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The Inner Life of Things: Object-Oriented Architecture, Programming, and Ontology

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The hype surrounding object-oriented ontology in the past few years has been enough to make one turn in exasperation to its exact opposite. The cognitive furniture of hard, dead objects, which has so quickly become dusty and unfashionable, is being replaced by something new: vibrant and complex living things that promise surprise and wonder. This may appear to be a simple and necessary change in fashion, but there are deeper disciplinary dynamics at work. When the philosopher and proponent of object-oriented ontology Graham Harman became a professor at SCI-Arc in 2016, it felt incongruous because objects are something architects already know quite a lot about. One imagines him not so much teaching at the school as triggering, by his mere presence, deep-seated obsessions to bubble to the surface. Architects already know objects to be living, breathing things, and they probably suspect that a philosopher could not possible care about them as much as they do. Who could love a thing more than its creator? This paper is an attempt to give this feeling some substance by tracing a genealogy of object-orientation in architecture and its relationship to a particular concept of life. It begins in the nineteenth century and passes through the artistic and architectural avant garde of the early twentieth century (Paul Klee, Le Corbusier, and others) and on to mid twentieth century computer art and object-oriented programming. It ends with the contradictions of current sensibilities.

A problem I face at the outset is that the terms "object" and "life"

are vague: they absorb their meaning from their surroundings. The meaning of life is very different in a world of angels and afterlives than in a world of synthetic biology and artificial intelligence. The premise of this essay is that object and life draw their meaning, in particular, from each other. If we think of life not as the property of an individual organism but rather as a property of a collective culture, then we can begin to imagine that life is inherent to cultural objects. When architects design cultural objects, they are also designing life.

Such, in any case, was what architects around 1900 might have thought. This way of thinking later seeped into object-oriented programming and the design of computational objects. It is no coincidence, as I will show, that the principles of object-oriented programming were first tested in a piece of CAD software, and that its objects were the elementary objects of modern design codified at the Bauhaus. The story has taken a twist as computational thinking has oozed back into architecture in recent decades. All this happened well before object-oriented ontology (OOO) came on the scene. So while OOO might have something to say to architecture, it is probably not something new, but rather a remainder of ideas lurking deep within the discipline.

Indeed, the priority of disciplines could be flipped: the long history of thinking about the inner life of objects in architecture could serve as a reminder for philosophers. From the perspective of architecture, OOO seems a little confused. As described

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by Harman, OOO begins by rejecting Kant's argument that we can only ever know objects from our own subjective viewpoint; OOO wants instead to come to terms with the "hidden" features of objects that "withdraw" from subjective apprehension.1 Objects should be seen as autonomous and self-sufficient. What is strange in this is that the way recent philosophers have been thinking about autonomous, non-culture-bound objects seems very similar to the way modern architects once thought about culturally situated objects. Since the middle of the nineteenth century at the latest, architects have been fascinated by the way in which an object, once taken out of its original cultural context, becomes difficult to understand and seems to possess a hidden, inaccessible, mysterious depth— in short, a meaning, but a meaning rendered unintelligible by the fact that we have "lost" its language. Architects in the nineteenth century turned to objects because they seemed connected to a cultural life-force that they thought was lacking in industrial society. The conundrum, then, is that architects' idea of the hidden aspect of objects seems to be entirely different from the hidden aspect that OOO describes. Architects are eager to see objects as part of human cultures, while the whole point of OOO is to break our habit of seeing human subjectivity reflected everywhere and to appreciate the radical otherness of things.

I should emphasize that these contradictory sets of concepts stem, in both cases, from deep convictions. Philosophers argue that in order to do justice by objects, we ought to allow them autonomy and even treat them with the respect usually reserved for sentient beings. It is from this vantage point that Harman has been insisting that objects are more than the sum of their external features and relations—in other words, that objects are neither historically nor socially determined. As for architects, the inner life of objects became a matter of concern because they saw that modern civilization was dissolving the life-force of traditional cultures by killing cultural objects. Architects found themselves in a position to attempt the reanimation of objects in order to give birth to a modern culture.

OBJECT-ORIENTED ARCHITECTURE

While philosophy thrives on precise definitions, the concept of objecthood in art and architecture has been characterized by conflation. Objects are, first of all, things that have been abstracted from their environment. From here everything gets fuzzy. In their textbook entry on "abstraction," Rosalind Krauss, Yve-Alain Bois, Hal Foster, and Benjamin Buchloh write that the

tension between idealist and materialist imperatives runs throughout modernist abstraction. ... In the end, these tensions are integral to abstraction, which is best defined as a category that manages such contradictions—holds them in suspension, or puts them into dialectical play.2

The same could be said about the objects of art more generally. According to Jacques Rancière, the category of art has, since the emergence of aesthetic philosophy around 1800, existed in tension with its opposite term, life. Rancière

points to Friedrich Schiller's inaugural essay on modern aesthetics:

Schiller says that aesthetic experience will bear the edifice of the art of the beautiful and of the art of living. The entire question of the "politics of aesthetics"—in other words, of the aesthetic regime of art—turns on this short conjunction. ... Matters would be easy if we could merely say—naïvely—that the beauties of art must be subtracted from any politicization, or—knowingly—that the alleged autonomy of art disguises its dependence upon domination. Unfortunately this is not the case.3

According to Rancière, art has been governed by "the aesthetic formula [that] ties art to nonart" from the late eighteenth century to the present. The aesthetic regime, as he calls it, depends on a constant shuttling between these two poles—art and life— and the testing of every combination in between.

I would like to re-word this slightly and say that modernism in art and architecture holds objects and life in unresolved opposition. This is a central tension in the genetic makeup of architecture as we know it.

To get a sense of the changes that occurred between the classical system of architecture and one that is recognizably modern, we need look no further than the Great Exhibition of 1851, the coming-out party of modern industry. In London, in the Crystal Palace, the newest and best products from Western Europe were displayed in stark contrast to indigenous products from around the world. Alina Payne begins her authoritative book on the modern rise of the object

with Gottfried Semper, an architect and theorist who was deeply affected by the premonitions of mass consumerism and global trade on display at the Great Exhibition.4 Having moved from Germany, an industrially backward part of the world, to London, the foremost city in the emerging global economy, Semper was acutely aware of the way industrial objects could transform a society by replacing traditional cultural production. His own response remains inspiring: in an intellectually heroic re-evaluation of values, Semper abandoned the preoccupations of academic architecture and developed a theory that begins with cultural artifacts. Architecture, Semper argued, has its origin not in Greek temples but in weaving. Architects have little use for architectural precedents if they want to understand the techniques for making and using rugs; in place of academic architectural history, architects could turn to the new sciences of anthropology and ethnology to understand their discipline. Semper offered not only a new theory for architecture but also an entirely different sphere of reference, at the heart of which was the relationship between cultural objects and cultural life.

1 Graham Harman, *Tool-Being: Heidegger and the Metaphysics of Objects* (Peru, IL: Open Court, 2002).

2 Rosalind E. Krauss, Yve-Alain Bois, Hal Foster, and Benjamin H. D. Buchloh, *Art Since 1900: Modernism, Anti-modernism, Postmodernism* (London: Thames & Hudson, 2005), 118–124.

3 Jacques Rancière, "The Aesthetic Revolution and Its Outcomes: Emplotments of Autonomy and Heteronomy," *New Left Review* 14 (March–April 2002), 124.

4 Alina Payne, *From Ornament to Object: Genealogies of Architectural Modernism* (New Haven: Yale University Press, 2012).

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Semper's turn to objects was both a symptom of and a proposed solution to a widely perceived cultural crisis. Other theorists offered similar formulations. George Simmel noted that the growth of cities had led to the loss of folk traditions and the emergence of a new type of blasé individual.5 For Adolf Loos, the eclipse of craft production made ornament immoral.6 Expressionists from Henry van de Velde to Wassily Kandinsky were concerned with rebuilding a lost sense of community through artistic labour.

The defining institution of modern architecture, the Bauhaus, was infamously founded on just such an agenda. Here is an excerpt from the breathless pronouncement of Walter Gropius, its first director, on the founding of the school:

Together let us desire, conceive, and create the new structure of the future, which will embrace architecture and sculpture and painting in one unity and which will one day rise towards heaven from the hands of a million workers like the crystal symbol of a new faith.7
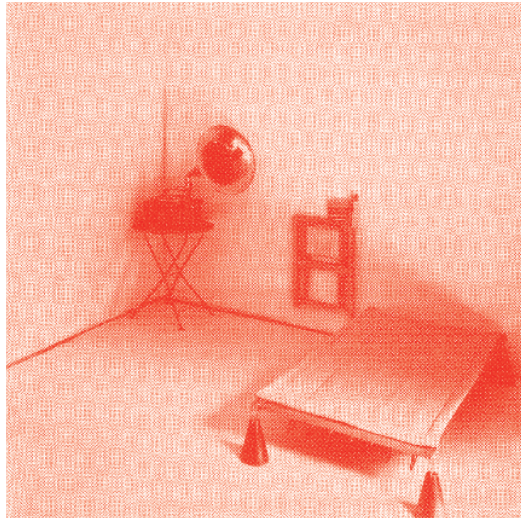

Figure 1: Hannes Meyer, Co-op. Interior, 1926

More than any other institution of modernism, the Bauhaus hit upon a winning formula: to replace the obsolete figure of the architect, instructors at the Bauhaus consolidated a pedagogy that would train designers to make objects. If Semper marks the beginning of the attempt to solve the crisis of culture by reorienting architecture towards objects—both older cultural objects and the new objects of an emerging consumer culture—the Bauhaus marks the moment when architecture made peace with product design. By 1926, the second director of the Bauhaus, Hannes Meyer, could create a minimum dwelling in which the walls were white fabric backdrops for charismatic objects and it would seem in keeping with the direction of the times (Figure 1). Architecture was being replaced by

objects, and architects were becoming their producers and curators.

The conceptual elements of object-orientation were combined and inflected in infinitely various ways by modern architects—I will outline a few permutations below. But object-orientation also invited polemical responses. If architects for the most part promoted the cultural life of objects, the artistic avant garde of the early twentieth century became obsessed with developing methods to torture and kill them. Think of the futurists' iconoclasm ("Take up your pickaxes, your axes and hammers and wreck, wreck the venerable cities, pitilessly!"), the cubists' shattering of figures and space, the surrealists' and dadaists' mocking distortions of found objects and reconstructions from trash. The famous artists of the Bauhaus, Kandinsky and Paul Klee, tended not towards destruction but careful vivisection. Their methods combined extremes of analysis and metaphysics—similar, in some ways, to the sensibility of OOO.

EMPATHY SCHOOL AND THE BECOMING OF FORMS

Before he started teaching at the Bauhaus in 1921, Klee lived the scattered life of a struggling artist. He played violin in an orchestra, pursued Gestalt psychology, and took a serious interest in children's drawings (Klee was also a stay-at-home dad.) One of the earliest of his characteristically oracular pronouncements comes from this period: "The object is surely dead. The sensation of the object is of first importance."8 Notice that the object is dead but not

entirely absent; it remains as an afterimage of sensations. Klee probably had something in mind like the famous illusion of a vase created by the negative space between the profiles of two faces, which is both absent (a void space) and present (as a perception). It was this sort of ambiguity between the mysterious presence and palpable absence of objects that Klee was to investigate throughout his career.

Klee was notorious at the Bauhaus for his metaphysical mindset. A caricature from 1928 titled "Der Bauhausbuddah" shows him as a guru floating above the school. As a successful artist, Klee presumably felt little urgency to condense his techniques into digestible pedagogy. In his first semester of teaching, Klee's classes were structured around ad hoc analyses of his own paintings.9 The following semester, Klee shifted focus to artistic forms "derived from the structural principles or the functional laws of nature." The historian Norbert Schmitz notes that Klee's

5 Georg Simmel, "The Metropolis and Mental Life" (1903).

6 Adolf Loos, "Ornament and Crime" (1908).

7 Walter Gropius, "Programme of the Staatliches Bauhaus in Weimar" (1919), printed in Ulrich Conrads (editor), *Programs and Manifestoes on 20th-century Architecture* (Cambridge, MA: MIT Press, 1970), 49.

8 Paul Klee, *The Diaries of Paul Klee, 1898–1918* (Berkeley: University of California Press, 1968), 670. Klee's thinking about sensation was derived from the psychological theories of Ernst Mach, whose *Analysis of Sensations* he had just read. See Marianne L. Teuber, "Paul Klee: Between Art and Visual Science," pre-sented at the 12th annual meeting of the Cheiron Society, Bowdoin College, Maine (cited in John Willats, *Art and Representation: New Principles in the Analysis of Pictures* (Princeton: Princeton University press, 1997), 264).

9 Magdalena Droste, *Bauhaus, 1919–1933* (Köln: Taschen, 1998), 62–65.

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precipitous leaps between art and nature—between a close look at the principles of composition and developing a "feeling for forces"—was jarring; one student wrote in his diary that he could not attend Klee's classes "without inner preparation." In the 1922–23 winter semester, Klee re-worked his course around theories he was developing of colour and the perception of movement in static pictures. It appears that Klee was building up a sensitivity—perhaps in himself more than in his students—for what he called "the becoming of forms."

Klee's drawings suggest several methods for facilitating this becoming. One was to depict forms in the same graphic material as the fields from which they emerge. In a set of three drawings from 1927, the "rain" at the top, the "pagodas" and their reflections shimmering off the water in the middle, and the "cathedrals" at the bottom are made of similar patterns of lines. This is not simply an attempt to show the emergence of a figure from a field: the juxtaposition of forms (cathedrals, pagodas), fields (rain), and sensations (the glimmering movement of light reflected off water) makes it impossible to pin down the direction of becoming. Is the figure emerging from the field, or is the figure dis-
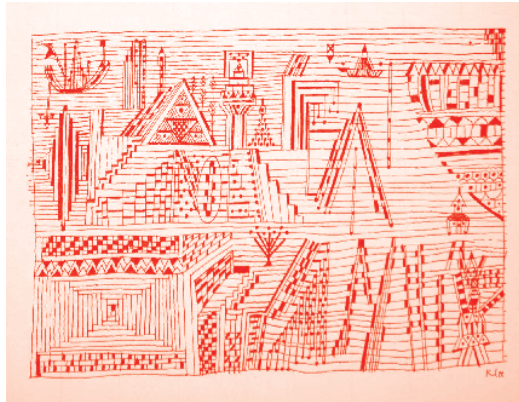

Figure 2. Paul Klee, *Air-tsu-dni*, 1927

solving into the field? Once the viewer is put into the right frame of mind, properties of one element (rain or reflections) transpose into properties of others (pagodas and cathedrals). We imagine that buildings can be made of glimmering light and that sensations have an architecture of their own. Klee's strategy is to create a space of association in which it would be difficult not to think, for example, that the force of gravity acting on rain has its analog in the force of life resisting it, embodied by buildings. In counterposing objects and life, Klee suggests that they are not essentially different.

Klee's importance for the argument I am trying to make has to do with the way he pursues a range of methods for imbuing objects with life, while at the same time trying to avoid any implication that this life-force depends on artistic subjectivity. Another one of his techniques, for example, was to hide

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figures within a graphic field so that the viewer discovers them one by one, enacting a drawn-out process analogous to emergence (Figure 2). While he could have described his graphic methods easily enough as a subjective, artistic process, Klee instead filled his *Notebooks* with psycho-physiological explanations of his artworks. For example: "Rising from the bottom towards the source of light, we feel an increase of unparalleled intensity and breadth between the poles."[10] In this sort of description, Klee effects a short circuit between the artwork and the viewer that leaves out the artist and the whole realm of techniques. Figures emerge, he suggests, because the same life-force resonates in the graphic material of the drawing and in the mind of the viewer. The artist does not *create* form so much as, through a quasi-automatic process of drawing, set up a force-field out of which form emerges, as if on its own.

Klee shared methods for effecting the autonomy of objects with many of his contemporaries. If the central question of the Bauhaus was "whether art can be taught at all,"[11] Klee's theory of the becoming of form gives the typical Bauhaus answer: no, because that would entail the fool-proof, mechanical transmission of a subjective process. Artists do not make art; they facilitate the becoming of forms. This requires an altogether different skill: the rare gift of the spiritual medium. To lay out a fool-proof method for facilitating becoming would be to invite suspicion that the profound but fragile spiritual content—the mysterious inner life of the object—is nothing but the

ticking of an automoton. We might begin to suspect that the artwork does not really contain its own life-force and that any hint that it does is probably created by a clever sleight of hand. The importance of the Bauhaus, methodologically, lies in this epistemological short circuit that Klee and others developed.

Another example of this short circuit begins with one of the famous origin myths of modern art. In a notebook entry from 1913, Kandinsky tells the story of entering his studio one evening and encountering "an indescribably beautiful picture."[12] The picture turned out to be an unfinished painting turned on its side, caught in a beam of moonlight. Though it was a figurative painting, the figures were unrecognizable in this unintended orientation. The next day Kandinsky tried to re-create the impression in a new painting, but all the objects in the picture spoiled his reverie.[13] Kandinsky: "Now I could see that objects harmed my pictures … a terrifying abyss of all kinds of questions, a wealth of responsibilities stretched before me. And most important of all: What is to replace the missing object?"

Just as Klee replaced the dead object with a ghostly afterimage of

10 Paul Klee, *Notebooks: Volume 1: The Thinking Eye* (London: Lund Humphries, 1961), 10.

11 Norbert M. Schmitz, "Wassily Kandinsky," in *Bauhaus*, ed. Jeannine Fiedler and Peter Feierabend (Köln: Könemann, 2000), 264.

12 Wassily Kandinsky, "Remi-niscences," in *Kandinsky: Complete Writings on Art, Volume One (1901–1921)*, ed. Kenneth C. Lindsay and Peter Vargo (Boston: G. K. Hall & Co., 1982), 369–370.

13 Daniel Naegele, "Object, Image, Aura: Le Corbusier and the Architecture of Photography," *Harvard Design Magazine*, Fall 1998.

Figure 3. Wassily Kandinsky, *Orange*, 1923

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sensations, Kandinsky developed methods to replace straightforward depictions of objects with figures that seem to emerge from basic graphic elements (Figure 3). Also like Klee, Kandinsky was reluctant to give a bare-bones explanation of his own artistic methods. His courses at the Bauhaus focused on "analytical drawing" and "abstract elements of form" from which he built up a "universally valid grammar of form and color."[14] Kandinsky described his artistic program as a leap between the elements of drawing and a spiritual effect: "Only by means of a microscopic analysis can the science of art lead to comprehensive synthesis, which will extend far beyond the confines of art into the realm of the 'oneness' of the 'human' and the 'divine'."[15] Kandinsky's description, like

Klee's, leaves no place for the artist. Instead of a mediating realm of communication and meaning, Kandinsky implies a direct connection—a fundamental resonance—between colours and spirit, lines and life-force.

This short-circuit strategy has a name: empathy theory. The preliminary course taught by Josef Albers at the Bauhaus centred on a similar but more economical technique for creating an empathetic effect. Unlike his artist colleagues, Albers oriented his teaching pragmatically towards the constraints of industrial production. One student recounts a story of how Albers "strode into the room with a bundle of newspaper under his arm," handed them out, and gave everyone the assignment to "make it into something more than it is at the moment."[16] When he came back a few hours later, the result that stood out to Albers was one of the simplest: "all [the student] had done was fold the newspaper lengthwise, so that it stood upright like two wings." This made it "visually active" and less "boring" but not overtly symbolic. Albers pointed out other abstract forms that implied movement or dynamic poise. Looking at photographs of these sculptures arranged on the classroom floor, we are confronted with a compelling model of how design education can set aside artistic intentionality in favour of collective experimentation (Figure 4). There is little room for personal motivation or meaning; instead, students are offered a consensual experience of the relationship between forms and the feelings they evoke. One student described the experience as "group therapy."

Albers's studio pedagogy was based on several decades of trickled-down empathy theory, a popular paradigm of psychology in the mid-to-late-nineteenth century that emerged as an alternative to scientific analysis. Rather than breaking things apart into constitutive elements as analytical psychologists would, empathy theorists developed techniques for "feeling into" the underlying spiritual reality.[17] The experience of an aesthetic object, in particular, was understood as equivalent to an encounter with another human being. By the early twentieth century, empathy theory had become common sense, in the artistic community in Germany. The pedagogy of the Bauhaus was based on developing a feel for objects. It has been argued that this was a uniquely architectural form of knowledge. As historian Zeynep Çelik Alexander explains, by "juxtaposing, rotating, reversing, superimposing, and transforming forms, they would be producing an unusual form of knowledge unlike that in the humanities, social, or natural sciences."[18]

This pedagogical model—the creativity school model—was exported far and wide from the Bauhaus.

Figure 4. Assessment of work in Josef Alber's preliminary course (c.1929); photograph by Umbo

14 Schmitz, "Wassily Kandinsky," 263.

15 Wassily Kandinsky, *Point and Line to Plane* (Mineola, NY: Dover, 1979), 21 (originally published in 1926).

16 Norbert M. Schmitz, "The Preliminary Course under Josef Albers–Creativity School," in *Bauhaus*, ed. Jeannine Fiedler and Peter Feierabend (Köln: Könemann, 2000), 374–375.

17 Karsten Stueber, "Empathy," in *The Stanford Encyclopedia of Philosophy* (Spring 2017 Edition), ed. Edward Zalta, https://plato.stanford.edu/archives/spr2017/entries/empathy.

18 Zeynep Çelik Alexander, "Metrics of Experience: August Endell's Phenomenology of Architecture," *Grey Room* 40 (Summer 2010), 74.

Albers brought it with him to Black Mountain College in North Carolina. Something similar came along with László Moholy-Nagy to the New Bauhaus in Chicago, with Max Bill to the Hochschule für Gestaltung in Ulm, and with Walter Gropius to Harvard's Graduate School of Design in Boston. The empathetic theory of design—fusing the extremes of analysis and metaphysics, form and feeling, objects and life—has since become the hegemonic formula for architecture and design pedagogy.

The basic features of Semper's theory, which based architecture on objects infused with cultural life, have thus enjoyed profound success. Klee and Kandinsky carried out the vivisection of the objects of abstract art—teasing apart graphic elements in search of a spark of life—because they, along with their expressionist compatriots, thought that these modern objects would bear the seeds of a new community.

LE CORBUSIER AND THE OBJECTS OF MODERN CULTURE

Architects' growing preoccupation with culture-building was apparent by mid-century. "The vernacular," in particular, was on everyone's mind. Bernard

Figure 5. Aerial view of *Unité d'Habitation*, Le Corbusier, 1952

Rudofsky's *Architecture without Architects* (1964) now serves as the monument to the era, but at the time students of modernism were also reading an essay by James Stirling. Stirling analyzed a building by Le Corbusier, Maison Jaoul, whose colour, material, and form seemed to repudiate his earlier, more abstract work.[19] It seemed as if the cosmology of modernism was being overturned. The architect who had fought for blank boxes in which to place the objects of industry (rooms similar to Meyer's minimum dwelling) was now crafting building-sized objects that seemed to belong to a pre-modern era.

Though certain aspects of his architecture looked shockingly new in the post-war period, Le Corbusier had incorporated vernacular objects into

his thinking decades earlier. Le Corbusier was a great sponge of contemporary ideas, and he was not immune to the force of expressionism emanating from Germany in the first decade of the twentieth century.[20] There is more than a formal comparison to be made between the abstract objects sitting on Albers's classroom floor and the forms sitting on plinths or hilltops in so many of Le Corbusier's architectural projects (Figure 5). They share an ideology and a methodology as well.

Some of the sources of Le Corbusier's ideas are well known: his thoughts about the arrangement of objects was derived, in part, from August Choisy's picturesque reading of the acropolis and from elementary school exercises with blocks, for example. A less well-known source of Le Corbusier's sensibility towards vernacular objects seems to have been the first part of his so-called "Voyage to the Orient"—a modern grand tour through the Balkans, Turkey, Greece, and Italy. The historian Francesco Passanti, who has combed through Le Corbusier's notebooks from the trip, writes that while the second part of the voyage focused on architecture, the first part, which passed through Eastern Europe, was "devoted to vernacular things."[21]

Passanti shows that "the real emotion, in [Le Corbusier's] Balkan notes, concerns people and the relationship of people and their artifacts." In a passage on traditional pottery in a village "untouched by Western civilization," Le Corbusier writes about "the village potter, whose fingers blindly obey the orders of a centuries-old tradition." For Le Corbusier, vernacular culture is a force that passes through people as if through a medium: "it is the fingers of these potters that work, not their spirit." Or, commenting on a performance of traditional music: "the Gypsies let the race speak." For Le Corbusier, vernacular objects embody and emanate a culture independently of the intentions of their makers.

Le Corbusier was acutely aware, like Semper, of the after-effects of industrialization. Between his childhood in a Swiss village and his time as an intern working for Peter Behrens in Berlin, Le Corbusier certainly saw its effects on watchmaking and architecture. So his trip through the Balkans did not offer a new experience, exactly, but rather an isolated case suitable for an anthropological investigation. Distance and detachment can aid the process of generalizing from observations. After leaving the Balkans, Le Corbusier travelled through Turkey, where traditional pottery was falling out of use and being replaced by a modern by-product: recycled petroleum cans. Thus the trip through Eastern Europe doubled as ethnographic field work, offering the spectacle of culture changing right before his eyes—and objects changing with them.

19 James Stirling, "Garches to Jaoul: Le Corbusier as Domestic Architect in 1927 and 1953," *The Architectural Review* 118 (September 1955): 145–151.

20 Jean-Louis Cohen, "Introduction," in *Le Corbusier, Toward an Architecture* (Los Angeles: Getty Research Institute, 2007).

21 Francesco Passanti, "The Vernacular, Modernism, and Le Corbusier," *Journal of of the Society of Architectural Historians* 56, no. 4 (December 1997): 439.

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Figure 6. Charles-Édouard Jeanneret (Le Corbusier), *Still Life*, 1919

It was from thinking about vernacular objects, not architecture, that Le Corbusier developed his theory of culture. Foreign cultural objects seemed to Le Corbusier to have a singularity of function and meaning, but he seems not to have thought the same way about vernacular buildings. As Passanti notes, Le Corbusier tended to pull elements from vernacular buildings—window or courtyard types, for example—rather than taking the building as a whole.22 An unimportant building in a traditional village seems to merge with others; it has no identity of its own. A brightly coloured clay pot, on the other hand, seems to be singular in both meaning and function. The pot holds liquid, and it looks like it holds liquid. (One could even say it is "a machine for carrying liquid.") As a set, these meaningful forms—which Le Corbusier called archetypes—add
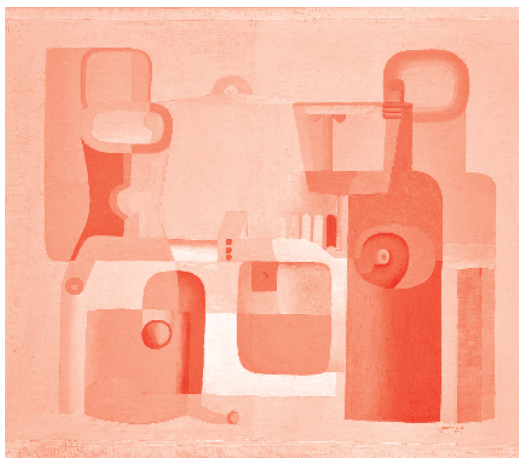

Figure 7. Charles-Édouard Jeanneret (Le Corbusier), *Still Life Filled with Space*, 1924

up to a culture in its material form. Objects communicate in the language of a specific culture; objects exhibit intention and willfulness. For Le Corbusier, these traits of objects are the essential traits of modern architecture and the modern architect.

If the relationship between people and their artifacts that Le Corbusier observed in Eastern Europe formed the conceptual foundation for his approach to design, this is not to suggest that he wanted to import foreign objects or foreign cultures into Western Europe. As Passanti notes, Le Corbusier thought that "the solution to the ravages of modernization should not be sought in the example of pre-modern cultures, because they are even more vulnerable than our own."23 A more viable option would be to deploy objects that embody modern culture. Like Adolf Loos, Le Corbusier sometimes populated his architecture with the found objects of modernism. His *Pavillon de L'Esprit Nouveau,* for example, was filled with iconic Thonet chairs, a simple table, leather armchairs, a chest of drawers, and paintings.24 Another option would be to create his own objects that embody a modern vernacular. The furniture Le Corbusier made from bent steel tubing into machine-like forms fits into this category, as do some of his buildings. But in order to understand how exactly Le Corbusier sought to imbue his objects with life, the best place to look is yet another arena: his paintings.

Like Klee and Kandinsky, Le Corbusier developed a method of painting that would recompose and reanimate the objects killed by the

avant garde. Le Corbusier co-authored a manifesto on "Purism" with Amedee Ozenfant in 1918. Against Cubist distortions, the program of Purism was, as Robert Slutzky writes, to "rescue *objets-types* from pictorial misrepresentation by accentuating their inherent architectonic qualities, depicting them through the more 'honest' and universal definitions of plan, section, and elevation."25 Le Corbusier was drawn to new, stripped-down objects of industrial manufacturing—pitchers, glasses, bottles, carafes, siphons, pots, dishes, dice, boxes, lanterns, architectural moldings, books, violins, and guitars—which he placed together in careful, close juxtapositions (Figure 6).

These would be boring paintings if they were mere collections of objects, but in fact they seem charged with psychological drama. The resulting "marriage of contours" is executed with enough abstraction and ambiguity that the objects depicted could just as well be imagined as figures in an urban scene or people gathered in a room. Objects become "actors on the stage of a still-life theater."26 Even more, the arrangement of characters of different shapes, sizes, orientations, and visages create a metaphor of family, imbuing the objects with all the complicated emotional charge of intense interpersonal relations.

While Le Corbusier's micro-technique in these paintings is to create a drama of contours, his preferred

22 Ibid., 439.
23 Ibid.
24 Payne, *From Ornament to Object*, 3.

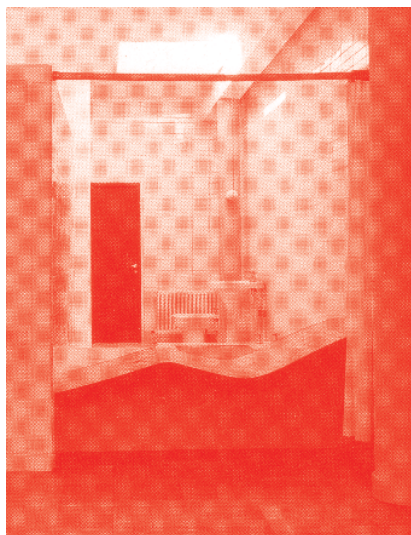25 Robert Slutzky, "Après le Purisme," *Assemblage* 4 (October 1987): 95.
26 Ibid., 96.

Figure 8. Interior of main bathroom on the first floor of the Villa Savoye (Le Corbusier, 1931); photograph by Roberto Schezen

macro-technique involves the blunt, even absurd juxtapositions of objects. Why is a scrap of molding sitting on the table with a bottle and a guitar? The juxtaposition implies a profound meaning while offering no clue as to what it might be. This technique was the cornerstone also of De Chirico's paintings: the juxtaposition of a bunch of bananas and a sculptural bust on a barren street creates a metaphysical atmosphere.27 Le Corbusier tends towards messier arrangements,

Figure 9. Le Corbusier, A "composition" on the terrace of the Villa Savoye, c. 1931

but they are no less enigmatic.

As the years went by, Le Corbusier diverged more and more from the principles of Purism and allowed his "psychic energies to overflow into his work."28 As Slutzky describes one painting (Figure 7),

The Purist surface manipulations of plan-section-elevation, intended to elucidate the concealed structures of presumably ordinary objects, now in fact have just the opposite effect: that of engendering ambiguously related animistic subjects, trapped within a garden of delights rather more mechanistically inspired than that of Bosch.29

Modern vernacular objects are thus invested with a primordial life-force as well as a calculating psychology.

Le Corbusier transferred methods from Purism to architecture. He sometimes composed rooms like still-lifes, ready to be photographed from a particular vantage. One view of the bathroom of Villa Savoye, for example, creates a marriage of contours similar to his paintings using tiled surfaces, bathroom fixtures, and a door painted an ominous black (Figure 8).

A series of early photographs of Villa Savoye perhaps marks the point at which Le Corbusier's techniques were distilled into a trope. One is a view over a table with a pair of sunglasses, a cigarette box, a bowler hat, and a cylindrical object (Figure 9). Another in this series features a ceramic teapot and half of a giant loaf of bread; yet another includes a fan, a milk pot, a snake-like fish, and a stainless-steel teapot. The photographs of Le Corbusier's furniture in the living room belong to the same

genre. At this point the techniques of Purism were ripe for co-optation—they were well on their way to becoming advertising clichés. These are the forerunners, both pictorially and ideologically, of the neatly arranged, aesthetically uniform, ambiguously related but symbolically charged objects in the spreads of *Monocle* magazine or the tableaux of Wes Anderson films. These sophisticated objects, which remain perfectly composed and impeccably reserved, are meant to reflect the personality of their owners. This was the moment, in short, in which the cultural objects of modernism were enrolled in the regime of lifestyle consumerism.

In retrospect, then, it is clear that Le Corbusier was entirely successful in creating modern vernacular objects that were part of an authentic modern culture, though it may not have been the type of cultural community the expressionists had in mind. By now the consequences of architecture's turn towards objects have become ubiquitous. The motivations have been honed and the methods have been perfected. It is now not at all unusual to grant objects autonomy or to imagine they have an inner life and mysterious depths. In fact, we depend on objects to be cool, inscrutable, and intelligent so that their properties will (we hope!) rub off on us, their owners. The strategy is clear. But by now the danger is also apparent: if

27 Ara H. Merjian, "Discipline and Ridicule: Giorgio de Chirico, Le Corbusier, and the Objects of Architecture in Interwar Paris," *Grey Room* 44 (Summer 2011): 54–85.

28 Slutzky, "Après le Purisme," 101.
29 Ibid.

we rely on objects as the link between people and culture, objects may end up being a substitute for culture. Certain longings are likewise part of the package: nostalgia for an imagined lost culture, the desire to be connected to culture without the mediation of object. Modern individuality, compelling objects, and cultural life all belong together; you cannot have one without the others.

OBJECT-ORIENTED PROGRAMMING

It is not obvious that object-oriented programming would have anything to do with object-oriented architecture or object-oriented ontology, but the circle closes in uncanny ways. One of the first works of computer art was a re-creation by Frieder Nake of a drawing by Klee (Figure 10). Indeed, it was in some ways a realization of Klee's project. Nake did not copy the drawing, but rather
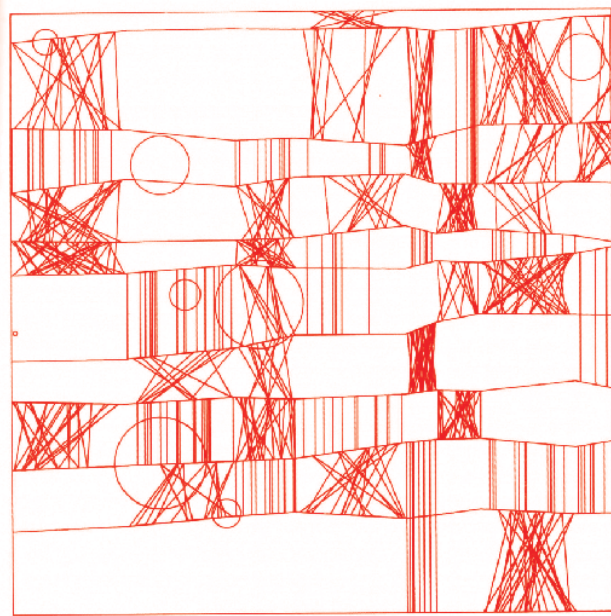

Figure 10. Frieder Nake, *Homage à Paul Klee*, 1965

distilled the algorithm behind it so that a computer could draw something very similar. Nake could run the program again and again and the computer would create any number of Klee-like drawings—Klee's plan to cut out the artist and to allow forms to "become" on their own, seemed to have been fulfilled. We may be suspicious of this now (after all, computers are hardly spitting out masterpieces on their own, and people are still very much involved), but when Nake's work was exhibited in 1965, local artists staged a protest and *Der Spiegel* ran a scathing review denouncing artificial intelligence as a threat to human agency. The arrival of computers seemed to have turned an artistic thought-

experiment into a dangerous reality.

What was unsettling about computation was that it had driven a wedge of rigorous coding between intuition and realization. Klee might simply draw something, but Nake had to specify every step required to produce a drawing. This computational way of thinking necessitated an updated concept of objecthood: objects could now be algorithmic. The historical concept I want to pinpoint was fully present in everything from programming to conceptual art in the 1960s. Imagine an object with two sides, or two faces. One face of the algorithmic object is an actual, physical presence—perhaps an image on a screen or a physical action. The other face, by contrast, is a mysterious mass of hidden code that may never be fully revealed or acted out; these are the algorithms or procedures that guide the action and define the concrete form. The algorithmic object links the virtual and the actual—it is the code and parameters, as well as the series of instantiations in which they are manifest.

Not coincidentally, the double-sidedness of the algorithmic object is also the basic idea of structuralism. According to Ferdinand de Saussure, the sign also has two sides: one faces the structure of language and the other is oriented toward our capacity to understand particular speech acts.[30] Expressionist artists and architects at the Bauhaus were interested in creating a "new language of form" for the "new man"; inheritors of the Bauhaus tradition such as the Hochschule für Gestaltung in Ulm updated this agenda in the

fashionable terms of linguistic science. There, the language of form was taught in terms of parameters, proportions, and combinatorics.

Still, the first attempts to work out a comprehensive, computerized system for formal manipulation came as a shock. One popularizer of the project talked of "human-computer symbiosis"; another researcher in charge of the CAD Project at MIT (one of the first programs of its kind, founded in 1959) said drily that "the user must be able to establish a controlled environment, set up an experiment, try test cases, analyze results and modify whatever is appropriate, all by simulation on the computer."[31] In the story I have been telling, this ought to sound like a nefarious turn: the life coursing through objects and culture is diverted into the machine. Computer simulation certainly changed what it meant for something to be "inside" and "alive," as people started imagining life in virtual environments. With the advent of CAD, the computer became a medium—in the spiritual, as well as the artistic, sense—for creating and communing with objects.

Within a couple years, the CAD Project had a working prototype. Sketchpad—generally recognized as the first CAD software—had a profound impact on computer science and beyond. Generally, Sketchpad provided a model and a proof of

30 Fredric Jameson, *The Prison-House of Language: A Critical Account of Structuralism and Russian Formalism* (Princeton: Princeton University Press, 1975).

31 Douglas T. Ross, *Computer-Aided Design: A Statement of Objectives, Technical Memorandum 8436-TM-4* (Cambridge, MA: MIT Electronic Systems Lab, 1960), 15.

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how a user can interact with objects inside a computer.[32] More specifically, Sketchpad was the first software written using the principles of "object-oriented programming." Rather than thinking about a program as a series of commands, Ivan Sutherland, the programmer behind Sketchpad, imaged programming as a way of creating an environment in which users could interact with objects (Figure 11). Technically, Sutherland created what he called a "ring structure" in computer memory, in which every "object" had its "place," as well as places for "links" to other objects. A location in memory might have a line object, for example, which would have links to two point objects that would specify its two endpoints. Crucially, properties were also thought of as objects: a colour can be specified as an object (perhaps with three sub-objects: R, G, and B values). The brilliance of Sutherland's programming of Sketchpad was the idea of creating a generic object-structure in which anything could be thought of as an algorithmic object.

Sutherland's Sketchpad thus stands as a generalization of abstraction in

Figure 11. Drawing at the Sketchpad console (Ivan Sutherland, 1963)

art and design. It would fit Kandinsky's project of analysis and synthesis perfectly; his points, lines, and planes would find their coherence in a virtual object-structure. The figure of the programmer-designer works through empathy with algorithmic objects.

Sutherland was a relatively no-nonsense type. Luckily one of his acolytes, Alan Kay, was not shy about developing the philosophy of object-orientation. In the history of computation, Kay is respected as one of the pioneers of personal computing—an idea which was a systematic application of Sutherland's concept of computing as an interaction with virtual objects. Using contemporary software, we now have no problem thinking of, say, documents and folders and desktops; in fact things like these that exist "inside" the computer are equivalent to things "outside," like physical desktops, pieces of paper, keyboards, monitors, and even the computer itself. Everything, virtual or physical, is an algorithmic

object. Kay's well-known manifesto of object-oriented programming contains the following principles:
1. Everything is an object.
2. Objects communicate by sending and receiving messages.
3. Objects have their own memory.
4. Every object is an instance of a class.[33]

Kay rigorously worked these principles out in his programming language, SmallTalk. They have since filtered into widespread usage in languages like C++ and Java. This is the ontology of today's software.

Though I do not have the space to detail the connections, it should be at least somewhat clear that object-oriented programming is compatible with object-oriented ontology.[34] The world of object-oriented programming is a flat world made of crisply delineated things that are in direct communication with each other, with no intervening medium. Objects have a hidden interior: they contain memories and functions for taking in, processing, and sending messages. There is no need, conceptually, for explanations at a higher level (such as society) or a lower level (such as physics); the important features of the world (inside the computer or outside) can be accessed by thinking about objects and their relations. This is Kay's view of the world, and it is also Harman's.

What is most interesting for architects, however, is that object-oriented programming is also compatible with the object-orientation of Klee, Kandinsky, and Le Corbusier. Like the artistic and architectural avant

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garde, Kay hoped that his algorithmic objects would generate a new culture. With characteristic hippie-techie optimism, Kay hoped that children would create their own objects, inside the computer and outside.[35] His pioneering work at Xerox PARC developed hardware and software to put the power and flexibility of computation into the hands of everyone. When Kay said that "everything is an object," he meant it literally—people and ecosystems are algorithmic objects just as virtual documents are. Scary as this sounds, it also allowed Kay to imagine that the humblest bit of code could carry the seeds of a new community. Indeed, the implication was not that humans should be thought of as "mere objects," but rather to challenge us to imagine that the seemingly insignificant things we interact with every day are every bit as consequential to human life as biological organisms.

THE SENSIBILITY OF OBJECT-ORIENTATION

Returning to the artists' outcry against the first algorithmic art, it appears that today's battle lines surrounding object-oriented ontology were already in place in 1965. One side (the artists then, some architects

32 Matthew Allen, "Representing Computer-Aided Design: Screenshots and the Interactive Computer circa 1960," *Perspectives on Science* 24, no. 6 (November–December 2016): 637–688.

33 Alan Kay, "The Early History of Small-talk," *ACM SIGPLAN Notices* 28, no. 3 (1993): 69–95.

34 Alexander Galloway spells out the connections and their implications in "The Poverty of Philosophy: Realism and Post-Fordism," *Critical Inquiry* 39, no. 2 (Winter 2013): 347–366.

35 Lev Manovich, *Software Takes Command* (London: Bloomsbury Academic, 2013).

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now) argued for the unique role and responsibility of humans: the role of the subject who is responsible for giving meaning to the world and aligning action within a moral sphere. The other side (computer artists then, object-oriented ontologists now) pays more attention to the objective world: the things, facts, numbers, and algorithms that remain unaffected by human agendas. The former are rightly suspicious of the latter, but recent ontologists certainly have a point when they emphasize—as Timothy Morton does36—that global warming, for example, will play out no matter how we spin it. There is a case to be made that politics today must first of all come to terms with the inhuman, meaningless aspect of reality.

I have been arguing that other outcomes of these negotiations between objects and politics—art and life—are possible, as we can see in the longer trajectory of object-oriented thinking. Object-orientation in architecture and design began, with Semper, as a parable about the death and possible reanimation of culture in modernity. Klee and Kandinsky saw culture as a life-force latent in the elements that make up the modern world; a properly attuned artist-medium could channel this life-force towards our spiritual rebirth. In this light, the analytical tendency of OOO and object-oriented programming is equivalent to Kandinsky's deconstruction of objects, which he thought was only the first step towards a new spiritual synthesis. The mentality that the work of the present is "only the first step" certainly explains the optimism that surrounded the discipline of programming when it was still new and seemed to be making quick progress towards a radically different world. The same could perhaps be said about the mentality of object-oriented ontologists today.

The closeness in sensibility between OOO and cultural constructivism is worth emphasizing. At its base, object-orientation is connected to ethnology and anthropology. Modern architects were fascinated with objects because they seemed to carry in themselves the code to cultural life. Objects are, strangely, the key to understanding humanity.

If this way of thinking—which I am arguing is shared between object-oriented paradigms in all the fields I have looked at—had an origin moment, I would place it in the cabinets of curiosities created right at the cusp of the modern period. Cabinets of curiosity were collections of wondrous objects, juxtaposed together on shelves. Stuffed armadillos and griffin claws sat alongside intricate ivory carvings, holy relics, and Oriental footwear. These objects resisted modern analysis and categorization not because they were meaningless, but because their true meaning was tied up in a hidden order. In medieval cosmology, the book of nature was written by God, and mankind could only hope, at best, to have brief glimpses. The historian of science Lorraine Daston has argued that this is where the concept of "the fact" came from.37 Confronted with an irrefutable but inscrutable thing—a fact—proto-scientists developed the habit of shrugging and saying that theory cannot *explain* reality, it can only *describe* isolated phenomena. Even when the newly emerging sciences began to rearrange and make some sense of the objects in cabinets, they did not overturn

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the underlying sensibility. Objects—facts—are real and partially knowable, but reality itself is as mysterious as ever. What does it *mean* that atoms are made up of electrons, protons, and neutrons? This sort of question is ruled out of bounds by the sensibility of science. I have been suggesting that this is also the sensibility of ethnologists and architects confronted with cultural objects—and it is also the sensibility of OOO. Objects are real and knowable, and they have functions and seem to carry a life-force, but their ultimate meaning is inscrutable.

It seems likely, therefore, that architects who turn to OOO for hints about possible disciplinary reorientations will find only a reflection of the ontology of modern architecture and the ontology of contemporary computational tools. Architects could instead use their own disciplinary raw material to create their own theories of the inner life of objects, which they could export to other fields as they did in the past.

36 Timothy Morton, *Hyperobjects: Philosophy and Ecology After the End of the World* (Minneapolis: University of Minnesota Press, 2013).

37 Lorraine J. Daston, "The Factual Sensibility," *Isis* 79, no. 3 (September 1988): 452–467.