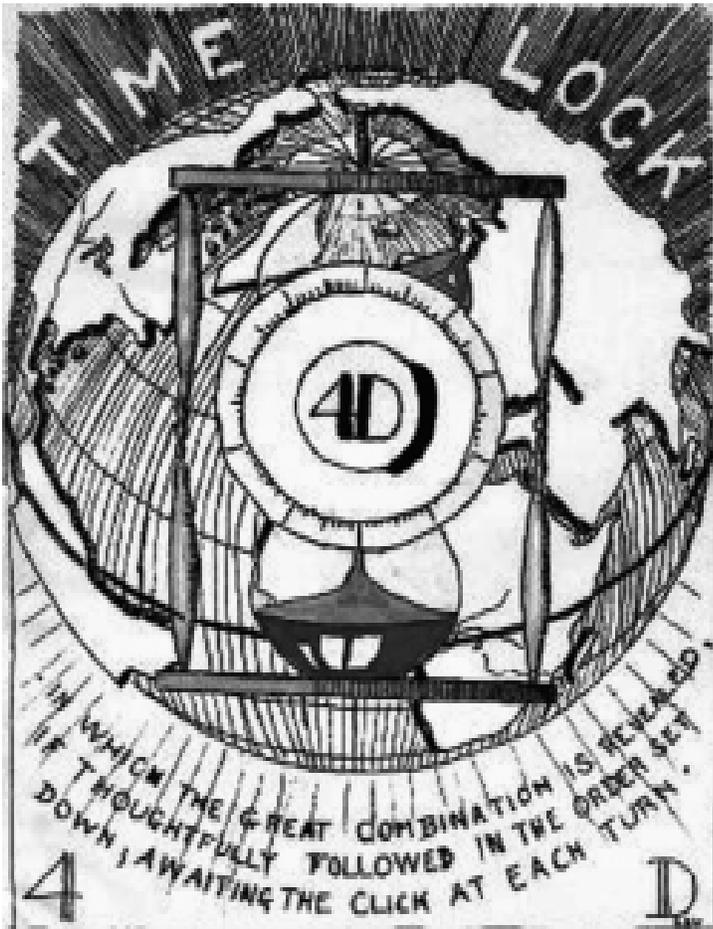


# Universal Architecture

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Fig. 1 – Cover to R. Buckminster Fuller's first literary venture: *4D.*, 1928 (Later renamed *4D Time Lock.*)



NO TIME SHOULD BE LOST BEFORE READING IT  
 NO TIME MAY BE LOST IN READING IT  
 NO TIME SHALL BE LOST WHEN ALL HAVE READ IT  
 COMPLETE "TIME OUT" MUST BE TAKEN TO READ IT.'

—R. B. Fuller, Introduction to *4D*

Fuller employed strong language for his *T-Square* debut. In particular, his first article on "Universal Architecture" accused "'shelter minded' promoters," *i.e.* – developers *and* architects, of meeting "[B]ehind closed doors in all parts of the world" with "capitalists, industrial leaders, and technologists" in "would-be-usurpation" of industrial methods and machineries.<sup>2</sup> To counter this self-interested, profit-motivated perpetuation of labor exploitation and industry manipulation, Fuller proposed assembling "universally minded, pioneering designers" to pursue viable alternatives. For his part, he claimed to have mustered 50 like-minded persons for a "volunteer designing association" called Structural Study Associates, or the SSA.<sup>3</sup> Disavowing both singular designs and archaic construction methods, SSA members nominally aspired towards not only the "final structure, to be reproduced in quantity, but also with the complete ramifications of the industry, from elemental source to the site." As such, the resultant "searching consideration of contiguous sociologic development and its potentials for further growth, through design" comprised a valid, if comprehensive, recourse which Fuller called "life-enshrining UNIVERSAL ARCHITECTURE." Or, as he rendered, characteristically, in equation form: "Science + Art + Industry = Universal Architecture."<sup>4</sup> Significantly, these constituent variables were specified to exacting tolerances.

The first component of Fuller's trivium was "the resultant of intellectual activity which is essentially: '—'Selection'."<sup>5</sup> That is, by discerning the probable from the improbable, scientific investigation identified myriad, infinite "special sub-systems" the collection and organization of which resolved human experience into comprehensive – and comprehensible – categories.<sup>6</sup> As such, its mode of selection comprised an internalization of external, but still "natural," selection. Its incorporation into "Universal Architecture" thus corporealized a generic selection, or filtration, process. For instance, Fuller's "Checklist of Universal Requirements" stipulated the concretization of "spacial[*sic*] control" as buffer zones, or "compassed spaces," which protected against such diverse external dangers as "pestilence," "marauders," or "selfishness (Politics, Business, Materialism)," and such varied internal hazards as nervous shock, physical fatigue, or fear. As well, "mechanical provision," or instrumenta-

tion, promoted developmental processes like the "selective awareness of universal progressions," verbal and musical articulation, and "fueling" or "sleeping." Effectively, this first constituent of "Universal Architecture" bespoke both the instrumentality of space and the spatiality of instrumentation. Indeed, the double meaning of "compassed space" evoked the former's sheltering spatial "encompassment" and the latter's "compassing" spatial awareness. Despite this "scientific" mediation of human agency, the activation of Architecture as a fundamentally prosthetic construct warranted a further, but adverse, *artistic* refinement.

The second component of "Universal Architecture" comprised the singular medium in which human sensibilities, *e.g.* – the—"visual, oral, textural, olfactual[*sic*]," were superposed in combinatory indefinitude to generate what Fuller called "an infinity of mutable, selective, sense-limited, harmonic progressions."<sup>7</sup> That is, in like manner to producing (seemingly) endless music from harmonic resonances, Art fashioned perception into the "abstract infinity" of human experience. In turn, this experience was manifested as localized, transitory phenomena. Contrasted to the reductive impetus of Science, Art breached the "direct personality limit" of traditions, conventions, and physical strictures"—even if its medium and expression were intrinsically ephemeral. For Fuller, in fact, every human achievement constituted little more an emersion of humanity's underlying "abstract infinity." If Science effected both the spatiality and instrumentality of "compassed space," therefore, its union with Art translated the infinite into the definite, but dynamic. Significantly, this transformation conferred telepathic spatial control, or what he designated as the "progressive material unselfconsciousness of control."<sup>8</sup> Fuller's earlier manuscript on "Lightful Houses" even suggested: "There will come a time when in our individualistic harmonious state all work will consist of thinking and crystallizing[*sic*] thought into sound or directionable[*sic*] spheres...."<sup>9</sup> Thus, where scientific selection gave form to shelters and fittings, artistic abstraction actually enabled their inhabitation and utilization – and thereby activated the architectural potential of "Universal Architecture." However, issues concerning commensurability and, by extension, sustainability of otherwise mutually exclusive Science and Art remained.

Appropriately, then, the final component of “Universal Architecture” preserved both selection and abstraction from temporal and spatial devolution. That is, it assumed the double role of arbiter and promoter for what Fuller designated as “ideal” and “standard.” Where the former derived from individualized, *artistic* conceptualization, or what Fuller described as the “latest sensation of refinement towards perfection along any one time line,”<sup>10</sup> *scientific* reduction of the infinitude of human experience into identifiable and, hence, selectable “subsystems” constituted the latter. In principle terms, then, Art distinguished individuals, but Science comprised humanity’s lowest common denominator. As such, Fuller’s conception of Industry as the “scientifically cleansed, de-exploited, decentralized, minimum-effort, maximum-result, mobilized world-community inter-service”<sup>11</sup> explicitly authorized its mediation of this opposition. Specifically, even though Industry coordinated motivations, methods, and materials towards the production of “standards,” this mode of production failed to account for the intrinsic volatility of human perception, abstraction, and desire. However, its endowment with Science and Art sufficiently escalated its efficiency (as embodied by *scientific* selection) and adaptability (as mandated by the myriad, infinite forms of *artistic* abstraction) so as to assure the imminent industrial realization of “ideal.” Instead of propagating “house designs that are manufactured like-as-peas-in-a-pod,”<sup>12</sup> therefore, “Universal Architecture” signified what Fuller hoped would be a “new, reproducible[*sic*], design [which] could in no way be accomplished by quantity reproduction of any one stylistic architectural composition.”<sup>13</sup>

Neither repetitious nor serial, Fuller’s trivium essentially repudiated “conventional” Architecture for its demonstrated, and continuing, failure to confront the mutability of time, place, and function. In stark contrast, the “compassed space” of his “Universal Architecture” detected, rendered sensible, and then distributed the flighty, immaterial, or “weightless” constituents of individual human consciousness to the full expanse of every possible “aesthetic dimension.”<sup>14</sup> For Fuller, in fact, the “ultimate progression in relation to Universal Architecture” explicitly precluded the “necessity of words, articulation being immediately possible in its ultimate form.”<sup>15</sup> Indeed, the conception, realization, and inhabitation of space together com-

prised the broadest potential and, hence, highest achievement of individual human creativity.<sup>16</sup> In effect, then, “Universal Architecture” resolved the fundamental incommensurability between dynamic life and static, even possessive, Architecture.<sup>17</sup> Fuller even saw fit to assign it the tremendous role of “humanity’s supreme survival gesture.” However, this lofty aspiration did not derive solely from the “synergy” consequent to superposed Science, Art, and Industry.<sup>18</sup> Rather, it followed from their unexpected susceptibility to correction, refutation, and finally, revolution.

## 2

### *Life in Thermal Death*

My continuing philosophy is predicated, first, on the assumption that in dynamical counterbalance of the expanding universe of entropically increasing random disorderliness there must be a universal pattern of omnicontracting, convergent, progressive orderliness and that man is that anti-entropic reordering function of universe and, secondly, upon the assumption that man is born with an extraordinary inventory of faculties within an extraordinary inventory of universal phenomena.<sup>19</sup>

The serious matter of creating an industrial house that shall at the same time possibly compass and affect millions of lives in *what they have to do* and *what they choose to do*, affecting, most important of all, the upbringing of millions of children, demands the very broadest thought.<sup>20</sup>

—R. B. Fuller

Albert Einstein’s most celebrated achievement followed from his assertion of the foundational import of the speed of mass-less, immaterial light. Specifically, by ingeniously positing its constancy, he discovered that temporal and spatial measurements necessarily varied as functions of the relationship between observer and observed. On this account, once absolute notions of time and space of the Newtonian world view, *e.g.*, — as exemplified by the notorious universal ether, succumbed to the Einsteinian correctives of spatial “contraction,” time

"dilation," and even cosmological "curvature." More ominously, by unifying spatial and temporal dimensions into a "four dimensional space-time continuum," his theories seemed to compromise the physical basis of "truth."<sup>21</sup> Indeed, in place of the singularity and, hence, singular veracity of events, Relativity bespoke the universal equivocation embodied by an infinitude of potentially contradictory, if not even non-causal, events.

Of course, it was precisely this manner of repudiating hitherto assured notions of stability, permanence, and certainty that appealed so much to the professed "outsider" Buckminster Fuller.<sup>22</sup> For instance, his first literary, even philosophical, venture of 1928 was titled *4D*. Later, he represented his architectural aspirations as "the first complete attempt in architectural design to acquire a symbolism of the fourth dimension, as the designing method is literally from the 'inside out' on a radionic, time, space and quantum basis,"<sup>23</sup> while the resultant designs nominally "set in motion machinery or controled[sic] fourth dimensional design."<sup>24</sup> Fuller even met Einstein to defend, with apparent success, his practical "application" of the latter's theories.<sup>25</sup> However, his embrace – and ready appropriation— of both the tenets and vocabulary of Relativity was quickly qualified by a further, non-relativity inflected assault on the physical constitution of the universe.

In 1929, Erwin Hubble published his seminal paper on the mathematical correlation between the distance and speed of various nebulae.<sup>26</sup> Unexpectedly, and contrary to prevailing theories of cosmology, his results implied that the universe existed in a state of expansion. In contrast, even Einstein's cosmological model treated the universe as homogeneous, isotropic, and static. More alarmingly, an "expanding universe" introduced the disconcerting possibility of an entropic devolution towards "thermal death."<sup>27</sup> Or, as a popular account of this prospect concisely noted: "the entire universe appears – at present, at least – to be 'blowing up'."<sup>28</sup> Appropriately, news of Hubble's discovery proved more substantive to Fuller than even Relativity. Indeed, while his *4D* nominated Architecture – in the form of "4D," time-"unlocked" industrialized housing – as the most efficacious mode of contribution, his subsequent conceptualization of "Universal Architecture" derived its impetus and form from a conjunction of Hubble's (literally) chilling

pronouncement and Einstein's continuing efforts to formulate an encompassing theory of nature, or "Grand Unified Theory." For Fuller, in fact, the former's dissipative *physical* model was countered by the latter's integrative *conceptual* project.<sup>29</sup> Not surprisingly, his "Universal Architecture" aspired to Einstein's daunting goal by amplifying his earlier, earthly interventions to the magnitude of an universal corrective which he called "Correlation."

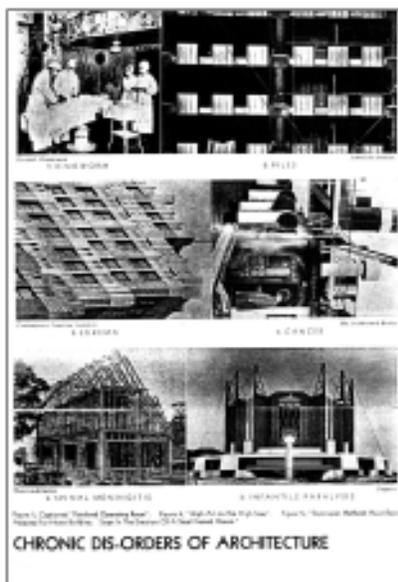
As indicated by the introductory quotation, Fuller perceived the coherence of human thought as a check upon an "expanding universe." Specifically, in like manner to Einstein's intellection of an "unified cosmos,"<sup>30</sup> Correlation signified the conceptual integration of the universe under "universal" principles. Regardless of the myriad physical and mental restrictions which undeniably frustrated humanity's otherwise boundless ambitions, Einstein's manifest success in accounting for physical phenomena across all scales, (virtually) all speeds, and even over all times past and present rendered palpable the very force of human intellect.<sup>31</sup> For Fuller, therefore, the *correlating* "abstract infinity" of human conception conceivably countered the *material* death of universal expansion with the *immaterial* life of unified humanity. As such, Correlation effectively denoted humankind's *contractive*, if only conceptual, "anti-entropic re-ordering function." Or further, its singular talent and, hence, principle distinction even with respect to the "extraordinary inventory of faculties within an extraordinary inventory of universal phenomena." For just this reason, he saw fit to denounce any enterprise which potentially deterred humanity's attainment of an "omnicontracting, convergent, progressive orderliness."

Architecture, for instance, garnered Fuller's particular scrutiny – and lifelong denunciation. That is, unlike his later term "syntropy," Correlation was not counterpoised to dissipative, stochastic entropy. Rather, it reconfigured the newly unified space-time into constituents of a truly "universal" Architecture. Seen this way, the anti-partitive connotation of Correlation and, by extension, "Universal Architecture" together effectively supplanted Architecture's hitherto traditional foundation upon the notion of *ownership*. Indeed, Fuller's second essay on "Universal Architecture" even affirmed its "elimination of the arbitrary property-sense."<sup>32</sup>

This second article began by citing the conclusion of recent research in child psychology. In particular, he recalled: "It has been scientifically observed that children have no 'property sense' at birth, and receive the idea somewhere between the average ages of two and four ...."<sup>33</sup> From that moment forward, the

illusion of "possession" ... [is] extended, through accustomed relationship, to include "possession" of one's clothes, pencils, house in general, land, friends, wife and children, business, state, nation, world,

Figure 2.



and, finally, "God"....<sup>34</sup>

As a result, he construed "property sense" as little more than a "mirage" the infliction of which upon unsuspecting victims was facilitated by Architecture. That is, even the faintest act of Architecture distinguished between inside and outside, private and public, or individual and communal. Worse, the architectural embodiment of this partitive disposition effected individual possessiveness, the raising of ramparts, and most dangerous of all, what he infamously designated as Architecture's "chronic dis-order" of permanence. In just this way, Architecture expressly privileged the transience of human life over the finality of its death. Humanity's dissociating "illusion of 'possession'" therefore ac-

rued from Architecture's manifest complicity in sustaining the stability of both time and space. For Fuller, however, the twentieth century's hallmark progress in the former domain dictated parallel advancements in the latter. Or, as his introduction to *4D* suggested, ownership was merely an artifact of Architecture which was "purchased on Time." Accordingly, the Correlation underlying "Universal Architecture" was initially realized in the temporal, and then extended to the spatial, domains.

As Fuller himself noted, the "first consideration" of his critics who objected to his "so-called 'industrialization of the shelter industry' must always be the land."<sup>35</sup> However, he countered thusly: "mankind intuitively associated building as part and parcel of the land" only "[U]p to the birth of the skyscraper industry." At that juncture, "a distinct sense of divorcement of the shelter and the land" was developed consequent to "the fact that such structures as the Empire State have occurred within so short a span as one year...."<sup>36</sup> Although ever more efficient and customizable methods of construction created ever higher densities of occupancy ever more quickly, Fuller proposed to avoid the requisite inflation in land value by extrapolating Architecture's myriad innovations in mass-production and mass-assembly to the very objective dictated by his "Universal Architecture": ephemeralization. That is, its implication of a progressive, evolutionary drive towards the ephemeral, or the "doing the most with the least," denoted the transference of "temporal efficacy to that space. As such, an *industrially* produced (not *re-produced*), but *scientifically* achieved, fulfillment of *artistically* conceived requirements of shelter comprised the ultimate corrective to humankind's dependence upon land – or, more accurately, its bondage to inescapable gravity. Instead of (literally) supporting ever taller, denser, and, hence, weightier Architecture, Fuller's "Universal Architecture" replaced the sedentary, static dwellings of old with the ambulatory, dynamic, even ephemeral shelters of scientific, artistic, and industrial revolution.<sup>37</sup>

By denying the human prerogative to ownership, "Universal Architecture" necessarily dictated a manner of equalization. Unlike the communal sovereignty advocated by most flavors of historical materialism, however, Fuller transposed the target of his still class-based revolution from subject

to object. That is, his innovation in the otherwise saturated field of scientifically-inspired historicism followed from his recognition of the complete extensibility of *corporeal*, individual ownership to *incorporeal*, common Correlation. To this end, he was careful to balance his persistent call for humanity's detachment from literal, *architectural* ground with the notion of absolute, but no longer partitive, ownership of flighty, yet fully instrumented, shelter. Even as "Universal Architecture" specified the "universal" inhabitation and utilization of shelter, therefore, its actual manifestation evolved towards ever less substantial and, hence, less possessive forms. Correlation, in particular, essentially aspired to the further displacement of humankind's foundation from *object* to *objectivity*. Indeed, although it connoted the *contractive*, but solely conceptual, "orderliness" of the universe, its integrative force actually derived from the additional, *expansive* impetus which surmounted every human limitation and, thus, rendered fully accessible the universal self-determination required to counter even "thermal death." Given his commitment to the displacement of object, Fuller very appropriately called this force "Conning."

### 3

#### *Glass Walls*

To allow of new perspective "to see ourselves as others see us." Not only would

this be potential to extraordinary individual development, but also to whole human welfare as conferees would incline to elimination of esoteric idiosyncrasies, and obvious selfishness.<sup>38</sup> —from *Shelter*, "Industrial Conning Tower," November, 1932

I became gradually interested in the possibility that all the variables involved in naval ballistics might be identified with all the variables operative in the most complex problems of Universe. I intuited that the combined sciences of navigation and ballistics might embrace all the variables governing Universe-event prognostication.<sup>39</sup>

—R. B. Fuller

Fuller liked to recall that his "Navy experiences ranged all the way from those small commands to subsidiary functions within much larger command patterns."<sup>40</sup> Significantly, of his many assignments, none proved so formative as the role of communications officer. In particular, additionally to witnessing the "first development of ship-to-plane radio-telephony," the "first long-distance wireless arc telephony," and even the first trans-oceanic voice transmission, he also performed the more mundane tasks of gathering, deciphering, and interpreting coded dispatches. A remarkable photo-

Fig."3"— From left to right, humanity's progress from pre-history to 1850, 1850–1950, and from 1950 forward. The first depicts the "physical impasse" of ignorance and isolation, the second shows the "linking up [of] resources and survival by lines of transport and communication," and the last tries to depict the abstract, "intellectual answer ... wireless, trackless, omnidirectional" which "bypasses all constrictions, yet in every way facilitates man's range and frequency of voluntary assembly and separation in a continuity of ever higher standards of environment and process control." It is the final image that resonates with the present delineation of "Correlation." Images and quotations from Fuller's introduction to Ladislav Sutnar's 1950 brochure titled "Transport." As cited in "Krauss and Lichtenstein's Your private sky: R. Buckminster Fuller, the art of design science, Baden, Switzerland: Lars Müller Publishers, 1999. 182.

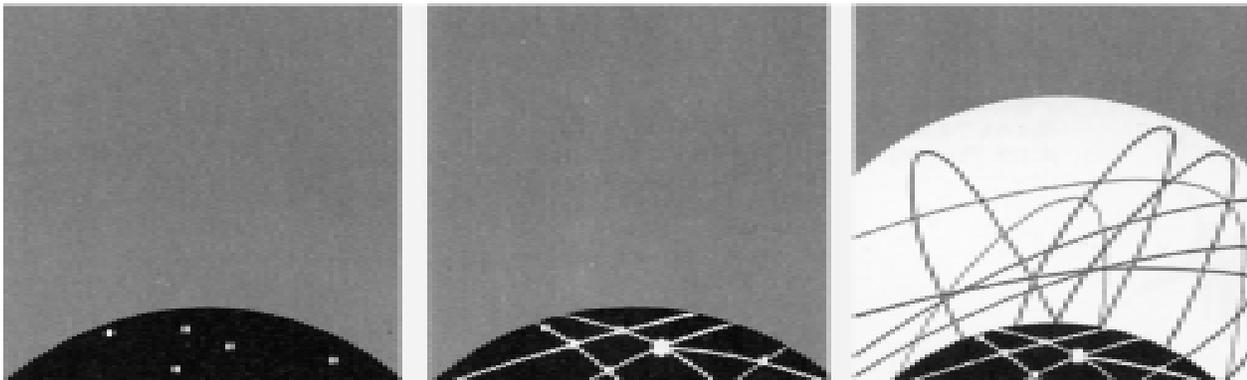


Figure 4.



graph dating to the time of Fuller's service aboard the *'USS George Washington'* actually captured the young officer at his post, bespectacled and focused, and surrounded by such instruments as telephone, telegraph, and oversized scissors. Not coincidentally, these scissors were used to cut fragments of paper from "ticker-tape" receivers to reconstruct otherwise fragmentary communiqués. Indeed, just over a decade later, Fuller brought the full force of this experience to bear upon his conceptualization of "Conning."

Although underdeveloped for the Dymaxion House of 1927, Conning was fully formed by the time of Fuller's involvement with *Shelter*. Specifically, the journal's final November, 1932 issue carried an unsigned, two page article describing the design of a "Conning Tower —'Hoop-Skirt' Room." Despite its anonymity, its prose and content left little doubt as to its author: retired Lieutenant R. Buckminster Fuller.<sup>41</sup> Indeed, as its name suggests, the conning towers on military ships were mast-mounted communication rooms in which information was collected, sorted, and distributed. Further, while early versions of these chambers were constructed from interwoven steel tubes, later variants were clad in ever thicker armor to protect against ever more accurate gunfire. As such, the resulting isolation effectively dictated their operation solely by reconstituting external data into an internal, *alternate* reality. It was precisely this mode and manner of mediating – and augmenting – human agency, or what he called—"information routing and correlating activity," that Fuller sought to evoke with

Figure 5.



his conceptualization of Conning. In particular, whereas the earlier Dymaxion House adopted the mere *appearance* of conning towers – as affirmed by Fuller's inclusion of a photographic example in his *Dymaxion Chronofile*, his "Conning Tower" of 1932 replicated their *functions* – though it substituted steel with "hoop skirt."

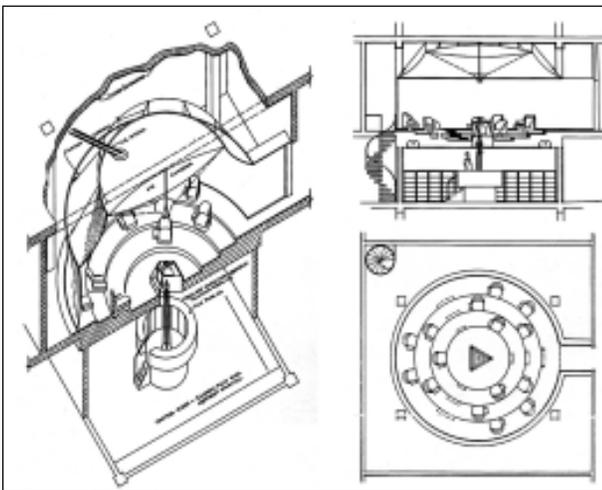
Whether for the *T-Square Club Journal*, *T-Square*, or *Shelter*, the appearance of Fuller's "Conning Tower —'Hoop-Skirt' Room" was unexpected. Illustrating neither building nor, strictly speaking, design, three drawings •– including an unprecedented isometric – schematically depicted a circular conference room. At the center stood a multi-screened, audiovisual console which not only interfaced with external databases, archives, news services, and information centers,<sup>42</sup> but also recorded and reproduced sounds and images through its "trans-lux visible displays." As well, seats were concentrically distributed across three levels. In fact, a "correlation of [the] 3 forces essential to stabilization" was supposedly achieved by their division into "3 team-sectors on principle '3's a crowd'." Significantly, every chair was turned to face the center. That is, rather than communicating directly with each other, conferees only interacted through the central console. In fact, its many displays even showed conferees their own appearances. Last, complete isolation and privacy were assured by confining service personnel to a lower, unconnected level and enclosing the entire space with an insulating "hoop skirt."

According to Fuller, his "Conning Tower" constituted an infinitely extensible prosthesis which carried out its assigned "information routing and correlating activity" with "hitherto incredible acceleration, accuracy, and lack of human effort." That is, its for-

midable array of instruments were especially selected to efficiently overcome material and intellectual barriers. For instance, ignorance was remedied by both ready access to remote information depositories and the continuous monitoring of dynamic external data. As well, records of recent meetings were available for immediate recall even as conferees concurrently monitored themselves from every perspective. In fact, since the instrumentation compensated for their absence, the efficiency and capacity of the "Conning Tower" actually increased with its deployment across the full range spanning from individuals to collectives. He even envisioned the formation of an entire global network of similarly equipped "Conning Towers." (In this vein, his earlier Dymaxion House was certainly serviceable as a node of the system.<sup>43</sup>) Thus, Fuller saw fit to affirm its preservation of

the integrity of intellectual progress by freeing the enthusiasm momentum of hitherto stultifying effects of constantly re-

Figure 6.



peated disclosures of "purposes" and "results" which through medium of "conning tower" require but one disclosure for their potential social diffusion.<sup>44</sup>

Considered together, these capabilities denoted the collection, recollection, manipulation, and enforced legibility and productivity of information in its most generalized sense – and form. Symptomatically,

these encompassing functions derived from both the metaphoric transparency and reflectivity of an otherwise isolating enclosure.

Although the "Conning Tower" protected against distraction, perturbation, or violence – as dictated by Fuller's "Universal Requirements," its ready access to, and manipulation of, information bespoke an enclosure constructed not of impenetrable armor or "hoop skirt," but of sheerest glass. Indeed, despite its avowed isolation, it nevertheless remained fully transparent to the flow of immaterial, mass-less information. Seen this way, its immediate connotation of the constituent *scientifically*-fitted, but isolated and buffered, "compassed space" of "Universal Architecture" was qualifiable in purely phenomenological terms. That is, in like manner to the physiological reception of sensory excitations as neurological impressions, the "Conning Tower" rendered informational every mode and manner of external existence. As a result, its absolute admittance of the resulting information effectively reconstituted an alternate – even if nominally faithful – reality within the "compass" of its interior. Within this inner space, however, transparency turned to reflectivity.

As Fuller suggested in this section's opening quotation, Conning was extensible into the insular interior. Specifically, the novel seating arrangement and means of communication and interaction in the "Conning Tower" accorded a "new perspective" of seeing "ourselves as others see us." However, in order to sustain the objective bias of informational transparency within the confines of its "hoop skirt," metaphorically transparent, or glass, enclosures effectively became reflective, or looking-glass, envelopes. By transforming even self-same human subjects into observable phenomena and, further, *objective* sources of information, therefore, Conning also effected a novel, mediated mode of self-awareness. In fact, as Fuller noted above, it not only promoted "extraordinary individual development, but also to whole human welfare as conferees would incline to elimination of esoteric idiosyncrasies, and obvious selfishness."

Significantly, the resultant equalization between subject and object, or the transposition from *self* to *other*, apparently surmounted the final "direct personality limit" previously implicated by his formulation of the second component of "Universal Architecture." That is, "progressive material

unselfconsciousness of control" was actually realized by complete, if instrumentally imposed, *artistic* consciousness of both exterior and interior. Or, as Fuller later described in his *Nine Chains to the Moon*, he actually perceived the conferees in his "Conning Tower" as "phantom captains" who were fully equipped in their *scientifically* "encompassed spaces" to "signal, via the complicated visual, aural and oral, tactile and olfactory systems of his machine, to captains of other machines, who receive the message through complementary mechanical systems of reception." As such, telepathic communication and control, or the *artistic* realization of "abstract infinity," "readily yields to his [the phantom captain's] un-self-conscious guidance of its processes and instruments." More tellingly, its privileged medium consisted of an "infinite communicating code, based on processes and continuities and not on static fixation identities."<sup>45</sup> Thus, it was precisely on account of its simultaneous embrace of both transparency and reflectivity that Conning most effectively ensured the fluidity of this "infinite communicating code" across all divides – be they physical, conceptual, intellectual, or even psychological.

Since Fuller originally—"intuited that the combined sciences of navigation and ballistics might embrace all the variables governing Universe-event prognostication," his "Conning Tower" effectively comprised an uniquely *logistical* resolution which reached out beyond all boundaries to collect, collate, and equalize all phenomena, knowledge, and experience as mere constituents of an informational matrix and, thus, enable their manipulation towards realizing a coherent, encompassing view after the exact fashion of Einstein's "Grand Unified Theory." In just this way, "expansive" Conning achieved the requisite "contractive" Correlation to surmount even the universal obstacle of entropic "thermal death."<sup>46</sup> However, despite his grandiose, if often confounding, rhetoric, Fuller's optimistic qualification of "life-enshrining UNIVERSAL ARCHITECTURE" still found him beholden to Architecture's foundation not upon the abstraction of objectivity, but the reality of object. Accordingly, he finally rendered insubstantial, or ephemeral, the very shelter demarcating Conning's exterior from its interior, or its metaphoric transparency from reflectivity.

#### 4

As Fuller often noted, he was moved to participate in what he called the "last industry" of Architecture by the manifest efficiency and, more importantly, adaptability of industrialization. In particular, he was profoundly impressed by American Industry's conversion from the production of domestic appliances to military ships with such great efficiency as to "slide them off one a day."<sup>47</sup> Thus, his famous denouncement of the "International Style" as merely a "Quasi Functional Style" which

has been codified in European Schools, such as the Bauhaus, and is reinfiltrating[sic] itself into this country, from which it sprung, as an aesthetic, static, dogma – of its original economic science<sup>48</sup>

actually followed from his perception of a certain mastery of industrial production. That is, by calling the "original" an "economic science," he effectively countered the myriad, competing "-isms" with Industry's foundational performance economy.<sup>49</sup> In fact, he considered its greatest asset to be the ready adoption of methods and processes to maximize performance – a distinction he termed—"re-tooling."

Besides merely resisting the importation of "industrialized" housing, therefore, Fuller's professed enmity for what he called "Internationalist Architecture" also accrued from its apparent reticence with respect to the actual "re-tooling" of the construction industry – even if it constituted a veritable re-conceptualization and, therefore, advancement of Architecture.<sup>50</sup> In contrast, he endowed his own "Universal Architecture" with the *scientific* "tooling" and *artistic* "re-tooling" of *industrialized* distribution. More importantly, since its constituent Conning inferred the "tooling" and "re-tooling" not of methods and materials, but of Correlating, or anti-entropic, *information*, its medium and goal were, respectively, immaterial and conceptual and, hence, both singularly and infinitely adaptable. As such, a final measure of facilitation was necessarily invoked.

Although originally intended to signify the "new scientific architecture" at the first exhibition of his "minimum house, for industrial reproduction,"<sup>51</sup>

Fuller later expanded the connotations of the term "Dymaxion" to include every mode and manner of minimizing resistance. For example, by adopting circular floor plans, his Dymaxion Tower "was able to reduce the drag on those square skyscrapers by wind stress by at least 87 percent...."<sup>52</sup> As well, his Dymaxion Car "slipped" through air resistance like fish through water. (Appropriately, his Dymaxion Car Company adopted the image of a flying fish for its corporate logo.) In fact, his continuing preference for cylindrical and spherical forms over what Reyner Banham later characterized as the "Phileban solids" of the "Internationalists" followed exactly from their embodied minimization of disagreeable drag.<sup>53</sup> (As such, Fuller was likely the first person to perceive architectural affectation as a literal "drag.") Thus, Dymaxion also denoted the progressive, evolutionary "re-tooling," "streamlining," or *facilitation* of processes, materials, and concepts

Figure 7.



towards their most efficient collection, utilization, and distribution, *i.e.* – the previously described "doing the most with the least" of ephemeralization. In just this way, it resonated especially with his formulation of "Universal Architecture." For the "Conning Tower," in particular, Dymaxion intimated the expeditious flow not of air, but of information.

Similarly, Fuller's Dymaxion World Projection of 1940 represented the otherwise immutable globe as a deformable, "plastic" map which attempted to alter perceptions regarding what he tellingly characterized as humankind's "egotistically important, special mechanistic and chemical process arrangement," *i.e.* – its avowed prerogative of ownership.<sup>54</sup> As such, it resisted, if only in appearance and connotation, the embodied friction of geo-political boundaries. In fact, as a graphic resolution to the logistical problem of minimizing the "mean free path" between global objectives, the Dymaxion projection explicitly evoked the informational matrix of Conning.<sup>55</sup> Appropriately enough, it was by further developing this projection that Fuller real-

ized the most successful expression of his "Universal Architecture": the Geodesic dome.<sup>56</sup>

The Geodesic dome was a truly remarkable invention. As structure, it fulfilled its function with such efficiency it remains unrivaled some half-century later. As shelter, it handily survived the deep freeze of the Arctic, scorching heat of the desert, and hurricane winds of the Tropics. And as instrument, it not only formed the superstructure against which the entirety of human drama was simulated in grandiose virtuality, *e.g.* – both the Geoscope and "World Game," but its incarnation as the radio telescope "Sky Eye" accorded a further unprecedented, if penetrating, view into the deepest universe. Indeed, this last application testified to the dome's unrivaled – and unprecedented – capacity to simultaneously operate as structure, shelter, and most importantly, actual instrument. Moreover, its emergence evolved towards ever lighter, stronger, and imperceptible forms of every composition.<sup>57</sup> Accordingly, the development from geometry to form, then to structure, shelter, and finally, instrument together denoted a manner of closure which spanned from concept to abstraction. That is, the platonic "ideal" was realized not by partitive specifics, but by the industrialized production of Geodesic "standard." Thus, if the "4D" or Dymaxion House comprised a generic manifestation of demarcation, or merely sheltering Architecture, the Geodesic dome not only satisfied every "Universal Requirement," but finally constituted the actual observational instrument of expansive Conning. In just this way, it also realized the encompassing perspective of contractive Correlation.

Ultimately, the progressive *de*-materialization of the Geodesic dome attested to the viability of Fuller's *dis*-embodied imperative of ephemeralization. Similarly to Einstein's *Gedanken*-propelled discovery of conjoined *space-time* and pursuit of "Grand Unified Theory," the encompassing vision of the "Sky Eye" equalized humanity regardless of handicap and, thus, "unlocked" it from the confines of not just of "4D," but of both time and space. Seen this way, "Universal Architecture" effectively denoted an actual, surpa-architectural prosthetic which enabled and, thus, enjoined every person – irrespective of physical or mental limitations – to participate in the realization of correlative, even Einsteinian, "anti-entropic reordering function."

Figure 8.



## LIST OF FIGURES

Fig. 1. See caption.

Fig. 2. Fuller's diagnosis: "Chronic dis-orders of Architecture." From *Shelter 2*, no. 4 (1932): 13.

Fig. 3. See caption.

Fig. 4. Fuller on assignment as communications officer aboard *USS George Washington*, c. 1919. From Krauss and Lichtenstein's *Your private sky: R. Buckminster Fuller, the art of design science*, Baden, Switzerland: Lars Müller Publishers, 1999. 62.

Fig. 5. Photograph of an actual conning tower from Fuller's *Dymaxion Chronofile*, volume 36, 1929. From *Ibid.*, 127.

Fig. 6. Illustration of Fuller's "Conning Tower, 'Hoop-Skirt' Room" from the article. Unsigned. "Conning Tower - 'Hoop-Skirt' Room." *Shelter 2*, no. 5 (1932): 64-65.

Fig. 7. From a sketch of the logo conceived for the Dymaxion Car, c. 1933. See Krauss and Lichtenstein's *Your private sky: R. Buckminster Fuller, the art of design science*, Baden, Switzerland: Lars Müller Publishers, 1999. 133.

Fig. 8. Photomontage of Charles Eames' model for a self-supporting 300' diameter radio telescope called "Sky Eye," c. 1953. He also worked on the foundation, while Fuller designed the structure/instrument. From Marks, Robert W. *The Dymaxion world of Buckminster Fuller*. New York: Reinhold Pub. Corp., 1960, Figure 416.

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Unsigned. "Space Curve Proof Lacking to Einstein." *New York Times*, 30 January, 1932, 5.

## NOTES

<sup>1</sup> From the introduction to R. Buckminster Fuller, *4D Time Lock* (Albuquerque, NM, 1928, 1972).

<sup>2</sup> R. Buckminster Fuller, "Universal Architecture," *T-Square* 2 (February, 1932): 37. For instance, after the fashion of the recently completed Empire State Building, "shelter minded" architects or developers made simultaneous use of inexpensive labor and pre-fabricated components for further capitalization instead of benefaction. With respect to the initially low tenancy of the building, Simon Breines argued for its open, government-subsidized rental. See Simon Breines, "Empire State Apartments," *Shelter* 2 (May, 1932).

<sup>3</sup> The SSA member roster included such prominent figures as Knud Lönberg-Holm, Frederick Kiesler, Isamu Noguchi, and Simon Breines, while Frank Lloyd Wright

apparently considered joining. More interestingly, *T-Square* editor-in-chief Maxwell Levinson was also a member. See the three pages of typed meeting minutes in Box 27, Volume 43, Folder 4 of Fuller's Dymaxion Chronofile of 1932, *FPSU*. These pages detailed the partition of SSA membership into three categories: "Organization now," "2nd," and "Possibly SSA." Wright's name was listed in the third.

<sup>4</sup> Fuller, "Universal Architecture," 38.

<sup>5</sup> *Ibid.*: 37.

<sup>6</sup> Characteristically, Fuller's explanation for this terminology left much to the imagination. He finally elaborated upon the notion of Science as "selection" of "special subsystems" in R. Buckminster Fuller, *And it came to pass—not to stay* (New York, 1976). 7. Specifically, he noted that scientists like Sir Arthur Eddington and Ernst Mach were seeking to put in order the same "raw materials"—i. e. Experiences – With which to identify Their special subsystems Of UNIVERSE.

<sup>7</sup> Fuller, "Universal Architecture," 38.

<sup>8</sup> *Ibid.* The notion of telepathic control was suggested by Fuller as early as 1928. Specifically, his 1928 manuscript titled *Lightful Houses* claimed: "There will come a time when in our individualistic harmonious state all work will consist of thinking and crystallizing[*sic*] thought into sound or directionable[*sic*] spheres which will set in motion machinery or controlled[*sic*] fourth dimensional design." (From *Lightful Houses*, as quoted in Krausse, Lichtenstein, and Museum für Gestaltung Zürich., *Your private sky : R. Buckminster Fuller, the art of design science*. 106.)

<sup>9</sup> From *Lightful Houses*, as quoted in Krausse, Lichtenstein, and Museum für Gestaltung Zürich., *Your private sky : R. Buckminster Fuller, the art of design science*. 106.

<sup>10</sup> Fuller, "Universal Architecture," 38.

<sup>11</sup> R. Buckminster Fuller, "Universal Architecture, Essay No. 2," *Shelter* 2 (April, 1932): 35.

<sup>12</sup> Athena V. Lord, *Pilot for Spaceship Earth : R. Buckminster Fuller, architect, inventor, and poet* (New York, 1978). 64.

<sup>13</sup> Fuller, "Universal Architecture," 24. Curiously, Fuller thought the many accomplishments of Henry Ford exemplified his "Universal Architecture"—and thereby attested to the validity of his ambitions. For example, besides calling Ford "one of humanity's greatest artists," he also cited his success in "having conceived and executed the largest 'canvas' ever painted, world-wide in actual size, and involving a constantly mobile inventory worth \$60,000,000, synchronized with [the] life activities of ten million people and 2 billions' worth of mechanical tools, heedless of nationalistic boundaries and banker's gold." See *Ibid.*

<sup>14</sup> Evidently, Meyer Schapiro's often repeated criticism of Fuller's Dymaxion House as "the savvy discovery of a previously untapped industry available for ... intensive, large-scale exploitation" followed from his conflation of Fuller's "Universal Architecture" with the admittedly confounding rhetoric of the SSA. As well, in her essay titled "On Architecture under Capitalism," Felicity Scott's conclusions concerning Fuller's "misread" of the "centrality of the role of aesthetics within Schapiro's argument" as a "collapse" of Schapiro's Marxist notions of architecture with the "overt aesthetic program of the International Style" disregarded Fuller's struggle to distinguish between "standard" and "ideal." Indeed, whether on account of the supersaturated aesthetics of the "ideal" or the non-aesthetics of the "standard," Schapiro's nomination of an "international, classless, and practical" architecture was not rejected by Fuller because of his neglect of Schapiro's "more overt discussions of social relevance, financial speculation, labor exploitation, and revolution." Instead, it was due to Schapiro's misapprehension of "ideal" as a veritable, realizable "standard." Most importantly, if Fuller had "recognized the political prospects of architectural practice" as located in the "aesthetic dimension," as Scott noted, this recognition followed not from his disavowal of aesthetics, but from the *non*-political prospects of architectural practice consequent to an individualized, even if fully aesthetic, "ideal." As quoted from Schapiro's "Architecture under Capitalism" by Felicity Scott. See Felicity D. Scott, "On Architecture under Capitalism," *Grey Room* (Winter, 2002). Unexpectedly, Fuller might have harbored sympathy for Schapiro's Marxist agenda despite appearances otherwise. The Dymaxion Chronofile of 1932 contained a provocative four page pamphlet titled "Architects and the Crisis – An Open Letter to the Architects, Draughtsmen and Technicians of America." Nominally from the "League of Professional Groups for Foster and Ford," this curious document emphasized the importance of architects with respect to the expenditure of billions in materials and labor. At the same time, they remained "hired servants" entirely dependant upon the business interests of "realtors, contractors and speculators, whose interest, first and last, is exploitation." Worse, these interests were "ready to sacrifice the artistic and social ends of architecture to immediate gain." Accordingly, "[T]he impressive quantity of American building is no sign of the skill of architects, but the unbridled, chaotic energies of individuals in a struggle for gain." (Emphasis added.) Supposedly speaking from the perspective of fellow architects, this pamphlet propounded the commonality of victimization by claiming that "[W]e share the fate of all productive workers under capitalism. We can change the hateful conditions of life only by a common effort." For this reason, the profession of architects should be allied with "the workers, the bulk of the people, whose misery urgently demands the abolition of the capitalist system."

Arriving at the crux of its rhetoric, a call was made to "the masses, which in attaining consciousness of the causes of its condition, must destroy the institution of private property and all class privilege." In this way, the "growing organization for socialism" which could "install a new society and a new culture" would finally be realized. In spite of its vision of collectivity, though, this pamphlet took great care to stress the distinction between the Socialist and the Communist parties. As a matter of fact, "[O]nly the Communist Party has consistently stood for socialism. It alone has fought for all workers, regardless of nationality or color." For this reason, the Communist Party was nominally unique in having "realistically denounced imperialism, armament, and war..." Considered in light of Fuller's own superficially sympathetic writings, his possession of such an inflammatory document should not be particularly surprising. With respect to our invocation of Meyer Schapiro's brief interaction with Fuller and the SSA, however, further elaboration of the distinction between Fuller's anti-capitalist agenda and that of analogous sentiments is appropriate, but must be deferred for a future paper. See Pamphlet titled "Architects and the Crisis – An Open Letter to the Architects, Draughtsmen and Technicians of America." Published by the "League of Professional Groups for Foster and Ford." See Box 26, Volume 42, Dymaxion Chronofile, 1932. FPSU.

<sup>15</sup> Fuller, "Universal Architecture, Essay No. 2," 31.

<sup>16</sup> Interestingly, this expansive view contrasted sharply with Le Corbusier's miserly allowances for individual creativity in the same issue of *T-Square*, *i.e.* – the expressions of which "even in the smallest degree is to taste the wellspring of happiness." See Le Corbusier, "We Are Entering Upon a New Era," 42.

<sup>17</sup> In this vein, Fuller also denigrated the "International Mode" for its masquerade of eclecticism as "functionalism." In his view, this misrepresentation followed from the self-imposed restriction of "Bauhaus international designing" to "formulated employment of the component items manufactured by the going old-line building materials world." (From his essay "Influences on My Work," in Fuller and Meller, *The Buckminster Fuller reader*. 66.) Thus, even as Functionalism became the new byword of Architecture, he still insisted upon the distinction of Science as "the life blood of function." (From Fuller, "Universal Architecture," 35.) Similarly, Le Corbusier's assertions regarding the individualized capacity to "think, contemplate, study, and create" were premised upon the inclusion *by* and *for* a collective, *i.e.* – tradition, community, or society. Indeed, even as he declared "the man of the mechanical age" to finally be capable of "living" on account of "his sound-proof chamber, within his well-planned building, overlooking his parks, and breathing his pure air," this life also required him to "earn his living, play his part in the community, and develop in body

and mind." (From Le Corbusier, "We Are Entering Upon a New Era," *T-Square 2* (February, 1932): 42.) As such, Le Corbusier's "liberation of the individual" demanded no less than the loss of individuality. Put differently, however "liberated," however high in the sky the inhabitation "unit," and however isolated in sight, sound, touch, and smell, the individual was still bound – by Architecture, no less – to others, to the past, and to the ground.

<sup>18</sup> Fuller usually defined "synergy" thusly: the "behavior of whole systems [which was] unpredicted by the behavior of their parts." While "Universal Architecture" was certainly an example of this behavior, he did not fully develop the notion until he attempted to account for the remarkable strengths of geodesic domes in 1950. See, in particular, the manuscript for "Noah's Ark no. 2" as cited in Joachim Krausse, Claude Lichtenstein, and Museum für Gestaltung Zürich., *Your private sky: R. Buckminster Fuller, the art of design science* (Baden, Switzerland, 1999). 521.

<sup>19</sup> R. Buckminster Fuller, *No more secondhand God, and other writings* (Carbondale, IL, 1963). v.

<sup>20</sup> From the chapter titled "The great economic problem of this age, and all ages, the HOME," in *Fuller, 4D Time Lock. 1*.

<sup>21</sup> In fact, an editorial for the New York Times once declared: "Einstein seems to say that unalterable can be altered." This letter was also interesting for its perception of influence on both the works of Frank Lloyd Wright by Newtonian Physics and Fuller's Dymaxion House by Einsteinian Physics. G. P. Hersey, "Einstein seems to say that unalterable can be altered," *The New York Times*, 10 August, 1930. Ironically, Einstein conceived his *Relativitätstheorie* specifically to affirm the universal validity of physical behavior, or "truth." That is, Relativity accounted for deviations from expectation at high speeds, large masses, and great distances by rendering mutually commensurate otherwise divergent, conflicting observations.

<sup>22</sup> Regarding his "outsider" status, Fuller once claimed that "only the free-wheeling artist-explorer, non-academic, scientist-philosopher, mechanic, economist-poet who has never waited for patron-starting and accrediting of his co-ordinate capabilities holds the prime initiative today." See R. Buckminster Fuller, "Prime Design," in *The Buckminster Fuller Reader*, ed. James Meller (Middlesex, England, 1960 original, 1970).

<sup>23</sup> As quoted by G. P. Hersey from the "catalogue of the Harvard Society for Contemporary Art" in his previously mentioned letter to the New York Times. See Hersey, "Einstein seems to say that unalterable can be altered."

<sup>24</sup> As described in a catalog of the Harvard Society for Contemporary Art. From *Lightful Houses*, as quoted in Krausse, Lichtenstein, and Museum für Gestaltung Zürich., *Your private sky: R. Buckminster Fuller, the art of design science*. 106.

<sup>25</sup> Fuller recalled his meeting with Einstein thusly: "Young man, you amaze me. I cannot conceive anything I have ever done as having the slightest practical application. I evolved all this in the hope that it might be of use to cosmogonists and to astrophysicists in gaining a better understanding of the universe, but you appear to have found practical applications for it." The topic of discussion was a chapter on Relativity's practical ramifications in Fuller's manuscript titled *Nine Chains to the Moon*. See Alden Hatch, *Buckminster Fuller; at home in the universe* (New York, 1974). 142.

<sup>26</sup> See Hubble, Edwin. "A Relation between Distance and Radial Velocity among Extra-Galactic Nebulae." *Proceedings of the National Academy of Sciences* 15, No. 3 (1929). Essentially, Hubble noted the linear mathematical relationship between the velocity and distance of extra-galactic nebulae. The further away the nebula, therefore, the faster it appeared to travel.

<sup>27</sup> As postulated by the Second Law of Thermodynamics, entropy bespoke the inexorable, universal distribution of energy. Although the notion of total dissipation is more accurately described as "cold death," the term "thermal death" was preferred for its specific reference to entropy and thermodynamics. Interestingly, for the cover of the final issue of *Shelter*, Fuller selected an image of Isamu Noguchi's sculpture titled "Miss Expanding Universe." See "Shelter, November, 1932.

<sup>28</sup> "Space Curve Proof Lacking to Einstein," *New York Times*, 30 January, 1932. As even a cursory glance at Fuller's Dymaxion Chronofile makes evident, the New York Times was his principle, and preferred, source of news.

<sup>29</sup> Most likely, Fuller was influenced by the many newspaper articles of the late twenties and early thirties which enthusiastically followed Einstein's search for "an equation or groups of equations which will give a complete picture of all physical phenomena." (From Edwin L. James, "Einstein Near Goal of a Unified Cosmos," *New York Times*, 8 June, 1930.) In Fuller's preferred New York Times, for example, headlines declared, variously, "Einstein Near Goal of a Unified Cosmos – Scientists Now Keenly Await the Equations to Unite all Physical Phenomena," "New Einstein Theory Now Joins Electricity And Gravitation in One Structural Whole" (*New York Times*, 28 October, 1931), and finally, "Einstein Completes Unified Field Theory" (*New York Times*, 23 January, 1931). Perhaps most tellingly, Einstein's pursuit sought to subsume "both gravitation and electricity under one comprehensive theory of the same architecture throughout." Although Einstein did not achieve his goal, the popularization of his unification theories served to balance both the uncertainty induced by the emergent quantum mechanics and the alarm consequent to Hubble's findings.

<sup>30</sup> See, for instance, the headlines in the previous note. Conceivably, Fuller's inspiration by Einstein also followed from the latter's much-touted methodology, *i.e.* – his–*Gedankenexperimente*, or thought experiments. Indeed, with respect to Einstein's relativistic and grand-unifying phenomenology, "Correlation" comprised an epiphenomenon of Fuller's own innovation.

<sup>31</sup> Fuller's perception of the emergent quantum mechanics is less clear. Certainly, he liked to use novel, suggestive terms like "quantum." However, Einstein's unqualified success resonated with Fuller's avowed determinism. For Fuller, in fact, "Correlation" explicitly rejected even modest uncertainties or chaotic behavior.

<sup>32</sup> Fuller, "Universal Architecture, Essay No. 2," 31. His third and last article covered historical precedents for industrially mass-produced housing. As such, its contents – though prodigious in volume— is of minor concern with respect to our delineation of Universal Architecture. The three essays on Universal Architecture as published in *Shelter* were synthesized into a revised version in 1938 for inclusion in his first commercial publication, *Nine Chains to the Moon*. The most recent version appears in the chapter titled "Universal Requirements of a Dwelling Advantage" of *The Buckminster Fuller Reader*, ed. James Meller (Middlesex, England, 1960 final revision, 1970). In all of these later compilations, the contents of the final essay were summarily discarded. Our focus on the first two essays therefore follows Fuller's own practice. In fact, Fuller even characterized his third essay as being possibly "high-spotty, thus invoking unselfconscious syncopation – rather than conscious continuity." See "R. Buckminster Fuller, "Universal Architecture, Essay 3," *Shelter 2* (May, 1932).

<sup>33</sup> Fuller, "Universal Architecture, Essay No. 2," 34. The source of this claim is not clear. Archival research in the *FPSU* for the period from 1929 to 1933 failed to produce the usual newspaper clippings, science bulletins, or even pamphlets on this subject.

<sup>34</sup> R. Buckminster Fuller, *Nine chains to the moon* (Carbondale, IL, 1963). 21.

<sup>35</sup> *Ibid.*: 33.

<sup>36</sup> Fuller, "Universal Architecture, Essay No. 2," 33.

<sup>37</sup> Fuller endeavored to practice what he preached. For instance, his Dymaxion House of 1928 was transportable by airship, while his Tetra- and Cloud-cities of the 1960's envisioned floating, unbound cities entirely freed from land.

<sup>38</sup> Unsigned, "Conning Tower - "Hoop-Skirt" Room," *Shelter 2* (November, 1932).

<sup>39</sup> Fuller, *Critical path*. 239.

<sup>40</sup> From his essay "Influences on My Work" as it appeared in Fuller, *Ideas and integrities, a spontaneous autobiographical disclosure*. 15.

<sup>41</sup> Interestingly, this essay appeared in a section which sought to "represent initiation of a specific attack upon the problem" delineated by "Selden Smyser" of the "Washington State Normal School." (See its description in Theodore Larson's "Ecovolution," *Shelter 2*, November, 1932.) Indeed, Smyser specifically challenged Fuller to "develop functionalism into a recognized philosophy that would be considered the legitimate successor of the philosophies of Mach, Peirce, James, and Dewey." (From Selden Smyser's letter to Fuller, dated 27 September, 1932 as cited by Larson.) Thus, the "Conning Tower" formed part of Fuller's response.

<sup>42</sup> More precisely, Fuller noted: "There could be mechanical hook-ups of industrial unit production headquarters by teletype, telephoto and television with central publishing headquarters of industrial units, who in turn would be tactically hooked up in like manner with information sources such as Bureaus of Standards, Navigation, Department of Commerce, etcetera or corporations such as Standard Statistics, Consumers' Research, Science News Service, etcetera, as well as university hook-ups." The room was also linked to "Intramurally[sic] integrated ticker services, weather forecasting instruments, economic traffic indicators, elemental availability indicators, storage indicators, storage pile-up indicators, dominant news indicators, harmonic trend indicators." See "Conning Tower-"Hoop-Skirt" Room."

<sup>43</sup> As related by an "editorial commentary" in the June, 1929 *Architecture* concerning Fuller's Dymaxion House: "In a living-room combination, for example, an integral assembly consists of desk, filing-cabinet, typewriter, calculating machine, telephone, radio-television receiver, dictaphone, phonograph, and safe." See Krausse, Lichtenstein, and Museum für Gestaltung Zürich., *Your private sky : R. Buckminster Fuller, the art of design science*. 136.

<sup>44</sup> *Ibid.* 65.

<sup>45</sup> Fuller, *Nine chains to the moon*. 20. John Rajchman's "neo-Leibnizian definition of the Virtual House" seems especially appropriate here: "... it is the house that holds together the most, and most complicated, "different possible worlds" in the same container, allowing them to exist together along a constructed plane with no need of an "established harmony. From John Rajchman, "The Virtual House: a description," *ANY 20* (1997): 6.

<sup>46</sup> Characteristically, he later designated yet another, but now narrowly applied, term to this process: "Teleology." He defined it thusly: "NAME for the process of OBSERVING consciously, or absorbing subconsciously, from the OUTSIDE INWARD so that one may do from the inside outward is TELEOLOGY." Fuller, *Nine chains to the moon*. 44. Not coincidentally, "Pass-age 7" of the November, 1932 *Shelter* had been titled "Teleology." However, this initial usage was not yet qualified in terms relating to Correlation, Conning, or "Universal Architecture." Of

course, major strands of Fuller's formulation of these concepts parallel those set forth by Vannevar Bush in his seminal essay "As We May Think" of 1945. In this remarkable work, Bush argued for the instrumentation of inherited intelligence so that subsequent generations may acquire their knowledge ever more readily. Significantly, he argued for the specific derivation of these instruments from wartime technology, *e.g.* – his development in the 1930's of "Memex" which is seen today as a prototype of "hypertext" correlated databases. See Vannevar Bush, "As We May Think," *The Atlantic Monthly* (July, 1945).

<sup>47</sup> From handwritten note on a diary page from the time of Fuller's naval service. Here, he was specifically referring to the daily production of *Eagle*-class destroyers. Reproduced in Krause, Lichtenstein, and Museum für Gestaltung Zürich., *Your private sky : R. Buckminster Fuller, the art of design science*. 52.

<sup>48</sup> Fuller, "Universal Architecture," 22.

<sup>49</sup> Not coincidentally, Fuller's "Universal Architecture" series appeared after a year long debate in both the *T-Square Club Journal* and *T-Square* which culminated in an article decrying all forms of "-isms." See Ralph T. Walker, "Prophets and "Isms"," *The T-Square Club Journal of Philadelphia* 1 (1931).

<sup>50</sup> Fuller first ventured into industrialized housing in 1922 as a partner to his father-in-law, the distinguished architect James Monroe Hewitt. However, their distribution of the "Stockard" building system lasted but four years. Arguably, his subsequent achievements all consisted of "re-toolings" of this initial concept.

<sup>51</sup> As is well known, "Dymaxion" was coined by the publicists of the Marshall Field Department Store of Chicago specifically for the two week exhibition of Fuller's "4D" house in April, 1929. Apparently, it derived from the combination of dynamic, maximum, and ionic.

<sup>52</sup> R. Buckminster Fuller, *Designing a new industry; a composite of a series of talks* (Wichita, KS, 1946). 33.

<sup>53</sup> Banham, *Theory and design in the first machine age*. 328. Nevertheless, he did note that "as soon as performance made it necessary to pack the components of a vehicle into a compact streamlined shell, the visual link between the International Style and technology was broken."

<sup>54</sup> Fuller, *Nine chains to the moon*. 21.

<sup>55</sup> In this vein, a mention of the well-known "points on

cube" puzzle is appropriate. Specifically, the primary logic of determining the shortest surface distance between any two points on a cube is the unfolding of that cube. Thus, the Dymaxion World Projection was actually the application of this principle to a dodecahedron. Similarly, Fuller conceived of his *Fluid Geography* as the actual manipulation, and re-arrangement of an otherwise static globe. By the simple act of manipulating the disjunction between the globe and its 2D projections, for instance, Fuller was able to introduce the notion of mobility into an otherwise static representation. See, in particular, his R. Buckminster Fuller, "Fluid Geography," in *The Buckminster Fuller Reader*, ed. James Meller (Middlesex, England, 1944 original, 1970).

<sup>56</sup> While Fuller's chronological precedence has, in this case, been questioned, his originality has not. Specifically, Walter Bauersfeld led a team of researchers on a five year quest to design and build the world's first lightweight, hemisphere-domed planetarium above the Carl Zeiss Optical Works in Jena. Finally completed in 1922, this dome consisted of a concrete shell cast onto the steel frame forming an icosahedron. See Helmut Werner, *From the Arratus Globe to the Zeiss Planetarium* (Stuttgart, 1957). However, Fuller's innovation derived from his mathematical theorization of geodesic structures. Put most simply, the novelty and, further, strength of these structures derived from their equipartition of spherical surfaces into identical units. As might be expected, the solution is geometrically predetermined. That is, it exists as scale-less ratios rather than specified values.

<sup>57</sup> For instance, in a 1958 letter responding to the solicitation by "Mr. Pratinga" for blueprints to his Geodesic domes, Fuller noted that the strength of his dome for the Ford Motor Company's Rotunda Building *doubled* simply by maintaining the "tolerance, in the positioning of the rivet holes and in the diameter of those holes, of .005 inch." That is, "[M]aintaining this tolerance produced a structure whose end-fixity strength was twice what it would have been had the tolerance been slackened to dimensional variations of .01 inch" – which is *the limit of human sensorial perceptivity*." (Emphasis added.) Effectively, the Geodesic dome comprised subsequent, progressive "re-toolings" of its initial "tooling" as geometric and mathematic principle. See the Letter to "Dear Mr. Pratinga," dated 24 January, 1958, from "R. Buckminster Fuller." (Box 98, Folder 10, Volume 192 [1 of 7], *Dymaxion Chronofile*, 1958 Jan. 20 - 1958 Mar. 6. *FPSU*.)