Emergent Objects:
Designing through performance

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Abstract

This paper presents Emergent Objects 2, a portfolio of sub-projects funded by the EPSRC/AHRC Designing for the Twenty-first Century (D4C21) initiative. Our focus is on the way interdisciplinary exchange and collaboration allows fluidity and responsiveness in uncertain design contexts. Resisting the Modernist, instrumental conception of design, Emergent Objects 2 does not propose an alternative model for direct emulation. Rather, the aim is to defamiliarise the design process; and to play with its nature and possibilities. The notion of a singular designer is displaced by the notion of a *collaborative design process*, whereby any participant is an active *design agent*, partaking in *design functions*. The paper explores how key performance concepts of play and embodied knowing are employed within our design practices, with illustrations from the three sub-projects: Snake, Spidercrab and Hoverflies.

Keywords: collaboration, design process, interdisciplinary, play, embodied knowing, responsiveness

1. Emergent Objects

Emergent Objects 2[1] is a portfolio of sub-projects funded by the EPSRC/AHRC Designing for the Twenty-first Century (D4C21) initiative. It adopts an interdisciplinary and cross-sector standpoint to promote new ways of thinking about design and designing from a performance perspective. It involves artists, designers, choreographers, performance academics, computer specialists and roboticists from the academy and the professional sphere.

The portfolio name plays with the concepts of emergence and objectile. Emergence addresses three areas: self-evolving *performances* engendered by complex products and systems such as gaming; productive complexity in *design processes*; and the complex and shifting *context* of design practice itself. Design

thinking and performance knowledge intersect particularly when considering the potential for an expressive and affective interaction between the designed object and the human subject, and this is the terrain that Emergent Objects explores. We consider the designed object as an 'objectile', a continuous variation of matter and development of form: the object becomes an event, always in the process of becoming through interaction (Deleuze 1993).[2] Such a perspective doubles as an impetus to the development of new design thinking and practices.

The portfolio comprises three sub-projects and one meta-project. Each sub-project addresses its own concerns through practice-led methodologies founded on the hermeneutic spiral (Trimingham 2002). Design and performance theory/practice imperatives develop iteratively, through a structured series of encounters, drawing on groundwork established between researchers at University of Leeds and Shadow Robots (see Popat & Palmer 2005). The sub-projects inform each other through regular joint meetings. Simultaneously, the meta-project informs the sub-projects by mapping design- and performance-related models and paradigms for reflection or application. In addition, the interpenetration of the sub-projects is observed, charted and theorised.

The design processes of the three sub-projects are deliberately at different stages of emergence:

Snake (Nottingham Trent University) principally investigates the performed engagement between an interactive sculpture and human agent. The key objective is to design an interface to facilitate a direct responsiveness that is conducive to a corporeal, tacit engagement. The sculpture will engage the viewer in a 'dance duet' through use of sensors, both responding to existing mood and suggesting/creating alternative mood. The design of the moment of engagement between duet partners takes account of its emergent nature, arising from a real-time encounter where the partners have equal influence.

SpiderCrab (University of Leeds and Shadow Robot Company) is a robotic agent conceived of as a multi-sensorial mediation between architectural environment and dancing partner. As with *Snake*, performative merging is a key concern, and Popat proposes that the 'Turing Test' will be the dancer's sensation of *SpiderCrab* as another dancer. The fully-realised 6-limbed, 3.3 metre high, robot will have pseudo-human characteristics including precoil and recoil in gesture, learning, aesthetic choice, redundant movement, mood and physical temperament. As objectile, it will set continuing evolutionary challenges to software design, robot engineering, performance specialists and human agents.

Hoverflies (Universities of Huddersfield and Leeds) is at the earliest design stage, where the objectile is in its most fluid state of emergence. The aim is to design and build an interactive object which entices performative interaction and play. Using accelerometers as the mediating technology and the performing body in flight, the work investigates how motion, gravitational pull and velocity might be

projected into a variety of digital outputs. The guiding principle is to investigate hyper-physical interfaces where the traditional notion of 'user' is supplanted by 'participant-performer'. *Hoverflies* will be installed in a number of different social contexts (e.g. playground, festival, public space) to investigate how positioning and spatiality impact on people's willingness to participate (see Fig. 1).

Figure 1. Hoverflies pursues a simple interface for technological interaction – a swing. Photo: Alice Bayliss.
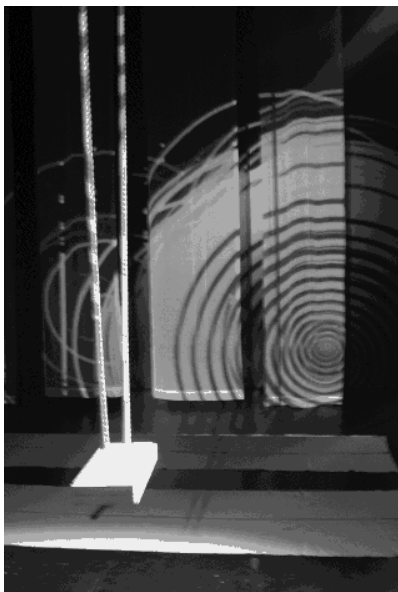
2. Contexts

Performance devices (role-play, scenarios) have long been employed directly and indirectly by design researchers, primarily as a means of accessing and understanding human factors within the design process. The role of performance-based techniques and scenarios in participatory design (Muller, 2002) and in design of interactive systems (Iacucci, Iacucci & Kuutti, 2002) have been examined. Whilst endorsing these studies, we aim to mobilise a deeper understanding of the value of performance knowledge to design practice and thinking about design.

Key performance concepts such as embodiment, empathy and / or expression facilitate exploration of design as an agent of interaction and experience, as

suggested by Robertson and Woudhuysen (2000). Emergence has been variously described in different design domains (e.g. Testa et al. 2002, Cavallo 2000). Our focus is on the way interdisciplinary exchange and collaboration allows fluidity and responsiveness in uncertain design contexts.

Calls for design to facilitate creative engagement between its objects and their users identify the need for improvisational and expressive space (Fischer & Scharff 2000, Redstrom 2006). The rootedness of our experience of products in bodily interactions between people and their environments has been stressed (van Rompay, Hekkert & Muller 2005). And performance theory and practice foreground the phenomenological dimensions and embodied nature of encounter and expression (Garner 1994).

The value of tacit knowledge and kinaesthetic perception to an interdisciplinary design practice has been argued (Rust 2004). The tacit dimension enhances consideration of both what the designer knows and can act on and the way that humans may meaningfully interact with technological objects.

Over-inflated claims for the 'interactive' nature of products have been countered by re-definitions of the possible and desirable relationships between users and designed artefacts or systems. Thus, Kozel (2005) calls for 'responsive' interactions between system and participant. The spatial, phenomenological experience of design (in particular theatre design) suggests an intersection of imaginations between designer and 'consumer' - an exchange rather than a transmission. (McKinney 2005).

3. Designing

While the *Snake* team, formed before EO2 started, has designated designers, the other two projects comprise design teams. The Meta-Project Briefing states:

> In Emergent Objects, the notion of a singular designer is displaced by the notion of a *collaborative design process*, whereby any participant is an active *design agent*, partaking in *design functions*. Even where one person may be ultimately responsible for the design outcome of a particular aspect of a project, the *permeability* of their own design activity will be an important principle and indeed object of research. Wherever possible and appropriate, active collaboration on the setting and conduct of design tasks should be sought.

This contrasts with the currently dominant conception of the designer and their place in the design process. Addressing the *Cox Review* (2005), the Meta-Project Briefing notes that Cox's linear sequence of three defined terms neatly maps traditionally good business practice:

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creativity -   'is the generation of new ideas'

design -   'shapes ideas to become attractive propositions for
                 users or customers'

innovation -   'is the successful exploitation of new
                 ideas'

<div align="right">(Cox, 2005: 2)</div>

But the Briefing suggests that, in order better to understand the actual and possible place and nature of design, we might play with these definitions and the relation of terms. Rather than think of 'Design' as 'creativity deployed to a specific end' (ibid.), we might ask:

Is there any line to be drawn between creativity and design?

Are perhaps creative play and working towards specific ends both *parts of the design process? If so, are they sequential? dialectically related? cyclical? Or is the situation 'fractal' – design having its own sequence or cycles of* creativity-design-innovation?

How can we define and map the three terms – creativity / design / innovation – *in relation to the functioning of our proposed objectiles?*

The design process in EO2 is eccentric in conventional terms. Not only is the design function spread across a number of agents, few of whom are professional designers; the team members are also typically institutionally and geographically distant. Resisting the Modernist, instrumental, conception of design, EO2 does not propose an alternative model for direct emulation. Rather, the aim is to defamiliarise the design process; and to play with its nature and possibilities. EO2 set up its design process as a complex system for three reasons: to examine how such a system encourages emergent behaviour in the design process, and emergent design solutions; to play towards the emergence of a new, complex, sustainable design process; and to ask what conditions might encourage the design of such new processes themselves to be emergent, evolving.

4. Play

Play theory has regained importance in performance studies through its appropriation for instance by games design and theory. EO2 makes its own strategic appropriations. Huizinga (1949), Caillois (1958) and others conceive of play as a framed activity, where the frame both defines a space of freedom and

provides a productive restraint. Csikszenmihalyi (1996) associates play with the condition of 'flow' – the absorbed concentration, non-contradiction of goals, and immediate feedback essential to creativity.

For a conventional designer, the non-contradiction of goals necessary to a creative design solution often equates to a clear design brief. Such has been the habitual expectation of software designer John Bryden from the *SpiderCrab* team, for example. But EO2 works to deny such teleological prompts, by opening out a complex space of play from the outset. At the same time, it offers easily graspable models for self-management of the newly-opened space. In particular, the Meta-Project Briefing provides Caillois' two key mappings of play for reflection and experimentation: first, the four categories agon/competition; alea/chance; mimicry/illusion; and illinx/vertigo; and second the continuum between paidia/sheer playfulness and ludus/rule-bound play. The first question for an EO2 designer, then, is 'Am I playing, and how?'

As a complement, the Briefing appropriates Schön's (1983) analysis of professional practice: 'reflection-in-action'; 'tacit understanding' and '*post hoc* reflection', to engender a five-phase feedback cycle:

(1) *post hoc* reflection on existing practice	- have I been playing; and how?
(2) conscious framing	- I am consciously using a frame of play to guide or inform my design process
(3) reflection-in-action	- I am aware that I am playing, and how, but my principal focus is the process
(4) tacit understanding	- I am fully immersed in the process; I am playing but am unconscious of this
(5) *post hoc* reflection on developed practice	- have I been playing; and how? is there a qualitative difference from (1)?

Contributing to the meta project, Bryden reports that such tools have provided him with what might itself be identified as a frame of play – the license and the protection within which to play. That he began with an inclination to experiment outside his 'safety zone' was of course crucial. (Fig. 2)

Figure 2. John Bryden interacts with a SpiderCrab prototype limb, entwined with a full-scale mock-up of the robot. Photo: Neil MacPhail.

Caillois' categories of play have been directly exploited early in the *Hoverflies* process, with each member of the design team in turn leading the others in a play-based activity prompted by their initial self-briefing. Playing between the striations of play categories and the smoothness of open experiment (Deleuze and Guattari 1980), the team thereby generated a complex system of prompts for

their design process through inductive experiment. The intention is to allow the nature of the process itself to project into the designed object which, in turn, will encourage playful shifts between roles of performer, participant and observer - as defined in the model of tripartite interaction (Bayliss et al, 2004).

Schechner (1988) adapted the notion of the frame of play to consider what might otherwise be called determinations on the performer's playful creativity: it happens within concentric frames of play, from the logic of the part through the director's desires to the prevailing performance conventions. While ambiguous – which is the most potent frame, the nearest or all-encompassing? – Schechner's model provides a useful tool for the negotiation of internal and external determinations on the design process. In other words, it provides a metaphorical space in which a complexity of determinations – the contradictions of interdisciplinary praxis; funding imperatives; scheduling, etcetera – can be managed by the group as a group.

Further, Schechner's model became for some in the *SpiderCrab* group a ready means to figure towards the outer frame of Bryden's emergent software design solution for scripting the robot's gestures. We established early that a palimpsest of determinations would frame its movement: external signal; current state; 'disposition'; 'game' and so on. By way of discussions around object-related computing, these have settled into a fundamental model to generate emergent behaviour through the complexity of a system comprising successive simple levels: stochastically-generated 'random' movement is over-determined by a number of constraints, themselves simply designated 'high-' or 'low-level'.

5. Embodied knowing

Recourse to Schechner's frames of play for the understanding of complexity mediates between the modes of knowledge and knowing. On the one hand, a reified map of determinations begins to precipitate out; on the other, the ambiguity and mobility of the model tends to dissolve precise boundaries. Our formulation here draws on Williams' (1973) notion of a 'structure of feeling': while we may feel able to objectify historical data into clear structures, our grasp of the present necessarily remains fluid, more a matter of feeling. Structure remains emergent. Arguably, one challenge for the cultural historian is to retain the 'structure of feeling' dialectic when addressing the past; to grasp the 'knowing' that precedes 'knowledge': to re-imagine the emergence of seeming historiographic artefacts from the complexity of human interaction.

Such knowing requires an open body, and the EO2 Briefing foregrounds the role of the designer's own body as much as it asks what kind of embodied relations we want our designed objectiles to draw their human co-agents into. The *SpiderCrab* team have reflected, for instance, on the habitus – defined by Bourdieu (1998) as 'the deeply-installed set of cultural frames within which our physical improvisations can occur' – that we bring to the designing process.

Allowing, as many do, habitus to include intellectual and emotional as well as physical dispositions, we might suggest that two vectors of Bryden's habitus at the start were his openness to experiment and his discomfort at the lack of a clear brief. Physical games in particular assisted him in his desire to experiment outside his 'safety zone'. Professor David Hogg, also from the Leeds School of Computing, described the early initiation into physical play as at first 'terrifying' and then liberating: the habitus frame was recalibrated within the frame of EO2.

Popat and Palmer (2005) report on a mask exercise by Popat and Wallis in experiments with Shadow Robots in late 2003. Dancers contemplated a robot so as identify fully with it, to embody it. A commonplace of mask technique, the exercise proved to have significant value in the context of technological design. The performer contemplates the mask so deeply that it can 'possess' - fully inhabit or in-form - their body when worn. In 2003, this embodied performance of the robot by the dancer, one instance of knowing, served also as a second. Designers and mechanics from Shadow in turn had the sensation of haptic, kinaesthetic, encounter with the dancer-as-robot. Their knowledge of their robot was for a time supplanted by a more immediate knowing. New perspectives on the robot, its design and potential, emerged with a palpably exciting rapidity. *SpiderCrab* adopted the mask exercise as a foundation.

The protocol of knowing aligns broadly with Heidegger's (1949) *technē*, a kind of relationship with the world, its objects and processes that works through an attitude of in-dwelling. Truth is not extracted; rather, space is made for the essence to make itself manifest. And when complexity theory identifies or conceives of self-developing closed systems, it suggests essences. Idhe (1993), like others, has celebrated the power of Heidegger's intervention in the 'Technology' essay, while resisting his romanticism and recourse to foundationalism. Wallis (2005) subjects the essay to a rhetorical critique to much the same ends, while proposing the theatrical apparatus as a collective subject of *technē*. One thread that runs through the EO2 Meta Project is a similar conception of the individual design process as a creative iteration of objectifications and phenomenal encounters, simultaneously drawing on and contributing to the human-crafted environment.

Delegates to an international Emergent Objects symposium in June 2007 expressed satisfaction that the project has opened up new perspectives on the role of emergence within the design process, as well as the design of emergent interactions between technological objects and human agents. Meanwhile, the frame of DC21 has opened up our own awareness of the 4D and complexity design communities, especially through the initiative of Alec Robertson. We leave it to him to weave those connections here.

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FOOTNOTES

[1] For full details of projects and personnel, see http://www.emergentobjects.co.uk/. EO2 builds on perspectives gained in the similarly-funded Emergent Objects 1 Cluster (2004), also led by the University of Leeds.

[2] Jan Overfield, a participant in EO1, used performance perspectives so successfully as Strategic Arts Officer for Hinckley and Bosworth Borough Council, to be put in charge of the development of the Hinckley Master Plan. She conceived of a disused factory building as a Deleuzian 'objectile' – constantly transformed through the use of the community in their rehearsals and modelling of their material environment.