Default Model (Model Space vs. Paper Space)
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Computation in the Core: Critical Pedagogies
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The postdigital, like the postmodern, might define a period, but it is more helpful to understand it as a genre. Like postpunk, the postdigital represents an attitude--an aesthetic, an affect--regarding the use of computers in architecture. The work of any genre tends towards what become its defining techniques and conventions. But that of the postdigital embraces conventions or, what we'll call here defaults, as such. That is, it tends towards established, easy, or automatic gestures or solutions. This is one of its characteristic qualities, which unites numerous of its disparate practitioners. As we'll elaborate here, there are at least two predominant camps in the postdigital (and most likely many more), but in place of stylistic commonalities, one can identify a more fundamental interest in constructing working methods that limit choices, establish rules and reflect existing conventions of either, or both, digital tools or the discipline more broadly. The preference appears to be to make as few decisions as possible. The postdigital represents a shift from the pursuit of novelty—in technology, in form, in material, in program, in rhetoric—towards the pursuit of standards. If the digital can be associated with an iconoclastic movement led by a small group of early adopters who attempted to bring about a wholesale transformation in architecture; the postdigital suggests a more diffuse sensibility and set of effects regarding the impact of computation, now that computational tools have become ubiquitous.

Looking at the work of the period, we find numbered lists, texts written in short, declarative sentences, diagrammatic organizations of things that follow clear rules in terms of both the parts and their relationships to one another. Helvetica predominates, tempered by the occasional sensible serif, as do right angles and radial arcs, grids and piles, plywood and curtains. Many architects and students appear to have settled on a relatively stable suite of software—and a limited set of commands or techniques within them. There is little theoretical verbiage. Things are what they are, and, despite recent attention to terms such as ambivalence, ambiguity and unfamiliarity, what they are—and, most importantly, how they are made—is not generally difficult to discern. (As discussed elsewhere, the postdigital is nothing if not literal.)

By way of example, we might compare arguably the two most influential practices of their (postdigital) generation, one American and one European, beginning with their websites. Each is organized as a scrolling list of numbered projects: on MOS's website, the projects are organized by typology/medium (house, installation); on KGDVS's they are organized in the relentless chronological sequence of standard architectural office file naming (the antecedents, in the numbered houses of Peter Eisenman and numbered projects of Herzog & de Meuron, respectively, are clear). Gone are the idiosyncratic flash websites and motion graphics that characterized the web presence of an earlier generation. The lists are enumerated in clearly formatted black Helvetica on a white background, inverted to white on black, or grey, on some subpages. Images are organized by specific representational medium: for MOS, screenshots

and video capture of digital models, photographs and films of physical models, photographs of built projects, and rudimentary plan and section diagrams are each grouped together into discrete slideshows within each project page; for KGDVS, each project is represented by a diptych—a slideshow of orthographic (occasionally oblique), black line drawings on one side and a slideshow of perspectival (and generally colored) digital photo collages or photographs (when projects have been completed) on the other.

These medium specific categorizations of images suggest that the representational media themselves, and the working methods that their production requires, are central to the ways in which these practices approach architecture. More so, the difference in media presented suggests important differences between the practices, and a framework for parsing postdigital work.

MOS's website is full of photographs of physical models (constructed and lit with a precision and ambience that suggests that they might be digitally rendered, particularly when positioned in gradient environments scattered with occasional, texture-mapped objects) and what they term screenshots (refined digital renderings that echo the viewport properties of the modeling software Rhino). There are no plans or sections as such, only single line drawings—with no hierarchy of line weights or detailed description of material thicknesses and fixtures—which have the appearance of directly output linework extracted from a Rhino model by the "make2d" or "section" command, in essence another form of screenshot. In all of these, the model, either digital or ambiguously located between the physical and digital, is foregrounded as the design object, and representation of projects follows the conventions of what we might term "model space." Models float on empty backgrounds, lines and rendered surfaces coexist in the same representational space, lighting and shadows are clearly artificial, colors are bright and fall off in clean gradients.

KGDVS by contrast, show precise, conventional orthographic plans and sections, produced without any visual rhetoric. Features of projects are described through common graphic standards of line weight and line type. These drawings are complemented by (or complement) one or two-point perspective images that describe literal materiality through carefully composited digital photo collages or photographs of built projects (often appearing almost orthographic in their flatness—a one-point perspective of a facade does not offer much potential for representing spatial depth). Models, whether physical or digital, are never seen; instead, the orthographic and perspectival conventions of "paper space," as they have been developed in the discipline since its Renaissance origins, are foregrounded.

This comparison reveals a structural characteristic of the discipline since the widespread adoption of commercial and user-friendly computational software. On the one hand, architects work in "model space," that aspect of software that reproduces a three-dimensional environment in which objects can be manipulated, and which generally has its own visual properties optimized for navigation and management of this modeling environment (various methods of rendering and shading surfaces, discrete coloration of layers of information, high

contrast relationships between objects and background environments). Complementing this is digital "paper space," that aspect of software, either integrated into a single program (in the case, for instance, of the "model space" and "paper space" windows of modeling/drafting software such as AutoCAD or Rhino) or borrowed from the illustration, graphic design and photography industries (in the case of Adobe Illustrator or Photoshop) that reproduces the flat page as a working surface, and offers various tools for the manipulation of information on it. Both suggest potentially new aesthetic and representational possibilities to the discipline deriving from the digital manipulation and representation of information, and various software packages come with established preset tools and representational settings that today comprise a new set of conventions for architects to default to. "Paper space," also enables the reproduction of conventional, pre-digital representational conventions, such as black line drawing, photo-collage, and flat shading.

It should be noted that the discussion here focuses on the work produced at leading graduate programs and in small offices. Revit—a purpose-built architectural software that collapses the division between "model" and "paper" by automating the translation from models to drawings, and providing an integrated set of documents for use in the building industry, challenges some of the distinctions made here, but is also not central to design pedagogy and the discourse that informs it (a whole different discussion). Meanwhile programming, while done in "text space"(?), is continually tested for its spatial and especially graphic effects—it generally serves as an extension or plugin to existing software platforms in the design process and production of representational content.

From this structural division within the commonplace computational software that architects today use, new conventions or defaults have emerged in parallel to those that predate computational tools. Together, these comprise the conventions that undergird the preponderance of "postdigital" work, which alternates in its aesthetics between an embrace of what we might call "model space," or the default appearance and representational conventions of software itself (which, we should add, extend to "paper space" software such as Illustrator, with its fat lines and flat fills, or Photoshop, with its gridded background or drop-shadow effects) and a suppression of the specifically digital aesthetics of various software in favor of continuity with pre-digital representational conventions in the form of orthographic black line drawings and photo collage (though these too almost inevitably have a particular digital quality, reflecting the qualities of the software used to produce them, and compounded by the ways in which they are disseminated as digital files through websites and social media platforms).

While the embrace of "model space" as an alternate aesthetic to the long established conventions of "paper space" suggests a desire for novel modes of representation, both representational frameworks can be related to immediate and more distant antecedents in the discipline. These relationships suggest that the postdigital is in many respects continuous with the "digital" that preceded it—moreover, that the "digital" was not a monolithic period, but a genre as well, occurring simultaneously to others with different working methods and fascinations that continue to shape the postdigital period. The "screenshot aesthetic" of MOS

has clear parallels in the rendered images that populated documents of the high "digital" period in the discipline. Consider the ghostly gray forms floating on black backgrounds that fill Greg Lynn's seminal monograph *Animate Form*. That axonometric or oblique projections (preset or easily generated in Rhino) have replaced perspectives, and pink gradients have replaced black backgrounds, does little to complicate the continuing centrality of the object of the digital model itself—and, importantly, the digital modeling environment—in the representation of the project. Indeed, the vast, empty expanses of Rhino, or Maya, rather than some specific location recorded in aerial photographs or detailed survey drawings, is revealed to be the native environment of these projects, and a corollary for their disciplinary autonomy.

In this, they follow clearly from a lineage of pre-digital works, such as Peter Eisenman's colored prints of House VI, which similarly describe an object of abstract materiality—or rather the materiality native to the media rather than a representation of another, more authentic "reality"—floating against a gray backdrop. Moreover, these media do not merely convey certain disciplinary affiliations or technical or aesthetic predilections; they shape the conception of the architecture itself. For the "paper architects" of the 1970s and 80s, or the "model space" digital and postdigital practices that followed them, the suppression of "real" materiality in favor of replications of the material qualities drawn from the media itself, or the suppression of the relationship of the architectural object to the ground in favor of a seeming detachment from any specific context, are defining features—there is an insistence on the transfer of qualities of the media to built form. When confronted with the question of what material to construct a building of, you imagine the correct answer is, it doesn't matter, so long as it looks like the model.

Like the surfaces of House II, or of a Rhino "solid," the roofs and exterior walls (and, if possible, the underside) of MOS projects such as the Element House must always appear to be the same material, so as to convey the monolithic quality of the digitally-modeled objects from which the projects are derived.

It is worth recalling, however, that the rendered digital model was not a ubiquitous representational mode in the "digital period," and it is not today, despite the ubiquity of digital modeling in the design process itself. Most digital models pass through "paper space" in order to be translated into conventional, pre-digital formats (of course "screenshots" and other representations of the modeling environment are also generally filtered through software such as Illustrator and Photoshop). An important counter form of representation is the forced perspective linework and photo collage made easy by the camera settings of modeling software and post production in Photoshop, and popularized in the "digital" period by firms such as LTL and DS+R. Rather than the autonomy and monolithicity of the digital model itself, floating before a camera which might rotate in any direction, these images insist on a particular, singular viewpoint and a perspectival armature of linework—in the tradition of Renaissance *disegno*—to which collaged image fragments and color fills are subordinated. Unlike Constructivist, Dada or Surrealist models of collage, the coherence of such a singular perspective and of a pre-existing model of form is not challenged—collage does not produce the object, it illustrates it, the architectural object remains inviolable. (The crude Photoshop

collages of OMA of similar vintage, or the early works of Reiser + Umemoto, perhaps come closest to the canonically modern form of collage as generator).

We might then begin to articulate two alternating default modes of working on and representing architecture in the time since the widespread adoption of contemporary modeling and graphic computational tools.

One, foregrounding "model space," is communicated through "screenshots," and makes decisions regarding the work of architecture itself by defaulting too, or insisting on, the conventions and qualities of a digital model as it is constructed and appears in the modeling environment of software such as Rhino or AutoCAD (again, this extends to two-dimensional formats, e.g. the Autocad layers of Andrés Jaques plan of the House in Never Never Land, or the Photoshop effects of T+E+A+M's "Living Picture").

The other, foregrounding the established conventions that "paper space" enables the reproduction of, is communicated primarily through perspectival photo-collage and orthographic black line drawing. This tends to bring with it its own set of architectural qualities—highly legible plan organization and carefully composed elevations, often referential or striving towards the archetypal, in a manner that foregrounds the historical continuity or lasting relevance of particular geometric arrangements.

In this way, these two (crudely delineated) camps suggest a broader set of defaults that govern the production of architecture in both practice and pedagogy. One the one hand, a default to basic techniques of manipulating digital models—stacked, rotated and repeated objects, extrusions, "Boolean" additions and subtractions—the blunt (and easy) manipulation of solids in Rhino supplanting the deformation and articulation of meshes in Maya.

On the other hand, a default to legible and often referential plan organization—a grid, a rectangle, a circle—and to equally reductive and referential elevations—a grid frame, arches, an unbroken expanse of glass or brick or concrete.

In the work of the practices discussed here, these working methods are critically engaged through the conscious, rules-based use of design software and an insistence on specific representational media. To produce a "screenshot" or a "collage" is to take a position on what constitutes the work of architecture—the work being both a verb and a noun—what you make and how you make it—inseparable from one another. It is the stark and rigorous delineation of that method that allows for critical reflection on the contemporary state of architectural work more broadly. It proposes that the minimal technique of the model—an arrangement (a stack, a pile, a row) of identical objects or a limited family of objects—or of the plan—architecture reduced to a frame, a wall or arrangement of walls in a grid or simple geometric figure—is always a sufficient solution. The default becomes a means of articulating a thesis as to the potential of a limited palette of techniques to maximize architectural effects and establish a coherent set of effects and relationships—a language—within (and across) practices. And it is a

means of promoting wider engagement with the work, as there is a clear means of articulating materials and their relationship to architectural form—its visible surfaces and occupiable spaces.

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However, in many practices and particularly in many pedagogical environments, these default representational conventions and default working methods are perpetuated in an unquestioned manner. Students stack or "Boolean" objects or draw grids or circles because that is what is today easy (given the defaults of the software), commonplace (given the ubiquity of social media) and accepted as a model or plan of architecture (perhaps by virtue of its sheer repetitive presence in contemporary architectural culture). These are both literal and conceptual presets in the engagement with design software—irrespective of a considered position on working through the techniques of the model or plan in the contemporary, digitally-mediated context. Carefully crafted perspectival photo collages are produced without coherent underlying plans from which to establish the geometric specificity of the perspective and to locate its subjective view, equally stylized screenshots and similarly materially abstract and graphic digital representations are produced without a commitment to working through the translation of software effects into physical buildings.

Pedagogically, then, the task is to develop teaching methods that prompt critical reflection on the ways in which architects today work, while at the same time directing those methods towards the production of buildings that engage a broader audience. While I have not undertaken an exhaustive survey of contemporary pedagogical methods, teaching at both SCI-Arc and the GSAPP, and attending reviews at numerous other schools, suggests a general lay of the land. Following from the division articulated above, two camps seem to have formed. In the first, careful attention is paid to constructing a particular working method. Specific software and commands, geometries or inputs, color palettes and forms of projection, are defined for students at the outset, often in a procedural manner (do this, then this, then this…). Students produce refined models and representations of those models, but are rarely able to articulate a strong position on the models as buildings--in other words, to both master the technique and translate it into a meaningful architectural diagram, at least within the course of a semester (and rarely do studio sequences allow for consistent development of a specific technique or idea across semesters, even in the most highly coordinated programs). In the other, particular conceptual, programmatic, contextual or other problems are posed, and more or less generic sets of deliverables are required, and students, in a manner mirroring the typical output of an architectural office, work towards a design solution and a standard suite of representations of that solution, without being asked to critically interrogate the technical methods by which they work and their relationship to the representational media they are asked to produce. While occasional and exceptional students and teachers transcend these camps, on the whole there tends to be a trade-off of careful attention paid to methods at the expense of a strong building proposal, or, a conceptually sound building proposal executed without rigorous examination of methods.

A recent series of studios at the GSAPP has attempted to overcome this divide by explicitly focusing on particular working methods, and then insisting on their literal translation into building. On the one hand, students are given precise rules by which they operate, on the other, they are asked from the beginning to define an architectural diagram--not a model of an object, but a model of a building and its internal spatial and structural organization. Students work with readymades and rules-based approaches to their aggregation. They are then told they have to preserve, to the greatest extent possible, the qualities of the aggregated ready-mades in the (relatively) comprehensive design of a building project. In this way, they are tasked with working towards a default method in several ways--the selection of pre-existing and specific objects, the combination and transformation of objects according to clearly articulated rules deriving from the properties of the objects themselves, and the deferral of design decisions towards the material, spatial and structural qualities of the aggregations of objects.

By always insisting that the models being produced are models of buildings, while at the same time always insisting that the buildings be conceived as models, students are able to arrive at novel and compelling diagrams for the organization of buildings that are grounded in precise and clearly articulated working methods.

Crucially, the studios begin with physical objects. These both constrain subsequent computational work--which occurs in relation to the specific ways in which the objects can be physically aggregated--and pushes students to a higher level of control of the computational output--as they attempt to translate the geometric and material properties of the objects into digital media. What distinguishes this from numerous other courses (many of which I've taught) that introduce computational techniques through the translation of geometrically and materially specific objects into digital form is that these objects are not selected for their geometric complexity or novel aesthetic qualities per se; rather, they are selected for their capacity to aggregate in meaningful spatial and structural terms--that is, to behave as the organizing structure (not image or surface) of a building. Not as reductive as the archetypal elements that largely characterize the postdigital, and not as complex as those that motivated the digital, they are aligned more so with a parallel genre, which carries through both periods, in which there has been a steady conflation of the physical model and the building--aided by, but not motivated by, computation, and not subordinated to particular suite of representational media. But that is another paper.