Laura U. Marks / TAKING A LINE FOR A WALK, FROM THE ABBASID CALIPHATE TO COMPUTER GRAPHICS, or, The Performativity of the Vector

Une ligne pour le plaisir d'être ligne, d'aller, ligne. Points. Poudre de points.
Une ligne rêve. On n'avait jusque-là jamais laissé rêver une ligne.[1]

This essay follows important continuities in what at first may appear as disparate traditions in art history: classical Islamic art, European modernism and contemporary new media. Comparing several tendencies shared by both classical Islamic art and contemporary computer-based art, my research traces how principles of the former traveled westward, at several points from the 12th to the early 20th centuries, ultimately informing the development of European modernism.

I should state at the outset the result I hope to achieve from this comparison. Islamic art, as we know, is a religious art, driven by a divine imperative, a will to come face to face with the Infinite. In our secular and ecumenical time, no such drive unifies contemporary art. Nor should it. However, I hope that this comparison sheds light on a certain utopian potential of contemporary art. Within an information-capitalist society, there is little room or time for the infinite. It gets crowded out by ceaseless flows of information, covered over by the *pixel skin of consumerist society*, supplanted by fake infinities that pretend to stand in for it. Yet people living in this crowded desert of information and capital, perhaps especially people who do not have the solace of religion, have a thirst for the infinite. So I am hoping that the inspiring example of Islamic art will show that an *immanent Infinite* is imaginable in contemporary society, and that contemporary works of computer-based art may point toward this infinity. I know this is a very grand claim, which may well not be borne out either by contemporary artwork or by the desires most people bring to it, but the immanent nature of this infinity means that it will be there when we finally feel like looking for it.

One goal of this research is to underline connections, to show the Islamic roots of modern abstract art, which find a certain flowering in computer-based art. Another goal is to allow the history of Islamic art, and the Islamic philosophy, theology, and science that accompany it, to pose questions to new media art.

There are presently about eight tendencies that I posit are shared by Islamic art and computer-based art. In this article I explicate one of these common tendencies, namely an emphasis on performativity rather than representation. In both Islamic art and computer art, the work of art plays out in time. This can occur in the carrying out of algorithms or the attentive recognition of observers, or both. Here we will see this performativity in terms of the relationship between point and line.

In "Point and Line to Plane," Wassily Kandinsky suggested that the line itself is invisible; it is "the trail left by the point in motion…. It comes about through movement – indeed, by destroying the ultimately self-contained repose of the point."[2] This is a line that destroys as it creates; it is a time-based line that has no existence independent of movement. In figurative art, the line serves representation or depiction, such as when it is a contour that defines a figure. The line Kandinsky describes is a line that is free to be itself and to become; it is what Deleuze and Guattari call an abstract line. We see the freedom of the abstract line in modern painting such as work by Kandinsky and Paul Klee. Here the line is in dynamic tension between figuration and becoming, between concrete and abstract. Klee himself spoke of taking a line for a walk, and in his works the lines do indeed stretch their legs and test their powers. The poet Michaux writes that never before Klee had a line been allowed to dream, to be a line for the pleasure of being a line. In fact the abstract line had been permitted to dream quite extravagantly long before it returned to European painting.

Computer media historian Claus Pias suggests that the lively and destructive line of which Kandinsky wrote points forward to the vector of computer graphics.[3] Here is the incarnation in phosphorus of Kandinsky's principle – a line that has only a momentary existence as a connection between points. In vector graphics the line emanating from the center of the monitor is actually a moving point that leaves behind it a trail of light as it connects one point to another. Vector graphics are still used in oscilloscope and radar, those wonderfully analog screen-based media. Vector graphics can draw quickly in real time with very little data, making them ideal for early computer arcade games.

The line of vector graphics, which is drawn as a vector from the center of the screen, is actually a moving point that leaves behind it a trail of light as it connects one point to another. It exists as a momentary leap between programmed points. It doesn't have independent existence. The living-dying line of vector graphics is taken up poetically by film scholar Sean Cubitt, who

defines the vector generally as "any quantity that has magnitude and direction" and specifically as a line that describes not being but becoming, not identity but mobile relationship.[4] The television disciplined the vector into the raster, drawing the electron beam across the screen into 525 parallel lines (NTSC). The digital screen replaces even this time-based act of drawing with the mosaic-like array of pixels. Vector graphics are still used in 3-D animation software like Flash, which relies on their speed and economy to draw contours in real time. Elsewhere, vector graphics have been mostly surpassed by the pixel-based screen.

Both Pias and Cubitt note with regret the subsumption of the vector to the bit map, the realtime drawing on the computer screen by the discrete sample. Cubitt's film theory sees the vector as a principle of narrative, which invents the future in a universe that is ultimately open. At the level of narrative, its obsolescence is tragic, as the vector's principle of becoming gives way to the fixed universe of what he calls neo-baroque cinema.[5] Similarly, Pias, the modernist scholar of computer media, finds it a shame that the transparency of the vector-based screen, which allows us to see how it builds its image, has given way to the opacity of the pixel-based screen, which obscures the image's origins in machine and software. In the vector was movement and connection; in the pixel, connections are hidden, and movement stops.

Pias's genealogy from Kandinsky to vector graphics points forward from modern art to computer media. One can also follow this genealogy backward. Where in history do we find nonfigurative works of art whose lines suggest free movement, self-direction, and fearless becoming? Deleuze and Guattari look for the abstract line in art that does not tame the line into a contour:

> Whereas the rectilinear (or 'regularly' rounded) Egyptian line is negatively motivated by anxiety in the face of all that passes, flows, or varies,… the nomad line is abstract in an entirely different sense, precisely because it has a multiple orientation and passes *between* points, figures, and contours: it is positively motivated by the smooth space it draws, not by any striation it might perform to ward off anxiety and subordinate the smooth.[6]

Deleuze and Guattari, following the art historian Wilhelm Wörringer, find the abstract line in Gothic art, and also in nomad art and children's art. But the unsubordinated, lively line is also moving in Islamic art as early as the 9th century. Here, I'm suggesting, is one of the deep roots of the vector. Needless to say, the aniconism of Islamic art, in other words, its tendency to avoid

figurative representation, is a healthy environment for abstraction, or at least for lines to be free not to depict. In Islamic art, the fleeting, immaterial nature of the line and the sense of the point pulling it along in a trajectory arrive to us inscribed in stone, stucco, ceramic, and on paper. Looking at Islamic art compels me to redefine the vector as *the power of signification that propels a sign to have meaning for a certain receiver.* Islamic art is performative in that its vector, though supposedly coming from the divine to the human, is nonetheless activated by the human receiver.

While my focus remains primarily on the vector-like qualities of Islamic calligraphy, I want to draw your attention to one of the origins of the free and lively line of Islamic art. I will just note that both writing and curvilinear patterns function in very similar ways in much of Islamic art: as ornament that performs the meaning of a space. A typically Islamic form, the so-called "Third Samarra Style," erupted in Iraq during the Abbasid caliphate sometime in the 9th century. In this decoration, the plant forms of Byzantine and other prototypes were abstracted and flowed together in an endless metamorphosis. This style developed in Mesopotamia and spread like wildfire to everywhere but Spain, which kept Umayyad vegetal style.[7]

Made of stucco, the Third Samarra Style shows the sure and sweeping movements of the craftsman, working while the material was still wet. (These pieces were pried off the walls of a palace in Samarra, Iraq, and carted off to the Pergamonmuseum in Berlin, where they now reside.) Art historians fall over themselves to qualify this style as the origin of the *arabesque* and other kinds of overall ornament in Islamic art. In the arabesque, the line multiplies,

Third Samarra style

branches, and doubles back on itself until it takes on an additional dimension: fractal-style. It almost becomes a plane. It gives the eye freedom to roam in all directions.

Calligraphy, or beautiful writing, has the qualities of abstract line at the same time that it signifies words. Calligraphy is the most privileged form of decoration in Islamic art. Art historian Oleg Grabar writes of ornament – those signs that seem to mean nothing in themselves – that it has a performative function in marking the entry to a different space, for example the ritual space of the mosque.[8] Grabar writes that in Islam, life is considered impermanent and appearances cannot be trusted; hence what holds the community together

is language, spoken or written, as it is the intermediary of prayer.[9] Thus Islamic calligraphy can be considered the visible, living line of a community of faith – the vector that holds the community in a relation with God.

It is not a surprise to find one of the most compelling descriptions of the performativity of the vector halfway between iconophilic Europe and the aniconic Islamic world, in Byzantine art. The Emperor Constantine V (reign 741-75) denounced images as impious because they are *composed of lines, and hence finite*: "If the icon draws the figure of the divine, it encloses the infinite within its line, which is impossible."[10]

Constantine's astonishing decree might justify Islamic aniconism, for Islamic disapproval of making figural representations of divine beings also expresses a kind of artist's modesty in the face of the infinite. But, as Marie-Josée Mondzain writes in her magisterial study of the Byzantine icon, Eastern Christian religious icons were defended against Constantine's iconoclasm insofar as they were not discrete images (thus subject to idolatry) but vectors that derive their meaning from the *directionality* of divine intention, performed by the worshipping viewer. The icon was saved by those who could argue that it is empty in itself, that it derives its meaning from the *directionality* of divine intention, performed by the worshipping viewer – in other words, the icon is not an image, but a *vector*. The icon, Mondzain writes, "made in the image of [the 'natural image' of Christ, will no longer be expressive, signifying, or referential. It will not be inscribed within the space of a gap, but will *incarnate withdrawal itself.*"[11] By this description, the religious icon is not an image in itself but a compulsion that draws the worshipper to gaze into its absence, thereby enjoining the presence of God. It pulls the worshipper's gaze beyond it, toward the divine.

Calligraphy and other kinds of abstract Islamic ornament also have this vector-like quality that pulls the worshipper toward the divine as though toward a magnet. Writing the Qur'an is a form of prayer, as it is repeating in time the words spoken by God. The calligrapher, writes contemporary calligrapher Abdel Ghani Alani, must be both present and absent, as though daydreaming; as though the "energy" that motivates the writing moves both from beyond the calligrapher and through him or her. This writing, Alani suggests, indexes the body of the calligrapher: "The letter takes the form and movement of the body that realizes it, such that what one writes becomes, as for the painter, a self-portrait."[12] The rhythm of writing, Alani writes, is informed by the calligrapher's *breath*: in the drawing of a line, breath is suspended, "between life and
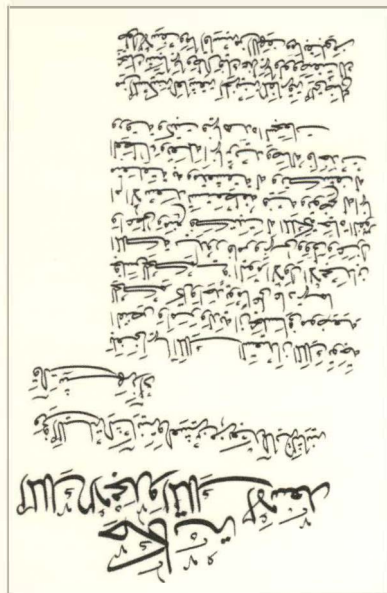
death."[13] So the latent rhythm of calligraphy is accompanied by the movement and breath of the calligrapher, not only in him- or herself but in relation to the divine source. (Some Muslims consider Alani's comments unorthodox or an inappropriate assertion of the self in the act of prayer.)

In calligraphy, is the line abstract? Is it not in the service of language and required to defer to language's need to communicate? Deleuze and Guattari considered writing to be a disciplining of the line[14]; I would say, it's not only or not necessarily that. Insofar as writing embodies the breath of the writer, as Alani describes, it is not a fixed symbol but the trace of a performative act. In other words, Islamic art is performative in that its vector, though supposedly coming from the divine to the human, is nonetheless activated by the human receiver.

We will see below what happens to the performing line when writing is systematized.

Fixing the point

In the ninth century the Abbasid caliphate, like other burgeoning bureaucracies, needed an efficient and legible script in which to keep its documents in order. Ibn Muqla (885-939), geometer and vizier to the Abbasid court in Baghdad, created a standardized, proportioned Arabic writing based on geometry (*al-khatt am-mansub* or "proportioned writing"). This standardization was based on multiples of the smallest mark, namely the cross-section of a reed pen, as a point. This point becomes the basis of all other measurement. It is square or a rhombus.

In Ibn Muqla's systematized calligraphy, the straight line is defined as the trace that springs from a point, the source of curved lines being *noqtat*, the center of a circle.[15] The line springs from the point, yet can also be considered a series of points. If the point is the mother of letters, the line (alif) is the father[16] – less because of the alif's verticality than because,

Islamic calligraphy

rotated to form a circle, it describes the field of all possible letters in Ibn Muqla's standardization of writing. Arabic writing shows well the line latent in any point, the line being, in essence, a point drawn out or acted upon in time. But in systematized writing, the point is as small as we can go.

Meanwhile, Islamic philosophers in Iraq in the 9th and 10th centuries were attempting to account for the smallest elements of matter, i.e. atoms, arguing that matter, space, time, and motion were all composed of indivisible minimal parts. The *kalam* atomists critiqued the versions they received of Greek atomism, reframing it in a theistic cosmology. They hotly debated whether atoms had magnitude and extension, generally concluding, following Epicurus's doctrine of minimal parts, in the affirmative. At the turn of the 9th century, Ibn Mattawayah of Basra argued that atoms measure space by occupying it, and that they are not triangular or round, but square.[17] The smallest possible line is made of two atoms; the smallest possible surface holds four; and three-dimensional space is filled by 8 atoms.[18]

In the 9th century, atomism reigned, not just across writing and philosophy buy also theology, fueling fiery debates. When God sustains the universe, went the argument of the radical atomist Al-Baqillani, He sustains it one atom at a time, one motion at a time, with the command "Kun!" – Be! Or not. Evidently the atomist philosophers held a radical perspective on performativity: if nothing can be counted on to endure, continued existence must indeed be performative; furthermore, its continuity is not due to some internal power but to divine grace.

The parallel concepts of square points in calligraphy and square atoms in philosophy raises specific questions concerning the existence of the square in time. We may wonder, for example, whether the form extends internally? But in the discrete worlds of standardized Islamic calligraphy and Islamic atomism, these questions are no longer posable. Standardization stops at the point; in fact, it is notable that the Arabic term for standardization is *muqaf,* to fix or stop. There is infinite extension outward from the minimal part, and an infinite possibility of embodied movement latent in the still point. No need to look for internal infinities – for the moment. Let us agree for now that minimal parts are indivisible and see what their doctrine might say to digital media.

Atomism translates well to the digital world. There is no question (is there?) that computers work with discrete, minimal parts: the on and off signals, the bit and byte of information. We may ignore for the moment that in a

transistor-based digital computer each "on" signal represents a hurtling mass of hundreds of thousands of electrons, each "off" signal a relative dearth of electrons). The pixel is the visual minimal part that corresponds to a minimal part (actually a byte) of information. There's no inside to the pixel.

However, time and infinity are implicit in the point or pixel because it is capable of drawing infinite iterations. This is beautifully illustrated in the classic computer-based work *Every Icon* (1997) by John F. Simon Jr.[19]

In *Every Icon*, a near infinity of forms arises from an algorithm describing the action of 32x32 pixels over an unfathomably long time. Simon calculates that the second line would take 5.85 billion years to iterate all its possible variations. This modest-seeming artwork brings us into contact with infinity, or certainly with an awesomely long time, which in turn puts both our lives and planet into humbling perspective.

If rhythm is connected to body and breath, then the temporality of computer media does not have a rhythm; or at best its rhythm is the perfectly regular beat of some internal timer. What comes along to shape and punctuate its
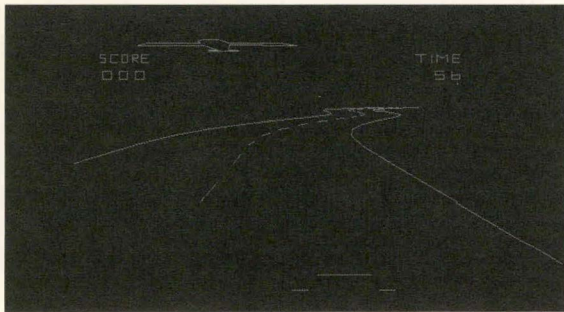
Speed Freak: early vector-based video game

tedious journey into the infinite? Only the materiality of software, hardware, programmers; only the imaginative effort of humans to compare numeric infinity with our own finiteness. The rhythm of computers seems to be measured by the giant On/Off of mortality. It is the human interventions that instill "breath" into software. While the latent rhythm of Islamic art, here in the privileged example of calligraphy, is doubly rhythmed by the body of the artist and the (divine) breath from beyond.

Yet some works of new media make manifest the latent movement of calligraphy, the breath that pulls the writing, vector-like, toward the goal of becoming. Animation, video, and new media, allow calligraphy to reveals its hidden inner life. For example, in Mounir Fatmi's video *Alphabet Rouge*, in which calligraphy spins and transforms, unfolding new forms.

The inspiring example of Islamic art shows that an *immanent Infinite* is imaginable in contemporary society, and that contemporary works of computer-based art point toward this infinity.

NOTES

[1] Henri Michaux, "Aventures de lignes," on the art of Paul Klee in *Oeuvres Complètes* (Paris: Gallimard, 2001), 362.

[2] Kandinsky, quoted in Claus Pias, "Point and Line to Raster – On the Genealogy of Computer Graphics," in *Ornament and Abstraction*, ed. Marcus Bröderlin (Basel: Fondation Beyeler, 2001), 64-69.

[3] Pias' point is that vector graphics are the true modern art, being a direct effect of the action of the medium, while pixel-based images are tired old naturalistic illusionism (68).

[4] Sean Cubitt, *The Cinema Effect* (Cambridge: MIT Press, 2005), 70-71.

[5] Ibid., 249.

[6] Gilles Deleuze and Félix Guattari, "1440: The Smooth and the Striated," in *A Thousand Plateaus: Capitalism and Schizophrenia*, trans. Brian Massumi (Minneapolis: U of Minnesota, 1987), 496-97.

[7] Baer, 7-10. Gülrü Necipoglu likens it to "primordial matter" in *The Topkapi Scroll: Geometry and Ornament in Islamic Architecture* (Santa Monica: Getty Center for the History of Art and Architecture in the Humanities, 1995), 96.

[8] Oleg Grabar, *The Mediation of Ornament* (Princeton UP, 1992), 103 and passim.

[9] Ibid., 111.

[10] Constantine V, quoted in Marie-Josée Mondzain, *Image, Icon, Economy: The Byzantine Origins of the Contemporary Imaginary*, trans. Rico Franses (Palo Alto: Stanford UP, 2004), 73.

[11] Mondzain, 80-81, my emphasis.

[12] Abdel Ghani Alani, *L'Écriture de l'écriture: Traité de calligraphie arabo-musulmane* (Paris: Dervy, 2002), 18; my translation.

[13] Ibid., 50.

[14] Deleuze and Guattari, 497.

[15] Alani, 68.

[16] Ibid., 70.

[17] Alnoor Dhahani, *The Physical Theory of Kalam: Atoms, Space, and Void in Basrian Mu'tazili Cosmology* (Leiden: E.J. Brill, 1994), 95.

[18] The atomists of Baghdad and Basra disagreed on whether atoms fill all space. The Baghdad view was that space is a two-dimensional container that envelops bodies like a skin; they generally argued, following Aristotle and his Greek commentators, that there is no void and that nature abhors a vacuum. The Basrian kalam philosophers, among them Ibn Mattawayah, argued that space is a three-dimensional expanse of void (Dhanani 67-68). Their debates are similar to the Greeks, who did not distinguish between physical and geometric space; hence Epicurus rejected Euclidean geometry because he could not support the Euclidean hypothesis of infinite divisibility (Dhanani 103).

[19] http://www.numeral.com/appletsoftware/eicon.html