

Making, using and interpreting design probes: how subjective is participation?

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Abstract: *The wealth of participatory methods in human-centred design adheres to the notion of a democratic process and solutions that respond to the experiences and needs of users and stakeholders. However, as human-centred design philosophies permeate the landscape of design education and research, the designer's role as both an objective facilitator and creative decision-maker suggests their impact upon stages of data collection and analysis. This paper advocates tools and techniques to support design students in initiating user engagement and insight-gathering whilst simultaneously recognising and utilising their own subjective experiences and knowledge. Drawing comparisons between our practice-led masters and PhD research, we discuss how an interactive activity pack is used to gather community members' perceptions of fear and safety in the urban environment before examining how observational illustrations are employed to examine the multiple functions of an art school. In this, we consider how the designer's creation, use and interpretation of design probes can establish an empathic and intersubjective dialogue in participatory design exploration. We propose that the application of a reflexive methodology can strengthen students' critical awareness of sociocultural issues and promote authenticity and rigour in human-centred design.*

Keywords: human-centred design, participation, probes, dialogue, reflexivity

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Navigating complexity in human-centred design

The landscape of design is in a constant state of flux. Through the *Designing for the 21st century* initiative, Inns (2010, p. 17–22) explores design's shift in focus from the development of products, spaces, images and their surrounding technologies to an interdisciplinary inquiry that tackles complex sociocultural problems. Norman and Verganti (2012, p. 2) maintain that such human-centred design (HCD) processes operate through iterative stages and encompass methods to support exploration, idea generating and the proposing and testing of solutions. To accompany this repositioning of the field, a multitude of roles and responsibilities are revealed. The designer operates as a negotiator of value, facilitator of thinking, visualiser of the intangible, navigator of complexity, mediator of stakeholders and coordinator of exploration (Inns 2010, p. 24–26). At the same time, customers, users and other stakeholders are encouraged to actively contribute to the design process as research participants and collaborative partners (2010, p. 13). In advocating a participatory design methodology, Sanders and Stappers (2008) recommend that shared ideas and collective creativity enable the conception of solutions that respond to first-hand insights. As such, a recent influx of resources prescribe the (apparent) optimum criteria for design researchers to employ innovative data collection and analysis methods (Aldersey-Williams et al. 1999; IDEO 2002; Tassi 2009; The Design Council 2012; Helen Hamlyn Centre for Design 2012; HCD Connect 2012; Hanington and Martin 2012).

As postgraduate students and aspiring HCD researchers, our consultations with such resources oscillate between initial inspirations and mid-project confusions. We strive to devise innovative ways to engage with participants yet our desire to elicit their insights is often at odds with our own subjective experiences and how they are embodied in the techniques we choose and the tools we design. In this paper, we interrogate recent debates surrounding HCD's increased focus on participatory methods. We critique and redefine perceptions of the designer as both a creative auteur and facilitator of participants' ideas by drawing insights from our own practice-led case studies.

We begin by providing an overview of the literature surrounding HCD processes, relationships and methods before presenting an account of the two case studies undertaken, respectively, in our masters and PhD design research. Set against the contexts of urban and organisational community place-making in the city of Edinburgh and the Glasgow School of Art, we concentrate firstly on our use of observation and visual documentation to externalise our initial encounters. We then explain how these images inspired our creation of an interactive activity pack and an observational logbook as participatory insight-gathering tools. Unpacking established conceptions of design probes, we discuss how these tools promoted participation remotely and in workshop and interview settings (Gaver et al. 1999, 2004; Mattelmäki 2006). We go on to suggest that by translating our subjective experiences into images and creating participatory tools, design students can reflexively negotiate their own positions in the field. This self-reflection can instigate engagement, dialogue and empathy to uncover qualitative intersubjective insights and inform an authentic HCD process.

HUMAN-CENTRED DESIGN PROBLEMS: PEOPLE, PARTICIPATION, POSITIONS AND PROBES

The premises of an iterative HCD process are embodied in the UK Design Council's concepts of *transformation design*. Burns et al. (2006) assert that transformation design values interdisciplinary collaboration and stakeholder and user participation to address sociocultural, economic and political issues such as healthcare, environmental

sustainability, infrastructure, crime and education. However, these developments have been subject to much controversy in the design world itself, as Bedell points out:

We used to know what designers did. They understood the relationships between form and function, aesthetics and usefulness. And they produced stuff. People who do something rather different are now being hailed as the coming thing. The new stars of design work on rather nebulous, intangible things such as services and business models. They collaborate, so it's difficult to see where their authorship begins and ends. And their arrival has caused toxic shock to the design world, resulting in an awful lot of bad feeling. (2005)

Bedell underlines that the proliferation of HCD has been met with a degree of suspicion. She counters The Design Council's defence of a creative problem solving profession with concerns that such distinctions negatively skew perceptions of designers from creative experts who marry form and function to "organisational impresarios, or design catalysts" (Burns et al. 2006, p. 25–26; Bedell 2005). Furthermore, Steen interrogates confusions over the designer's role as both a practitioner and analyst and suggests that by acknowledging their impact in the field, designers can render access and communication with others more transparent:

I present HCD as fragile: I think that it can be beautiful and that it can break easily. Furthermore, I recommend that practitioners bear this in mind when they organise or conduct HCD. I recommend reflexive practice as a way for practitioners to be (more) aware of and (more) articulate about their own role and agency in their HCD practices. This would help practitioners to align their practice more closely with their intentions and with what HCD can be about. (2008, p. 17)

Bedell and Steen's comments are pertinent to our discussions of disciplinary definitions and interdisciplinary relationships. Writing with Manschot and De Koning, Steen (2011, p. 53) draws from Sanders and Stappers' premises of *co-design* to investigate how services are reconsidered from the perspective of users' experiences and stakeholders' logistical knowledge. In 1989, architects King, Conley, Latimer and Ferrari (1989, p. 7–8) utilised *co-design* to describe their environmental community consultation workshops. Stressing how the designer operates as a visual conductor, they discuss interpreting and sketching figurative visions of residents' insights and needs. As the following passage highlights, creative exercises can externalise residents' local knowledge and elicit design-led dialogue in an accessible way:

The point of the drawing exercise is to lessen participants' fear of plans, maps, and other drawings normally found in an architect's office. In addition, the participants then feel less inhibited to comment on each other's drawings and to evaluate the different lifestyles the maps portray. This emphasis on visualisation by drawing is user-friendly and encourages participation. (1989, p. 163–164)

Despite their recontextualisation of drawing practice in design, the architects' examples of urban regeneration through community participation serve to somewhat suppress the interdisciplinary adaptation of creative and visual methods. Hanington and Martin (2012, p. 54) have reassessed the growing landscape of HCD research and emphasised the benefits of using observation, brainstorming, personas, scenarios and prototyping in distinct stages of the design process. In their textbook directory of methods, they also advocate the *cultural probe's* agency as an innately subjective and projective tool that supports participatory exploration and innovation.

In 1999, Gaver et al. (p. 22) first described the sets of activity packages that they created and implemented in a series of community engagement sessions as cultural probes. Once provided with postcards, maps, diaries and disposable cameras,

participants were encouraged to interactively record aspects of their daily lives. This enabled the designers to collect a wealth of qualitative data to underpin their proposals for technological devices and systems (p. 27). Elaborating on his extensive applications of cultural probes, Gaver et al. (2004, p. 53–56) have since critiqued the method's adaptation by a multitude of research disciplines. Consequently, the designers express their concerns that the cultural probe has evolved from an exploratory device applied to apprehend participants' subjective experiences (defined as *probology*) to a specific tool deemed capable of answering the researcher's questions. In considering the interpretation of probe responses and their contribution to design solutions, Lucero et al. (2007) point towards some general misgivings and concede that "the large amount of data resulting from the probes may be perceived as fragmented, too detailed, or even sometimes irrelevant" (p. 383). Yet in evaluating participants' responses collected in their investigation of bathroom lighting systems, the design researchers recognise the probe's capacity to evoke participants' experiences, emotions and desires, thus suggesting requirements for the HCD process (p. 389).

We are inspired by the notion that probes foster relations between designers and participants whilst collecting experiential data through creative hands-on activities. However, reflecting on these debates, we propose that the designer's process of probe creation is underplayed due to an overarching concern that designers must remain objective facilitators to focus fully on users' needs (Burns et al. 2006, p. 26; Inns 2010, p. 25). To the contrary, we develop Mattelmäki's view (2006, p. 34) that as human-centred designers are actively involved in user engagement, their own subjective experiences cannot be divorced from the participatory process. We therefore suggest that elements of designers' personal and professional identities are inherent in the probes' visual and material formats and that these qualities can actively enhance social relations and insight-gathering.

In the following sections we describe the creative decision-making process that prompted our production of participatory tools. Design researcher 1 (DR1) outlines her use of observational documentation to subjectively examine her own perceptions of fear and safety in the city of Edinburgh. These encounters inspired an interactive activity pack made to explore the experiences of young people living in the city. Design researcher 2 (DR2) details how her sketches and notes made whilst participating in public tours of the Glasgow School of Art's Mackintosh building are deconstructed. Reflective drawing forms the basis of a logbook interview prompt used to examine visitors' behaviour and problems underlying the tour service. We go on to evaluate the nature of the insights and the level of information afforded by the tools.

FEAR AND SAFETY IN THE CITY: A DESIGN-LED EXPLORATION OF THE TEENAGE PERSPECTIVE

After initial background reading on social and cultural theories, area specific socioeconomic case studies, and crime and victimisation distribution case studies, DR1 began a series of observational routes around the city of Edinburgh. Through immersion in the research context, she aimed to gain an appreciation of the dynamics of a diverse range of neighbourhoods. By placing herself in a position of a *user* (the word user in this context describing a city resident), she wanted to highlight and challenge her own emotional and behavioural reactions and perceptions to semiotic cues in the external environment. All the observational routes were carried out by bus, enabling the design researcher to travel and observe safely, document through the use of photography and filming (where/when appropriate), and listen and interact with users. Appropriating the Lothian Bus route map (Lothian Buses 2012) to record her

journeys (See Figure 1), observation took place over four days, completing thirteen routes. DR1 designed an observational matrix tool (See Figure 2) through the use of music manuscript, providing a framework which documented:

- Start and end time
- Neighbourhoods travelled through
- Signals and cues (including sensual awareness of sight, sound and smell)
- Users
- Emotional responses at key points

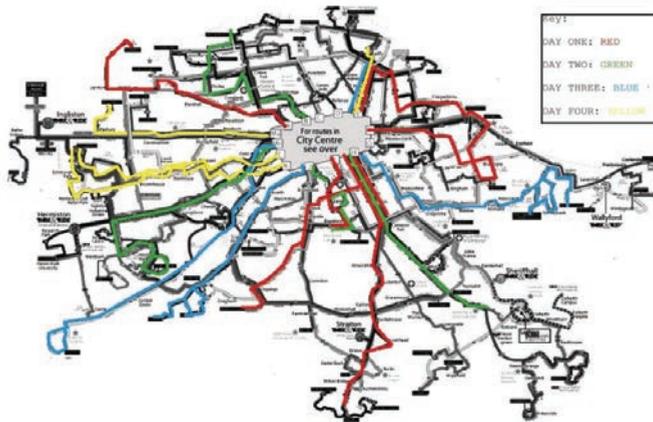


Figure 1. Lothian Bus Map. Used to document observational routes. Source: McAra 2012.



Figure 2. Notes from the Observational Matrix Tool. Source: McAra 2012.

After observation, DR1 identified two significant themes which informed the next stage of the investigation. A series of artefacts were designed as means of engagement with the chosen sample of participants. She created a pack of activities (See Figure 3)

which were given to ten participants (Group A) to be completed in their own time and environment. A similar pack (See Figure 4) was created to be used during insight-gathering workshops with two different participant groups (Group B and Group C). The activities were a collection of visual instruments and whilst her aim was to uncover insights into fear and safety, both packs had holistic qualities inviting participants to explore their sense and experience of community and home life.



Figure 3. Pack of activities given to Group A. Source: McAra 2012.



Figure 4. Pack of activities used in workshops with Groups B and C. Source: McAra 2012.

The first observational theme was titled *Place and Person*. Here, DR1 had observed how user identity was projected, perceived and reflected in the physical environment. This inspired the activity of asking all participant groups to explore their physical *neighbourhood-scape*. Drawing a map and annotating with designed icon stickers highlighted areas where feelings of fear and safety were experienced (See Figure 5).

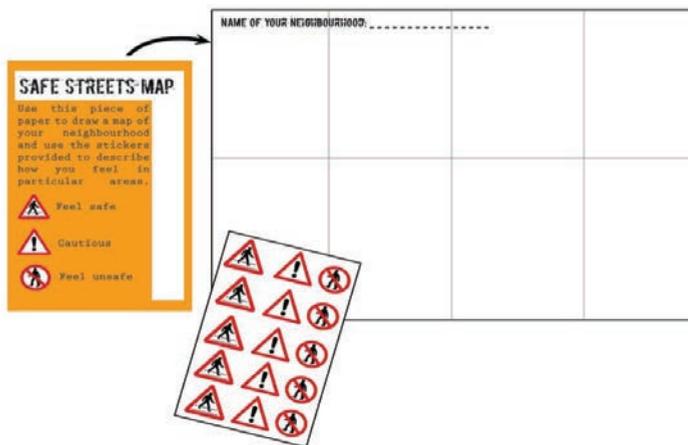


Figure 5. Neighbourhood-scape mapping. Source: McAra 2012.

During the workshops with Groups B and C, participants were encouraged to include objects, people, buildings, where they lived, local businesses, public spaces and street names. Modelling clay was provided for participants to build three-dimensional structures onto their maps. This process not only informed DR1 of how safe or fearful they felt in their neighbourhoods but also displayed cultural and social values and representations of their identity and personality. Group A was also asked to draw a map of their neighbourhood and annotate with stickers. Taken away and completed in the participant's home environment, this activity was supplemented with the use of a disposable camera and concept booklet (See Figure 6), asking participants to take photographs of:

- Where you feel safe in your neighbourhood
- Where you feel unsafe in your neighbourhood
- What does *community* look like
- The view from your bedroom window
- The front of your house
- A view of your street
- Your prized possession
- Your favourite place in your neighbourhood
- Your least favourite place in your neighbourhood
- The person you most trust in your neighbourhood



Figure 6. Camera Concept Booklet. Source: McAra 2012.

The second observational theme came under the heading of *Cues and Clues*. Throughout the routes, DR1 had marked on the matrix moments where she had felt a shift in emotions and attempted to reason this change through pinpointing particular phenomena observed at the time and interrogate their meaning. DR1 was interested to include the concept of stereotyping in the research packs, as a means of uncovering how and why participant's perceptions of fear and safety were formed. She created a set of *perception prompt cards* (See Figure 7) – a series of small cards with images from photographs she had taken during observation. Through digitally editing the photographs, DR1 created stylised representations of, what could be argued as, stereotypes including: objects, personas, transport, and other aspects of youth culture. This activity, which was completed by Groups B and C during the workshops, facilitated

discussions on what, where, how and particularly why, stereotyping informed their perceptions, affecting behaviour and emotions.



Figure 7. Perception Prompt Cards. Source: McAra 2012.

A final activity completed by all three participant groups was a dictionary style profile booklet (See Figure 8), designed to gain an understanding of how the participants interpreted the key words (*fear, safety, community and wellbeing*) that framed the project's brief. Words can mean different things to different people, having personal connotations and associations. Enquiring about participants' experiences and knowledge, DR1 created a platform for them to set the interpretative framework for their stories, experiences and opinions to be viewed through.

SAFE STREETS DICTIONARY	Name:	SAFETY:
	Age:	
	Words can have different meanings to different people.	FEAR:
	Please write or draw your definitions of the following words and what they mean to you:	COMMUNITY:
		WELL-BEING:

Figure 8. Dictionary Tool. Source: McAra 2012.

The overall holistic nature of both engagement packs, inspired by observational reflection, was a conscious effort to encourage participants to explore aspects of their lives where fear and safety could be experienced, as DR1 had experienced first-hand during observation and as a user herself.

Project Outcome: giving young people a voice

Whilst the overarching focus of the project was on fear and safety, DR1 identified an underlying issue surrounding participants' frustration and resentment caused by a lack of representation. The insights described illustrated that these young people

encounter many adversities in their community and neighbourhoods but felt powerless to voice their experiences and concerns. As a result, the participants had sought their own means of embracing adversities, through either a developed *make do and mend* tolerance (particularly prevalent with the youngest participants), or through displaying resistant rebellious behaviours (more so with the older participants). Through further research into young people's political representation in Scotland, DR1 discovered that whilst the age of criminal responsibility is eight years old, young people, particularly those under the age of sixteen, are not offered engaging platforms to inform decision-making on both a local and a national political level. Insights on participants' negative relationship with authority figures such as the Police revealed a further dimension which influenced DR1's final design outcome. DR1 recognised an opportunity to design a tool and service for young people that would facilitate a dialogue between them and policy-makers (and other stakeholders) and promote insight into the real cultural experiences of young people today. This opportunity took the form of a designed alternative campaigning device aimed at giving this underrepresented group in society a voice.

Having set out the stages of observation, tool creation, use and interpretation in DR1's study, we now account for how this methodology is adapted DR2's investigation.

Building on Observations: visualising, reflecting and constructing the GSA user experience

Built in 1909 by Modernist architect Charles Rennie Mackintosh, The Glasgow School of Art's (GSA) main building (*the Mack*) remains an architectural icon housing fine art students and academic and support staff. The buildings adjacent to the Mack were demolished in 2011 to make way for a new School of Design. In the meantime, staff and students have relocated to *Skypark* – a commercial building situated one mile west of GSA's main campus. Promoting visitor access amidst the construction work, *GSA Enterprises* train students as guides whilst conserving the fabric of the Mack and sustaining its primary use as a working art school (The Glasgow School of Art 2012). These varying functions and associated users inspired DR2's selection of GSA as a context to examine design-led approaches to organisational place-making. Here she aimed to better understand how the designer's creation and use of participatory tools can inform insight-gathering, dialogue, roles and relationships.

To begin to investigate the daily experiences of the Mack's multiple user groups, DR2 adopted the position of a participant observer on five public building tours. Her objective was to experience the tours first-hand whilst absorbing the Mack environment and the visitors' behaviour. Through making drawn and written field-notes, she documented the guides' spoken commentary, visitor demographics, movements, questions, comments and interactions. Figure 9 shows an example page of notes to demonstrate her divergent investigation and intuitive assembly of text and sketches.



Figure 9. Observational field-notes: tour three, stage six. Source: Broadley 2011.

DR2 recognised patterns and themes emerging from her observations through a stage of experiential and reflective drawing. In making ten collages, she depicted the stages of the tour and the information presented by the guides. These multi-layered visualisations connected the sensory spectacle of the Mack to the visitors' movements (Figure 10).



Figure 10. Viewing the exterior. Source: Broadley 2011.

Focusing on behaviours, she interrogated visitors' actions such as pointing, touching, listening and looking and unpacked her observations of rule breaking in fourteen line drawings, an example of which is shown in Figure 11.

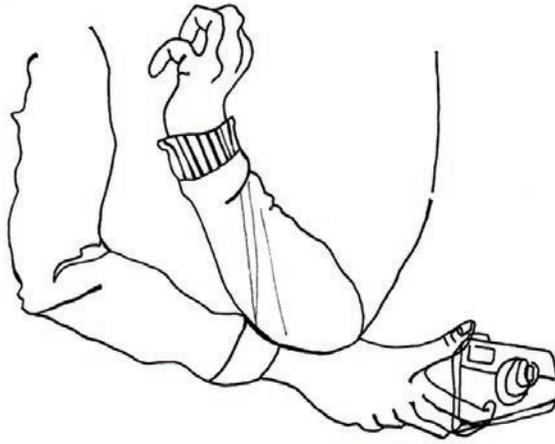


Figure 11. Interior photography. Source: Bradley 2011.



Figure 12. Helpful staff. Source: Bradley 2011.

In a further eight drawings DR2 explored a range of positive and negative interactions between visitors, students and staff. Figure 12 illustrates her representation of the Mack as a landscape encompassing digitally drawn characters while speech bubbles and text boxes contribute an additional level of narrative. As Figure 13 shows, she made six diagrammatic drawings to examine foreign visitors' behaviour and the problems implicated by language barriers.

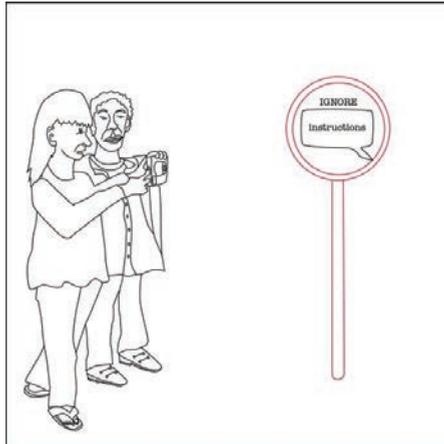


Figure 13. Visitors ignoring instructions. Source: Broadley 2011.

She then photographed customised *LEGO* figures as users situated against the Mack backdrop. By contextualising these scenarios with her interpretative written narratives as in Figure 14, she considered the needs of the building's diverse user groups and identified problems arising from the tour format.



The girl in the middle of this photograph is a first year fine art student. She moved to Glasgow from Newcastle in September and is very excited to be studying in an institution with such a positive reputation. She has been set her first project to produce a series of

Figure 14. The fine art students. Source: Broadley 2011.

Echoing DR2's immersion in the field and her perceptions of the current user experience, the collection of drawings comprised a combination of media and styles derived from her established visual practice. They were not, however, solely personal expressions, but *problematizations* of observed and experienced social events. As such, she explored how the drawings could facilitate a discussion of the building and service from a stakeholder perspective.



Figure 15. *Building Observations: investigating the visitor service and user experience of The Mackintosh Building in The Glasgow School of Art – format and layout.* Source: Bradley 2011.

She carried out an interview with two members of GSA Enterprises' (tour coordinators A and B) to gather their insights surrounding the building's functions and identify opportunities to enhance the visitor experience. In preparation, she designed an observational logbook to use as a visual prompt (Figure 15). Mimicking the familiarity of the sketchbook and evoking her roles as a student user and design researcher, she positioned her drawings on pastel blue lines, captioned them with titles and hardback spiral bound the pages.

Two weeks prior to the interview, DR2 gave the tour coordinators each a copy of the logbook and a packet of *Mack-it notes*. These paper squares, seen in Figure 16, featured an illustration of the design researcher posing qualitative questions concerning their daily encounters with the building. A blank speech bubble was provided on the reverse for their responses. She encouraged them to examine the logbook and questions, write their responses on the *Mack-it notes* and attach them next to related drawings. This combination of tools allowed the exploratory conversation to be structured by DR2's drawings and questions but led by the tour coordinators' experiences and expertise.

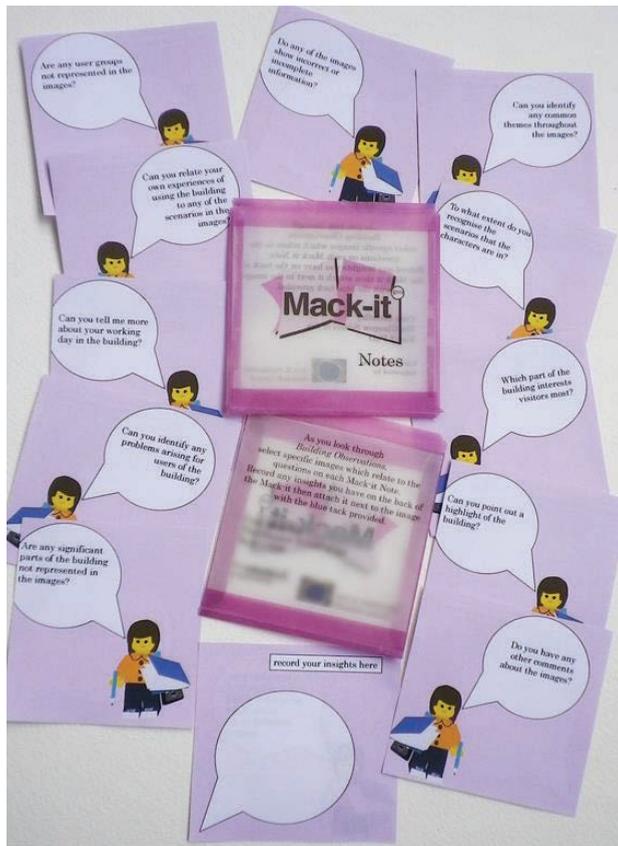


Figure 16. Mack-it notes. Source: Broadley 2011.

Re-designing the Mack: interpreting insights and students as users

The interview began with an examination of the construction work and its affect on the daily operations of the tours. In relation to the scenario depicting a group of builders working outside the Mack (Figure 17), tour coordinator B explained that she regularly undertakes a route check to determine any inaccessible areas and ensure the tour groups' safety. In her corresponding Mack-it note, she alluded to the student guides' dual identities and emphasised their responsibility to contextualise the significance of the architectural conservation to visitors.

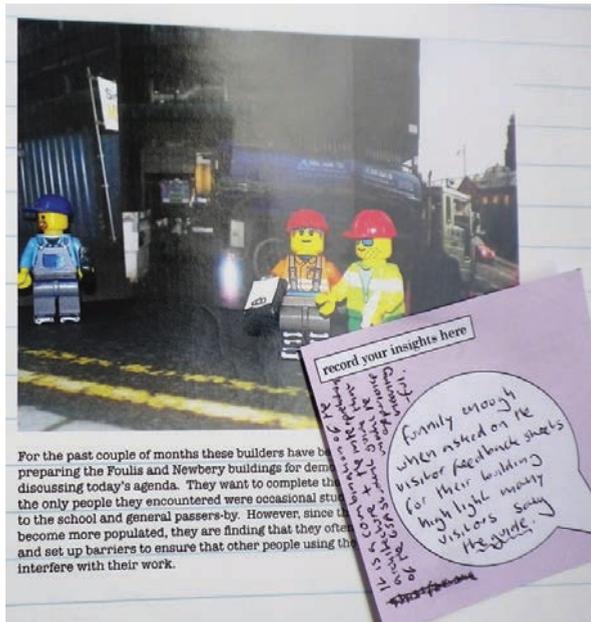


Figure 17. The builders and tour coordinator B's annotated Mack-it note. Source: Bradley 2011.

When DR2 asked if most guides are fine art students who are familiar with the Mack through working in its studios, tour coordinator A commented that the cohort is a mixture of guides from diverse disciplines across GSA. Tour coordinator B elaborated on the school's desire for all students to have a meaningful relationship with the building as a piece of architecture. As a design student at the school herself, these insights led DR2 to question her own limited interactions with the Mack. This underpinned her decision to incorporate further participatory tools and techniques in a co-design workshop. Through this, she explored the impact of the School of Design's decant to Skypark on design students' perceptions, uses and experiences of the Mack.

The logbook and Mack-it notes' abilities to mediate dialogue in the staff interview were vital in illuminating this opportunity. The students collaboratively articulated and shared pertinent problems, deconstructed these to suggest opportunities, and prototyped innovative services and products to improve communication and access within GSA.

As an intervention, the workshop transmitted a participatory human-centred ethos through the undergraduate and postgraduate design community and addressed student-centred issues concerning the organisation of the school across its two campuses.

Human-centred design dialogue: evaluating and redefining probe-led participation

Developing our accounts of insight-gathering tools, in this section we interrogate the impact of their design, use and interpretation on the role of the human-centred designer. We begin by considering how our development and delivery of the packs and the logbook influenced our engagement with participants. Reflecting on these

evaluations, we appreciate the probe method's contribution to HCD participation, but argue that the designer's initial inspiration and critical interpretation are equally pivotal. As such, we return to our creative processes of designing the tools. Originating from our stages of observation, we propose that empathy, understanding and dialogue are promoted when human-centred designers assume the position of users. Moreover, by visualising their own experiences and knowledge in the creation of probe-like tools, designers can devise responsive ways to gather and evaluate the insights of others.

Modes of engagement

We can identify similarities and discrepancies between our parallel uses and interpretations of our tools. DR1 sent the pack to Group 1 and asked them to complete it autonomously in their own environments. She simultaneously employed a similar pack in the facilitated workshop with Groups 2 and 3. DR2 gave her expert stakeholders the logbook and Mack-it notes prior to the interview to allow them to absorb the concepts visualised in her drawings. Their written interpretations were then employed to structure the interview discussion. In each of our studies, and building on Gaver's (1999; 2004) original cultural probe method, we refer to the tools given to participants to complete independently and in the absence of the designer as *remote probes*. When accompanying the designer in a workshop or interview setting, we found that facilitation and participation were enhanced through the presence of what we term *direct probes*.

By visualising the behaviours of visitors, students and staff, DR2 communicated her perceptions of problems arising from the tour service to the tour coordinators and promoted their individual reflections and responses through the Mack-it notes. Upon embarking on the interview, DR2 found that while tour coordinator B compared the issues conveyed in the drawings to her own experiences and recorded her thoughts through writing, tour coordinator A returned her annotated notes to their packet without connecting her insights to the content of the images. This indicates the difficulties in encouraging participants to engage with remote probes when the design researcher is not present to reiterate the purpose and process. Recalling the misgivings of Lucero et al. (2007, p.383), the remote probe responses alone were one-dimensional and insufficient. Yet by using the logbook and Mack-its in the interview to contextualise and co-evaluate her observations, DR2 uncovered additional rich insights regarding the tour's limited provisions for child, infirm and foreign visitors.

As a result, the central position of the logbook as a direct probe instigated a collective dialogue quickly as the tour coordinators verbally supplemented DR2's accounts with insider information.

Mattelmäki and Battarbee (2002, p. 268) suggest that the visual and material character of *empathy probes* stimulates social relations and an open dialogue in the design process. Assessing the probes' participatory applications, Graham and Rouncefield (2008, p. 196) consider how discursive participation can build relations between designers and users, investigative participation supports users in examining their daily experiences, and reflective participation encourages their communication of insights through their direct annotation of material artefacts. Combining remote probes and direct probes enriched our engagement with the participants, not simply by helping us collect their written and drawn accounts of everyday life, but by structuring and contextualising our interactions and fostering a sense of mutual understanding. This foregrounds the empathic and imaginative elements of participation that our probe creation, use and interpretation helped harness.

The designer as interpreter

Our processes followed the premise that design opportunities and solutions should respond to the serendipitous information we uncovered and the decisions we made while moving between geographic, sociocultural and professional territories. Graham et al. (2007, p. 34) maintain that feelings of ambiguity and uncertainty are inherent in probes-based studies and that through the consensual working out process, diverse and surprising solutions can be generated from probe responses. This perspective is informed by and substantiates the notion that probes do not claim to discover a chain of factual evidence regarding participants' experiences and needs. To agree with Gaver et al. (2004, p. 53), the probes' exploratory nature promotes a combination of both ambiguous and prescriptive questions to help designers extrapolate fragmentary clues to frame and shape their resulting solutions.

DR1's proposals for a means of consulting marginalised young people and the insights and prototypes that emerged in DR2's study can be traced back to the participants' contributions in the workshop and interview, their interactions with the probe materials and the content and quality of their responses. This points towards the intersubjective process by which the collective experiences of designers and participants determine the direction and outcomes of HCD. In recounting their participatory design workshop with groups of teenagers in Hong Kong, Ho and Lee (2012, p. 74–75) deem intersubjective participation as achieving empathy with users and thus, capable of creating solutions that respond closely to their needs. Cementing the use of probes to stimulate empathy and the development of design solutions, it therefore follows that "designers need both information and inspiration to be innovative, in that sense all the user data should not be cut up into small dry facts" (Mattelmäki and Battarbee 2002, p. 270). To arrive at our solutions, we pieced together each participant groups' responses and supplemented these with our own subjective experiences.

The designer as visualiser and maker

Returning to the implications of probe creation, we suggest that the designer acknowledges and negotiates their subjective understandings of the research context in the initial stages as an authentic starting point. In our studies, we found observation an intuitive technique to absorb and document our encounters while immersed in each environment.

DR1 created tools in response to the themes derived from the observational matrix and photographs. Whilst travelling through specific areas she recorded personal feelings of fear and intimidation, as well as feelings of safety and security. Questioning whether external perceptions of particular districts created some form of reputation which residents felt they had to uphold or conform to; DR1 was inspired to question how the participants' identities were formed and perhaps mirrored in their external environments. A further example of this reflection was in the construction of the second observation theme (*Cues and Clues*). Highlighting phenomena during the routes which precipitated emotional and behavioural change, DR1 questioned her own social and cultural values that were being translated through her perceptions, associations and stereotyping. This informed the activity of identifying and challenging clues which participants associated with fear and safety.

In DR2's study, the rules of the Mack tours state that interior photography is not permitted. These constraints drove DR2's broad-brush act of sketching and note-taking

in the initial tours and her convergent investigations of visitor behaviour and unmet needs in the final tours. She then reflected on the data contained in these field-notes to create her cartoon-like representations of interactions between people and spaces. The tensions surrounding the building's use as an art school on one hand and a museum on the other are evident in the images and result from her experience as both a student at the school and as a visitor on the tours. DR2 recognises that her drawings may be perceived as critical of the tour service and resentful of the visitors' presence, but suggests that intersubjective authenticity and rigour are reinforced in exploratory HDC research when personal biases are externalised and subsequently challenged.

The designer as user

Advancing the Design Council's premise that designers should imagine themselves as product and service users and "eat their own dog food" (2007 p. 22–23), we maintain that a greater degree of empathy and understanding are reached and solutions are more sensitive to users' needs when designers recognise their subjective experiences. Regarding the design researcher's input and impact, reflexivity functions "as a way to constructively combine practice and analysis and to be honest about my [their] dual role of working in as well as studying the project" (Steen 2012, p. 69). Such roles occasionally became confused during our studies as we moved between studio-based creation and participatory fieldwork.

DR1 concedes that she strived to create an objective form of tool, removing herself from the designer-user equation by asking participants to define the concepts and terms that she assumed were central to her study. However, she notes that in the workshop, the participants themselves forged empathy. When struggling to answer certain questions or define key terms such as wellbeing, DR1 was asked to give examples, definitions and experiences from her own life. Through DR1 displaying compassion and gaining trust, her subjective involvement rendered a deeper, more insightful understanding, creating a dialogue where participants felt comfortable, safe and relaxed to divulge their personal experiences. In stark comparison to the rich, in some cases highly metaphorical insights gathered during the workshops, participants of the remote probe provided very literal responses with no real reflection, personal meaning or context.

Conversely, DR2 actively included her own subjective perceptions in the drawings in an attempt to negotiate an intersubjective discussion. In the interview, the staff members consistently drew from their experiences of working in the Mack as a form of response to the visible display of DR2's insights. The contrasting tones of DR1's open-ended questioning and DR2's personal visualisations of problems echo the varying relationships formed during the workshop and interview. While the group of young people and DR1 entered into a shared dialogue of mutual experiences, DR2 encountered a separation between herself as a student and the tour coordinators as staff members.

These insights confirm the influence of reflexivity and intersubjectivity when designers attempt to engage with participants through images and artefacts. As such, Inns' (2010, p. 24–26) conceptions of the designer as a negotiator of value, facilitator of thinking, visualiser of the intangible, navigator of complexity, mediator of stakeholders and coordinator of exploration remain evident in each of our studies. We framed sociocultural problems surrounding fear and safety and organisational imbalances with the goal of enhancing participants' lives and promoting innovative change. Our

observational practices helped us unpack these problems and begin to condense complex ideas into tangible insight-gathering tools. The negotiator-facilitator-visualiser role prevailed during our creation, use and interpretation of the probes while our positions as mediators and coordinators became particularly apparent in the project planning, logistical and participatory stages of the projects.

MAKING AND USING PROBES TO SHARE HUMAN-CENTRED KNOWLEDGE: WHAT'S THE BIG IDEA?

As the development of HCD continues, methodological innovation follows on naturally from methodological inspiration. The personalised qualities and bespoke applications of our remote and direct probes correspond with a need to blend methods that are at once conventional and game changing; rigid and imaginative; verbal and visual in order to enrich engagement, participation and insight-gathering. Visualising our own experiences renders them more concrete and those of participants can be considered from a more tangible standpoint. Participants are invited to confirm or refute the designer's assumptions. To develop previous deductions on visual and creative consultation techniques (King et al. 1989, p. 163–164), the probes' presence as an additional *participant* reduces inhibitions as ideas are mediated and translated through their materiality.

We drew from our own experiences to construct questions and imbue our tools with distinct visual styles. As a form of visual hypothesis, the probes waited patiently to be adjusted and amended through participatory activities. They were written on, drawn on, pointed at, picked up, talked about, criticised, celebrated and ultimately, witness to a complex intersubjective dialogue. The inquisitive probes gathered rich, interpretative evidence to underpin our design processes and solutions. This acknowledges the synthesis, interpretation and reconsideration of our insights as reflexive designers in tandem with the first-hand experiences of our participants. Our probe creation supports the degree of rapport, communication and collaboration needed for an effective HCD relationship.

Responding to Bedell and Steen's concerns (2005; 2008), we believe that reflexive visualisation and tool creation go some way to alleviating the fragility and intangibility of HCD. This positions the probes at the nexus of experiential exchange and knowledge sharing. Our processes suggest that human-centred designers can not only retain their creative, visual integrity, but that these traditional skills are increasingly pertinent in enhancing participatory engagement and achieving clarity as the discipline advances.

To obtain intersubjective empathy and authenticity through participatory activities, we urge students to acknowledge and interrogate their positions as both subjects and objects during the early stages of HCD exploration. At the same time, we ask design educators to accompany us in redefining the boundaries of HCD methodology by encouraging a less rigid approach to the selection of insight-gathering methods. When devising participatory strategies, we recognise the complexity attached to each unique sociocultural setting and endeavour to create bespoke tools and techniques. The level of visual connotation embodied by the logbook, for example, is an unsuitable way to engage with the young people from Edinburgh and the interactive, playful nature of the packs may not have generated useful insights from the GSA staff. The specificity required when designing probes supports our recommendation that designers immerse themselves in the field, become users, simultaneously reflect on their experiences and their observations of others, and gain an authentic understanding of the context for themselves. We propose that our subversion of established tools and techniques

reveals a reflexive and empathic role for the designer. By integrating their perceptions, feelings and emotions into visual and material insight-gathering tools, design students can elicit a holistic and rigorous human-centred dialogue.

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References

- Aldersey-Williams, Hugh, John Bound and Roger Coleman, eds. 1999. *The Methods Lab: User Research for Design*. London: Design for Ageing Network; Helen Hamlyn Research Centre.
- Bedell, Geraldine. 2005. "Politics of the Drawing Board". *The Observer* [cited 4th October 2012]. Available from <http://observer.guardian.co.uk/review/story/0,6903,1651396,00.html>.
- Burns, Colin, Hilary Cottam, Chris Vanstone and Jennie Winhall. 2006. *Red Paper 02, Transformation Design, The Design Council* [cited 4 October 2012]. Available from <http://www.designcouncil.info/mt/RED/transformationdesignTransformationDesignFinalDraft.pdf>.
- Gaver, William, Tony Dunne and Elena Pacenti. 1999. "Design: Cultural Probes". *Interactions* 6 (1): 21–29.
- Gaver, William, Andy Boucher, Sarah Pennington and Brendan Walker. 2004. "Cultural probes and the Value of Uncertainty". *Interactions* 11 (5): 53–56.
- Graham, Connor, Mark Rouncefield, Martin Gibbs, Frank Vetere and Keith Cheverst. 2007. "How Probes Work". Proceedings of the *19th Australasian conference on Computer-Human Interaction: Entertaining User Interfaces, OZCHI 2007*, Adelaide, Australia. New York: ACM. 29–37.
- Graham, Connor and Mark Rouncefield. 2008. "Probes and Participation". Proceedings of the *Tenth Anniversary Conference on Participatory Design, PDC 2008, Indiana, USA*. New York: ACM. 194–197.
- Hanington, Bruce and Bella Martin. 2012. *Universal Methods of Design: 100 ways to Research Complex Problems, Develop Innovative Ideas, and Design Effective Solutions*. Massachusetts: Rockport.
- HCD Connect. 2012. *Methods* [cited 4 October 2012]. Available from <http://www.hcdconnect.org/methods>.
- Helen Hamlyn Centre for Design, Royal College of Art. 2012. *Methods* [cited 4 October 2012]. Available from <http://designingwithpeople.rca.ac.uk/methods>.
- Ho, Denny K. L. and Yanki C. Lee. 2012. "The Quality of Design Participation: Intersubjectivity in Design Practice". *International Journal of Design* 6 (1): 71–83.
- IDEO. 2002. *IDEO Methods Cards* [cited 4 October 2012]. Available from <http://www.ideo.com/work/method-cards/>.
- Inns, Tom, ed. 2010. *Designing for the 21st Century: Interdisciplinary Questions and Insights*. Farnham: Gower.
- King, Stanley, Merinda Conley, Bill Latimer and Drew Ferrari. 1989. *Co-design: A Process of Design Participation*. New York: Van Nostrand Reinhold.

- Lucero, Andrés, Tatiana Lashina, Elmo Diederiks and Tuuli Mattelmäki. 2007. "How Probes Inform and Influence the Design Process". Proceedings of the 2007 conference on *Designing Pleasurable Products and Interfaces, DPPI 2007*. Helsinki, Finland, New York: ACM, 377–391.
- Lothian Buses. 2012. *Route Maps* [cited 10 July 2012]. Available from <http://lothianbuses.com/timetables-tickets-maps/route-maps>.
- Mattelmäki, Tuuli and Katja Battarbee. 2002. "Empathy Probes". Proceedings of the 2002 *Participatory Design Conference, PDC 2002*. Malmö, Sweden, Computer Professionals Social Responsibility (CPSR), 266–271.
- Mattelmäki, Tuuli. 2006. "Design Probes". *Publication Series of the University of Art and Design Helsinki* [cited 4 October 2012]. Available from <http://www.uiah.fi/publications>.
- Norman, Don and Roberto Verganti. 2012. *Incremental and radical innovation: design research versus technology and meaning change* [cited 4 October 2012]. Available from http://www.jnd.org/dn.mss/incremental_and_radi.html.
- Sanders, Elizabeth B.N. and Pieter Jan Stappers. 2008. "Co-creation and the new landscapes of design". *CoDesign* 4 (1): 5–18.
- Steen, Marc. 2008. *The fragility of human-centred design*. Amsterdam: IOS Press.
- Steen, Marc, Menno Manschot and Nicole De Koning, 2011. "Benefits of Co-design in Service Design Projects". *International Journal of Design* 5 (2): 53–60.
- Tassi, Roberta. 2009. *Service Design Tools: communicating methods, supporting design processes* [cited 4 October 2012]. Available from <http://www.servicedesigntools.org/>.
- The Design Council. 2007. *Eleven lessons: managing design in eleven global brands, A study of the design process* [cited 4 October 2012]. Available from <http://www.designcouncil.org.uk/about-design/Managing-Design/Eleven-Lessons-managing-design-ineleven-global-brands/>.
- The Design Council .2012. *Design Methods* [cited 4 October 2012]. Available from <http://www.designcouncil.org.uk/about-design/How-designers-work/Design-methods/>.
- The Glasgow School of Art. 2012. *Mackintosh Building Tours* [cited 4 October 2012]. Available from <http://www.gsa.ac.uk/visit-gsa/mackintosh-building-tours/tour-faqs/>.