Exploring perceptions of

braille on common everyday objects

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the requirements for the
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in Inclusive Design

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Exploring perceptions of braille on common everyday objects

Ambrose Cheuk-Wing Li, Master of Design in Inclusive Design, OCAD University, 2015

Abstract

Tactile writing sometimes has an advantage over purely visually presented text. As a form of tactile text, braille might be usable for tactile writing. If braille as tactile writing is usable on everyday objects, the amount of braille in the environment would increase and people might be encouraged to learn it, simultaneously addressing the decline in braille literacy. However, sighted individuals might perceive braille negatively. A preliminary study was thus conducted to gauge possible negative perceptions. A number of brailled and unbrailled ceramic bowls were fabricated and distributed, with questionnaires, at a public event. The process of fabrication and the questionnaire responses suggest adding braille to studio ceramics is not straightforward, but a resistance to the addition of braille to objects is not expected. The study was limited in scope and the exploration of additional techniques, development of specialized tools, and further studies involving different objects and materials are recommended.

Acknowledgements

This project would not have happened without two groups of people.

First of all are the many with a connection to the OCAD U Ceramics Studio—the many in the OCAD U Throwing Club who introduced me to the art of ceramics, and my studio mates who treated me as an equal even though I have never taken a single ceramics course, but above all studio technician and ceramics instructor Robin Tieu who drilled into me the importance of ergonomics and usability and material properties, and provided me with much needed advice, technical support and accommodation in the area of ceramics, despite not being an advisor to my MRP.

Also are the people who have encouraged me to explore and stay on this course—Lester Leung, the first to suggest to me that merging ceramics with my MRP was even a possibility; Peter Coppin, the first professor to make the same suggestion; and my thesis advisor Barbara Rauch, for accommodating my unusual direction.

Lastly, I must mention Jan Derbyshire, Angela Punshon and Qi Chen from my first-year course "Inclusive Design Laboratory", during which we formed a group that we called an "artists' collective" and that we named "32 Pigeons." Although our group has, for obvious reasons, been inactive and despite the fact that I can trace my project through my own encounter with braille and ceramics, this project still turned out to be at least somewhat "32 Pigeons" in character, and as such is very much indebted to it, if only in an indirect way.

To the valiant ones—

the Dickin Medal–worthy

thirty-two pigeons

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Foreword

My encounter with ceramics

I had my first encounter with ceramics in my first year at OCAD University, through the OCAD U Throwing Club. In fact I encountered it during orientation week, which was interesting because by that time students in my program had already finished an entire semester during the summer.

I mostly neglected ceramics at first, but by the Winter semester I noticed that while we were talking about ergonomics and usability in class, in the studio we were putting ergonomics and usability into *practice* and being *critiqued* for them.

My encounter with braille

Orientation week also brought me my first true foray into braille. Being sighted, I had never felt a need to learn it, but near orientation week I noticed a call for submissions asking incoming students to create a self-portrait postcard. The postcards would be shown on campus, which was something I had always wanted to do, so I just felt I should answer the call. However, since I had already finished a semester, I was constantly thinking about how to make the flat, two-dimensional artefact known as a postcard "inclusive." How could a postcard be meaningful at all to a blind visitor, in case there was one? I decided to braille my personal information and a link to a description on the card, *despite* having already been taught that

only a minority of blind people knew braille, and I actually had to go to the local association for the blind to buy a stylus and a slate in order to do the brailling.

This encounter with braille continued throughout my first year, first when I tried to create, with braille, an updated business card for a conference, then in a course called the Inclusive Design Laboratory (a first-year studio class), when my group decided to produce—in lieu of a design artefact—artworks in response to actual calls for submission. After going through many different ideas, we settled on producing a window-sized installation tangentially based on the braille code. I then went on to create the information panels describing our work, intentionally adding braille on the panels—and considering the braille first and the type second. I was confronted as a result with questions: How can blind people actually find brailled signs? And how can they avoid accidentally knocking off any fragile objects that happen to be between them and the signs?

The confluence of the two

By second year I began experimenting with clay marbling. One day, while I was in the studio, I realized that on marbled clay, the usual way of making marks on clay—by carving—was producing text that was hardly legible (Figure 1). I realized that tactile writing, if feasible, could potentially solve this and similar legibility problems, and I realized that braille, as a standardized form of tactile writing, should have the potential to benefit sighted people: If we can succeed in putting such tactile labels (which are in fact braille) on objects that we encounter every day, blind people who do not yet know braille might even find a renewed motivation to learn it, thus simultaneously addressing the current decline in braille literacy.

The decline in braille literacy

I mentioned earlier that we had been taught—albeit simply as a fact—that only a minority of blind people knew braille. And confirming a low rate of braille literacy is not difficult, as this

has been cited by many in academia and the popular literature alike, for example by Johnson (1996) or Franks (1998) in journals, Guerreiro, Gonçalves, Marques, Guerreiro, Nicolau, & Montague (2013) in a conference, or Aviv (2010) in a mainstream newspaper. In fact, as Aviv states, the literacy rate is not only low, but is in decline. But exactly how many blind people are in that literate minority? Aviv cites "fewer than 10 percent," but it is interesting to track down where this figure actually came from. Aviv, who wrote her article in 2010, based her figures on an article written in 2009 by the National Federation of the Blind (NFB, 2009), but NFB actually based its figures on an earlier article written in 1996 by the American Foundation

Figure 1. Carved text on a marbled surface is virtually illegible, but it is in this case also about the same size as a standard braille cell

for the Blind (AFB, 1996). Taking a closer look of the AFB article, however, reveals that this number is not based on hard data at all, but, as AFB acknowledged, on a survey "conducted in the late 1970s" and "adapt[ed]" (i.e., extrapolated). Although the figure is considered credible because "[a]s assessed by experts... AFB's estimate is considered at the high end of a plausible range," we should nonetheless keep in mind that "[a]lmost all statistics on blindness are estimates" (NFB, n.d.) and in this case it is an estimate based on data gathered 40 years ago. Spungin (1996) summarized the situation very well when she wrote that there is a "lack of consistent, accurate numbers."

Setting the question of numbers aside, what is the reason for the decline? NFB (2009)'s newer article proposes that the cause is at least fourfold: a "teacher crisis", a "spiral of misunderstanding", that "blind children with low vision are deprived of braille instruction", and a "paradox of technology". However, the literature appears to suggest that most efforts to combat this decline have been focusing only on either new teaching methods (such as Drezek, 1999) or teacher training (such as Franks, 1998)—in other words just the first problem.

Meanwhile, accounts such as that recounted by Kleege (2006) suggest the decline to be related to a lack of braille in our everyday environment. This is certainly a plausible view, particularly in light of Clark & Stoner's (2008) assertion that "[s]ighted children are exposed to print at a young age and in a variety of media" but "Braille readers typically have limited experience with print and with incidental experiences that are important in the development of preliteracy skills," or Lamb's (1996) assertion that blind children "have fewer opportunities than do sighted children for incidental learning." If the absence of braille is the reason (or at least *a* reason) for a perceived uselessness or irrelevancy of braille, and such a perceived uselessness or irrelevancy is the reason for the decline, then the lack of braille in the environment will take on a fundamental significance that needs to be addressed. It seems reasonable to suggest that one way to effectively combat the decline should be to increase the amount of braille in our everyday environment, such as by putting braille onto mainstream everyday objects.

Everyday objects

Let us step back a little and consider what I mean by "everyday objects." When Betts (2004) set out to talk about "the authority of everyday objects," he was focusing on industrial design (in particular West German industrial design), and when he mentioned "the styling of these everyday objects" (p. 4) he was referring to "modern designed objects" (p. 4) or "commodity styling" (p. 1). However, despite the focus on designed objects, the "everyday household objects" (p. 2) that he referred to earlier included such things as china, glassware, and furniture that can at time be related to the crafts instead of to modern design. Even within Betts' narrow focus, it is an object's "ability to affect the daily lives of all West Germans" that makes it "everyday." Design is not a necessary condition for an object to be an "everyday object"; it is its relationship to our everyday lives.

"Everyday objects" are things like spoons and cups (Williams & Kendell-Scott, 2006, p. 56), taps and light switches (p. 56), or forks (p. 6). They are "material items that are regularly used in mealtime and washing routines and which can be manipulated by the hand" (p. 53). But it is interesting to note that the term "everyday objects" is often used without being defined (such as in most of the remaining chapters in Costall & Dreier's (2006) book on "the design and use of everyday objects"). If we really have to define it, Attfield (2000) defines "the everyday" as "meaning ordinary, common or garden, usual, informal, banal, unremarkable." (p. 50), and Caple (2006, p. 1) defines an "object"—or, equivalently, "artifact"—as "any physical entity created [or, equivalently, formed] by human beings."[1] For the purpose of this

1 That objects should be physical things is certainly the accepted view within the art tradition, but I claim that such a restriction is actually quite unwarranted. Design spans different traditions, and if we venture out into the engineering tradition, we find in computer science that the word "object" often refers to *non-physical, abstract* constructs, such as when Weisfeld (2009, p. 6) defines it as "an entity that contains both data and behavior." In fact, when Dahl, Myhrhaug, & Nygaard (1970) put out the second edition of *Common Base Language* for Simula more than 40 years ago, objects (p. 6) as immaterial, abstract constructs was by then already not even a novel concept. Given the

project, I am going to use the term “everyday object” to refer to any physical thing that reasonably can be expected to be frequently encountered in our daily lives.

pervasiveness of technology use in art these days, I regard the art tradition’s insistence that objects be physical both unnecessary and behind the times.

The questions

As mentioned earlier, the project started as a technical problem encountered in the studio, one of legibility, namely: How do you read any text on a surface when the material has so much colour variation that the text becomes visually illegible? (Figure 1) Even if the text were filled with a solid colour, a large amount of colour variation will make the text hard to read, and if the text contains important information, such as an instruction on how fabrication is to proceed, this will be more than an issue of visual aesthetics but one with practical implications.

I also mentioned previously that one possible way to address this issue would be to take advantage of the sense of touch, which is unaffected by colour variation. While one might be able to discern text carved into a surface, a standardized embossed code might be easier to discern, and we might not even need to invent a new code, because a standardized embossed code already exists and it is called braille.

In the example given in Figure 1, the important information is given by the number "6", which indicates a mid-fire "cone 6" clay, in contrast with the other possibility in this studio, "04" which indicates a low-fire "cone 04" clay. Subjecting a cone 04 clay to the much higher cone 6 temperatures will cause melting, while subjecting a cone 6 clay to cone 04 temperatures will prevent the finished artefact from gaining the proper strength. It is therefore vital to discern this number on the object when there is any possibility for mixups.

The digits in the example in Figure 1 are also approximately the same size as a standard braille cell. In this and similar situations, replacing or augmenting this carved text with braille should therefore be practical, provided that braille can be feasibly embossed and the embossed

braille will not be too easily damaged. Even if sighted individuals cannot be expected to understand braille, being able to distinguish a one-digit code from a two-digit code still seemed feasible, so braille should have the potential to benefit even sighted individuals, at least in some situations.

Taking this further, if braille has the potential to benefit sighted individuals, why not make braille a standard part of the product designer's tool set for creating mainstream products, so that the decline of braille literacy can be addressed at a fundamental level? A number of possible questions can be generated by this "seed" question, but let us consider two of these questions as a start:

(Q1) How easy it is to label an object or parts of an object with braille? In other words, is there no braille on the market due to a technical issue, that it is too difficult to add braille to products?

(Q2) How do sighted individuals feel when presented with such a modified everyday object that has been pre-embossed with braille? In other words, is there no braille because of a semiotic issue, that braille has a connotation of, for example, disability or blindness? (The issue of an unwanted connotation certainly felt real, as it was, if I remember correctly, the first thing mentioned when this project was first discussed in class.)

These questions obviously do not address all possible questions. My project thus represents only a small step towards introducing more braille into the mainstream.

Background

How braille might be added to ceramics

As my project started out as a question in the studio, it seems natural that my investigation should also continue in the studio in some form. So how might one actually add braille to ceramics? Interestingly, brailled mugs and other brailled ceramic objects are in fact already in existence on the market, for example designs by Andersson (n.d.) or Pantling (n.d.), or products mentioned in Designbuzz (n.d.). Furthermore, workshops exist to teach blind people how to add braille to ceramic objects, one such workshop being Blind Art Gallery (n.d.), which describes a method in which small clay dots are formed and then individually attached to the objects.

Brites (2013a, 2013b) has also explored the addition of braille to ceramic objects, and the method he chose was slipcasting, a fabrication method that is also used in industry (as mentioned by, for example, Cowley, 1978, p. 71).

A call for submissions

In early March 2014, I came to be aware of an event called Empty Bowls organized by a local museum (Gardiner Museum, n.d.), in which ceramic artists were called to create and donate bowls for raising funds for an aboriginal community-based health centre; participating artists are also asked to include a business card (Toronto Potters, 2012). Being a decentralized "international grassroots effort to fight hunger" where people would eat soup from the donated

bowls (Imagine/RENDER, n.d.), there can be more than one Empty Bowls event in any given city, and indeed, an article "Empty Bowls can build concern and community" (2004) mentions another Empty Bowl event in Toronto.

I was made aware of the event early March through the Throwing Club, and by mid-March I realized that not only would this event provide an ideal vehicle to distribute ceramic objects modified with braille to the public, but it would also be a natural setting where members of the public would use the objects for their intended purpose, and it would simultaneously provide me an opportunity to distribute questionnaires (masquerading as business cards) with the objects. I therefore proposed the following method, which aims to gain a partial understanding of the two questions I described earlier:

The method, as proposed

The study will centre around a ticketed public charity fundraiser called Empty Bowls, to be held on Wednesday, May 21, 2014 at a local museum, during which people will be eating soup from bowls donated by ceramic artists who have responded to an open call for submission. Artists are asked to include a business card with their submissions.

I will be one of the artists submitting bowls, and for the purpose of this study 18 bowls will be created. Half of the bowls (9 bowls) will include calligraphy and braille, and the other half (the other 9 bowls) will have calligraphy but no braille. This serves to see if there are any differences in the answers provided participants who have chosen and used an actual object with braille or whether participants need to base their answers on an imagined situation.

In lieu of business cards, questionnaires sized to resemble business cards will be included with my submissions. This specific size serves two purposes: First, they make my submissions blend into the other donated bowls so that potential participants are unlikely to choose or avoid them due to the presence of a questionnaire. Second, the questionnaires need to be small enough to minimize the chance of them falling out of the bowls.

First stage: Object making

The first stage of the study involves the creation of the bowls and the questionnaire booklets. After creation of the bowls they will need to pass vetting by the studio technician before being submitted to the event.

The first stage serves two purposes: To provide the objects needed for the second stage, and to investigate technical difficulties in adding braille to ceramic objects within a studio environment. One possible cause why there is a lack of products with braille may be that adding braille is difficult, and this stage provides context for that hypothesis.

Second stage: Questionnaires

After the objects are made and vetted, they are submitted to the museum by May 16. It is expected that up to 18 people will end up choosing my bowls, each of which will come with a questionnaire booklet (sized to resemble a business card so as not to stand out from other donated bowls) with a self-addressed return envelope. If the person chooses to answer the questionnaire, the person will be given a choice of answering the provided paper questionnaire or an equivalent web-based version.

Participants requesting a copy of my completed MRP will be asked to provide their names and email addresses.

Participants are asked in the questionnaire booklet to return them by the end of May.

Third stage: Analysis

Around mid-June all questionnaires should have been returned. The questionnaires will be transcribed into electronic form and analyzed.

Preliminary exploration

Constraints of braille typography

When one considers putting braille on an object, sooner or later one would run into two problems: the apparent typographic inflexibility of braille, and the small amount of text that can be set.

Braille is ordinarily subject to highly standardized typographic conventions, such as those described by the Braille Authority of North America (BANA, n.d.). In certain contexts such as signage, it may even be subject to legislation such as the American Disabilities Act (United States Access Board, n.d.). That said, typographic variation in braille is not something that has been left unexplored; for example, Brites (2013b) has explored this and found, among his other findings, braille users "[do not] recognize any benefit to have Braille in different sizes to emulate typography concepts like light, regular and bold".

For the second problem I decided to do a short investigation (Appendix C) to find out why only a small amount of text can be set: I started with the summary in BANA's fact sheet (BANA, n.d.) and tried to determine whether it is possible to duplicate this prescribed standard braille typography with a standard braille font, such as Apple Braille. What I found out was that while Apple Braille does not strictly follow the prescribed standard paper typography, it is nevertheless possible to set braille that conforms reasonably to the said standard by setting Apple Braille at 28 points on a 28.8-point leading, with a tracking adjustment of –50/1000 em.

It is highly revelatory that the standard braille typography in fact corresponds to a type size of 28 points. While point size by itself is not a meaningful measure (a fact mentioned by, for example, Mitchell & Wightman, 2005, p. 76), this is still considered a very large size by print standards, exceeding even the requirements for "large print" set by either the CNIB (n.d.) or the Royal National Institute of Blind People (RNIB, 2012). This finding explains why braille takes up so much space compared to print and demonstrates why the amount of braille text that can be put into any particular space is so constrained.

Text on bowls

Unlike mugs (Appendix B), bowls are not often decorated with text. I took a look at the bowls I have at home and found only a few bowls that sport any text at all.

One such bowl is a traditional Chinese soup bowl (Figure 2). Interestingly, although its graphical motifs are all textured and thus amenable to being perceived by touch, the words are not: all the words are imperceptible to the touch, as if they have been applied with a decal or a very thin layer of underglaze.

Aside from this, the only other bowls at my home that sported any text at all were merchandized, factory-produced items (for example, Figure 3 and Figure 4). The surfaces of these

Figure 2. A traditional Chinese soup bowl

Figure 3. A merchandized bowl

Figure 4. A merchandized children's bowl


Figure 5. A paper bowl for take-out food

factory-produced bowls are completely smooth and so the text on them are also imperceptible to the touch.

One other kind of bowl that often feature text would be the paper bowl used for take-out food (Figure 5). Such bowls often contain a large amount of very small print. In the previous section I have mentioned that braille has been found to correspond to "large print" type (specifically 28 points), so it is clearly not possible to duplicate all this information in braille.

Possibility of using stamps on thrown objects

Choosing a technique to fabricate my objects was also among the first things I needed to consider when I began my project. Coming from a throwing background, the first option I considered was whether it would be feasible to add braille to thrown objects. I attempted to test the feasibility of the idea in two ways.

In November 2013 I created a series of small test stamps using thin strips of clay and my slate and stylus. The stamps were bisqued and in December I attempted to test them by pressing them onto moist clay. The results were unsuccessful (Figure 6).

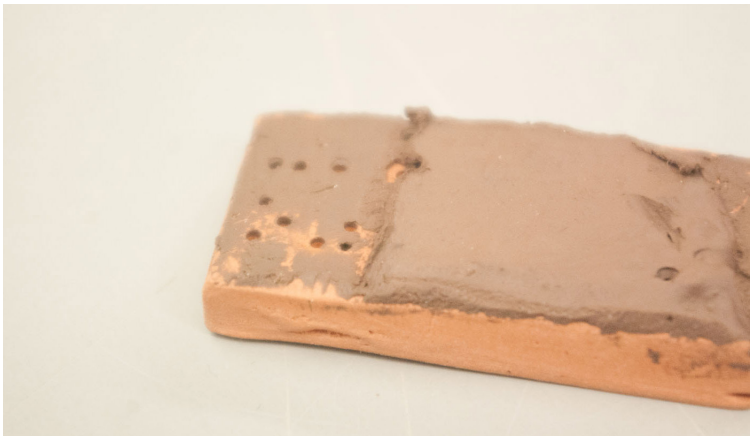

Figure 6. Failed stamping attempt performed in December 2013

Then in early 2014 I attempted to replicate Blind Art Gallery (n.d.)'s method of adding braille by creating small clay dots and attaching them to thrown objects. I found that it was very difficult to create small dots of consistent size, as well as to attach the dots.

After both attempts failed, I consulted Robin Tieu (personal communication, February (?) 2014) about the feasibility of creating a brailled ceramic object. She suggested that adding braille to thrown objects would probably not be very feasible, but it would be feasible to either add braille to slabs for handbuilding, or to moulds for slipcasting.

I felt that slipcasting was closer to the industrial processes that I had in mind, and in addition, I wanted to create identical objects for future interviews or surveys. As a result I decided that my objects would be slipcast.

Artefact one

Material for making the model

After deciding to slipcast, the question became: How should I create the mould? Two issues were at hand: What material to use to create the model, and how to create a mould that when cast will produce a brailled object.

Although a number of materials can be used to create the model (a fact mentioned by Cowley (1978, p. 72) or Wardell (2007, p. 31), for example) two materials are standard: plaster is the "traditional material of the ceramics industry" (Quinn 2007, p. 36), while in the studio it is clay is usually preferred, one reason being that "the resulting pottery actually looks like clay" while "[f]inished pots made from plaster models (or prototypes) that have been turned on a wheel or lathe often end up looking like plaster" (Martin 2006, p. 9). That being said, Wardell (p. 33) claims that plaster is "the material most favoured by ceramicists and industry", so there is actually some contention as to whether clay or plaster is the preferred material in a studio environment.

Considering that the project has been imagined with an industrial application in mind, there was no compelling reason to choose clay over plaster, and in fact plaster should make more sense given my intentions. However, because I did not know there was a whirler in the plaster studio and I had trouble getting information about using the lathe in the model shop, I ended up creating my models with clay.

Creation of the model

As soon as I started contemplating the possibility of doing my study concurrently with Empty Bowls, I carefully threw a clay model of a bowl form (Figure 7), making sure that it was a form without undercuts that could be reproduced using a one-piece mould: At the time I was planning to create only my brailled bowls with two-piece moulds, so that bowls without braille would be created with a one-piece mould. This clay model would later be converted into an equivalent but more durable plaster model (Figure 9) using a technique called "blocking and casing" (Wardell, 2007, pp. 69–70).

One-piece versus two-piece moulds

As it turned out, my one-piece mould produced casts with an uneven surface, even though my two-piece moulds did not. A number of different causes, such as incorrect pouring of the slip and incorrect slip viscosity, were suspected but after a few iterations I still failed to determine the cause.

It was at this point that I decided that my unbrailled bowls should also be cast using a two-piece mould, because I felt that the absence of a seam line would constitute a substantial difference between the brailled and unbrailled bowls.

Braille dots on the model versus on the mould

There are two ways to get a mould to produce casts with braille: Adding raised dots to the model, or carving dot-shaped depressions into the mould.

The first way was the method first suggested by Tieu (personal communication). As mentioned before, it has precedent (Blind Art Gallery, n.d.), but when I tried it I could not get consistent dot sizes nor get the dots to adhere properly. It seemed logical to pursue the alternative.

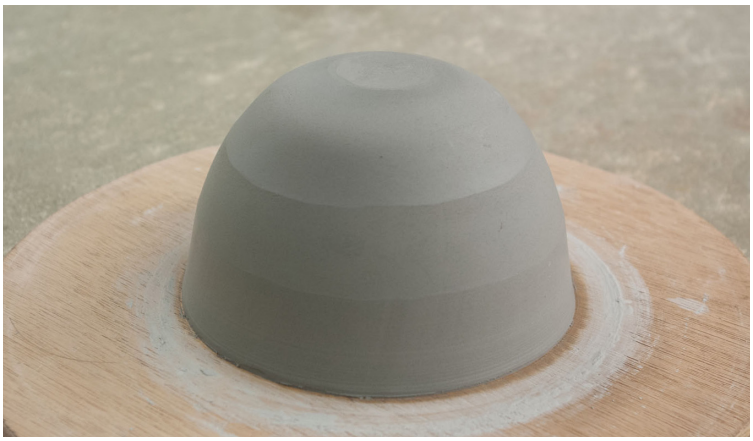

Figure 7. The original thrown form, before a separately thrown reservoir ring was added

Figure 8. Equivalent plaster model created through "blocking and casing"

Figure 9. A two-piece mould duplicated from another two-piece mould

There is another reason why carving the dots into the moulds seemed preferable in my project: Since I was going to create both brailled and unbrailled bowls which should be made as similar as possible, some way to duplicate a mould—i.e., to create an identical mould from an existing one—followed by and then modifying the duplicates would be ideal. As this is exactly the "blocking and casing" technique that Wardell (2007, pp. 69–70) describes, adding depressions to duplicated moulds is therefore a better way to work than adding dots to a model.

Choice of carving tool to create the braille dots

The question of *how* to carve those depressions remains.

Brites suggested a round tool (personal communication, January 8, 2014), and this was the first tool I tried. However, Brites was carving into clay and not into plaster. When I tried making dots with a round tool I found out that the round tool could easily slip, which in turn could easily cause two separate depressions to run into each other, forming a ridge instead of two discrete dots. Whether I modified the mould when the plaster had completely set or when it was still relative malleable did not seem to make a difference.

My failure in using a round tool to create the dots successfully suggested that the appropriate tool should not be actually ball-shaped, but should be a knife that when rotated would produce a ball-shaped depression of the correct size. I tried looking for a tool like this but could not find one, suggesting that this ideal tool would need to be custom made.

Instead of trying to fabricate the ideal tool, I chose to try using a small triangular knife, with and without first using the needle tool to do a pilot drill and with and without trying to use the round tool to make the resulting dots more round. None of these produced satisfactory results. (Figure 11)

Figure 10. Dots produced by the round tool

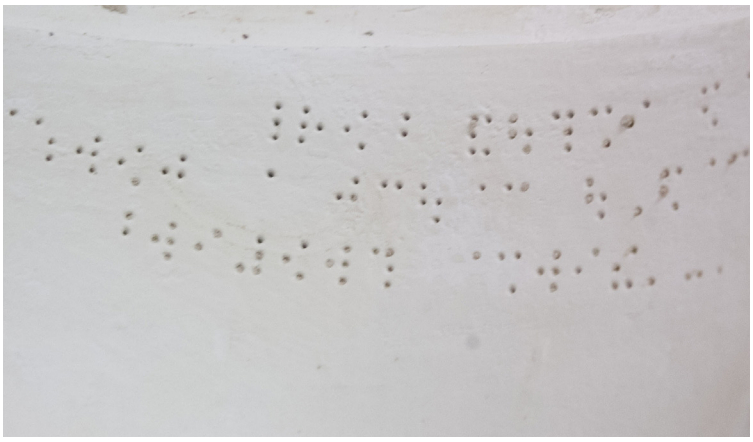

Figure 11. Dots produced by the triangular knife

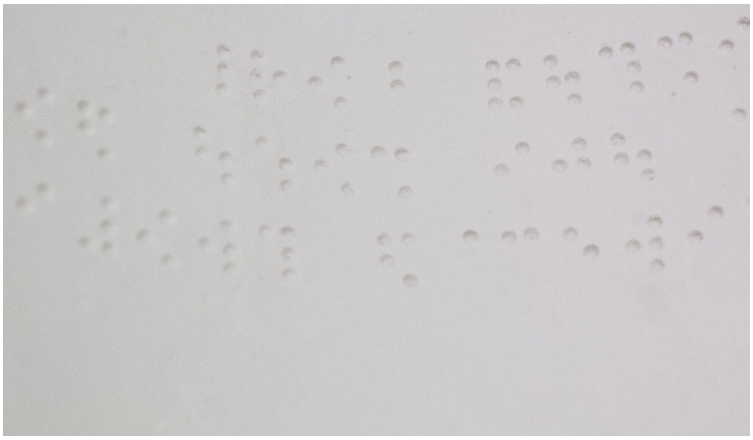

Figure 12. Dots produced by the drill bit

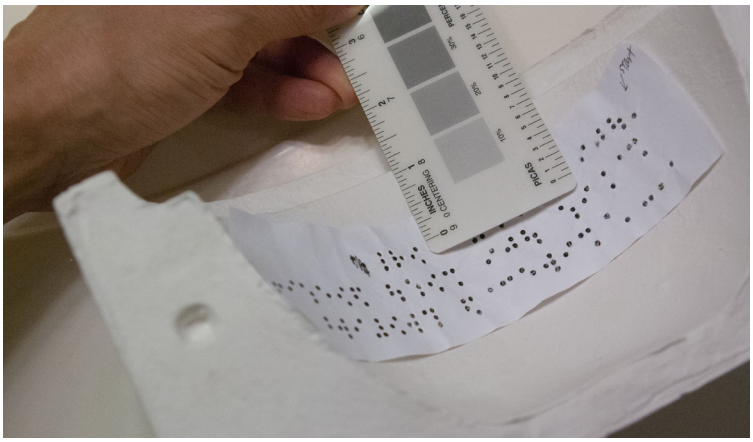

Figure 13. Measuring distance from top edge of braille template to rim of mould

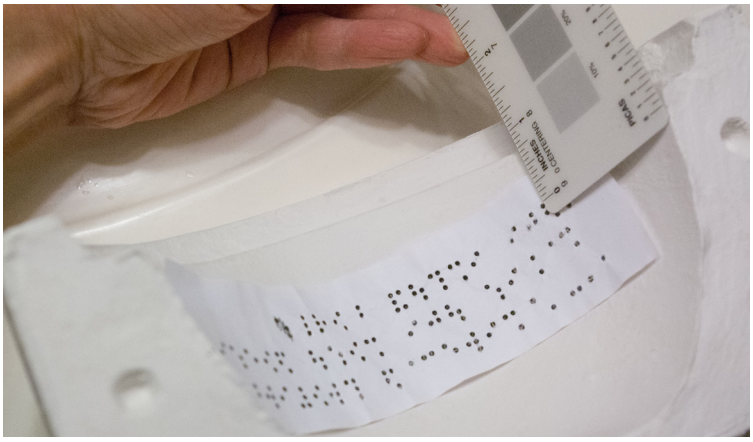

Figure 14. Measuring distance from top edge of braille template to rim of mould

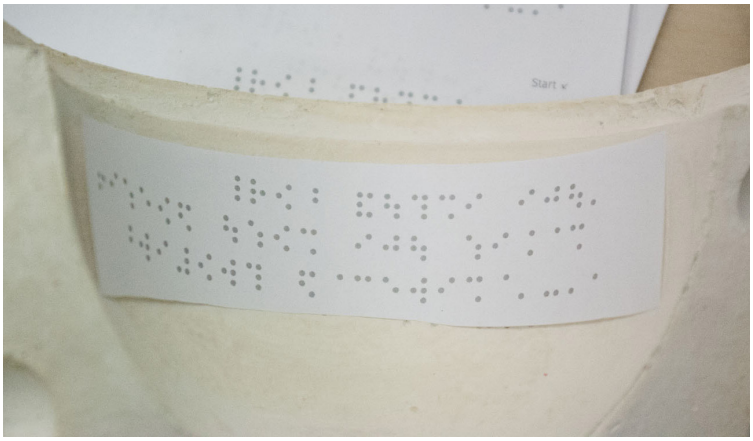

Figure 15. Testing how the curvature-compensated layout fits on the mould

Figure 16. A cast made by a mould without the bowl's curvature taken into account

Figure 17. A cast made by a mould with the bowl's curvature taken into account

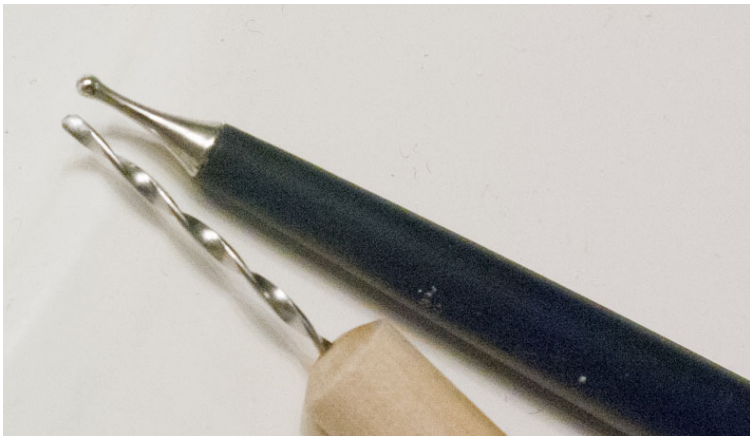

Figure 18. The shape of the drill bit versus the round tool

The tool I finally chose was a small drill bit with approximately the correct diameter (Figure 18) for producing appropriately-sized dots and which did not produce a sharp extrusion (Figure 12).

Compensating for curvature

One problem that became obvious around this time was that because the paper template for the braille was two-dimensional but the bowl form was curved in three-dimensional space, the braille that got carved into the mould would become curved (Figure 16). While this could be considered interesting from an artistic point of view, a designer would want to have the option to make sure that the braille was horizontal, on a straight line.

So I postulated that if I could create a layout that was curved in the opposite direction, the resultant template should produce dots laid out on a straight line. So I started by measuring the distances between the rim of the mould and the top edge of the braille when the template was on the mould (Figure 13, Figure 14). Then I used the measurements as a guide to produce a curved layout.

The original template was then iteratively adjusted in Illustrator until the adjusted template produced a straight line of braille when fitted onto the mould's inside surface (Figure 15). The resulting mould was able to successfully produce a cast with a straight line of braille (Figure 17).

Detached dots

Another problem that became obvious was that braille dots can become easily detached from the cast (Figure 16). During my production process, dot detachment occurred on a large proportion of the casts. Between April 3 and April 17, 23 out of 31 casts with braille (74%) that were not rejected due to deformation were recorded or observed as having dots broken off.

In my specific case, dot detachment might have been caused by several faults in my fabrication process: the use of a less-than-ideal tool to create the dots, drilling too deep into the mould, an incorrect angle for positioning the tool while the dots were created, incorrect placement of the partitioning walls, or the moulds having too few number of pieces. Incorrect slip viscosity, poor timing, and poor fit of the mould pieces might also have been causes.

Around the end of April, Tieu (private communication) suggested that the dots could be repaired using a slip trailer fitted with a fine-tipped metal nozzle. All subsequent casts, as well as a number of earlier, defective casts were repaired using this technique.

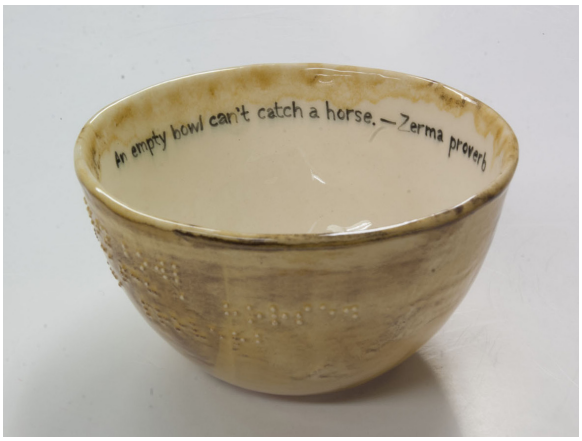

Figure 21. One of the low-fire brailled bowls from the trial run

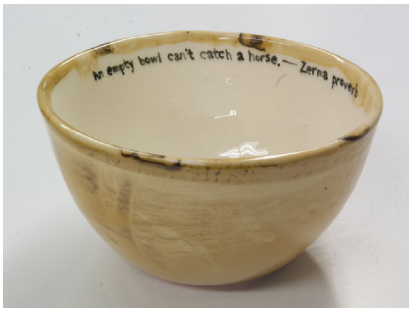

Figure 22. A low-fire unbrailled bowl

Figure 19. One of the mid-fire brailled bowls from the production run

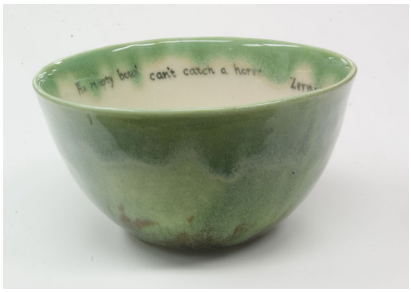

Figure 20. A mid-fire unbrailled bowl

Trial run: Low-fire casts

An initial batch of bowls were made between early and mid-April in low-fire slip. Not counting rejects and test pieces, a total of 20 bowls, including 14 brailled and 6 unbrailled bowls, were produced.

The finished bowls felt light but they had the correct shapes. More importantly, the braille dots seemed unaffected by the glaze, although I felt the coloured glaze layer to be on the thin side.

Although mid-fire glazes do not behave the same as low-fire glazes, I was hoping results from the trial run (for example Figure 21 and Figure 22) to be able to give me an idea of what to expect in the production run.

Production run: Mid-fire casts

Around mid-April it was suggested that the bowls probably should be remade in mid-fire slip for durability reasons.[2] As a result, a batch of bowls were made between mid-April and early May in mid-fire slip. Not counting rejects and test pieces, a total of exactly 18 bowls, including 9 brailled and 9 unbrailled bowls, were made.

Unfortunately, after firing, two of the 9 brailled bowls had to be rejected due to quality reasons: one developed severe blistering and another had aesthetic problems with the glaze coverage. Two similar bowls from the low-fire batch were consequently chosen to replace the two defective ones.

The finished pieces (for example Figure 19 and Figure 20) felt substantially heavier and more robust than the low-fired pieces made earlier (partly because they were cast thicker), but

2 It turned out that on June 13, when I was preparing my bowls during the Culminating Festival of the Inclusive Design program, I found a large number of the low-fire bowls which had never been used having crazing on the inside. While not as really an issue for mid-fire ceramics, for low-fire ceramic objects crazing is an issue.

they were also clearly misshapened, and almost half an inch smaller in diameter compared to the low-fired ones. The layer of glaze looked more glassy and, despite having used the same technique for glazing, felt thicker.

Because the glaze layer turned out thicker, the braille dots were also less tactile. However, I was not trying to gauge the perception of blind people, and there was no more time to make a new batch—firing had become irregular due to onset of the summer semester and the mid-fire pieces were not fired until one week before the event.

Reflections

In a sense, the whole study revolved around these ceramic bowls, and it was on them that I devoted most of my time. Yet I still failed to finish fabrication until a week before the event. Although exploration was a large part of my project, it was nevertheless important to get a specific number of artefacts ready for the event. When two bowls in the production run turned out defective, my original plan to fabricate two sets of bowls that were identical except for the presence or absence of braille, was compromised.

A number of things could have prevented this. First and foremost I could have started fabrication earlier, especially given the reduced access to studios and the irregular firing schedule during the last month of the semester. Also, I could have used mid-fire slip from the beginning, thus making it possible to have a much larger supply of identical bowls.

An earlier start would have provided me more time to have more depth in my exploration, such as designing a tool for creating proper braille dot–shaped depressions, investigating the faults in my techniques, or refining the design of the bowl. It would also have provided me time to have more breadth, for example to explore alternative techniques; at the end of the project I was indeed made aware of several possible alternative techniques, such as stamping or slip dotting; these are described in more detail in Appendix E.

Artefact two

Design constraints

I mentioned earlier my rationales for making my questionnaires business card–sized. While this clearly constrains my final design for the physical artefact, it also imposed several additional constraints:

First of all was the amount of text that had to fit within the small pages, particularly the standard consent form that was a full letter-sized page long and as a result would fill up at least eight business card–sized pages. Evidently that the questionnaire had to be a booklet. However, questionnaires need to be concise (Schwesinger, 2010, p. 100) and I was concerned that the large number of pages would discourage people from reading, so I felt it important to reduce the number of pages by as much as possible. A standard solution would be to reduce the font size, but that would clearly not be ideal, as an accessible design would require the text to be set sufficiently large.

Also, as I regularly respond to questionnaires, I was very aware of the importance of question design, in particular the importance of wording questions so that they would not only be understood but also that choices provided by multiple-choice questions would to cover all possibilities.

Then there was the tension of myself-as-an-artist to leave the participant something about my work, and myself-as-a-designer for a questionnaire that needed to be sent back to me. The desire to satisfy both suggested the artefact would have to be in two parts. However,

Tieu (personal communication) mentioned that it would be chaotic at the beginning of the event when people choose their bowls, so two separate artefacts would not be ideal. This suggested that the design should be a single artefact which could detach into two.

Finally, how the self-addressed stamped envelope could fit inside the artefact would also need to be considered.

Sizing the questionnaire booklet

I started laying out the questionnaire booklet on April 8. As I mentioned earlier, the questionnaire booklet was constrained to be approximately the size of a typical business card. However, a lot of text needed to fit into the space. I quickly discovered that text would be too cramped to fit in such a small space.

Eventually, I decided to base the page size on a zine design I created earlier, in January 2014. Halving the size of the earlier design resulted in a page of size 4⅛″ × 2⅝″, which still approximated the size of a business card but would be able to provide more space for text layout.

Simplifying the consent form

As I mentioned earlier, I realized a lot of text needed to be fit into the small space. On April 10 I started putting the consent form onto the questionnaire, and immediately realized not only were there too much text, but the wording was also stilted. As both are undesirable for a questionnaire (Schewinger, 2010, p. 100), I started simplifying the text using plainer language, and by April 16 I succeeded in reducing it to five pages.

Then I realized I might not be allowed to change the consent form, so I sent an email to query whether it would be possible to simplify or shorten the standard consent form. I received a confirmation the next day that my proposed changes were acceptable.

Uniform versus customized wording for the questionnaires

One thing that turned out to have far-reaching consequences later in the project was whether the questionnaires should have uniform wording for all questionnaires or customize wording for each individual bowl or type of bowl.

Uniform wording means that every copy of the questionnaire would be equivalent, so mixups would not be possible, and if any questionnaire went missing it would be possible to quickly replace it. However, it would also mean additional questions would be needed, because how questions are asked might depend on whether the participant has chosen a brailled or unbrailled bowl.

On the other hand, customized wording would mean that the questions the participants see would feel more straightforward. However, this would require questionnaires to have to go with the correct bowls; any mixups would cause wrong questions to be asked and would therefore be unacceptable.

On the assumption that I would be able to control which questionnaire could go with which bowl, I decided to make the questionnaires customized.

Mechanism for detaching the questionnaire

There was also the question of how to make the questionnaire easily detachable. Several possibilities, including the use of low-tack glue, an additional staple, and perforations were considered. I was leaning on the use of perforations and Richard Hunt, an OCAD graphic design professor agreed (private communication, May 28, 2014) that perforations should be a good solution. At the end I never tested the detachment mechanism with any prototypes.

Near the end of the production process, when I started assembling the booklets, I discovered that it was not straightforward to produce a clean perforation when attaching the questionnaire to the rest of the booklet; the main problem was that it was easy to accidentally

detach the questionnaire while attaching it. As a result, most of the perforations were not cut close to the spine.

Also, because collation happened very late into the production process, I did not include an explicit instruction to ask the potential participant to tear along the perforation.

Mechanism for keeping the questionnaire booklet closed

Another problem that arose because of the questionnaire's booklet form was that some mechanism was required to keep it closed until the potential participant decided to open it. I mainly considered two designs, a sleeve to contain the booklet, and an flap integrated with the booklet to keep it closed. I felt that two pages of printable area would be lost if a sleeve design was used, and concluded that a flap design would be preferable. Prototypes with different flap designs were then created to test how the booklet could be closed while remaining relatively easy to open. At the end, I settled on a wide flap inserting into an opening as wide as the height of the page (2⅝″).

The wide opening for the flap would provide a natural space to insert the self-addressed stamped envelope.

Fitting an envelope into the questionnaire booklet package

Because the space to fit the self-addressed stamped envelope was small, small envelopes would be needed. Due to their small size, "invitation" envelopes were originally considered. However, when testing with the prototypes I found that their size (4⅜" × 5¾") was not small enough. To fit the small space created within the questionnaire booklets, "#8" envelopes (3⅝ × 6½") were chosen instead; a #8 envelope can be fitted into the space by folding in half with one fold.

Production of the questionnaire booklet was finished on the deadline for submissions—one day before the event, when all the booklets were assembled and all envelopes fitted into the booklets.

Reflections

In retrospect, the questionnaire booklet is first and foremost a booklet with a lot of text. It is a typographic piece with a narrow measure (4⅛″ minus left and right margins), yet the font size had to kept reasonably large to avoid introducing legibility problems.

The presence of the flap and the envelope pocket also made that the booklet closer a recloseable, three-dimensional artefact with a space to hold a second physical object; at the same time the booklet also includes a detachable part. As it turned out, the actual physical questionnaire booklet ended up closer to a package than a typical book.

Lastly, the primary function of the questionnaire booklet is, clearly, to serve as a questionnaire, which can be considered a kind of form (Schwesinger, 2010, p. 34), which he calls "frameworks for communication" where "textual content is given a visual structure"; the communication they facilitate is "a kind of silent dialogue" (p. 11) which in the case of questionnaires takes the form of a "written, structured interview with standardized ways of answering" (p. 100). Schwesinger noted that forms—questionnaires in particular—must be consistent, must have a high level of attention to detail (p. 42), must motivate, and must be easy to understand, clear, concise, and barrier-free (p. 100).[3] Questionnaires, being forms, are inherently "complex visual structures" (p. 124) that make "great demands in terms of concept and design" (p. 36).

Despite the artefact's expected complexity and the complications that were ultimately encountered, design of the artefact was not well planned out in advance, as evidenced by the both the late start and late completion dates. I was focusing only on the ceramic artefacts and the questionnaire booklet was felt to be auxiliary, which while true, also turned out to be complex and so needed as much thought as, if not more than, the bowls.

3 What Schwesinger had in mind was linguistic barriers; however, other forms of barriers are also clearly relevant, and so other concerns of inclusive design, such as legibility or contrast, are clearly also applicable.

Several things clearly should have been done better. First of all more thought should have been put into the package design, and prototypes should have been used for testing. An earlier start and the use of prototypes would have exposed faults in the design that might hinder usability, such as the lack of an explicit instruction on how to detach the questionnaire from the booklet. Schwesinger (p. 123) identified as many as ten broad steps in any form design, three of which relate to prototyping and testing. The amount of planning, prototyping and testing were clearly inadequate.

Artefact three

Design constraints

As I mentioned earlier, to encourage response, I was planning to create an online version of the questionnaire. The technical requirements of an inclusive website would be, one might suppose, relatively straightforward, as they have been standardized (World Wide Web Consortium, 2008).

Documentation website

Production of the website had a very late start, and indeed, the website did not come into existence until May 5, when I decided to use WordPress. I was relatively familiar with WordPress and thought it would take me less time to create it in a familiar environment, and I wanted it to be easy to maintain; it was getting close to the submission deadline and so both ease of implementation and ease of maintenance were concerns. So on the next day I put up my contact information and a short note about the project on the site, but the site remained in this virtually empty state for the next ten days while I tried to get the paper questionnaires done.

On May 12 I started updating the records for my ceramic works on an existing site about my ceramics that I created back in September 2013. I was planning to use the data and some code from the old site as the backend for my new site.

On May 17 I started writing more about the project, and on the next day I started blogging and linked the two sites together. It was also on that day that I chose to use a minimal

base theme called Roots (Word, 2011). The layout of the theme was not substantially changed, though I have changed many aspects of the presentation, including the fonts used.

Online questionnaires

I had originally planned to use off-the-shelf software packages to create the questionnaires; in fact, as early as on January 18 I had already created a short list of possible software packages I could use. However, because of my focus on the ceramic artefacts, I did not really revisit the problem of online questionnaires until May. By then I was already caught up with creating the paper questionnaires and had no time to look at my shortlist of questionnaire software.

On May 21 I realized the online questionnaires had to be functional before people might start completing questionnaires online, so I reviewed my shortlisted software packages and quickly realized that all the packages required complicated setup, for which I did not have time. I was concerned I would not be able to set up the packages in time, and so I decided to code my own questionnaire using the low-tech techniques of HTML forms and plain-text files. The first functional version of the questionnaire was coded in three hours, but by the time it was finished it was already 5:30PM.

After I returned from the event, I looked at the questionnaires again to make some adjustments, which I did not finish until 10:51PM.

As it turned out, the first completed questionnaire arrived online at 11:56PM, an hour after I finished making my final adjustments.

Reflections

In looking back at the production of the online artefact, it is obvious that the process was rushed. The entire site was created in little more than two weeks, and the online questionnaire component—arguably the most important part of the artefact—was rushed through in a day. The website was felt to be an auxiliary artefact for another auxiliary artefact (the paper

questionnaire), and I was so focused on the technical aspects of the site that I failed to remind myself that it was still a questionnaire and was therefore inherently complex. It never occurred to me that I might need to plan the design of this artefact early.

It is said that among speed, quality, and cost one can choose only two; with cost being constant, rushing through the process certainly meant quality must have somehow been compromised. The question is whether this compromise in quality has also compromised the results of the study.

As it turned out, two mistakes in my code were found after the second set of results were received (Appendix F). The first mistake, found on May 31, prevented the participant from writing in a "some other reason" for question 2, while the second mistake, found on June 4, would appear to the participant as an irrelevant choice for question 2. As Table 5 shows, the participant who chose the brailled bowl still found a way to say that the presence of braille contributed to their decision to choose the brailled bowl; it is, however, not clear whether the participant who chose the unbrailled bowl would have indicated the absence of braille as a reason if the question was correctly asked. These mistakes certainly would have been discovered if it were possible to spend more time proofreading the questions.

As an interactive form, there is also another concern related to the questionnaire's user interface: In discussing HTML forms, Schwesinger (2010, p. 214) stressed, among other things, the importance of a "sensible tab order" for navigation. One problem that I encountered during the construction of the online questionnaire was how to treat the two navigation buttons. Due to a limitation of HTML, it is impossible to specify a default action if a form contains two "submit" buttons. For compatibility reasons, I decided to implement both the "Previous"and "Next" buttons as "submit" buttons, but for visual reasons the "Previous" button must be on the left. I decided to make different ways of accessing the user interface consistent and so as a result the "Previous" button was the first button, so the default action ended up being going back to the previous question. In terms of usability this was not ideal.

In short, design and prototyping of the online artefact should have started earlier. All the problems discussed above could have been avoided if more time was spent on testing.

The questionnaire survey

The paper questionnaires were finished one day before the event and delivered to the event venue. A friend was able to help me assemble the questionnaires and deliver both the questionnaires and the bowls to the venue. Her help was instrumental in helping me deliver the artefacts on time.

Shortly after my artefacts were delivered, the organizer sent me an email acknowledging receipt of the artefacts. I sent her back a reply asking to make sure that the questionnaires be kept with the correct bowls. When I arrived at the venue the next day (May 21) I found that this had been accomplished by taping the questionnaires to the bowls (Figure 34, for example). I looked for my bowls and found 10 of the 18 bowls still left on the tables. This suggested that the maximum number of responses that I would be able to get would be eight.

Because I was not able to finish the online questionnaire until the event had started, I arrived at the venue almost an hour and a half after the event had started, and as a result I was not able to observe how people had picked their bowls.

The first set of responses arrived online at 11:56PM, and the second set of responses arrived the next day (May 22) at 3:40PM, after which no more responses came back either online or by postal mail.

Findings

Appendix H shows the data from the two returned questionnaires that had been delivered on May 21. A total of 8 out of 18 (44%) bowls were taken; two (25%) out of the eight attendees who selected my bowls chose to participate in the survey.

Additionally, Appendix G shows what is known of and can be inferred from the leftover bowls I was able to pick out when I arrived at the venue. Based on this, I estimate that out of the 8 bowls that were taken, 4–5 (50–63%) were brailled and 3–4 (38–50%) were unbrailled.

DEMOGRAPHICS

Not much was known about the pool of potential participants, though a fundraiser like this would certainly attract a demographics that is not representative of the general population. However, there is no reason to suppose the attendees were any more inclined to care about accessibility.

I did not do a careful observation at the event, but my impression was that most of the attendees were adults, with a small number of children present. Both attendees who chose to participate indicated that they were adults.

BOWL CHOSEN

Assuming that questionnaires have not been mixed up, one participant (50%) picked a bowl with braille; the other participant (50%) picked a bowl without braille.

REASON FOR CHOOSING

For both participants, visual aesthetics was a primary factor in choosing the bowl. One participant identified colour as the aesthetic reason, while the other participant mentioned the presence of braille as the aesthetic reason.

One participant also mentioned the chosen quotation as being a reason why the bowl was chosen.

Neither participant chose the a brailled or unbrailled bowl due to a lack of choice.

It is interesting to note that the presence of braille was identified as visual. However, because this specific question was affected by the bugs mentioned in Appendix F, it is not clear if this association was an artefact of the buggy question or not; for the same reason, it is also not certain whether the lack of braille might have been a factor the unbrailled bowl was chosen.

EFFECTS ON USABILITY

Both participants indicated that they did not know braille and the presence or absence or braille did not make the bowl any more or less usable.

COMFORT LEVEL IN USING THE BOWL BY THE PARTICIPANT OR TO SERVE GUESTS

Both participants indicated that they were comfortable with using the chosen bowl both for themselves and to serve guests.

Discussion on findings

While the number of responses is low and not enough to draw a statistically meaningful conclusion, it is nevertheless possible to make some observations. It is in fact possible to look at it from two different perspectives.

First of all, while only two out of eight potential participants chose to participate in the survey, it is still possible to estimate how many bowls of each kind had been taken, and one can reasonably conclude that attendees chose both types of bowls in approximately equal numbers. For a public, ticketed event like Empty Bowls in which "people just want to get a nice bowl" (Tieu, private communication), this suggests that on their own merits, the brailled bowls were able to comfortably compete with the unbrailled ones.

The actual responses received do not appear to contradict the above. With both brailled and unbrailled bowls available for the choosing, one participant took a brailled one while the other took an unbrailled one. Assuming that the comfort level in using or gifting a brailled bowl can be interpreted as an indication of whether brailled bowls are desirable, they do seem to be perceived as not undesirable, despite both participants not knowing any braille.

Reflections on the process

Let me also reflect a little on the actual delivery of the survey.

I had previously mentioned that the process of making the questionnaires was rushed. This had clearly affected the delivery of the survey, as evidenced by the fact that I could not finish the questionnaires until the last day for submissions and would not have been able to deliver them without the friend's help. However, specific to survey delivery was my failure to communicate with the organizer before the artefacts were delivered.

I also did not make careful observations during the event. Although my lack of planning had prevented me from observing the beginning of the event, I still could have observed other things better, such as making a more careful observation about the demographics.

In addition, I did not take proper inventory of my leftover artefacts when I arrived at the venue and after the event was over. Proper inventory taking would have made estimates (Appendix G) unnecessary: Everything I had made had been marked with a serial number but I failed to take advantage of that.

Lastly, although I was able to estimate whether my artefacts were able to compete among other similar artefacts, I had not thought about how I would be able to quantify such comparisons.

Incidentally, one thing that struck me was that no participant sent back their responses by mail. While I have mentioned earlier that the design of the paper questionnaire booklet

had been less than ideal, the lack of mail-in responses suggested that mail-in paper questionnaires might no longer be useful as a means of gathering data.

Additional focus group

A month after Empty Bowls, an informal peer critique was held during a presentation at the Inclusive Design program's "culminating festival," which took place from June 13–14, 2014. The event, which included a poster exhibition and a series of presentations from the graduating cohort, was open to the public but not actively publicized. Attendees were primarily the professors and the four cohorts of my program. As is customary in all my program's courses, all presentations and discussions were audio recorded.

Three meals were catered during the two days—lunch and dinner on the first day and lunch on the second day. My session was on the second day after the third meal. To create context for the discussion, I provided bowls alongside the disposable plastic plates and paper bowls during the second and third meals. Because all my mid-fire bowls had already been donated to Empty Bowls, all bowls were from my low-fire trial run.

The discussion was held in a focus group format, consisting of a brief introduction of my project followed by live questions from my original questionnaire, though due to time constraints it was not possible to go through all the questions in the questionnaire.

Findings

Appendix I summarizes the responses from the discussion. Not everyone who attended on the first day were present on the second day; not everyone who attended on the second day stayed until my presentation; and not all attendees at my presentation participated in the discussion.

The discussion was much less structured than the questionnaire-based survey, and I did not count the number of participants, so I will not attempt to analyze any numbers here.

DEMOGRAPHICS

The demographics at this event was very different from that at the earlier event, as attendees were predominantly students and professors in the Inclusive Design program, plus a very small number of people outside of OCAD but connected to the program (for example guest speakers and friends and family of the graduating cohort)—in short, people likely to be concerned with accessibility or even disability.

REASON FOR CHOOSING

Most attendees chose disposable plates. However, during the discussion, I found that attendees did not base this decision on a resistance to brailled bowls; instead, disposable plates were chosen because of the concern that ceramic bowls might be fragile or the concern that a craft object might get dirty.

Except for one response, reasons given for choosing any given bowl or plate did not have anything related to braille; if anything, it was the presence of braille that contributed to choosing the ceramic bowl over the other options. It is also interesting to also note that as in the earlier findings, the presence of braille was seen as visual.

EFFECTS ON USABILITY

On the usability end, no attendees thought that the presence of braille made or would make the bowl less usable. Most attendees who participated in the discussion thought that it made or would make no difference, one thought it depends, and one thought it made the bowl more usable because the braille dots would act like a grip.

COMFORT LEVEL IN USING THE BOWL BY THE PARTICIPANT OR TO SERVE GUESTS

Finally, none of the attendees expressed any aversion to using braille bowls. Two said it would depend—on things that had nothing to do with braille but had to do with the perceived fragility of ceramics.

Discussion on findings

As mentioned above, the demographics at the discussion session was very different than those who returned their questionnaires in the earlier event, so feedback from the two events are not really comparable. Nevertheless, the participants did not express any resistance to brailled bowls and the findings seem to corroborate the limited results gathered from the questionnaires.

One thing to note about these findings from the focus group is that, in terms of the level of gauging whether a negative perception of brailled objects exists or not, they do not seem to substantially add to the diversity of results. One might cautiously say that these findings corroborate with the earlier conclusion that addition of braille does not have a negative effect of perceived desirability.

However, one might also note that despite the fact that these are individuals already concerned about accessibility, many did not choose the brailled bowls, for reasons like perceived value of craft objects or perceived fragility of ceramics, reasons that have nothing to do with the presence or absence of braille.

Reflections on the process

A number of things can be said about how this has been conducted, but most striking is the fact that a lot of numbers are simply not known because they have never been recorded. This includes things like the number of ceramic bowls taken, the breakdown of ceramic bowls

taken, the number of attendees at the presentation, and the number of people answering my questions.

The lack of such numbers suggest inadequate planning. In particular, I should have anticipated the existence and relevance of this event at the beginning of my project.

Conclusions

We might need to be reminded that a perceived fragility of ceramics and a fear of dirtying a craft object were the stated reasons of why participants in the focus group did not choose the ceramic bowls; in other words, the material used for making a product and whether the product is a craft or mass-produced object affect perceptions in ways that cannot be ignored. Add to this the small number of responses received during the survey stage and the biased demographics in the peer critique, it is clear that findings from this project can only be generalized in very limited ways. However, to the extent that they are, a number of conclusions can be drawn:

During my process of creating the moulds, one thing that struck me was that it was not straightforward to create the braille pattern on the mould. While alternative methods of creating braille that I did not investigate (for example stamping) exist, it is reasonable to say that creating braille on ceramic objects requires a certain level of skill and can be prone to error. It is reasonable to conclude (Q1) that it is not straightforward to add braille to *studio ceramics*.

With regard to perceptions (Q2), responses from the questionnaire survey suggest that resistance to brailled products is not expected, and this suggestion is corroborated by the responses during the peer critique. The responses also suggest that visual aesthetics and other factors not related to braille are likely to dominate perceptions, and braille, if present, might be perceived either as a visual aesthetic or a gripping mechanism.

During the trial run and while producing various test pieces, I discovered that it is quite easy for braille dots to detach from the object until the bisque state (or after the final glaze firing with a slip dotting technique). My original seed question postulated that braille might be useful as a tactile label for an instruction during the fabrication process, which would require the dots being able to withstand being read by touch during the unfired and bisque states. Since this has been shown to be false, braille in fact cannot solve the problem as originally postulated, although it might still be useful if other fabrication methods are used.

In terms of ceramic object making, dots on my objects might have detached because of poor technique or a lack of proper tools on my part, so it might be useful to explore what kind of techniques or tools will be able to give more predictable results. It should also be useful to explore alternative techniques such as slip dotting or stamping.

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Research Ethics Board

May 1, 2014

Dear Ambrose Li,

RE: OCADU 188 “Exploring perceptions of braille on common everyday objects.”

The OCAD University Research Ethics Board has reviewed the above-named submission. The protocol and the consent form dated May 1, 2014 are approved for use for the next 12 months. If the study is expected to continue beyond the expiry date (April 30, 2015) you are responsible for ensuring the study receives re-approval. Your final approval number is **2014-23.**

Before proceeding with your project, compliance with other required University approvals/certifications, institutional requirements, or governmental authorizations may be required. It is your responsibility to ensure that the ethical guidelines and approvals of those facilities or institutions are obtained and filed with the OCAD U REB prior to the initiation of any research.

If, during the course of the research, there are any serious adverse events, changes in the approved protocol or consent form or any new information that must be considered with respect to the study, these should be brought to the immediate attention of the Board.

The REB must also be notified of the completion or termination of this study and a final report provided before you graduate. The template is attached.

Best wishes for the successful completion of your project.

Yours sincerely,

Tony Kerr, Chair, OCAD U Research Ethics Board

OCAD U Research Ethics Board: rm 7520c, 205 Richmond Street W, Toronto, ON M5V 1V3
416.977.6000 x474

Appendix B. A preliminary study of messages on mugs

Before the project shifted direction to bowls, I expected the project to centre around mugs and therefore a preliminary study was performed on messages on mugs in January 2014. It was performed by examining the mugs section of my cupboard and I was able to arrive at seven non-mutually-exclusive categories of messages; the exercise also revealed that whether the message is presented in poetic form is unrelated to the nature of the message content. In other words form and content are unrelated.

Method

I examined the mug section of my cupboard at home and a few mugs that were not inside the cupboard at the time, disregarding the mugs that I made myself. They were then checked to see what kind of messages, if any, are on them. The messages were then categorized.

Findings

There were 36 mugs and other drinking vessels in the cupboard stacked in three vertical layers, plus three additional mugs were in the sink, on the drying rack, and in the fridge. Of these 36 drinking vessels are 31 distinct designs.

THE FIRST LAYER

Disregarding a few drinking vessels that were also in the second layers, seven mugs were in the outermost layer (Figure 23). From top-left to bottom-right were

Figure 23. Outermost layer of mugs


Figure 24. Second layer of mugs

Figure 25. Innermost layer of mugs

- A mug with the name and drawing of the owner's zodiac year (1-1)
- A mug with a message promoting a condo project (1-2)
- A mug with a message commemorating a business, plus its telephone number (1-3)
- A mug with a message commemorating a conference (1-4)
- A mug with the owner's last name (1-5)
- A souvenir mug with the name of the city visited (1-6), and
- A mug with the name of an animated feature (1-7)

THE SECOND LAYER

A few drinking vessels on the far left were in both the first and second layers. In the second layer (Figure 24) these were

- Two mugs with no messages (C-1), and
- One cup with no messages (C-2)

The rest of the second layer were

- A mug with health tips (2-1)
- A mug with an inspirational message (2-2)
- A teacup with a message of unknown commemorative significance (probably a contest or conference) (2-3)
- A teacup with no messages (2-4)
- A mug with the name and blurb of a university (2-5)
- A souvenir mug with a transit-related message (2-6)
- Another souvenir mug with a transit-related message (2-7)
- A mug with a message commemorating a conference, plus a biblical quote (2-8)
- A mug with a poetic promotional message (2-9)

THE INNERMOST LAYER

Disregarding the mugs and cups on the far left, the innermost layer (Figure 25) had 10 drinking vessels. Going from top-left to bottom-right were

- A small teacup with a promotional message (3-1)
- A glass with no messages (3-2)
- A large teacup (which could also be described as a mug if the vessel's intended function is disregarded) with no messages (3-3)
- A mug with a biblical quote (3-4)
- A mug with no messages (3-5)
- A large teacup (which could also be described as a mug if the vessel's intended function is disregarded) with a philosophical message (3-6)
- A souvenir mug with a transit-related messages (duplicate of 2-7)
- Another souvenir mug with a transit-related message (3-8)
- A mug with no messages (3-9), and
- A mug with the name of a university (3-10)

Figure 26. Mugs not in the cupboard

MUGS IN THE SINK, ON THE DRYING RACK, AND IN THE FRIDGE

The three mugs that at the time were not in the cupboard were (Figure 26)

- A mug with the name of an animated feature and its creator (4-1)
- A souvenir mug with the name of the city visited (4-2), and
- A mug commemorating a conference (4-3)

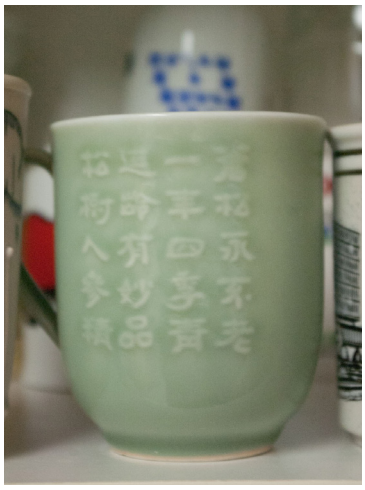

Figure 27. Mug with a poetic promotional message

UNEXPECTED FIND

One unexpected find was the mug with a poetic promotional message (mug 2-9, Figure 27), in the second layer. Although the embossed message is in the form of a traditional 5-syllable Chinese poem, closer inspection reveals that the poem is in fact a promotional message for a health food product.

This find shows that poetic and promotional messages are in fact not mutually exclusive categories.

CATEGORIES

Although subjective, the different messages can be categorized as follows (Table 1):

Table 1. Types of messages on each mug

Design	Personal identity	Promotional (excl. brand image)	Commemorative (excl. souvenirs)	Souvenir	Brand image	Advice/Inspiration/ Philosophy	Religious	Poetic
1-1	✓							

Design	Personal identity	Promotional (excl. brand image)	Commemorative (excl. souvenirs)	Souvenir	Brand image	Advice/Inspiration/ Philosophy	Religious	Poetic
1-2		✓						
1-3		✓	✓					
1-4			✓					
1-5	✓							
1-6				✓				
1-7					✓			
c-1								
c-2								
2-1						✓		✓
2-2						✓	✓	
2-3			✓					
2-4								
2-5					✓			
2-6				✓	✓			
2-7				✓	✓			
2-8				✓		✓	✓	
2-9		✓						✓
3-1		✓						
3-2								
3-3								
3-4						✓		
3-5								
3-6						✓		? [1]
3-8				✓	✓			

Design	Personal identity	Promotional (excl. brand image)	Commemorative (excl. souvenirs)	Souvenir	Brand image	Advice/Inspiration/ Philosophy	Religious	Poetic
3-9								
3-10					✓			
4-1					✓			
4-2				✓				
4-3				✓				

1 My understanding of the Japanese language is too low for me to discern whether the message is in poetic form or not.

Summary of categories found

The content of the messages can be summarized in seven categories as follows:

1 Personal identity: A message related to the personal identity of the mug's owner, for example a first or last name or a zodiac sign

2 Promotional, excluding brand image: A message with an explicitly promotional nature, such as an advertisement

3 Commemorative excluding souvenirs: A message with a commemorative nature (such as the anniversary of a company) that does not make the mug a souvenir

4 Souvenir: A commemorative message with a personal significance to the mug's owner, for example the name of a city visited, conference attended, or competition entered

5 Brand image: A promotional message that does not feel explicitly promotional but designed to increase the "brand image" of a product or company

6 Advice/Inspirational/Philosophical: Any message that is intended to be helpful advices, inspirations, or a philosophy

7 Religious: The message has a religious significance

In addition, whether the message is presented in poetry form or not was found to be unrelated to the nature of the message's content.

Conclusion

A small sample of about 30 mug designs were examined for the nature of the messages printed or embossed on them. A total of seven preliminary categories were identified: Personal identity, Promotional (excluding brand image), Brand image, Souvenir, Commemorative (other than souvenir), Advice/Inspirational/Philosophical, and Religious. The categories were found to be not mutually exclusive.

Additionally, it was found that the message can be in either poetic or non-poetic form, irrespective of the nature of the message content.

Appendix C. A short study on braille spacing

Introduction

It might be common knowledge that braille takes up a lot of space (a fact mentioned by Crowe (1999), for example), but I was not aware of any information on how braille corresponds to standard typography, or in other words why it takes so much space, so I decided to find out the answer myself.

Method

To find out the type size and leading corresponding to the standard spacing described by BANA (n.d.), two short lines of braille were set in Apple Braille in Adobe Illustrator. Various aspects of the two lines' spacing were then repeatedly adjusted until each aspect either matched the BANA description or was determined to be incompatible with it.

Specifically, the two short typeset lines were matched for "nominal distance from center to center of adjacent dots" (criteria 3.2.3.1), "nominal distance from center to center of corresponding dots in adjacent cells" (criteria 3.2.3.2), and "nominal line spacing of braille cells from center to center of nearest corresponding dots in adjacent lines" (criteria 3.2.4). Note that "nominal base diameter of braille dots" (criteria 3.2.2), while useful for creating visually accurate mockups, is not a relevant spacing characteristic of standard braille typography.

Findings

The first aspect to be matched was the "nominal distance from center to center of adjacent dots" (criteria 3.2.3.1). The standard distance of 0.092 inches was achieved when the text was set at a type size of 28 points.[1]

The second aspect to be matched was the "nominal base diameter of braille dots" (criteria 3.2.2). Since this cannot be adjusted independent of the type size, it was determined that Apple Braille is incompatible with criteria 3.2.2. However, when in situations where dot size is relevant, it was determined that adding a stroke of width 0.72 points will approximate the standard dot diameter of 0.057 inches.

The third aspect to be matched was the "nominal distance from center to center of corresponding dots in adjacent cells" (criteria 3.2.3.2). The standard distance of 0.245 inches was achieved after applying a tracking adjustment of –50. According to Adobe (n.d.), the implicit unit for this number is 1/1000 of an em.

The fourth aspect to be matched was the "nominal line spacing of braille cells from center to center of nearest corresponding dots in adjacent lines" (criteria 3.2.4). This is just the leading, so any text will conform to this criteria simply by having its leading set to 0.400 inches, or 28.8 points.

Discussion

It is worth noting that, assuming Apple Braille is representative of braille fonts, the standard size used for braille on paper correspond to 28 points, which is a very large size by print standards.

1 For the purpose of this study, a point is equivalent to 1/72″, the usual size of a point in digital contexts. In traditional (metal) typography a point is slightly smaller.

To put this in perspective, RNIB (2012) states that "[t]he majority of commercially produced large print books in the UK are printed at 16 point, with more specialist libraries like RNIB's National Library Service stocking text at 24 point." CNIB (n.d.) also defines "large" as "preferably between 12 and 18 points depending on the font". This puts the standard size of braille characters to be larger than "large print": the fact that this is larger than large print explains why braille takes up so much space.

Conclusion

In conclusion, assuming that Apple Braille is typical of all braille fonts, the standard text size of braille corresponds to a type size of 28 points on 28.8 point leading, with a tracking adjustment of –50/1000 em. This is larger than the type size used for typical large print books.

Appendix D. Additional details on the process

Adding calligraphy to the bisqued casts

Because the outside of the bowls would be brailled, I decided that the calligraphy should go inside; this would allow colour to be used on the brailled side to add visual interest, which I felt would be important given that my bowls would need to "compete" against other bowls.

Adding calligraphy to the bisques was expected to be straightforward, as I had already done calligraphy on bisques before and I already had a nib that I knew would work. Unexpectedly, however, I found it difficult to hold the pen except at an awkward angle; in order to write on the inside of a bowl form, the pen in fact had to be held backwards from behind (Figure 28).

Figure 28. Writing from behind with the pen held backwards

Glazing the bisques

Glazing the inside was straightforward. However, being without a foot, it was not possible to hold the bowl by the foot while glazing the outside. This was solved by suspending the inverted bowl onto two thin strips of wood and pouring glaze over the inverted form, and to ensure a good visual effect after firing, the rim of the inverted bowl is then slightly dipped in glaze (Tieu, private communication).

During the production run for the mid-fire bowls, I also added additional visual interest by sponging the bottom of the bisques in a second coloured glaze before the primary coloured glaze was poured.

Appendix E. Issues of a more tangential nature encountered in production

A number of unanticipated design issues surfaced during the production of the various artefacts. While these were not directly related to the stated goal of the project I will nevertheless mention them briefly here:

Alternative techniques for creating braille dots

I mentioned earlier (page 26) that while dots can detach from the cast, it is possible to repair them using a slip trailer with a fine-tipped metal nozzle, similar to the slip trailing technique described by, for example, Pozo (2010, pp. 59–60). It is not difficult to infer from this that it should be possible to just take the slip trailer to create all the braille dots. When I inquired about this possibility, Tieu (private communication, April (?) 2014) commented that she knew an artist that does exactly this and calls the technique "slip dotting".

However, attempting to do this on two thrown bowls showed that this was not as straightforward as it appeared to be. First of all, there is no obvious way to use a template to position the dots. If a needle tool is used, the holes produced by the needle tool would make it difficult for slip to attach to the clay surface. Even if the clay dots succeed in attaching to the clay surface, they might still come off after firing. This problem would not be serious if the slip dotting technique were used purely for decoration; but in the case of braille, it is essential to minimize the possibility of the dots detaching from the surface.

Mark Jaroszewicz (personal communication, May 23, 2014), another ceramics instructor at OCAD, later also mentioned that he had actually created braille stamps and successfully used them on thrown objects. I had explored stamping (for example, as described by Pozo, 2010, pp. 38–39) as a possible way to add braille to clay before deciding to pursue slipcasting, but my attempts were unsuccessful. Mark's success shows that my failure was a result of a lack of sufficient skill and knowledge on my part, and not a fault in the technique itself.

Specifically, Jaroszewicz stressed that stamps must be used when the clay was at the leatherhard or hard leatherhard stages, and individual stamps for single letters would need to be used. My failure to use stamps on clay was a question of timing and the use of stamps that were too wide.

In short, there are techniques other than slipcasting that will be fruitful to explore.

Artefacts with detached dots as a sculptural form

As I mentioned earlier on page 26, producing braille from slipcasting produced an unexpectedly large number of rejects caused by detached braille dots. The missing dots caused the message to become corrupted, rendering the casts unusable.

What might these damaged messages actually read? I kept some of these damaged casts and tried to interpret the damaged braille, and found that it was not always possible because sometimes the damaged patterns no longer produce a dot pattern that is meaningful in English braille.

In fact, because the process of corruption is different, I think a corruption of message content through detached braille dots would produce results that exhibit characteristics different from faulty spelling, typing mistakes, faulty optical character recognition, or predictive input (such as autocorrect or certain phonetic-based input methods used in some East Asian languages). So using these damaged casts as a sculpture or an installation might be instructional.

In June 2014 I produced a simple computer-generated video that demonstrates how corruption of various messages through such a process might look like. The simulation was not particularly accurate, but trying to produce such a video also highlighted the fact that there does not seem to be any readily available table to translate braille back to text.

The problem of dot detachment thus generated two possible areas for future exploration: We could investigate how corrupted braille might affect communications, and we could work out how to programmatically translate braille back to English text.

Writing angle and the prevalence of writing on the inside of bowls

Finally, there is something that I want to mention but has little to do with either ceramics or braille: I mentioned earlier that when I wrote on the inside of my bowls, I had to hold my pen backwards, and the result was calligraphy that leaned to the left instead of to the right.

This brings me back to the postcard I mentioned at the beginning (page 1). In addition to the braille, I also wrote some calligraphy on the postcard, and I intentionally wrote it left-leaning as a statement of my cultural identity. In contrast to that postcard, however, when I wrote on the inside of my bowls I had to write my calligraphy left-leaning out of necessity. One can understand why calligraphy on the inside of bowls are not commonly seen, because calligraphy usually leans to the right.

But Arabic calligraphy in fact usually leans to the left. So, is writing on the inside of bowl forms more prevalent in the Middle East? How might one find the answer?

Generating a large number of QR codes

Because I planned to provide a different URL for each individual questionnaire for the 18 bowls, it was necessary to generate 18 different QR codes for the 18 different URL's. Generating 18 QR codes using online QR code generators would be a tedious process requiring saving and keeping track of 18 different image files and it would be necessary to find out how to associate

each of these QR codes with the correct questionnaire. This would be an error-prone process so a more robust solution needed to be found.

I realized that since a QR code consists of nothing but a matrix of square-shaped cells and the Unicode standard contains a number of square-shaped glyphs, it should be possible to set QR codes as text, and if QR codes could be treated as text, then they could be treated as just another piece of data in a data merge, if either there was a way to specify colour in the merge, or find a way to set the QR code without having to specify colour. I realized that colour could be avoided if the code was constructed by varying between a filled square glyph and a space of identical width.

An offline tool to generate QR codes as text was thus needed. After some searching, I found the qrencode tool by Kentarō Fukuchi (2012) and found out that the tool could output QR codes in ASCII, which could readily be transformed into a combination of blanks and square-shaped Unicode glyphs.

The problem then became one of finding a suitable square glyph for use in the data merge. I identified two candidates, the Unicode character "full block" (U+2588) which is a solid 1 em by 1 em square, and the Unicode character "black square" (U+25A0) which is a small solid square that spans less than a third of the body.

Using U+2588 would be straightforward, since to create a functional QR code it suffices for a font to include a space of a width identical to the full block (the glyph that will most reliably fit this description would be the "ideographic space" (U+3000), present in any Chinese, Japanese or Korean (CJK) font), and set tracking to zero; presumably, a leading exactly the same as the point size should work. However, two problems soon surfaced: First of all, unexpectedly, InDesign was found to have difficulty processing data files containing the ideographic space. Also, a PDF file with a QR code generated using U+2588 was found to require a very small point size. Specifically, to fit a QR code into a space approximately 19 mm by 19 mm, a point size 1.48 had to be used. This caused the QR code to be "greeked" in certain

PDF viewers such as Apple's Preview, causing the QR code to become illegible on the screen. As a result, even though U+2588 would have been typographically less complicated, it was found to be impractical.

The other option, using U+25A0, is typographically much more involved. As this character is not usually present in CJK fonts, a monospaced non-CJK font would need to be used. The text that makes up the QR code would need to be set with negative tracking to close up the horizontal gaps, and then set with a leading less than the point size to close up the vertical gaps. Both would need to be determined by trial and error.

When Fira Mono was used, a point size of 4 with a tracking of −60/1000 em and a leading of 2.183 pt were found to be satisfactory. A PDF generated with these settings did not cause "greeking" when viewed in Preview.

Legibility of URL's for individually customized surveys

Because I identify my own work with a date code and all the bowls have been cast within the same month, originally I just took the last three digits and letter of my date code and used it to identify each survey. (For example, a bowl marked as "2014 04 04 B" would be represented by the code "04B".) However, I felt that some letters and digits looked similar enough to cause confusion when printed at a small size (for example, 6 and b, or 8 and B), so from a legibility point of view this solution was not ideal.

To address the legibility issue, the first alternative I tried was to remove the ambiguity between similar letters and numbers by using an all-letter code. This was done by translating the numeric portion into letters. However, this resulted in codes like *aec* and *aee* which still looked similar enough to cause confusion. Because the codes also look random, the potential participant has no way to spot any typos.

The next step I tried was to phonetically write out each digit in full, or by naming each letter by using its name in the International Radiotelephony Spelling Alphabet (International

Civil Aviation Organization, n.d.). For example, a URL ending in *aec* would have the parenthetical comment "(alpha echo charlie)". However, I felt that the results sounded strange.

Next I tried to use an all-numeric code in conjunction with the code spelled in full. For example, a URL ending in 802 would have the parenthetical comment "(eight zero two)".

Another idea that I explored was to generate a pronounceable syllable from the numeric code, by dividing the numeric codes into three parts and then mapping the three parts respectively into a beginning consonant or consonant cluster, a vowel or diphthong, and an ending consonant or consonant cluster. For example, "106" might be represented by the syllable "sict". This was later abandoned due to the possibility of generating meaningful but inappropriate words (Canadian Press, 2013). Alternatively, it would be possible to take a word list, choose 100 three-letter words, and then perform a mapping from the numeric code to words in the list. However, it would still take considerable effort to try to filter out potentially problematic words and so this idea was also abandoned.

Finally, I decided that numeric codes with their spelled-out equivalents sounded the least strange and so they were chosen over alphanumeric or alphabetic codes.

Error Resilience of URL's for individually customized surveys

After choosing to use numeric codes, I then noticed that there are consecutive ranges of numbers like 105, 106 or 624, 625, 626, 627, 628, 629. It is easy to see that a potential participant can easily make a one-digit typo and get the wrong questionnaire, or they might want to try typing in the next number to see what other questionnaires are like. A more random code to minimize the effects of the former and to discourage the latter was contemplated.

The first idea to try was to apply a mapping function the numbers to make them appear more random. However, since each number must represent a different survey, the mapping must be what is known as a *one-to-one correspondence* in mathematics. Such mappings are known as *perfect hash functions*.

Since I know that all the bowls were cast in the same month, there are only a maximum of 31 days in a month, and I know I cannot produce more than 26 pieces of work in a single day, the maximum possible numeric code I can get from a simple mapping of the date code is $31 \times 26 - 1 = 805$. Since this number is less than 1000, a perfect hash function can be obtained by multiplying the original numeric code by a number that is relatively prime to 1000 (that is, essentially any prime number that is not 2 or 5), and then taking the result modulo 1000. Test code was written to confirm that multiplying the original numeric code by 17 produces a new numeric code that is a perfect hash and which looks more evenly distributed.

The new numeric code should thus be more resilient to typing mistakes. This problem might need to be considered whenever potential participants are asked to manually type in a URL that includes a survey number.

The current numbering system does not address the second issue, namely that of a participant trying out random survey numbers. This might be solved by including a checksum or some other form of error checking code in the survey number.

Appendix F. Mistakes retroactively discovered in the online questionnaire

May 31

The first mistake was discovered on May 31, at 12:04PM, corrected by the following change:

```
diff --git a/questionnaire.php b/questionnaire.php
index 4caf29e..a84668b 100644
--- a/questionnaire.php
+++ b/questionnaire.php
@@ -501,7 +501,7 @@ Can you elaborate why?
 <?php checkbox('q2_other', 'Some other reason:'); ?>
 <br>
 What reason?
-<?php checkbox('q2_other_details'); ?>
+<?php textinput('q2_other_details'); ?>

 <?php } elseif ($stage == 3) { ?>
```

Where the participant was supposed to enter "Some other reason" for question 2, the questionnaire was presenting a checkbox instead of a text field.

June 4

A second mistake was discovered on June 4 at 10:17 PM. While additional responses were no longer expected because it was already past the stated deadline for mailing in responses, the code was nevertheless corrected, and the correction was the following:

```
diff --git a/questionnaire.php b/questionnaire.php
index a84668b..91434e9 100644
--- a/questionnaire.php
+++ b/questionnaire.php
@@ -317,7 +317,7 @@ if ($spec) {
        $q1a_w = 'with';
        $q1b_wo = 'without';
        $q1c_h = 'had';
-       $q2a_h = 'does not have';
+       $q2a_h = 'has';
        $q3a_d = 'Do';
        $q3b_t = ' the';
        $q3c_m = 'makes';
@@ -325,7 +325,7 @@ if ($spec) {
        $q1a_w = 'without';
        $q1b_wo = 'with';
        $q1c_h = 'had no';
-       $q2a_h = 'has';
+       $q2a_h = 'does not have';
        $q3a_d = 'Would';
        $q3b_t = '';
        $q3c_m = 'would make';
```

In effect, where the questionnaire was asking in question 2 whether the participant has chosen the bowl because braille is present or absent, the opposite question was asked.

Appendix G. An estimate of how many bowls of each kind were taken

When I arrived at the venue on May 21, it was already an hour and a half into the event. I looked for my bowls and photographed the 10 that I found. While an accurate inventory has not been taken, an estimate of what kind of bowls had been taken can nevertheless be inferred from the photographic record.

The following table summarizes what can be inferred from the photographs (Figure 29 to Figure 38, photographs as numbered by my camera; two bowls were photographed in photo 4538):

Table 2. What kind of bowls were still left over around 6:30PM on May 21

Photo	S/N[1] discerned	Quotation discerned[2]	Braille dots discerned	Type of bowl
4538 (a)	2014 04 25 A	Right side, Z/H	None visible	Unbrailled
4538 (b)		None visible	Left side	Brailled
4539		Far side, Z/H	Near side	Brailled
4540		Left side, Z/H	None visible	Unbrailled (?)
4541		None visible	None visible	Inconclusive
4542		Right side, Z/H	None visible	Unbrailled
4549		Far side, Z/V	Near side	Brailled
4550	[2014] 04 24 F	Far side, A	None visible	Unbrailled
4552		Far side, A	None visible	Unbrailled
4553	2014 04 13 B	Left/far side, Z/H	Near side	Brailled

[1] Serial number

[2] A: American proverb; Z/H: Zerma proverb written horizontally; Z/V: Zerma proverb written vertically

Assuming that I had located every leftover bowl from my batch of 18, and further assuming that each leftover bowl has been identified correctly, we can conclude that 4 brailled bowls, 5 unbrailled bowls, and 1 bowl of unknown type remained.

Since exactly 9 brailled and 9 unbrailled bowls were sent to the venue, we can further infer that about halfway into the event, 4–5 brailled bowls (44–55%) and 3–4 unbrailled bowls (33–44%) had been chosen by the attendees.

Figure 29. Photo 4538 (a)

Figure 30. Photo 4538 (b)

Figure 31. Photo 4539

Figure 32. Photo 4540

Figure 33. Photo 4541

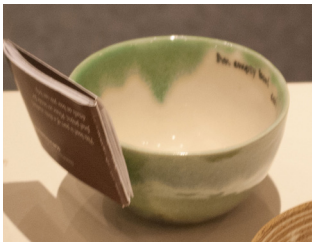

Figure 34. Photo 4542

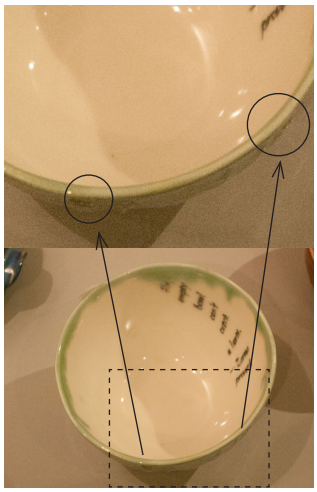

Figure 35. Photo 4549

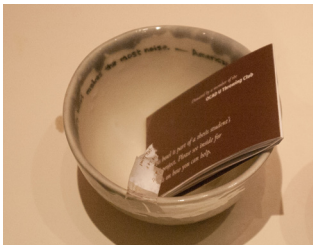

Figure 36. Photo 4550

Figure 37. Photo 4552

Figure 38. Photo 4553

Appendix H. Findings from returned questionnaires distributed on May 21

There were two participants, P1 and P2. Both participants chose to do the questionnaire online.

Table 3. Bowl chosen

Brailled	Unbrailled
1	1

Table 4. Whether any bowls with the opposite braille treatment was considered

	Brailled	Unbrailled
Considered	1	1
Not considered	0	0

Table 5. Reason bowl was chosen

	Brailled	Unbrailled
No reason in particular	0	0
Looks better	1 [a]	1 [b]
Feels better	0	0
There is braille (no braille)	1 [a]	0
Other	0	1 [b]

[a] The idea of having braille on it (given as a visual reason)

[b] The quotation and the colour

Table 6. Whether the braille had made the bowl more or less usable

	Brailled	Unbrailled
More usable	0	0
Less usable	0	0
Not any more or less usable	1 [a]	1 [b]
It depends	0	0

[a, b] Did not know braille

Table 7. Whether the participant would feel comfortable using the bowl at home

	Brailled	Unbrailled
Comfortable	1 [a]	1 [b]
Not comfortable	0	0
It depends	0	0

[a] It was a nice bowl and the maker was less anonymous than some others

[b] Perfect size

Table 8. Whether the participant would feel comfortable using the bowl to serve guests

	Brailled	Unbrailled
Comfortable	1 [a]	1 [b]
Not comfortable	0	0
It depends	0	0

[a] Why not?

[b] It was unique, so it would probably be interesting to the guest

Table 9. Whether the participant would feel comfortable giving the bowl as a present

	Brailled	Unbrailled
Comfortable	1 [a]	0
Not comfortable	0	1 [b]
It depends	0	0

[a] Might give the bowl to a friend who was blind but was unsure how the friend might feel

[b] Liked the bowl too much

Table 10. Whether designers putting braille on everyday objects would be a good or bad idea

	Brailled	Unbrailled
Probably a good idea	0	1 [b]
Probably a bad idea	0	0
It depends	1 [a]	0

[a] Unless there was matching English text on the design; also, braille and the matching English text should probably be on the same side

[b] Blindness could be a barrier when it should not be

Table 11. Whether the participant would choose the brailled or unbrailled among two otherwise identical products

	Brailled	Unbrailled
Probably the brailled one	0	1 [b]
Probably the unbrailled one	1 [a]	0
No difference	0	0

[a] Simplicity

[b] It would make the product more likely to be more useful

Table 12. Thoughts about using a product with braille

- P1, who chose a brailled bowl, thought it would either be treated as a novelty, or they would use it if it would asset their guests. P2 thought they were more likely to get a ramp for their house in order to be wheelchair accessible.
- P2, who chose an unbrailled bowl, did not think they would use it unless they learned some braille, though they thought it might mean they could share it with someone with that ability.

Table 13. Whether the participant knew any braille

	Brailled	Unbrailled
Knows braille	0	0
Does not know braille	1	1

Appendix I. Findings from focus group during peer critique on June 14

Table 14. Reasons given for choosing a particular bowl or plate

	Ceramic	Disposable
No particular reason	1 [a]	0
Looks better	1 [b]	0
Feels better	0	0
There is braille (no braille)	1 [b]	0
Other	3 [b, d, f]	2 [c, e]

[a] Did not know it had braille but liked the texture

[b] Liked the colour, images of braille, reusable

[c] Chose the plastic for fear that ceramic bowls might break

[d] More inviting, complements the food, good size

[e] Chose the plastic for fear that ceramic ones might get dirty

[f] Hates plastic plates, did not specifically choose between braille and non-braille

Table 15. Whether the braille had made the bowl more or less usable

More usable	1 [a]
Less usable	0

More usable	1 [a]
Not any more or less usable	3 [b, c, e]
It depends	1 [d]

[a] It just feels like a grip so it feels like it helps hold the bowl

[b] Why not? Bowls are covered in texts and messages anyway

[c] Really cool, liked both braille and calligraphy

[d] It depends

[e] An invitation to touch so it's good for both sighted and unsighted people

Table 16. Whether the participant would feel comfortable using the bowl at home

Comfortable	Multiple participants
Not comfortable	0
It depends	2 [a, b]

[a] Only when special guests are present, because the braille looks fragile

[b] Not when small children are around, unless it is not ceramic

Table 17. Whether the participant would feel comfortable using the bowl to serve guests

Comfortable	Multiple participants
Not comfortable	0
It depends	0

Table 18. Whether the participant would feel comfortable giving the bowl as a present

Comfortable	Multiple participants
Not comfortable	0
It depends	0

Table 19. Whether designers putting braille on everyday objects would be a good or bad idea

Probably a good idea	0
Probably a bad idea	0
It depends	0
Other	1 [a]

[a] There would be a tipping point beyond which people will start to notice when braille is absent

Appendix J. Glossary

Technical terms used in this thesis are briefly explained below. To avoid introducing more technical terms, some of the explanations below have been simplified and as a result are not entirely accurate from a technical point of view.

Etymological information has been taken from Krueger (n.d.).

Legend: *adj.* = adjective; L = Latin; OE = Old English; *n.* = noun; *v.* = verb

bisque *n.* The ceramic object or material obtained by bisquing

bisque *v.* In studio ceramics, a low-temperature firing to turn unfired and unglazed clay into porous ceramic material; in industrial ceramics, a high-temperature firing to turn unfired and unglazed clay into non-porous ceramic material

cone *n.* A specially formulated block of clay engineered to melt when subjected to a specific temperature for a certain amount of time, used as a visual indicator of when a specific firing temperature has been reached; cone numbers are often used as a more accurate indicator of firing temperature than generic descriptions such as "low-fire" or "mid-fire"

crazing *n.* Network of hairline cracks on the glaze surface

em *n.* A relative unit of measurement equivalent to the current point size

glaze (< OE *glær,* amber) *n.* A mixture of clay and colorants which when heated in a kiln forms a layer of glass

glyph *n.* A visual representation of a letter, digit, or other textual symbol

greek *v.* To approximate the shape of a piece of text set at a very small size with a shade of grey

handbuilding *n.* An umbrella term for various techniques other than throwing and slipcasting for forming objects from clay

HTML *n.* Short for "hypertext markup language"; a standardized way to structurally mark up the content of a web page so that it can be displayed on a web browser

kiln (< OE *cylene, cyline,* large oven < L *culina,* kitchen, cookstove) *n.* A thermally insulated chamber

leading /'lɛdɪŋ/ *n.* In digital typography, the distance between two subsequent lines of text; in metal typography, a strip of lead inserted between two subsequent lines of text to space the two lines farther apart, or the total thickness of any such strips of lead added between two lines of type

low-fire *adj.* Suitable for being fired at a low temperature; earthenware

measure *n.* The width of the space between the left and right margins, where text can be typeset.

mid-fire *adj.* Suitable for being fired at a medium temperature; stoneware

model *n.* A positive master with the same shape as the desired final object, used for making a mould; also called the positive or the prototype

mould *n.* A negative master with a shape such that when a casting material is poured into it, the casting material would take the form of the desired final object; also called the negative

point *n.* In digital typography, an absolute unit of measurement equivalent to 1/72 of an inch; in metal typography, an absolute unit of measurement equivalent to 1/72.27 of an inch

reservoir *n.* An opening on the top of a mould that simultaneously allows slip to be poured in to do the casting, and as a storage area (i.e., reservoir) of extra slip as moisture from the slip is absorbed into the mould

reservoir ring *n.* A solid disc, either smaller or larger than the model, attached to the model to create the reservoir when the model is cast to form the mould

slab *n.* A thin piece of clay of relatively consistent thickness

slate *n.* A metal or plastic template for writing braille by hand using a stylus

slip (< OE *slype,* liquid mud) *n.* Liquid clay obtained by mixing clay with water, or, in

slipcasting, liquid clay obtained by mixing clay with water and a small amount of chemical that causes clay particles to repel each other

slipcast *v.* To cast a form using slip as the casting material

throw (< OE *þrawan,* to turn) *v.* To form an object using raw clay on a potter's wheel by means of a turning action

tracking *n.* Overall looseness or tightness between letters and symbols on a single typeset line

undercut *n.* A kind of fault in mould design resulting in the cast not being able to release from the mould without being damaged

underglaze *n.* A colorant, often in liquid form, designed to be applied under a layer of clear glaze

URL *n.* Short for "uniform resource locator"; a notation for specifying a network resource on the Internet, usually equivalent to either a Web or email address

whirler *n.* A potter's wheel repurposed for turning plaster