Understanding Artistic Prototypes Between Activism and Research

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The paper explores the concept of artistic prototypes to analyse a strand of new media art generated within research or activist contexts. Two key features of a framework for artistic prototypes, openness and fictionality, are explored through the discussion of two artworks which embody a sense of prototypicality. The contingent, situated interpretation of knowledge emerging from creative practice-based research is associated to the instability of prototypes proposed as a paradigmatic object for experimentation.

1 Introduction

Historical and interpretative approaches to new media art have focused on its immaterial, networked nature, and its problematic fitting with traditional museum settings and preservation standards (Dietz 1999; Banovic et al. 2002; Krysa 2006; Paul 2008; Graham & Cook 2010; Graham 2014). Current tendencies in technological development however suggest more hybrid and integrated forms of materiality and immateriality, with digital devices embedded in physical objects or disseminated across the environment, rather than confined to screen-based interfaces (Weiser 1991; Gershenfeld et al. 2004). Such vision towards ubiquitous computing embraces (or questions) ambient technologies that disappear in the background but seamlessly pervade the environment, becoming more human or calmer (Weiser & Brown 1997; Greenfield 2010; Dourish & Bell 2011). New paradigms of understanding account for this shift from a cultural perspective: the notion of post-digital refers to a complete blending between analogue and digital, a dimension where digital technologies are no longer a revolution (Negroponte 1998), but a fully assimilated factor by now treated as a given (Cramer 2014).

A particular strand of new media art is engaging with technology to question patterns of innovation, or tell stories about possible futures. These practices are often generated within research environments, in the context of practice-based research (PbR) or research through design; or from activist and collaborative approaches typical of media-labs, hack-labs and makerspaces.

These works use coding to make physical objects perform in determined ways, and adopt processes close to interaction design. It is actually possible to describe an overlap across art and design, with tendencies like critical and speculative design (CSD) (Dunne 2008) appropriating artistic languages and channels of dissemination, and artists, on the other end, adopting design methods to make artworks. Despite Dunne and Raby's assertion that Critical Design is not art (Dunne & Raby 2007), strong parallels exist with both attempting to inject an element of the critical into the everyday. The main feature that this strand of new media art is borrowing from design is the practice of prototyping or the tendency to present the artwork as a prototype: an invented, innovative device introduced to the public more like a proposal for further development to be used or manipulated, than as a unique, stable piece to be contemplated.

Prototypes are commonplace in research because of the way they afford an analysis of the making process and suggest new fields of exploration. Within activist approaches, they are created to demonstrate how social/political/economic change is possible

and support innovative practices inspired by values such as freedom (of speech, information), equality, sharing and communitarianism, anti-consumerism and environmentalism. This paper compares literature on prototypes with two artworks to explain why it is possible to define them as prototypical, and disclose their relationship with research and activism. Subsequently, it suggests a framework to understand the behavior of artistic prototypes, with the aim to support further work by curators, museum practitioners and theorists in conceptualising and mediating these works to the public.

2 The Prototype: What Is It?

The most common definition of the term prototype relates to the design process: it tangibly manifests an idea to test possibilities and share it with stakeholders (managers, collaborators, perspective users). In fact it *is* an idea. Prototyping has been described as a way of thinking and learning by doing, integrating reflection and evaluation with the practice of making and performing in the real world (Hartmann et al. 2006, p.299). In manufacturing, prototypes are used to assess technical feasibility, aesthetic issues, usability or experience (Visser 2014, p.5); they can address different audiences depending on purpose: to externalise and develop an idea, to promote the project within the organisation, to evaluate user experience, or its potential success on the market. Consequently it can be high or low fidelity and made in different media (Rudd et al. 1996).

Prototyping has been described as crucial to innovation (Schrage 1993; Kelley 2001), especially because of its persuasive power. The material manifestation of an idea can be more convincing than verbal or written accounts, and articulate the complexity of the context in which the new product might become desirable, or the problems it might create. Indeed prototypes are common ways to materialise visions for the future, catalyse creativity (Carleton & Cockayne 2009) and quickly generate new avenues of development (Briscoe & Mulligan 2014; Rosell et al. 2014). Finally, prototypes have a special role within activist paradigms of open and grassroots innovation, when making becomes a pathway for collaboration and to negotiate the value of emerging technologies in bottom-up dimensions of co-creations (Chesbrough 2003; Kera 2001; Kera 2013).

Prototypes are strongly suitable to support cooperation and collaboration within an organisation (Schrage 1993) or through networked communities. They can elicit discussion, facilitate the comparison of different perspectives, and contribute to the articulation and sharing of knowledge around a project. For this

mediating role they have been interpreted as boundary objects (Rhinow et al. 2012; Subrahmanian et al. 2003). Additionally, they are key in participatory design methods to encourage contributions from participants (Bødker & Grønbæk 1991; Greenbaum & Kyng 1991; Vines et al. 2013). These characteristics of prototypes make them ideal instigators in activist processes of change, both proposing viable alternatives to the status quo, and enabling the diffusion of such alternatives through co-creation.

Prototypes can also function as critical artefacts: rather than early versions of products, they are provocative objects able to open up new directions or field of exploration for design; instigate debate; support an investigation on people's values and attitudes (Dunne & Gaver 1997; Bowen 2007; Gaver et al. 2008). Therefore they can be used for advocacy and to subvert a passive acceptance of the status quo. SCD artefacts belong to this category, and are sometimes presented alongside narrative elements and scenarios to depict their imaginary settings.

This brief overview highlighted a variety of ways of describing prototypes and their range of functions: representations, manifestations or mediations of ideas; tools for sharing, collaborating, communicating, testing; embodiments of arguments and visions; props for action or discussion. Such an assemblage of heterogeneous meanings can be useful when compared with existing artworks that present some of the above characteristics. The next section analyses two examples in this light, as a prelude to a more general understanding of artistic prototypes.

3 Artistic Prototypes

3.1 Sentient City Survival Kit

The *Sentient City Survival Kit* (SCSK) by artist and architect Mark Shepard consists of a series of devices conceived to bypass various forms of surveillance in near-future cities dominated by ubiquitous computing. The aim is to question the paradigm of a responsive urban environment disseminated with information systems and to raise awareness on the possible consequences for social and cultural life, privacy and trust (Shepard 2010).

The kit contains four artefacts. The *Serendipitor* is an alternative navigation system opposing the logic of efficiency guaranteed by common navigators, to reintroduce detours, unexpected encounters and serendipity. *Under(a)ware* is a line of underwear able to sense Radio Frequency Identification (RFID) Tag readers and alert the wearer of their presence with a small vibration. The *Ad Hoc Network Travel Mug* creates free networks of communication

hidden to any monitoring system. The *CCD-me-not Umbrella*'s infrared LEDs let the user play and bewilder surveillance cameras.

In a paper presented at the Digital Arts and Culture Conference, Shepard explicitly refers to these artefacts as prototypes and describes them as the main vehicle to disseminate the project in museums, art festivals and public lectures (Shepard 2009, p.5). Additionally, a dedicated website offers DIY tutorials to engage the public in building the kit: these include source code, circuit diagrams and parts list, released under a Creative Commons License. The intention is not just an alignment with an open source attitude, but also that this artistic project be replicated, multiplied and used.

Shepard mentions critical design as a method, and shares with it the goal of generating "discussion around just what kind of future we might want" (ibid. 2009, p.2). The kit however is presented as an artwork, rather than a design project uncovering forthcoming technological trends. As opposed to positions "casting art in a reactionary role vis-à-vis technological development", Shepard wants to explore new roles for the artist "in shaping how we inhabit the near-future Sentient City" (ibid. 2009, p.5). The prototypes are framed as archaeological traces of the future, demanding interpretation and questions about proximal socio-cultural developments "to instigate the process of imagining a future city and its inhabitants through fragments and traces of a society yet to exist" (ibid. 2009, p.5).

Grounded on current orientations of R&D labs in urban computing and ambient informatics, the *SCSK* is rooted in a research framework and, through its prototypes, generates new knowledge (forms of conceptualisations and problematisation of an issue), that finds dissemination through typical academic channels such as lectures and conferences, alongside artistic channels (exhibitions and festivals). Like classic design prototypes, it proposes a set of innovative devices that might be associated with new social practices, but it simultaneously elicits discussion and critical exploration. Finally, thanks to its open source logic, the project presupposes collaboration and, potentially, multiplication, implementation or modification of the prototypes. The activist perspective is rather implicit, but it can be identified with the intent of anticipating change, and inspiring actions of resistance towards imposed technological paradigms (control, surveillance). The next example instead shows a stronger activism take, and a less evident link to research.

3.2 Re:Farm the City

Re:Farm the city is an ongoing project initiated by a collective formed across Barcelona's Hangar Media Lab and Madrid's Medialab Prado, with the lead of Hernani Dias. It consists of a set of open source tools (hardware and software) to develop sustainable, small scale urban agriculture. These include farm containers (mobile planters, of various dimension, for indoor or outdoor use), watering systems connected with monitoring systems, compost mixers, a web interface for managing the farm at distance, and bike powered water pumps or generators. The initiative has now reached various cities across the world where new participants have embraced the project, adopting, customising or adding new tools. Part of the tutorials is available to everyone on the blog and wiki. Dias however tends to privilege the formation of small communities built through workshops he runs when invited by artistic institutions, so that a more direct exchange can take place, and the expansion of the project can be more easily documented (Dias 2013).

The tools are prototypes combining sensors, electronics and recycled material aimed at generating new everyday practices and impacting the real world. Their functioning is not always guaranteed; rather they are unstable and open to implementation and customisation according to specific local conditions, including climate, cuisine and biodiversity. This makes of *Re:Farm* an exportable, adaptable model to support local production, conceived to turn much of the city's own recycled trash into a resource (2013, p.ibid.).

Similarly to *SCSK*, this work comprises a set of digital devices embodying a proposal for new practices; expects to be shared, appropriated, used and transformed by other contributors; adopts technology to suggest alternative views and critique established ones. Artistic approaches and channels of disseminations are integrated within a process of grassroots innovation supported by typically activist values such as respect for the environment, resistance to consumerist cultures, communitarianism and localism. The project has also been presented through talks and conferences (Calvillo et al. 2010), and its development required combining existing knowledge (from math to biology and the mechanics of fluids) into something new and transferable. This transferability is what differentiates it from more traditional artworks usually expressing the unique talent of the artist. The artefacts created through *Re:farm* are conceived to be as easily replicated as possible.

4 Between Activism and Research

The existence of a strong tie between new media art and research has been recognised in recent literature that emphasises the experimental approach of artist-technologists (Gere 2010) and the way they share similar channels of dissemination and reward with academics, diverging instead from the logics of the gallery and the art market (Scrivener & Clements 2010). The prototypical nature of a significant number of artistic works generated as research however has been neglected in discourses of media art and only mentioned by proponents of PbR in the arts as one of its key physical outcomes. In this context, prototyping has a crucial role because it fits with a cycle of trial, analysis, implementation and evaluation, usually adopted by researchers to combine theory and practice (Winter & Brabazon 2010, p.5; Edmonds & Candy 2010). Here, building artefacts is regarded as the main site of knowledge production, while the identity between maker and researcher is recognised as PbR's defining quality (Coessens et al. 2009; Borgdorff 2011). Accordingly, prototypes are particularly suitable to scenarios where we wish to manifest, visualise and analyse the making process. Because artefact and research development are constantly affecting each other, prototypes are a natural outcome of artistic research. Furthermore, in virtue of their openness to transformation and their unfinished dimension, they are well placed to encourage feedback and elicit responses from users/audiences when the research goals concern aspects of public experience (Muller 2008; Chatting 2014). Finally, prototypes allow hypotheses to be explored and tested in tangible ways, opening up new fields of research or creative possibilities.

The nature of knowledge in artistic research has been at the centre of passionate debates and, in the attempt to establish its position alongside traditional academic standards, redefined as situated, contingent, embodied, experiential and tacit or non-conceptual (Sutherland & Acord 2006; Knowles & Cole 2007; Barrett & Bolt 2010; Borgdorff 2011). These approaches to 'knowing' seen as an action rather than a static entity all share an awareness of the intrinsic dynamism of material and social situations in which artefacts come to exist. We suggest that such an emerging conceptualisation of knowledge comes together with the provisionality and instability typical of prototypes.

The second context where artistic prototypes are thriving can be identified with media-labs and makerspaces. These environments embrace the processual and collaborative dimension of new media art (Graham & Cook 2010, chap.4) by supporting hybrid platforms for activities such as workshops, presentations of work in progress, festivals, conferences or hackathons. Even

though some media-labs, such as MediaLab Prado or Ars Electronica Futurelab, have become key references in the media art scene, most of them develop identities less focused on art in a narrow sense, and more on production and intervention. Social empowerment, environmental issues and participation are generally high on makers' agenda (Yair 2010), and prototyping results as an ideal practice to support these goals. Labs recognise access and engagement with emerging technologies as an essential step to enable citizens in understanding and negotiating otherwise top-down innovation paths (Kera 2013). Specific programmes are devised for the inclusion of marginalised groups such as NEETs, homeless people or women (Frost 2012). Even if deployed in small scale projects, they can demonstrate the potential of alternative approaches and contribute to change accustomed mind-sets or challenge traditional production and distribution systems (Yair 2010, p.3). Prototypes are usually the vehicle of such endeavors, because of their capacity to materialise vision and demonstrate inventive and sustainable possibilities that can be easily built and tested in small communities. Indeed, prototyping resources such as 3D printers, microcontrollers and laser cutters are among the most common items populating fablabs (the area of media-labs devoted to fabrication).

Workshops and hackathons are the most typical event-formats in labs. They engender opportunities to collaboratively and informally work around creative ideas, and generate prototypes thanks to their intense and concentrated structure (Seravalli 2013; Briscoe & Mulligan 2014). The open source ethos and the preference towards recycling that commonly inform media-labs (Frost 2012) is another relevant factor leading to the production of prototypes. Both attitudes imply that objects have an expanded lifecycle and are constantly subject to transformation from a distributed network of users/makers. Prototyping is seen as an agent of change, and connected to an activist mindset that opposes consumerism, encourages exchange, cooperation and sustainable, scalable solutions.

5 A Theoretical Framework

The examples reported demonstrate a range of specific characteristics of artistic prototypes that serve either research or activist purposes. In previous unpublished work we have described a conceptual framework for understanding the behavior of artistic prototypes. 'Openness' and 'fictionality' are identified as their key features and related to research and activism as their main areas of application (Fig.1). The framework also articulates how 'openness' and 'fictionality' support further facets of prototypicality,

namely generativeness, participation, critique and testing. The scope of this paper is however only focusing on a specific part of the framework; in the next paragraphs we will demonstrate that 'openness' and 'fictionality' are strongly compatible with activist and research functions of prototypical artworks respectively. Beginning by identifying some ways that the examples described embody these facets we will continue by suggesting how a conscious adoption of these aspects of our framework can support artistic prototypes as both kinds of research and modes of activism in the future.

Fig. 1 The artistic prototypes framework.
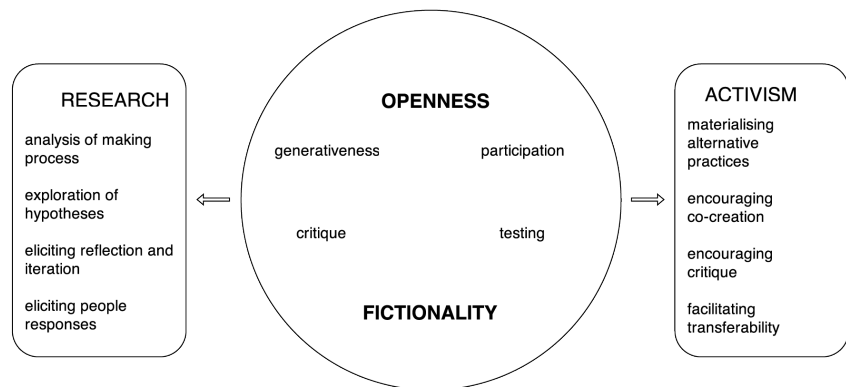
5.1 Openness

Both *SCSK* and *Re:Farm* imply a potential towards their own expansion, appropriation and modification. This can be understood as a form of openness of the prototype. Prototypes are open because they are unstable, provisional, not definitive, unfixed, prone to transformation and re-definition, situated in a dynamic life-cycle, in between made and un-made. Both this instability and the reliance on external influences to determine its performance relate the openness of prototypes to activist modalities. Openness can be found at different levels. Technological iteration 'opens' the prototype to new functionality and consequently new applications. Openness to interpretation not only relates to polysemy and subjectivity (as in Eco's theorisation of The Open Work 1989), but also provokes consideration of the ways prototypes connect to practices, values and cultural systems. These associations between objects and contexts are not established permanently, but evolve through time, so that the same device becomes potentially integrated into very different practices. Finally, multiple and differentiated versions of a prototype can be made, on the basis of shared instructions. This is also associated with a participatory dimension, where interventions are coming from a broad community of local or networked collaborators. Phenomena such

as Open Innovation (Chesbrough 2003) and Open Design (van Abel et al. 2014) are based on a similar principle.

It is notable that the open aspect of protypical artworks is foregrounded in many activist artworks. This is achieved principally through the production of workshops and through the release of code resources or kits of parts, as described earlier (or in examples such as Loenen 2013; Dentaku 2014). By stressing participation both during an art event (such as an exhibition) and afterwards – as others take forward and develop the work further, artists use the openness of prototypes as catalysts to support a particular vision of participation and a politics of self empowerment: learn to code and gain agency in the (techno-political) world. The activism embodied hitherto in artistic prototypes has the flavor of an alternative techno-utopianism e.g. as described in (Oliver et al. 2011). Code however is not the only site and means of participating in the transformative process around a prototype, as modification and personalisation can also concern other levels of intervention (such as the aesthetic and formal level, or the use and context of adoption). The simple replication and adoption of a prototype as it is released in the public realm is also a way of generating change, by disseminating a new kind of practice or behavior.

We are sympathetic with the political will expressed in such work but note that to achieve its goals requires a very significant proportion of a community to engage, develop and own it. There are some distinct technical devices through which activist-friendly kinds of openness can, we feel, be encouraged. Open source code repositories such as those hosted on Github (Dabbish et al. 2012) provide an appropriate analogy for the success of open, activist, artistic prototypes. We define success here as the degree to which the prototype has become an active agent for change, adopted and adapted by many and put to diverse uses. In open source code repositories contribution comes in two main forms; an addition to the main development strand or a 'fork' which effectively splits the development of the code into two diverging directions (which in turn can be subdivided further in the future). There is nothing inherently better or worse about forking or contributing but the later strengthens and develops the code in tune with a core ethos sometimes explicitly agreed among developers while the former diversifies and pluralises what the project is or can be. Returning to artistic prototypes, we point out that often, little strategy exists for tracking, consolidating and mutually supporting the future iterations of work, all of which might support better its activist aims. Outside of the world of software development we point to a need to manage, identify and coordinate further development of artistic prototypes. Not only will this strengthen and pluralise their development but will also contribute to their

relationship with knowledge and research by allowing for comparisons and cross-referencing of projects in different contexts.

5.2 Fictionality

The fictionality of artistic prototypes also assumes a variety of forms. In our examples *SCSK* explicitly suggests a near future scenario, developed on the basis of current socio-technological tendencies. By contrast *Re:farm* suggests a more subtle (and less futuristic) narrative, letting people imagining how the urban environment might be should the project become commonplace. We propose a very broad definition of 'fiction', which includes hypothetical cultural systems and associated values, practices, scenarios, behaviors, and any non-actual but plausible element that can be associated to the way the prototype is used or interpreted.

The fictional layer can be directly provided by the artist through supporting information, documentation and materials; or manifested through ambiguous objects demanding the viewer to imagine possible scenarios to which they might belong. Such strategies support PbR by providing avenues for understanding audiences' responses to artworks, for pluralizing their message or indeed for helping the artist to develop them in new directions. Fictionality is compatible with research also because of its critical and speculative facets. Artefacts presented as embedded in imagined but plausible situations materialise an alternative world that makes them a prompt for critique, reflection and debate (Dunne & Raby 2010). In critical design the subjects of critique are often innovation, consumer culture, assumptions and ideologies embedded in products. Prototypes support research aims by demonstrating the feasibility or desirability of innovative technologies (Kirby 2009), testing and evaluating their implications on society (Bleecker 2009), or assessing the responses they might elicit in the public (Beaver et al. 2009). Similarly in artistic prototypes fiction becomes an environment where hypotheses can be developed, explored and made tangible. In artistic prototypes fiction and reality are never mutually exclusive, but maintain a strong tie, as the engagement of the viewer is rooted in their complementary relationship. Prototypes' fictionality is grounded in the artefacts' material presence and in their scientific or technological background. This is directed at generating in the public a sense that such artefacts can be related and integrated in their everyday lives. Thus, research is enacted through fiction because of an explicit commitment to testing, hypothesis and experimentation on human attitudes and behaviors.

6 Discussion and conclusion

Artistic prototypes are interpreted as a key object emerging from research approaches based on practice and are associated to contingent and transitional definitions of knowledge. Their role in research relates to the way they enable us to investigate the making process, provoke responses in and feedback from the public and provide a tangible environment to trial hypotheses. These potentials are particularly supported by the fictional character of prototypes, especially when involving participants in the study. Openness by contrast is more strongly related to an activist dimension. Its participatory and generative potentialities in fact directly link to grassroots initiatives and to the search for sustainable and ethical alternatives to established patterns of manufacture and distribution.

This distinction is tentative and provisional but intends to support and enrich the vocabulary for further discussion. The concept itself of artistic prototypes is also inherently porous since there are no conclusive and unequivocal criteria to distinguish it from non-artistic prototypes. Rather we point to a 'family resemblance' (Wittgenstein 1953) between such works. Aims and contexts in which a project is developed can contribute to the definition of an artistic prototype. Ultimately, it is distinctive of artistic prototypes to be valued regardless of their following developments, whereas other prototypes' value relate to the expectation of a closure, a resolved version even if that resolution is subsequently undone. Nevertheless, we believe that this framework could be a valuable starting point to identify the emerging concept of the artistic prototype and initiate a debate around its behavior and positioning in contexts where new media art is developing and finding applications beyond traditional artistic environments.

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