SCREEN TESTING, TEST DRIVING

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Research as a place apart.

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In architecture, applied research is a form of labor that seeks to delay entry into the assumed circuits by which architectural production is capitalized, distributed, and accumulated. This type of 1:1 activity produces spectacle and attention, forming temporary communities or solidifying permanent ones, around the distribution of risk and the sensible (to make strange bedfellows of the sociologist Ulrich Beck and the philosopher Jacques Rancière). Applied research diagnoses and demonstrates, bringing truth and untruth into an encounter with the physical world and resetting the conditions of possibility for quantitative and qualitative experience. In taking distance and measure, this type of practice insists that architecture is concerned with producing subjectivities, inventing mixed-media methodologies, and exploring the aesthetics of indeterminacy paradoxically latent to our discipline.

The popularization of terminology associated with “testing,” “experiment,” and “research” in recent discourse signals an increasing valuation of the intermediary products between ideation and construction as conventionally understood. In the traditional design process thought from scale-less sketch to scale model, the latter serves as proof of concept in educational and professional realms, and the former is now acquired into museum collections. Applied research short-circuits the serial model of design production in favor of a parallel processing one, where problems that lie between initial strategy and final execution are figured as primary. For example, problems of environmental research, programming, social and labor organization, communication design, scripting and coding, and fabrication (to name a few) can and do support autonomous inquiries that seek immediate 1:1 demonstration.

The language of “testing” is also symptomatic of a desire by architects to enter into alternative relationships of power where value is created, consensus debated, and epistemology developed—whether new markets, social practice and policy, forensics and cartography, artificial intelligence, data mining, or “life itself.” By its nature, applied research permits technology transfer into and out of architecture, and qualifies the valuation of architecture against phylogenetic, social, cultural, and ethical capital, as well as in its more conventional funding and costs. By extracting and deploying the “test” from a spectrum of practices adjacent to architecture, the architect emerges as an arbitrageur, double agent, or hacker, rendering architecture as the humanizing of technology and introduction of philosophical and moral issues into the instrumental relationship between human beings and the constructed environment.
Andy Warhol (American, 1928-1987), *Screen Test: Nico (ST239)*, 1966. 16mm film, black-and-white, silent, 4.2 minutes at 16 frames per second. ©2014 The Andy Warhol Museum, Pittsburgh, PA, a museum of Carnegie Institute. All rights reserved. Film still courtesy The Andy Warhol Museum.
Andy Warhol's *Screen Tests*, produced between 1964 and 1966, is a series of nearly five hundred short films of Warhol's friends and muses—including Nico, Dennis Hopper, and Edie Sedgwick, seated in front of a stationary 16mm film camera. Hal Foster has described these works as both "an initiation" and "a shield." In the first case, for the approximately three-minute-long film recordings, recorded at the speed of sound film but projected at the speed of silent film, Warhol's "test subjects" were given neither instructions nor direction. This psychic and physical triangulation of self-object-apparatus frequently caused physiological and psychological discomfort. *Screen Tests* both problematizes the assumed role of photography as an objective form of documentation and forces an alternative encounter with the technological apparatus. The ensuing "endurance test" guarantees, if not outright celebrity, then at least an initiation into a select community of the celebrated and notorious. In describing those who sit for the *Screen Tests* as a "quasi-double" for the artist, and in noting that "this self is subject to both alienation in the image and automatization in the process," Foster draws attention to problems of identity, agency, and self-representation that reflect onto the originator of the work. In addition, the sublimation of social relationships within a technical apparatus governed by frames per second anticipates future iterative technologies, the transfer of intelligence from man to machine (exemplified by something like the Turing Test or machine vision), the conflation of the technical and televisual image (perhaps best represented by the explosion of Space Shuttle *Challenger*), and the problems of identity inherent in a shift to Big Data and "selfie" culture.

In the second case, when Foster notes that Warhol differs from his contemporary Marshall McLuhan, who "viewed media technologies as prostheses," the *Screen Tests* appear as that which aggressively shields and encloses, if only temporarily, "a place apart"—namely the Factory. McLuhan, in embracing the extension of sense and cognition through media technologies—an outward movement from a stable self, or selves, toward the world—privileges the structure of media over content. Warhol's obsession with portraiture and self-portraiture, image and self-image, instead suggests a dissembling, a kind of camouflage through media technologies, where an unstable self or social formation is protected from view.

The tenuous "closure" of the Factory to its outside is brought into relief by the story of Warhol's *13 Most Wanted Men*, a large-scale screen-printed mural bearing the mug shots of the New York City Police Department's then currently most wanted criminals. Commissioned for the 1964 World's Fair in Flushing Meadows by Philip Johnson and Robert Moses, Warhol's only public art project was installed on the façade of the New York State Pavilion but painted over a few weeks prior to opening (supposedly at the behest of governor of New York Nelson Rockefeller). The projection of an enlarged taxonomy of criminality onto the Pavilion façade introduced a foreign set of epistemological and aesthetic criteria into a space curated to showcase America's mid-20th-century technological achievements, its scientific and consumer culture. The ensuing censorship makes explicit that both applied science and applied art are governed in the world by designations of the lawful and unlawful—creating the possibility to extend...
what Richard Meyer calls “outlaw representation” into these fields, and then into architecture.

This “reality test” is less a cautionary tale than an acknowledgment that the studio shares a similar inside-outside relationship as the lab-field of scientific research. In Bruno Latour’s study of Louis Pasteur, experimental space moves from countryside farm to a laboratory at the École Normale Supérieure and back again. Latour writes: “the very difference between the ‘inside’ and ‘outside,’ and the difference of scale between ‘micro’ and ‘macro’ levels, is precisely what laboratories are built to destabilize or undo.”

Warhol’s The 13 Most Wanted Men and Screen Tests are then forms of “artistic research” described by the recently inaugurated Journal for Artistic Research as research providing “an artistic and epistemic orientation that does not only give information but demonstrates an engagement.” In this definition, the works become part of a larger demonstration of engagement—“in effect, photo-booth, mug shots, and publicity images all rolled into one,” into techniques like filming and projecting at different speeds, installing in galleries versus at happenings, or in composing a subject through film versus as a combination of frontal and sagittal views.

Between the 13 Most Wanted Men and Screen Tests, the triangulation of self-object-apparatus yields a comparison between celebrity and criminality, and implicates, if
normatively, the architectural object as enclosure and surface. In this example, what separates artistic from scientific inquiry is the possibility of interested versus disinterested research and a refusal to standardize or conventionalize engagement. Further, if the criteria of evaluation for artistic research is knowledge production and interrogation of presentation technique in search of aesthetic experience, we can begin to contrast that with criteria of evaluation for the other implied protagonists in the story of the 13 Most Wanted Men: for scientific research, refutability, and reproducibility in search of fact; for legal research, citation and sourcing in search of decision.

Reflecting Warhol's works onto architectural research prioritizes experimental methodologies of triangulation and their criteria of evaluation, rather than the psychodynamic concerns of subjectivity explored by Foster. What carries forward is the idea that a "screen test" exemplifies the "vicissitudes of self-imaging and the technological training of the modern subject."9 Following this, we see that the screen test is in fact present in architecture from antiquity onward, including the myth of Dibutades' daughter and her lover,10 Durer's wood cuts, the Ames Demonstrations in Perception, work by Ed Ruscha and Ant Farm, as well as the early visualization experiments of Lise­Ann Couture—which required a photographic darkroom, and Bernard Tschumi—who freely appropriated cinema for architecture. As such, we can expect that the articulation of the screen test continues to change over time with the reconceptualization of the body and subject, both politically and through techniques of self-imaging: including surgery, the X-ray, and the Human Genome Project, as well as technologies like LIDAR and simulation software packages.

RESEARCH, C. 1968
Panning and zooming from Warhol's Screen Tests also serves to locate architectural research within a particular socioeconomic and political milieu. Contemporaneous with Warhol's Screen Tests, the founding of the Institute for Architecture and Urban Studies...
(1967–1986) and the academic studios taught by Robert Venturi, Denise Scott Brown, and Steven Izenour at the Yale School of Architecture—“Learning From Las Vegas” (1968), but also “Learning From Levittown” (1971)—are, if not de facto representatives of the true state of architectural research in the late 1960s, nonetheless mythical representatives in the story that architecture tells itself.

If, in turning evidentiary celluloid toward a socializing representation, Warhol captures both a generalizable culture of celebrity and an almanac of the avant-garde of the 1960s, then in a similar way, as noted by Mark Wigley in Diana Agrest’s recent documentary on the history of the IAUS, the Institute existed so that its apartness, and its parties, could be photographed. But, of course, more interestingly—as Lucia Allais, Joy Knoblauch, and others have examined (beyond the scope of this article), the IAUS triangulated the liberal arts pedagogy and the social science regime represented by governmental agencies like Housing and Urban Development (HUD) and the National Institute of Mental Health (NIMH). In particular, the very awarding of the NIMH grant to a project that studied various semiotic theories, autonomy, place, and poetics collapses the idea of the individual as constituted by language with that of a nascent biopolitical subject administered by empirical forms of control. This transitional condition is perhaps exemplified in the IAUS’s own self-imaging—its logo depicting Vitruvian Man held in chains above a Cartesian grid. Agrest also alludes to this in her interview for Suzanne Frank’s IAUS: An Insider’s Memoir.

The project got funded with a grant that turned out to be the largest the Institute ever had up to then. We got $200,000 in ’71 or ’72. We worked for a year as stipulated in the grant. After, politics changed and funds went to the applied sciences. Indeed, “politics changed” in the early 1970s, as did the status of “environment,” gold with respect to the collar, labor unions, media technologies, and the distribution of risk.

If the IAUS’s photographic dossier reproduces certain self-imaging functions of Warhol’s Screen Tests, the photographs taken during the research trips of Venturi, Scott Brown, and Izenour’s Yale studios situate the car and its windshield as an accomplice—a secondary apparatus inserted between self and object. Further, the comparative matrices of heraldry, speed, and asphalt memorialized in Learning From Las Vegas share not only a tabular grammar with 13 Most Wanted Men but also diagram relationships between applied art, applied science, and designations of lawful and unlawful. For example, “heraldry” (as the physiognomy of a typical casino sign) communicates information across a “vast space” at once legal, technical, and climatic by announcing differences in environment. To move between these environments—from the inhospitable to the sybarite, is to transition from one risk position to another—from risks to life and limb (driving) to risks to one’s fortune (gambling) to risks to one’s identity (as the practitioner operating outside of his or her discipline). The “quasi-double” of the Yale studios is then both the mass-media subject constituted by the visual and proto-television language of iconography and the consumer subject of cultural anthropology. However, it was not the embrace of the ugly and the ordinary that Scott Brown describes as the most controversial aspects of their Yale studios but the insistence that 1:1 experience must inform design.
In both cases, architectural research passes through the fieldwork of anthropology, economics, political science, psychology, and sociology. The resulting reality-tested research primarily takes the form of publication, thus locating architectural writing as another form of outlaw representation. But if between Warhol and McLuhan we have seen that media technologies operate both intensively, as a form of camouflage, and extensively, as prosthesis, we come to see that applied research exposes architecture itself as a media technology. In truth, architectural research is unambiguously of mixed-media and mixed method—concerned with knowledge production, presentation technique, refutability, reproducibility, citation, and sourcing (the sum total of evaluative criteria for artistic, scientific, and legal research). But rather than lament this promiscuity, we should understand that the impurity of architectural research is its strength.

The “research” of the IAUS and the Yale studios falls outside of practice, whether by desire or necessity, and outside of the academy, literally if only temporarily. As if to emphasize the illicit position of research, Peter Eisenman, also in Agrest’s recent documentary, speaks of the end of the IAUS as a homecoming to practice—a veritable return from the wilderness. By occupying a place apart on the road or in an institution of one’s making, research diverts labor, momentarily escapes from the conventional criteria of evaluation of the academic studio or professional practice, and opens onto alternative
systems of value—the comfort of philosophy, the futurology of statistics and demographics, and the risky card game. While the ubiquitous camera functions as an initiating apparatus per Screen Tests, the processes of grant-writing and desert-adventuring exemplify encounters with a more broadly defined set of technologies that, as Walter Benjamin reminds us, "subject the human sensorium to a complex kind of training." These encounters of the late 1960s imposed the social sciences regime upon architecture—its epistemology, subject, methods, but also its previously unavailable funding opportunities—and reveal the architect to be an opportunist and an arbitrageur, if not yet a double agent or hacker.

It should become clear that applied research triangulates not only self-object-apparatus, but also makes "environment" explicit. In the first case, through encounters with "quasi-doubles," architects indirectly intervened in the spaces of law—civil rights, women’s rights, workers’ rights. Through encounters with institutions and governments, architects indirectly absorbed methodologies (and funding) from not only the social sciences, but also the Space Race, and the quality control of the consumer electronics industry. In the second case, the "environment" latent to the late 1960’s included everything from Ian McHarg’s and McLuhan’s respective definitions of ecological and mediatic environments, to the politics of urban renewal and the smoke from cities in flames, to redefinitions of civil rights and neoliberalism.

THE TEST DRIVE
Avital Ronell defines the lure of the test as irresistible, irreducible, and inescapable: "The need to define, the need to know, the need to be sure, and the need to establish rank […] needs that press with the urgency of hunger.” This urgency, approaching a biological necessity, suggests that testing is an imperative prior to a method. The "test drive" then emerges as a response to generalized conditions of uncertainty in a subject’s worldview that may not yet be instrumentalized, intellectualized, or formulated as a problem of study. By the relational nature that allows testing to make "environment" explicit, it obtains to an ethical system prior to a theory. The physical and spatial relationship between tester and testee, a triangulation between self-object-apparatus, assumes a set of moral principles governing behavior that are the precondition to any system of ideas independent of things and environments. In this way, as Ronell writes:

> Whether clearly stated or largely disavowed, models of testing inform diverse types of social organization, legitimating crucial and often irreversible discursive tendencies and mandating critical decisions. In terms of the political implications of testing, one need only consider the way wars are waged on material sites and objects, and the way the state uses drugs in order to take possession of the body.  

It is these “political implications” which set up the possibility for the test that produces outlaw representation on the face of architecture, in its written practice, but certainly elsewhere.

In Ronell’s telling, basanos: “a concept of enslavement [is] at the core of the experience of testing. It names the latency of truth in testing and the use of torture for which the slave body becomes emblematic.” Beginning with the Athenian legal system, the embodiment of testing, its corporeality, is “sublimated into performative acts such as taking oath, swearing in, and contractual agreements.” The theater of law then is the first apparatus that triangulates the self and object (here, again, a “quasi-double”) through an ethical system predicated on witnessing. It is only in the seventeenth century that scientific or “experimental culture provoked a crisis in witnessing.” Of the relationship of art to science, or untruth to truth, Ronell reads Nietzsche to find that “science assumes a relationship to scientificity that is linked to art and play. It at no point derives its authority from institutional divisions or scientific hegemonies but draws the possibility of its vitality strictly from art.” Neither of these histories is intended to delegitimize science as a model for architectural research but to establish that the philosophical conditions for invention lie in both Nietzsche’s “cult of the untrue” and Derrida’s claim that “an invention […] always presuppose[s] some form of illegality.”

We must then ask how this law of nature feeds back into our discipline’s imperatives, methods, ethical system, and theories. Testing, neither inherently nor explicitly of scientific form as per Warhol, the IAUS, and the Yale studios, carries within itself a desire for evermore rigorous analysis and evaluation. The screen test, endurance test, and
tradition-discipline-practice. these vocabularies and communities by making its own faith-based self is constituted before law informs not only the invention of participatory and traitor.

the management of other material conditions tortures , not least of traditional concerns with sense, language, and calculation, architecture essentializes the triangulation: an interdependence of art, law, and science, each constituted by a "vocabulary of doubt," and "community of verification." In the first case, in its role as an ethical and epistemological set of relationships to failure, architecture (the architect) is initiated into an ethical and epistemological set of relationships to failure, illegality, and error (that constitute a profession liable for the production of space).

simply, these are to be avoided. From the prevention of structural failure (extending to the management of other material conditions including fire, egress, heating, cooling, and air circulation), to conformance with legal practices in the form of contracts, building codes, local law, and ADA, to control over errors in calculation and data processing (from cost control to unruly software to information management and retrieval), architecture emerges from institutionalized testing as a form of risk management.

on the other hand, applied research, through the design of screen tests and execution of reality tests, points beyond these ultimately conservative criteria toward the provocative agency inherent to the test drive. Applied research is paradoxically a constant movement away from, rather than toward, certainty, the knowable, and the sayable. Thus, it is those research practices that embrace failure, illegality, and error that produce the sort of outlaw representation required to test alternative futures. In the first case, failure may outline one criteria of evaluation for objects of research—such as those born of assembly and materials research—but also represents the ethics of "a noble loser" or "the noble traitor." While openness-to-failure was introduced into experimental culture by Robert Boyle in the seventeenth century as "proof of moral probity, of disinterested work," it is also now a mantra of the Stanford d.school and other pedagogical models built around "innovation" that asks students to fail early and often. In the second case, the idea that the self is constituted before law informs not only the invention of participatory and spatial practices but also techniques by which to bear witness to folds in sovereign power and wrinkles in the social contract. Lastly, the trial-and-error approach that has gained ascendancy with the iterative possibilities inherent to software and fabrication productively questions the authorial role of the architect. At the same time, the possibility of errors in structures of thought and in databases of information open onto the staging of cognition and intelligence, both sensorial and artificial.

self-tests
it is through applied research that architecture can strategically and actively pursue small acts of planned obsolescence—in some respects the making of tradition as a means to create space for foreign elements. While it is still common to speak of architecture as...
riven by a theory-praxis divide, this antagonism is no longer reducible to dialectic. Transitions in architectural education and professional practice—some, but by all means not all, brought about by digital technologies—have perhaps precipitated this third term: tradition. This is not to say history-by-another-name, nor to summon the traditional against the modern, but to imply that in the triangulation of tradition-discipline-practice, an opening is found to seek alternative originary scenes. Thus, applied research emerges as a kind of self-test—a search for origins and limits to historicize the profession in its current form as a liability-based form of risk management.

The test drive suggests that a third originary scene might be added to the profession’s twin natal stories typically organized around the Albertian paradigm and the invention of perspective. The first predicates the licensing exam and the construction drawing as discussed by Mario Carpo30 and others; the second, attributed to Filippo Brunelleschi by Robin Evans31 and others, lays the “scientific” foundation upon which architectural fantasies are projected. Though not contemporaneous with either, Christopher Wren’s “weather clock”—designed in 1663 by Wren but constructed by Robert Hooke in 1679—suggests that another kind of apparatus might lie at the heart of architectural inquiry. Both Brunelleschi’s “viewing machine,” by which he rediscovered linear perspective in front of the Baptistery in 1420, and Wren’s “weather clock,” designed to measure temperature, humidity, rainfall, and barometric pressure, share certain similarities. Both situate the (male) architect as an interdisciplinary polymath with comparable expertise in goldsmithing, engineering, visual arts, and theater, or in mathematics, physics, and astronomy. In each case, the design and testing of an apparatus, as distinct from the role of architecture in housing humanity’s research functions (from the library to the seventeenth-century house of experiment, from the nineteenth-century operating theater to the laboratory of Big Science), reveals a participatory relationship to what we today call applied architectural research.

Whether apparatus or house, architecture’s role in organizing the spectacle of demonstration, whereby knowledge is produced from opinion by a public process (rather than discovered through private rumination, abstraction, and logic), is both social and epistemic. While Brunelleschi’s and Wren’s tests obviously predate the institutionalized testing regime of the modern profession, the latter originates in Alberti’s separation of design from building in the fifteenth century.32 More importantly, if Brunelleschi demonstrated a world imaged through light and geometry and Alberti one constructed through the virtual organization of labor—both reducible to a type of circulating drawing, Wren’s apparatus is a reality test that makes environment explicit as pneumatic facts that vary over time.

But as usual, it is the ancient Greeks that best punctuate our originary scenes with mythology and etymology. We now see that Dibutades’ daughter and her lover—busy

Left. The accuracy of perspective drawing demonstrated in front of the Florentine Baptistery, © 2014, The American Institute of Architects. All rights reserved. Illustrated by Jim Anderson in Il Duomo: Brunelleschi, a Man of Many Talents (AI/Architect 14, 2008), by Jim Atkins.

staging the origin of painting—are joined by Dionysus, the god of ritual madness and ecstasy, appropriated by Ronell as “the god of the test,” and those subjects whose labor is organized through the institution of basanos, whether by slavery or contractual agreement. All are arguably witness to the birth of architecture. Wren’s apparatus, of course unfairly, has the benefit of being properly experimental, taking place to the other side of the “crisis in witnessing” that Ronell identifies as a consequence of the seventeenth century’s “new non-metaphysical experimental discourse.” Indeed, Boyle’s early air-pump trials, were witnessed by “those excellent and deservedly famous Mathematic Professors, Dr. Wallis, Dr. Ward [...] and [the architect] Mr. Wren.”

Replica of the Hooke-Boyle Air Pump. Photo courtesy of Kinkreet, via Wikimedia Commons.

RISK, C. 1986

Of course, Boyle’s air-pump experiments became axiomatic, teachable, and testable, in the law $PV = nRT$. This ideal principle now forms part of a basic science whose engineering and aeronautical applications include steam turbines, jet engines, and space rockets. We are reminded by something like the failure of the Space Shuttle Challenger’s O-ring in 1986 that pneumatic and other facts are contingent; scientific testing itself is not immune to its own “crisis in witnessing.” The loss of Challenger brings us from the “weather clock” to the instrument panel and from the “vision machine” to the television. Broadcast live to schools across the country, the circulation of a failed technical image transcoded into a televisual one displaced and multiplied the possibilities of witnessing.

Beyond a confrontation with technology shared by a mass televisual subject, another “crisis in witnessing” emerges in the lawsuits brought against NASA by the families of astronauts and by the whistle-blower Roger Boisjoly (a mechanical engineer employed by the contractor Morton Thiakol). In the first case, settlement amounts were determined by actuarial science, with 94 percent paid by NASA and 6 percent by the contractor Morton Thiakol. This financial arrangement marks the line between design and construction—between the agency that approves drawings and specifications and the contractors whose work conforms. In the second case, test results obtained by Boisjoly, that predicted the failure of Challenger’s critical gasket in cold weather, were judged inconclusive by his managers. Boisjoly’s own unsuccessful lawsuit, claiming that the public was defrauded, led to his ostracization and eventual departure from Thiakol, but also to his receipt of the
The fate of Challenger is a failed reality test on many levels—a failure to accept pneumatic facts and of the specialized expert systems that gained the most when, as Agrest noted, “politics changed and funds went to the applied sciences.”

Architecture as a form of risk management is mirrored in the post-nuclear age of the Cold War—Beck’s “society of risk,” by the story of Challenger, but also in the industrial accidents at Chernobyl and Bhopal. Meanwhile, both architectural postmodernism—in its pursuit of signification, symbolism, and populism, and the IAUS—which exits the scene in 1984, after sponsoring alternative forms of education, discourse, and texts like Rem Koolhaas’s Delirious New York, continued throughout to hold tightly to humanist traditions invested in language and sense, both visual and metaphysical.

However, other testing trajectories identified in and around Warhol’s Screen Tests also reach their high point, or nadir, in the 1980s. With the fall of the Berlin Wall (whose “closure” Rem Koolhaas et al projected onto London as a metropolis scale prison) in 1989, the economic experiment of neoliberalism, while continuing space with deregulation and privatization, turns from industrial capitalism toward finance capitalism. If architecture’s confrontation with the social sciences regime had earlier challenged the primacy of an individual constituted by language, in this decade, both the biopolitical subject and “life itself” were further put to the test by court decisions and policy changes that paved the way for living organisms to be patented by researchers, universities, and corporations who had long since acquired the rights on an individual before the law. This collapse of intellectual property law into natural law sets the stage for the transformation of biology into a technical design project. Going forward, this history of the recent past, its experiments with life and loss, offers perhaps not one but a few cautionary tales about our “age of experiment.”

THE AGE OF EXPERIMENT
Research systems, as “future-generating machines” and “tracing game[s],” pass through multiple triangulations: self-object-apparatus, art-science-law, failure-illegality-error, and tradition-discipline-practice. These imperfect groupings are designed not so
much to explicitly categorize research practices as to valorize a shared tradition of investigation into alternative value systems, technology transfer, and the distribution of risk and the sensible.

Ronell’s case for testing, both its sober and heart-stirring manifestations, is totalizing: “everything from recent warfare [...] to urban planning, military strategy and national security, space, medical and reproductive technologies [...] ethics, drugs and polygraph testing.” But a new “crisis in witnessing” is perhaps dawning: Big Data, its interrogation and circulation through digital media objects—coded in bits, pixels, and voxels—challenges conventions of drawing and making, as well as authorship and facts. Techniques of verification now include not only what is visible to the eye and its physical prostheses but also techniques of the electromagnetic spectrum, environmental sensors, and other forensic tools. The tenuous legitimation of an expanded sensorium has, without returning to architecture’s metaphysical tradition, begun to undo modernity’s hygienic division of the senses into five.

Through its range of modalities: the diagnostic and instrumental screen test, and the 1:1 reality test, architectural research is uniquely situated to organize all of the above as constituent parts of contemporary society, epistemology, and subjectivity. The future of applied research is relational rather than of a fixed aim toward fact and truth; its research products take both legitimizing and non-legitimizing forms. Opportunities to produce new value are latent in contemporary networks of circulation, through counter-mythologies regarding disciplinary origins, and through alternative criteria of evaluation triangulated from parallel developments elsewhere.

If the televised presidential address to the nation, broadcast live at 8:30 p.m. EST on September 11, 2001, included this statement of mourning: “the resolve of our great nation is being tested—we will pass the test,” we see that applied research remains vital in initiating and shielding its test subjects within a society of risk. Architecture’s occupation of spaces simultaneously regulated by failure, illegality, and error situates its practices, particularly after 9/11, as spectral figures within and around what Peter Sloterdijk refers to (in addition to the “incommensurable achievements in the arts”) as the primary explicative models of the last century:

[...] the practice of terrorism, the concept of product design, and environmental thinking. With the first, enemy interaction was established on a post-militaristic basis; with the second, functionalism was enabled to re-connect to the world of perception; and with the third, phenomena of life and knowledge became more profoundly linked than ever before.
Here, we not only recognize that the art-science-law triangle undergirds Sloterdijk's four categories (inclusive of "achievement in the arts") but also that each can be thought through testing—the screen test, reality test, loyalty test, and contested desires of the market, as well as air quality tests and the testy rhetoric of sustainability surrounding our poorly tempered environment. Yet, as we have seen in architecture's dual function as house and apparatus (and now metaphorically as the structure of computation), it is everywhere implicated in this gambit. In actuarial terms, architecture's ubiquity across Sloterdijk's categories is a result of its simultaneous function as both a method and object of insurance. The (service) profession of architecture cannot fail, err, or cross over the line of legality; professional practice and buildings themselves are redundantly insured to hedge against risk.

But architecture, through research, also occupies a place apart, creating contaminated laboratories and instrumentalized natures. In the triangulation of self-object-apparatus, the researcher collaborates with his or her "quasi-double" to extract signal from noise—what is perceptible to sense, and what is latent in horizontal and vertical technologies of command and control. In producing outlaw representation, the implications of the lawful and scientific cannot be divorced from the artifacts of architectural research techniques. Architecture's abilities to simultaneously negotiate quantitative and qualitative information, and organizational and statistical complexity, allows its practices to affect subjectivities that are organized by cognitive capitalism, as well as by older industrial and financial forms. Architectural research is simultaneously an archaeology and futurology. In moving backward and forward, it at once qualifies tradition, acculturates its test subjects to technology, and produces new aesthetics of indeterminacy. Applied research produces the architect as not only opportunist and arbitrageur, in the lineage of postwar research practices, but also as now a hacker and double agent.

CODA

Though the disciplinary self-test is perhaps now more individuated as the "selfie," it may be possible to speculate on certain relationships in applied research based on shared criteria of evaluation, mythologies, and models of circulation.

For example, Reyner Banham's *Architecture of the Well-Tempered Environment* and Alessandra Ponte's "Desert Testing" come into view as retroactive manifestos for Wren's atmospheric intervention. Banham argues that architecture is inseparable from environmental technologies—the arts of light and air, and has too easily abdicated its ethical responsibility to problems of energy. In Banham's history of passive to mechanical ventilation, we move from Wren's apparatus that merely measured pneumatic facts to the air conditioner that produces its own climate. Ponte describes the ethical anxiety of artistic and scientific production when confronted with the nuclear tests. This "crisis of witnessing" is predicated on the ultimate spectacle of the annihilating environment made explicit by an apparatus that transforms states of matter and energy. In the movement of artistic practice from the studio to the desert (in evidentiary photography and land art intervention) to the museum, a newly alert "quasi-double" joins the heroic experimental explorer as the test subject of an atomic sublime. Reflected through these texts, the nuclear moment, and the end of the Cold War Space Race, the research of contemporaries like Kiel Moë, Philippe Rahm, The Living, and others—while representative of a range of research modalities: the diagnostic, the instrumental, and the 1:1 demonstration, is brought into relief as part of an architectural tradition that adjudicates pneumatic and
Reflecting broadly through Brunelleschi’s perspectival experiment to the computer screen, the gun sight, and contemporary interface design, we might locate an intermediary hybrid in Vannevar Bush’s 1945 “Memex.” A proto-hypertext system born of military-sponsored research, the Memex’s microfilm storage and display were integrated into a midcentury office desk. As Bush writes, “Thus science may implement the ways in which man produces, stores, and consults the record of the race.” But the test drive problematizes science. For example, while concerned with the visual representation of populations at risk—diagnostic projects like Laura Kurgan’s “Million Dollar Blocks”—and Eyal Weizman’s spatializing of the stateless cannot be thought without human rights and the counter-analysis of the statistical subject. By comparison, by instrumentalizing “nature,” Catherine Seavitt-Nordenson et al’s recent project on Palisades Bay expands the role of the architect, not only into landscape architecture, but also into policy, zoning, and building code that govern the housing of populations at risk from rising tides and climate change. And in the lineage of the training of the sensorium via an encounter with technology, Aranda Lasch’s investment in the scalable fragment represents work that reaches back to architecture’s fascination with ruination while engaging with tooling, fabrication, and computation. Work by Kurgan, Seavitt-Nordenson, and Aranda Lasch have all been exhibited at the MoMA (in exhibitions curated by Paola Antonelli) and thus evaluated or validated as adjacent to art practice.

Finally, the movement from a pre-modern Albertian paradigm, to a cybernetic feedback model, to Department of Defense-sponsored development of robotics and artificial intelligence, maps directly onto architecture’s social and labor relationships. We arrive ever closer to a post-human form of split agency, as between man-machine-animal, allowing process thinking, and a renewed vitalism and parliamentarism, to inform the possible futures imagined by architecture. By example, Gramazio and Kohler’s uncanny laboring robots as well as Future Cities Lab’s responsive architectural structures both answer the Turing Test through the distribution of (artificial) design intelligence. By comparison, Storefront for Art and Architecture director Eva Franch’s “Storefront Series” tests the possibilities for social practice, witnessing, and new forms of engagement in the (embodied) intelligence of the design community. Lastly, Jenny Sabin’s research into applications of molecular form has evolved into an interdisciplinary partnership with the cell and molecular biologist Peter Lloyd Jones in a shared laboratory adjacent to both disciplines. The above work has not only sponsored new forms of collaboration but has also expanded funding opportunities to include industrial contracts, corporate sponsorship, and a $2 million National Science Foundation EFRI grant awarded jointly to Sabin and Jones.

As many of the above are also educators, we are reminded that applied research has a contiguous relationship to education and pedagogy. Given higher education’s construction through the testing regime, we must ask how a form of matriculation that both prides itself on producing a generalist who is paradoxically a specialist, can absorb research given its outlaw status vis-à-vis professional practice. Going forward, today’s applied research might redefine agency for a next generation of designers. This next generation is already receiving a general training in spatial skills in virtual testing grounds like the video game Minecraft, – an apparatus itself already adjudicated through intellectual property lawsuit and preemptively acquired by the MoMA.

3. Foster, 33.
4. Foster, 34.
8. Foster, 39.
10. Robin Evans uses the architect Karl Friedrich Schinkel’s version of “The Origins of Painting” to argue that drawing precedes architecture. In Schinkel’s version, the mathematical space defined by the architect’s drawing, precedes the act of building; whereas In European architecture, the drawing is the starting point from which a building is organized.
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