Ernest Edmonds

FROM INTERACTION TO INFLUENCE: generating form and space

Paper

Topic: Art

Authors: Ernest Edmonds
Name1
University of Technology, Sydney Creativity and Cognition Studios
Australia
Creativityandcognition.com
and
De Montfort University, IOCT
UK
ernest@ernestedmonds.com

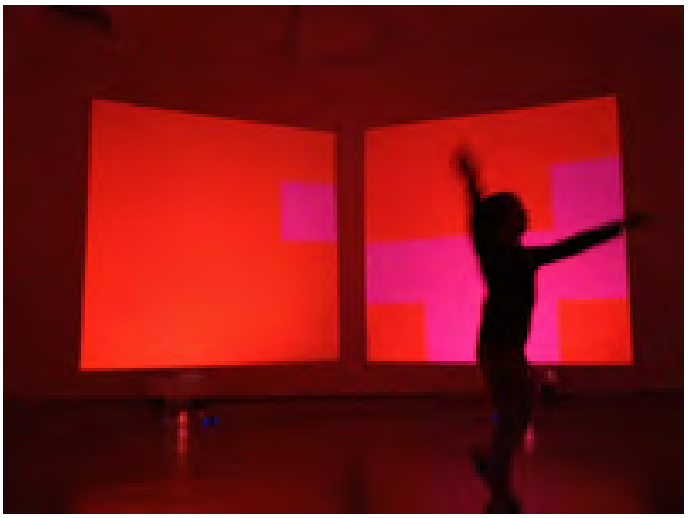
Main References:

[1] Candy, L and Edmonds, E. A.(editors) *Interacting: Art Research and the Creative Practioner,* Libri Publishing, Oxfordshire, 2011.
[2] Boden, M. A. and Edmonds, E. A. (2009) What is Generative Art?. *Digital Creativity* Vol. 20 Nos 1-2, pp 21-46.
[3] www.generativeart.com

Abstract:

What do we really mean by interaction in generative art? In some respects, with delayed response, as a result of mode change, and even delayed influence on autonomous output, in the same way, interaction does not seem an appropriate word to use. Perhaps the words *influence, stimulus*, and *interchange* are more evocative of the meaning discussed above. Perhaps the influence of one system on another could be said to come about as a result of stimulus, interchange or even co-operation and conversation, if we add a layer of meaning to the situation. We may talk about the audience's "influence" on an art system where the development of its behaviour is affected by the interactions that it has experienced.

As an example, my *Shaping Form* (and *Space*) series of generative artworks consists of unique abstract interactive artworks that are each generating colours and forms in time from a set of unique rules. They also take data from a camera and continuously calculate the amount of activity seen in front of the work. The computer software then steadily modifies the rules. The artwork and its development over time are influenced by the people who look at it: the audience help to shape the work. *Shaping Form* is a representation of computed life, moving and changing of its own accord but maturing and developing as a result of the movement of audiences. Each work interacts gently with its environment. The *Shaping Space* installation is in a darkened room where there are two changing images in space creating a field of colour. The screens show a living matrix of colours that sometimes change very slowly and at other times burst into life. The colours use a small, but changing, pallet of hues. Images are generated using rules that determine the colours, the patterns and the timing. These are generative works that are changed by the influence of the environment around them. People can readily detect the immediate responses of the work to movement, but the changes over time are apparent only when there is more prolonged, although not necessarily continuous, contact with it. The shaping of the form is a never-ending process of computed development.



Shaping Space in the Light Logic Exhibition, Site Gallery, Sheffield 2012-13

Contact:
ernest@ernestedmonds.com

Keywords:

Generative, interactive, art, installation, influence

From Interaction to Influence:

Generating form and space

Ernest Edmonds

University of Technology, Sydney, Australia

and

De Montfort University, UK

ernest@ernestedmonds.com

Keywords:

Generative, interactive, art, installation, influence

Introduction: Interaction in Generative Art

What do we really mean by interaction in generative art [1,9]? Do we only refer to direct and immediate action-response or can we also include mode changes (e.g. changes to the generative rules) and consequential delayed responses? In some respects, with delayed response as a result of mode change, and even delayed influence on autonomous output, interaction does not seem an appropriate word to use. Perhaps the words *influence, stimulus*, and *interchange* are more evocative of this meaning.

Perhaps the influence of one system on another could be said to come about as a result of stimulus, interchange. We might even use the terms co-operation and conversation, if we add a layer of meaning to the situation. We may talk about the audience's *influence* on an art system, where the development of its behaviour is affected by the interactions that it has experienced over time.

As an example of art influenced by experience, rather than simply interacting in the action-response sense, consider my *Shaping Form* (and *Space*) series of generative artworks. These are abstract interactive works that are each generating colours and forms in time from a set of unique rules. See figure 1. They also take data from a camera and continuously calculate the amount of activity seen in front of the work. The computer software then steadily modifies the rules. The artwork, and its development over time, are influenced by the people who look at it: the audience help to shape the work. *Shaping Form* is a representation of computed life, moving and changing of its own accord but maturing and developing as a result of the movement of audiences. Each work interacts gently with its environment. In this paper I discuss the *Shaping Form* works as well as the extension of that work into the installation *Shaping Space* and the related generative paintings and prints.

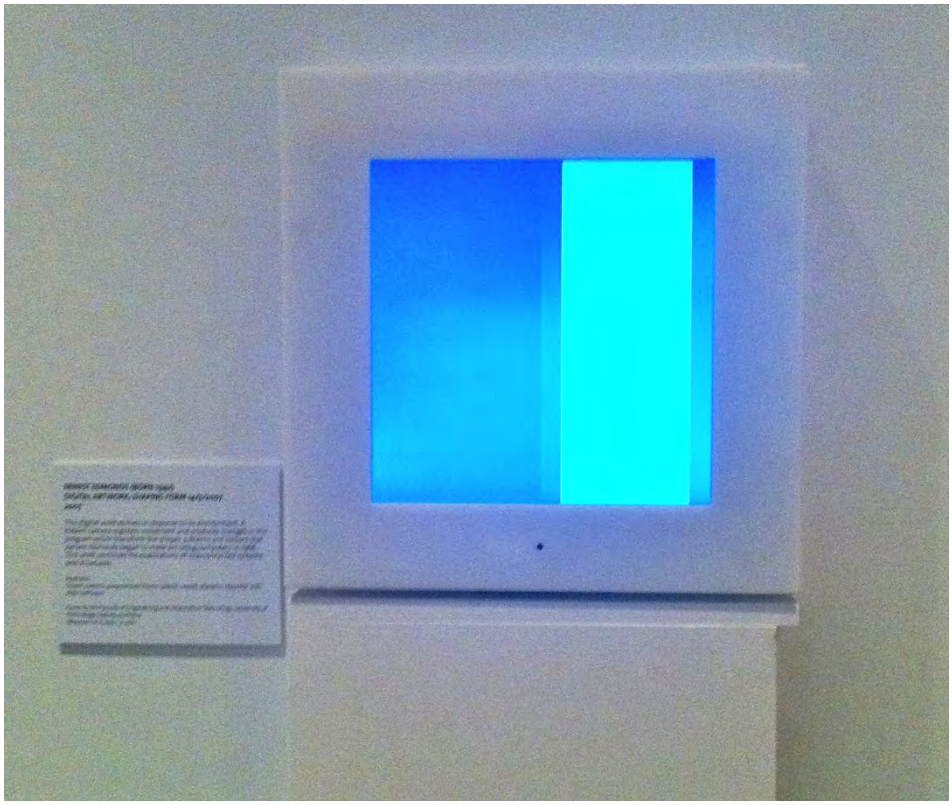


Figure 1: *Shaping Form*: Ernest Edmonds; in "*Selected New Acquisitions",* Victoria and Albert Museum, London, 2012-13 .

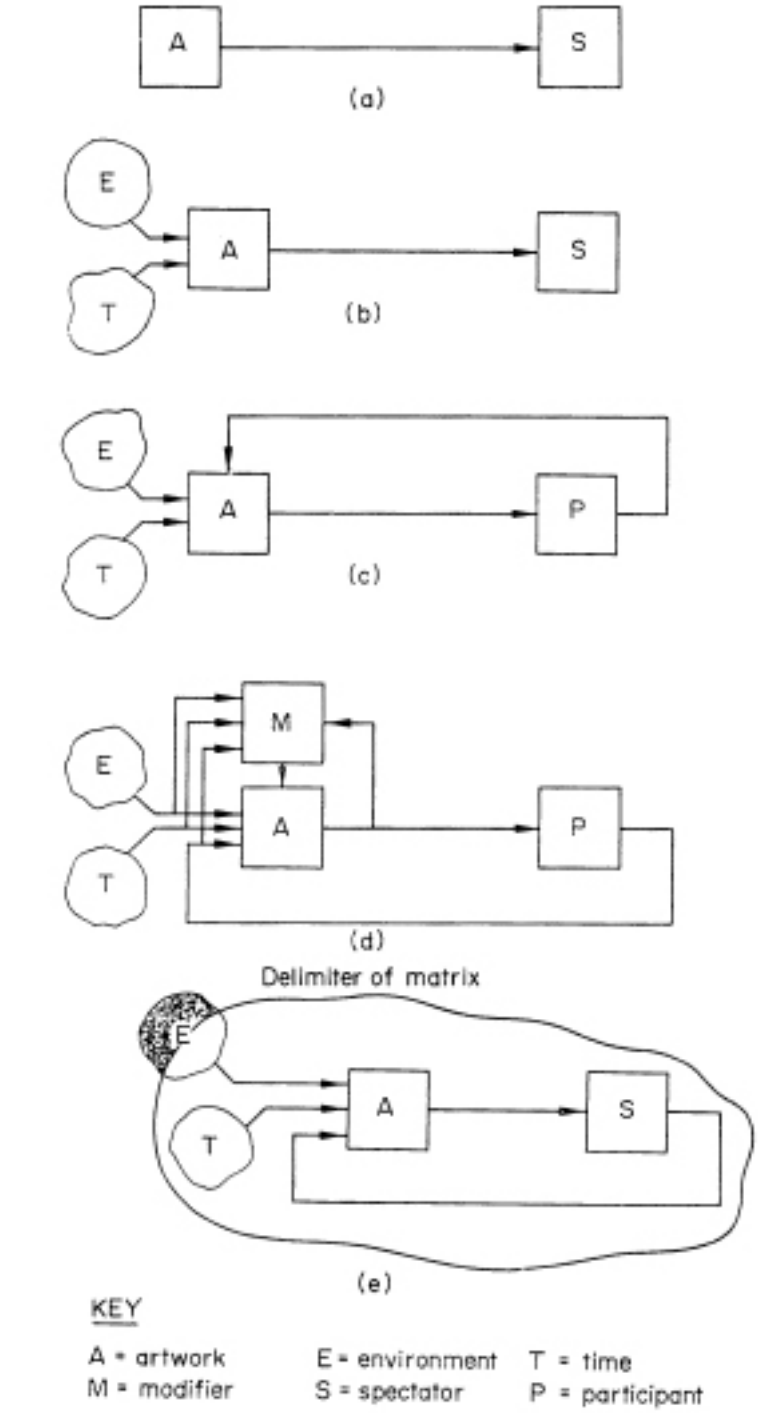
Background: Exploring Interaction

I first worked with a computer to make an interactive artwork in 1969 with Stroud Cornock. We showed that work, **Datapack*, at the CG70 exhibition and conference, where we also presented a paper that discussed the implications of the computer for art and, in particular, for participation and interaction [3]. We identified a number of forms of interaction, represented by the diagram reproduced as figure 2.

I went on to develop a range of artworks that explored interaction through networks [7]. I looked both at interaction between people and artworks and at interaction between people through artworks. These works were not strictly generative, but, together with the theoretical discussions in the Cornock and Edmonds paper, they can be seen to represent a fairly comprehensive investigation of interactive art. Much more recently, I have collaborated in developing and reviewing work in the area, as seen in the 2011 Candy and Edmonds publication [2].

Soon after I made these early interactive works, all of my art became generative. At first I devised structures, rules and procedures that I followed by hand. My paintings and drawings were generative and I was the generative engine that realised them. By 1980, however, I found

ways of making time-based generative art using computer programs [4]. I realised from the start that this way



(a) *Static system.* (b) *Dynamic–passive system.* (c) *Dynamic–interactive system.* (d) *Dynamic–interactive system (varying).* (e) *Matrix.*

Figure 2: Interactive art systems, from Cornock and Edmonds [3].

of working allowed the possibility of including exchanges between the artwork, its environment and people. Interactive generative art was the next step [5].

As I have described in various places, including the book mentioned above [2], I came to realise that there was something missing in the conceptions of interaction that I, and very many other artists, had been using. I will explain this step in the next section.

From Interaction to Influence

In 2006 I realised that the kind of interaction that I had been looking at and using in my art was based on a direct action-response model. It assumed that if, for example, a participant did something relevant to the artwork the work would immediately respond. Clearly, this need not be the case. Consider interaction between humans, to take a different context, where I might be told that my train is an hour late, have no apparent reaction but, after a while, go for a coffee instead of walking to the platform. My response was embedded in a change of intention rather than a direct action.

Of-course, I understood the principles behind this systems view of interaction well before 2006. I was quite familiar with them in 1970, when making that first interactive piece, taking considerable interest in systems theory, biological systems and emerging ideas in psychology. However, somehow the implications for artworks were not fully put into practice until this century.

I wrote about the theoretical implications for art in a 2007 paper [6]. In that paper, I pointed out, for example, that:

> "An interactive system is an open system that exchanges information or matter, in both directions, with its environment. One key concern is the relationship between any input and later output. In the simplest such system, any given input is followed, after a certain interval, by a certain predictable output. One depresses a switch and the light comes on. If we add the notion of an internal state, then a slightly more complex version can be described. The output associated with a given input may be a function of both the associated input and the current internal state or, as it is often described, the mode that the system is in."

I asserted that:

> "… we can consider the artwork and the audience as interacting systems that influence one another. We can consider the development of computational art systems that are open to influence and that develop over time as a consequence. Equally we can think of the influence that such systems will have on their audiences. We therefore need to consider this kind of computational generative art in open systems terms from the very core of their design."

These ideas have been explored in my generative artworks, the *Shaping Forms,* by using "the history of interactions between participants and the work to modify the generative behaviour by changing the rules or changing which rules are used". From the audience's point of view, these works need long-term engagement. They presume that, for a complete experience, that engagement is extended over days, months or years. Art that benefits from this kind of engagement brings to mind Donald Judd's comments on emotion in art:

> "European art … is based largely on immediate emotions…Rembrandt, for example, is a compendium of gloom sadness and tragedy. This immediacy of feeling is basic to all his paintings… Newman and Pollock have no immediacy of this kind. The thought and emotion of their work … is underlying, durable and concerned with space, time and existence. It's what Bergson calls 'la durée'." [8]

Influence, rather than simple interaction, in generative art may have a greater significance than simply exemplifying natural, for example biological, interactive systems.

Shaping Forms

Each *Shaping Form* work consists of a square LCD monitor, typically 17", on which the abstract images generated by the work are displayed, figure 3. Attached to, or around, the monitor is a camera that is also connected to the computer. An image processing system analyses the image stream from the camera in real time and determines the amount of movement taking place. That information is used to influence the rule structures being used to generate the image sequence.

The rules operate on the colours, shapes and timing patterns being used. Colour is broken down into hue, saturation and lightness and, typically, very close hues are used for most of the pallet. As the generative rules change all of these parameters are likely to shift so that, for example, the hues might gradually move from a red dominance towards the blues.

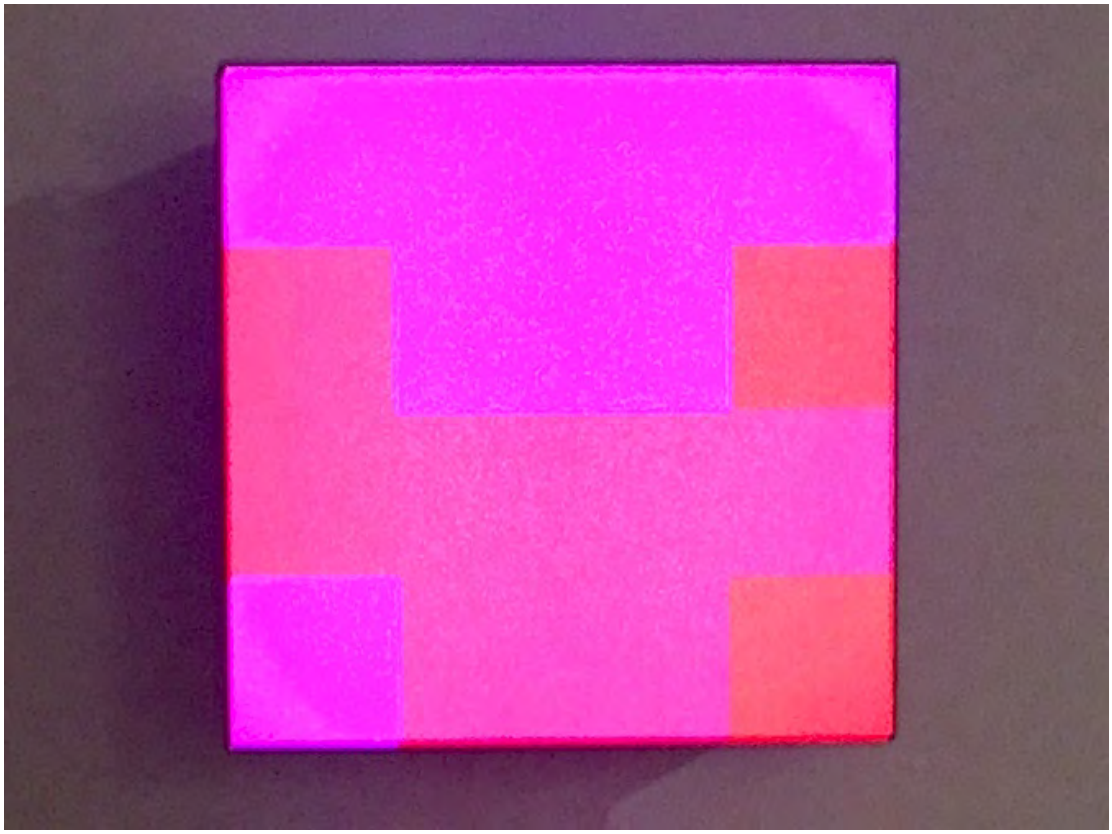


Figure 3: *Shaping Form 1 May 2015*: Ernest Edmonds; in "*Primary Codes"* [9].

An important aspect of these works is their formal systems-based exploration of colour through generative processes and, in the context of this paper, with the slow, evolving influences that the movement of audiences cumulatively have on the development of those processes.

The *Shaping Space* series continues, using new structures, new rules and new system architectures. At the same time, I am using the concepts in other kinds of work, such as full room installations, paintings and prints.

Shaping Space and Shaped Forms

The *Shaping Space* installation is in a darkened room where there are two changing images in space creating a field of colour, figure 4.. The screens show a living matrix of colours that sometimes change very slowly and at other times burst into life. The colours use a small, but changing, pallet of hues. Images are generated using rules that determine the colours, the patterns and the timing. Just like the small *Shaping Forms*, this is a generative work that is changed by the influence of the environment around it. People can readily detect the immediate responses of the work to movement, but the changes over time are apparent only when there is more prolonged, although not necessarily continuous, contact with it. The shaping of the space is a never-ending process of computed development.

Figure 4: *Shaping Space*: Ernest Edmonds; in "*Ernest Edmonds: Light Logic"*, Site Gallery, Sheffield 2012-13.

Photo Robert Edmonds.

As discussed in the companion artwork paper [6], the interactive time-based works also lead me back to still images where the implications of the generative processes are explored in paint and print and where my colour investigations, in particular, are refined leading to new colours and structures in *Shaping Forms*.

Conclusion

I have outlined the development of the thinking, in my practice, about interaction as a significant element in generative art. I have described an approach that I term *influence*, in which the primary effects of actions on the artwork, through its sensor systems, change the generative processes rather than instant behaviour. The *Shaping Form* series, *Shaping Spac*e and the *Shaped Forms* exemplify and use this approach in various aesthetic ways. Following Donald Judd's thoughts, perhaps what Bergson calls 'la durée' can be seen as key to these works.

References

[1] Boden, M. A. and Edmonds, E. A. (2009) What is Generative Art?. *Digital Creativity*. Vol. 20 Nos 1-2, pp 21-46.

[2] Candy, L and Edmonds, E. A.(editors) (2011) *Interacting: Art Research and the Creative Practioner,* Libri Publishing, Oxfordshire.

[3] Cornock, S. and Edmonds, E. A. (1970) The creative process where the artist is amplified or superseded by the computer. *Proc. Computer Graphics '70,* Brunel University, UK.

[revised version published 1973 in *Leonardo*, Vol. 16, pp 11-16]

[4] Edmonds, E. A., (1988) Logic and time-based art practice. *Leonardo, Electronic Art Supplemental issue*, Pergamon Press, Oxford, pp 19-20.

[5] Edmonds, E. A. (2003) Logics For Constructing Generative Art Systems. *Digital Creativity*, Vol. 14 No. 1, pp 23-38.

[6] Edmonds, E. A. (2007) Reflections on the Nature of Interaction. *CoDesign: International Journal of Co-Creation in Design and the Arts.* Vol. 3 Issue 3, pp 139-143.

[6] Edmonds, E. A. (2015) The Shaping Form Series: Four Shaped Forms, Venice. *Proc. GA2015* (this volume).

[7] Edmonds, E. A. and Franco, F. (2013) "From Communications Game to Cities Tango". *Int. J. Creative Computing*, Vol. 1 No. 1, pp 120-132.

[8] Judd, D. (1987) Abstract Expressionism. In Donald Judd Complete Writings 1975-1986. van Abbemuseum, Eindhoven NL. pp 37-48.

[9] Nunez, G. A. (2015) Primary Codes. http://www.studiointernational.com/index.php/codigos-primordiais-computer-art-paul-brown-frieder-nake-harold-cohen-ernest-edmonds-rio-de-janeiro.

[9] www.generativeart.com