

## **TOBY JULIFF & TRAVIS COX**

### **The Post-display Condition of Contemporary Computer Art**

#### **ABSTRACT**

Recent exhibition attempts to recuperate and revise Conceptual Art — ‘Open Systems’ (2005), ‘Invisible: Art About the Unseen’ (2012) — have brought to the fore wider discursive concerns regarding coding, interfaces and artistic intentionality. Taking its lead from Rosalind Krauss’ seminal work on the post-medium condition, this paper argues that the continued privileging of interface/display-user inherent within artistic discourse belies a more nuanced reading of the critical relationship between artist and code. Furthermore, this paper explores new practices in Computer Art and its related theorisation by Tanaka-Ishii and Dominic Lopes, with a view to re-conceptualising the relationship between artistic intentionality, coding, interface and user input. Based on this re-conceptualisation we identify the ‘post-display condition of contemporary computer art’, a condition that neither privileges user-display communication, nor the space between code and user, but rather envelopes meaning production between all elements of an artwork.

#### **1.1 Open Systems**

In 2005 an exhibition entitled ‘Open Systems: Rethinking Art c.1970’ opened at the Tate Modern with the intention of examining how international artists rethought the object of art in the late 1960s and early 1970s.<sup>1</sup> Drawing together work from artists such as Carl Andre, John Baldessari, Lygia Clark and Sol LeWitt — much of it already iconic and enshrined within the histories of Conceptual Art — ‘Open Systems’ sought to evoke, revise and revitalise discursive histories of Minimalism, Post-Minimalism and early Conceptual Art. In the words of the curator Donna De Salvo, ‘all of the artists included here are linked by their use of a generative or repetitive system as a way of redefining the work of art, the self and the nature of representation’.<sup>2</sup> Contributing essays from Boris Groys, Mark Godfrey and Johanna Burton each revealed a consistent concern of recent art historical scholarship: revising and rejuvenating the critical practices of late 1960s and early 1970s art. Mark Godfrey, in ‘From Box to Street and Back Again: An inadequate descriptive system for the Seventies’,<sup>3</sup> described what many had already feared: the emergence of the artist-shaman (Joseph Beuys) in the late 1970s and 1980s ‘artist-star’ (Jeff Koons) had superseded what, for ‘Open Systems’ at least, existed as a paradigm of the critical

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<sup>1</sup> ‘Open Systems: Rethinking Art c.1970’ was held at the Tate Modern from 1 June 2005 to 18 September 2005.

<sup>2</sup> De Salvo, 2005, p. 12.

<sup>3</sup> Godfrey, 2005, pp. 24-49.

artist exemplified in the work of Robert Morris, Bas Jan Ader, Hélio Oiticica and Sol LeWitt. Furthermore, such manoeuvres reduced critical discussion of systems, generative art, code and a radical new relationship to artistic production to a set of aesthetic strategies borne out of late-Modernism.

In the fourth and final essay ‘Mystics Rather than Rationalists’,<sup>4</sup> Johanna Burton similarly bemoaned that the received histories of post-Minimalist practice had tended to generalise and universalise a set of disparate examinations of a range of institutional, art historical and artistic practices. Burton employs the analogy — borrowed from that of Wittgenstein — of the ‘solipsistic’ artist, each trying to find a way of structuring their world. This world is not that of the exterior flâneur of Modernism but of one increasingly self-aware of their presence interior to systems of bureaucracy.

## **1.2 Boris Groys’ ‘The Mimesis of Thinking’**

With a background in mathematical logic and structural linguistics, the Russian-German art writer and media theorist Boris Groys appeared aptly placed to reinvigorate the ‘systems’ aspect for ‘Open Systems’. His continual deferral to a language born of binary systems — ‘open-closed’, ‘on-off’, ‘zero-one’, ‘negation-variation’ — seemed to openly acknowledge the task of redefining the work of Minimalism, Post-Minimalism and early Conceptual Art practices.

Early in ‘Mimesis of Thinking,’ Groys intimates as much apropos Minimalism:

The act of artistic creation was reduced to an instant autonomous decision between yes and no, between affirmation and negation, between leaving something intact and declaring it an artwork, between 1 and 0. But such a highly formalised decision can easily be placed in the context of a formal logic, a semiotic system, a digital code.<sup>5</sup>

Groys makes an important point here. Such decisions, such variations of process can be ultimately broken down into a simple binary process determined by an opening and a closing. And this turn away from the history of Systems Art as a set of images and participations is certainly very useful in reconceptualising the ‘systems’ of Systems Art. Put quite simply, Groys — and to a lesser extent Godfrey and Burton — remains critical of the continued privilege of the image in histories of Systems Art.

What matters in Systems Art are not ‘images’ but system and artistic intention. Groys explains this. In moving from Minimalist work to Minimalist work — say a floor

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<sup>4</sup> Burton, 2005, pp. 64-80.

<sup>5</sup> Groys, 2005, p. 54.

brick work by Carl Andre to vertical steel box work by Judd — we are not moving from image to image but instead *from thought to thought, system to system*.<sup>6</sup> Resiting the orthodoxy of Michael Fried — and his critics — Groys realigns such work in terms of the generative conditions determined by the artist, communicated through the work and experienced by the viewer: ‘what happens between artworks in a Minimalist installation is not theatre but a set of rules, a formal logic, an algorithm, which may generate an image but is not itself an image.’<sup>7</sup>

But it is here that Groys falls short. In deferring to a reading of Systems Art as elucidating analyses and critiques of ‘regimes of image production and distribution’,<sup>8</sup> he simultaneously acknowledges the significance of coding within such practices *and at the same time fails to specify the nature of code itself*. Groys is keen to acknowledge a range of different systems — the ironic taxonomising and systematising of Belgian Conceptual artist Marcel Broodthaers and the brutal universalising system of Ilya Kabakov for instance — but neglects to specify the role of code and code generation on the part of the artist itself. Instead Groys intimates towards code only in its most general sense: ‘Every such system can be described using a binary code: presence or absence, inclusion or exclusion, communication or interruption of communication, action or inaction, life or death.’<sup>9</sup>

In Groys’ defence, ‘The Mimesis of Thinking’ opens the door rather than showing us the way through. Writing a catalogue essay, Groys’ refusal to be drawn into specifying elaborate systems of coding seems reasonable enough. The deference to the canon too — whilst troubling — is not in itself grounds for specific criticism.<sup>10</sup> As an essay that goes some way to revise, reconceptualise and reinvigorate the systems at play in Systems Art, it evinces an increased willingness to engage in systems of code and generative systems in the history and trajectory of Minimalist, Post-Minimalist and Conceptual Art.

### 1.3 Julian Stallabrass: *Internet Art*

Julian Stallabrass’ work on the early years of Internet Art is similarly helpful in identifying an increasing awareness of the significance of coding mechanisms in recent computer practices.<sup>11</sup> Published in 2003, *Internet Art* emerged as one of the

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<sup>6</sup> Groys, 2005, pp. 50-64.

<sup>7</sup> Groys, 2005, p. 56.

<sup>8</sup> Groys, 2005, p. 60.

<sup>9</sup> Groys here employs a rather audacious conflation of code as system and system as code: ‘Every such system can be described using a binary code ...’ Though we do not share Groys’ ‘ease’ in this conflation, recognising the specificity of computer code, we find it nonetheless useful in reconciling the two uses of code in Groys’ essay. Groys, 2005, p. 54.

<sup>10</sup> For instance, he makes no reference to practices by women, despite the number of works in the show that investigate the coding of gender.

<sup>11</sup> As we shall see, defining ‘Internet Art’ as distinct from ‘Computer Art’ encourages a range of

first critical examinations of new categories of art production and consumption based in and from the Internet and the World Wide Web. The subtitle of *Internet Art* indicates the interpretative framework: ‘The Online Clash of Culture and Commerce’. Stallabrass’ position seems to accord with Groy’s in that both privilege a paradigmatic critical analysis of systems of production and consumption. In examining the capacity to renew the dematerialisation of the art object, *Internet Art* sets out a range of discursive possibilities offered in relation to the normalising forces of art, market and the culture industry.

Whilst highlighting these important points, *Internet Art* proves most useful when it identifies a new mode of thinking about recent computer art practices.<sup>12</sup>

Acknowledging early on that new computer practices were challenging not just the modes of consumption of art *but the very nature of art production itself*, Stallabrass intimates towards a radical shift in the way we read such practices:

While computers are agile in the realm of simulation, digital technology is not merely a matter of reproduction *but just as importantly* of production. If modernism was most strongly associated with new technologies of mass production that had a profound impact on everyday life (such as electric lighting, cars, plane and ocean liners) and postmodernism with new technologies of preproduction that transformed domestic life (above all, television), then the new era is brought into being by their synthesis.<sup>13</sup>

Such a commitment to the production of this synthesis is to be commended. In many respects, Stallabrass’ evocation of a new order of art production and consumption is relevant when re-evaluating our continued reliance on archaic discourses inherent within the art market.

But it is here that we must pick up the baton. Searching through the index of *Internet Art*, and through the footnotes of Stallabrass’ edited special issue on ‘Digital Art’ in *October* (2011), reveals passing references to Hypertext Mark-up Language (HTML) and the specificity of code as the producer of meaning within Internet Art.<sup>14</sup> ‘Code’ and coding systems however seem conspicuous in their absence. While Stallabrass acknowledges that code remains an integral condition of Computer Art, the failure to specify the nature of that code — and in particular, in its relation to artist and user — in terms that challenge the privileged condition of the interface, display and user initiates further consideration here. When Stallabrass considers artistic practices such

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discursive positions.

<sup>12</sup> Stallabrass’ — and our own — definition of ‘Computer Art’ is left wanting here. We chose to follow the definition of ‘Computer Art’ offered by Dominic Lopes as interactive works which generate a subjective display based on the input of a user. We remain somewhat critical of this definition however and employ Computer Art throughout the following discussion in acknowledgement of this, except when making direct reference to Lopes. We will discuss the terms for defining ‘Computer Art’ in more detail below.

<sup>13</sup> Stallabrass, 2003, p. 54.

<sup>14</sup> In particular, see Stallabrass, 2011.

as that of *jodi.org*, which playfully reveals and conceals the processes of coding and its relation to meaning production, the persistence of the interaction-display marks out the failure to address the underlying paradigm: ‘Their [*jodi.org*] technique of throwing up functioning code *for the examination of the user*, revealing aspects of its ideological function, marks a strong, didactic break in the parade of simulacra.’<sup>15</sup>

In *Internet Art*, Stallabrass examines a range of practices that reveal the changing conditions of production and consumption. Despite the focus on code, his discussion can be placed in the same field of enquiry as Groy’s ‘The Mimesis of Thinking’. Both maintain the autonomy of the artist as a privileged subject who employs coding mechanisms to reveal systems of meaning production (often ideological) to the user-viewer. It is, however, the capacity of code to reform and reconfigure this paradigm that interests this paper.<sup>16</sup>

#### 1.4 Between artist and code

The trope of code, as a language and binary system of ‘on-open-1’ and ‘off-closed-0’, has proven useful to Groy and Stallabrass in discussions of generative systems of art production. They have been reluctant, however, to fully engage with the underlying system of meaning production within these artworks. By ‘meaning production’, we refer to the inter-relationship between artistic intention, the production of code and conditions of engagement with a view/user.

We argue that the continued privileging of interface/display-user inherent within artistic discourse belies a more considered and nuanced reading of the critical relationship between artist and code. Furthermore, this paper seeks to explore new practices in computer art and its related discourses — by Tanaka-Ishii and Dominic Lopes — with a view of re-conceptualising the relationship between artistic intentionality, coding, interface and user input.

Rarely has code been considered in light of artistic intentionality. Whereas, it could be said, Jackson Pollock intentionally produced a painting, computer artists are, strangely enough rarely considered in light of producing code. Whereas the technical support of painting supports the physical and ontological act of painting, all too often, this paper suggests, the histories of computer art have dwelt for too long on the display at the expense of the code in the realm of intention.

Through an examination of dominant discourses in post-medium practices in recent

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<sup>15</sup> Stallabrass, 2003, p. 38 (our emphasis).

<sup>16</sup> Stallabrass’ early work on *Internet Art* offers a now somewhat dated set of parameters for the consideration of ‘Internet art’, especially in terms of new modes of consuming, exhibiting and acquiring web-based artworks. It is not in the scope of this essay to take up this challenge but to rather consider the inheritance of a set of parameters still defined by its ‘screen essentialism’.

art historical scholarship (Krauss), together with a critical review of new voices in 'Computer Art' (Lopes) and recent semiological examinations of code-as-language (Tanaka-Ishii) this paper seeks to explore the elision of code in dominant modes of analysis together with advocating a critical re-evaluation of coding practice in post 1960s art. Code, as employed here, is inalienable to artistic intentionality just as paint was inalienable to Pollock. As we suggest here, code in itself neither offers objective access to an artist's intention nor can it be said to be solely a technological apparatus *independent of* intention.

In drawing from discourses from a range of art historical perspectives together with new approaches in semiology and computer art, we outline a space of discursive potentiality, one that reconceptualises the relationships between the constitutive elements of these artworks. Just as Godfrey, Burton and Groys lament the reduction of Minimalist & Post-minimalist practices down to a set of generalised and universalised aesthetic conditions, we ask for a much more nuanced and critical relationship to the systems of meaning production alluded to but elided in 'Open Systems'. As such, we situate this paper in light of similar re-examinations of Systems Art such as 'Art of the Invisible, 1957-2012'.<sup>17</sup> The intention of this paper however is not to contribute to such a re-examination and rehabilitation but to rather expand upon the terms employed in these exhibitions: code, system, intention, computer art, display.

### 1.5 Post-medium condition

In 1992 art historian and writer Rosalind Krauss presented a series of lectures at Birkbeck College, University of London that would by 1999 form the basis of her ground-breaking work *A Voyage on the North Sea: Art in the Age of the Post-Medium Condition*. Identifying a tendency in art after Modernism to disavow the concept of medium as a specific aesthetic condition — painting, sculpture, photography, etc — Krauss reframes debates regarding the place of medium in contemporary art. Often misunderstood as a missive against medium, it is rather a radical reframing of debates regarding the capacity of a given medium to secure its autonomy through self-referentiality: painting exacerbates its painterliness and sculpture its objectness. Such loaded conditions, Krauss argued, had only alienated and isolated art through its continual self-serving repudiation of its own conditions: 'The specific mediums — painting, sculpture, drawing — had vested their claims to purity in being autonomous, which is to say that in their declaration about being about nothing but their own essence, they were necessarily disengaged from everything outside their frame.'<sup>18</sup>

Such a condition could not be sustained, Krauss continued, and its claims of purity

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<sup>17</sup> 'Invisible: Art about the Unseen, 1957-2012', Hayward Gallery, London, 12 June - 5 August 2012.

<sup>18</sup> Krauss, 1999, p. 11.



would soon be challenged by the emergence of a critical examination of the very nature and conditions of art. In her attempt to re-examine this muddying of Modernism, Krauss lays out a condition borne of Conceptual Art and the work of Broodthaers in particular: *the post-medium condition*. This condition does not reject medium as a category wholesale, but instead examines and questions the status of medium as an aesthetic condition. Painting could no longer sustain itself on its own terms. This does not mean doing away with paint, but rather challenging its privileged apotheosis, painting.

The resultant challenge to the Modernist autonomy of medium resulted not in the abandonment of art but led to a new generic condition: art. 'For if Modernism was probing painting for its essence — for what made it specific as a medium — that logic taken to its extreme had turned painting inside out and had emptied into generic category of Art: art-at-large, or art-in-general.'<sup>19</sup>

It is in the work of Marcel Broodthaers — as Groys and Krauss both agree — that such a paradigmatic shift in Conceptual Art first takes flight. Taking umbrage at Joseph Kosuth's claims that he replaced one 'pure' and specific medium for another more general thought, replacing medium with art, Krauss locates in Broodthaers' *Museum of Modern Art, Eagles Department* (1968-1972) a systematised breakdown of differentiated medium-specificity.<sup>20</sup> This four-year project saw Broodthaers sequence a range of works that examined what he called the 'identity of the eagle as ideas and of art as idea'.<sup>21</sup> A refusal to capitulate to the conditions of medium-specificity, the work 'announces not the end of Art but the termination of the individual arts as medium specific; and it does so by enacting the form that this loss of specificity will now take'.<sup>22</sup>

Krauss, much like Stallabrass and Groys, reserves a privileged position for the artist within this paradigm as a subject who analyses and critiques the systems of image production and consumption. 'By abandoning this pretence to artist autonomy,' Krauss argued,

and by willingly assuming various forms and sites [...] Conceptual art saw itself securing itself a higher purity for Art, so that in flowing through the channels of commodity distribution it would not only adopt any form it needed but would, by a kind of homeopathic defence, escape the effects of the market itself.<sup>23</sup>

But it is not for this that the 'post-medium condition' is evoked. Seen as a radical denial of the privileged status of medium-specific conditions, Krauss conversely

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<sup>19</sup> Krauss, 1999, p. 11.

<sup>20</sup> Krauss, 1999, pp. 10-2.

<sup>21</sup> Broodthaers, cited in Krauss, 1999, p. 12.

<sup>22</sup> Krauss, 1999, p. 12.

<sup>23</sup> Krauss, 1999, p. 12.

restructures the relationship between artist, intentionality, technology and viewer. Though for Stallabrass, it is precisely the capacity of Internet Art to analyse and critique the marketisation of image production, it is just as important to acknowledge that this in itself does little to arrest the privileging of display-value in 'Computer Art'. What matters is code.<sup>24</sup>

An over-emphasis on appearance is not lost on Krauss, who responds several times following the publication of *A Voyage on the North Sea*. The 'post-medium' is not a call to arms against the idea of paint. Instead it is a call to reframe our discussions of medium in terms of the 'technical support' that underpins the work of art:

Technical support has the virtue of acknowledging the obsolescence of most traditional aesthetic mediums (such as oil on canvas, fresco, and sculptural materials, including cast bronze or welded metal), while it also welcomes the layered mechanisms of new technologies that make a simple, unitary identification of the physical support impossible (is the "support" of film celluloid strip, the screen, the splices of the edited footage, the projector's beam of light, the circular reels?).<sup>25</sup>

It is this idea of an artwork's 'technical support' and recognition of the 'layered mechanisms of new technologies' that this paper welcomes just as much as the challenge to the continued privilege of medium as an aesthetic condition. The technical support of computer art *is* code.

Krauss identifies as early as 1976 the specificity of video in 'The Aesthetics of Narcissism: Video Art'. Video is not film, nor is it television. For Krauss, it is video's capacity for 'the simultaneous reception and projection of an image' that marks out video as the technical support of Video Art.<sup>26</sup> The mediating technology of the camera determines precisely Video Art. Video Art is not simply 'display/screen', nor is it 'subject/artist'; Video Art lies precisely in the organisation of artist, camera and display.

Seen in such terms, we might similarly propose a 'post-display condition of contemporary computer art'. For Krauss, the 'post-medium' is not a recourse to pure thought (as in Joseph Kosuth) at the expense of sensuous materiality, but rather a challenge to the conceit and privilege of an idea of medium bound up in its own sufficiency. As video is to Video Art, code is to computer art; neither primary nor

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<sup>24</sup> We remain aware that Krauss' discussion of 'technical support' situates itself within the post-medium condition. In light of this, the employment of 'Computer Art' may seem contradictory. The authors conceive of Computer Art in post-medium terms, defining it not solely as the technological and ontological apparatus of the computer, but rather outlining a particular mode of meaning production that encompasses multiple elements of computing, from the technological to the discursive. We remain cautious regarding its usage.

<sup>25</sup> Krauss, 1999, p. 11.

<sup>26</sup> Krauss, 1976, p. 56.



secondary. We suggest similarly for the ‘post-display’ condition. We do not suggest that display is unimportant, rather that the privileged status it currently enjoys in discourses of Computer Art cannot be sustained.

Just as video has the capacity to record and transmit at the same time, so too can code capture, translate and transmit its subject matter and communicate a mediated insight into artistic intentionality. That it does so as a mediating ‘technological support’ requires some elaboration. Indeed, as we shall see, code’s ‘layered mechanisms’ renders the discussion of the ‘post-display’ condition of contemporary Computer Art all the more pressing.

## 2.1 Dominic Lopes: *A Philosophy of Computer Art*

We must consider again the artwork of jodi and how they employ a purposeful misuse of HTML in order to produce errors. Rachel Greene has termed this ‘desultory representations of code, protocols and operating system.’<sup>27</sup> This type of subversion is evident in many of jodi’s works, one example being the site <http://www.jodi.org/> in which the viewer is confronted with a sea of symbols that only resolve into comprehensible images once the source code has been viewed. Within the source code, sandwiched between HTML is an image made of text symbols forming the schematics of an explosive device. Jodi’s artwork, we argue, could be considered a literal example of the role of code within computer artworks. Their code, when interpreted by the browser, loses its objective artist-defined structure instead becoming a visual mass of symbols that subjectively change based on browser window and text sizes. The code is the statement of intent unsullied by outside force while the display is a subjective interpretation of it. Therefore we can see that the consideration of code, and in the case of this work the literal viewing of the code, is integral in understanding these artworks. Code is a ‘technical support’ of computer artworks and so requires a framework for interrogating its role.

Dominic Lopes’ *A Philosophy of Computer Art* alludes to this ‘layered mechanism’ of meaning production, outlining a ‘new art form’,<sup>28</sup> which Lopes labels ‘Computer art’. This form is differentiated from the broader term Digital Art by connecting the digital to a technological continuation of previous media such as video or paint. For Lopes the computer is a new ‘medium’ that allows for the production of specific artworks that would not otherwise be possible. These ‘Computer Artworks’ are interactive, and interactive because of the ‘display’, the interface through which a user perceives the outcome of their interactions with the underlying (and unseen) code. This display is specific to the user that generates it and changes based on interaction from said user. Lopes, as with Groys and Stallabrass, does not move beyond this space to directly

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<sup>27</sup> Greene, 2004, p. 52.

<sup>28</sup> Lopes, 2010, p. 9.

acknowledge code as integral to the production of dialogues between user and display. The code takes input from the user and subjects it to internal semiosis between distinct elements of the code, before being output to the display. This code, having been written by the artist, or an agent of the artist, contains within its structure an inbuilt intentionality, a way of approaching input that is integral to conveying the intended meaning.

Lopes diagrams his Computer Art form as an artwork that is produced by an artist, from which the user generates a display. For Lopes, this display is one of many possible generated outcomes of the work and it is this display that the user interacts with as they engage with the artwork (Fig. 1). Lopes' display is not necessarily a screen but instead the overarching feedback provided through visuals, sound, motion or other sensory information resulting from user input. However, Lopes' space of interaction within these artworks is situated directly between user and display, but this fails to take into account the code from which the display is generated and which the display consistently engages with in order to update after input from the user. If we instead augment Lopes' model of interaction with these artworks we can show the importance of code in the dialogues entered into between the user and display.

As can be seen in Fig. 1, the artist produces the code that encompasses their intentions for the artwork. This code then produces the display with which the user engages. The user's mediated input is passed to the code, which interprets this input in accordance with the systems defined by the artist, before the system outputs an updated display for further user engagement.

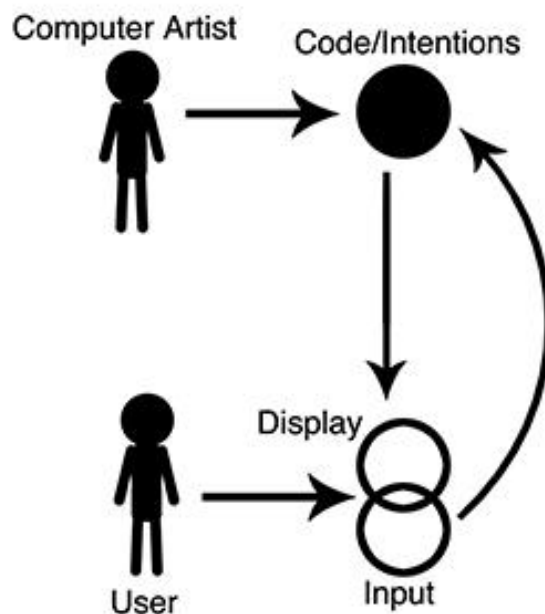


Fig. 1. Meaning production within a computer artwork.

While this augmented system diagrams the interaction between user display and code, it fails to consider the space of interpretation within the program itself. If code is to be considered as the technical support of these artworks, then engagement with the internal dialogues of data passed within the programming system must be explored. It is on this point that an understanding of the semiotics of code, such as that offered by Kumiko Tanaka-Ishii, can be employed to advance consideration of code in meaning production (Fig. 2).<sup>29</sup>

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<html>
<head>
<style>
  .button {
    width: 100px;
    border: 1px solid black;
    margin: 5px;
    background-color: white;
    text-align: center;
    cursor: pointer;
  }
</style>
</head>
<body>
  <div onclick="changebg('red')" class="button">Red</div>
  <div onclick="changebg('blue')" class="button">Blue</div>
<script>
  function changebg(color){
    document.body.style.background=color;
  }
</script>
</body>
</html>
```

Literals  
Operators  
Reserved Words  
Identifiers

Fig. 2. Code of a simple interactive webpage with Tanaka-Ishii's four sign types highlighted.

## 2.2 Tanaka-Ishii: *The Semiotics of Programming*

Taking Figure 2 as a prime example, what can be seen as a complex and esoteric code of indecipherable algorithms and operations can quite quickly be broken down into elements of language that seem, if not understandable, then at least familiar. This code produces a simple web-page artwork that contains two boxes in the top left

<sup>29</sup> Tanaka-Ishii, 2010.

corner of the screen labelled ‘Red’ and ‘Blue’. When the user clicks a box the screen background changes to match the signifying word within the box.

Such a code — written in a hybrid language of HTML, CSS and JavaScript — can be analysed using Tanaka-Ishii’s *Semiotics of Programming*.<sup>30</sup> She employs a broadly Peircean semiotic system to outline the way in which elements of computer programs work in similar ways to linguistic particles in order to produce meaning. The four distinct ‘sign types’ she identifies are: literals, operators, reserved words and identifiers.<sup>31</sup>

Literals are specific values or strings of text (these values can define font size, placement of elements on the screen, margins as well as the actual text) whereas Operators are the signs that provide contextual information for other signs as well as signifying certain processes (for example, signifying ‘100’ as the literal sign type that corresponds to the Reserved Word of ‘width’). Seen in our simple webpage the Literals contain numerals or text that when contextualised by Reserved Words and Operators tell the browser to apply a 1 pixel border to each button or write specific text in a space that is visually the button and so on.

Reserved Words refer to code that has a specific meaning that is not user defined but rather *defined in the design of the language*. In our code therefore, red, as a reference to a specifically defined colour by creators of the language is a Reserved Word. The code however only understands that it is the Reserved Word that is being referred to because of the Operators ‘(’ and ‘)’ that contextualise it.

Identifiers are the user-defined names for the variables and functions created by the coder to corral the other sign types (and other Identifiers) into producing the intended outcomes. In the case of our example, the function ‘changebg’ modifies the specific on-screen visual associated with the reserved word ‘document.body.style.background’ (the background of the webpage) by assigning (=) a new value defined by the ‘color’ identifier, this colour being passed to it by clicking one of the buttons.

Seen in such terms, we can note code’s similarity to most language forms. There are functions, variables, operations and identifiers. Importantly, this reflexivity between code’s sign types is *only one part of meaning production*. These dialogues output to a display that the user engages with, and the display’s original state as well as its continual modification due to the execution of code affects understanding.<sup>32</sup> Should

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<sup>30</sup> While the example here uses coding languages associated with the Internet, code is written in a multitude of programming languages for various interactive computer artworks. Moreover, Tanaka-Ishii’s semiotics of programming was not, however, produced as a guide for discussion of code as the ‘technical support’ within post-medium artworks, even though she uses visual artworks as examples at the beginning of each chapter. Nonetheless, this does not suggest that it is inappropriate to utilise it in that way. Computer artworks are necessarily produced by code and so come under the purview of Tanaka-Ishii’s discussion.

<sup>31</sup> Tanaka-Ishii, 2010, p. 16.

<sup>32</sup> Understanding meaning through interaction and modified display is documented within the

we change one element in the code by swapping the two literals ‘red’ and ‘blue’ (the labels on the buttons) we would challenge the user’s inferred understanding of the page. By clicking a button labelled ‘blue’ the background would change to red (the reserved word) and vice versa. It is this — the code’s capacity to act as a mediating language that interprets the artist-coder’s intention and communicates that intention to the view-user via the display or interface — that interests us most here.

Through aligning programming languages with accepted semiotic systems, Tanaka-Ishii’s *Semiotics of Programming* outlines the way in which elements of computer programs work together to produce meaning. By examining the often overlooked but inherent reflexivity between elements of a computer program Tanaka-Ishii relates programming languages to human languages.<sup>33</sup> Tanaka-Ishii’s breaking of programming languages into these four types allows the relations between elements of code to be mapped. Therefore, Tanaka-Ishii’s explorations of code can be used to consider the ‘technical support’ apparatus of computer artworks.

### 3. Conclusion

We are aware in the writing of this of the emergence of number of discursive considerations of what has been termed ‘screen essentialism’.<sup>34</sup> We situate this paper alongside these responses employing a methodology more concerned with the wider history of systems art and the emergence of post-medium art. Mounting a critique of Lopes’ continued privileging of display through Tanaka-Ishii’s semiotic interpretation of computer coding, this paper seeks to find a space between the concerns of the discourses of ‘Computer Art’ (Human-computer interaction (HCI), cybernetics, information aesthetics and post-Internet Art, among others) and the longer histories of Systems Art.<sup>35</sup>

The ‘post-display condition of contemporary computer art’ identifies a discursive gap

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discourses of human-computer interaction (HCI) (de Souza, 2005). A more specific role of code however within meaning production as well as a larger connection to the Visual Arts has not been established.

<sup>33</sup> Including signs within code and input from a user.

<sup>34</sup> The discussion of such ‘screen essentialism’ has played out in the pages of the online magazine of Internet and post-Internet Art, *Rhizome*. In particular the work by Lisa Adang on jodi.org’s *Untitled Game* (1996-2001) and the subsequent editorial by Michael Connor mark out just one particular area of discussion in this area. See Connor, 2013: <http://rhizome.org/editorial/2013/oct/16/required-reading-closer-look-jodis-untitled-game>; accessed September 12, 2014. We note however that many such discussions of ‘screen essentialism’ have hitherto failed to engage with the wider histories and theoretical discourses pertaining to Systems, Conceptual and post-medium art, preferring instead to consider such work in their own terms as Computer Art. This paper is an attempt to move such discussion closer to those histories.

<sup>35</sup> The work of Hito Steyerl is indicative of this discursive manoeuvre (Steyerl, 2012). Whereas Steyerl employs a reading of Walter Benjamin’s writings on translation, authorial production and technological reproducibility, we seek a more direct engagement with the longer history of Systems Art and the emergence of the post-medium condition.

in the revision of Conceptual Art, Systems Art and Computer Art. It calls for a better understanding of artist-code-display-user with the view to a more nuanced and critical relationship to Computer Art. In reaffirming the significance of code seen underlying these authors' discussions of a particular type of art production, this paper advocates reconceptualising the artist-display-user paradigm that remains all pervasive in regards to computer art. Groys and Stallabrass agree that the significance of code remains paramount in the development of generative and non-generative computer art works but fail to specify what is meant by code, not least in terms of code as language and code as meaning production. Lopes further calls for a greater degree of specificity when defining such processes in differentiating 'Computer Art' from other alternative code-based digital practices. For Lopes, as for Groys and Stallabrass, there is an elision of the integral support of code in discussions of recent computer art practices. This paper recasts code as not only a product of intention and meaning, but as a producer of intention and meaning.

Tanaka-Ishii's thesis examines such an approach through a broadly Peircean semiotic system of sign types, referents and variables. In so doing, code becomes a language very much like that of any written or spoken language. Code in Tanaka-Ishii's terms is therefore not an objective and uncomplicated language offering unmediated access to artistic intention. Instead code plays, as language itself, a role in translation. In clarifying the often unproblematised system of meaning production — the digital camera sees what the eye sees, the screen sees what the camera sees, ergo the screen sees what the eye sees — Tanaka-Ishii clearly points towards a condition forged out of reflexivity, variability, transliterations (literals) and translations.

This paper suggests a new discursive position borne out of such manoeuvres: the post-display condition of contemporary computer art. As in Krauss' radical reading of the legacy of art after modernism, this is not to diminish display or user but to rather reconsider the conditions of meaning production in such works. As celluloid is to film, and paint is to painting, code is to computer art.

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### **Illustrations**

Fig 1. Meaning production within a computer artwork.

Fig 2. Code of a simple interactive webpage with Tanaka-Ishii's four sign types highlighted.