

Image and Interaction

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Introduction

The Surfacing Image

"I saw what the moorhen sees as it dives: the thousand rings that encircle each little life, the blue of the whispering sky swallowed by the lake, the enraptured moment of surfacing in another place. Know, my friends, what images are: the experience of surfacing in another place."¹ For Franz Marc, an image is not an assemblage of material in which something else besides that material can be recognized, as aesthetics would have it, nor is it a symbol that refers to something other than itself, as iconography tells us. Rather, it is immersed in what today we would call a medium but for Marc was a living carrier. Is the painter a moorhen? Yes, most certainly – but the same description applies to photographic and cinematic images: they are made in one place and viewed in another.

Painting's criticism of photography has always been that photographs were not "living" images, like those created with brushes and paint on a base, but dead reproductions. These dead images were set in motion by the medium of film and dynamically transformed by the medium of video, but these were merely attempts to breathe life into images that were inherently lifeless, static and flat. The technical media are media of resurrection, or what today we would call "reenactment." But painting is not, or at least it need not be. A painting is an "enactment," an original, an initial image, not a derivative. It is created, not shot or recorded, however often painters borrow images from their peers and from other media.

Art should not be judged by its lesser siblings but by its best achievements. A painting is saturated with meaning. Each brushstroke is a choice and, in that sense, an aesthetic moment: it could have been different. A painting as a whole, on the other hand, can have been no different. It is perfect the way it is, and it tells us about more than the painter's skill with the brush. A painting can be everything, all at once, and is therefore inexhaustible. We never tire of looking at it. A photograph, by contrast, is always specific: even when it is of a crowd of people, it is full of recognizable individuals. Because of its one-time-only quality, its property of being applicable only to a single specific event, photography long remained outside the sphere of fine art. What people wanted to see in art was not

beauty but the universal; that was the broad definition of art.

The girl who stood in her damp gray-green bathing suit on the beach in Kolobrzeg, Poland, in front of Rineke Dijkstra's technical camera on July 26, 1992, and allowed herself to be transformed into a photograph was one girl, there and then, unique and non-recurring, and she should not have anything to do with art history or our desires.² But she does. Her body is pointed straight at us, poised between restraint and expressiveness. We do not know who we are looking at, as we would with a family snapshot, yet we respond emotionally to the photograph. The girl in the bathing suit is universal because the photograph allows everyone to see her as the photographer did: movingly artless, shy and non-recurring. If you are individual enough, everyone will recognize you. Beauty is that which expands and deepens the emotional spectrum, concentrates it or spreads it out. Photographs can be inexhaustible too. What constitutes ineffable meaning? Analyze a photograph until you have stripped it of everything that can be described and interpreted, and then see what is left. The rest is presentational meaning, as opposed to discursive meaning, the part we can put into words, however difficult it may be.³

Emotion alone, and not mere craft or technique, can create living meaning. Artists' mutual influences, borrowings and modifications are fascinating, as art history has repeatedly shown, but even when the viewer knows nothing of all that, the image will have an effect. Franz Marc's odd metaphor of the diving moorhen shows us that every image makes a fresh start. It surfaces from out of its medium. It might turn out later to be connected to previously existing images. Even if the artist consciously seeks to imitate other images, at first there is nothing, and something must come into being. Every image is an original. But what sets photography apart is that – to quote Walter Benjamin – "it is another nature which speaks to the camera as compared to the eye."⁴ What we see in a fraction of a second is different than what we see through sustained contemplation and comparison. But if that instant is captured, we can study and compare it again, closely and at length, though what we see will be different from what the world showed us before.

What legitimizes static images is the fact that they grant the gaze extra time and thereby allow it to feel, sense and empathize. Moving images limit the duration of vision and sum up time instead of stretching it. The effect is like reading a three-hundred-page novel in an hour and a half. But we can become absorbed in them, through mimesis, sympathy and identification. Photography and film offer different kinds of time gain. The image is not about a tension between being and non-being or the shown and the unseen; it shows itself and creates and is its own present. It lets us become something other than ourselves. The reason we like representative images is that the things they represent – deer, starry skies, traces of human presence in the landscape – existed before they did. Images do not conjure a world into being: the world calls forth images. They anchor us in existence. They can be made up of pencil marks, paint, photographic grains or pixels, arrangements of screens and objects, rumbling machines, or just a few lines carved in the trunk of a tree.

The Contemporary Worldview (1)

Matter and energy, information and the virtual – these are what the world is made of. Energy is matter's capacity to move; information is matter's capacity to organize itself into forms; and the virtual is those forms' capacity to transform themselves and emerge as something that was not there before. Just as energy makes possible new connections within matter, the virtual enables new connections between the connections that organize matter and energy – between informed forms. Every relation is a relation between relations.⁵ In communication, matter is informed in such a way that something is transmitted from a to b: air vibrations, photon flows, electromagnetic radiation, ink or paint on paper, electrons in a wire, ones and zeroes in a digital network. There is a law of conservation of energy, which is also a law of conservation of matter, since mass is energy multiplied by the speed of light squared. There is no law of conservation of information: the virtual only increases the world's information content. Everything, every object, every situation, every idea, is one actualization in a virtual space full of possibilities that could

exist but have not been actualized for some reason – but still might be.

A virtual space stretches between a certain number of dimensions or axes, each standing for a parameter or quality of a particular body or situation. Within this abstract geometric – or, more precisely, topological – space, every individual existing object is a temporary combination of a single value on each of these different axes. Everything that develops, every process and system (and the world is nothing but processes and systems), can be pictured as one track through a virtual landscape of hills and valleys made up of all the possible combinations of the many parameters that determine that process or system. We can never know precisely how many axes a virtual space has, because for every fact, every form, every actualization, the values on certain axes could be zero and therefore imperceptible. No description can be exhaustive, for it is itself one actualization in the virtual space of all possible descriptions.

The mathematical reproduction of virtual spaces is metaphorical in nature, a tool for talking about things we can sense, just as mathematical descriptions of mass and energy are metaphorical. How can subatomic particles perform all those complex calculations in real time in exactly the right way to exhibit the behavior predicted by advanced quantum mechanical computer modeling? How can genes combine over time in such a way that, switched on or off, they will allow the body particular to a given animal or plant species to develop? The body-mind split does not run so very deep. To high school students, it is even a mystery how objects can know the value of g in the gravity formula. Matter is multiple traits coinciding in a single point in three-dimensional space. To this, the virtual adds the passage of time. Every actualization of our consciousness is built up millisecond by millisecond and then experienced as a perception or thought.⁶

The Darwinian evolution of species and their activities within an ecosystem is another example of a movement through a virtual landscape built up out of all possible combinations of traits of all the living beings in the system. Perhaps evolution, like water, seeks its lowest level – that is, the greatest possible simplicity of execution

with the greatest possible complexity of capacity to act. Or maybe it tends instead toward a dynamic state in which organisms have just enough capacity to act to be able to survive in spite of using too much energy in the process, or overly heavy or fragile materials (shells, bundles of muscles, lignifications, membranes, fluctuating hormone levels, and so on). The fact that all the astronomical and physical constants on planet earth are precisely right and correctly attuned to make this kind of life possible in specifically this place tells us only that if those values had been different we would not be here to observe them. There is no purpose, no fate. Every actualization is a "contingency": everything could have been different, within an n -dimensional space of possibility. The possibilities in that space are not unlimited, but the number of spaces of possibility might be.

Because every work of art is an actualization of many latent possibilities, x other works can always be derived from it. This can be done not only through copying or remediation (copying in another medium) but also through playing its many parameters of speech, hearing, vision, smell, touch, taste and proprioception off each other in a different but related way. This is how styles, schools, movements and typologies arise. To act is to add information to the world. Even when you think you are removing information – for example, by blowing up two massive, ancient Buddha statues – what you are doing is creating more information: stories and videos of the demolition, expressions of outrage, plans to rebuild the Buddhas someday. Things always play out in more virtual spaces than we could ever predict or control. As the hackers said back in the 1980s, information wants to be free; it always forges new connections.

We should study images and technologies not to find out what information they might contain (knowledge) but what kind of capacity for action they enable (agency). The question should not be "What is this artist trying to say?" but "What does this work make possible?" and also "What makes it possible?" and "What does it enable us to experience and do?" Just as the difference between a body part's structure and its function lies in the former's slow process of change versus the latter's much faster one, the difference between an action and an idea is a question of speed – a matter of quantity,

not quality. Theory is practice, except that it deals not with individual instances but with the conditions under which those instances can occur. Its object of investigation is always the virtual. I use "model," a word that appears often in this book, to mean a point of entry to a virtual space. To find a new model is to make a new world possible. New worlds are not necessarily nice places to be.

The Constructed Image

Paul Klee defined the image in 1924 as "a construction leading to equilibrium."⁷ "First one builds an armature on which the picture is to be constructed," he said. "How far one goes beyond this armature is a matter of choice, an artistic effect can proceed from the armature alone." Klee's definition contrasted with Franz Marc's. First there was nothing, and then the painter's work brought the image into being. An image was a construction, less an end product than a growth process, whose human goal, or "artistic effect," was to reconcile opposites and thereby achieve equilibrium (for the duration of the artwork). An image was not plucked from the world but created by an artist according to the "laws" of images – or, as we would say, on the basis of its own logic or its creator's strategy. For at least twenty years, Klee systematically studied these laws or principles, mainly at the Bauhaus, where he taught. He sought the laws of lines, planes and colors; of horizontals, verticals, straight lines, curves and curlicues; of hue, tone, tint, shading and shadow.

A line is active when it is drawn before our eyes or followed by our gaze.⁸ Sometimes it is wavy; sometimes it is the shortest distance between two points. A line becomes passive as soon as it crosses other lines and thereby becomes the boundary of a plane. Klee calls lines that form interfaces but can still be identified as independent lines "medial." Planes are active as long as the artist and viewer move, reflect and turn them in rhythm with each other during their cocreation of the work, until a larger, harmonic pattern finally becomes visible. In this pattern the planes are no longer independently active. Medial planes do retain their independence in spite of being part of a larger pattern. Lines and planes can evoke

"telluric" movement in the image, consisting of vectors and antivectors (left, right, up, down, forward, backward). They can also create "cosmic" movement, by means of an endless line (such as a circle) or a fluid plane floating in a white or colored void.

Before the artist sets to work, there is nothing there – at any rate, nothing but his materials (matter and energy) and the rules (information) according to which he can create a work or build an armature from which one can appear. This is the fundamental condition Klee was referring to in his adage "Art does not reproduce the visible; rather it makes visible." So what does art make visible? "Everything we see is a proposal, a possibility, an expedient. The real truth, to begin with, remains invisible beneath the surface."⁹ And what is this real truth? "At one time, people used to paint things that could be seen on Earth, things they liked looking at and would have liked to see. Now we make the reality of visible things apparent and in doing so express the belief that, in relation to the world as a whole, the visible is only an isolated example and that other truths are latently in the majority."¹⁰

Klee was always succinct in his formulations, though he used different jargon than we would today. By "the real truth," he meant the virtual space of which a single work of art was an "isolated example." Other actualizations, other possible combinations, were always "latently in the majority" (because the virtual space was nowhere near full of actualizations). And this was what the artist made visible. Each work of art stood for a vast sphere of possibilities, all of which were potentially present within it and could be extracted by the viewer when his or her imagination was activated (Klee called this "artistic effect"). Klee expressed the same insight by reference to the end of Goethe's *Faust*: "Art is a simile of creation. Each work of art is a simile, just as the terrestrial is an example of the cosmos (Virtually, a great many other living planets are possible.) The reason art seeks to make the virtual visible is that "symbols console the mind ... showing that there is something more than the earthly and its possible intensifications."¹¹ We are not mired in things as they are; everything could always be different (within certain parameters). This is why Klee saw art as a method of creat-

ing reality on a par with nature and wrote jokingly, "I am God."

In a surfacing image, the world shows itself. It is a revelation; this is what gives it its religious charge. A constructed image, however, offers an alternative to the world. It is part of a parallel flow. Since Klee's media were drawing and painting, for him every image was stationary and two-dimensional. The unique thing about this type of image is that it allows all opposites, movements and energies to be reconciled in a single framework. If a particular element (lines, planes, bodies or colors) absorbs too much attention, the image will fall out of balance and lose its tension, and also its interest, as Klee did not hesitate to point out with respect to students' work.¹² But when everything is given exactly the right tension and placement, the artist can smile and see that it is good, like God creating the universe. This is not a revelation but an observation.

In Rineke Dijkstra's photograph of the girl by the seaside, the world is in balance. The girl is alone, separate from the world (on the beach by herself), but she is connected to us, the viewers, who are as alone as she is and, like her, reconciled to our fate. The girl will be different tomorrow. She was probably already different two seconds after the shot. But intensified in this photograph, she symbolizes for us the infinite preciousness and vulnerability of human life on earth. Unlike paintings, photographs lack a temporal factor. Time becomes visible in an image as soon as the eye begins to follow the graphite or ink line, the congealed movement of brush or palette knife. But a photograph contains no lines, only planes, captured all at once. Nothing is constructed. There is no revelation, no observation; there is only sampling. What technical images lack is what makes traditional images traditional: lived time.

Meaning

Meaning is the image's ability to form a relationship with the viewer. The gaze cannot engage with meaninglessness. Meaning is an invitation, not an order; we do not have to accept it. Because there are two kinds of images – those that open up the existing world and help us to accept it and those that open up virtuality, or possible

worlds – there are also two kinds of meaning. One tells us about the world, the other about the creator's worldview.

Franz Marc wrote, "God created the world and presented it for discussion."¹³ We conduct this discussion through surfaced images. The part we conduct in words, spurred by those images, is discursive meaning. We carry on a different conversation through presentational meaning. This conversation is experienced directly through the image and expressed in enthusiasm or rejection (or subsequent images). We must feel this experience ourselves, sense it with our intuition. It, too, has something to tell us about the world, but not in words, and often not even in images. A surfaced image's presentational meaning is that part of the world with which it allows us to have a relationship we never could have had through language. A presentational image leads not to insight but to metamorphosis, sometimes only briefly and sometimes for the rest of one's life. When we engage with art, there is always the danger and the promise that we will come out of the relationship different than we went in. In a surfaced image, presentational meaning creates a connection or interface between two outsides: us and the world.

Paul Klee wrote, "I seek a more remote point, one that is closer to the origin of creation, where I divine a kind of formula which applies to the animal, plant, man, earth, fire, water, air, and all revolving forces at once."¹⁴ A constructed image's presentational meaning lies not in the connection it forges between two outsides but in the formula according to which it is created or organizes itself. And for Klee, everything springs from such a formula: living creatures, the elements, every force. The relationship of a surfaced painting to a constructed one is like that of an analog photograph to a digital one: the first requires a world, the second does not. Instead, a world is made according to an algorithm and then edited.

A constructed image's presentational meaning does not foist a finished world on the viewer but shows its creation – the process, not the end product. It lets us see an image or a world coming into being, again and again. It is not an interface between two outsides but between two insides: the viewer's and creator's respective imaginations. What does it allow us to envision, and what not? It is not

the world but our view of it that is presented for discussion. That view could have turned out differently, but this is how it is now. Creation is never complete. The boundary between the surfaced image and the constructed one is not a gap but an interface where exchange still takes place. Shortly before departing for the front where he would lose his life, Marc made a number of abstract paintings (constructed images); Klee, for his part, described his own work as "abstract with memories" (that is, with surfaced images).

What the two kinds of image have in common is that we always sense the presence of meaning in each before we can point it out or describe it. For the viewer, meaning always precedes the image: the image is the expression of that meaning. We notice that something is worth looking at – sometimes immediately, sometimes not for years. Everything has meaning for someone. That someone might be part of a blockbuster film audience of billions or a language community of millions, or a circle of sixty friends or four; at worst, he or she might be the only one who sees anything there. But there is always someone for whom a thing has meaning. So we should not be dismissive or narrow-minded. It is much more interesting to find out how a thing can have meaning than why it is supposedly incomprehensible, or mere fodder for the masses. Discursive meaning is indispensable for any artist who wishes to reach anyone beyond himself or herself and an oddball or two who "might sort of get it."

We must analyze the meaning of any work of art on different levels. Iconography distinguishes three.¹⁵ Its object of study is the way drawings', engravings', paintings' and statues' visual elements are derived from each other over the course of history and how those elements simultaneously take on meaning. To determine that meaning, iconographers perform three kinds of analysis. The first, pre-iconographic analysis, defines motifs and forms in terms of stylistic history. What looks natural at first glance is explained historically and hence also politically. In the second – iconographic analysis in the narrower sense – images are interpreted in terms of literary themes and figures, e.g., "Judith with dish" or "Salome." In the third – iconographic analysis in the deeper sense – images and visual elements are interpreted using the "synthetic intuition" Erwin Panofsk-

ky said we should use to sense general, essential intellectual tendencies as they were expressed in different periods through specific themes and concepts. In this way, one determines an image's intrinsic meaning, its content. The three levels of meaning, in short, call for three different methods: respectively, contextual analysis, thematic analysis, and a fusion of the two that enables us to determine how the spirit once lived somewhere.

The presentational is everything in an image that remains strange enough to make us keep looking at it. Strangeness is not a rational category; one cannot apply much logic or math to it. It is an experiential concept. It refers to a general human capacity to experience something as not one's own and thereby to create a distance from oneself in which one becomes conscious of one's standpoint, what one does and is. Consciousness is primarily organized presentationally, not linguistically, contrary to the claims of generations of French philosophers. It is not about the words that precede it; it remains outside language. "The extramedial" is another term for presentational meaning. But strangeness is also the first step toward familiarity, for the ways in which we differ are also what makes us interesting to each other. Strangeness can lie in an image's subject – say, multiple conflicting facial expressions in the same portrait – but also in its presentation: the clarity of a photograph, the aura of a cinematic image, the inward-directedness of a video, the glamour of a digital image. A constructed image has to get by with presentational strangeness. Everything we can say about it is intrinsically uninteresting.

As fascinating as the iconological or iconographic approach is, it does not work on technically produced images. When a new photograph refers to an old painting, what it borrows is not the specific meanings of a lock of hair, a shell or a tender glance but the general impression the painting has left on our collective memory. Botticelli's *The Birth of Venus* (1480), which Rineke Dijkstra's photograph of the Polish girl in the swimsuit reminds us of, is full of allegorical and mythological allusions, but they add nothing to our understanding of the photograph that supposedly refers to the painting. An iconological interpretation adds nothing to the image of the girl,

for the picture forges a relationship with the viewer through a different route than that of discursive meaning – through the girl's bodily expression, her gaze, her condition of being self-contained yet open to the world.

Information

An image is a message transmitted by a sender to a receiver through a medium: a drawing, a painting, a technical or digital image, or a 3D arrangement such as a sculpture, installation or performance. Iconography is a method for extracting information from a visual image. The higher an image's information content, the more interesting it is. Information is a measure of the unlikelihood in what we see, its strangeness, everything that escapes the conventions and explicit and implicit rules the construction of images is supposed to obey. What iconologists call meaning cyberneticists call information. Information arises through options: a thing can mean different things, or, in cybernetic language, it can have different information values. The smallest possible choice is that between zero and one. That choice has the lowest value: one bit.¹⁶ Malevich attempted to paint a one-bit image in the form of a black square, but craquelure increased its information content to a kilobyte – and the many books and writings about it raised that to a gigabyte.

Anything that deviates can be termed a choice. A choice need not per se be made by a human or other conscious being; blind matter also makes choices when it self-organizes into forms. A striated tree trunk contains more information than a smooth one; an oak's bark has more variability than a silver birch's. Thus the birch is beloved of minimalists, while to romantics every oak is a world all its own. A specific tree's bark is one actualization of the possibilities in a virtual bark space containing at least three axes for the internal variables of texture, thickness and color, and several more for dominant wind direction, annual precipitation, hours of sunlight per day and season. Other parameters include gnawability and porosity. Nature is informed matter, just as technology and art are. The old slogan "form follows function" is wrong, for only human beings are

able to name the function of a crack in a tree trunk. To the tree, it is nothing but a temporary effect of the interplay of forces in the growth of the bark.

Function is a description bestowed by an outsider. It is the practical variant of the more abstract "meaning." Occasionally, a function can be ascribed to every part of a system (then form follows function), but much more often, we find functionless elements, or at least characteristics whose function is hard to determine. In contrast to what many naturalists believed in the early twentieth century, the solutions plant and animal bodies find for particular problems (for example, the heat differences and great amount of water in the environment) are not automatically optimal or best. Think of the genetic code, which is up to 95 percent functionless junk DNA. Heredity apparently cannot do without it. Information, unlike function, is not something ascribed to a system by an outsider. The amount of information in a system may be open to discussion, but everyone can agree on its informedness.¹⁷

In practice, it is impossible to establish how many giga- or terabytes of information a tree's bark contains. The word "information" is not meant to describe the outcome of a past process. Nor should we use the term "function" in an effort to determine the future reasons for which something has taken on its present form. Goal-orientedness is a tragic concept, for nothing ever turns out as intended, unless those intentions change during the form-finding process. Things always develop their own dynamic, however slowly or minimally. The term "information," like "presentational meaning" and "function," is future-oriented: all three question what kind of behavior a certain form, situation or system makes possible. The fact that an image is an actualization of one position in an (imaginary) virtual space with an unknown number of axes means all the other points that surround it in an n -dimensional cloud could be realized too: anything can be made, done, thought, interpreted, experienced or lived in a different way. Anything can serve as a starting point for a process of transformation whose outcome is unknown.

The cyberneticist Donald MacKay defines "meaning" as a quality that creates "conditional readiness."¹⁸ He gives a characteristi-

cally British example. "Suppose, someone tells you 'it's raining! What happens? You may be immersed in a book, and may not feel inclined even to grunt an acknowledgement. But this does not mean that your understanding of the message has had no effect on you. If a sudden call comes for you to go out of doors, for example, you may now be ready to reach for umbrella or mac. If someone comes in you are likely to ask whether he got wet; and so on. What has been affected by your understanding of the message is not necessarily what you do – as some behaviourists have suggested – but rather what you would be *ready to do if given* (relevant) circumstances arose. It is not your behaviour, but rather your state of *conditional readiness* for behaviour, which betokens the meaning (to you) of a message you heard."

MacKay specifies "behavior" as a "goal-directed, adaptive activity: activity with a purpose." This purpose is what allows us to speak of meaning. The more information affects our conditional readiness for goal-directed behavior, the better we understand it. The information "it's raining" carries the meaning "Everything outside is wet. Take that into account if you go out or someone else comes in." According to MacKay, meaning is "clearly a relationship between message and recipient rather than a unique property of the message alone." It is not the recipient alone who determines meaning, nor the sender alone; rather, meaning is what they manage to make clear, discursively or presentationally, in their communication about the world outside, and what they proceed to do with it.

A message, or actualization in a medium, is meaningful to an individual or a community if it makes a certain behavior not only conceivable but also performable, though it may take time before that behavior is actually exhibited. The brain or body evidently stores meaning until further notice. An image serves as an external memory for conditional readiness. This is why a picture is worth a thousand words. Meaning is a symbolic process; it refers to something that is not there. But what is not there is the actions that will someday be performed on the basis of the received message, which will only gradually be understood or deemed useful or necessary. When we do something we have always wanted to do, we should ask our-

selves where the initial desire came from. Meaning always lies in the future; the present is the gateway through which it comes to us. As soon as we have to locate a work's meaning in the past, that work becomes history. Yet an artwork's art-historical meaning also lies in the future, for it says: Unravel me, study more, make more connections, probe my iconology more deeply, and so on. Its current meaning, by contrast, says: Hey, you. Who, me? Yes, you, and every-one with you.

In an advertising image, however refined or abstract, the "goal-oriented activity" for which information creates conditional readiness is unambiguous: the purchase of a product, the adoption of a lifestyle or mentality or the quest for experience. An ad awakens a desire, partly to imitate an exhibited behavior and partly to use that behavior to create the conditions under which it can be considered worthwhile. People have long claimed that art has no purpose, or is a goal in itself. Under such restrictive conditions, the search for meaning is a clever counterstrategy for experiencing something that supposedly has nothing to do with you. You *will* develop a relationship with the artwork, *will* change the canvas or installation with your gaze, however fiercely it resists you.

Once you form a relationship with a work of art, however futile it might seem, you bring about the thing that started it all: the possibility of a behavior that was previously inconceivable and impracticable, even if it is only a form of attention you were hitherto incapable of. The world becomes ambiguous. You feel, empathize, reflect, see your surroundings anew, refine your feelings, think your way out of things that no longer concern you, envision things you are not but could become. Reality does not need to be represented, for it already exists; art is made for a world that does not exist or, more hopefully, does not yet but could, if only we would look (read, hear, act). Information is not only a consequence of choices but itself leads to more choices. Understand what you are doing. This is what you are. This is what we are. And these are our options. Where do you stand?

The Contemporary Worldview (2)

The realization that a whole is more than the sum of its parts raises the question of exactly where that "more" lies. People call it God, the macrocosm reflected in the microcosm; they also call it genius, or talent, the preferred term these days. The "more" comes from outside the parts, which consist of matter, which the mind acts to shape and organize. But now imagine that the mind is one of the parts, which act together to add "more" to the material realm: then no God or genius is necessary. We know a system is more than a sum when it is capable of a behavior none of the parts exhibits on its own. Combine oxygen and hydrogen: a stream begins to gurgle, and life flourishes. From the point of view of the parts, "more" always lies in the future. It is not the inevitable outcome of the linkage of a number of parts or "partial objects" that were floating around separately and now suddenly enter into a close relationship and become productive. Things might have turned out differently: certain other elements – people, materials, techniques, environments – could have led to different results but happened to be absent in the place where the process crystallized. The more-than-the-sum-of-the-parts is itself also subject to improvement. As long as a system can develop, it will endure, and everything is a system, from eco-spheres to individuals.

There are no wholes, no closed bodies; every system, however homogeneous, is always open. Even timeless works of art are subject to decay and unforeseen enrichment. A system is not an aggregate, an accumulation of materials with no effect on each other, but an assemblage made up of linked parts. The components in an assemblage are not reflections of the larger whole; widely diverse elements connect to things that are different from themselves, generating something else that is different again. Certain couplings are non-recurring, but most repeat, giving rise to a style, behavior profile or pattern. Gilbert Simondon called this process individuation.¹⁹ Partial objects link to each other not in a causal chain but through a process of transduction, as when a telephone converts spoken language into electrical pulses to be sent to a speaker. What we hear is converted within our bodies into the meaning we perceive, in a conditional

readiness of the system made up of us and our information sources.

Transduction is not a cause-and-effect process any more than translation is. In translation, a word in the source language can be turned into a variety of words and expressions in the target language, depending on its strength in the sentence or argument and on how people put things in the target language. A translation not only has to convey meaning but also to maintain the source text's information content, and thus the unlikelihood of the writing, and this depends on the discourse an utterance is placed in on the one hand and the language's internal tensions on the other. Similarly, the conversion of sounds into electric pulses is not a homogeneous transfer or literal translation: noise is added, but so is the "more" that turns a string of words into a meaningful utterance, and sounds into a conversation or song. An assemblage is created when heterogeneous components activate each other through a process of transduction.

Assemblages are oriented toward the outside; they can connect to anything they come in contact with, though it is far from certain that they will. Deleuze and Guattari called these associations "relations of exteriority."²⁰ An assemblage is a network of temporary connections and mutual influences. Every component exerts its own influence on the system as a whole but can be removed and plugged into another assemblage, where it will enter into new interactions with adjacent components. Deleuze and Guattari called social, cultural and political assemblages "multitudes"; the Internet, with its innumerable users and network formations, is the paradigmatic example. The parts themselves do not understand how they add up but experience something akin to being part of a "more." Identity is something observed from outside; individuation is the participants' own experience of the assemblage. Without a sum, there are no parts.

Manuel DeLanda writes, "One and the same assemblage can have components working to stabilize its identity as well as components forcing it to change or even transforming it into a different assemblage."²¹ An assemblage can take on an identity for a time, in the sense of being "recognizable as such," but all its parts are themselves also assemblages in continuous states of change, albeit at

different speeds and rhythms. An assemblage is a cloud-shaped actualization in a virtual space, or what Peter Sloterdijk calls a bubble in the foam of reality.²²

Soap bubbles vary little in chemical composition and physical makeup, yet each has its own shape, and this is precisely what gives the foam cohesion and a certain stability. Every living thing lives in a bubble, like an astronaut in a capsule or the earth within its ecosystem. Our social lives consist of pressure exerted on us by countless bubbles – buildings, streets, institutions, families, governments, businesses – that give us a choice between going along with change and cracking under it. The result is an airy, flexible social whole. The bubbles are individuations but not individuals. They are empty, with no content or essence of their own; they are informed matter subject to energetic processes. Great precision is needed to explain which of these components must act on each other, and how, for the purposes of realizing a particular socioeconomic constellation or individual subjectivity, but it can be done.²³ And it surprises us every time.

In a process of symbiosis, two organisms join to create a third that can be viewed as a new species.²⁴ Bacteria were the first living organisms on earth, and every other life form in nature's six kingdoms – archaeobacteria, eubacteria, protoctists, fungi, plants and animals – arose out of assemblages of them. Bacteria are the building blocks of all the living bodies on earth today. The cilia on primitive bacteria can be found in the photoreceptors of our retinas. They registered pressure changes in the environment back then and still do today, but we experience these as light, sound, smell, taste, equilibrium: the assemblage and interaction are different, but the component is the same.

Interactivity as Interaction

In 1961, Robert Rauschenberg made a painting that literally created a meaningful relationship between the image and the viewer and was therefore interactive. Rauschenberg's "combines," as he called them, resemble bulletin boards of the kind one finds in kitchens and

offices, covered in newspaper and magazine clippings, postcards, loose notes, family photographs, and other surfaced images. They bring an accidental coherence to what Rauschenberg described as "perpetual inventory," representing life in the present day.²⁵ Combines are less objects to be looked at than instructions for action, like bulletin boards full of to-do lists. They are combinations of orientation materials, visual and concrete. They teach the viewer to get along in the present-day world and, moreover, to take action there as a "responsible man working in the present," as the artist wrote on the 1968 triptych *Autobiography*.

His 1961 painting *Black Market* is a square with some dark splashes and a photograph of the Capitol at the bottom, four steel clipboards attached in the middle, and, at the top, a white area with a metal construction, a shelf and a "one way" arrow sticking out about four inches past the frame.²⁶ A string hangs down to a suitcase on the floor marked "open." The idea was that the visitor would take one of four objects out of the suitcase and replace it with an object or drawing of his or her own, stamp that with the number of the removed object, and record the trade on a list on the appropriate clipboard. The painting was thus an administrative system, an information bank for keeping track of contacts and trades made between visitors. As the visitors interacted, the work would change. Four lists would accumulate on the clipboards, showing what people were willing to trade for what. Trade – the giving and receiving of gifts – is the original form of interaction.²⁷ But Rauschenberg's interface proved ineffective. People took objects away without leaving anything in return, and the process soon ran aground. Today, conservators bar visitors from even touching the suitcase, and the clipboards are empty. *Black Market* has become a monument to interactivity instead of a point at which interaction crystallizes. But it can be viewed as the missing link in the evolution from painting to the automated interactive art that came later.

Seven years after *Black Market*, Rauschenberg made another interface – part material, part electronic and part immaterial (using light) – for which he built an installation with the help of technician friends. *Soundings* (1968) was the world's first responsive environ-

ment.²⁸ The work measures about thirty feet across, nine feet high and three feet thick and is currently positioned against a back wall of the Museum Ludwig in Cologne. The viewer is confronted with nine large, reflective dark panels with eight microphones above them on black poles. You see yourself and the museum setting mirrored in the panels. But if you make a sound – cough, shout, clap or sing – the work lights up, and you see that it is composed of three layers of plexiglass bearing photographs of a chair from different angles and in various sizes and positions, some in negative form. The more noise you make, the more panels light up. High tones light up whole panels; low ones illuminate only the lower parts. It is difficult to determine the pitch, volume and shrillness needed to light up all nine panels at once, since bulbs keep going on and off everywhere. The lighting system keeps modulating, making the chairs dance; they only stop after you go silent, and then you see yourself again reflected in the work's surface, looking.

Open artworks do not open by themselves or for free; the audience has to make a contribution, even if that means doing things that are still considered inappropriate in museums, however much racket some artworks make these days. Only if the visitor gives something will the work give something back. That is the exchange. It takes a while before you realize what a masterpiece *Soundings* is. Not only is the interaction pattern between the work and the visitor seductive and confrontational, the dark-printed panels and the pointless chair in all its positions make the piece at once hilarious and movingly beautiful. Light makes stable images dance through time. Rauschenberg sets the medium of photography in motion via the medium of sound. But *Soundings* also confronts you with yourself. Screaming in a museum quickly becomes exhausting; the lights go off, and there you are. It is not easy getting fellow visitors to scream and clap along with you, but what fun it is when you succeed.

Soundings's form of interactivity is so simple and effective that one wonders why the whole museum is not set up according to the same model. Spontaneous singing and foot-stamping concerts flare up and die down every day; avant-garde ensembles ask to perform,

followed by choirs and competition days, for the piece has a competitive element: who can make *Soundings* and similarly illuminated works dance in the subtlest or wildest way? Put one interactive artwork in an exhibition and the rest suddenly look very tame. Include ten and you start to look forward to some peace. Interaction and reflection alternate; they never coincide, even if you take something from the *Black Market* suitcase without giving anything back. You cannot possess an interaction; you can only enable or restrict it. Consumption is theft.

Robert Rauschenberg was the godfather of pop art, the first in America to incorporate newspaper photographs in his paintings. But he was also the godfather of interactive art. He developed interactive interfaces for the media of painting and sculpture that still affect us today. Interactivity is a concept, a way of working; it is not tied to specific technologies or machines. It can be achieved in any medium. Interactivity is an idea and its representation; interaction is action plus experience. You do not need a computer per se for interaction, but you do need an object. There has to be something people can interact with or through. That something might consist of computers and electronics, or it might be the score of Simeon ten Holt's *Canto Ostinato* (1976–1979) or *Incantatie IV* (1990), whose performers must decide among themselves as they play which sections to perform when and how often. Or it could be a motorized mechanical arm with a speaker attached that growls and screeches as it follows visitors moving around a work of art, as in Marnix de Nijs and Edwin van der Heide's *Spatial Sounds* (2000/2001). Any kind of interactive installation will generate unforeseen events within itself as well as physical responses outside it each time it is activated. Interaction can take place between performers, between a work and its audience, between multiple works a curator has brought together, or between audience members. The computer art genre that was known as "interactive" in the 1990s is just one form of interactivity in the arts.

Allan Kaprow criticized work akin to Rauschenberg's for being "artlike art," in contrast to "lifelike art," such as his late "happenings" of the 1970s, which referred not to other art but to life outside art,

from brushing one's teeth to partying hard. "The root message of all artlike art is separateness and specialness; and the corresponding one of all lifelike art is connectedness and wide-angle awareness," Kaprow wrote. The point of lifelike art was to do things, however normal or absurd, as if they were art, because of the heightened consciousness that implied. But it was also to make things that only the artist knew were art. "Artlike art's message is appropriately conveyed by a separate, bound 'work'; the message of lifelike art is appropriately conveyed by a process of events that has no definite outline. For each kind of art, the conveyance itself is the message, regardless of the details. Artlike art sends a message on a one-way street: from the artist to us. Lifelike art's message is sent on a feedback loop: from the artist to us (including machines, animals, nature) and around again to the artist. You can't 'talk back' to, and thus change, an artlike artwork; but 'conversation' is the very means of lifelike art, which is always changing."²⁹

Kaprow expanded Rauschenberg's conception of interactive art with the notion of the changeability of the object and process of interactivity. An artwork can be made out of trash and simply thrown away after a lifelike happening, or it can be constructed from smoothly functioning machines or computers, creating a effect that is different from an experience of efficiency or ease, since art is founded on doubt and the urge to experiment. An interactive work is not completed by the viewer, as Marcel Duchamp believed, for every interaction is different, and a final state is never reached, however subtle the behavioral modulations ultimately are. An interactive work can never be exhausted in terms of information, though it can be in terms of meaning. The viewer must personally experience the happening, performance or installation, the awareness of the system's functioning that is produced, and his or her own response to that. The viewer can contemplate the phenomenon of interactivity, but not what happens during an interaction. Onlookers see the interaction as a performance, but the interacting participants experience something that exceeds spectacle, because it is not representational and not interpretive. It is lived experience.

The ironic argument that new art is only possible when there is

old art for it to oppose is not the whole story. It is also only possible if there are new experiences waiting to be activated and interpreted. When there is no new feeling, only a memory is retained, an idea of art, but if intuition spurs investigation, a new art can be discovered. Since 1910, it has been a bone of contention whether technological changes determine social developments or vice versa. What is cause and what is effect? Feedback provides a better explanatory model. Technology changes with use, and that use changes as the technology develops. Along with one-way traffic, there are two-way and many-to-many media. Today, "talking back to the media" changes not just an artist or part of a work but the entire information industry, which has spent the past decade or so doing little more than recording audience behavior and individual network use and analyzing it for consumption patterns.

In the new paradigm of interactivity and bottom-up assemblages, the computer serves as a symbol, toolbox and index fossil, yet computers and their networks are only one route, one bandwidth, through the virtual space of interactivity. As all previous media of language, image, sound and gesture are transferred to computers and computer networks, distinctions like that between surfaced and constructed images are disappearing. The image is an interface; it has been made operational, a frame for multiple media channels all transmitting at once. Everything is an interface, including analogue phenomena – a walk through the city with its security cameras, an apple, a greeting. This is our new condition, and the job of artists today is to help us see, manage and reflect on it. The formats have not changed, and no new ones have been added, in spite of the arguments of the theorists of the technical and interactive arts. Art is still art, and it keeps on happily evolving.