



David Reinfurt: EVERYTHING IS IN EVERYTHING

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Cover image: Montessori School classroom. “A framework that supports autodidactic activities, operating under the assumption that everything is in everything.”

The other day I found the picture on the cover of this Bulletin, together with its caption:

Montessori School classroom. “A framework that supports autodidactic activities, operating under the assumption that everything is in everything.”

The image was on page 5 of *Common Circular 4*, a tabloid newspaper published in early 2010 by Common Room architects, New York City. I’d read the paper when it was published and was even quoted within. However, this time the image struck me fresh—almost certainly it was the line “everything is in everything,” plus the economy of these four words forming a complete pedagogy. A room full of maybe-four-year-old school children, engaged separately yet in common proximity, sit on the floor, at desks, and work with cards, letters, models, sticks. Montessori teaching emphasizes the self-direction of children in the classroom, particularly through intuitive development of the senses. The teacher in the classroom acts less as an instructor than a guide or host, facilitating a child’s free development and removing obstacles that might get in the way. These methods are based on the research and experiences of Italian educator and physician Maria Montessori at the beginning of the 20th century.

About sixty years before, Friedrich Fröbel had developed a compatible approach to early childhood education in Germany centered around a set of sensory toys, or gifts, and called Kindergarten. In a 2002 article from *Cabinet* magazine, Norman Brosterman offers a concise account of Fröbel’s methods:

The life forms were tangible: chairs, trees, people; the knowledge forms mathematical: $2 \times 4 = 8$, $4 + 4 = 8$; the beauty forms were usually symmetrical patterns as Fröbel felt symmetry was most comprehensible as beauty to little children. Equivalency was kindergarten’s foundation and it was expressed in all things and at all times. For four-, five-, and six-year-olds, transforming the very same materials into something new each day, as the class shifted from gift to gift and from realm to realm, the ultimate lesson of kindergarten was straight forward. In slightly different guise, the world, mathematics, and art were interchangeable,

and their perceived borders were misleading, artificial constructs. A chair might become numbers, numbers art, and art either or both. With extremely simple means, former crystallographer Fröbel effectively assembled all the components of the universe into his training program for infants. Children could make anything they saw, perceived, or imagined, and while doing so would enter the world—and it would enter them.

At home later that night, I picked up *Hypergraphics, Visualizing Complex Relationships in Art, Science and Technology*. I've spent quite a bit of time with this peculiar collection of semi-academic papers published in 1978 by the American Association for the Advancement of Science, and this time, the book opened itself to page 25:

Everything, every "thing," takes meaning only by interaction with something else. Indeed its existence cannot be known without such interaction. The inside of Fig. 1 represents this, though its boundary is joined to the rest of the world. Both physically and conceptually the qualities of things are discernible only by the response of an external probe interacting with their internal structure. The real units of the world are not particles—atoms, in whatever sense one uses the word—but connections, and a connection must be between two things.



Figure 1

Cyril Stanley Smith, Institute Professor Emeritus at Massachusetts Institute of Technology¹ continues in his article, “Dimensionality, Valence and Aggregation,” to describe the relationship of these dynamic connections to a “thing.” He says of finding a “thing” in the world, that “it is all a question of what connections are actually established at the time of observation.” If the connections change, the “thing” changes. He follows this argument and makes the kind of assertions for which a retired academic is particularly forgiven. His next section is titled by the radical assertion:

Polyhedra Don’t Exist

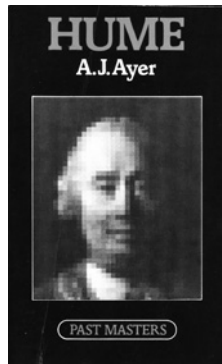
and continues:

There has been much speculation as to why the world in which we live seems to be three-dimensional. Our experience as children learning by moving and poking and acquiring a sense of inside, outside, flexibility and solidity makes us think of dimensionality in terms of points, polygons and polyhedra, the things so beautifully related by Euler’s Law. I contend that polygons and polyhedra do not exist but only what Arthur Loeb in private conversation has called polyvertices. Polygons and polyhedra mark the negation of connections, and their seeming reality is a mere construct of the human senses responding to gradients of density of vertices with one-dimensional interconnections. Both polygons and polyhedra can be shrunk to points without any change in external connections. Whether or not they appear is entirely a matter of choice, of the scale or resolution of the means of observation.

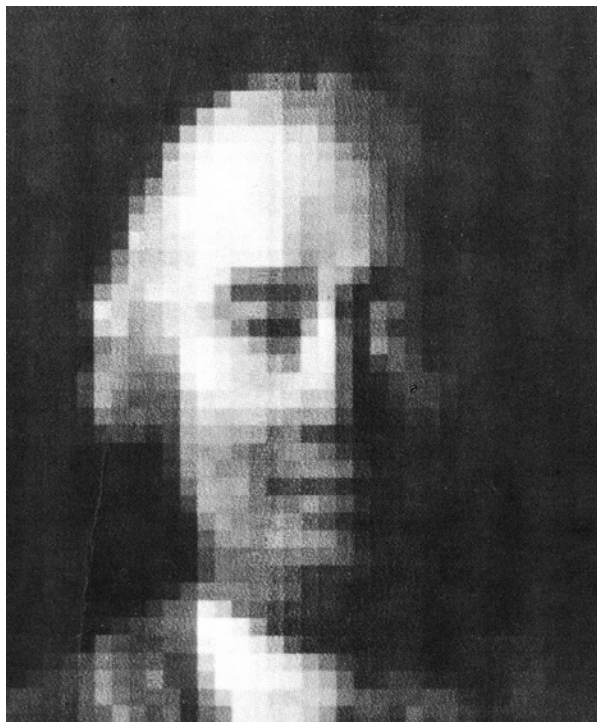
Professor Smith marks a pronounced skepticism in what he sees, and by the end of his paper he has more or less done away with “things” altogether. In their place, he offers a fluid, contingent world, defined by connections and manifest ONLY in the moment of perception:

Whether or not a connection between two vertices is actually made is a question of time—of perhaps more properly the inverse, that time is the sequence of connections. The changing present is a sort of moiré pattern formed between the structures of past and future.

Earlier this spring, I picked up a paperback from a street vendor on upper Broadway. The cover was marked by a cascade of two names, an image, and a category.



The slim volume was a synthesis and analysis of David Hume's thought compiled by Oxford University Professor of Logic Alfred Jules Ayer. The cover has a picture of David Hume, an oil painting of unidentified provenance which looks as if it has been run through the filters of an early Paintbox computer graphics program to realize this exaggerated pixel-portrait.



I couldn't believe my eyes (Hume, arch-skeptic of the senses would say that is precisely the point)—the cover image viscerally flipped back and forth in my brain between being a portrait of David Hume, 18th century Scottish Enlightenment philosopher, and being simply surface, the pure sensation of its infra-thin Paintbox pixelation effect. No sooner do you decide for yourself that it is one, then it flips back to the other.

David Hume provides a fundamental category distinction that describes this split. He begins Part I, Section I of *A Treatise of Human Nature* describing exactly two ways of knowing the world:

All the perceptions of the mind resolve themselves into two distinct kinds, which I shall call impressions and ideas.

Impressions are first-hand sense reports—"those perceptions that enter with most force and violence." Ideas, on the other hand, are noisy signals from the past, impressions that have been churned and reordered in the mind—"faint images of these [impressions] in thinking and reasoning." For Hume, direct sensory perception and its resulting impressions are always primary.

A.J. Ayer helpfully places Hume in the framework of British Empiricism, a fundamental philosophical position that claims all knowledge arrives directly from sense experience. Empiricism relies on a step-by-step sensory construction of the world and sits directly opposite of Rationalism, which imagines the world as complete and total, waiting to be described. Ayer begins his Empiricist line with John Locke. In *An Essay Concerning Human Understanding* (1690), Locke first concretely described our understanding of the world as coming only from sense perceptions. He then divided this sense data into two categories: ideas of primary and ideas of secondary qualities. Primary qualities resemble the object that they describe, such as the solidity of a table, or the extension of a broom handle. Secondary qualities are then reduced to surface treatments and therefore subject to change. These include color or taste, and as Ayer describes Locke describing these, they are:

Nothing more than effects.²

In Locke's estimation and in order to make his philosophy square with Sir Isaac Newton's contemporary scientific theories, objects themselves contain these qualities which are in turn sensed by people as we move through the world.

Next in line according to Ayer is George Berkeley, the Anglo-Irish philosopher and Bishop who, at the beginning of the 18th century, "demolished [Locke's] theory of perception." Following Locke, Berkeley agreed that we only know the world through direct sensory experience but then traced this to its logical end. If we only know something through direct experience then we cannot say anything about external objects separate from our sensible perception of them. Bishop Berkeley continues by suggesting that a mind is required to order these sensations and to construct these objects through a series of sensations. Therefore Locke's distinctions of primary and secondary qualities as located in an object was patently false. Berkeley's account instead relied on God to originate the sensations and to make them known in a mind. According to the Bishop, Locke "had no warrant, on his premises, for believing in the existence of physical objects at all, that is, so long as physical objects are conceived ... as existing independently of our perception of them."

Ayer places David Hume directly in this arc. Hume reduces the Empirical argument to its almost-absurd essence. Ayer, again:

Berkeley had eliminated matter, but left minds intact. Hume, an avowed sceptic, showed that this favouritism was unjustified. We had as little reason for believing in the existence of minds, as beings maintaining their identity through time, as we had for believing in the existence of material substances ... All that remains, then, is a series of fleeting "perceptions" with no external object, no enduring subject to whom they could belong, and not themselves even bound to one another.

This parade of perceptions, Hume argues, actually produces the mind, and knowledge is constructed only through the sequence of sensory experiences. Hume's words now: "I say compose the mind, not belong to it. The mind is not a substance, in which the perceptions inhere." He follows this argument to its end, wrestling with the fundamental philosophical problem of cause and effect. Hume arrives at the radical

conclusion that no such relationship can be shown to exist only through direct sense experience. Or, as Ayer says, “There could be no necessary connection between distinct events.” But, I am clearly getting ahead of myself.

. . .

Two years ago while spending a month in Edinburgh, I picked up a copy of *A Treatise of Human Nature* and spent the summer reading it. I’d meant to read Hume for about the previous ten years, anyway, since I had first seen words “Pure Sensation” attributed to him. In the meantime, I got to know many of Hume’s ideas second-hand—still, finding my way through his arguments was tough. Published first in 1739, Hume knew that *A Treatise* was a difficult book and would likely find an equally difficult reception. It did.

On publication, the *Treatise* solicited mostly critical silence, save one mediocre and misguided article in the London-based *Review of Works of the Learned*. Hume had anticipated this effect by printing an anonymous review or “abstract” of the book, titled *An Abstract of a Book Lately Published; Entitled, A Treatise of Human Nature, &c. Wherein the Chief Argument of that Book is farther Illustrated and Explained*, and sending this companion-review together at once with the *Treatise* unsolicited to booksellers. In my edition, the *Abstract* is even incorporated back into the work as an appendix—as a kind of useful auto-summary provided in advance.

The *Abstract*’s authorship is disputed. One story holds that Hume himself attempted to write a condensation of the *Treatise* in 1737, two years before its publication, and failed. Then, in 1739, Francis Hutcheson, Professor of Philosophy at Glasgow as well as Hume’s friend and colleague, gave the assignment of summarizing the book to his star 17-year-old student Adam Smith, soon-enough-to-be political economist, Scottish Enlightenment figure and author of *The Wealth of Nations*. Smith’s summary was sent to Hume who liked it so much that he had it printed with minor corrections. Another story maintains simply that David Hume wrote the summary anonymously in the hopes of soliciting a more favorable response to his book.

The *Abstract*'s author begins: "My expectations in this small performance may seem somewhat extraordinary, when I declare that my intentions are to render a larger work more intelligible to ordinary capacities, by abridging it." The author then proceeds to offer the essence of the argument in a language both more compact and more convincing. Still, the trickiest part of Hume's book lies in his interrogation and refusal of a productive relationship between cause and effect:

Here is a billiard ball laying on the table, and another ball moving towards it with rapidity. They strike; and the ball, which was formerly at rest, now acquires a motion. This is as perfect an instance of the relation of cause and effect as any we know, either by sensation or reflection. Let us therefore examine it.

According to Hume, since all perception comes only through sensible experience in the base unit of the impression, then he is unable to sense any quality directly of either the first moving billiard ball or the second billiard ball that would "admit" of the former's motion as producing the motion of the latter. There is nothing that can be directly sensed either from the motion of the first or the motion of the second that can account for a cause and effect relationship between the two. He continues then to suggest, if we cannot sense anything directly to account for this relationship, then our expectation of the second ball moving on consequence of the first striking it is founded on absolutely nothing beyond previous experience. According to Hume, there is no fundamental connection between cause and effect. And further, "We are determined by custom alone to suppose the future conformable to the past."

Returning to Ayer, summarizing Hume,

it would never be possible "to infer motion in the second ball from the motion and impulse of the first." If ... we infer a contrary conclusion, it is because we are making projections from our past experience. So far as logic is concerned,

anything may produce anything.

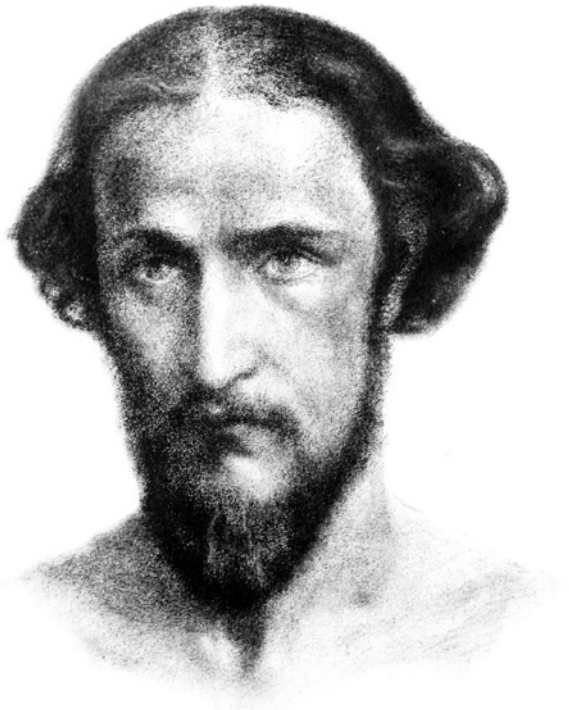
Already a near-heretical suggestion, Hume follows his catholic logic one

step further:

When I see a billiard-ball moving towards another, my mind is immediately carried by habit to the usual effect, and anticipates my sight by conceiving the second ball in motion. But is this all? Do I nothing but conceive the motion of the second ball? No surely. I also believe that it will move.

Hume follows the billiard balls of cause and effect straight into the realm of belief, asserting that “It is not, therefore, reason that is the guide of life, but custom.” And that custom, or in Hume’s words, “habit,” repeated again and again, hardens into belief.

This is the line that American philosopher William James picked up 150 years later in his two-volume book of collected writings, *The Principles of Psychology* (1890).



Chapter 4 is an essay called “Habit” that fits quite tidily with Hume, leaning on his terminology and acknowledging the debt to this empiricist/ “associationist” line of thought. James begins the essay:

When we look at living creatures from an outward point of view, one of the first things that strikes us is that they are bundles of habits.

and continues:

The moment one tries to define what habit is, one is led to the fundamental properties of matter ... The habits of an elementary particle of matter cannot change (on the principles of the atomistic philosophy), because the particle is itself an unchangeable thing; but those of a compound mass of matter can change, because they are in the last instance due to the structure of the compound, and either outward forces or inward tensions can, from one hour to another, turn that structure into something different from what it was.

offering the example of:

a bar of iron becomes magnetic or crystalline through the action of certain outward causes, or India-rubber becomes friable, or plaster “sets.”

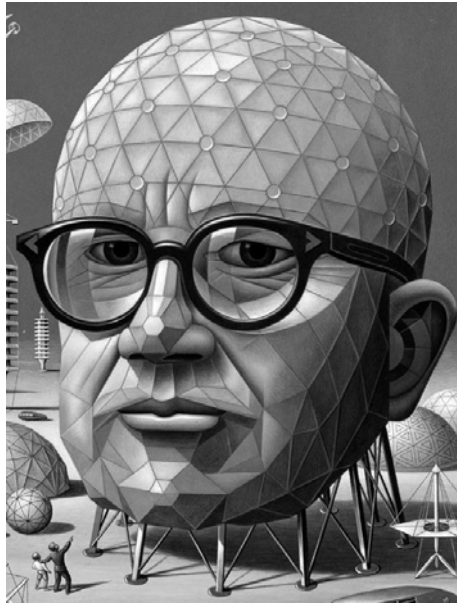
and, finally, he describes this transubstantiation of one form to another:

Plasticity, then, in the wide sense of the word, means the possession of a structure weak enough to yield to an influence, but strong enough not to yield all at once. Each relatively stable phase of equilibrium in such a structure is marked by what we may call a new set of habits.

In this, William James echoes Hume’s argument that anything may become anything else and that cause and effect are essentially discrete, ordered by habit and belief. James then adds a qualifier—the rate of change must be slow enough and the subject of that change strong enough that the resulting migration, movement from one form to the next, does not completely obliterate the original. He calls this particular resistant flexibility “plasticity,” and details how beliefs are written permanently into our character through habit, suggesting that:

It is well for the world that in most of us, by the age of 30, the character has set like plaster, and will never soften again.

Comprehensive design scientist R. Buckminster Fuller would suggest that this hardening happens quite a bit sooner.



Synergetics, Explorations in the Geometry of Thinking (1975) is a catalog of Buckminster's numbered thoughts offered as so many provisional theorems, sequenced and assembled by E.J. Applewhite. *Synergetics* has been described as a library of "science cartoons" or scenarios, each of which uses accessible metaphors in place of mathematical equations to describe complex ideas. Number 530.03 states:

The parents tell the child he cannot have both the sun and the moon in the picture at the same time. The child says that you can. The child has the ability to coordinate nonsimultaneity. The parents have lost the ability to coordinate nonsimultaneity. One of our great limitations is our tendency to look only at the static picture, the one confrontation.

Bucky had a persistent belief in the inductive, empirical powers of children. He describes:

Children are born true scientists. They spontaneously experiment and experience and reexperience again. They select, combine, and test, seeking to find order in their experiences—"which is the mostest? which

is the leastest?" They smell, taste, bite, and touch-test for hardness, softness, springiness, roughness, smoothness, coldness, warmth: they heft, shake, punch, squeeze, push, crush, rub, and try to pull things apart.

In his first mass-published book, *Nine Chains to the Moon* (1938), Bucky offers the dedication to his two daughters, one living and one not, as:

To Alexandra and Alegra:
"Your strange divinity still kept."

The dedication is a line excerpted from the poem, *To A Child* by Christopher Morley. As Bucky's close friend and closer drinking buddy, Morley also made the necessary introductions needed to get Fuller's less-than-conventional collection of musings published. *Nine Chains to the Moon* was even subtitled "An Adventure Story of Thought" by its publisher Lippincott and prepared with science-fiction-fantasy cover art, in order to locate the strange book for an imagined audience. Anyway, Christopher Morley's full poem begins:

The greatest poem ever known
Is one all poets have outgrown:
The poetry, innate, untold,
Of being only four years old.

Still young enough to be a part
Of Nature's great impulsive heart,
Born comrade of bird, beast, and tree
And unselfconscious as the bee —

And yet with lovely reason skilled
Each day new paradise to build;
Elate explorer of each sense,
Without dismay, without pretense!

In your unstained transparent eyes
There is no conscience, no surprise:
Life's queer conundrums you accept,
Your strange divinity still kept.

Being, that now absorbs you, all
Harmonious, unit, integral,
Will shred into perplexing bits,—
Oh, contradictions of the wits!

And Life, that sets all things in rhyme,
may make you poet, too, in time—
But there were days, O tender elf,
When you were Poetry itself!

I'd offer now a horribly reduced description of poetry as language subordinated by form. And through the short course of this poem, Christopher Morley equates that form (poetry) with living ("When you were Poetry itself!")

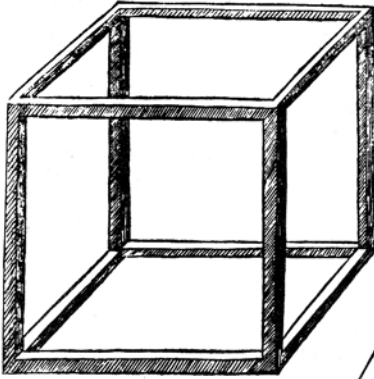
French art historian Henri Focillon would agree. In his book *Vie des formes* (1934), he says as much:

To assume consciousness at once is to assume form. Even at levels far below the zone of definition and clarity, forms, measures, and relationships exist. The chief characteristic of the mind is to be CEASELESSLY DESCRIBING ITSELF. Forms mingle with the life from whence they come; they translate into space certain movements of the mind.

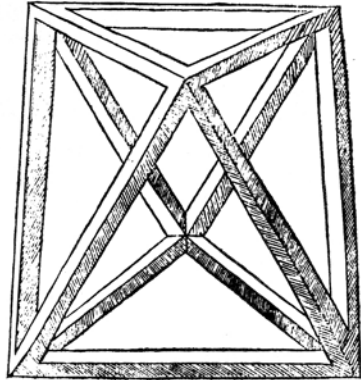
Focillon then returns us to David Hume for now, by making the case that thinking makes itself felt in the world ONLY through forms. Hume suggests that these forms are actually **constructed** by our direct sensory impressions, and articulated by the connections that they make from one to another and through time. According to Hume, objects are little more than bundles of perceptions, temporary and contingent—living made concrete as form.

All of this suggests a chicken-and-egg problem of the most viscous circularity: Which comes first, the forms or the thinking (that renders them (into forms)). Hume's logic suggests an answer to this eternal riddle, as so:

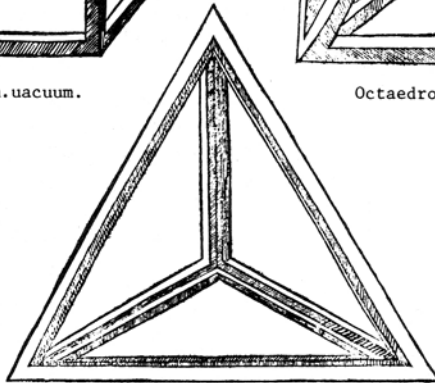
Q: Which comes first, the chicken or the egg?



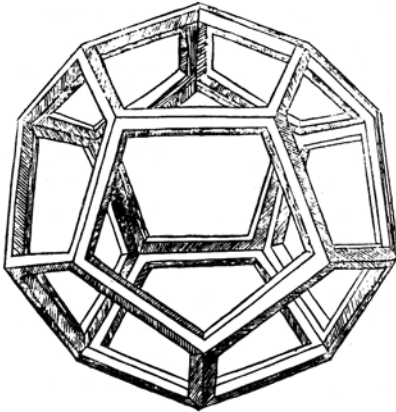
Hexaedron. Planum. uacuum.



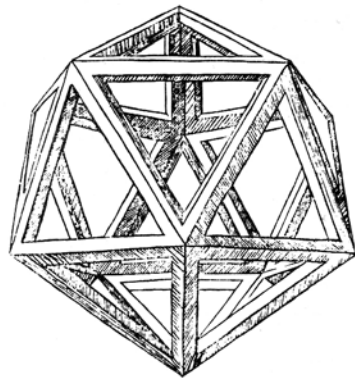
Octaedron Planum Vacuum



Tetraedron Planum Vacuum



Dodecaedron Planum Vacuum



Icofaedron Planum Vacuum

The Five Platonic Solids drawn by Leonardo da Vinci
from Pacioli's De Divina Proportione

A: Both.

If (1) the only way to know the world is through direct sensory experience, and (2) objects are collections of sense impressions, and (3) the mind is CONSTRUCTED from this series of fleeting perceptions, then it follows that thinking and form are ALL ONE. Thinking (the chicken) and form (the egg) are indivisibly co-dependent and integrally co-incidental.

Earlier I described David Hume's "catholic" logic (with a lower-case "c"). I've noticed this word recently, and was unclear precisely of its definition, though I generally understood it to mean something like very diverse, universal, all-embracing. Thinking for only a moment and tracing the word back to its upper-case precedent, "Catholic" religion lies on the fundamental proposition of transubstantiation and is reinstated each week around the ritual of Communion. Here, the bread you take is the body of Christ and wine you drink, the blood. And this is no metaphor: taken on faith, the bread IS the actual body and drinking the wine IS the actual blood of Christ. Much of which sounds very much like the proposition that began this text and relies on a similarly productive faith:

Everything is in everything.³

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1. "When consulted by the Massachusetts Institute of Technology as the best way to infuse their technologically-heavy curriculum with art, [American designers Charles and Ray] Eames rejected the idea of additional art courses or fine arts programs as 'an aesthetic vitamin concentrate.' Instead [they] designed an alternative situation, a program for enriching the student's (and the university's) communicative possibilities to the point where they could experience the aesthetic possibilities of their own discipline. In the proposal [the] Eames would have each student near the end of his M.I.T. career join one or two other students in teaching something of their major specialty to an elementary school class for a semester. The teaching could take the form of films, exhibits, lectures, games, models—whatever the team needed to make what they knew and understood meaningful to children. '... If the M.I.T. student is going to learn anything about art,' [the] Eames argued, 'he will learn it here.'" — Ralph Caplan, *Making Connections: The Work of Charles and Ray Eames* (Los Angeles: UCLA, 1976), as reprinted in *Re-Connections: The Work of the Eames Office* (New Haven: Yale University School of Architecture, 1999)

2. "WHAT, AFTER ALL, IS AN 'EFFECT'?" The word is familiar enough. According to the *Oxford English Dictionary*, its earliest appearance, just antecedent to Chaucerian times,

denoted either a 'result' or 'goods, moveable property.'

Other applications would soon arise, however, including a pair that seem directional opposites along a single axis of causality, pertaining to 'a mode or degree of operation on an object' and, conversely, 'the physical result of an action of force.' Here the significance and usage, one imagines, were determined by context—by the grammar of a given situation. Yet all these different meanings are germane and even possess a kind of simultaneity today, when it comes to digital effects bought and sold in filter packages ranging from Adobe Premiere to Final Cut Pro. Indeed, they are tightly interwoven, production and product, dynamic and object, catalyst and consequence.

For at stake in this specific contemporary context—where the effect is understood as 'a visual or acoustic device used to convey atmosphere or the illusion of reality'—is an impression of naturalistic action or behavior rendered in what is, in fact, inanimate form. Put another way, as a simulation device, the 'effect' posits a kind of chronology where there is none—suggesting some precipitant action responsible for the visual and aural phenomena taking place before the eye and ear. The 'effect' creates nothing so much as a rhetorical hole in time, but only in order to fill that hole in advance with some false history or phantom memory for the individual viewer (so that he or she encounters the world intact, and also anew). In this way, while the above examples of Adobe Premiere and Final Cut Pro are relevant, most aptly named is no doubt Adobe After Effects: After what? one might reasonably ask, uncertain of what could possibly constitute a 'before.'"

— Tim Griffin, "The Personal Effects of Seth Price," *Artforum*, June 2009

3. "My pointing out that Callahan's recordings *sound like what they're about* is just an easier, more immediate way of talking about something I'd reasonably want to try and put across as a design teacher: of *form and content informing each other,* of SYMBIOSIS. And ultimately, in fact, to transcend the dichotomy altogether, as Susan Sontag does in her seminal 1964 essay 'On Style.' 'Form and content informing each other' is distinct from the simple cause-and-effect of the more famous catchphrase 'Form follows function,' not least because in Callahan's case it seems as likely that the music preceded the words as the other way round ... By now it should be blindingly apparent that everyone else has examples that are as pertinent for them as Callahan is for me, but perhaps less so that this personal pertinence is precisely what turns them into a tool for teaching, because realized deeply enough—or 'felt'—to be passed on with conviction. The teaching of Jacques Rancière's *Ignorant Schoolmaster* is founded on the single principle that *everything is in everything.* A set of footprints on a beach are a language: their shape is the same as your own feet, therefore they must be human; their size and the distance between them relative to your own suggests that human's approximate age; their placement reveals the direction they went, and so on. Any THING can be taken as a starting point, which automatically becomes a talking (or thinking) point; by talking (or thinking) you relate that thing to other things, and by relating to other things you gain insight, i.e., learn. In the words of the original Ignorant Schoomaster, Joseph Jacotot, 'The problem is to reveal an intelligence to itself. ANYTHING can be used ... a prayer or a song that the child or ignorant one knows by heart. There is always something the ignorant one knows that can be used as a point of comparison, something to which a new thing to be learned can be related.'"

— Stuart Bailey, "It is the Outsidedness Flavor of It," a talk delivered at Stand Up Comedy, Portland, Oregon, May 16 2010