DIGITAL INDETERMINISM: THE NEW DIGITAL COMMONS AND THE DISSOLUTION OF ARCHITECTURAL AUTHORSHIP

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All that is digital is variable, and all that is digitally variable is potentially open to interaction, communality and participation. In the course of the last ten years digital culture at large has enthusiastically albeit belatedly embraced all kinds of collaborative tools; this new emphasis on shared agency is a key aspect of what has been called the Web 2.0, and communal making is fast becoming a dominant technical and cultural paradigm of our age. With one significant exception: architecture. Architects have for the most part neglected or rejected the new digital commons, and digital design culture seem to have chosen its own peculiar way to liquidate humanistic and modern authorship – one which is not based on social bonds and communality, but on the quest for a new alliance among technology, complexity, indeterminacy, and the sometimes mysterious capacity that some natural and social systems have to self-organize and thrive against all odds.[1]

Mechanical machines make objects; digital machines don't. As the name suggests, digital machines, in the first instance, just produce numbers – sequences of numbers, also known as digital files. These numbers must eventually be converted into objects, or media objects (texts, images, or music, for example), but this conversion requires the subsequent intervention of actors, networks, and tools that are, in most cases, independent from the maker of the initial digital file. Users of digital tools have always been aware of this ontological difference between mechanical making and digital making. At the very beginning of the digital turn, Gilles Deleuze and Bernard Cache famously defined the new technical object of the digital age as a generic object – an open-ended mathematical notation designed for interaction and variability, which they called Objectile.[2] As in the Aristotelian theory of science, an Objectile is a class or family of object, but no object in particular. Scholastic thinkers held different views on this matter, but in the case of digital making, the class (genus) may become an event, or individual, through the addition of predicates, which today we often call specifications. A peculiar aspect of digital making is that the limits for the possible variations of some specifications, or parameters, can be set from the start, hence the term parametricism, which is today often used to denote this mode of design.

In the course of the last ten years, digital culture at large has enthusiastically, albeit belatedly, embraced all kinds of digital interactivity and collaborative tools. This new emphasis on shared agency is a key aspect of what has been called "Web 2.0", and has prompted a complete reinvention of the digital economy after the dotcom crash at the turn of the century. The reasons for this delayed surge of collaborative

1
The first part of this essay refers to arguments I developed in *The Alphabet and the Algorithm* (Cambridge, MA: The MIT Press, 2011), 4, "Epilogue: Split Agency," 123-128; and in "Digital Style," *Log* 23 (2011): 41-52. This essay was commissioned by the office of David Chipperfield for publication in the *Critical Reader* to accompany the 13th exhibition of architecture of Venice Biennale (2012), *Common Ground*. It was rejected by same after delivery.

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Gilles Deleuze, *Le pli: Leibniz et le baroque* (Paris: Éditions de Minuit, 1988), 22-26; English translation: *The Fold: Leibniz and the Baroque*, trans. Tom Conley (Minneapolis, MN: University of Minnesota Press, 1993), 15-19.

making in the digital domain were probably technical as well as social. But, when it became clear that, on the Web, every consumer of data can be a data producer, and every user can be a maker – as well as an editor, self-appointed curator, and referee for any existing body of data, many users started to use the Web to do just that, with tremendous cultural, social, and economic consequences.

The interactive Web offers unlimited possibilities for tapping the wisdom of crowds, and for aggregating the opinions and knowledge of many. This goes well beyond the simple collecting and averaging of data. Particularly in the making of media objects, the old statistical ways of mean finding have been replaced by a new, open-ended mode of "aggregatory" versioning, where the collective knowledge of a community is garnered by inviting all agents to edit one another – in theory, *ad libitum atque ad infinitum*; in practice, under the stewardship of some form of curation. Against all odds, there is evidence that this unauthorized mode of making can be quite effective. Open-source software made collaboratively by many, but by none in particular, often works better than competing proprietary, commercial software. The authorial *Encyclopaedia Britannica* has recently stopped to exist in print, but collaborative Wikipedia is thriving. Based on the simple principle that more people know more, if there is a way of garnering their lore, Wikipedia's strategy of digital aggregation promises to convert the shortcomings of each into the wisdom of many – just like in Adam Smith's classical economics, the "invisible hand" of the market converts the egoism of each into the common good.

The success of Wikipedia, and of similar case studies, may seem anecdotal. Yet, interactive aggregation and participatory versioning are fast becoming a pervasive, and possibly dominant, technical and cultural paradigm of our age. Aspects of it occur, more or less conspicuously, whenever and wherever digital tools are used – which is to say, today, everywhere, and all the time. This is why we are – slowly – getting used to technical objects of all kinds that are never finished nor ever stable; which are designed for permanent evolution and variations, and seem to live forever in trial mode, always waiting for the next patch or fix – to some extent working most of the time, but never entirely or fully predictably. Alexandre Koyré famously saw precision, it all its forms, as the hallmark of modernity.[3] Just as industrial, mechanical modernity needed and fostered precision, it would appear that post-industrial, digital postmodernity is reviving an ancient techno-cultural paradigm of approximation, redundancy, and endless revisions – now carried out by electronic computation, not by manual craft. Lawyers and economists have already started to tackle the many paradoxes of electronic versioning and mass-collaboration. The old authorial notions of intellectual property, copyrights, and royalties, which, not coincidentally, rose in synch with mechanical printing technologies, are famously unusable and often meaningless in a digital collaborative environment.[4] Yet the aesthetic implications of this new digital "style of many hands"[5] have received little attention; among the design professions, almost none.

This is not by coincidence. Digital design theory spearheaded and pioneered the digital turn. In the 1990s, architects like Greg Lynn and Bernard Cache were at the forefront of technical and cultural innovation. But, in the 2000s, when digital culture went 2.0, architecture did not follow suit. With few exceptions, which will be discussed below, there has been no participatory turn for digital design. This may be partly due to technical factors: architectural notations must be frozen, at some point, in order to be built, and can seldom be open-ended. But the burden of heritage may have played an even bigger role. Architectural design is the brainchild of Renaissance humanism. Humanists, Leon Battista Alberti first and foremost, invented architecture as an art of drawing, and the notion of the modern architect as a new kind of humanist author – a thinker and a maker of drawings, not a craftsman and a maker of buildings. For better for worse, this early-modern cultural revolution made

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Alexandre Koyré, "Du monde de l'"à peu près' à l'univers de la précision," *Critique* 28 (1948): 806-823; reprinted in Koyré *Etudes d'histoire de la pensée philosophique*, Cahiers des Annales, 19 (Paris: A. Colin, 1961), 311-329.

4
On "copylefting" and other digital alternatives to analog copyright laws see for example Lawrence Lessig, "Re-crafting a Public Domain," *Perspecta* 44, Domain, (2011): 177-189.

5
See Carpo, "Digital Style."

architecture what it still is: a high added-value intellectual profession. Most architects today still see themselves as authors in Albertian, humanist terms, and the Albertian, authorial definition of architectural design as an art of drawing – a notational art – is today enshrined by the laws, customs, and social practices of most countries around the world.[6]

Hence, it is not surprising that so many digital designers in recent times have been testing and trying, more or less deliberately, design strategies aimed at curtailing, taming, or effacing the participatory potentials of digital parametricism. The most common case in today's digital scene is that of an author that first designs an open-ended system (an Objectile, or generic notation), then finalizes it all alone, picking a limited number of perfectly finished design solutions of which she will be, in a sense, the double author: first as the inventor of a general parametric system, then as an end-user of the same. Without going to such extremes, the normal mode of use of today's parametricism allows for such a limited range of variations that all end-products of a given design environment tend to look the same, regardless of their degree of customization. As most offices working this way also happen to favor a legacy repertoire of curving lines and smooth surfaces derived from the spline-dominated design software of the 1990s, many of the objects they create also appear similar to one another, hence corroborating the claim, strongly restated of recent by Patrik Schumacher, of parametricism as a comprehensive theory, and of a spline-based visual environment as the ineluctable stylistic expression of digital making.[7]

But not all the cultural and technical reasons that prompted the rise of digital spline-making in the 1990s may last forever. Today's digital designers might conceivably choose to leave many more design options open to subsequent interactive or collaborative choices, increasing the degree of indeterminacy embedded in a parametric design system, or the share of authorial responsibility devolved to others. In this instance, similar to the initiator of an open-sourced software project, who writes the first code then monitors all its edits and changes, the primary designer would become, in a sense, the curator of an ongoing collaborative project, designing it at launch and then steering its course: watching, prodding, and occasionally censoring the interventions of all co-authors (or interactors) to follow. While many examples attest to the success of this collaborative design strategy in fields such as software development, and increasingly in the design development of physical objects, its instances in architectural design are rare. Some digital designers pride themselves on using open-source software, but few or none on authoring open-ended design – architectural notations that others could modify at will.[8]

In fact, the most radical Web 2.0 applications in architectural design have not been devised by designers, but by the building and construction industry. The family of software known as Building Information Modeling, originally a management tool used to facilitate costing and the exchange of information between architects and contractors, is fast becoming a fully-fledged design platform, and imposing its collaborative logic to all involved.[9] While the traditional design–bid–build process embodied the Albertian way of making by design and by notation, today's BIM model translates a new mode of building by collaborative leadership, which, in turn, resembles and almost reenacts the collaborative way of building that prevailed in most European building sites before the Humanist invention of the modern authorship. As the author that is now being done away with used to be called the architect, it stands to reason that not all architects may enthusiastically endorse this new technology. Indeed, designers often blame BIM software for its philistine, bureaucratic approach to architectural design.

Yet architects who resent, more or less overtly, the digital diminishment of their modern authorial privileges often seem more keen to envisage a lesser degree of design determination when it is to the benefit of a higher order of indeterminacy – one which many designers today

6
Carpo, *The Alphabet and the Algorithm*, esp. 71–80.

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Patrik Schumacher, "Parametricism and the Autopoiesis of Architecture," *Log* 21 (2011): 63–79; see in particular p. 63. See also Schumacher, *The Autopoiesis of Architecture: A New Framework for Architecture*, Vol. I (London: Wiley, 2011); and *The Autopoiesis of Architecture: A New Agenda for Architecture*, Vol. II (London: Wiley, 2012)

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Carpo, "The Craftsman and the Curator," *Perspecta* 44, Domain (2011): 86–91; Eric von Hippel, *Democratizing Innovation* (Cambridge, MA: MIT Press, 2005), esp. 103–105.

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See Peggy Deamer and Phillip G. Bernstein, ed., *Building (in) The Future: Recasting Labor in Architecture* (New York: Princeton Architectural Press, 2010), esp. Bernstein's essay "Models for Practice: Past, Present, Future," 191–198; see also Bernstein, "A Way Forward? Integrated Project Delivery," *Harvard Design Magazine* 32 (2010), 74–77.

increasingly like to attribute to nature itself. The cultural roots of this new breed of digital naturalism are no less transparent than its technical premises, as various postmodern theories of chaos, complex, non-linear, and self-organizing systems have merged with a traditionally empirical approach to structural design, which architects always cherished, to give rise to a holistic practice of structural and material making often known as "form-finding," "design by making," or "emergence." [10]

All designers know that some structures and materials occasionally behave in unpredictable ways, and that under certain conditions, normal relations of cause and effect (stress to deformation, for example) do not seem to apply. Similar shortcomings of predictive sciences may have many rational explanations. Long before the rise of today's digital technologies for "big data" management, for example, scientists often found it convenient or expedient to follow statistical models rather than causal ones. Others, however, may equally conclude that as some behaviors of a given system in certain conditions cannot be causally predicted, the system must have a life of its own. Improbable as it may appear – in the etymological sense of being difficult to prove – this assumption may not be more difficult to prove than the opposite; and indeed, vitalism has a long and distinguished tradition in the history of Western thought.

The above explains, to some extent, the system of belief underpinning the frequent rejection of rational design, and of cause-and-effect analytical calculations, among many of today's digital designers. For the last twenty years, the technical continuity between computer-based design and computer-driven fabrication has mirrored, and at times re-enacted, aspects of traditional, one-to-one hand-making and bespoke craftsmanship. Today, a new generation of digital craftsmen are increasingly perceiving CAD-CAM technologies as an extension of the mind and hands of the designer, and many of them have embraced traditional, phenomenological, and esoteric interpretations of craftsmanship – as recently epitomized, for example, in the influential work of Richard Sennett.[11] The "tacit knowledge" of the craftsman cannot be verbalized because it derives from a mystical union between the body of the artisan and the materials he is crafting. The phenomenological craftsman does not analyze, quantify, calculate, predict, and design; rather, he just makes and feels, and finds form by trial and intuition. Likewise, today's theories of "design-by-making" – always popular among architects, and particularly among architectural educators, but today enhanced, promoted, and almost vindicated by the power of digital tools – often favor a silent and almost mystical or sensual experience of design without thinking. According to these theories, reason and speech are of little use to the maker sensing his making through his body and, increasingly, through the body's digitally mediated prosthetic extensions. Digital tools can be powerful allies of design-by-making, because digital simulations can make or break more models in an instant than a physical craftsman could in a lifetime. And when a model works, whether a physical model or its digital equivalent, there may be no need to understand why.

Digital technologies for data collection and information retrieval offer increasingly functional alternatives to the analytic, predictive approach of modern, positivistic sciences: what happened before, if retrievable, will simply happen again. For designers, digital simulations have an additional treat – the appearances of a holistic re-enactment of reality. Of course, digital simulations are based on analytical tools, and the data they feed on, causal, statistical, or other, must have been picked and ranked and their programs scripted, at some point, by someone. Yet in this instance, too, digital technologies and their use may curiously foster a wide swath of vitalistic beliefs; and the notion – sometimes the fantasy – of the computer as a non-linear machine has been a strong component of digital thinking from the very beginning. While traditional phenomenologists continue to abhor computers, which, with some reason, they perceive as machines, many digital theoreticians of the last twenty years have been phenomenologists *malgré eux*. From the proprioceptive science of the digital sensorium and of the digitally extended body in the 1990s to today's neoromantic theories of making by intuition and by computational simulation, digital phenomenology has been and remains to this day a surprisingly strong component of digital thinking, and an often hidden or even concealed source of inspiration for many digital makers.

So it will be seen, to sum up, that while digital culture at large has embraced the interactive and collaborative way of making which seems inherent in the technical logic of most digital tools, and has already developed a number of successful post-authorial strategies, in architecture and design the same digital pattern of devolution of agency has been mostly redirected from social participation to a new and daring partnership with what many perceive as the mysteries and indeterminacy of nature. The spirit of the game is in many ways similar, as social crowdsourcing, no less than material self-organization, may lead to forms of automated, evolutionary, and non-authorial making. In a current mode of web design known as A/B testing, design choices are made by trying out two versions of the same interface and comparing their performance via the automated feedback of user data. When a new version (the B version) of a website works better than the old one (the A version), for example because users stay longer on the page, or click on a link more often, the system automatically switches to the new version. Variations may have been introduced by actual designers, but they may also have been randomly generated.[12] In this case, the system self-organizes by accidental mutations and environmental feedback, or natural selection, as in Darwin's

model of biological evolution. As in the parametric model mentioned above, the designer of the system may author some general aspects of each individual product, but individual variations result in this case from the anonymous aggregation of the choices of many (crowdsourcing).

Evidently, this is not design as we knew it. But the new streaks of vitalism, naturalism, and romantic irrationalism that are so pervasive among digital form-finders at the time of this writing (in the summer of 2012) also point to other, riskier developments. User-driven customization and the social devolution, distribution, or dissolution of design have long been a myth of modernity, before becoming a late-modern corporate strategy and an almost inevitable practice of digital post-modernity. Not surprisingly, participatory design can be declined in both a corporate and a socialist version (and it has been), as it has an undeniably democratic aura about it (majority rules, and majorities can better rule, particularly in design, if there is a way to aggregate their choices) – which some designers may resent as social determinism (if clients are always right, why should they not design for themselves? Well, with today's digital tools, they almost can). Likewise, co-designing with nature, negotiating with – even surrendering to – nature's whim are timeless human ambitions, more recently revived by nineteenth-century romanticism and by the various naturalisms and organicisms that followed in the course of the twentieth century. And one can certainly see many reasons why the quest for a renewed alliance with nature may be a popular theme today, given the ideological perceptions of the limits of human making and of the finiteness of the natural environment, which are now stronger than at any time in modern history.

In today's generative scripting, just like in the morphogenetic theories that have so powerfully inspired it, evolution emerges by natural selection (in the case of digital design, enacted by computational means). Digital Darwinism is indeed an implicit and often latent component of contemporary digital design culture, which may account for the often transparent political allegiances of today's digital phenomenology: a universe of forms where forms "just happen" is also a universe where, in the best Nietzschean tradition, the hero, the magician, the artist, or others, can and will capture, interpret, and perhaps tweak the spirit of nature – to the detriment of all others.

In this, today's digital irrationalism appears to be at odds with the more socially oriented inclination of mainstream digital culture. Perhaps digital design has chosen its own eigene Weg.[13] Perhaps designers are once again, as in the 1990s, anticipating more general trends and developments. Time will tell. One thing is for certain: whether in the social form of devolution of agency (the digital style of many hands), or in the naturalistic mode of dissolution of authorship (the digital style of chaos and nature), the visual forms that will result from the digital elimination of humanist authorship are likely to be a far cry from the polished smoothness, elegant curvilinearity, and delicate intricacy which authorial parametricism has engendered and nurtured so far. Social interaction creates a common ground of solidarity, collaboration, and community that romantic identification with nature often likes to break. A digital Sturm und Drang may not be around the corner, but there is thunder on the horizon, as well as dawn.[14]

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Unlike mathematicians, postmodern philosophers and architects often refer to "non-linearity" as a synonym for indeterminacy. The best account of architectural interpretations of "non-linearity" and their intellectual provenance is in Charles Jencks, *The Architecture of the Jumping Universe: A Polemic: How Complexity Science is Changing Architecture and Culture* (1995; second revised edition, London: Academy, 1997). See also AD 67 (1997), Profile 129, *New Science = New Architecture*, guest-edited by Charles Jencks. On the architecture of "emergence," see the works of members of the former Emergence and Design Group (Michael Hensel, Michael Weinstock, Achim Menges), starting with the seminal AD 74 (2004), Profile 169, *Emergence: Morphogenetic Design Strategies*, guest-edited by same. The Emergence and Design Group was a pioneer in the investigation of the mathematical and computational (rather than holistic and intuitive) design strategies deriving from the theories of self-organizing systems. The ambiguity inherent in the biological theories on the self-selective "emergence" of form and, more in general, in the postmodern discourse on indeterminacy, is particularly evident in their computational metaphors, which are sometimes part to analytic and scientific agendas, sometimes plied to corroborate mystic, vitalistic or irrationalist ideologies. In the recently published Log 25 (2012), *Reclaim Resi[lience]stance*, guest-edited by François Roche, the term "form-finding" is used in different contexts, including to denote recursive processes of mathematical optimization. (See, in particular, François Jouve, "Structural Optimization," 41-44, and Roland Snooks, "Volatile Formation," 55-62.)

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Richard Sennett, *The Craftsman* (New Haven: Yale University Press, 2008).

12
Brian Christian, "Don't Trust the Designers, Trust the Audience," *Wired*, May 2012: 178-183.

13
Nietzsche, Morgenröte, V, 184.

14
Ruskin, *The Lamp of Obedience*, X, 2.