Everybody Needs Somebody: Physical Social Networks & Visualisation

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Abstract

This practice-led design research explores the deployment and use of a physical, non-digital visualisation tool to model personal social networks. The emphasis is on how people choose to represent their networks, what they choose to show, and how the process of creating physical representations contributes to the uncovering of an otherwise invisible set of relations. Research focus is on the construction of narrative meaning in a social context by a mixed sample of participants, and the development of instruments to support and mediate this construction. The research is intended to shed light on how people construct personally meaningful narratives about their social networks by creating physical visualisations of them. Experiencing personal networks physically by constructing them from everyday materials brings them into clear sight; to the forefront of haptic and phenomenological consciousness in ways difficult to emulate with computer monitors and touch screens.

Author Keywords

Interfaces; display; materiality; data environments, digital objects; physical interactions, physical visualisation, social network models.

Introduction

The people we know, and our places in a complex web of personal relationships define what we do, who we do it with, and why we do it. Our connections contribute to how we see the world, and where we choose to live, work or study. However, the ways we are connected to each other can be difficult to see or understand because they are complicated to show and tend to change constantly. Social scientists now use computers to create intricate models of social connections using specialist software and advanced algorithms. The results of this research are often impenetrably elaborate, drained of human values, and understandable only by other computers.

Making things in physical form is an important aspect of externalisation. Externalisation is understood in constructionism and in a whole range of theories to be the process of making internal thoughts, structures, or processes apparent and visible. This happens when there is a breakdown or if a repair is necessary. i.e. when your car breaks down it is necessary to open up the bonnet and get the tools out. *Internal* understandings of how the engine works are transformed into *external* actions. Latour [1] suggests that moments of crisis reveal the limits and extent of networks, an initial overview of their topology. When participants were asked to model their social networks in physical form, a moment of crisis ensued in which the network became externalised through tangible materials. Externalisation is also understood to be necessary when collaboration is happening, requiring people to make their views, actions, and abilities apparent in order to facilitate co-ordination within the group. In [2] social anthropologist Nigel Rapport describes context as *an act of personal externalisation*.

He refers to Bateson's [3] conception of multiple contexts forming an interlocking set of social relations. The way people see the world around them is externalised in their respective personal contexts.

Digital social networks are owned and controlled by large corporations who exploit their users' social connections for personal profit, often without the user's knowledge or awareness. The deployment of complex proprietary algorithms to do this work leads to the situation where Facebook or LinkedIn have access to much finer-grained knowledge about social networks than their users. The aim is that creating physical externalisations of personal networks leads to ownership and awareness of the internal network representation.

Research question
How do physical artefacts mediate understanding of how people are connected digitally?

Related work
Hand drawn maps of social connections have been used in qualitative research. Bagnoli [4] used what she calls 'relational maps' with the aim of developing creative ways of examining the social world and of discovering how young people show their networks. She provided paper and pen and asked participants to show important relationships. She specified that the author place themselves in the centre of the map and that distance from the centre indicated strength of connection, otherwise she follows [5] in providing 'basic scaffolding' for participants, allowing them to construct their own representations. *Everybody Needs Somebody* uses a similar approach to elicitation in physical form.

Connections are made physically by stretching elastic bands between pins representing people. Where Bagnoli was interested in the development of creative tools and in personal network topology, *Everybody Needs Somebody* is more concerned with how the network is externalised and how the process contributes to personal autonomy, discovery and empowerment.

Roseneil [6] uses relational maps in her study in which people are asked to arrange their social relationships in expanding concentric circles, distance from the centre indicating degree of closeness. This is done during the interview process. Again the completing of the map is more directed than in *Everybody Needs Somebody* and there is less attention given to the material dimensions of the exercise. Although Roseneil's work is firmly in the field of therapeutic psychology and psycho-social dynamics, there are some similar aims with participants asked to model their relationships in visual form as a way to reach hidden understandings.

Ingold [7] suggests a view of engaging with physical materials he calls *correspondence*. Correspondence entails the arrangement of materials into correspondence with one another. Pieces become parts as the making progresses and as they tend increasingly to cohere. The maker has anticipatory foresight about how the process might end up but does not guide materials to any precisely preconceived end. Participants are invited to arrange the materials into meaningful arrangement – a correspondence of substrate, pin, rubber band, and gesture.

Pin and rubber band maps have been used as ways of teaching mathematics. A Geoboard [9] is a mathematical manipulative designed in the 1950s which uses nails and rubber bands to model concepts in geometry. However, placement of nodes is fixed on these boards and does not allow for adjustment by the user.

Everybody Needs Somebody is consciously positioned in the discipline of participatory design [8] activity. This tradition places design material in the hands of participants, the designer steps back and allows the process to unfold, observing and trusting that participants will engage fruitfully with creative tasks.

Development
Design of the visualisation method was treated much like any design task, with a series of iterations. Refining the pins and tile design took a number of identifiable steps. Version 1 started with cotton thread, an MDF wooden board and standard drawing pins. The thread was found to be difficult to break, fiddly to tie and hard to see. Drawing pins were difficult to push into the MDF substrate, which was also heavy.

Version 2 used rubber bands cut into strips, and foam board, which was much lighter and portable and came supplied in bulk at a standard size. The drawing pins went into the foam board very easily and but did not hold the rubber bands well under tension. In many cases they went straight through the board to project dangerously from the underside. When stretched, the single strip of rubber band seemed to have just the right level of visibility and signification, forming an unambiguous straight line between pins, but poor contrast with the colour of the foam board. Version 3

involved gluing two cork tiles together, painting them white, and using coloured rubber bands to indicate degree of connection. The cork tiles, like foam board, were lightweight, portable and supplied in bulk at a standard size. Drawing pins held the bands better through two sandwiched tiles with less risk of projecting through or pulling out under tension, and colour contrast was improved against the white background. Version 4 substituted coloured push-pins for brass drawing pins, enabling coding for types of connection.

Design development followed the practical considerations of affordability, availability and portability, but also gave serious thought to how analysable the results would be. The final version held pre-coded values, embodied in the materials themselves, for node category and edge value. It was also important that the materials themselves be familiar everyday objects visible in work and domestic settings. It was hoped that using familiar materials in an unexpected synthesis would lead to the qualities of surprise, discovery, delight and engagement.

Analysis
Limitations of space prevent detailed description of how participants responded to the task. The following is therefore a narrow sample of how participants described their models. The focus is on moments where interview responses centre on the physical nature of the task.

'The order is consider(ed) like a clock. And I've put my best friends, actually most of them are from kindergarten here, and I have put these ones further since they are more recent. And … of course my partner 'cos we live here together so I spend more time with him than my family that is back home'

Compositional arrangement thus indicates degree of closeness, which the participant has consciously related to time. The longer she has known her friends, the closer they are placed to her in the circle. It is also clear that possibilities for the number of connection shown are limited to what can fit on the tile. The network could be depicted as more densely connected, with more connections, and more people included.
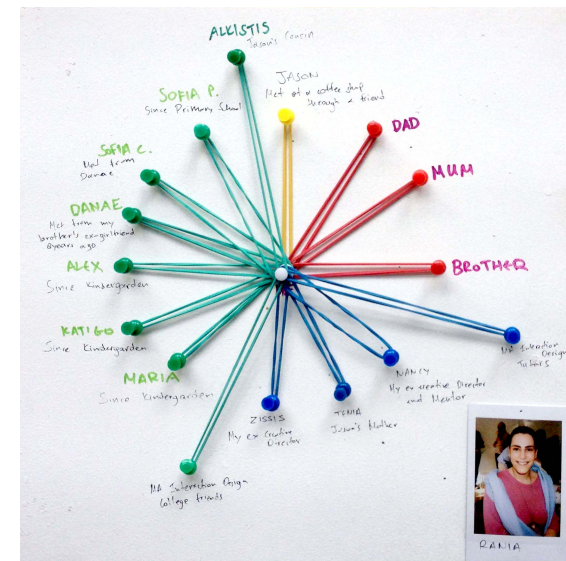

Figure 1. Social network model A

'Here is a lot of, like, managers, and ex co-workers, directors - there are many of them but these are the main ones. It could get much more expanded'. 'Friends and like other people from work 'cos I've changed like five jobs'. ' I could put more people like from college and old folks from the past'.

The haptic aspect of the task was highlighted by some participants. These observations emphasised the qualitative or emotional aspect to creating the model. The feelings associated with connecting people physically were seen as positive *because* tactile.
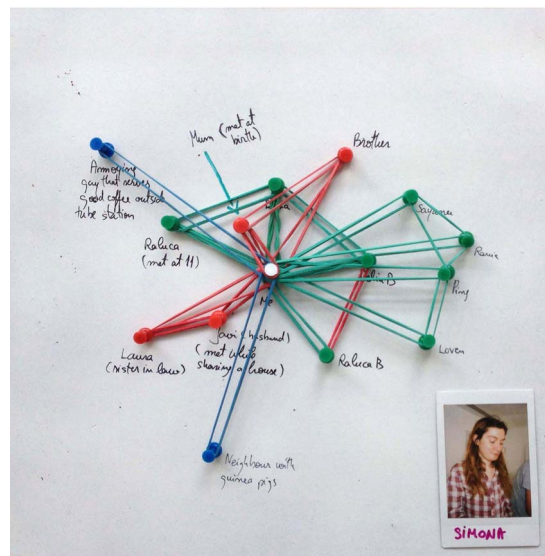
including the setting, instructions, materials, and resulting insight (seen as a correspondence) contributed to a sense that participants had created a work of art.

'It's tactile with the rubber bands and that, and it feels good to link them up'. 'It makes it into a piece of art'.

Comparing a digital screen-based model to the physical models a participant suggested an undefined but noticeable difference. The physical model works in a specific way that a computer model couldn't
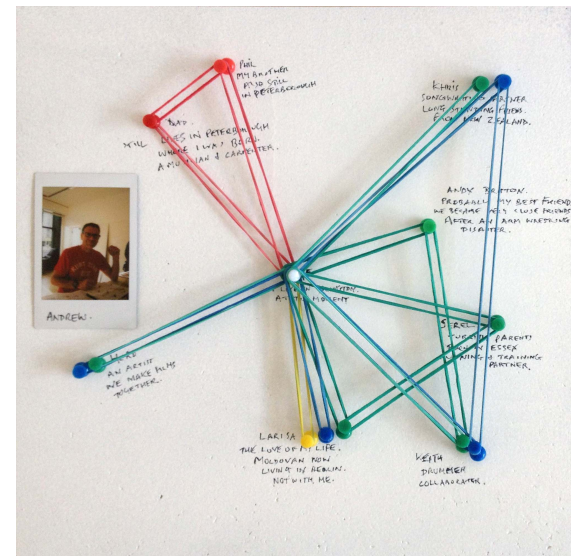

Figure 2. Social network model B

Figure 2. Social network model C

One participant framed the task as specifically related to artistic practice. This was seen as a rewarding and transformative quality. The set of material conditions,

If you were to do it linear it certainly doesn't work the same way.

Conclusion

Findings indicate personal social networks have a wide variety of different configurations. The majority of responses, but not all, placed the participant in the middle with a radial arrangement around the centre point. Variety is evident in how many connections the models feature and whether the people in a network are shown as connected to each other. Telling stories about networks causes them to change shape. When semi-structured interviews were conducted in front of the completed artefacts, participants changed the position of their pins in relation to the centre point and to each other. Participants expressed how the physical nature of the exercise shaped their expectations of network topology and how the physical objects allowed for detailed externalisation of a mental construction.

In conclusion, while the desktop may not quite be dead it is certainly suffering at the hands of tangible interfaces. As digital systems grow in complexity (and the consequent mystery of how they work deepens), so the place for tangible data manifestations and physical representations will grow in importance. We have been handcrafting tools for at least 2.6 million years [10] in close interactional correspondence with physical materials. Tangible artefacts are an essential part of how we experience the world, and how human consciousness has evolved. The future vision for visualisation described in this paper argues for the primacy of these *before the desktop* examples placed at the centre of how we understand digital systems, networks, mental representations, and lived experience.

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