

Genetic Algorithms, Caucasian Carpets, and *Kunstwollen*

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Long ago in the primordial soup, there were no separate species. According to biologist Carl Woese, "Life was then a community of cells of various kinds, sharing their genetic information so that clever chemical tricks and catalytic processes invented by one creature could be inherited by all of them."¹ A biological golden age, it ended when organisms ceased to share information and began to evolve separately: the introduction of species.

This privatization of genetic information, as Freeman Dyson puts it, resulted over two or three billion years in the universe of evolved species, from which *Homo sapiens* developed and over which it now presides. Our anthropocentric art practices celebrate the zenith of evolution in humanity – as why should they not? They treat with dread the monster, the hybrid, and the unclassifiable, from the grotesque figures of the Baroque to the pod people of twentieth-century science fiction.

I think of that soupy golden age as motivated by a genetic *Kunstwollen*, Aloïs Riegl's term for art's desire to grow and transform,² as form traveled freely among organisms without regard for their nature. Following Riegl, I attribute continuity and autonomy to plastic form in art, and am most fascinated by those circumstances in which new forms arise. Riegl loved by cultural contact, and the *Kunstwollen* concept respects the ways form transforms as it travels between cultures.

Artificial life has found its way into art – or, *back* into art. Presently many artists are working with genetic algorithms to produce art forms that grow, mutate, resolve into new configurations. These artworks have a deep historical precedent in the evolving forms of Islamic art. The nonfigurative patterns of Islamic art have an algorithmic liveliness that prefigures artificial life. I believe it was this implicit life and movement of abstraction that attracted Western artists to Islamic images. Qualities of nonorganic life, self-organization or autopoiesis are one of the

provocative commonalities between new media art and much Islamic art:³ Fixed though they are, Islamic artworks in many media exemplify the generative processes that contemporary algorithmic art carries out in time. Riegl found the most lively expressions of *Kunstwollen* to arise in the decorative arts, relatively free, as they are, from concerns with figural representation. Thus the two “low” forms examined here, carpet weaving and computer art, are prime loci for their cultures’ expression of the will of art.

This essay will look at two examples of these forms: contemporary software-based generative artworks, and the so-called dragon carpets produced in the Caucasus in the seventeenth and eighteenth centuries. I will show how the lively patterns on these and other Islamic carpets infected a solidly figurative Western art form, the Dutch genre painting of the seventeenth century, in a prefiguration of the Islamic influences on contemporary algorithmic artworks. Dutch painters’ engagement with Islamic carpets is *Kunstwollen* in action – form itself traveling from one culture to another, through the desiring looks and inventive hands of painters. I suggest that the Islamic influence on 17th-century Dutch art was one of the first bursts of algorithmic, non-figurative expression that slowly led European art to abandon figuration, and in turn to release the living, performative qualities that are typical of contemporary computer-based art. Indeed, carpets and painting have proto-qualities of artificial life, even though their movement occurs not in software but in the mind of the beholder. Needless to say, this argument is speculative. Yet to look at an earlier example of art whose motifs evolved independently of figurative representation, namely carpets, sheds an interesting light on the contemporary evolution of form in computer-based art. Moreover, the way carpets inspired artists as they traveled westward hints that Islamic non-representational aesthetics began to infiltrate European art long before the latter embraced abstraction.

Genetic art now

Art based on genetic algorithms is comparable to the act of gardening, in that the artist uses a computer program to seed the field, then decides which of the lifelike forms shall be culled, which grown.⁴ The resulting forms hover somewhere between animal, vegetable, and mineral. But how does an artist decide which forms to grow?

Mitchell Whitelaw defines the genetic algorithm as a digital simulation of biological genetics. A string of code is the genotype that generates phenotypes, whose variations are programmed. “Breeding” is rapid and prolific, and some process intervenes to determine which forms shall be selected to evolve further.⁵ Even before Whitelaw used these terms, new media artist Gary R. Greenfield suggested that

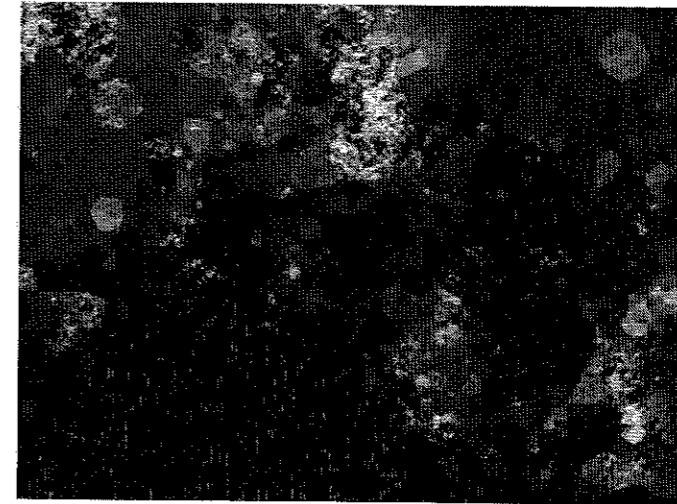


Fig. 1: Screen grab, *Ima Traveller* (1999) by Erwin Driessens and Maria Verstappen. [Courtesy of the artists]

the basic algorithm provides the genotype, which the artist genetically modifies to produce and refine the corresponding images or phenotypes.⁶ Greenfield, who has written thoughtfully on the creative process in software-based art, emphasizes that nurturing these forms is a subjective, imaginative process: hence he prefers the term “art by choice” to genetic art or AL art.

Like Whitelaw, Greenfield adapts Richard Dawkins’ concept of “fitness aesthetics,” whereby the artist applies some criterion that determines which genotypes will evolve. Greenfield calls this process “user-guided evolution,” and stresses that it takes years of work to develop a deep and creative understanding of his algorithms’ capacities and learn to discriminate among their progeny. This slow, patient, manual process relies at key points on the artist’s unconscious: “My subconscious makes the choices until I can gain a foothold, as it were, in image space.”⁷ In emphasizing the unconscious aspects of his practice, Greenfield (as his name suggests, a gardener of the mind) seems to conjure the concept of *Kunstwollen*; in the patience of his labors, he, like so many artist-programmers, resembles a carpet weaver.

Of the many fascinating examples of genetic software art, Erwin Driessens and Maria Verstappen have made some that are especially carpet-like in appearance and activity.⁸ Their *Ima Traveller* (1996), an early and beautiful example of genetic software art, generates a colorful visual field that seems to expand infinitely in any direction the user looks, including infinitely into depth (fig. 1). Zooming along the surface of *Ima Traveller* is like gazing into the vast, colorful field of a carpet, where new variations seem always ready to appear to the eyes. It unfolds before your eyes



Fig. 2: Installation view, *Eau de jardin* (2004) by Christa Sommerer & Laurent Mignonneau. Interactive computer installation developed for the HOUSE-OF-SHISEIDO, Tokyo. [Courtesy of the artists]

in real time, just as a carpet reveals yet more fascinating details to the attentive beholder. Like a carpet, *Ima Traveller* closes the difference between vision and touch, in a haptic image. The experience is disorienting and, for some, nauseating, as one gets lost in the space's uncertain orientation and depth. Driessens and Verstappen's *E-Volver* (2006) is genetic software that produces an ever-changing, moving image and reacts to the interventions of a human actor. Like a carpet growing under the hands of a weaver, *E-Volver* grows according to a code whose variations are directed by human aesthetic choices.

Many carpets, we will see, derive from plant-like forms, and such forms thrive in the work of Laurent Mignonneau and Christa Sommerer. These artists design interactive systems that incorporate the actions of users to create self-generating software and the images that result. "From analyzing principles of nature, such as the emergence of life, the emergence of order and complexity, and the dynamics of interactions, we were inspired to create artificial systems that model some of these processes."⁹ Their artworks "change, adapt, and diversify according to their environmental input parameters."¹⁰ What results from this kind of genetic experimentation is monsters, that is, unrecognizable new creatures whose birth and constant mutation we, the visitors, witness and contribute to. Visually, some of the forms generated are a hybrid of seaweed-like plants and the old Windows "pipes" screensaver. Performatively, their

works enact a delicate synthesis of participant gestures and algorithmic response. For example, *Eau de Jardin* (2004) brings to life ferns and creeping ivy, refracted as though by water, onscreen when viewers touch real plants in the gallery (fig. 2). Participating in this work is like attentively following the growth of flowers and tendrils in a carpet, bringing them to life under your eyes – just as Riegl did for years in his work as a curator of textiles.

Artists and writers commonly characterize artificial-life art as "emergent," meaning that it gives rise to forms or activities that cannot be predicted from its component parts (Whitelaw, 2009). Emergence arose as an important concept for artificial life in the 1980s, as in Christopher Langton's explanation:

"Natural life emerges out of the organized interactions of a great number of nonliving molecules, with no global controller responsible for the behavior of every part. Rather, every part is a behavior itself, and life is the behavior that emerges from out of all of the local interactions among individual emergent behaviors. It is this bottom-up, distributed, local determination of behavior that AL employs in its primary methodological approach to the generation of lifelike behaviors."¹¹

Genetic art in the seventeenth century: Caucasian carpets

Let us shift our attention to an earlier sort of genetic artwork: the carpets of the Caucasus. The Caucasus is a primordial soup for hybrids and mutations. It is a multi-ethnic, multi-religious region, home to scores of languages. The southern Caucasus, present-day Azerbaijan, Armenia, Georgia, and Daghestan, formerly comprised the northern regions of the Safavid Persian empire: the provinces of Karabagh, Moghan, Shirvan, Daghestan, and Georgia. It is a mountainous region, difficult to traverse, yet crossed by trade routes from Persia, Anatolia, the Persian Gulf, India, China, and Russia. Shi'i, Sunni, Armenian, Orthodox, Jewish, and pagan religions coexisted there. Though a crossroads, the Caucasus was, compared to the power centers of Iran and the Ottoman Empire, marginal, provincial, unofficial.

Emergent life entirely characterizes carpets made in this region. "There is not much evidence of inspired originality in Caucasian patterns," May Beattie writes dismissively, "but it is apparent that the weavers reaped a rich harvest of designs from the traffic of adjacent trade-routes."¹² She laments that Caucasian rugs "render graceful curvilinear designs in an angular provincial style." Friedrich Spuhler finds them "clumsy and coarse"; Richard Ettinghausen notes the "weird stylization of their animal patterns."¹³

Where some scholars dislike the strange genetically engineered creatures of the Caucasus, others defend them in the same terms. Kurt Erdmann notes, "The digestive power of the Caucasus is amazingly strong. ... It is as if the unfamiliar forms are plunged into a bath from which they emerge again in Caucasian styling."¹⁴ Reinhard Hubel notes, "The Caucasus region was always open to new ideas; the result is always Caucasian even when the models are apparent. ... Thus it seems unjustifiable to speak of 'bastard carpets.'¹⁵ And some people are powerfully touched by the energy the carpets seem to release when (to mix metaphors) they smash their nuclei together. The collector Joseph V. McMullan calls the dragon carpets "the most exciting rugs ever made" and, pulling no punches, "the most energetic form of decoration ever placed within the confines of a woven fabric." He continues, "In the entire field of textile design it would be difficult to find anything that matches the extraordinary display of controlled power exhibited in the so-called 'dragon' rugs of the Caucasus."¹⁶ Arthur Upham Pope, driven into a primitivist frenzy by the carpets' life force, wrote in 1926 of the Chicago dragon carpet: "Such austerity, such seizing power, such robust yet harmonious color, such forceful silhouettes are hardly to be found in any known textile. ... It is as if the vast grandeur and savage contours of the Caucasus Mountains were transmuted directly into the design, distilled and concentrated by virile and objective minds. We who come after can but observe and describe!"¹⁷ The *Kunstwollen* of Caucasian carpets seems to leap from the carpets to the minds of writers contemplating them; or at least it did so before art historians codified the terminology.

These accounts respond to Caucasian carpets' angular yet biomorphic shapes, which, though unclassifiable, are so insistently detailed they seem to index *something*. Some motifs look a bit like animals but are missing heads and had extra legs; some of the bunched shapes might be flower buds; the angular twisting tendrils seem rather like the tentacles of some deep-sea creature – drawn with an Etch-a-Sketch. Caucasian carpets are full of a life force, liberated from the confines of definable forms. Animal, vegetable, *and* mineral, their energetic disrespect for differences among life forms recalls the genetic free market of primordial life.

Genetic mutation in Caucasian carpets

Many people consider the carpets produced for the Safavid courts in sixteenth- and seventeenth-century Iran to be the height of refinement of the textile art (fig. 3). With exceptionally high thread counts and other techniques making for high-resolution images, they combine motifs of animals in combat, especially the Chinese dragon and phoenix, hunters, vines, flowers, and architectural fantasies.¹⁸ These mo-

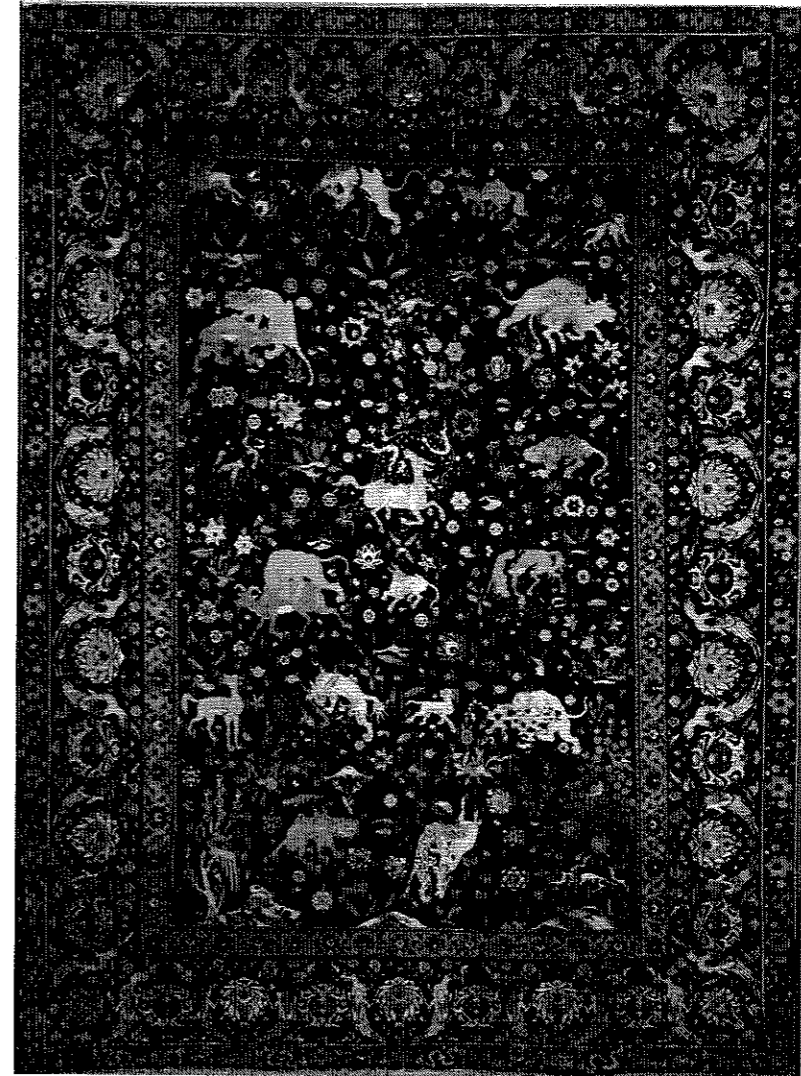


Fig. 3: Animal carpet, Kashan, Iran, second half of 16th century. [Metropolitan Museum of Art]

tifs, particularly the animal combats, were taken up and transformed in the Caucasus, evolving into fantastical forms.

Where Iranian carpets have curvilinear designs, Caucasian carpets are more angular. This is partly for technical reasons. The symmetrical or Gördes knot used in Turkish and Caucasian carpets gives motifs a more angular form than the asymmetrical or Persian knot; it also emphasizes the matrix of the carpet. Lower knot densities than those in Safavid carpets, and the use of wool rather than silk,

also lend themselves to more geometric forms.¹⁹ Yetkin notes simply, "We can not criticize Caucasian carpets for being coarser than Iranian; this is part of a profound difference in style between the two groups of carpets."²⁰

The abstraction of the Caucasian carpets cannot be explained as primitivism. These large and complex rugs are not nomad or village products but must have been produced in urban workshops organized by Caucasian independent khanates, along the lines of Safavid workshops.²¹ Erdmann argues the carpets must have been woven from cartoons because of "painstakingly studied composition."²² Two recombinant forces were at work: those of the designers, who drew cartoons based on their knowledge and imagination; and those of the weavers, who adapted the cartoons. Indeed most carpets are woven from drawings, not knot plans that would specify the number of knots. This gives weavers more freedom and responsibility and allows the pattern to "drift."²³ They are copies of copies of copies, with no slavish attitude toward the original. The same occurs in Persian carpets when weavers copy a rug design from another rug, or when a style "trickles down" from the court, to the wealthy elite, to clients of less means, and finally to village copies. Drift and "bit rot" (to borrow William Gibson's term) transform the designs; they lose detail and become distorted and more angular.²⁴

Animal combat motifs have a long history in Asia Minor, whence they traveled to Anatolia, Persia, and the Caucasus. The dragon and phoenix motif traveled west from China at least twice.²⁵ After the Mongol invasions of Islamic lands in the mid-thirteenth century, Chinese motifs traveled westward. Turkoman tribes, then Persian weavers, adapted them in the fourteenth and fifteenth centuries.²⁶ Anatolian carpets from the fifteenth century featured the dragon and phoenix, circling each other in combat,²⁷ as in a famous fragment at the Pergamonmuseum in Berlin. Already highly geometricized, the creatures are barely recognizable, with spiky wings and tails, spiky tendrils, and diamond-shaped eyes. These carpets show up in Italian and Northern paintings of the fifteenth century.²⁸

The Chinese dragon, phoenix, and other fantastical creatures travel westward again, to Persia during the Mongol-influenced Ilkhanid and Timurid reigns. While the Chinese prototype is very long and sinuous, Safavid painters who designed the carpet patterns adapted the creature, making it a little shorter and less fluid. Among the exquisitely rendered animals in combat on the Kashan animal carpet woven in the second half of the sixteenth century, now at the Metropolitan Museum in New York, for example, a well-formed, large-eyed green dragon, with yellow spots and three visible tendrils, curves entirely around an ass and bites its neck. By the time dragons appear on early Caucasian carpets, such as the one in Berlin, they retain the spots, tendrils, bug eyes and twisting body of the Chinese-Persian dragon, but their bodies are angular abstractions.



Fig. 4: Dragon carpet, Caucasus, c. 1700.
[Pergamonmuseum, Berlin]

What is certain is that no Caucasian dragon ever looked like a dragon. As Ian Bennett observes, "There appears suddenly at the end of the 16th century a group of rugs which, even at their most sophisticated, are already in a state of compositional disintegration."²⁹ Like their Anatolian prototypes, the Caucasian dragons were stylized from the inception. The classical dragon carpet first appears at the end of the sixteenth century.³⁰ It is composed of several rows of lozenges, with dragons and

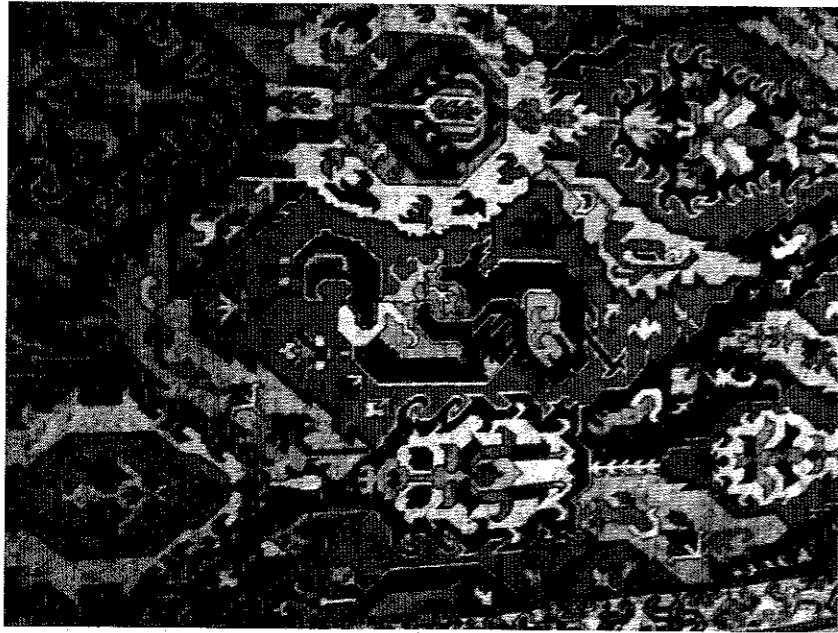


Fig. 5: Detail, dragon carpet, 18th century, Caucasus (probably Shusha, Karabagh province). [Philadelphia Museum of Art]

other vestigial beasts and flowers inside, divided by lancet leaves. Spotty creatures whose heads, looking backward, merge with their bodies and whose knobby legs seem to run in several directions, show up on the earliest known Caucasian Dragon carpet, known as the Graf carpet, which was found in a mosque in Damascus (it was taken to Berlin, where fires from the Allied bombing destroyed it in 1945) (fig. 4). Sometimes the dragon battles with an equally abstracted phoenix; sometimes it romps alone; sometimes it is hard to tell. In the large and colorful dragon carpet from the Caucasus, c. 1700, at the Pergamonmuseum in Berlin, you see a jaggedly curvilinear, grass-green form sprinkled with small colored diamond shapes, crossed at angles by irregular, forking bands of red, yellow, and white, and sprouting a gridlike green “tail” (fig. 5). Spuhler, the curator of the museum from 1968 to 1985, writes in the catalogue that in some of the lozenge forms on the carpet “we again *encounter* the S-curved creature, with a spotted body and flaming clouds in contrasting shades, which we interpret as a dragon. It is a problem to try and decide on which side to look for the head.”³¹ His term “*encounter*” emphasizes that there is indeed something bracing about confronting a creature that defies categorization. There’s even a question of whether the motif is just a dragon, or a dragon incorporating what’s left of a phoenix.³²

One of the forces toward abstraction in these carpets is the Sunni Muslim disapproval of figurative representation. Animals continued to gambol on Persian carpets in the relatively permissive atmosphere of Shi’i Islam, to which the first Safavid Shah, Isma’il, converted when he was quite young, around 1499.³³ But after the Ottomans defeated the Seljuks in 1402, animal motifs vanished from Anatolian carpets.³⁴ Given that many Caucasian carpets were found in Sunni mosques in present-day Turkey, it is reasonable to conclude that the animal motifs “went underground” in order for the carpets to be acceptable to Sunni religious clients. So the carpet makers disguised the dragons and other creatures in abstracted and rarefied forms.

Over time the dragon figures morph from stylized animals, to flowers on tendrils, to a hard zigzag inside a box.³⁵ As the animals become vestigial they start to resemble flowers on complicated tendrils.³⁶ On some examples, the dragon’s round eyes float free of its body and cluster together like flower petals. Elsewhere the dragons get more boxy and compressed: Yetkin notes that the dragons on the famous carpet at the Pergamonmuseum, and others, “resemble devices on a heraldic shield.”³⁷ By the eighteenth century, the dragons evolve into no more than a zigzag, or “meander”, boxy head, and some spikes, contained inside a shieldlike box.³⁸ It’s as though the creature has been concentrated down to its own DNA. Similarly, animal combats resolved (back?) into yin-yang-like motifs, a dark and a light shape curling around each other.³⁹ In short, like a seventeenth-century Monsanto, the carpet industry transferred animal DNA to plants.

Caucasian carpets are the vigorous product of intercultural adaptation. It seems to me that designers and weavers are more likely to approximate the rhythm of received designs, rather than the connotations. Even when the animals are abstracted, the “energy” of a dragon-phoenix battle remains in the spiky, muscular intertwined forms.⁴⁰ What the Caucasian carpets have is the power to evolve and transform, independent of the organisms – trees, flowers, dragons – that give rise to them. Some Caucasian motifs seem to have begun as animals and evolved into plant forms, while others began as plants and evolved into animals, as when flowers become birds, in a fascinating phenomenon of becoming-figural. Hence the vigor that impresses some writers, and the uncanniness that worries others (I am in both groups): it’s a life force that (in Deleuze and Guattari’s terms) operates at the molecular level, while we remain at the molar! And of course that’s what they have in common with the unnerving liveliness of computer-generated nonorganic life.

Like genetic software artists, carpet designers and weavers have several ways to quasi-genetically modify received motifs. A method Greenfield notes, “using image-compression techniques to accelerate the breeding cycle,” aptly describes the way motifs are approximated, especially if the new carpet has a lower thread count than

the original, as was the case with Caucasian carpets. Many Caucasian and related carpets literally compress received motifs. These carpets' designs remind me of genetic algorithms that produce thousands of new forms: some of these the programmer chooses to evolve further; others are left in that limbo of becoming-nonorganic-life, neither animal, vegetable, nor mineral.

Carpets' traveling *Kunstwollen*

Oriental carpets traveled westward as early as the thirteenth century. After the Fourth Crusade in 1204 Venetians began to bring Seljuk carpets back from Constantinople. "Westward" also implied an internal movement, as the Spanish conquerors of the Islamic caliphates and taifas absorbed the Andalusian Muslims' artistic techniques and retained Islamic converts as craftspeople. Upon her marriage to Edward II of England in 1255, Eleanor of Castile brought carpets with her, to the hilarity of Londoners.⁴¹ Carpets begin to appear in Renaissance painting in the mid-fourteenth century.⁴² The fifteenth-century Italian painters such as Gentile Bellini, Vittore Carpaccio, and Giovanni Mansueti depict Venetian parades in which small Anatolian carpets, probably prayer rugs, hang from every balcony.⁴³ The painters' careful attention to the carpets allows historians to identify them as Anatolian geometric and animal carpets.⁴⁴

By the early sixteenth century, well-established trade routes, across the Mediterranean and through the Balkans, brought carpets from Constantinople, Cairo, and Damascus to Venice, and thence across Europe, in huge numbers. A Transylvanian document of taxable goods that passed through the border town of Brasov in 1503 includes over 500 Anatolian carpets in an eight-month period.⁴⁵ In his trade negotiations with the Venetians, Cardinal Wolsey, minister to Henry VIII of England, extorted carpets as "gifts" to sweeten the deal: "from his time onward," Denny notes, "'Oriental rugs' appear repeatedly in connection with the rich and colorful Western tradition of political bribery."⁴⁶ From that point in time, carpets appear under the feet of Henry and other English royalty and nobility. Evidence suggests only a few dragon carpets made the move to Venice: the Berlin dragon carpet described earlier was found in a church on the Venetian island of Burano.⁴⁷ A portrait by English court painter William Larkin (active 1609–1619) features "a curious rug with animal-like motifs which seem to hark back to the dragon-and-phoenix rugs."⁴⁸

By the seventeenth century, the textile trade from the Orient to European countries was well established.⁴⁹ Carpets were still luxury goods, but being made to suit European markets, for example as covers for tables, footstools, and other European

furniture.⁵⁰ After 1680 the taste for Oriental carpets declined in France and regions cultivating French taste, not to return until the nineteenth-century Orientalists. But the interest in carpets persisted in Venice, as well as prosperous Holland.⁵¹

Anatolian, Caucasian, Persian, and Indian carpets show up in hundreds of Dutch genre paintings in the seventeenth century. Scholars account for these carpets as signs of conspicuous consumption and the exotic appeal of foreign goods.⁵² Portraits from this period emphasize the worldliness of their protagonists, as in Holbein's *The Ambassadors* (1533) and Van Dyck's (d. 1637) *Portrait of Lucas van Uffel*, with their globes and instruments of music and measurement. They showed Holland as the center of trade and the Dutch wealthy class on top of the world OK as is.

I think, however, that Oriental carpets were not only signs of wealth and cosmopolitanism but also sources of aesthetic inspiration. Evidently painters are advertising their skill in depicting the beautiful colors and complex patterns of Oriental carpets – whether to master, subsume, or translate their qualities. But it's also clear that the carpets exert different kinds of fascination for different artists. Sometimes the carpet is just a backdrop or incidental element that doesn't perform any special formal, stylistic, or metaphorical function. Sometimes the carpets are meticulously imitated in their materiality: the painter is equally attentive to the weave and the tufting as to the patterns. Sometimes the texture is not emphasized directly but it is metaphorized in a sense of thickness, lushness.

And in the most interesting cases, it seems quite clear that the carpet *expresses* in abstract form something that cannot be depicted iconographically. As in melodrama, the carpet functions as expressive *mise-en-scène*. Discussing a painting of 1604, David Sylvester notes this expressive dimension when he admiringly describes the role of a carpet covering a table over which French and Spanish diplomats hold a peace conference: "Spread out as a no-man's land between the opposing teams of great sly men of state, its bright geometry presents them with a paradigm of forthright statement, ingenious design, perfect organization and radiant harmony." The unknown painter, he observes, welcomed this aesthetic emissary: "that carpet is painted with a loving involvement that is a true exercise of art in celebration of another art."⁵³

Carpets often amplify an atmosphere of spiritual and intellectual contemplation. For example, in the *Portrait of Laura Pisani* from the Circle of Dosso Dossi (Italian, Ferrara, c. 1525, at the Getty Museum) the young woman is looking up from her writing, with a confident air. The carefully rendered Anatolian carpet covering her table suggests complexity that has been well-ordered, as though in a parallel to the successful writing process.

A fascinating painting, *The Philosopher in His Studio* by Abraham van der Hecken (Antwerp, ca. 1618–1656) from 1650 shows the familiar scene of a sage contemplating

the transience of life with the usual accessories of books, skull, and fading flowers, as well as the worldly globe. But far from contemplative, the philosopher seems overwhelmed and nonplussed by the gorgeous red-ground Mughal carpet, with rich floral ornament and a fat colorful border, whose folds tumble luxuriantly into the foreground. The flowers on the carpet are as big as the sage's little face and hands.⁵⁴ Van der Hencken often painted these beautiful carpets from Lahore, and he seems to be commenting, *Memento mori* be damned – let us enjoy the sensuous pleasures of the world!

Often a carpet will play up the eroticism of a scene. Many a genre painting of a courting couple, he perhaps proffering a pheasant or some other suggestive bird, she perhaps playing a musical instrument, smolders with the color, texture, and lush patterning of a carpet extravagantly draped on the table. Gabriel Metsu uses a rosy-colored rug, with positively labial folds, in more than one of his genre scenes of courting couples. These islands of color and pattern, while non-narrative, contribute to the emotion of inflamed desire that the depicted scene can only modestly indicate.

Sometimes the affect a carpet brings out is a pure curiosity, to see and to see differently, that seems to move both the painter's hand and the viewer's eye. The great variety of patterns invite curious looks. They test the point at which both painter and viewer lose interest (notably, this occurs right away in Rubens, who doesn't even look at the carpet's motifs but dabs in some Dutch-looking flowers).

My argument about carpets' affective dimension in paintings gains support from the anti-iconographical interpretations of art historians who argue that Dutch seventeenth-century painting is about painting itself, about the act of perception, and the painter's skill in transmitting experiences or "experiments" (Svetlana Alpers' term) in perception to the viewer.⁵⁵ Gazing upon the particular abstract patterns of Persian and Anatolian carpets entails an experiment in perception, in the tension between two and three dimensions and the dynamic relationships between figure and ground, and in the perceptual interest of abstraction itself. The patterns reward the curiosity of visual exploration. They establish a dynamic between optical and haptic, figurative and abstract.

Consider Thomas Keyser's *Portrait of Constantijn Huyghens* (1627) (fig. 6). The carpet draping the encumbered table seems to express the very thought processes of this dynamic man. Constantijn Huyghens, secretary and artistic advisor to Prince Frederick Henry of Orange, former ambassador to Venice and London, composer, musician, art writer, poet, well-informed about developments in science, especially optics, was a Northern Renaissance man. He had access to everything deemed worth having or knowing, and by all accounts he used this access well. His writings emphasize his curiosity, satisfaction, and fascination with the newly perfected optical

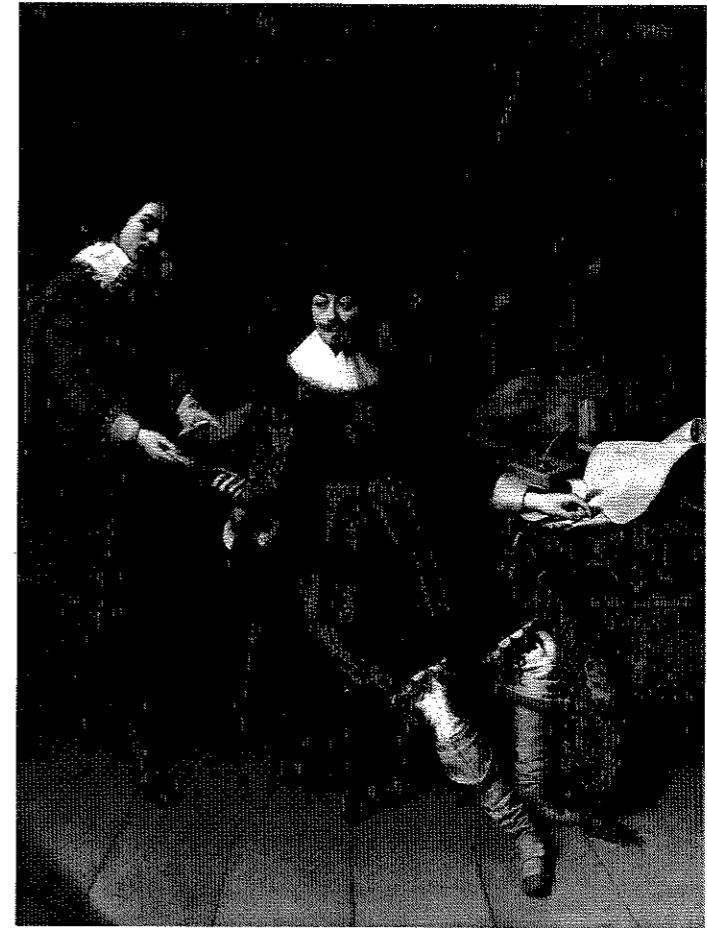


Fig. 6: *Portrait of Constantijn Huyghens and his (?) Clerk* (1627) by Thomas Keyser. [© The National Gallery, London]

instruments, the microscope built by Cornelis Drebbel, the telescope, and his own precious eyeglasses.⁵⁶

Huyghens is presented in movement, raising a hand to receive a letter from a servant. He faces the viewer but his arch-browed eyes look aside, making him appear very alert. On his desk are two globes, a lute-like *chittarone* (perhaps the instrument on which he performed for the king of France), books, pen and ink, and the plan and compass.

The painting is full of movement: Huyghens' and the clerk's gazes cross in front of him, activating the space visually, as do the bright white areas of collars and cuffs, stockings and paper. The globes and other objects, including the carpet, indicate international travel and trade. Huyghens' lively pose and our own knowledge of the

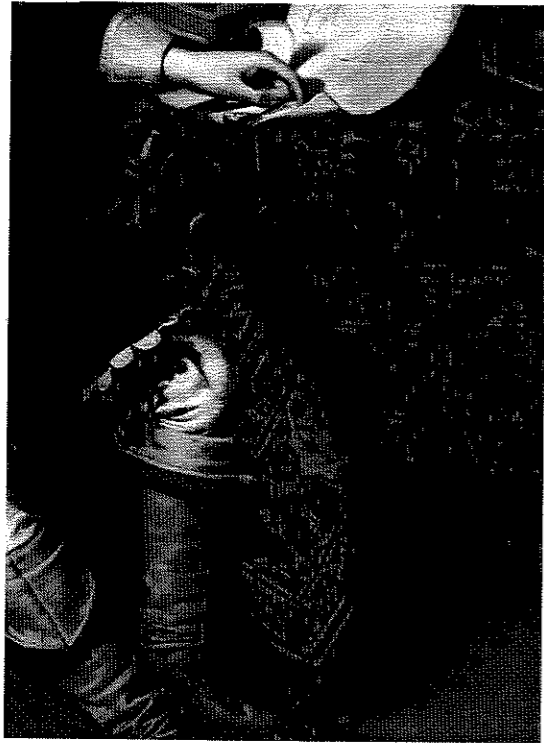


Fig. 7: Detail, *Portrait of Constantijn Huyghens* (1627) by Thomas Keyser. [© The National Gallery, London]

man's role of ambassador, his accomplishments, and his knowledge suggest his own travels, both geographic and intellectual. Yet finally it is the carpet that expresses the activity of the polymath's mind.

Keyser paints the carpet with great care, so that it is recognizable as a "Transylvanian" carpet;⁵⁷ many of which were imported to Europe in the seventeenth century (fig. 7). It is woven in muted greens, browns, and white, upon which abstracted, slightly geometricized flower forms are linked by slim tendrils, outlined in a lighter color, that reach among them; the deep border features a red and black "change-counterchange" pattern (in Riegl's term) where figure and ground reverse as you watch.

The floral arabesques, strange forms connected by lively lines, seem uncannily *synaptic*. The new forms produced by the Caucasian carpet's genetic algorithm seem uncannily alive. They metaphorize Huyghens' own ideas and the thought processes that connect them. The carpet pattern is like Huyghens' own brain – full of connections that are inventive and complex, yet clear and directed. Of course Dutch science of the seventeenth century did not have an account of neural processes, and thus my reading of the carpet as representing neural firing is anachronistic; yet as a

metaphor for the thought process, and the curiosity and fascination that leads from one idea to others, the carpet's pattern speaks to its time.

Alpers dwells on Huyghens as a Northern intellectual who typifies the Northern attitude of empiricism, as opposed to the idealism of the Southern Renaissance.⁵⁸ For Huyghens, it is in going deeper into the materiality of things that one comes into the presence of God, and the sublime, rather than in generalizing from them. For him it was the animalcules visible in the microscope. For Keyser and the viewer, it is perhaps that carpet. Yet the painting suggests, on the multiple levels I've described, the fusion of scientific and aesthetic curiosity in Huyghens' own thought. Gazing into the forms that take shape and motion in the carpet is not unlike peering at a drop of water through Leeuwenhoek's microscope, to see protozoa swimming there.

Dutch genre painters of the seventeenth century came into intimate and material contact with the sensuous abstraction of the carpets. Being immersed in a visual culture that was materialist and non-abstracting, as Alpers argues so convincingly, the Dutch painters (and carpet owners) looked carefully at carpets in order to know the world in its particularity. Theirs was a material visuality, a *haptic* visuality. Perhaps the carpets, perhaps like the protozoa that Huyghens loved to examine under the microscope, invited an immanent appreciation of the world of creation. It is an immanent notion of creation, rather than a transcendent one. Or perhaps they aided a kind of abstract, diagrammatic thinking that could be expressed in plastic form.⁵⁹

Joyous monsters

The late nineteenth and early twentieth-century philosophers who introduced the concept of emergence, as Whitelaw points out, were attempting to interpret evolution in a way that still placed humans at the top. They saw emergence as maintaining a hierarchy: life emerges from inert matter, mind emerges from life. By contrast, Riegl's vitalist concept of *Kunstwollen*, introduced at the same time, disregarded differences among life forms. Only recently has the concept of emergence caught up to Riegl's ideas, as a system capable of emergence is now defined by "openness to the environment—the ability to measure and effect changes in the outside world – and a capacity for adaptive self-alteration."⁶⁰ We saw such a process of open, non-hierarchical inventiveness in Caucasian carpets, where the many forms received from various cultures mingled, under the hands of designers and weavers, with an apparent disregard for what kind of forms would ultimately arise. They epitomize, in Langton's terms, the "bottom-up, distributed, local determination of behavior." The Caucasian

dragon carpets offer a fascinating commentary on becoming-animal, nonorganic life, and experimental biotechnology. The dragon carpets freely exchanging information, flowers-becoming-dragons and vice versa, recall the generous promiscuity of our archaic one-celled ancestors. These carpets, like the monsters produced by genetic algorithms, celebrate a will to form that is not constrained by its products; rather it continues to invent for the joy of inventing. The contemporary art of genetic algorithms, introducing software behaviors into environments produced by human interaction, is now also capable of emergent behaviors.

Freeman Dyson, with whom this essay began, argues that the Darwinian age is over, and that evolution will now take place through biotechnology. We are coming upon a new age of nonorganic life, in which unforeseen and unclassifiable creatures will come into being. He hopes that these processes will take place not in the profit-driven genetic engineering mega-corporations but in the micro-experiments of amateur breeders, housewives, and children. Trying to share Dyson's optimism, I compare the coming generation of experimental cross-breeders to the designers and weavers of evolving carpets, through whose fingers flowed a sense of life that was larger than the form it took.⁶¹

Endnotes

- 1 Freeman Dyson, "Our Biotech Future," *The New York Review of Books* 54:12 (July 19, 2007): 4–8. Dyson refers to Carl Woese, "A New Biology for a New Century," *Microbiology and Molecular Biology Reviews* (June 2004).
- 2 See Alois Riegl, *Problems of Style: Foundations for a History of Ornament*, trans. Evelyn Kain (Princeton: Princeton University Press, 1992). See also Jacqueline E. Jung, translator's introduction to Alois Riegl, *Historical Grammar of the Visual Arts* (New York: Zone, 2004), 13–19, and Margaret Iversen, *Alois Riegl: Art History and Theory* (Cambridge, MA: MIT Press, 1993), 3–8.
- 3 See Gilles Deleuze and Félix Guattari, "1440: The Smooth and the Striated," *A Thousand Plateaus: Capitalism and Schizophrenia*, trans. Brian Massumi (Minneapolis: Minnesota University Press, 1987), 497–499; Niklas Luhmann, *Art As a Social System*, trans. Eva M. Knodt (University of Chicago Press, 2000); Manuel De Landa, "Non-Organic Life," in *Zone 6: Incorporations*, ed. Jonathan Crary and Sanford Kwinter (New York: Zone Books, 1992); Mitchell Whitelaw, *Metacreation: Art and Artificial Life* (Cambridge, MA: MIT Press, 2004).
- 4 Steven Todd and William Latham, *Evolutionary Art and Computers* (San Diego: Academic Press, 1992); cited in Gary R. Greenfield, "Evolving Expressions and Art by Choice," *Leonardo* 33:2 (2000), 93.
- 5 Whitelaw, 8–9.
- 6 Greenfield, 93.
- 7 *Ibid.*, 95.
- 8 [www.xs4all.nl/~notnot/ima/traveller_a.mpg]; [www.xs4all.nl/~notnot/E-volverLUMC/evo-a.avi].

- 9 Laurent Mignonneau and Christa Sommerer, "From the Poesy of Programming to Research as Art Form," in *Aesthetic Computing*, ed. Paul Fishwick (Cambridge, MA and London: MIT Press, 2006), 171.
- 10 *Ibid.*, 173.
- 11 Christopher Langton, "Artificial Life," in *Artificial Life*, ed. Christopher Langton, Santa Fe Institute Studies in the Sciences of Complexity, vol. 6 (Reading, MA: Addison-Wesley, 1989), 2–3; cited in Whitelaw, 212.
- 12 May H. Beattie, *The Thyssen-Bornemisza Collection of Oriental Rugs* (Castagnola: Thyssen-Bornemisza, 1972), 79.
- 13 Friedrich Spuhler, *Oriental Carpets in the Museum of Islamic Art, Berlin*, trans. Robert Pinner (London and Boston: Faber and Faber, 1988), 93; Richard Ettinghausen, "Islamic Carpets: The Joseph V. McMullan Collection," *The Metropolitan Museum of Art Bulletin*, New Series, 28: 10 (June 1970), n.p.
- 14 Kurt Erdmann, *Oriental Carpets: An Essay on Their History*, trans. Charles Grant Ellis (New York: Universe Books, 1960), 46.
- 15 Reinhard G. Hubel, *The Book of Carpets*, trans. Katherine Watson (New York and Washington: Praeger, 1970), 100.
- 16 Joseph V. McMullan, "Catalogue," in *Islamic Carpets from the Joseph V. McMullan Collection* (London: Arts Council of Great Britain, 1972), 43.
- 17 Arthur Upham Pope, *Catalogue of a Loan Exhibition of Early Oriental Carpets from Persia, Asia Minor, The Caucasus, Egypt, and Spain* (Chicago: Art Club of Chicago, 1926), n.p. (insert before p. 83).
- 18 For example the Medallion and Animal Carpet, c. 1600, possibly Isfahan. Widener Collection, National Gallery of Art, Washington.
- 19 However, like Persian carpets, Caucasian carpets use a depressed warp, permitting a greater thread density. Ian Bennett, *Oriental Rugs, volume 1: Caucasian* (Austria: Oriental Textile Press, 1981), 16.
- 20 Serare Yetkin, *Early Caucasian Carpets in Turkey: vol. II: The Development of the Caucasian Carpet*, trans. Arlette and Alan Mellaarts (London: Oguz Press Limited Humanities Press, 1978), 102.
- 21 Bennett, 12; Erdmann, 46.
- 22 Erdmann, 46.
- 23 Jon Thompson, "Early Safavid Carpets and Textiles," in *Hunt for Paradise: Court Arts of Safavid Iran, 1501–1576*, ed. Jon Thompson and Sheila R. Canby (Milan: Skira, 2003), 287.
- 24 Thompson, 298.
- 25 McMullen sees a much longer continuity for the dragon carpets in Scythian animal and bird figures, "which would indicate a continuous tradition of design over a period of more than 3000 years." (43)
- 26 Yetkin, 40. She also notes that a Chinese silk contains the dragon-and-phoenix motif inside lozenges, perhaps the origin of the motif.
- 27 Something they never would have done in Chinese art; Thompson and Canby, 292.
- 28 Yetkin, 6–7.
- 29 Bennett, 10.
- 30 *Ibid.*
- 31 Spuhler, 97.
- 32 When I showed a slide of this carpet to a group of students, one, Sum Li, noticed that the "dragon" appears to consist of two superimposed, different-colored bodies.

- 33 Sheila R. Canby, *The Golden Age of Persian Art, 1501–1722* (London: British Museum Press, 1999), 11–13.
- 34 Erdmann, 23. Ettinghausen (n.p.) dates the Turkish eschewal of figurative representation to the sixteenth century.
- 35 Yetkin, volume II, 33.
- 36 For example, Dragon carpet, seventeenth century, Vakıflar Carpet Museum, Istanbul; in Yetkin, vol. I, plate 7: “the phoenix has disappeared and the dragon is now a floral ornament” (Yetkin, vol. II, 20). The same occurs on the Victoria and Albert dragon carpet.
- 37 Yetkin, vol. II, 21.
- 38 A late eighteenth-century dragon carpet, Turkish and Islamic Museum, Istanbul, from Köse Ömer Aga at Erzurum; Yetkin, vol. I, plate 21.
- 39 For example Yetkin, vol. II, fig. 179.
- 40 For example in the former Staatliches Museum’s seventeenth-century Dragon carpet, burned in 1945, reproduced in Erdmann, fig. 98. During the Second World War, the Staatliches Museum curators removed all but the large carpets for safekeeping; of those that remained, most (about 20) were destroyed in the Allied bombing of Berlin on March 10–11, 1945, by incendiary bombs and water.
- 41 John Mills, “The Coming of the Carpet to the West,” in the exhibition catalogue *The Eastern Carpet in the Western World from the 15th to the 17th Century*, ed. Donald King and David Sylvester (London: Arts Council of Great Britain, 1983), 11.
- 42 According to John Mills, the earliest extant evidence of a carpet in a painting is a fresco of the life of St. Martial painted by Matteo di Giovannetti in the Palace of the Popes at Avignon: Mills, 11.
- 43 Walter B. Denny, “Oriental Carpets and Textiles in Venice,” in *Venice and the Islamic World, 828–1797*, ed. Stefano Carboni; catalogue of an exhibition organized by the Metropolitan Museum of Art and the Institut du Monde Arabe (New York: Metropolitan Museum of Art, 1977).
- 44 Mills, 13; Denny, 176–77.
- 45 Denny, 177.
- 46 Denny, 180.
- 47 Denny, catalogue note, 325.
- 48 Mills, 19.
- 49 See Leonard Helfgott, *Ties that Bind: A Social History of the Iranian Carpet* (Washington, D.C.: Smithsonian Institution, 1994), chapter three; and John Sweetman, *The Oriental Obsession: Islamic Inspiration in British and American art and Architecture, 1500–1920* (Cambridge University Press, 1988), chapter one.
- 50 Helfgott, 55.
- 51 Denny, 190.
- 52 See for example Hal Foster, “The Art of Fetishism”, in *Fetish*, special issue of Princeton Architecture Journal, 1992; and Lisa Jardine, *Worldly Goods: A New History of the Renaissance* (New York: Norton, 1998).
- 53 David Sylvester, “The Eastern Carpet in the Western World from the 15th to the 20th Century,” in *The Eastern Carpet in the Western World from the 15th to the 17th Century*, 9.
- 54 The painting is reproduced and the carpet identified in Michael Franses, “Interior Perspective: Classical Carpets in Paintings at the 1996 Maastricht Fair,” *Hali* 91 (March 1997): 117 (article is 114–119); but the painting’s whereabouts are unknown now.
- 55 As well as Svetlana Alpers’ enormously influential *The Art of Describing: Dutch Art of the Seventeenth Century* (University of Chicago, 1983), see Peter Hecht, “The Debate on Symbol and Meaning in Dutch Seventeenth-Century Art: An Appeal to Common Sense,” *Simiolus* 16

- (1986): 173–87, Celeste Brusati, *Artifice and Illusion: The Art and Writing of Samuel van Hoogstraten* (Chicago: University of Chicago Press, 1995), and Eric Jan Sluijter, *Seductress of Sight: Studies in Dutch Art of the Golden Age* (Zwolle: Waanders, 2000).
- 56 Alpers, chapter one, “Constantijn Huyghens and ‘The New World,’” 5–25 *passim*.
- 57 A. F. Kendrick notes this in a review of *Altorientalische Teppiche in Siebenbürgen* by Emil Schmutzler, *The Burlington Magazine for Connoisseurs* 63: 368 (November 1933): 237. (whole review 236–237) Transylvania, now Romania, was occupied by the Ottoman Empire from 1526 to 1799. Many carpets produced there were imported to Europe in the seventeenth century. Transylvania and the Caucasus shared Anatolian carpet-making practices, such as the angular flowers and tendrils visible in Huyghens’ rug.
- 58 Alpers, chapter 1.
- 59 Interestingly, Huyghens’ own artistic taste favored not the detailed genre painting of which his own portrait is exemplary, but the moody, character-driven painting of Rembrandt, whose work he recommended early on to the Prince of Orange.
- 60 Whitelaw, 218; citing Peter Cariani.
- 61 I thank my wonderful research assistants Sharon Kahanoff and Donna Szöke and my students at Simon Fraser University. This research is supported by the Social Sciences and Humanities Research Council of Canada. It forms part of my book *Enfoldment and Infinity: An Islamic Genealogy of New Media Art* (forthcoming, MIT Press).