the test in empirical research activities the prototype building and testing.

The fourth stage reviewed the principles and practices of information design that would scaffold the remainder of the research journey, offering methodologies for: eliciting user need; informing user-driven document content decisions, design strategies and design development; user-testing. This review had 2 functions. Firstly it secured the rationale for employing information design as a guide for the prototype building and testing. Secondly, it established an understanding of information design for the purposes of the study – as a *process*, *ethos* and user-driven *practice* centered around co-design, as opposed to simply a discipline or paradigm for describing design artifacts.

The review explored a range of information design writing by Frascara (2005), Horn (1999), Jacobson (1999), Sless (1994), and Waller (1979) among others. It identified the information design tools that would provide a practical approach to designing live art documentation as an alternative to the ideological ones offered by through documentation discourses. But the review also anticipated 3 key challenges of applying information design in communicating live art: 1) the incongruity between the two disciplines regarding how ideas and messages are communicated (via clear communi-

cation versus via suggestion and tangent); 2) the challenge of creating an information document in which the final message is to remain open, not prescribed or constrained; and 3) the impossibility of employing a 'subject expert' or 'communication expert' (as often argued for within information design) in the context of managing audience 'experiences'. The final LAIDoc testing enabled a reflection on these challenges.

Groundwork to building and testing the LAIDoc: 2. Qualitative research activities

Drawing guidance from the reviews, 3 empirical research activities (all qualitative) were devised and undertaken to elicit a good understanding of postgraduate live art student researchers' desires, needs and preferences. Each activity was given ethical approval by the University of Reading. The activities comprised inviting participants to: 1) undertake a set of documentation tasks using writing and photography, exploring the nature of audience perception; 2) take part in 2 day-long group workshops to understand expectations and needs of live art documents and attitudes to document design; and 3) engage in one-to-one interviews (7 in all), evaluating a recent designed printed published live art document (*Access All Areas,* LADA, 2012), in order to observe real-time practical document use in tandem with users' reported documentation desires. Each activity engaged a different cohort of participants.

Given the lack of co-ordinates on the nature of live art document user needs in the field, the workshops and interviews were structured around using think-aloud protocols (e.g. Schriver, 1997). This sought to ensure that the elicited responses would be participant-led, and shaped directly by their own criteria and concerns, as opposed to the researcher's. Any pre-prepared semi-structured interview questions were issued after the think-aloud protocol, again to allow the respondent to lead in the first instance. The semi-structured questions allowed sufficient flexibility to allow the interviews to probe participants more deeply, but based on what emerged naturally, but also ensure that key research queries could be addressed where they were not raised directly. In the interviews these questions also provided the opportunity to cross-check what participants had already reported as pressing needs as they consulted the selected designed printed published live art document. All activities were audio-recorded and transcribed. A constant comparative method was applied, generating a set of codes, which were then grouped together to identify linked themes. These generated Key Findings and a set of Action Points (guided by the principles and practices of information design) that would need to be addressed within the content and design of the final prototype[1].

In sum, the research activities suggested a dichotomy within a postgraduate researcher's key concerns. On the one hand, they wish to unearth the real objective 'truth' of both what happened during a past live work, and its meaning, despite acknowledging that achieving such objectivity was impossible. At the same time, they desire freedom of interpretation and the opportunity to draw their own conclusions (often creatively) about what a live work means to them personally. In search of the desire to support both goals, participants first sought rich, reliable and rigorous descriptive data about 'what happened' during a live work (thereby supporting the user's ability to interpret the work for themselves); and second, welcomed good document and data transparency (see below for examples). These transparencies had two knock-on effects: they helped users to determine the relevance of a document to their own research criteria (again supporting freedom of interpretation); and they secured document credibility and appeared to counteract negative preconceptions typically associated with *subjective* data (e.g. audience commentaries). This increased credibility appeared to instill a sense of confidence in all kinds of data being presented, and also in the users' own readiness to use and apply data they may not previously have drawn from. All 4 activities identified the crucial role that design plays in influencing how we access, consume, comprehend and interpret data in live art documents, and how strongly participants shared a desire for well-crafted, clear and functional document design that enabled their easy access to the documentary data.

[1] Details of the coding process are available in the study's thesis titled: ***An information design approach to documenting live art: locating and empowering the document user***, available via the Department of Typography & Graphic Communication, University of Reading.

LAIDoc prototype building and design development

Summary of approach

The prototype building and testing sought to evaluate one possible broad alternative approach (to the traditional interpretative approach) in its earliest stages of development. In other words, this initial research foray would first address the concept, feasibility and potential affordances of pioneering a descriptive, user-centered live art information document for postgraduate live art student researchers, through qualitative methods. More quantitative methods would be ideal for subsequent research in relation to further design development, testing and evaluation of individual document elements, or more comparative testing of two or three very different broad alternative approaches.

Method

Key Findings and Action Points from the research activities were reviewed in tandem with insights drawn from stages 3 and 4 of the literature review, in order to guide content and design decisions in building a prototype 'Live Art Information Document' (LAIDoc).

LAIDoc Prototype building – content decisions

The prototype employed subjective audience descriptions and artist-commissioned documentary photographs as its core data for documenting what happened during a selected live work. In the attempt to create a document that foregrounded 'the descriptive', a decision was made to omit the artist's commentary entirely.

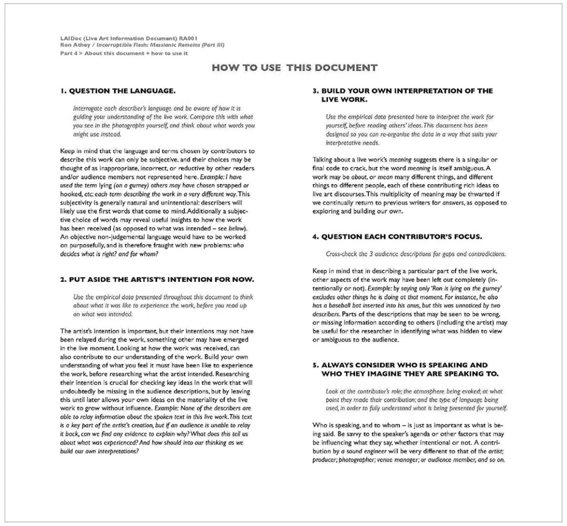
It was decided the prototype should document a real live work, so that the feasibility of the LAIDoc approach could be tested from start to finish, to identify practical issues arising. With the support and advocacy of the Live Art Development Agency, the LAIDoc prototype documented established live artist Ron Athey's *Messianic Remains: Incorruptible Flesh, Part III (IFMR3)*, which was performed in London, in May 2014. A documentation task with 6 participants was undertaken directly after Athey's live performance, generating 3 subjective audience descriptions. The artist agreed to forward a set of 8 artist-commissioned documentary photographs contributing to the core descriptive data. All participants agreed to their comments being audio recorded, transcribed, reproduced in the prototype, and reported in the final thesis.

The core descriptive data (photographs and audience descriptions) were presented with, and scaffolded by good document and data transparency, throughout the prototype. Content-wise, *document transparency* was offered primarily through a 'How to use this document' section (*Figure 1*) and an 'Aims & Agendas' section (relaying the prototype's unique non-interpretative stance, described above).

Content-wise, *data transparency* was offered through the provision of *data provenance* information for all primary and secondary data (sources, any data manipulation, e.g. for the audience descriptions, see *Figures 2.1, 2.2 and 2.3*), right through to providing an interview with the documentary photographer about their creative vision and the nature of Athey's commission.

FIGURE 1

'How to use this document' section of the LAIDoc. An example of an element in the prototype relating to document transparency.



LAIDoc (Live Art Information Document) RA001
Ron Athey / *Incorruptible Flesh: Messianic Remains (Part III)*
Part 4 > About this document + how to use it

HOW TO USE THIS DOCUMENT

1. QUESTION THE LANGUAGE.

Interrogate each describer's language and be aware of how it is guiding your understanding of the live work. Compare this with what you see in the photographs yourself, and think about what words you might use instead.

Keep in mind that the language and terms chosen by contributors to describe this work can only be subjective, and their choices may be thought of as inappropriate, incorrect, or reductive by other readers and/or audience members not represented here. *Example: I have used the term* lying *(on a gurney) others may have chosen* strapped *or* hooked, *etc: each term describing the work in a very different way.* This subjectivity is generally natural and unintentional: describers will likely use the first words that come to mind. Additionally a subjective choice of words may reveal useful insights to how the work has been received (as opposed to what was intended – *see below*). An objective non-judgemental language would have to be worked on purposefully, and is therefore fraught with new problems: *who decides what is right? and for whom?*

2. PUT ASIDE THE ARTIST'S INTENTION FOR NOW.

Use the empirical data presented throughout this document to think about what it was like to experience the work, before you read up on what was intended.

The artist's intention is important, but their intentions may not have been relayed during the work, something other may have emerged in the live moment. Looking at how the work was received, can also contribute to our understanding of the work. Build your own understanding of what you feel it must have been like to experience the work, before researching what the artist intended. Researching their intention is crucial for checking key ideas in the work that will undoubtedly be missing in the audience descriptions, but by leaving this until later allows your own ideas on the materiality of the live work to grow without influence. *Example: None of the describers are able to relay information about the spoken text in this live work. This text is a key part of the artist's creation, but if an audience is unable to relay it back, can we find any evidence to explain why? What does this tell us about what was experienced? And how should into our thinking as we build our own interpretations?*

3. BUILD YOUR OWN INTERPRETATION OF THE LIVE WORK.

Use the empirical data presented here to interpret the work for yourself, before reading others' ideas. This document has been designed so you can re-organise the data in a way that suits your interpretative needs.

Talking about a live work's *meaning* suggests there is a singular or final code to crack, but the word *meaning* is itself ambiguous. A work may be *about*, or *mean* many different things, and different things to different people, each of these contributing rich ideas to live art discourses. This multiplicity of meaning may be thwarted if we continually return to previous writers for *answers*, as opposed to exploring and building our own.

4. QUESTION EACH CONTRIBUTOR'S FOCUS.

Cross-check the 3 audience descriptions for gaps and contradictions.

Keep in mind that in describing a particular part of the live work, other aspects of the work may have been left out completely (intentionally or not). *Example: by saying only 'Ron is lying on the gurney' excludes other things he is doing at that moment. For instance, he also has a baseball bat inserted into his anus, but this was unnoticed by two describers.* Parts of the descriptions that may be seen to be wrong, or missing information according to others (including the artist) may be useful for the researcher in identifying what was hidden to view or ambiguous to the audience.

5. ALWAYS CONSIDER WHO IS SPEAKING AND WHO THEY IMAGINE THEY ARE SPEAKING TO.

Look at the contributor's role; the atmosphere being evoked; at what point they made their contribution; and the type of language being used, in order to fully understand what is being presented for yourself.

Who is speaking, and to whom – is just as important as what is being said. Be savvy to the speaker's agenda or other factors that may be influencing what they say, whether intentional or not. A contribution by *a sound engineer* will be very different to that of *the artist; producer; photographer; venue manager; or audience member, and so on.*

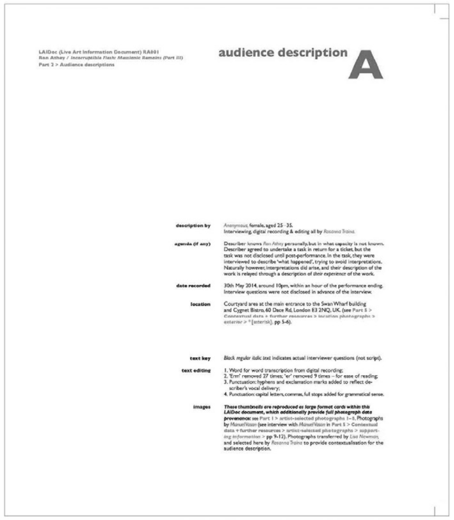


FIGURE 2.1

1 of 3 Audience Descriptions, each one a 4-page booklet.
Figure 2.1 displays the front page and the data transparency information relating to Audience Description A;

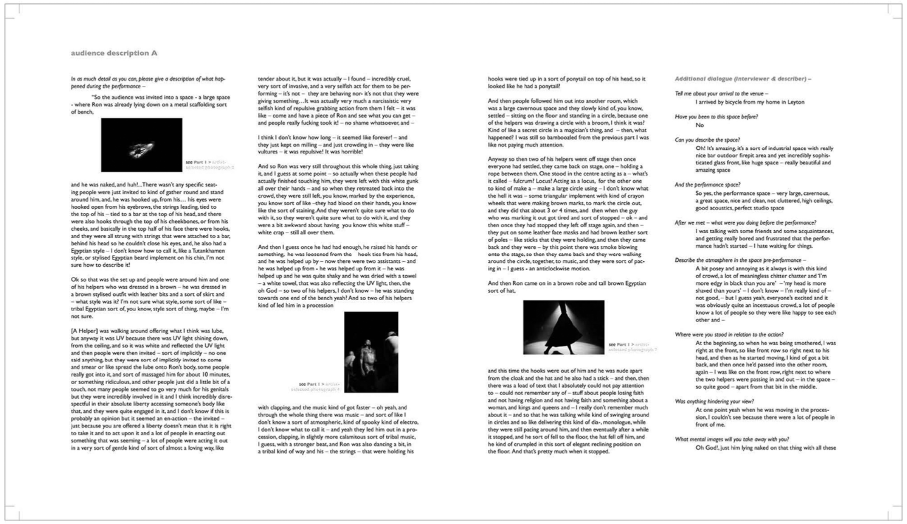


FIGURE 2.2

Figure 2.2 displays the middle pages, and provides an example of data contextualisation where links between the describers' details and the documentary photographs have been made (through embedding thumbnail photographs);

FIGURE 2.3

Figure 2.3 displays the final (back) page of description.

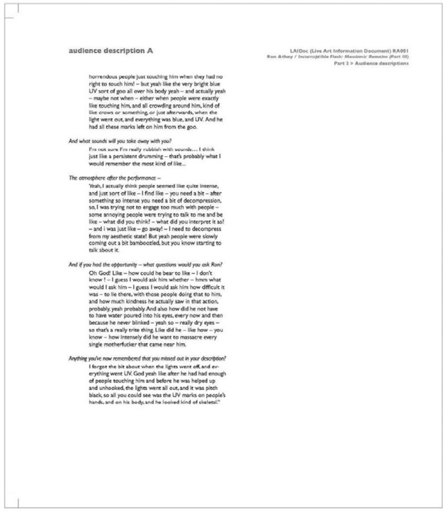


FIGURE 3.1

Front and reverse of 1 of 8 artist-commissioned documentary photographs. Figure 3.1 represents the front side, reproducing the photograph as large as is comfortable within the A3 card dimensions, and with no other documentary data being presented on the same side, to encourage undistracted engagement the photograph's rich descriptive and documentary data.

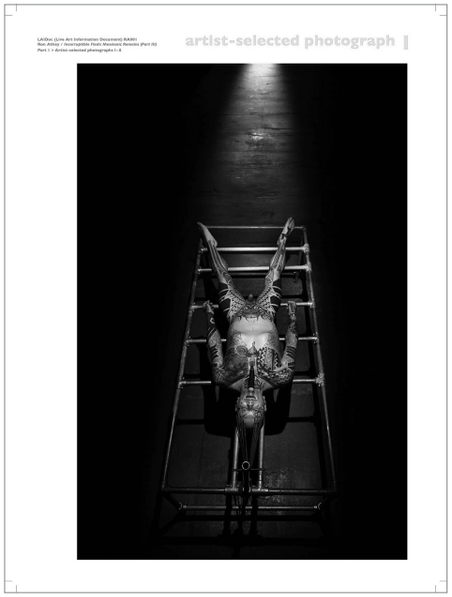
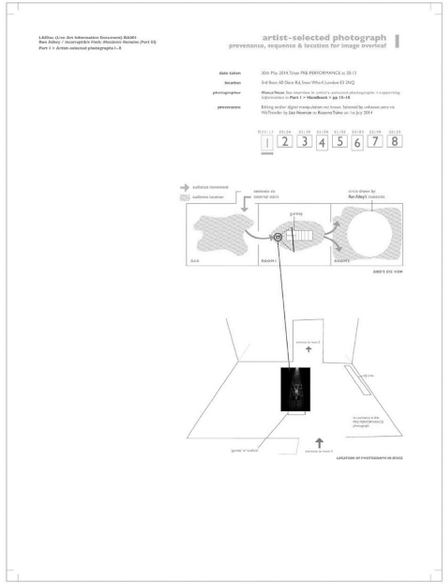


FIGURE 3.2

Figure 3.2 displays the reverse side of documentary photograph 1. An example of data contextualisation. The documentary photograph is visually contextualised in space by embedding the photograph in a schematic illustration of the performance space. The photograph is also time-contextualised through positioning it within chronological order (documentary photographs 1-8, above the maps). Data provenance information is presented at the top right of the page.

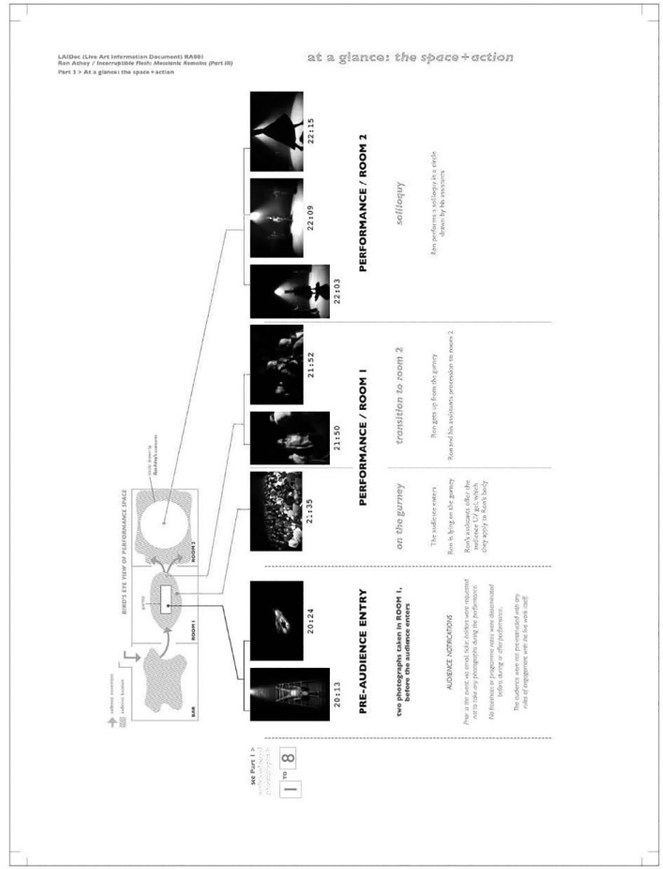


LAIDoc Prototype building – design decisions

All the LAIDoc prototype design decisions were guided equally by: 1) general design considerations for supporting the user offered by information design principles and practices (e.g. use of access structures or simplification techniques; colour coding for navigation; ways to support strategic reading) and 2) the Action Points generated during the data analysis of the research

FIGURE 4

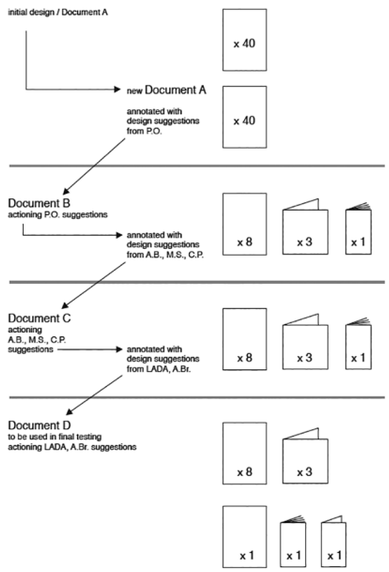
'At A Glance' sheet provides an overview of the action sequence of the performance (what happened), structured around the documentary photographs.



activities. The LAIDoc's final modular document structure (5 parts, 4 of which were unbound) sought to encourage users to explore the document according to their personal interests and needs. Documentary photographs were reproduced both as large as possible and alone (no additional data being presented on the same page) to encourage users to more deeply mine the rich descriptive data that these images provided (*Figure 3.1)*. A key focus within the prototype design development was to find ways to facilitate users' easy access, navigation and use of the new (and atypical) document and data transparency information elements described above. Design-wise, the attempt to achieve *data transparency* was also sought through the provision of *data contextualisation* of primary data wherever possible, including: visual contextualisation of documentary photographs in space (using a map and room schematic) and time (using a visual timeline, see *Figure 3.2* for both); provision of an overview of the sequence of actions in the performance (see the 'At a Glance' section, *Figure 4*); and by making clear links between the photographs and audience descriptions (e.g. see *Figure 2.2.*), in an attempt to encourage data cross-referencing and data critique.

FIGURE 5

Diagram representing design development stages of the LAIDoc, beginning with the intial design and working through 3 design iterations, to reach Document D, ready for final testing with live art postgraduate student researchers.



Design development

The LAIDoc prototype underwent 4 consecutive tranches of small-scale testing with subsequent design iterations, to bring the prototype to an appropriate stage for testing with final participants. During this process, individual critiques of the prototype were undertaken with 5 information designers (4 industry, 1 student) and a key stakeholder, the Live Art Development Agency. These critiques sought to identify and eliminate any content or design decisions that might present as stumbling blocks in practically consulting the LAIDoc generally, or any that might prevent elicitation of the participant responses that the final testing aimed to gather. *Figure 5* maps the stages, designers and an overview of the format the LAIDoc took from initial design through its 3 further iterations.

Final LAIDoc prototype testing

The end users selected to respond to the final LAIDoc prototype design were 4 postgraduate live art student researchers: 2 PhD and 2 MA level students. None of the participants had taken part in the initial research activities, or were known from previous engagements. Both those who had, and those who had not attended Athey's *IFMR3* work were welcomed, and of the 4, one had attended the work. All agreed to their comments being audio recorded, transcribed, and reported in the thesis. While it is recognizedthat this constitutes a small number of participants, this appeared to be sufficient for this early scoping stage of investigations, which focused first on identifying if this particular alternative approach to live art document production was worthy of further pursuit. In addition, the 4 responses were strongly consistent with each other.

The final testing aimed to evaluate the success of the LAIDoc's broad approach in meeting the desires, needs and preferences of post-graduate live art student researchers. Again, the testing applied a think-aloud protocol to elicit an open response to the LAIDoc, supplemented (afterwards) by semi-structured questions, in order to draw responses to the following 5 key queries:

1. Was the LAIDoc's broad descriptive, information design-led approach welcomed?
2. Did the LAIDoc meet participants' desires, needs and preferences with regards its new content?
3. Did the LAIDoc meet participants' desires, needs and preferences with regards its design decisions?
4. Did the LAIDoc present as practically and conceptually feasible within the live art field?
5. Did the LAIDoc's broad approach empower the user to interpret the meaning of a past live work for themselves?

Results & Discussion

All numbers in square brackets following quotes indicate participant number [1-4]

Responses to questions 1-3 :

(broad approach, content and design)

Overall, the LAIDoc approach was welcomed. Its attempt to resist offering any interpretations, including the artist's own explanation, was initially seen by all participants as surprising and controversial:

> *"I mean this is really controversial - all this stuff [re the 'aims & agenda']. I think it is interesting to put aside the artist's intention."* [3]

Participants also confirmed both the employment of in-depth subjective descriptions of audience members' experiences of what happened during a live work – and the presence of audience commentary per se – as uncommon in traditional live art documentation, but nevertheless strongly welcomed. For instance, they considered recording audience information and members' subjective descriptions:

as a valid 'research method':

> *"The only way I have to reconstruct [the works I am researching...] is going back to people who were involved, and interviews. So this idea of [...] testimonies, or through multiple voices is something that I'm interested in exploring."* [1]

as providing useful data (not normally on offer):

— *"[Having access to an audience 'profile'] is really good stuff to know about a performance, that would usually not be documented."* [2]

In summary, the prototype contents and design were deemed successful on the basis that:

1. It offered new 'forms' of desirable documentary content, particularly noting those elements providing key document and data transparency. For example, in response to including an interview with the photographer (data transparency), as part of the LAIDoc contents, one participant commented:

— *"There is an ethics here that I think that is lacking in most of whatever's done [by] the documenter - you take the photographer for granted, like you never ask yourself about the authorship of the image, so I think this is really important."* [1];

2. The design decisions were seen to support: good accessibility to the document and data (such as the size of the photographs and their visual contextualisation in time and space); participants' ability to read strategically (e.g. on account of its modular structure); ease of navigation through the document, for instance, with regards the inclusion of the 'At A Glance' section:

— *"I really like [the 'At A Glance section'] it is definitely thinking about the experience of the user, and acknowledging the fact that it's actually helpful to have somewhere you can get the [...] content at a glance [including...] how the work works [spatially]."* [1];

— *"Ahh, [the 'At A Glance section'] is what I was just asking for: about positioning the photographs within the action of the performance [...] awesome!"* [3]

3. The prototype's combined content and design features heightened their critical awareness of the document construction and the nature of the data being presented. Content-wise, for example, the 'Aims & Agenda' section, sought to bring this to the fore:

— *"I think it would be wrong to seek authenticity, instead [the Aims & Agenda section is] very knowing."* [4];

and design-wise through attempts to provide data-contextualisation, and encourage data-cross checking:

— *"I haven't seen a picture [in the doc images] of a woman with coloured hair [...] that's quite interesting because to me that seems like to [all the describers, by contrast] that was quite a vivid image."* [2];

— *"I am a fan of having different kinds of documentation that conflict about a single event [...] scores at different levels [or different responses] or different scales [each providing different content & functions]."* [3];

Perhaps, as a direct effect of encouraging heightened data-critique, participants astutely noted that the LAIDoc's aim to offer description over interpretation could not be achieved in full:

— *"Any sort of description, and any sort of text is inevitably going to be [interpretative], [Quoting from Audience Description A:] - 'it was repulsive, it was horrible' - which kind of clouds how you work with it."* [4]

Clearly, the process of producing documentation is inherently interpretative at every stage, from collating and managing data to making minor typographic decisions: all would influence readers' consumption and comprehension of the document. It is important to note here, that during the pre-prototype research activities postgraduate researchers were seen as very accepting of the interpretative approach typically employed in designed printed published live art documents. However, exposure to the LAIDoc's new approach and features during their consultation with the prototype instigated a shift in user demands and expectations: participants now reported rich descriptions and document and data transparency to be almost a basic pre-requisite for them as researchers.

Additionally, the pre-prototype research identified creativity and conceptual thinking as underscoring much of the postgraduate activities and ambitions *as they research* past live works. The LAIDoc appeared to activate both of these preoccupations, with participants reflecting on alternative creative approaches to document production, which seemed in part to be supported by the LAIDoc's unbound, modular structure encouraging users to find their own 'way in' to the document:

— *"It's good that we have the floor [to spread the LAIDoc out], because I pretty much want to have this multiple view - as well [with the photographs…it is] resisting an easy conception of [the*

work...] here you really are required to spend some time with the document." [1]

While participants welcomed the LAIDoc's foregrounding of document and data transparency information, equally, they did report concern over its strong 'presence', (too much, and too upfront), which distracted them from engaging with the live work itself, and contradicted the LAIDoc's primary aim to simply describe what happened during the live work. They felt some of the transparency information may be unnecessary, and that the more useful transparency information might be better presented in a more discrete location. However, since the concept of introducing document and data transparency was strongly welcomed nevertheless, and on the basis that these were design issues that could easily be addressed through additional design iterations and further testing with postgraduate researchers, it was concluded that these features should remain core to any LAIDoc contents.

Response to question 4:

Feasibility

All participants assessed the LAIDoc approach and its contents as being reliable and valuable for the researcher. This credibility was seen to instil participants with confidence in the documentary data and in turn encourage them to own and shape the data according to their personal research queries and criteria. This sense of credibility and validity appears linked to a variety of LAIDoc features: from its overarching approach (as per its 'Aims & Agendas'); the types of data offered; the aesthetics employed; to the added value offered by the of document and data transparency.

Further research would be necessary to identify the exact root of this sense of credibility.

The key issue potentially affecting feasibility of the LAIDoc in the live art field appeared to be the foregrounding of subjective audience descriptions as key primary data for documenting a past live work, in place of relaying the artist's interpretation or explanation of the live work's meaning.

— *"So I am wondering [even if we put the artist aside] why what the audience has to say about the work is more important than what the co-performer has to say?" [1]*

Acceptance of the LAIDoc approach would be dependent on a more positive revaluation of the contributions of audience reception in the process of academic interpretation. However, on the basis that:

— 1. the LAIDoc prototype appeared to transcend typical negative preconceptions regarding subjective data, with participants here recognising the affordances of audience descriptions for the researcher;

— 2. the LAIDoc would potentially exist as a *supplement*, not substitute to the many interpretative documents still available to the researcher; and

— 3. documentation not initiated by the artist themselves can and does already exist (mainly in the form of the independent academic 'Review') –

the LAIDoc approach presents as entirely feasible.

In the interim, in order to maintain upmost respect for the artist as originator of a live work, and in recognising traditional interpretative approaches to documenting past live works, the LAIDoc's approach should be clarified as an attempt to 'document the *experience* of the work', not the work itself (Keidan, via interview, 2015).

Response to question 5:

Empowering user-interpretations

The final prototype testing did not ascertain a sufficiently clear understanding of whether or not the LAIDoc had been successful in supporting users to draw their own conclusions about what the presented live work meant to them personally. This was not a weakness of the LAIDoc design decisions being guided by information design but likely rather to be a consequence of participants having to respond to a whole range of new, atypical content and design features during the testing process. The findings did suggest however, that the LAIDoc appeared to have been successful in laying the groundwork for supporting participants to nurture their own interpretative response, in time. Evidence for this could be seen in:

— The way participants freely sculpted their own document experience in accordance with their own criteria and concerns;

— The extent to which the LAIDoc features encouraged self-reflection on their behaviour as they consulted the document; and

— Heightened critique of the LAIDoc document structure and content.

It is clear however, that further research is necessary to gain a more comprehensive understanding of what constitutes 'an interpretation'; how and where interpretations of live works are commonly established dur-

ing the process of research; and what other factors may support or influence a researcher's ability to draw their own conclusions about a live work's meaning, independently.

Conclusions & Implications

Despite differing communicative approaches seen to be adopted by 'art' and 'information design', the principles and practices of information design here proved to be a successful facilitator in establishing a new, user-driven approach to producing useful live art documents for interested readers. For this study's specific selected end user, the postgraduate student researcher, information design not only provided key strategies for eliciting user need, but also for identifying desirable documentary data content, and managing, designing and presenting that data. Crucially however, what this study unquestionably proves, is that both design and the designers managing 'art data' *are custodians of art history*, on account of the powerful way in which design influences how we access, consume and interpret art data. In short, design and designers control and negotiate the *meaning* of art works. The findings of the prototype testing suggest that the LAIDoc's attempt to support the user through presenting rich descriptive data content; providing document and data transparency; and exploring design decisions that foreground ease of user access – together lay the groundwork for empowering users to take better ownership of the documentary data, and interpret it for themselves.

Key to note from an information design perspective, is the finding that it is possible to create an information document in which the messages arising from information being communicated may remain open, or may generate a whole array of equallyvalid messages. The research found that the usual information design requirement of working with 'subject experts' in order to let the data '…find good order, both for the sake of the material itself and for the sake of the people reading and using it' (Neurath and Kinross, 2009, 77-8 cited by Walker, 2017) may not *always* be necessary, particularly where the designed document is successful in supporting the user in reaching their personal goals, and where it asserts a strong sense of credibility. Both of these qualities appear achievable through foregrounding good document and data transparency information. The potential of creating an information document open final message may prove useful in a range of contexts (besides the arts), where the information designer has the responsibility to manage, design and present *but not interpret* data for the end user, perhaps for ethical reasons, or in instances where function of the information document itself is to elicit new unbiased user responses.

In addition the project reflected anew on the importance of document and data transparency for supporting *knowledge empowerment* across all information documents, based on the notion that good document and data transparency appears to facilitate deeper and freer user engagement with a document's contents. This finding may be of use for all kinds of communicative endeavors across a range of teaching and learning contexts and projects, in the arts and beyond. The precise affordances of document and data transparency, and/or how to relay, achieve or maintain good transparency through document design have not yet been established, research into which is now due within the information design field.

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Author

Rosanna Traina

36 Fentonville St,
Sheffield,
S11 8BB,
United Kindom

Rosanna studied as a Fine Art Printmaker at degree level, going on to attend the Royal College of Art on the Communcation Art and Design MA programme. Her PhD study was undertaken at the University of Reading's Department of Typography & Graphic Communication, and was awarded December 2017. Since her BA, she has also worked as an electronic notetaker for D/deaf students at all levels in further and higher education, and also as a freelance illustrator and graphic designer.

Spaces that Speak:

Exploring Creative Opportunities in the Communication Design of Conversational Spaces

“? . . . !”

Nina Lysbakken

In this article, I argue that designers can benefit from understanding social media spaces from a cultural and communicative perspective. This approach to designing interfaces can expand creative potential and guide the process of shaping innovative and engaging interfaces. Such an approach may also help the designer understand how visual design influences meaning in interfaces and how the meaning is socially situated and dependent on context. I argue that the design can shape online conversations by communicating intended values of the conversational space through designed features.

I demonstrate this through deconstructing, analyzing, and juxtaposing existing interfaces in terms of their visual language, intertextual references, and connotations. I discuss two design components of the interface – *typography* and *layout* – examples of tools the designer can use to shape meaning. I provide personal reflections, creative suggestions, and visualizations based on my practice as a graphic designer, in addition to metaphors that enable ways of thinking about the potential of such interfaces. The context is online magazines that promote conversation and dialogue – in particular, the interface of Medium.com, a hybrid of a magazine and a blog-publishing platform. The analysis is conducted through a social semiotic framework and a designer’s way of looking – a complementing perspective in an emerging field of social media design research that often emphasizes functional perspectives and use quality. I found that there is creative potential in both *what* and *how* designers prioritize to communicate, that may influence the conversational space.

Keywords:

Visual Communication

Communication Design

Social Media

Conversational Spaces

Online Magazines and Newspapers

Social Semiotics

Design for Democracy

Typography

Layout

Introduction

A designer's approach to studying social media

A colleague once said that "designers are thieves; they steal bits from here and there and put them together in new constellations." As a designer who is interested in the cultural and communicative aspects of social media, I am curious about what the *bits* or *components* in these contexts are and how we can design and combine them into new, engaging, and inclusive concepts. Components of visual language can be understood as *semiotic resources* – resources for making meanings (Van Leeuwen, 2005). Graphic and interactive designers are constantly engaging in *semiotic activity*; our minds are storage places for semiotic resources – various typefaces, graphic styles, social media buttons, or images shot in a specific way – that we continuously collect from observing what we see around us (Suri, 2011). Designers investigate how these semiotic resources are used in our culture, contribute by shaping and discover new design features, or use them in novel ways and contexts as intertextual references that can carry meaning.

A designer concerned with visual communication often asks questions to bridge the connotations of visual language with the underlying concept, values, and needs: "Does the design seem too sterile, too serious?" or "Should the graphics be funnier, more easygoing?" When designing for interactive environments, this communicative perspective of shaping meaning seems less prioritized than functional perspectives or use issues. In design research, *communication design* is framed as a concept that discusses the complexity of websites containing information, interaction, and graphic design (Skjulstad, 2008, 2010), closely linked to the field of multimodal discourse (Kress & Van Leeuwen, 2001) and drawing on social semiotics (Van Leeuwen, 2005). Communication design is, however, often used as an abbreviation for *visual communication design*, which is associated with graphic design (Løvlie, 2016; Frascara, 2004; Yates & Price, 2015). Løvlie (2016) frames communication design as a design practice beyond how the term normally is used for research.

Designers' approaches and communication design perspectives on social media have been little explored in research – with a few exceptions (Morrison, Westvang, & Skogsrud, 2010).

Computers, smart phones, tablets, and wearable technology can handle increasingly larger loads of graphics and animations, and our screens are becoming more fine-tuned for typographic details that are enabled through "typographic kits," tools containing selections of typefaces that were previously unavailable for the web. Today, designers have access to software that helps them code without much knowledge of coding, and the development of software and hardware now enables a larger span of expressions and social media interactions. In this article, I explore these opportunities in terms of how we may construct the meaning we aim to shape, through the variety of possibilities we have available while designing for social media expressions. I focus on two main features: *typography* and *layout*. First, I will frame the spaces that I study as *conversational spaces*.

Defining conversational spaces

Many of the well-known social media interfaces of today are defined as *social networking sites* (SNS). Researchers have defined these to include a complex social system with user profiles, lists of relations, and newsfeeds with user-generated content (Boyd & Ellison, 2007; Ellison & Boyd, 2013). Although this definition may describe Medium.com (as a user-generated magazine), it is poorly suited for describing interfaces that provide conversations in editorial online newspapers and magazines. Such interfaces can take several forms – e.g., custom-made and low-threshold polls or modular blog comment hosting services for commenting that is often placed below an article (which I will discuss in the following section). These are frequently used by online magazines and newspapers that don't have sociality as their main activity but rather for conversations about a topic that is already introduced in an article or blog post.

Engeström (2005) discussed *social objects* or *object-centered sociality* as possible factors in the success of SNS, building on the work of Cetina (1997) on knowledge objects. Engeström (2005) suggested that successful SNS don't center on *people* but around *objects* – e.g., jobs, photos, URLs, or events. In this view, the blog comment hosting services of online magazines and newspapers have vague social objects focused on debate, discussion or questions, or perhaps even *changing* social objects, depending on the topic of the article that is being discussed.[1]

Similar types of interfaces are often described with terms such as *commenting forums* and *commenting boards* (Santana, 2013, 2016) or *asynchronous online discussion environments* and *threaded forums* (Gao, Zhang, & Franklin, 2013). However, as a designer and a researcher aiming to open up creative possibilities and show opportunities and variety in designed features, I need a broader and *less* definite term that doesn't close too many doors for alternative choices. I describe and frame these spaces and sites as *conversational spaces*: communicative spaces where conversations take place. While framing and describing Medium.com alone, a more specific term could have been used, but when reflecting on possibilities in the design, a specific and precise term would have limited these possibilities. Not all expressions wished for may be defined as *comments*, not all designed structures should be *threaded*, and perhaps not even all discussion environments should be *asynchronous*. The more specific the term is, the less creative opportunities for stepping outside the boundaries can exist. That is not to say that there aren't a lot of opportunities *within* the boundaries of the terms, but rather that I see other possibilities yet little explored in design and research.

It is argued that designs are not culturally and ideologically neutral (Mazé, 2016), and the design, values, content, and expressions of these spaces may shape implications for how users perceive this surrounding space and feel empowered to contribute (Lysbakken, 2017). In my research, I focus mainly on *the designers'* possibilities to guide interpretations, and not various users' many ways of interpreting these choices – though knowledge on users' perspectives is essential for designers.

1 In a forthcoming article, I discuss designs that separate various social objects in these contexts and presents alternative social objects; *argumentation and emotional reactions.*

In this article, I contend that a cultural and communicative perspective on conversational spaces can expand creative potential and help designers see how they shape meaning based on their knowledge and backgrounds. This meaning is socially situated and can change depending on the context for the designs. I also argue that the design of the conversational space can give voices to people and facilitate inclusion and engagement. I do this by analyzing the typography and layout as components of the conversational space of Medium.com from a communication designer's point of view. I further reflect upon the creative possibilities I perceive through an auto-ethnographic approach, informed by a large collection of semiotic resources used in such conversational spaces. I juxtapose Medium.com's designs with other designs to build knowledge that may inform the designs of conversational and democratic spaces online.

Designing for a democratization of debate

Conversational spaces are important platforms for public debate. Medium.com is one example of an interface that facilitates a *democratization of debate*, through its ways of engaging people to participate in public discourse through a user-generated and non-editorial content platform. Online newspapers and magazines that support conversations can also be seen as agents for a democratization of debate. In my doctoral research, I have a particular interest for contexts that have a mission in society to include and engage various people and perspectives in public debate. Yet I find it problematic to believe that the complex issues regarding various people's participation in society are solved merely by giving them a practical and functional possibility to speak out in a public space. Handing out a microphone on a stage will not automatically provide everybody with the liberty to speak their minds. I find that social media that promotes debate is designed with little attention to these complicated issues.

The last twenty years have provided online magazines and newspapers with modular blog comment hosting services (Shin et al., 2013) like Disqus, Echo, IntenseDebate, and Livefyre – pre-designed systems that have made a democratization of debate possible. They can be customized in various ways, as is visible in *Figure 1*, a screenshot from the online newspaper *The Guardian*. These interfaces are giving users the ability to share comments, links, and images, and to view and evaluate other people's contributions. These contexts, technological developments, and modular systems also create various challenges for designers, who must adapt to pre-designed systems that give them less freedom to explore expressions, layouts, visual hierarchies, and conversation architecture. Few newspapers and magazines seem to put resources into building larger systems on their own terms. In addition, modular-based forums are debated and critiqued for trolling, discrimination, sexual harassment, "echo chamber" effects, and polarizing content (Sunstein, 2009; Biber, Doverspike, Baznik, Cober, & Ritter, 2002; Coleman, 2012) Several media houses have closed down their forums and moved discussions to social media (Reuters, 2014; Gross, 2014; Rygh, 2016), giving actors such as Facebook more power, as articles are often shared and

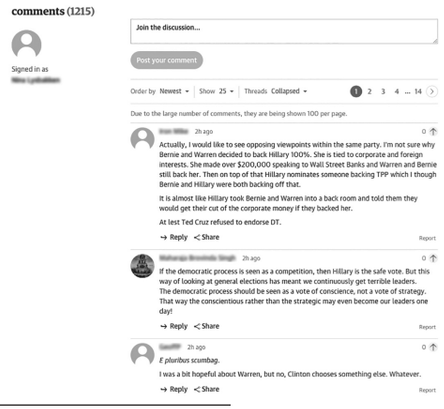


FIGURE 1

The Guardian's commenting field, powered by a blog comment hosting service.

discussed in such platforms, as opposed to in custom-made systems.

Wright and Street (2007) contended that the impact and role of design are underestimated factors in facilitating or thwarting deliberation in online discussion forums. Researchers outside the contexts of online magazines and newspapers have attempted to design, build, and analyze debating systems by challenging common design choices, such as reward systems and information architecture (Faridani, Bitton, Ryokai, & Goldberg, 2010). Other researchers have analyzed the editorial decisions and moderation (Ihlebæk, Løvlie, & Mainsah 2013; Santana, 2016), and the civil effect of anonymity versus requiring a full name (Santana, 2013).

Few (design) researchers have studied the surrounding space, how the digital "room" where conversations take place is formed. Wright and Street (2007) argued that the shape of the parliament may create hostility, which may be transferrable to how the design of online discussions affect deliberation (p. 853):

> There is a longstanding view that the design of parliament buildings, council chambers and the like, not to mention the electoral system which fills those spaces with representatives, affects the quality of the discussion and the nature of the debate (Olson, 1998). For example, the physical shape of the UK Houses of Parliament, with the government on one side and the opposition directly opposite, is thought to create a hostile and adversarial environment, while circular chambers lead to open debate and less vitriol. In the same way, it might be contended that the "shape" of discussion boards affects significantly the kinds of deliberation which takes place within them.

In this article, I initiate an inquiry into how the designer may influence this environment and these surroundings to enforce particular values such as *hostility* or *inclusiveness* in democratic, online conversational spaces.

A cultural perspective on conversational spaces

This article builds upon a cultural understanding of interfaces, seeing the interface as a mediating artifact in which the values and ideology of our culture are mapped implicitly and explicitly (Selfe & Selfe, 1994, p. 485). I contribute to the research that understands interface design from a cultural perspective (Marcus & Baumgartner, 2004; Bolter & Gromala, 2003; Eikenes, 2010; Balsamo, 2011), where culture is understood as a shared symbolic system of signs and meanings (Balsamo, 2011, p. 5). I draw on social semiotics to deconstruct interface features as communicative artifacts. I see the visual and interactive design of social interfaces as the designers' language, consisting of meaning-making signs and components such as typography, images, graphics, layout, navigation, information architecture, reward sys-

FIGURE 2

The redesign of Facebook's "friends icon." Published with permission by Caitlin Winner.

tems, and input options for contributing. How these are designed depends on the designer's knowledge, background, gender, values, and surrounding social conditions, such as the example in *Figure 2*. This shows the redesign of the "friends icon" by a Facebook employee who created the new icon to the right in light of her gender and perspective (Winner, 2016a). These design choices can be seen as inseparable from the culture and time in which we live.

This detailed example is part of a communicative landscape – a component of an environment in which conversations take place. In the analysis of this article, I explore how the designers of the conversational space and surroundings can connote meaning that may direct the conversation, both in terms of *who* they give voice to and *how* these are given voice. I investigate how values and culture can manifest through the design and how designers create this communication. As a designer myself, I see these components as my meaning-making tools to guide the users' interpretations. I can borrow components that carry social significance from other genres to help me shape the meaning I seek.

The conversational space of Medium.com

The case for this article is the interface of Medium.com, as shown in *Figure 3*. Medium is an example of a conversational space that promotes debate and dialogue. Medium is important, as it engages many, while at the same time, it is a concept difficult to categorize. It can be understood as a hybrid between a blog-publishing platform and an online magazine, founded by Evan Williams, also an entrepreneur of Twitter and Blogger. Medium was supposedly intended for more in-depth content than Twitter – content that enhances and raises the quality produced by users (Letzing, 2015). The magazine emphasizes topics such as technology, design, and culture. The platform provides writers with the possibility of a larger audience – instead of writing an occasional post on an unknown personal blog. Users can contribute with social highlighting, comments, and marginal notes (the latter are not provided at Medium.com anymore but are still interesting as a design choice for this article).

Medium.com does not look like a typical blog-publishing platform and is described as *confusing*: "[…] Medium's nature isn't confusing by accident — it's confusing by design" (Dash, 2013). As I will elaborate on in the analysis, Medium does not resemble a homemade personal blog; Medium looks like a serious, in-depth, editorial magazine, but its users seem to have a lot more power in this environment than in traditional editorial magazines. As a designer, I find this compelling and seek to explore how these connotations are shaped through various components. In the following sections, I will deconstruct and analyze the two intertwined components of typography and layout in terms of how I perceive these in a social and cultural context.

2 Caitlyn Winner, a female employee at Facebook, redesigned the "friends icon" in which "the woman was quite literally in the shadow of the man; she was not in a position to lean in" (a reference to Facebook COO Sheryl Sandberg's book and organization for women Lean In). The icon on the left could be seen as connoting an unequal position between women and men, showing the man larger, in front of the woman. The new icon Winner designed (on the right) showed the female and male icon as the same height positioned next to each other. Winner's story seemed to hit a nerve (Winner, 2016b) in a social and cultural context in which the women in the male-dominated tech-environments of Silicon Valley are fighting for equal rights (Pontin, 2014).

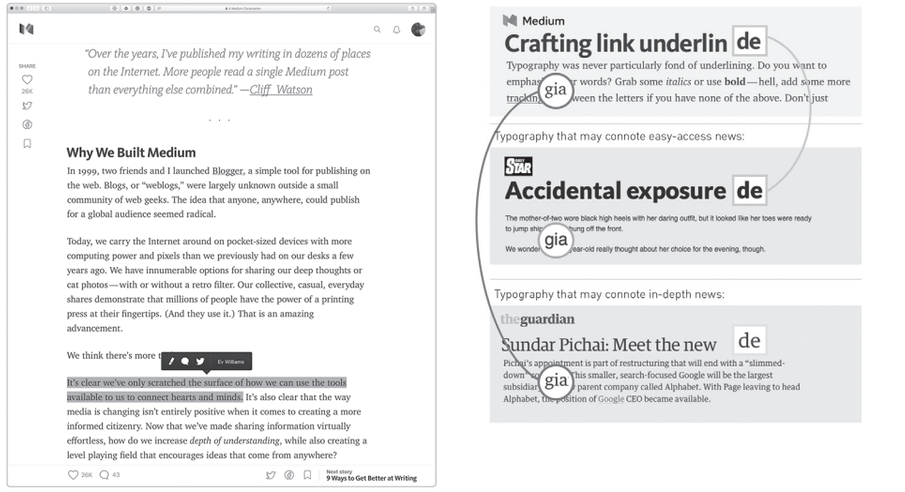


FIGURE 3 (L)

A screenshot of an article at Medium.com, gathered on May 10, 2017.

FIGURE 4 (R)

A collage showing the typography at *Medium* juxtaposed with typography from the *Daily Star* and *The Guardian*. All detail images are screenshots that are downscaled equally.
Author, 2016.

Typography as Communication Design

When graphic designers are working with typography, they can select from thousands of fonts – depending on CONTEXT, *purpose*, platform, **GENRE**, usability, and **communicative** aspects. In this analysis, I show that the choice of typography can influence the meaning of the content in particular contexts. The case for this article is the conversational space of Medium.com, where I find that the typography helps guide the readers' interpretations to an impression of a *serious, in-depth magazine with easily accessible content*. I show this by comparing Medium's typography with typography used in other genres. I argue that using typefaces that are frequently seen within a specific visual genre (such as newspapers) provides "hints" and intertextual references that guide the users' interpretations to the values of these particular genres.

Medium's typography as intertextual references to other designs

Medium's headline typography, shown on top in the collage in *Figure 4*, is set in a bold, expanded sans serif typeface – *FF Kievit* – in black, high-contrast color. The body text is set in the serif typeface *Charter*. The collage compares

Medium's typography with the typography of the tabloid newspaper the *Daily Star* and the more in-depth newspaper *The Guardian*. I demonstrate that the typeface of the *heading* letters of Medium is more similar to the heading letters of the *Daily Star*. The *body text* letters of Medium, however, are more similar to those of *The Guardian*. I argue that this is an instinctive (but perhaps unconscious) choice by the designer – to use intertextual references to other designs in order to guide a user's interpretations of Medium to the specific values for which these contexts stand.

The previous designer of Medium described his typography choices in terms of how the different typefaces matched and shaped meaning about Medium's brand:

> The preference of *Freight Sans* [earlier heading typeface replaced by *FF Kievit*] was used because it had more personality than the "corporate" looking *Myriad Pro*. Nuances in *Freight Sans* (the form, ears, tails, same x-height, et al.) complimented [sic] *FF Tisa Pro* [body text typeface replaced by *Charter*] much better when set against our brand values/placement. (Taylor, 2013).

The designer also stated that one of the typefaces was perceived as more *formal* and *authoritative*, and that Medium intended to encourage more *storytelling* than *fact-finding* articles. Hence, he chose a "slightly softer, more inviting typeface that would encourage that from our users." The body text typeface was changed to *Charter* (Wichary, 2015), a serif typeface designed with a large x-height that was made for low-resolution output devices in mid-1980. The large x-height of the letters makes the typeface look bigger than it really is and is space-saving, as it demands less of size and line heights. Thus, such typefaces are economic on paper and practical in print and have been made for and used by editorial newspapers, magazines, and books – arenas that required cheap printing. In today's online environments, these space-efficient typefaces now provide little economic and functional value. They are instead being used to communicate and shape meaning about the design – that may influence the conversational space.

In the contexts and arenas of credible newspapers like *The Guardian*, body text typography is normally set in a professional manner – meaning it takes many aspects into account – for example, legibility: Shorter line lengths (the amount of letters in a line length) enable more efficient reading (Dyson & Haselgrove, 2001). Professionally set typography can also provide contrasts in the reading experience (contrasts that we often *hear* in oral language; ***emphasis*** on particular words is set in bold or italics), different levels of headings that group different topics together, and quotes that are separated in the text through indents, italics, lines, or different colors. In addition, professionally set typography takes aesthetics into account. Researchers have previously studied the aesthetics of the reading process and have demonstrated that high-quality typography can induce a good mood in the reader (Larson, Hazlett, Chaparro, & Picard, 2007), though the readers may not be able to spot the details of the typography themselves. Medium.com is setting its typography in this type of professional manner, with attention to the details (Wichary, 2014, 2015) of line lengths, line heights, font weights, and contrasts.

FIGURE 5

A collage of various tabloid newspaper front page screenshots, showing bold sans serif typefaces as headings, similar to Medium's heading typography. These may be used as references to communicate easy-access news.

A graphic designer's training involves sensitivity training for these subtle differences in typefaces and the contexts in which they were made. We make our choices by reflecting on what the design is conveying and then revising and changing it to make the design communicate what we intend.

Designers, but also readers, are accustomed to seeing this professional typographic treatment in the context of in-depth newspapers, magazines, and books. These publications have a historically strong reputation of credibility and quality, as opposed to today's reputation of non-editorial blogs. Edited, educated, and "selected" voices still seem to carry meaning as more trustworthy in our culture, though perhaps more challenged by social media and the recent focus on "fake news" (Marchi, 2012). The term "blogger" is often characterized as *unprofessional*, even though a blog voice can be either a prime minister or a twelve-year-old. When Medium – a blog-publishing platform – is using typefaces and professional type treatments that are frequently seen within particular newspaper genres and *not* within homemade blogs, it is probably because the designer intended to guide the readers' interpretation to specific values. I contend that Medium's use of body text typography shapes the meaning that guides the reader to interpret Medium as a credible, in-depth magazine of quality.

Initially, I wrote that the headlines of Medium are more similar to those we can see in tabloid newspapers like the *Daily Star*. Most tabloid newspapers use similar bold or heavy sans-serif typefaces in contrasted black or white, as can be seen in *Figure 5*. This context is not known for its in-depth reflections but for more *lightweight* and *easy-access* news. By choosing this type of heading typography, Medium may be using an intertextual reference to a typographic convention that will guide the reader to interpret such values of tabloid newspapers.

In questioning the design of conversational spaces, it can be interesting to ask what meaning could have been constructed if Medium had deliberately chosen, for example, a handwritten typeface or a `monoline typeface` for its headings – or a COMIC FONT or a more generic body text typeface like the sans serif typeface used in the *Daily Star*. What if the body text was set in a less professional manner, perhaps with less emphasis on details, craft, and levels? How would that affect our interpretation of the conversational space of Medium? Could it have insinuated a lower quality of content or less reflected voices?

In this section I found that Medium's choice of typography can connote a *credible* and *in-depth* conversational space – yet one with *easy access*. This may be seen as contrary to the popular, quick, and easy social media services such as Twitter, where in-depth texts are not encouraged in the design.

Layout as Communication Design

Designers of digital interfaces often use the layout (in combination with other components) to symbolize and guide the readers to understand what

genre they are looking at. Is it a magazine, a personal blog, a game, a book, or a dating app? We rarely see dating sites presented with the layout of a newspaper front page, though that could be an interesting approach. In the physical designs of visual communication, the *format* and *material* are perhaps the main communicators of genre and content – like the large size and cheap, light paper of newspapers or the smaller size and glossy paper of certain magazines. In digital interfaces, the format can be a mobile screen or a desktop screen and tells less about the content of the interface. The layout may therefore be a more important feature to communicate content in digital spaces.

In this section, I find that a communicational understanding of layout design is useful for me as a designer. I also reveal that the design of a layout can be used as a tool that influences the meaning of a conversational space. By comparing Medium's layout to other layouts and analyzing it as a semiotic resource, I show that the layout can symbolize power relations. Drawing on Selfe & Selfe (1994), who argued that design can reflect ideological, political, economic values, and hierarchies adopted from real life, I suggest that the design of Medium can be interpreted as a social arena where users' opinions are highly valued.

In my Western culture and language, we often use metaphors to symbolize hierarchies and values – for example, *top* or *bottom* can indicate that a person at the top is of *importance,* or the bottom can denote *insignificance*. Hence, placing an element at the top or bottom of an interface can also be understood as a signal of power relations, similar to other meanings that may be shaped by composition: left and right, foreground and background, relative sizes, and contrasts between objects (Kress & Van Leeuwen, 2006, p. 183). Kress and Van Leeuwen (1996) argued that this integration of various semiotic codes is the work of an overarching code with rules and meanings that provide the multimodal text with the logic of its integration. This overarching code, may be related to for example specific intended values or even ideology. Whereas I previously found that Medium's typography helped communicate values of *trustworthiness, credibility,* and *quality*, I found – on the contrary – that Medium's way of designing the layout of articles is *distancing* itself from the references and traditional design of editorial newspapers and magazines.

A layout that gives voice to people

Traditional editorial newspapers and magazines often emphasize the editorial voice and play down the users' voices by placing the article on top and users' voices at the bottom of the site, as shown in the example on the left in *Figure 6*. Medium's design can be interpreted as elevating users' voices and adding value to users, due to their choice of layout. In Medium's layout, users' voices are placed in several positions within the layout, as visible on the right in *Figure 6*.

In existing online newspapers and magazines, users' comments on online articles are often enabled through a modular blog comment hosting service like Disqus, IntenseDebate, or Livefyre. For editorial newspapers and magazines, this layout may be a natural choice, as users' voices normally *are* regarded as less important than the editorial content. Editorial newspapers have a history of being the "lecturer" of a passive listener. For Medium, however, users' voices and the discussion around the article are the essence of the concept and a fundamental part of their values. Medium is also a product of its time, a time in which users' involvement and participation are regarded as highly important.

FIGURE 6

A juxtaposition of the layout and placement of users' voices in an editorial newspaper on the left (here shown by an article at Guardian.co.uk) and in a Medium.com article layout on the right. Author, 2016.

In *Figure 6*, I show that Medium placed users' voices over the *whole* article layout (highlighting, marginal notes, and comments), though the users themselves are also writing the articles. The users' comments on the articles are positioned both at the bottom of the site and on the side of articles as marginal notes. The marginal notes have changed over time, becoming *Medium Notes* and *Medium Responses*. Marginal notes are not a new feature of social media; the annotation and highlighting of text are visible in books from the 1500s, such as *De Humani Corporis Fabrica* (1543) (Meggs & Purvis, 2011, p. 113), and have also been a topic for research on annotation practices for digital libraries (Marshall, 1997). In social annotation, other users' highlighting is seen as valuable information. In the context of online magazines and newspapers, however, this is a rarely used feature. For this article, the social highlighting and marginal notes of users' voices are interesting, because they can be interpreted as a design feature that emphasizes and lifts users' voices upwards in the hierarchy and layout. If I look at users' voices and the layout of these in other social media concepts, I can see that the placement and position of users' voices varies. In *Figures 7* and *8*, I show the layouts of Opinion Space and Soundcloud, two social media concepts that promote commenting and discussion. Opinion Space has a layout in which users' opinions are represented as dots in an open space, almost signifying glowing stars in the universe. Soundcloud is designed with a layout that is structured on a sound clip timeline. This type of layout does indeed shape the conversation, because users *have* to comment at a specific point in time and not at the end. Marginal notes perform similarly; the user can choose a specific place in the article to discuss or highlight and does not have to search for the end of the text before highlighting or commenting. What meaning could these variously designed choices shape, and would they change the conversation? Would the timeline structuring shape more detailed and concrete conversations on specific elements in the sound clip

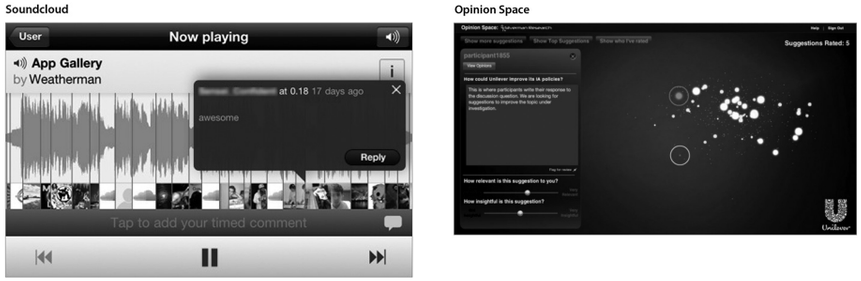


FIGURE 7 (L)

A screenshot of the conversational interface of Soundcloud. Soundcloud is a space where people can upload sound clips and get feedback from others. The conversation is structured on the timeline of the sound clip, meaning one must comment on a specific moment in the sound clip.

FIGURE 8 (R)

A screenshot of Opinion Space, a tool designed to help communities generate and exchange ideas about important issues and policies (Faridani et al., 2010). The layout of the interface is designed as a graphical "map," an open space with opinions represented as dots. These may resemble glowing stars in the universe, implying that everybody's opinion constitutes the universe. When a dot is pressed, a person's opinion becomes visible at the left, and users can express their agreement or disagreement with that opinion.

and not a holistic conversation on the *entire* clip? Does commenting *below* articles provide a discussion that evolves more around the holistic reading experience of the article?

In order to see possibilities and meaning potential in these layouts, I look to metaphors. Perhaps the designs of Medium and Soundcloud can be understood as similar to a lecturer who asks for questions *in between* – questions that guide the lecture. This choice could signify a lecturer's flexibility and curiosity. A metaphor for the editorial newspaper's classical layout with the comment field below might be similar to a lecturer who demands questions *afterwards*, which may signify rigidness but perhaps also integrity and knowledge – depending on who the lecturer is and how the audience knows him or her. A third metaphor for the layout of Opinion Space could be the lecturer who doesn't lecture but *facilitates* conversations and debate on a topic. Metaphors such as these are used throughout a graphic designer's education while constructing visual identities and thus may help a designer understand the potential meaning one can create with the designs of conversational spaces.

In this section, I have shown that the designer can manipulate connotations and communicate social hierarchies through the design of the layout. Knowledge about the context and how readers perceive this context is essential, as one online newspaper known for certain values may not be able to choose the same layout as Medium with equal success. I found that the layout of a conversational space can carry meaning in the same way as images and typography. In addition, I discovered that the combination and placement of elements may emphasize or devaluate users' voices. This is important knowledge for a designer to be able to reflect upon while improving sketches and concepts, as these design choices may create various opportunities for people to contribute in conversational spaces. In the following section, I will discuss different opportunities in the design process that can shape different meanings and implications.

Reflections on Creative and Strategic Possibilities when Designing for Conversational Spaces

This analysis shows that designers prioritize and emphasize different aspects with the features they have available. This prioritization shapes the surroundings of online newspapers and magazines, and can alter people's expectation

to the conversational space. Medium's typography can connote something about the *brand* Medium and the *genre* of online magazines, whereas the layout may communicate something about *users'* importance. Designers are often consciously or subconsciously prioritizing *what* to communicate, and hence makes choices that may have implications for how users perceive the space and the atmosphere surrounding the conversational space.

These reflections are divided into two parts: 1) reflections on *what* designers choose to prioritize through features such as typography and layout and 2) reflections on *how* designers choose to communicate through their designs.

Reflections on *what* designers prioritize to communicate

It is fundamental for designers to understand which components they can use to shape meaning about the conversational space; which elements can be prioritized in the visual hierarchy, but also *what* these components communicate to the user. As a younger designer, I would quickly and by default choose a magazine layout with titles and picture placement that I had seen in other magazines – picking references from the same genre, rather than picking from a completely different genre, such as one in which users were a larger part of the concept. Visual conventions would limit the creativity of my designs, and I chose components less consciously from within the genres I knew. I also automatically assumed that magazine typography should be used as a semiotic resource to communicate something about the *genre* or *brand* to distinguish it from other magazines. The following list includes four different aspects to communicate that can all represent different values. Hence, these may shape different surroundings for conversational spaces, and influence how users interpret the space.

Prioritizing to communicate something about the genre

As pointed out earlier in this article, typography and typefaces with a large x-height that are custom-made for newspapers can be used to communicate that the design is within the online newspaper *genre*. Images can also be used as components to communicate genre, such as in traditional *women's magazines*, with distinct types of photographs; beautiful women, poses, clothes and colors (Lysbakken, 2017). Layouts of dating apps is another example that is perhaps developing into a visual genre; we rarely see dating apps with a similar layout as online newspapers front pages – though a long front page consisting of images and titles could shape a different meaning and connote the "news" of single people. A different meaning arises when designers breaks with some of these well-known references and features – like Medium does when building on newspaper typography, yet distance themselves from the online newspaper layouts where users and commenting forums are placed at the bottom. In Medium's case, it was perceived as *confusing by design*, which can connote that it is "untraditional" or "different." These connotations related to genre, may also challenge the user's preconceived idea of what types of conversations the space may contain.

Prioritizing to communicate something about the brand

FIGURE 9

A screenshot of the Norwegian online newspaper Aftenposten showing diverse typefaces and styles that shape categories of content.

This can be done by using the same typeface and type treatment for *every* article in the magazine, making the website and the brand Medium.com immediately recognizable and understood. It is common to use different typography than one's competitors, *The Guardian* is one of several editorial newspapers that has a professional, custom-made typeface that is used throughout the newspaper. Most readers are probably not aware of details in the typography, but many will still recognize articles in this typeface as The Guardian. This is relevant to conversational spaces as users may draw on their diverse interpretations of such typefaces or other components while shaping their immediate and preconceived opinion about the space. Depending on how users know contexts such as The Guardian, they may draw on these values also when seeing the same typefaces in new contexts. This means that if users interpret The Guardian negatively as a *top-down*, *superior* newspaper – or rather as a *serious* and *reflected* newspaper – they may carry with them these preconceived ideas when initiating conversations in the space. This way of communicating and enforcing the brand is done through the many components of visual language, such as the use of image manner (format, filters, poses, angles), graphics (style), colors, and layout. A different approach could be to tone down the brand awareness and importance, and rather emphasize what *type* of space it is, or users' voices.

Prioritizing to communicate something about article content

FIGURE 10

Screenshots of print covers of Wonderland magazine with various typefaces used to shape meaning about a person and an article.

Another aspect to communicate is the content of each article. It is less common to use typography as a feature to distinguish between every article but rather common to use images instead as differentiator. The example in *Figure 9*, a screenshot from the mobile version of the Norwegian online newspaper *Aftenposten*, shows how various typographic styles can be utilized to distinguish between diverse types of articles. Another example, *Figure 10*, are the front pages of the *Wonderland* paper magazine, where images and headline typography communicate something about the represented cover person and story. This could nudge users to discuss the person itself, as opposed to a topic. Online magazines where the typography is applied to communicate something about *each* article are rare. Such an illustrative approach to designing magazines was used in the experimental *Emigre* paper magazine (Barness, 2016), and may connote values such as *different, untraditional, explorative* or *radical*. Such focus may also communicate something to users about the importance of the article content, in this particular space. It may also serve as inspiration to how we may differentiate the design of different conversational spaces and modules within one magazine or newspaper.

Prioritizing to communicate something about users' content

How designers present users' input and comments is a matter of visual emphasis. As I have shown with Medium, the layout may give users' voices visual emphasis by elevating these in the visual hierarchy. How could Medium, online newspapers and magazines emphasize and present users'

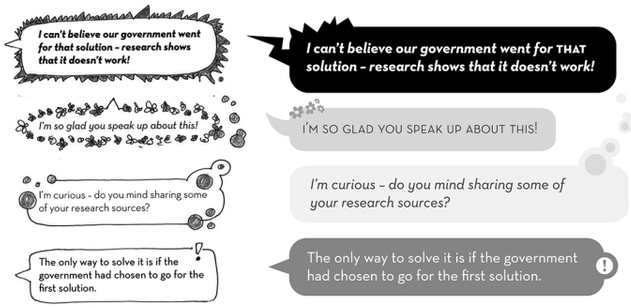


FIGURE 11

Using graphics and typography to emphasize and visually prioritize users' voices. The top comment is intended to denote anger, the second joy, the third curiosity, and the fourth a more emotionally indifferent comment. If the comment in the last grey bubble was visualized in the black angry bubble at the top, the content might have been interpreted differently. This visualization will be developed and further discussed in a forthcoming article. Author 2015.

voices in diverse ways? One option is to communicate something about the *content, atmosphere,* and *emotions* of users' comments, as my sketch in Figure 11 shows. In this way, the visual design attempts to help the reader understand the "body language" and tone of voice behind the comments – an aspect that is less communicated in the design of commenting forums. Other ways could be to use font sizes to differentiate between important and less important voices, or to use layout to extract certain voices. Such an approach would emphasize conversation and users, and communicate that users are not included as a "hidden" and obligatory aspect of the concept, but rather as valuable voices that influence the entire concept.

Reflections on *how* designers choose to communicate

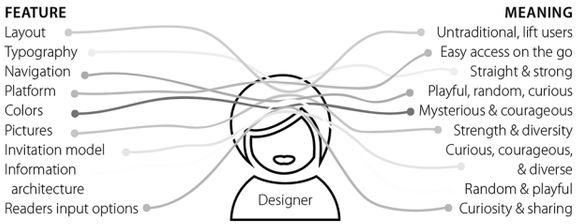
Identifying *what* aspects may be communicated and *how* these can be communicated through design features is important, as it may provide designers with creative possibilities and innovative solutions. As a designer, I often borrow design features and conventions from my surrounding world and from the knowledge I gain about different contexts and genres. Challenging common choices in the design of conversational spaces could contribute to shaping inclusive and engaging interfaces. Particularly if one considers how these design choices affect the meaning that supports the strategic goals for the space.

Combining and balancing meaning-making components

When designing a living room, a designer may build the whole room around certain values and perhaps a particular object, like a sofa – a prioritization that leads and balances the design of the surrounding elements. If the goal is to create an informal and relaxed playroom for kids, the designer likely would *not* choose an old-style, firm Chesterfield sofa that demands straight-up sitting. A good designer might be able to make it work, but the choice will have consequences for balancing the rest of the elements in the room. When designing for online conversational spaces, we can think similarly: If shaping an easy-going and informal space for kids, we may not choose a renaissance serif typeface and avatars with serious faces, as these often function as references to *serious* or *formal* contexts.

MODEL 1

A model that exemplifies how diverse design features can be used to shape and balance different meanings. Author, 2016.



I build on the notion of *design as a balancing act,* not only as balancing various interests and goals (Lurås, 2016, p. 28), but also as balancing meaning-making components. In the previously mentioned visualization in Figure 11, the features of typography and graphics were used to shape connotations of users' emotions, and also as a way of demonstrating the importance of users' opinions. In the analysis of Medium, I showed how typography is used as a feature that can signify a conversational space that is *credible, in-depth* and yet with *easy-access*. I designed Model 1 to exemplify these ways of designing diverse features to shape diverse connotations about the surrounding space. This complex mix of intended connotations shapes the holistic design.

These design features and connected meanings are often balanced against the concept values and strategy. Medium chose to use the *layout* as a feature to make visible and elevate valuable user comments, but other features could also support this. *Typography* could, for example, be used to show comments of high value in a larger type size. *Color* could be used as a feature to emphasize valuable comments. Perhaps selected users' comments could have *graphics* or *images* to accompany them and support these comments' messages, as visible in Figure 11. What meaning could be formed if a magazine had an architecture that was structured with front page titles in *alphabetical* order instead of being based on *time* and *importance* as many are structured today? Or what if the conversation below an article was structured on categories of selected emotional reactions rather than on the most recent published comment? Perhaps it would connote a radical magazine that relies less on being *current* and *fast*. What would these choices do to the space and the conversations?

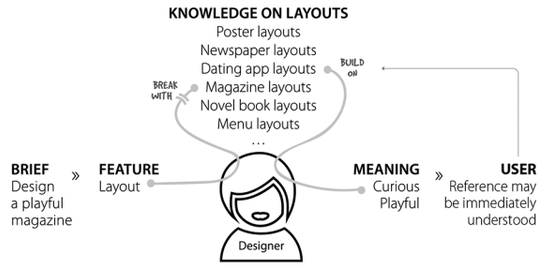
The ways of designing features and combining these are unlimited. I suggest a larger awareness of possible choices and a creative attitude toward exploring components and meanings – rather than only being informed by the choices that are common in our time. I also suggest that more knowledge is needed on the implications of these design choices.

Selecting design features and intertextual references

Prior to my work as a researcher, I was aware that I sometimes referred to other designs through the pictures I used. I was *not* aware of how tied I was to *visual genres* – that I automatically picked, e.g., a traditional magazine layout when the design brief said "magazine." I have realized that my designs could have been more innovative if I had chosen to be inspired by layouts within other genres as well. In Model 2, I have exemplified this process of drawing on inspiration from different genres and contexts to shape a

MODEL 2

A model that exemplifies how the designer chooses features and conventions from various genres and contexts in order to shape a particular meaning. Author, 2016.



particular meaning in a design. At Medium, the layout of the magazine article draws more on other types of social media platforms – where users are regarded as quite important – rather than on traditional magazine layouts.

In Model 2, the designer intended to shape a mobile magazine on a given topic, that represents the values of *playfulness* and *curiosity* and hence searched in her mental library to find a visual genre known for these values. She then borrowed a layout reference from the context of playful dating apps (a layout with one large image and title on the front page in addition to the navigational features of swiping to the next "headliner") that can connote these values. The designer therefore broke with todays' conventional magazine layouts (a layout with many images and titles down a long page) in order to communicate the concept values of *playfulness* and *curiosity*. Such use of design references, requires that the user knows these references well enough to make these – often instinctive and unconscious – connections. A case of an online magazine design where unconventional designed choices in layout is made, is explored and analyzed in terms of gender perspectives, ideology and power (Lysbakken, 2017).

Knowledge required to shape meaning through the intertextual references of design features

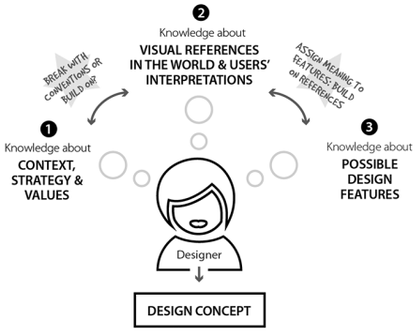
A designer may therefore both *build on* and *break with* the conventions of design references, like Medium built on typographic references from other types of newspapers, and broke with their layout references. I find that in order to do this successfully, it requires that the designer both has a broad knowledge of visual genres in general, but also of the genres and contexts the *user* knows. As mentioned, such use of references requires that the user knows these references well enough to make subconscious or instinctive connections. In this article, I mainly address the designer's choices in guiding interpretations and using references to existing designs, but a designer's knowledge must include information on users' perspectives, needs, objectives, interpretations and diverse ways of engagement with the interface.

In Model 3, I address the different types of knowledge required to design for communicating with users within a culture. She needs 1) knowledge on what to design for – the context, the strategy, and the values to be communicated; 2) general knowledge on the visual references in our world and specific knowledge on users' visual references and how they interpret these; and 3) knowledge on what possible design features she can use to communicate through and how she can assign meaning to these.

A designer who is already interested in skateboarding may,

MODEL 3

A model showing the knowledge a designer needs in order to shape meaning in the design. Author, 2017.



for instance, have an advantage when designing for readers who are skaters, as she knows about the cultural codes and visual language in skating magazines and movies. She may also be able to transfer these codes to other contexts to represent the values connected to skateboarding culture (e.g., playful, laidback, cool, and casual). The benefit of designing for one's own generational group is supported by research (Mainsah, Brandtzæg, & Følstad, 2016).

I argue that by combining features and meanings from different genres and contexts the user has knowledge about, we may shape new meanings – unexpected, surprising, interesting, or innovative ones. This is not just valid for conversational spaces and their surrounding space, though that is the context for this article. This process requires reflection while mixing social contexts, values, design features, users' references, and signaled meaning.

Conclusion

Designers can benefit from understanding interfaces and social media spaces from a cultural and communicative perspective. Through the analysis of design choices at Medium.com – an online conversational space and a hybrid between a blog-publishing platform and an online magazine – I demonstrated that various components, in this case layout and typography, can connote different meanings depending on the context. These meanings may alter people's expectations to the conversational space.

By using intertextual references to other design features from diverse contexts, these features can carry meaning that transfers to a new context. To see various components in this light has helped my understanding, thoughts, creativity, and reflection in the design process. Rather than choosing components that are common to use when designing for interactive environments, I see that the details and opportunities in each component can carry meaning that changes the holistic perception of the design. Designers should understand which features they may influence creatively, and expand their library of possible references and semiotic resources to draw on – but also distance themselves from – in diverse contexts.

Designers need knowledge and awareness of their own (sometimes unconscious) ways of collecting semiotic resources and building new designs from their mental library of these. The designer is not a neutral creator but a creative source of values, interests, and abilities that may inform different designs. An awareness of *what* designers choose to prioritize in their designs and *how* this is emphasized in the visual hierarchy through particular features can enable new possibilities that better communicate the underlying concept and values.

Graphic designers and visual communicators are also needed in the early conceptual stages of the interaction design process. They are often trained with an emphasis on communication, intertextuality, values, and strategy, as opposed to interaction designers' emphasis on use and functionality.

The design of the surroundings of conversational spaces may change how we communicate together. The designed components may shape conversational spaces and democratic spaces by communicating inclusive (or exclusive) values, changing power relations, and challenging readers' expectations to different voices in society. Hence, the design may influence the reputation of new public voices in conversational spaces. I find that more knowledge is needed on these issues. In the future work that forms part of my doctoral research, I will explore the designer's language in these conversational spaces and social media components further. I explore how the design of components such as *input options*, *conversation architecture* and *reward systems* may have an impact on the conversations for which we are designing.

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Author

Nina Lysbakken is a Norwegian designer, researcher and lecturer who is currently doing a PhD in Interaction design at the Oslo School of Architecture and Design (AHO). Her PhD is part of the delTA research project focused on social media and democracy, funded by the Research Council of Norway. She has previously studied design and visual communications at Bergen Academy of Art and Design, Nuova Accademia di Belle Arti in Milan and NTNU Gjøvik, in addition to entrepreneurship studies at University of California, Berkeley. Her work has been awarded several prestigious awards in Norway, including The Norwegian Design Council's Young Talent of 2011, in addition to Gold and Silver at Visuelt 2009 and 2011. Lysbakken was previously board member of IxDA Oslo. Her interests range from communication design, social media, design for conversations, speculative and critical design, feminist perspectives, activism, popular culture, public spaces, and design for education.