

## *Unit: A Semantic and Architectural History*

MORE THAN EVER WE CALL the spaces we inhabit units. Many university students live in them—some of mine at the University of California, Berkeley, live in Units 1, 2 and 3, names ill conceived for domestic coziness. They were built between 1958 and 1964 by the architectural firm of Warnecke and Warnecke as part of the urban renewal of the city. The dedicated website for Unit 1 states that the complex consists of six buildings built around a court, with a “unit office” at the center.<sup>1</sup> These units make little attempt to look like anything but impersonal superblocks. Recently, the university has countered their anonymity by “theming” parts of them African American, Native American, Asian Pacific American, and Latinx. Such units are modern, impersonal, institutional. The themed programs are more than an attempt to dress them up with new multicultural curtains: they work against the premise of the unit as a “single number regarded as an undivided whole.”<sup>2</sup> In fact, they divide, and in so doing they point out one of the central contributions of multiculturalism: to challenge the perceived uniformity and homogeneity of American society. While housing units flatten and regularize, the themed programs attempt to show the many grains of American culture.

*Unit.* What a cold word to describe a domestic space; and this gets right to how fitting this odd usage is and why dormitories at large public universities acquire the name. The word was coined by English mathematician and natural philosopher John Dee in his preface to Sir Henry Billingsley’s translation of Euclid’s *Elements* (1570).<sup>3</sup> More tellingly for the unit in the dormitory, it is a “single thing regarded as a member of a group,” a definition perfectly suited for large apartments, anonymous collections of spaces, and buildings.<sup>4</sup> If born of mathematics, it is a word that matured in the context of nineteenth-century mass society, bureaucracy, manufacturing, the

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ABSTRACT This essay peers through the peephole of the word *unit* to reveal the word’s journey across multiple fields from the mid-nineteenth century through the present. A keyword hidden in plain sight, *unit* links science and the world of measurement to society (family units), politics (political units), architecture (housing units), cities (neighborhood units), and, more recently, big data, the carceral state (crime units), and managerial oversight. REPRESENTATIONS 143. Summer 2018 © The Regents of the University of California. ISSN 0734-6018, electronic ISSN 1533-855X, pages 91–117. All rights reserved. Direct requests for permission to photocopy or reproduce article content to the University of California Press at <http://www.ucpress.edu/journals.php?p=reprints>. DOI: <https://doi.org/10.1525/rep.2018.143.4.91>.

modern military, and large institutions—the world in which the modern profession of architecture came of age. Although Raymond Williams did not include it in *Keywords* (1976), *unit* is an intimate relation of words like bureaucracy, management, masses, and institution.<sup>5</sup> How did it enter the house or the apartment and become attached to other spaces of modernity? This is its semantic, architectural, and spatial journey.

### Units of Superficial Measure

Its early modern origins notwithstanding, *unit* came into quotidian use in Western society more recently (fig. 1). The Google Ngram shows that the word was relatively rare, narrow in meaning, and nearly flat in the English language until the mid-nineteenth century, when usage increased steeply as measured against all other words, peaking in the late twentieth century. The word came into standard use in order to take the measure of a world increasingly parceled out into bits—and, in fact, to remake that world. Scientific and mathematical units dominated this early usage. Units of force, quantity, heat, time, work, and resistance became ubiquitous in engineering and science around the mid-nineteenth century. A partial list of neologisms of units of measurement and their dates shows the physical world coming under quantitative control, at least rhetorically: dyne (1842), ohm (1861), siemens (1867), weber (1872), oersted (1879), ampere (1881), coulomb (1881), gauss (1882), joule (1882), watt (1882), henry (1886), Ångström (1887), kelvin (1892), gilbert (1893), newton (1894), mole (1902), curie (1910).<sup>6</sup> Units like these were bonded in name to scientific celebrities and spread through curricula in years of educational expansion. As one author put it: “Let us derive terms from the names of some of our most eminent philosophers.”<sup>7</sup> The attempt to personalize these units suggests an effort, however quixotic, to reenchant what modernity was disenchanting through dissection. To know the world quantitatively—and one might venture in a modern and authoritative way—was to know it in terms of units. Who has not counted calories!—a unit of energy since 1863. These were terms of empirical measurement and organization, part of the scientific study of nature and natural laws.<sup>8</sup> *Unit* was naturalized into modern understandings of the world—and naturalized science as the world: “The year is a natural unit of time,” wrote an author in 1851.<sup>9</sup>

Architecture simultaneously emerged out of this new world of measurement, gave it material form, and looked upon it with trepidation. In the earliest Anglo-American dictionaries and encyclopedias of architecture, units of measure already sound normative, if not habitual. Joseph Gwilt’s *An Encyclopedia of Architecture* (1842) contains a “unit of superficial measure”

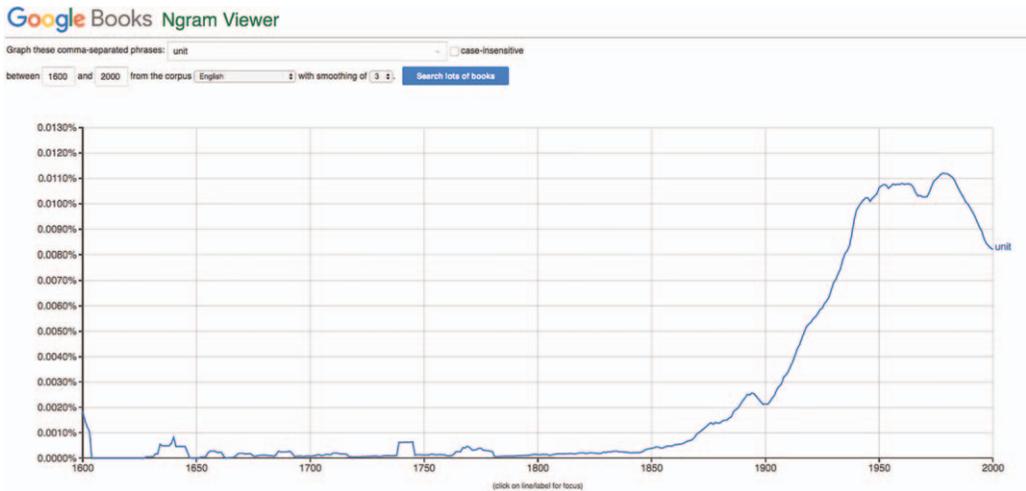


FIGURE 1. N-gram of the word *unit* (search performed January 17, 2017), Google Books Ngram Viewer, [https://books.google.com/ngrams/graph?content=unit&year\\_start=1600&year\\_end=2000&corpus=15&smoothing=3&share=&direct\\_url=t1%3B%2Cunit%3B%2Cc0](https://books.google.com/ngrams/graph?content=unit&year_start=1600&year_end=2000&corpus=15&smoothing=3&share=&direct_url=t1%3B%2Cunit%3B%2Cc0).

(meaning area) and units of linear measure, but Gwilt also used a more ambiguous unit. “We shall follow the practice of Vignola in describing the orders, that master dividing the diameter into two parts, of which each is a unit of the scale for profiling the order.”<sup>10</sup> The diameter of the column, that time-honored measure in classical architecture, became a unit. This was measurable, of course, but it was really a matter of proportion, which ushered the unit into a long history of classical aesthetics. Gwilt’s was a relatively new usage, since earlier translations of seminal texts like Vignola’s or Vitruvius’s—including Gwilt’s 1826 translation of the latter—found other words to express these relationships. Gwilt’s training speaks to this slippage between the unit as a measure and as an architectural element. Trained by his father, a county surveyor in Surrey, Gwilt went on to study at the Royal Academy and, after travels in Italy, wrote a series of books and treatises on architecture while also practicing as an architect.

The adoption of *unit* has to do with the technical basis of architecture before it was formalized in universities and professional associations.<sup>11</sup> In the early nineteenth century, most architects were practitioners of the “mechanical arts,” trained either as carpenters or builder-architects on site, more rarely as pupils of the few professional architects then in practice, or in technical societies. This was particularly the case in the United States. Societies like the ones that inhabited the famed Carpenters’

Hall or the Franklin Institute in Philadelphia that predated formal university training were aimed at house carpenters or “mechanics.”<sup>12</sup> Another mode of dissemination of architectural knowledge came through architecture texts, which by the middle of the nineteenth century were filled with units of measurement. In fact, every high-school arithmetic in the second half of the nineteenth century spoke the language of units, making the word part of the mental furniture of educated Americans. The “unit of surface is a square whose sides are the unit of length,” while the “unit of solidity is a cube, whose edges are the unit of length,” wrote West Point mathematician Charles Davis in *Practical Mathematics, with Drawing and Measurement Applied to the Mechanical Arts* (1852).<sup>13</sup> Practical guides like Davis’s flourished in a period before formal architectural education was possible.<sup>14</sup> Guides aimed more squarely at architects adopted much the same language.<sup>15</sup>

### Units of Aesthetic Liberation

From the beginning, however, units could also pose a threat. In response to the idea that there be “absolute ratios in the proportions” of buildings so that “every part should be some multiple of a radical unit,” British engineer W. J. Cockburn Muir answered resolutely that “Fancy [would be] constantly over-ridden and trampled by the abominable tyranny of his Arithmetic.”<sup>16</sup> “What right of reason have you to tie the Multiplication-table round the Architect’s neck?”<sup>17</sup> Such stubborn reaction reveals the power of the historical shift then underway. Indeed, at midcentury architectural authority came in the form of mensuration. Cockburn Muir’s rejection reflects a growing reaction against measurement’s rule. Engineers tended to see buildings as mathematical propositions in which “a similar unit of reference is adopted for the construction of their various parts.”<sup>18</sup> This is precisely what Cockburn Muir, unusual among engineers, argued against: an architecture conceived as “a system or assemblage of parts subject to certain uniform established proportions.”<sup>19</sup>

The renowned architect Eugène Emmanuel Viollet-le-Duc found a way out of the problem that pitted units of measurement against artistic freedom: “The scale adopted by the Greeks in their temples was not an absolute but a relative unit, known as the *module*, although, in their dwelling houses, it is certain that they used the absolute unit, which is the size of a man.”<sup>20</sup> If humanizing the unit was not argument enough, Viollet-le-Duc made his position abundantly clear: “While availing himself of mathematical means to justify his proportions according to a unit of harmonious relations, the artist must ever remain jealous of his individual liberty.”<sup>21</sup>

Such liberty is evident in the leap units took beyond the measurable in the late nineteenth century. Ralph Nicholson Wornum wrote of stars, colors, mosaics, diaper work, and stripes as “units of repetition, or repeats of irregular shapes,” which he deemed to “have [the] finest effects.”<sup>22</sup> Here the unit describes ornament, an aesthetic matter distinct from superficial units or Gwilt’s proportional units. Wornum had prepared the material as a series of lectures delivered in the late 1840s to government schools of design in England. National support for the Industrial Revolution greased the unit’s path from math to art. Such repetitive ornament was necessary in the increasingly large buildings of the period. While architects like A. W. N. Pugin attempted to train a new generation of craftsmen to fill buildings like his Houses of Parliament with tile, wallpaper, glass, and other decorative flourishes, much of the large-scale building in this period required “units of repetition” that could only be produced in quantity by industrial means.

By the turn of the century, the language of decorative units had become common in architectural practice, criticism, and art history. In an early review of the work of Frank Lloyd Wright, architect Robert C. Spencer Jr. wrote: “A repetition of a simple unit is only interesting and effective when there is a progressive rhythm . . . in sympathy with structure, or when it covers surface quietly without weakening it or destroying its beauty in order that the surface may be treated as a broad unit set off by richer elements of composition.”<sup>23</sup> On the chevron pattern in Norman architecture, the eminent art historian Arthur Kingsley Porter wrote: “It is noteworthy that, since these voussoirs were carved before being placed, each voussoir contains a unit of the pattern.”<sup>24</sup>

These various units were all ambiguously related, something that served the artful architect more than the calculating engineer. They could be assimilated into larger ways of seeing. For instance, in 1896 the architect Russell Sturgis (1836–1909) defined the “order” as the “unit of decorative post-and-lintel composition; that is, a column or pilaster, with its pedestal, if any, and so much of the entablature as may be thought to go with the column or pilaster.”<sup>25</sup> There are three distinct issues to note here. First, Sturgis imagined the unit neither explicitly as a proportional system, nor in strictly structural terms, but rather as a mode of composition or design. Second, he made it decorative, a matter of how facades were organized rather than constructed. Third, like Gwilt he rooted it historically in the classical tradition, but Sturgis ignored its mathematical basis. In one tidy definition, the unit had slipped decisively out of the realm of modern measurement and into an aesthetic realm with deep roots in the past—that other source of authority in nineteenth-century architecture.

It was a short leap from units of proportion and ornament or architectural and compositional units to still more complicated ones. In discussing Dankmar Adler and Louis Sullivan's Guaranty Building (1896) in Buffalo, Montgomery Schuyler wrote that the "unit of design may properly be called a bay."<sup>26</sup> Here was the leading critic of the day writing, arguably, of the most important architect in one of the most widely read American architecture journals, *Architectural Record*. He was reaching for a new vocabulary to describe a novel building type, the skyscraper. *Unit*, with its basis in measurement, proportion, and ornament, aptly described the cold, repetitive grid of structural steel. Yet Schuyler's description of the bay as a "unit of design" requires more explanation. Bays, of course, were not new. Architectural writers had been fascinated with Gothic bays. H. Heathcote Statham, for instance, wrote of the "single bay of nave or choir" as the unit of the French Gothic.<sup>27</sup> Bays were understood as part of medieval modular construction, which allowed architects and historians, most forcefully Viollet-le-Duc himself, to see the Gothic as a rational system of construction, an idea that would extend forward into architecture's Modern Movement. Schuyler was reading the façade of the protoskyscraper as it was taking shape, while partaking of an analogy to the Gothic that would become central to the Bauhaus and other strands of modern architecture. In the bay, the architectural and decorative units become one.

A few years later, the British Geoffrey Scott would make Schuyler's point explicit. One of the most important architectural theorists of the early twentieth century, he wrote of the masonry of the Strozzi Palace in Florence and Palazzo della Cancelleria in Rome that "the unit of design . . . is not material but aesthetic."<sup>28</sup> Neither a brick nor a bay, the unit had become unabashedly aesthetic. On scale, Scott wrote: "In transcribing ourselves into such a building we instinctively take its detail as our unit of measurement, and this gives us an increased sense of the grandeur and simplicity of the unbroken mass."<sup>29</sup> In both cases, Scott aestheticized the unit, first drawing attention to overall effects and then thinking of it in terms of human scale. He thus inserted both the decorative and proportional unit into a new framework that was phenomenological and personal.

Such aesthetic liberties would become ubiquitous in architectural writing. American architect Thomas Hastings (1860–1929), who as a principal in Carrère and Hastings designed the New York Public Library, cast aside all pretense of objectivity. Writing in 1915, he declared that "scale is the relation between the size of all these parts and an imaginary unit of measure which is determined by our sense of the fitness of things. This imaginary unit is fixed by our education, observation, and associations."<sup>30</sup> Clearer evidence of the evacuation of measure from units would be difficult to invent. Hastings had created a Potemkin unit, one dependent on class and taste.

What to make of the imaginary unit? It is not enough to see in it the triumph of the *École des Beaux-Arts* system and cultural elitism at the end of the nineteenth century. Hastings was thoroughly ingrained in the French mode, but Sturgis was a Ruskinian and an avowed enemy of *Beaux-Arts* classicism. Yet these two men of different generations, training, and sensibility converged on the same word. What links them is a shift in the temper of the profession as it became more rooted in universities and institutions. Sturgis, who learned his craft informally in other architects' offices, was nonetheless an institutional creature. He helped found the American Institute of Architects (1857) and the Metropolitan Museum of Art and taught architecture at the College of the City of New York before there were formal architecture degrees in the United States. The much younger Hastings studied architecture in Paris, was a founding member of the US Commission of Fine Arts, and was elected to the National Academy of Design. They both pressed the unit into duty as a way of looking at architecture in an era when architects needed to guard the liberties of their inchoate franchise jealously against engineers and builders—even if this meant twisting the objective word into subjective knots.

### Mundane Units

Of course, this formalistic way of conceiving of buildings does reflect the inestimable influence at the turn of the century of the *Beaux-Arts* system and the rise of art history. But another source, at least in the United States, is evident: the mass production and marketing of building materials. The first *Sweet's Catalogue* (1906), that compendium of products that rationalized the trade catalogs that inundated architects at the turn of the century, was itself inundated with units.<sup>31</sup> The Unit Concrete Steel Frame Company created a unit system and sold unit girders and unit sockets. Its materials could be “built as a unit” and “delivered as a unit.”<sup>32</sup> Merritt and Company, a Philadelphia manufacturer of metal lockers and sheet steel, wrote: “All our Lockers are built on the Unit and Interlocking Principle.”<sup>33</sup> This meant that they could be rearranged to suit changing needs or spaces. This sort of unit anticipated—or helped to establish—some of the ideals of the Modern Movement: mass production, modularity, and flexibility. At the same time, individual materials like bricks were understood as units that could be part of the composition of architectonic or aesthetic units. The American 3-Way Prism Company of Philadelphia wrote of its Luxfer prism glass: “The wire glass tiles are so constructed that the wire netting imbedded therein projects from the sides, and when placed in the construction, these projecting ends

overlap and ‘interlock,’ thereby causing the cement to firmly tie the entire construction into one unit.”<sup>34</sup> In *Sweet’s*, all of these units comingled. Architects encountered building materials, systems of construction, and their assembly into larger compositions or constructions as units. Here was the equivalent in everyday modern construction of the classical order or the Gothic bay, but in steel and glass. In the 1950s, Richard Neutra would call *Sweet’s* the modern quarry, articulating a reality that had set in at the turn of the century with changes in manufacturing and the maturation of a national economy.<sup>35</sup>

Long before the Modern Movement, architects had already been designing through units of building materials. Bricks, stone, timber, and glass all came in units, beginning at least by the middle of the nineteenth century. But even these straightforward material units could fire the imagination. In 1916, Charles Matlack Price echoed Sturgis and Scott, saying that there was something intrinsic to the brick, that it was “a unit of interest in itself.”<sup>36</sup> With the introduction of the “Harvard Brick,” “the brick became properly recognized as a *unit* in design” (Price’s emphasis).<sup>37</sup> Here is the aesthetic foundation for Louis Kahn’s famous utterance: “You say to brick, ‘What do you want, brick?’ Brick says to you, ‘I like an arch.’” The mysticism often attributed to Kahn also had other more mundane sources.<sup>38</sup>

As the building industry—in fact, nearly all industry—moved from craft-based practice to machine manufacturing, buildings increasingly were composed of prefabricated units, not just of materials but also of dishwashers, refrigerators, and other appliances.<sup>39</sup> Cabinet units, unit paneling, wall units, even larger ensembles like kitchen and bathroom units, came into vogue.<sup>40</sup> The earliest usage comes straight out of Scientific Management theory.<sup>41</sup> Units created “beauty through an order that is alive with usefulness.”<sup>42</sup> By the 1930s, unit kitchens and kitchen units had been absorbed into a consumerist agenda in women’s magazines. Kitchens were now manufactured as ensembles around systems of appliances and prebuilt cabinets of uniform height and character called units, where before they had been irregular and improvised arrangements of cabinets and appliances.<sup>43</sup> Whatever coldness still lingered in the word *unit*, the convenience of a kitchen with modern appliances and continuous surfaces must have been ample compensation. “We did satisfy ourselves,” one puff piece claimed about the Arcode kitchen (sold by the American Radiator Corporation), “that no kitchen on earth could be devised that couldn’t be scientifically planned with these obliging units” (fig. 2).<sup>44</sup> The language softened these pristine, white, perfectly joined units, transforming them from cold manifestations of Scientific Management into something “obliging,” and thus endowing them with a trait commonly expected of their users.



FIGURE 2. "Now We Buy Kitchens by the Package and Plan Our Kitchens with Units," *American Home* 16, November 1936, 32.

### Big Units

Units were more than parts, whether they were proportional, ornamental, architectonic, or manufactured. Sometime after 1850, whole buildings became units. In *Architecture for General Students* (1874), Caroline W. Horton wrote of St. Peter's in Rome that "the multiplicity of details"

makes it “impossible for the mind to regard the whole as a unit.”<sup>45</sup> When *unit* appears to refer to a complete and independent building, it seems to take the place of the Victorian “pile,” which the *OED* makes clear was not necessarily a pejorative, but could refer to “the best and stateliest” of buildings.<sup>46</sup> Yet building units could also be more modest in scale. Eugene Clarence Gardner, an architect from Southamptton, Massachusetts, wrote: “Bell-wires and speaking-tubes, water and air pipes, are the nerves and arteries that unite the whole outwardly, while the pervading spirit of intelligence that plans and directs completes that delightful unit which we call a home.”<sup>47</sup> Not only does this show one of the earliest uses of *unit* to describe a house; it is also a precursor to Le Corbusier’s provocation that the house is a machine for living in. In fact, it joins conspicuously nineteenth-century metaphors (“nerves and arteries”) drawn from science with this more mechanical analogy, given shade by the word “delightful.”

*Building unit*, then, was used from the first in aesthetic terms, and emphatically so. In his widely read essay “The Tall Office Building Artistically Considered” (1896), Louis Sullivan sang the unit rhapsodic: “It must be every inch a proud and soaring thing, rising in sheer exultation that from bottom to top it is a unit without a single dissenting line,—that it is the new, the unexpected, the eloquent peroration of most bald, most sinister, most forbidding conditions.”<sup>48</sup> Sullivan’s usage, in more temperate terms, became common. The antiquarian Stephen D. Peet wrote that the Maya temple El Castillo at Chichen Itza “is as nearly as consistent a unit of building as can be found anywhere in the Maya countries.”<sup>49</sup> In *Architectural Composition* (1908), John Beverly Robinson argued that in the four round towers of the Tower of London, “the composition ‘scatters’ and does not hold together as a unit to the eye.”<sup>50</sup> Robinson entwined two aesthetic explanations, one about composition, the other about perception. He asked: “Why is it that in all arts a unit composed of one large and two small parts gives pleasure?”<sup>51</sup> Putting aside the fact that the term “unit of pleasure” actually existed and was coined in the late nineteenth century, Robinson was operating in the same mode as Scott and Sullivan.<sup>52</sup> So was the architect, writer, and mystic Claude Bragdon, who wrote that the Taj Mahal is “a unit, but twofold, for it consists of a curved part and an angular part, roughly figures as an inverted cup upon a cube.”<sup>53</sup> Bragdon, who stuffed his books with mathematical diagrams, never managed to popularize the twofold unit of the inverted teacup. These examples would seem to be pure formal analysis beefed up with technical language. But *unit* retained its scientific authority. The British architect W. R. Lethaby, for instance, wrote of the Hagia Sofia: “It is very large, yet it is a unit, not an aggregation of many parts,” and at the same time: “Finally, we need a true science of

architecture, a sort of architectural biology, which shall investigate the unit cell and all the possibilities of combination.”<sup>54</sup>

By the teens, units as monumental piles and as more modest buildings were so common as to have lost all obvious relationship to their origins in measurement. In his book on the 1915 San Francisco World’s Fair, Eugen Neuhaus wrote that the Tower of Jewels by Carrère and Hastings “lacks that oneness of conception that characterizes almost every other architectural unit in the Exposition.”<sup>55</sup> He called the Oregon building “a most interesting single unit” and a fountain a “poetic unit” that was “very simple and well-sustained throughout its architectural parts.”<sup>56</sup>

The seemingly innocuous shift to calling whole buildings units inaugurated a new way of looking and thinking about buildings, if not the larger built environment. By the 1930s, *unit* had become standard in housing, tied to the quest for building standards. In 1937, the New York City Housing Authority published *A Note on Site and Unit Planning* for the Works Progress Administration, written by Frederick L. Ackerman and William Ballard.<sup>57</sup> The former helped establish graphic standards for architecture in the United States.<sup>58</sup> They filled their report with technical plans and diagrams that explore sunlight, artificial illumination, gross area, density, cost, and other factors to consider in designing “a system of unit plans.”<sup>59</sup> Dozens of variations on housing units would free the architect to concentrate on other parts of the design. In Ackerman and Ballard’s diagrams, *unit* is denoted simply as “u,” as if it were a scientific quantity. The language of the unit was paired with a highly technical diagrammatic graphic language as part of the New Deal’s technocratic mission of housing the masses during the Depression (fig. 3). By the early twentieth century, people had come to live in a built environment thoroughly divided into units.

### Everything in Units

Architectural units closely mirrored the social, political, bureaucratic, and economic units into which modern society was increasingly parceled. People learned in pedagogical units; were treated for illnesses in hospital and psychiatric units; were grouped into social units; and belonged to political, economic, or bureaucratic units.<sup>60</sup> Nearly every cultural milieu that intersected with architecture also came in units. This wider context of the word *unit* also has its origins in the mid-nineteenth century, when the word began to resonate in new ways. In 1847, the English historian George Grote wrote: “The village is a fraction, but the city is a unit.”<sup>61</sup> Grote transposed the earlier mathematical use of *unit* as something indivisible to a cultural context—and an urban one to boot. In 1856, another English

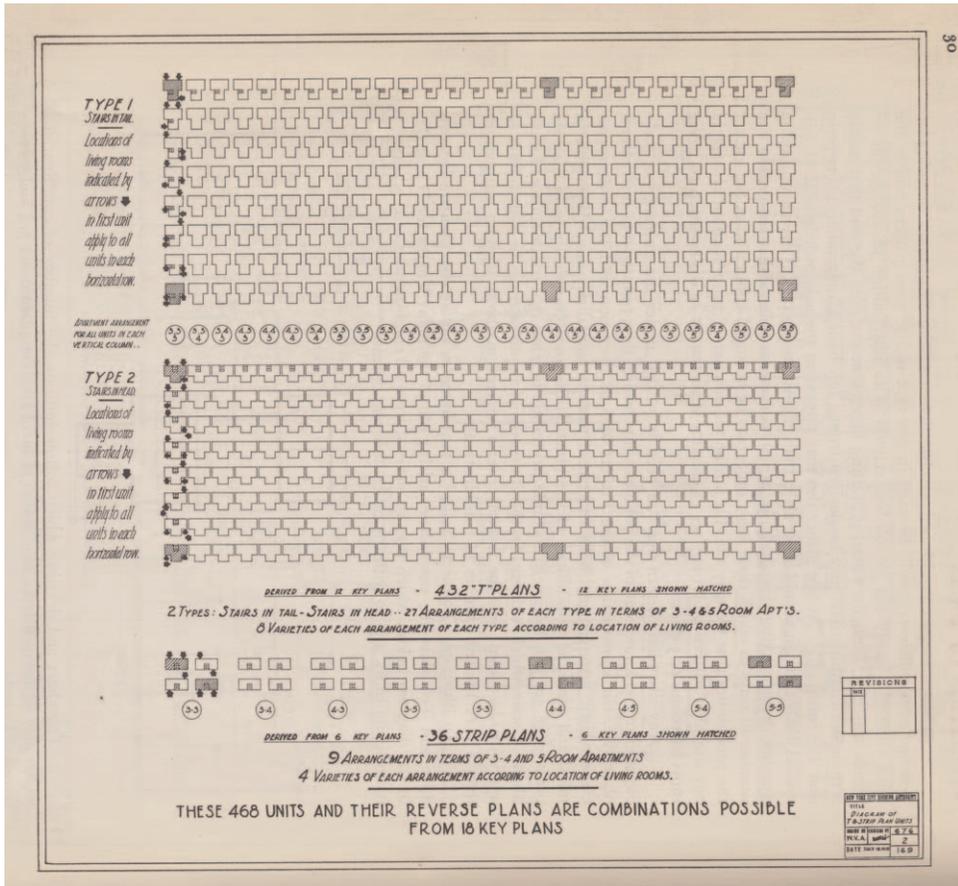


FIGURE 3. Diagram of T & Strip Plan Units, in Frederick L. Ackerman and William F. R. Ballard, *A Note on Site and Unit Planning* (Washington, DC, 1937).

historian, Charles Merrivale, wrote, “Our history becomes a review of the affairs of a vast unit, the aggregate of a multitude of smaller members.”<sup>62</sup> The word now has become so pat that we no longer see Merrivale’s metaphor, let alone feel the startling innovation of this sort of usage. Both Grote and Merrivale reached for the pure, universal language of mathematics to describe culture in a moment when historians sought a means to fashion their profession as objective, as a science.<sup>63</sup> With Grote the unit began to compass space, with Merrivale historical time. Both uses reflect emerging conventions. Grote’s urban unit related social units to the built environment; Merrivale’s boiled society down to fundamental political actors who shaped history. Both developed out of a panoply of uses.

For instance, units were conscripted into the military alongside their use in science and, for obvious reasons, engineering. “Military units” is attested from 1861.<sup>64</sup> Professional armies were bureaucratized, divided into units that fought on land and at sea and others that treated the wounded. Such units surely performed important work in a moment when the nation-state was still young, in assembling anonymous members of a large national group into a coherent, connected body of people willing to die for one another. This was the stuff out of which early national histories were written. Naval and cavalry units appear in print regularly after 1900, as do medical units, while “hospital units”—a much more directly architectural usage—appeared in 1862, a year after “military units.” By the 1880s, historians had absorbed the language of the fighting unit, referring back to ancient war.<sup>65</sup> Nationalism and war shaped new understandings of citizenship. “For once, the people of the Free States were a unit in action,” wrote Joseph Hartwell Barrett in his 1865 biography of Lincoln.<sup>66</sup> The scientific unit was instantly translated into social and political terms as a measure of social force awakened to its mission by analogy to the military unit. One can well imagine that the generation educated in and by the Civil War in the United States, if not also imperialism in England, emerged with a new way of speaking.<sup>67</sup> *Unit* was one of the new keywords of the late nineteenth century, commonplace across disciplines.

Architectural units were inextricably bound to these other units. Such grounding in physical reality—in science, engineering, and war—primed the unit for immaterial, social, or metaphorical use. This comes out in the semantic compounds or kin that evolved in the second half of the nineteenth century. The word can be found in linguistics as early as 1850 (“units of speech”), and was quickly adopted by statistics, social commentary, and philanthropy.<sup>68</sup> The phrase *social unit* became standard in the late nineteenth century. In 1883, the German grammarian George Mayr wrote: “If, however, man is to be scientifically investigated as a unit of society, the aggregate-observation of statistics is required.”<sup>69</sup> The mathematical sense still present in Mayr could be entirely rhetorical in the hands of other writers. In 1882, Reverend Isaac J. Lansing wrote that “the family is the social unit,” and “the home is the unit of society,” explaining: “By the unit of society we mean the germ from which the existence and order of society spring.”<sup>70</sup> The mixing of socially available metaphors—unit, home, germ—made social structure and its origins vivid and placed them in their setting.

Most germane to architecture, the concept of the social unit, whether family, tribe, clan, or village, emerged in the middle of the century and became ubiquitous by the 1880s. In sociology, the smallest indivisible social form often was the family unit, a term that came into use around 1860. Major figures such as Auguste Comte and Albert Schaeffle considered the

family as the “true social unit.”<sup>71</sup> The family unit became standard, so much so that in 1898 Samuel McCune Lindsay could write: “Some combination of these views which regard the family as a *micro-societas* and as an organic unit in a social organism has been held by doubtless the majority of sociological writers from Comte’s time to the present day.”<sup>72</sup> Social units blurred easily with political units, a term attested as early as 1832, and which covered multiple scales, from the family to the nation, with the manor, village, township, and county all serving as political units.<sup>73</sup>

The American philosopher and historian John Fiske wrote that the “primordial unit of humanity is the family,” whereas *The Cambridge Modern History* claimed that Martin Luther “does not recognise any real society but the State, and the family as its lowest unit.”<sup>74</sup> Family units were often shadowed by architectural ones. W. E. B. Du Bois wrote of the family as the unit of African society and the plantation as “the unit of a new development.”<sup>75</sup> When Dorothea Lange photographed the Mochida family in the process of being interned during World War II, her caption read: “Members of the Mochida family awaiting evacuation bus. Identification tags are used to aid in keeping the family unit intact.”<sup>76</sup> All of these uses—home, plantation, internment camp—demonstrate a persistent connection between social units and the built environment in which they lived.

The same connections infiltrated education, which, like architecture, was being rationalized and bureaucratized in this period.<sup>77</sup> By the first decade of the twentieth century, educators wrote frequently about units of instruction. Teachers planned units around discrete topics and published them in professional journals. Many readers of this essay will recall being ushered through their educations unit by unit. Units have been semantically woven into the thinking of every formally educated person since the early twentieth century in the Anglophone world. This is to say that *unit* has been more than a rhetorical matter; it has been part of the structure of knowledge itself.

What reinforced this structuring of knowledge is just how readily educational units were spatialized. Architects provisioned rooms for specific educational units. For instance, a dining room was set up at Schenley High School in Pittsburgh to teach various aspects of the home economics unit. A laundry room was established at Lux School in San Francisco for the “Clothing Unit” (fig. 4).<sup>78</sup> School architects spread the cant themselves: “The instruction area in a school building,” wrote Oakland architect John T. Donovan, “is the actual producing space of the educational factory. This production unit should be as large as possible and be consistent with safety and adequate administration.”<sup>79</sup> Everything in units, indeed.

Donovan’s unit rooms were part of the mission of home economics. In one particular assignment popular between the wars, students were asked

to plan their ideal house using clippings from magazines, hand-drawn plans, and written description, and then to organize them in a scrapbook. Most of the surviving scrapbooks document a thoroughly conventional sense of domesticity, stiffened by the language and ideology of Scientific Management. In one example from this period, the student divided the house into work, recreation, and rest units (fig. 5). The new taxonomy and terminology swept away office, living room, and bedroom and liberated the student to think about space in terms of function. The student created flexible units, spaces that served multiple functions. A “rest unit” might double as a “recreation unit,” which could be converted spontaneously into a “work unit,” as in a basement with a playroom and laundry. The doubling of function loosened the fixed state of rooms and demonstrated to her teacher a modern sensibility. Flexibility, a keyword of the Modern Movement in architecture, had already been heroicized in the open or free plan, which also attempted to break down the programmatic rigidity of traditional architecture. Home economics pedagogy would be instrumental to conceptualizing the entire house anew in terms of units instead of rooms.

Donovan’s institutional sense of unit went in another direction, as well. Buildings at schools, universities, hospitals, and other institutions came to be called units. The usage goes back at least to the 1870s, although even at this moment it remained curiously tentative. The pavilion system common in Victorian hospital design, for instance, “was technically called a hospital unit.”<sup>80</sup> Yet, this same unit “contained none of the necessary arrangements for the general administration of the house.” Clearly *unit* and *house* were roughly synonymous, the former displacing the latter slowly in a moment when fears of institutions often led Anglo-Americans to propose domestic settings for institutions, especially for maternity hospitals and women’s dormitories.

There were fewer fears, it would seem, at all-male institutions. Holder Hall at Princeton University, an Oxbridgean fantasy that completed a quadrangle in 1916 by architects Day and Klauder, was conceived of as a unit from the start: “It is to be said that the present dining-halls are believed to be as large a unit as is feasible for economical operation. The group is self-contained. Should the number of students materially increase, a new unit would be called for elsewhere.”<sup>81</sup> Here is a dormitory understood explicitly as a unit, the ancestor of Units 1, 2, and 3 at Berkeley.

The institutional unit arrived with the new mass scale of administration in manufacturing, business, and urban governance. It might be thought of as homologous to the contemporary invention of the corporation as a large business concern understood as a person, literally a *corpus* or body. Administrative units of various kinds appeared almost simultaneously in manufacturing,



FIG. 427.—LAUNDRY ROOM, LUX SCHOOL, SAN FRANCISCO, CALIFORNIA.

Mr. Wm. C. Hays, Architect.

FIGURE 4. “Laundry Room, Lux School, San Francisco, California,” fig. 427 of John J. Donovan, *School Architecture: Principles and Practices* (New York, 1921), 501–2.



FIGURE 5. “A work unit of the Home,” from *My Home Scrapbook* (a student scrapbook), undated but likely 1920s. From the author’s collection.

business, government, and the military, the last understood as the “smallest organized subdivision having a complete administration of its own.”<sup>82</sup> This usage appeared consistently after the Civil War, and by the turn of the century the administrative sense of *unit* was nearly indistinguishable across these different domains. At this very moment, architecture was formalizing its institutional bureaucracy, and architects were working closely with large corporate and governmental bureaucracies that were increasingly divided into units.

The use in business hewed closely to that of the social unit. The American economist Robert F. Hoxie wrote in a 1901 article in the *Journal of Political Economy* that “the business unit is the primary result of the united economic activity of individuals.”<sup>83</sup> Hoxie included a chart that shows just how thoroughly the world had been broken down into units (fig. 6). This division of businesses and political bodies into units is part of what James Burnham would later call the “managerial revolution,” in which technicians, bureaucrats, military leaders, and business executives were emerging as the rulers of a new world order.<sup>84</sup> In other words, the unit was part of the unifying language that this managerial elite used to promote its expertise and impose its authority. This nexus of power links Thorstein Veblen’s adulation of engineers to Dwight D. Eisenhower’s warning about the

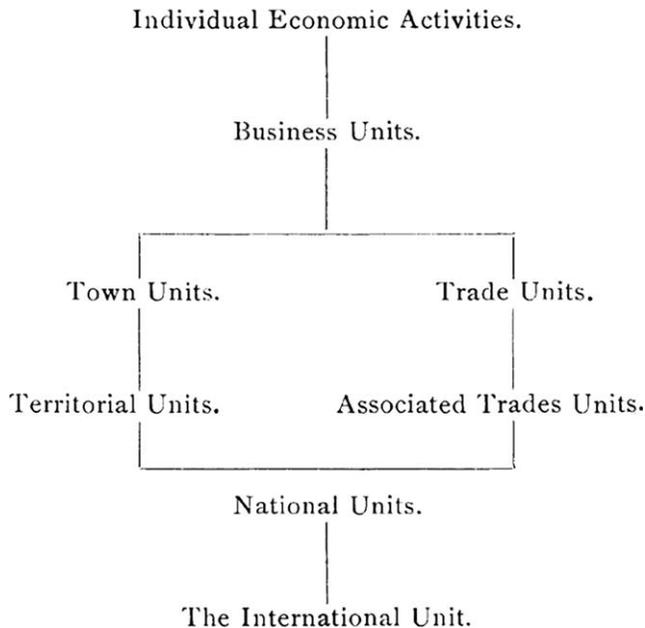


FIGURE 6. Robert F. Hoxie, chart from “On the Empirical Method of Economic Instruction,” *Journal of Political Economy* (September 1901): 518.

military-industrial complex, all of it organized into units of administration and action.<sup>85</sup> Architects curried favor with and sometimes joined this administrative elite. They designed their corporate headquarters, institutions, and infrastructure and built the houses that symbolized their ascendancy.

### Units Moral and Territorial

Architects were keenly aware of the relationship between the structure of society and that of the built environment. This can be seen vividly at the turn of the twentieth century. The American educator Denton J. Snider wrote that the Egyptian pyramid reveals a body of “self-conscious human beings who build a mighty image of their association and thus behold themselves as a social unit, as a people.”<sup>86</sup> At root, this was part of the physical determinism common in the period, and which would soon supply the Modern Movement with much of its moral purpose. Yet Snider gets at something quite different from the garden-variety physical determinism one might expect: “If we consider what kind of a social unit that old Pelasgic masonry envired and reflected, we think of the early Village Community in which man is not yet separated from the soil on which he lives, and is unconsciously one with his institutional center.”<sup>87</sup> Archaic architecture and society formed a monad, a singularity that roused in him a nostalgic response. The word *unit* spoke to a lost world in which people were organically connected to their environments, built and natural. As Geoffrey Scott wrote: “Nothing, for architecture, is more important than the nature of the political or social unit to which it has reference. . . . The self-centered life of the commune develops one type of building; the armed city-state has another.”<sup>88</sup>

These direct parallels between social and architectural form would continue to shape architectural thinking well into the twentieth century. In 1932, architect and educator Philip N. Youtz wrote: “The architectural draftsman who works over the plan of a new structure . . . is in reality engaged in producing one of the most effective instruments of social control. He is planning or erecting not a new building structure but a new social unit.”<sup>89</sup> Architecture, for Youtz, molded social life: “A building is first and foremost the material structure of a living social institution.”<sup>90</sup> Buildings are “the lithic forms through which the organic patterns of living institutions find social expression.”<sup>91</sup> It is not surprising, then, to find Henry-Russell Hitchcock and Philip Johnson in the same year calling Le Corbusier’s pavilion at the 1925 Paris Exposition of Decorative Arts “an ideal unit in a great urban apartment house.”<sup>92</sup> In this most famous of twentieth-century architectural texts, *Modern Architecture: International Exhibition*, they elaborated:

“The unit is no longer the individual house but the community,” and “The modern *Siedlung* is likewise planned as a unit.”<sup>93</sup> Hitchcock and Johnson easily could have lifted the term from William Morris, who as early as 1902 considered “an old village as a unit of ancient building.”<sup>94</sup>

The trajectory from Morris or Scott to Hitchcock and Johnson hints at a larger geographical understanding of units. In 1923, classics scholar Walter Leaf wrote that the Trojan peninsula “formed a political unit.”<sup>95</sup> About the same time, George Santayana wrote that in the Middle Ages the “economic and political unit is a great household with its lord, his wife and children, clients and slaves.”<sup>96</sup> In 1930, a historian of medieval Spain wrote: “The political unit of the municipio remained the parish.”<sup>97</sup> Jocelyn M. C. Toynbee claimed that by Hadrian’s time the “autonomous polis of ‘classical’ Greece, as the political unit, had perished.”<sup>98</sup>

These all are part of what was once called a “moral unit.” Now a dated usage (although it still exists), *moral unit* has referred to a range of social groupings rooted in land from the family to the state. It has appeared in philosophy, theology, political science, and law. But since these social groupings were all manifested geographically, the term implies a sense of place. The landscape historian J. B. Jackson made this clear when he called the moral unit “a permanent territory . . . granted in perpetuity to a family that agreed to live on it, work it, pay taxes, and perform occasional military service.”<sup>99</sup> Jackson echoed Denton J. Snider’s much earlier meaning. Jackson had in mind the “dwelling unit” as developed from medieval homesteads and given official status by the crown to enforce law within their established lands. Thus, law and socio-economic arrangements were laminated onto land, particularly domestic space, and called a “moral unit.” At the nadir of the Depression, Frank Lloyd Wright drew up plans for Davidson Little Farms Unit, a prototype for a self-sufficient farm to help restore connection to the land as the basis for bolstering democracy. Wright’s little farm was a moral unit with unmistakably nostalgic links back to premodern living arrangements.

Moral units like Wright’s Little Farm addressed particularly modern crises that by the 1930s had been festering for generations. In an age of alarming urbanization, the moral unit had to be reconciled with the immoral city. Urban units came to the rescue. By the turn of the century, cities and not just villages were understood as units, both administratively and aesthetically. The English historian George Williams Cox wrote in 1889 that in its war with Sparta, Athens undermined the Greek idea that the city was the “ultimate unit of political society.”<sup>100</sup> Anthropologist Frank Gouldsmith Speck, in *Ethnology of the Yuchi Indians* (1909), wrote that the tribe “forms another unit with special institutions called a town.”<sup>101</sup> These historical uses anticipated later professional use by urban planners. The first

architect to use *unit* to refer directly to larger urban assemblages comes out of the Garden City Movement. In 1907, the architect Alfred Richard Sennett recommended the use of “the polyhedron, six or eight sided, as the unit, resulting in an interesting enlacement of allotments and saving of waste space by avoiding acute angles.”<sup>102</sup>

The most conspicuous urban unit arrived in the form of neighborhood units, popularized in the United States by New York planner Clarence Perry in the late 1920s but rapidly disseminated around the world.<sup>103</sup> Perry imagined the institutionally self-sufficient neighborhood as the basic unit of planning. In his contribution to the 1929 Regional Plan of New York and in other publications, he organized this urban nucleus around the school or a similar institution, which gave the demographic and institutional measure to the plan. Here was the now well-worn idea of social units given spatial form. Once the City Scientific and City Efficient movements challenged the City Beautiful, the deeply statistical nature of planning endowed the neighborhood unit with the authority of social science and statistics. With quarter- and half-mile “pedestrian sheds” measured from the school, neighborhood units echoed the mathematical origins of units that made them part of the lingua franca of science, engineering, and technocratic government, if not also modern manufacturing and war. The neighborhood unit was also a moral unit par excellence, a way of creating order and organic connection out of the anonymous metropolitan areas then taking shape. With little hope of enacting comprehensive plans, the neighborhood unit broke the city down into manageable pieces that could be reconstructed—or built anew.

The moral unit persisted in urban thought deep into the twentieth century. In the 1960s, Konstantinos Doxiados called for the architect to be given “full responsibility for the conception and the creation of the proper human habitat.”<sup>104</sup> No longer would “he” be the isolated designer of individual buildings, but rather an architect, planner, and coordinator on a nearly regional scale: “A new organization of our forces must be based on the redefinition of the subject of architecture and the unit of architectural creation—the human community.”<sup>105</sup> Teams of architects would be responsible for what he called—perhaps ominously given this late date—the “total unit.”<sup>106</sup>

In the formative moments of its development into a modern profession, architecture struggled to find words to express its social dimension. For its physical and visual reality, Victorians found vivid language drawn from gender, geology, biology, industry, and ordinary metaphors. *Pile* is such a word, but buildings could also be muscular or masculine. The discovery of geological time provided architects with the polychromatic

striations common in Anglo-American architecture in the mid- to late nineteenth century. Ruskin wrote of walls that were like cliff faces. Circulation in buildings derived from the flow of blood in bodies, and the section is a metaphor taken directly from biological dissection. Later, modernism “drove out all previous vocabularies,” replacing these metaphors with space, form, design, and order, which at times could provide abstract cover for the more colorful and metaphorical language it rejected.<sup>107</sup> But for the social issues that architects increasingly took up in the late nineteenth century through the Modern Movement—and still wrestle with today—architecture has been curiously tongue-tied. *Unit* is one of the words that could straddle social and physical dimensions. It is ambiguous and flexible enough to have given a wide berth to architects searching for ways to engage with social and formal dilemmas simultaneously. As Adrian Forty has observed, “modernism tolerated only two particular classes of metaphor, those drawn from language, and those drawn from science.”<sup>108</sup> This is why units managed to survive the modernist purge of Victorian description.

Outside of architecture, *unit* has enabled more than the organization of ideas. It has framed and directed any number of cultural practices. We do more than organize physical and social reality in terms of units: in measuring, parceling, and living in units, we embody the word. Put differently, units are different from gangs, bands, teams, troops, squads, corps, clubs, sects, flocks, outfits, dioceses, or any other way in which people have organized themselves and their institutions. These words may all be related to *unit* and each, like *unit*, may be linked to manifestations in the material and built environment with which they exist in some dynamic relationship. But *unit* is like a universal solvent. Apply it to anything, whether physical or mental, and it goes to work breaking it down and reconstituting it, along with the people who work with that substance. Perhaps for this reason, none of these other words has so thoroughly infiltrated or come to describe the built environment.<sup>109</sup> *Unit* is a form-giver, a re-former, a deformer, a mode of thought that quietly has shaped the modern world, and in doing so, has reshaped thought, in an endless retort.

Most of the units discussed in this essay remain in general circulation today in the English-speaking world. Social, political, and economic units remain common, as do manufacturing and bureaucratic units. Even the obscure unit of pleasure is not dead. In industry, a relative parvenu is *unit operations*, a phrase that grew up in the postwar period. It subjects nearly every large industry, from food to clothing, to rationalization and efficiency, by streamlining and coordinating the movement of materials, production, distribution, and sales.

More recent uses of *unit* betray yet other changes that are upon us. The old military unit remains, but it has found new life in football (the “kicking

unit”) and in the “first responder unit” that arrives at disaster sites to rescue people and help stabilize the site.<sup>110</sup> First responder units spiked in the wake of national tragedies from Oklahoma City to 9/11 and Hurricane Katrina. They are cinematically gifted units. The first episode of David Mamet’s *The Unit* (2006), a television series about Army special operations was called “First Responder.” It links, for instance, the fire and police departments that heroically saved people after September 11, 2001, with the military usage. The show is daytime drama with heavy weapons, but unlike earlier military shows like *Hogan’s Heroes* or *M.A.S.H.*, it is conspicuously about putting down threats. The unit becomes a unit of action and not merely of organization and space.

“Oversight units” flourished in the 1980s and 1990s as part of the regular function of government and corporate bureaucracy. For instance, the “Joint Inspection Unit” of the United Nations formed in the 1970s as a way for the UN to have independent oversight of its programs. In 2017, it received the “knowledge management award” from Knowledge Management Austria, accepted by UN Inspector Petru Dumitriu “as the leading figure in the process of inspecting, reviewing, mobilizing and advocating for Knowledge Management in the UN System.”<sup>111</sup> Alongside the rise of consulting, oversight is one of the seismic shifts in bureaucratic function of the last couple of generations. Its fusion with *unit* indicates either a rhetorical reflex in contemporary society or an attempt to have it taken seriously. We may never know precisely what sort of spaces these sorts of units inhabit, in part because increasingly they do digital work.

Oversight and consulting simultaneously have served and spawned the era of big data, which has reinvigorated the managerial units of the twentieth century and led to new kinds of units, including units of code. Some of these merely extend the bureaucratic and corporate units of the last century, but some are more revealing. We are all part of an incalculable data set produced by surveillance that is increasingly shared by law enforcement groups, advertisers, and data-hoarding companies that hope to profit from information. Phone calls, emails, and our every journey into the public sphere are captured and, given enough expertise and access to that data, become part of how order is maintained and seduction stoked in mass society. Crime units—and specifically computer crime units—do much of that work. Crime units emerged in the late 1960s and have steadily become more prevalent as the United States has embraced a carceral model. The FBI has an “elite serial crime unit.” In turn, computer crime units have filled the all-too material “prison units.” This last term first appeared in the late nineteenth century, but became common only in recent decades, coinciding with the massive boom in prison construction and privatization of the prison system. A Google search turns up more than 43,000 results for *prison*

*units*. What cultural work the prison unit is doing here is obvious in light of the racial inequality of incarceration in the United States. Perhaps one day they will be themed, too.

## Notes

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- Thanks to Kevin Block, Benjamin Friedman, Desirée Valadares, and Zara Kadkani-Schmitt for their contributions.
1. University of California, Berkeley, Housing, Unit 1, <https://housing.berkeley.edu/unit1>.
  2. This assessment puts aside the troubling issue of theming, which is a key tactic in consumer culture.
  3. *Etymonline Online Etymology Dictionary*, s.v. “unit,” <http://www.etymonline.com/index.php?term=unit>.
  4. *Ibid.*
  5. Raymond Williams, *Keywords: A Vocabulary of Culture and Society* (New York, 1976).
  6. All dates taken from the *Oxford English Dictionary*. Some measurement units predate this list, such as the stère, a unit of measuring solids (1798).
  7. The quotation is taken from *OED* online, s.v. “ohm, n.2”: 1861 L. Clark & C. Bright, *Exper. Investig. Laws Propagation Electr. Current* 49, <http://www.oed.com/view/Entry/130861?rskey=X3DeoK&result=2#eid>.
  8. The word migrated to biology (*living units* appeared as early as 1868), other sciences, and soon to fields aspiring to science.
  9. *OED Online*, s.v. “natural unit,” <http://www.oed.com/view/Entry/255850?redirectedFrom=natural+unit#eid>.
  10. Joseph Gwilt, *An Encyclopedia of Architecture: Historical, Theoretical, and Practical* (London, 1842), 689.
  11. For the larger history of this process, see Joan Ockman, ed., *Architecture School: Three Centuries of Educating Architects in North America* (Cambridge, MA, 2012), 10–33.
  12. Jeffrey A. Cohen, “Building a Discipline: Early Institutional Settings for Architectural Education in Philadelphia, 1804–1890,” *Journal of the Society of Architectural Historians* 53, no. 2 (June 1994): 139–42.
  13. Charles Davis, *Practical Mathematics, with Drawing and Measurement Applied to the Mechanical Arts* (New York, 1852), 148.
  14. Similar lessons can be found in dozens of texts that continued to be published throughout the century, including Thomas Lund’s *Elements and Geometry of Mensuration* (London, 1859).
  15. Peter Nicholson and N. K. Davis, *The Carpenter’s New Guide* (Philadelphia, 1854).
  16. W. J. Cockburn Muir, *Pagan, or Christian? Or, Notes for the General Public on Our National Architecture* (London, 1860), 79.
  17. *Ibid.*, 159. See also 83, 158, 160.
  18. W. E. Worthen, ed., *Appleton’s Cyclopaedia of Drawing: A Text-Book for the Mechanic, Architect, Engineer, and Surveyor* (New York, 1869), 253.
  19. *Ibid.* For the rivalry between architects and engineers in England, see Andrew Saint, *Architect and Engineer: A Study in Sibling Rivalry* (New Haven, 2007).
  20. Eugène Emmanuel Viollet-le-Duc, *Discourses on Architecture*, trans. Henry Van Brunt (Boston, 1875), 494.

21. *Ibid.*, 434.
22. Ralph Nicholson Wornum, *The Characteristics of Styles: An Introduction to the Study of the History of Ornamental Art* (London, 1856), 18–19.
23. Robert C. Spencer, “The Work of Frank Lloyd Wright from 1893 to 1900,” *The Architectural Review* 7, no. 6 (June 1900): 67.
24. Arthur Kingsley Porter, *Medieval Architecture: Its Origin and Development* (New York, 1909), 1:275.
25. Russell Sturgis, *European Architecture: A Historical Study* (New York, 1896), 557.
26. Montgomery Schuyler, “A Critique of the Works of Adler and Sullivan, D. H. Burnham and Co., Henry Ives Cobb,” *Architectural Record* (February 1896): 35.
27. H. Heathcote Statham, *A Short Critical History of Architecture* (London, 1912), 385.
28. Geoffrey Scott, *The Architecture of Humanism: A Study in the History of Taste* (London, 1914), 32.
29. *Ibid.*, 234.
30. Thomas Hastings, “Principles of Architectural Composition,” in *Six Lectures on Architecture* (Chicago, 1915), 92.
31. Andrew M. Shanken, “From the Gospel of Efficiency to Modernism: A History of Sweet’s Catalogue, 1906–1947,” *Design Issues* 21, no. 2 (Spring 2005): 28–47.
32. *Sweet’s Catalogue* (New York, 1906), 127.
33. *Ibid.*, 140.
34. *Ibid.*, 273.
35. Richard Neutra, *Survival Through Design* (New York, 1954), 51.
36. Charles Matlack Price, *Practical Book of Architecture* (Philadelphia, 1916), 288.
37. *Ibid.*, 290. The reference is to Charles McKim’s use of variegated brick at the Johnston Gate at Harvard to create an aged or weathered aesthetic that matched the older buildings. Douglas Shand-Tucci, *The Campus Guide: Harvard University* (New York, 2001), 30.
38. Wendy Lesser, *You Say to a Brick: The Life of Louis Kahn* (New York, 2017).
39. See “Unit Concrete Construction for Walls, Ceilings, and Floors,” *Illustrated World* 34 (December 1920): 701. Donald A. Price, “Modern Wall Units Will Remake Any Room in Your Home,” *Popular Science* 137 (December 1940): 176–79. For some context, see Shanken, “From the Gospel of Efficiency to Modernism,” 28–47.
40. Shelving units are an exception. They didn’t emerge fully until the late postwar period. Christine Holbrook, “Four Screws and It’s Installed: Unit-Panel Bathroom,” *Better Homes and Gardens* 11, August 1933, 24.
41. Harriette Taber Richardson, “Inside the House: Kitchen Units,” *House Beautiful* 39, January 1916, 58–59, xiii. See Frank B. Gilbreth, “Units, Methods, and Devices of Measurement under Scientific Management,” *Journal of Political Economy* 21, no. 7 (July 1913): 618–29.
42. *Ibid.*, xiii.
43. “Unit Kitchen to Provide All Conveniences Along One Wall,” *Business Week*, June 10, 1933, 12.
44. “Now We Buy Kitchens by the Package and Plan Our Kitchens with Units,” *American Home* 16, November 1936, 32, 100.
45. Caroline W. Horton, *Architecture for General Students* (New York, 1874), 211.
46. The *OED* dates *pile* as a “large building or edifice” to 1573; *OED online*, s.v. “pile, n.5,” <http://www.oed.com/view/Entry/143824?rskey=MaGTtL&result=5#eid>.
47. Eugene Clarence Gardner, *Illustrated Homes* (Boston, 1875), 161.
48. “The Tall Office Building Artistically Considered,” *Lippincott Magazine*, March 1896, 406. Perhaps this is why Schuyler in the same year wrote of Sullivan’s work in terms of units of design.

49. Stephen D. Peet, *Ancient Monuments and Ruined Cities, or the Beginnings of Architecture* (Chicago, 1904), 408.
50. John Beverly Robinson, *Architectural Composition* (New York, 1908), 79.
51. *Ibid.*, 17.
52. “Jevons on the Theory of Political Economy,” *Saturday Review of Politics, Literature, Science and Art* 32, November 11, 1871, 625.
53. Claude Bragdon, *The Beautiful Necessity* (Rochester, 1910), 49.
54. W. R. Lethaby, *Architecture* (New York, 1912), 150, 248.
55. Eugen Neuhaus, *The Art of the Exposition* (San Francisco, 1915), xxv.
56. *Ibid.*, xlii, 11.
57. Frederick L. Ackerman and William F. R. Ballard, *A Note on Site and Unit Planning* (Washington, DC, 1937). See also United State Public Works Administration, *Unit Plans: Typical Room Arrangements, Site Plans and Details for Low-Rent Housing* (Washington, DC, 1935).
58. Paul Emmons, “Diagrammatic Practices: The Office of Frederick L. Ackerman and ‘Architectural Graphic Standards,’” *Journal of the Society of Architectural Historians* 64, no. 1 (March 2005): 4–21.
59. *Ibid.*, 26.
60. R. W. Corwin, *The Modern Model Schoolhouse on the Unit Plan* (Pueblo, CO, 1908). “Where the Hospital Units Come from,” *Survey* 37, February 17, 1917, 578–79. S. S. Goldwater, “The Passing of ‘the Hospital Unit,’” *Modern Hospital* 1, no. 1 (September 1913): 14–17.
61. *OED Online*, s.v. “unit,” <http://www.oed.com/view/Entry/214746?redirectedFrom=unit#eid>.
62. *Ibid.*
63. Peter Novick, *That Noble Dream: The “Objectivity Question” and the American Historical Profession* (Cambridge, 1988).
64. *OED Online*, s.v. “unit.”
65. Theodore Ayrault Dodge, *Alexander: A History of the Origin and Growth of the Art of War from the Earliest Times to the Battle of Ipsus, B.C. 301* (Boston, 1890), 2:135.
66. Joseph Hartwell Barrett, *Life of Abraham Lincoln* (Cincinnati, 1865), 227.
67. Raymond Williams observed the effect of World War II on language in England. See his introduction to *Keywords: A Vocabulary of Culture and Society* (New York, 1983).
68. Review of *The Philosophy of Language, Part I*, by John Stoddart, *North British Review* 13–14 (1850): 26, 28, 29, 34.
69. George Mayr, “Theory and Practice of Statistics,” *Journal of the Statistical Society of London* 46 (September 1883): 470.
70. Isaac J. Lansing, *First Annual Report of the Woman’s Home Missionary Society* (Cincinnati, 1882), 51.
71. Auguste Comte, *The Positive Philosophy of Auguste Comte* (1853; London, reprint, 1875), 2:109. He also cited Albert É. F. Schäffle, *Bau und Leben des Sozialen Körpers*, 2nd ed. (Tübingen, 1896), 1:66. This was originally published in four volumes that appeared between 1875 and 1878.
72. Samuel McCune Lindsay, “The Unit of Investigation or Consideration in Sociology,” *Annals of the American Academy of Political and Social Science* 12 (September 1898): 50.
73. The Google Ngram Viewer shows *political unit* increasing in usage from 1860 to 1940, with a remarkable range of applications, but relatively stable general meaning. The “social unit plan” is one example in which the social unit was conceived

- as a political unit aimed at encouraging participatory democracy in the modern, anonymous city. See Robert Blundo, "The Social Unit Plan (1916–1920): An Experiment in Democracy and Human Services Fails," *Journal of Sociology and Social Welfare* 24, no. 3 (September 1999): 169–91.
74. John Fiske, *The Destiny of Man Viewed in the Light of His Origins* (1884; reprint, Boston, 1886), 67. A. W. Ward, G. W. Prothero, and Stanley Leathes, eds., *Cambridge Modern History* (New York, 1905), 3:758.
  75. W. E. Burghardt Du Bois, *The Negro Church* (Atlanta, 1903), 4.
  76. Dorothea Lange, "Members of the Mochida Family Awaiting Evacuation Bus," National Archives Catalog, <https://catalog.archives.gov/id/537505>. I thank Valentina Rozas-Krause for this reference.
  77. Educational units are largely a twentieth-century phenomenon, but the usage dates to the late nineteenth century. For educational units, see W. H. Payne, "Units of Study," *Educational Weekly* 2, no. 18, May 3, 1884, 3–4.
  78. John J. Donovan, *School Architecture: Principles and Practices* (New York, 1921), 501–2.
  79. *Ibid.*, 570.
  80. "Hospital Construction," *Architect* (June 7, 1873): 301.
  81. *Holder Tower and the New Dining Halls of Princeton University*, reprinted from "A Description of the New Buildings at Princeton University," *Architecture* (New York, 1918), 10.
  82. Frank Moore Colby and Talcott Williams, *The New International Encyclopaedia*, 2nd ed. (New York, 1914), 2:159. For an earlier use, see George B. McClellan, "Army Organization," *Harper's New Monthly Magazine* 48, no. 287, April 1874, 672.
  83. Robert F. Hoxie, "On the Empirical Method of Economic Instruction," *Journal of Political Economy* (September 1901): 516, 518.
  84. James Burnham, *The Managerial Revolution: What Is Happening in the World* (New York, 1941).
  85. Thorstein Veblen, *The Engineers and the Price System* (1921; reprint, New York, 1954). Originally published in 1919 in the *Dial*.
  86. Denton J. Snider, *Architecture as a Branch of Aesthetic Psychologically Treated* (St. Louis, 1905), 69.
  87. *Ibid.*, 182.
  88. Geoffrey Scott, *The National Character of English Architecture* (Oxford, 1908), 12.
  89. Philip N. Youtz, *American Life in Architecture* (Chicago, 1932), 19.
  90. *Ibid.*, 20–21.
  91. *Ibid.*
  92. Henry-Russell Hitchcock and Philip Johnson, *Modern Architecture: International Exhibition* (New York, 1932), 73. The authors also used *unit* in many of the other ways described in this essay.
  93. *Ibid.*, 186, 193.
  94. William Morris, *Architecture, Industry and Wealth* (New York, 1902), 268.
  95. Walter Leaf, ed. and trans., *Strabo on the Road*, book 8, chapter 1 (Cambridge, 1923), xxv.
  96. George Santayana, *The Life of Reason* (New York, 1921), 76.
  97. Marie Regina Madden, *Political Theory and Law in Medieval Spain* (Clark, NJ, 1930), 157.
  98. Jocelyn M. C. Toynbee, *The Hadrianic School: A Chapter in the History of Greek Art* (Cambridge, 1934), 239.
  99. John Brinckerhoff Jackson, "The Future of the Vernacular," in Paul Groth and Todd W. Bressi, eds., *Understanding Ordinary Landscapes* (New Haven, 1997), 147.

100. George W. Cox, *The Athenian Empire* (New York, 1889), 35.
101. Frank G. Speck, *Ethnology of the Yuchi Indians* (Philadelphia, 1909), 68.
102. Alfred Richard Sennett, "Garden City and Its Units," *International Studio* 32 (August 1907): 65. This use is related to the vogue, especially in British planning, for using paper gridded with hexagons.
103. The literature on the neighborhood unit is vast. See Clarence Perry, "Cellular City, Why Is It Coming?," *Survey* 63 (January 15, 1930): 459–61. James Dahir, *The Neighborhood Unit, Its Spread and Acceptance: A Selected Bibliography* (New York, 1947).
104. Konstantinos Doxiades, *Architecture in Transition* (New York, 1963), 174.
105. *Ibid.*, 177.
106. *Ibid.*, 174.
107. Adrian Forty, *Words and Buildings: A Vocabulary of Modern Architecture* (London, 2000), esp. 19–20, 22, 58.
108. *Ibid.*, 42.
109. A runner-up to *unit* is *module*. Thanks to David Rosenthal for this thought.
110. South Korea assembled a "decapitation unit" to assassinate Kim Jong-un, the head of North Korea. Choe Sang-Hun, "South Korea Plans 'Decapitation Unit' to Try to Scare North's Leaders," *New York Times*, September 12, 2017, <https://www.nytimes.com/2017/09/12/world/asia/north-south-korea-decapitation.html>.
111. Joint Inspection Unit of the United Nations System, Events, <https://www.unjiu.org/content/events-0>.