The role of chance in the machine-generated art of Computer Art pioneer, Desmond Paul Henry (1921-2004)

Abstract

This paper links Desmond Paul Henry's art-making processes with notions of 'serendipity,' by virtue of his knack for experimentation and for converting unexpected 'accidents' and 'failures' into opportunities for creating highly original visual effects as art. Henry, in making his unexpected happy chance discoveries in the pursuit of art, was able to "see bridges where others saw holes" (The *New Oxford Dictionary of English,* definition of serendipity). Like others before and after him, Henry *insightfully* exploited the unexpected chance effects of artistic experimentation, thereby making serendipity a key feature of his creative output. Serendipity plays a significant role in the interpretation of chance-based effects as 'art'.

Serendipity definition

Walpole in 1754 coined his neologism, 'Serendipity 'based on a fairy tale, called *The Three Princes of Serendip*: "as their Highnesses travelled, they were always making discoveries, by accidents and sagacity." Its usage over the years has led to the following, commonly accepted definition: "Serendipity: the faculty of making happy and unexpected discoveries by accident." I take 'by accident' to mean 'by chance' and 'chance' to indicate something that happens unpredictably without *discernible* human intention or observable cause. Furthermore, 'serendipity' has come to mean "more than just a 'happy accident'. It also involves insight – an 'aha' moment of realisation" (Makri, 2012). This corresponds to the 'sagacity' mentioned by Walpole, when seemingly random events are fortuitously connected, based on individual interpretation.

The drawing machines: a summary

During the 1960s Henry created a series of three electro-mechanical drawing machines from wartime, analogue bombsight computers used in bombers to calculate the accurate release of bombs onto their target. These machines produced abstract images made up of curvilinear, repetitive single-lines which Henry subsequently often embellished by hand in response to their suggestive features. His second drawing machine was included in the I.C.A's exhibition of 1968 *Cybernetic Serendipity,* alongside a range of other cybernetic devices employing "random systems." (Reichardt, 1968).

Henry's life experience and his creative mindset.

Henry in fact interpreted with hindsight many aspects of his own life as being the result of 'happy chance *co-incidences'* as reflected by his frequent use of Leibniz's aphorism, 'pre-established harmony of the universe'. These "weird twists of fate" (Henry) inspired him to subsequently embrace and exploit experimental, 'imprecise' *serendipitous* art-making processes.

As Henry explains in his interview of *10/02/03*:

> 'all the way through I have been most fortunate in my Father, and then fortunate in my army career and then fortunate in the pure chances of what military equipment the second hand shops in Shude Hill Manchester happened to have in stock. It was as simple as that.'

- In 1923 he was rescued from a lime kiln at the age of two wearing a woolen suit, which saved him from potentially fatal burns.
- His father's hobby mending clocks, inspired Henry with a life-long fascination for mechanisms, which caused him to join R.E.M.E (Royal Electrical and Mechanical Engineers) in 1939.
- Wartime shortages meant he discovered his knack for artistic experimentation which led eventually to the development of his drawing machines from 1961 onwards.
- Joining R.E.M.E meant he became closely acquainted with the technology behind automatic fire-control weapons which enabled him to convert bombsights in the 1960s to make drawing machines.
- He met his future wife in the autumn of 1944 because he could speak French and so was committed to deliver an important letter to my mother's friend who by chance was hiding in the house she inhabited in Brussels.
- Henry subsequently escaped death on two occasions from a V1 and a V2, because he happened to have taken leave specifically to visit his fiancée living in Brussels. Leave elsewhere would have been *at a different time* leading to fatal consequences.
- It was whilst frequenting the second hand *book* stalls in Shude Hill, Manchester that he unexpectedly discovered the army surplus warehouse from where he purchased his first Sperry bombsight in 1952 which he later converted into his first drawing machine in 1961.
- It is only because his daughter, Elaine O'Hanrahan and author of this piece, unexpectedly fell ill in 1998, left teaching and was encouraged as part of her recovery process to pursue a Phd degree on drawing

machines, that awareness of Henry's contribution to early Computer Art has been acknowledged.

Serendipity in art: the interpretation of chance-based visual effects as 'art'.

It is a given that Modern Art, with Dada and Surrealism in particular, encouraged experimentation and that artistic procedures were developed which rely on the deliberate incorporation of chance for the production of unexpected visual effects. Experimental techniques involving chance[1] enabled a form of automatic painting that appealed very much to Surrealists, concerned as they were with the desire to evoke buried subconscious imagery. By allowing chance to generate the images, it was felt works could be initiated outside or beyond the artist's will and used *as a starting-point* to be worked upon later by the artist. Examples of automatic techniques relying on the creation of unexpected chance effects as a starting point, include: Frottage (Max Ernst), Decalcomania (Oscar Dominguez), Fumage (Wolfgang Paalen), Sand-Painting (André Masson) and Coulage (Joan Mirò)[2].In much the same way, Henry would stare at his machine-produced visual effects, and

[1] Today artistic techniques exploiting chance have been commercially exploited and popularised. For example the creative toys involving chance like 'Swirl Art', 'Magic Blo Paints' and marbling kits. Artist Damien Hirst exploits the effects of chance with his Spin Painting.

[2] "**Frottage**" (Max Ernst) involved making rubbings of different materials which would suggest all kinds of shapes and creatures to the artist. **"Decalcomania",** invented by Oscar Dominguez, consisted in smearing gouache, ink or oil onto a glossy non-absorbent surface and then pressing paper or canvass onto the paint while moving it, thereby creating a highly accidental design. This technique could also employ watercolour paints pressed between two sheets of paper. The marks made in this way would then suggest a direction for the finished work to take (Bradley, 2001, p.24). Wolfgang Paalen was converted to Surrealism in 1935 to which he contributed the technique of **"fumage",** that is, interpreting the smudge marks left by a candle flame applied to the surface of the canvass (Tomkins,1973,p.149). **Sand-painting**, developed by André Masson represents another surrealist technique providing a source of pre-pictorial inspiration. In this procedure, glue is smeared onto a canvas over which sand is then sprinkled and the resulting patches interpreted by the artist. (Bradley, 2001, p.22). Mirò was another surrealist who welcomed accidents and chance interventions as in his experiments as in the 1920s when he applied thin washes of paint which he allowed to run and drip. This was a first "free, unconscious" stage for Mirò, the results of which would then be elaborated upon by the artist. (Tomkins, 1973, p.135). "**Coulage**" was another technique that exploited chance, in that paint was poured onto the canvas rather than being applied by brush. Henry employed a similar technique when he dribbled and flicked commercial paint onto a smooth, door-size, gloss-painted sheet of plywood which he then left to dry standing on its side. The paint, in response to gravity, formed various trickles, smooth bumps and undulations. He called the visual effect produced *Effigy of a Napalm Victim*. However Henry's attempts to exploit the chance effects of rolling his wife naked in paint were met with a definite 'no', much to his disappointment!

allow his imagination to respond to their suggestive features by often elaborating and embellishing them by hand.

Serendipity and Henry *before* his drawing machines.

Experimentation and ingenious improvisation were the main driving forces behind Henry's art work as already witnessed in the 1940s and 50s by the various experimental drawing techniques which he developed. These techniques all relied heavily on whatever materials happened to be cheaply, easily and readily available at the time. For example, his photochemical technique, which he began to develop immediately after the war, was based around the free and plentiful supplies of photographic paper and developers obtained through his Father's place of work. Even his children's zinc and castor oil baby bottom cream found its way into his drawings when he created a form of etching by smearing tis cream in a *random* fashion on light sensitive, reflex contact paper, which was then scraped and treated in a hypo-bath, all of which produced sepia tone effects to be used as a *starting point* for further elaboration.

The drawing machines: their reliance on 'chance finds'

After nine years of feasting his eyes on the "mechanical ballet" (Henry) of the bombsight's internal cams, differentials and gears in motion, Henry became inspired to capture these mechanical movements on paper. And so in 1961 he transformed the bombsight into a harmless drawing machine. The various elements required to bring about this conversion were the mechanical components he happened to have collected in his workshop and which by good fortune turned out to be just what he needed to create something very original. Henry's serendipitous mind-set (he often referred to himself as "hopeful Henry") is encapsulated by yet another of his favourite sayings: "every hitch becomes a blessing". For example, the creative use he made of the nearly spent drawing pens:

> "Variety can be incorporated even when the two pens are the same colour by using a new Scripto as the dominant member and an old one, on the point of expiry as a subordinate partner; the latter gives a pleasing pencil-like variant of the dominant drawing. (Henry, May 1968)

A mechanics of chance in the service of serendipity

Henry manipulated the workings of the bombsight in order to propel drawing pens across the flat surface of a drawing table. They were based around an analogue computer, where information is conveyed through analogous physical quantities, and as such did not involve the use of algorithms or computer programming language. As a result, the drawing machines could not be pre-programmed nor store information. Nor did Henry have to *preconceive* what he was going to ask the machine to draw. Furthermore, he turned the fact he was not a trained mechanic, (he had been an *office clerk* in R.E.M.E) to his advantage. His lack of expertise meant that potentially "any loose screw" could have an unforeseen and dramatic effect on the final graphic result, much to Henry's surprised delight. Each image was in part, a 'happy chance discovery'. The imprecise nature of the way his machines functioned, were caused by:

"faults in the assemblage and parts of the machines. And quite a lot of my productions came from my own lack of skill in assembling the sub-parts of the machine" (Henry, 2003)

Having only general, overall control , his drawing machines ended up being idiosyncratic and unpredictable- the very opposite to a precision instrument. The frequently *imprecise* synchronisation of movement between drawing paper turntable and drawing pen holder, ensured an infinite variety of visual effects. Henry subsequently applied his *artistic intuition* (Walpole's 'sagacity'), to either leave untouched or to embellish whatever machine-generated effects had unexpectedly appeared thanks to this 'mechanics of chance'- a phrase first coined by Pontus Hulten in reference to the mechanical sculptures of Jean-Paul Tinguely (Peiry, 1997).

With modern digital graphic software there is no longer an unlimited number of "ways of going wrong" (Henry, 2003). As a consequence the scope for "adventurous, dangerous and unconventional art" (Brian Reffin Smith,1997 p.108) is reduced. The question arises as to what extent modern computer imaging software enables or determines what the artist may or may not do (Welsh, in Hayward, 1990, p.151). In digital computer programming, the random is deliberately introduced within fixed parameters by leaving a decision to chance within an exactly specified range of possibilities. However Henry's drawing machines avoid such prescription through their mechanics of

chance, that at the same time leaves scope for human intervention with the picture-generating mechanism.

Machine-Pollocks

Many of the automatic techniques pioneered by surrealist painters influenced American Abstract Expressionist painters, as in Jackson Pollock's drip paintings. Sometimes Pollock chose where to pour his paint and in what type of stroke; at other times he relinquished his paint can to the wiles of the irrational, allowing his body to become automated (Rohn 118-20). In essence, Pollock controlled his parameters while welcoming ``the dynamics of spontaneity and flow'' (Rohn 42). In much the same way Henry had only general overall control of his machines but could intervene at any moment of his choosing. He relished watching and intervening in the act of his machine making a drawing, whose configurations would only gradually emerge. With his second drawing machine, there were two servomotors, one for directing the pens, the other for the drawing table. The "running in and out of phase of the relative rate of revolution" of each motor occurred in regular or *random* sequences, producing regular or irregular patterns. These patterns were mainly obtained through a combination of varying degrees of table and pen oscillation which could be further enhanced by the positioning of clothes pegs attached to the drawing paper on the drawing table.

"But if one wants machine-Pollocks, then this is the way to produce them. There is an infinity of spring and stop distances, all of which may well produce new effects……." (Henry, letters to Elaine)

The imprecise elements in his machines,

"allow the machine…to put forward its suggestions, but at the same time leave immense scope for the creativity of the artist in the development, modification or suppression of the plastic material thus placed at his disposal" (Henry, 1964).

An example of '*Mechanical* Expressionism' maybe?

Mechanical Fractals

In order to arrive at a truly comprehensive understanding the effect of the role of chance in Henry's machine-generated art it is worth considering a branch of Chaos Mathematics known as Fractal Geometry in relation to the aesthetic appreciation of the machine-generated drawings themselves. Standard Geometry, explains Benoit Mandelbrot, is often described as cold and dry because it cannot describe the irregular and fragmented complexity of patterns and shapes in nature as can Fractal Geometry (Mandelbrot, 1994, p.2). Introduction to fractal theory in 2002 gave Henry additional conceptual terms when the author of this piece gave him the book by John Briggs, 1994, *The Patterns of Chaos.* His excitement at this discovery spurred him on to start yet another drawing machine project in 2003 with renewed enthusiasm, after a gap of some fifteen years. He subsequently also started to refer to his machine-produced graphic effects as, "mechanical fractals", (Henry, 2003)since his machine-produced drawings display "the kind of random yet strangely orderly grouping that is the signature of a fractal" (Briggs,1994,p.54). The patterns in his images are the result of both controllable and uncontrollable factors in their production method, as is the case for Jackson Pollock's "tangled abstractions" (Briggs, 1994).

Richard Taylor, together with Adam Micolich and David Jonas, analysed Pollock's patterns and successfully showed that they are fractal and so "display the fingerprint of nature" (Taylor, 1999). For Taylor, Pollock's drip paintings represent a type of *Fractal Expressionism* whose art products exercise a special appeal encompassed by what neuroscience has termed '*fractal fluency*' (Taylor et al., 2016). It would be interesting to see what similar computer analysis of self-similarity on different scales, of a Henry machine drawing, would reveal.

For Henry's machine-generated art, it wasn't so much a case of 'joining the dots' but more of 'joining the lines'- a clear case of making unexpected, happy chance discoveries and applying artistic interpretation or ' sagacity': in other words, serendipity.

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