The Arrow as Icon: drawing complexity

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With sincere thanks to Dr Gail Davies of UCL who first queried my use of the arrow: this owes everything to conversations with her.

Abstract

This paper engages with the question as to whether traditional epistemological schemes can be addressed through drawing or whether drawing challenges these schemes with visions of its own: how aware we are of conventions: and whether this matters.

The paper suggests that 'knowledge' and 'drawing' are not necessarily separate and that 'knowledge' (a questionable word) is produced in a fluctuating, culturally inflected field of practices, of which drawing is one.

With this in mind, this paper focuses on a specific case study in which I am currently involved as an artist, concerning the geographies implicated in translational scientific research. In particular I investigate the loaded and vexed icon of the arrow as it is unthinkingly and reductively used in graphics software and raise questions as to the part played by such digital icons in the constitution of 'knowledge'.

The arrow picked out of the (for example) Powerpoint digital toolbox can misleadingly suggest over-simple relationships between causes: flat, reductive notions of movement, direction, and time: translation as simple transliteration rather than the transformation often involved. The paper ponders the sense of encounter in the icon in its earlier forms and the loss of this sense in the digital and touches on the potential in hand-drawing for a vastly greater variety of expressivities. It notes that these, while bearing all kinds communicativeness in different kinds of registers, are not necessarily literal, so not instantly 'readable'. This suggests the existence of a friable boundary where code or language breaks down, and the need to keep awareness open to the possibility of fruitful dialogue between hand-drawn and digital visual modes.

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Bruno Latour writes in his essay 'How to be Iconophilic in Art, Science and Religion?'

that '... practice, loci, inscription, instrument, writing, groupware – was the active part, and not simply 'the means for a Mind to gain access to the World.' 'ⁱ He suggests that 'scientific' drawn representations regularly have the messy processes of their production elided, so that they appear cleaner, more complete and authoritative than is necessarily the case. I want to focus on a specific case study in which I am currently involved as an artist, concerning the spatialities implicated in translational biomedical research. In particular in this paper I look at the loaded and vexed icon of the arrow as it is unthinkingly and reductively used in graphics software. It is a universalising, globalising

icon but the 'cleanness' and 'professionalism' bestowed by graphics software gives it an authority which may on occasion be entirely spurious when it appears in a diagram. The following may apply to the arrow as an icon as well as to the larger diagram in which it appears:

'The word 'diagram' implies a schematising; while the world in its density and richness, seems to defy schematisation. Yet is there some expansionary potential in the 'diagram' to become a visual medium through which meaning pours out everywhere, rather than being pared too much away in simplification? (Scalway 2011: 1)ⁱⁱ

The graphics software arrow is ubiquitous as a sign: in traffic systems, at airports, in flowcharts. It appears in internationally used function modelling systems such as IDEF \emptyset (and it is perhaps significant that The United States Air Force was involved in its development – an arch parer-away of human meaning, certainly seeking 'authoritativeness' in presentation):

IDEFØ is a method designed to model the decisions, actions, and activities of an organization or system. IDEFØ was derived from a well-established graphical language, the Structured Analysis and Design Technique (SADT). The United States Air Force commissioned the developers of SADT to develop a function modelling method for analyzing and communicating the functional perspective of a system.ⁱⁱⁱ



Fig.1 IDEFØ Box and Arrow Graphics

The arrow may evoke direction, the passage of time or causality. It is used in the diagramming used by some sociologists such as the multivariate analysis taught at the University of California Riverside, where, with regard to causality, the sociologist Robert Hanneman writes in his teaching material:

Causal or path models are methods for asserting causal relations among variables (or more properly, among the concepts of which the variables observed are realizations in a sample)... It is usually a good idea for the researcher to use some formalism (like a propositional inventory or diagram) rather than "everyday" language to express the model. For many multivariate hypotheses (we shall use the term "models" interchangeably, here) the "causal" or "path" diagram is a very useful way of displaying the model... 1) it leaves little ambiguity between the analyst and the consumer about what is being said and 2) it guides the analyst in determining which analyses to conduct. (Hanneman 2012)^{iv}

The phrase 'some formalism' just slips in there as though unquestionable. These muchused formal systems have been produced by a deliberate paring down with the aim of avoiding ambiguity and the conventions are so well-established as to appear 'naturalised'. Yet they may conceal a multitude of messy issues which sometimes need to be rendered visible. 'Formalism' may not only be in the interests of lack of ambiguity but also at some level surreptitiously convey a specious 'professionalism' derived from the association with technology. This can slide into 'authoritativeness', the framing which produces the appearance of 'knowledge'.

Hanneman's teaching website points out the complex possibilities in the diagrammatic analysis of sociological problems: variables may be exogenous, endogenous, independent, dependent, residual or error, observed or unobserved, and effects may be direct, indirect, co-various, interactive, and/ or reciprocal. Throw in random (stochastic) elements and the mix is rich. Significantly for this paper, like most other users of the arrow, he draws his with computer software.



Fig.2 Robert Hanneman: A relation of covariation or correlation between variables

'Two exogenous variables are shown to covary, as do the residuals associated with two endogenous variables.' (Hanneman 2012)

He frames his work as dealing only with quantitative data but the kinds of issues he uses as examples, such as how a son's education is affected by his father's occupational prestige, are dense with qualitative implications – as are so many issues 'quantitatively' approached.

Arrows like other diagrammatic icons – lines, boxes – are tools to 'think' with. (Investigations of causation and variation seem magnetically to veer towards probability and thence into mathematics, the most abstract language of all, where the arrow has its own meanings). However, though these systems are evidently useful for their users in many contexts, they are unquestioned codes (language is too nuanced a word) and their rigidity and pared-down-ness can lead on occasion to over-simplification, a deadening of the thought they are meant to facilitate. This appears to be the case in contemporary neuro-scientific diagramming:

With activities on arrow (AOA) diagrams, you are limited to showing only the finish-to-start relationships - that is, the arrow can represent only that the activity spans the time from the event at the start of the arrow to the event at the end. As well, "dummy" activities have to be added to show some of the more complex relationships and dependencies between activities. These diagrams came into use in the 1950's, but are now falling into disuse.^v

The semiologist Gillian Fuller widens the discussion in her analysis of the use of the icon in a different context, the airport:

A complex of forces move through the sign which relate a more complex reality than the essentially hermetic world of signification... These signs, like links and buttons on computer interfaces, conjoin semiotic and material flows in a world where the informational and the material increasingly stream through each other.

(Fuller 2002: 241)^{vi}

Sometimes ambiguity and mess needs to be inhabited as in the poet John Keats's 'negative capability': the aim of avoiding ambiguity may very frequently conceal a morass which sometimes might fruitfully, and sometimes necessarily should, surface – for in 'mess' may inhere the not-yet understood. With this in mind I made a series of experimental drawings, attempting to construct a visual equivalent which might return some of complexity to the sign. I used everyday materials, sand and mud as well as pigments.





Figs.3, 4, 5 Helen Scalway: Downstream Arrows: Material Flows

These images were made by creating the arrows as rivulets. Like much bigger rivers all rivers, they have picked up traces of whatever is released into them or what they have passed through, different traces flowing, draining, drying. Like all rivers these may be read as timelines. The three images turned out profoundly – and were allowed to be – awkward, as is so often the case in work which attempts to hold together different registers of language and object; awkward because the shuttling these arrows perform, between their identities as a sign, readable arrows, and their material beings, enacts the

confounding slippage between a code which offers to represent complexity but whose readability and usefulness depends on a paring-down which eliminates meaning, and a materiality which is excessive. On one level this should be blindingly obvious and yet the ease and ubiquity with which the software arrow is used in diagramming suggests otherwise.

In relation to this the following is part of an exchange during an interview with the geographer Gail Davies at U.C.L.:

Scalway: Something that's unresolved for me is that with icons like the arrow, we're using some kind of code. The 'clean' software arrow too simply encodes complexities but if I make a more nuanced cloudy or multiple arrows, arrows which are hand-drawn, the problem then is how are they going to be read? How are they going to be understood?

If I hand draw then I've got to decide what kind of a communication I'm making. In the hand-drawing of code, looking to use the way of drawing as part of the code's whole communication, I may slip between several forms of... well, if you like, epistemologies, so that this excess ruptures the code. The question of how you animate either a map or an arrow, give it whatever nuance is needed, is an unresolved one.

Davies: That's the classic tension; it's the tension that's in people like Borges and the ultimate map being the map of all the territory that's fundamentally useless because it has so much in it, that it is the world not a useable representation of it. This is the same tension in science, that you need to abstract, to reduce, to understand and to render things in a way that makes them intelligible and manipulable and doable. (Scalway and Davies: 2012)^{vii}

The origin of the ubiquitous sign is disputed – perhaps deriving from the needle on the compass rose: perhaps from a hand with a pointing finger. Certainly the latter, the hand as pointer/cursor appears everywhere on our computer screens (though this may not be for much longer as touch-screens take over).

Gail Davies makes a sensitive point concerning the sparse and detached digital arrow as replacement for the pointing, haptic hand:

... this emergence from the hand... that's the ultimate reduction, you move from something that was touched, that was embodied, that had an author if you like or a person, a subject identified with it and suddenly it becomes abstracted and abstracted and abstracted and you lose the touch, you lose the embodiment, you lose the kind of sense that it emerged from relations, it had an origin, a someone who was gesturing towards something. When you think of it this way, the arrow becomes this way of figuring a movement that's not only about a direction, but always about a relation... the importance of 'recognising' something quite challenging... To me this term "recognition" was really important. It had layers in it about cognition, about thinking, about knowing. It also had at its core this encounter with the other... So the (digital) arrow just becomes the way of highlighting either a sequence, we move from this to this. It's lost that encounter in it. ^{viii}

The problem then becomes one of 'how to return the subject to the system that you're trying to understand. Multiple forms of subjectivity within one system perhaps.'^{ix}

The mode of communication profoundly affects the way of knowing and hence what we know. Davies's emphasis on haptic embodiment and touch is vital here.

Another possible candidate for the origin of the arrow is in male gender, as in 'Cupid's arrow' which flies straight to the heart. Iris Murdoch writes in her novel 'The Red and the Green' of a young man's awareness of the approach of his first sexual encounter as

... a secret murder. He could not imagine it as a part of ordinary life, and as the scarlet dart flew nearer and nearer he had times of feeling most dreadfully afraid.'

(Murdoch 1965: 26)^x

There is a suggestion here of woundings of all sorts, that this is an ancient, layered, profound sexual metaphor prefiguring the primal, generative, transformative encounter which is both a kind of death but also the maker of new beginnings. William Blake's Invisible Worm, flying 'to the heart of crimson joy' in his poem the Sick Rose,^{xi} is a complication of this, with its suggestions of guilt. And even at its most literal, the arrow is not a pointer at all but a weapon, dealing fleshly pain or death and their complex consequences. Fleshliness, complexity, encounter: these might be qualities or possibilities in hand drawing – and Blake, we might remind ourselves, was a terrific hand-drawer.

Does our awareness of the straitened-ness of digital conventions matter? If so, why? It is here that I would like to refer more closely to my own current project, working with Gail Davies. Her work as a geographer is on the spatialities of translational bio-science, the complexities involved in modelling human maladies in animal subjects in lab animals, particularly in mice. The arrow is all too apt to indicate that 'from this to that' is simple, whereas translation involves transformation – hugely more complex: Davies comments on

... this question of translation and language and how do you think about the relationships within one space where everyone's talking slightly different languages. So in the world I've been researching, you've got people who talk about molecular biology, you've got people who talk about animal welfare, you've got people who talk about clinical application and all of that's in there, in different inflections, intensities and visibilities in different spaces, but with potential relevance for every space.^{xii}

Davies refers to Deleuze and Guattari's notions of 'contingent assemblages' and 'becomings'^{xiii} in her evocation of a new vocabulary for the way lab animals are being developed. What she evokes are worlds of becoming – and how fast they are becoming! What graphic development might engage with this? For while codes have the limitation of closure of meaning built in, hand-drawing is always open to the charge of endless ambiguity/excess in meaning.

There are drawing artists who address this friable edge of language and its beyond: I think, in relation to writing, of an artist such as Cy Twombly, whose paintings have so much of language going/coming about them, and in relation to the subversion of code, of the absurd machine-like drawings of Eva Hesse who subverted the rigid logic of the minimalism of her 1970's day to evoke experiences of the living self and its boundaries: more recently Julie Mehretu, by layering one mapping/diagramming convention on top of another in her urban 'history' works, arrives at an evocation of the confounding chaos/becoming of cities. But there is potential for drawing to do more than simply offer a set of contrasts to the rigidities and absurdities of visual code: there is potential for it to investigate more closely where the collapses and crumblings might lie. Its relation to diagramming/mapping might be as that of innovative poetry to language, which poetry opens and makes anew.

The worlds of business, or administration or science of course most often need their

diagramming tools to be functional, unambiguous, far from poetry or hand-drawing; so that drawing may never have much effect on them. But always? It may be that all one can do is to remark that digital diagramming – and by the time graphics reach the public domain they are nearly always digital – invariably comes back to the digital's closed codes, and to plead for greater awareness of the powers of a more open graphicacy. The digital arrow can too easily suggest that a relation or cause is simple where in fact some real complexity may be lurking which will affect outcomes, and might be lethal when it conceals those pertaining to such vital matters as, dare one say it, international relations or human health.

Such complexities pertain to the fact that the world is a becoming. This is true of the biological world but also of those we are bringing into being in our cities, our systems of all sorts. There are of course investigations proceeding into the power of the digital to create self-organising and self-generating systems – that future is another open becoming – but hand drawing has the most available access to the fleshly, the haptic and immediate which is still our essential corporeal condition. I will give Davies the final word: drawing might, compared to desiccated digital code, be 'excessive', but it has

... the potential for new understandings, for something unexpected, for emergence to come through... you've either got a static system or you've got a totally excessive arrangement that's not understandable. So in some ways what you're doing is always moving between the two and I guess reminding us, at different points, that there are things that do have this potential for excess and maybe sometimes we're focusing on the wrong ones of those and we need to go back and open up certain points.^{xiv}



Fig. 6 Helen Scalway Arrow: context redacted



Fig. 7 Helen Scalway Arrows and growth



Fig. 8 Helen Scalway Arrows from negative space

Endnotes

ⁱ Latour, B. 1996 Latour, B. 1996, in Carrie Jones and Peter Galison, (editors) Picturing Science Producing Art, Routledge, London, pp. 418-440, 1998 p 426 (<u>http://www.bruno-</u> <u>latour.fr/sites/default/files/66-GALISON-JONES-pdf.pdf</u>

ⁱⁱ Scalway, H. 2011 Concept Paper for Seminar, Royal Holloway 2011, unpublished
 ⁱⁱⁱ Anonymous writer, http://www.idef.com/IDEF0.htm [Accessed 10 July 2012]
 ^{iv} Robert A. Hanneman Multivariate Analysis Graphical Conventions for Causal Models <u>http</u>://faculty.ucr.edu/hanneman/soc203a/diagram.html.ucr.

^v Anonymous writer, <u>http://wiki.answers.com/Q/Compare_and_contrast_activity-on-node_versus_activity-on-arrow_project_networks</u> [accessed 25 July 2012]
^{vi} The Arrow—Directional Semiotics: Wayfinding in Transit, Gillian Fuller, Social Semiotics, Vol. 12, No. 3, 2002 p 241
^{viii} Helen Scalway and Gail Davies in conversation May 2012, unpublished interview
^{viii} ibid
^{ix} Murdoch, I. 1965 p 26
^{xii} Blake. W. 1965 p 147
^{xiii} Helen Scalway and Gail Davies in conversation May 2012, unpublished interview

^{xiv} Helen Scalway and Gail Davies in conversation May 2012, unpublished interview

Citations

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7 Davies, G. and Scalway, H. (2012) *Helen Scalway and Gail Davies in conversation*, unpublished interview.

8 Murdoch, I. (1965) The Red and the Green, Chatto and Windus, London.

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10 Deleuze, G. and Guattari. F. (1980) *A Thousand Plateaus: Capitalism and Schizophrenia*, Continuum, University of Minnesota.