

The Heated Position: Some Methods in Question

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During the twentieth-century, thermal comfort has come to be considered an objective truth, determined using the scientific method and achieved with technical means. Following Joseph Rykwert's inquiry into the symbolic dimension of seated comfort, this paper examines the cultural dimensions of thermal comfort. A nascent yet growing awareness of thermal comfort is reflected in contemporary architecture culture. This increased attention is in part driven by a heightened awareness of global climate change. Changes to the weather, and the resulting impact of local ecosystems, sharpen our awareness of climates and comforts. Architects are using comfort as part of design strategies informed by old accounts and current events. By engaging with historical notions of comfort to propose contemporary projects, they are expanding the relationship of the present to the past. In parallel, historians are looking at the past through a contemporary lens, seeking to trace the ephemeral experiences of comfort, and how they are aligned with larger social and cultural shifts. Although exchanges between design and history on this topic are irregular and episodic, thermal comfort intertwines them in mutually-beneficial ways, blurring the lines between historical consciousness and design imagination.

I.

In 1965, Joseph Rykwert published "The Seated Position – A Question of Method" in an issue of the Italian magazine *Edilizia Moderna*. In the essay, Rykwert examined the notion of ergonomic comfort and the design of chairs. Using the example of the culturally popular but ergonomically uncomfortable Hardoy chair, he wrote: "The dependence of comfort on social convention is one of the factors which trips up writers on ergonomics when they attempt to define comfort and prescribe the conditions under which it can be obtained."¹ The method his article's subtitle referred to was the role of the historian in

teaching architects how to interpret and address the social dimensions of ergonomic comfort as part of the design process. In this article, I extend Rykwert's argument to thermal comfort—from the seated position to the heated position—to show how its prevailing fixed definition desensitize us to its cultural construction, and how historians and designers have a shared interest in thermal comfort as a research topic and creative springboard.

Unlike chairs, for which we can cite many famous architect-designed examples (Reitveld, Gray, Mies, Breuer, Perriand, Le Corbusier, Gehry etc.) architects have not actively engaged in designing thermal comfort, in fact, quite the opposite. During the twentieth-century, thermal comfort has come to be considered an objective truth, determined using the scientific method and achieved with technical means. It is commonly seen as a commodity provided by the HVAC industry to satisfy socially important but largely utilitarian concerns for health and productivity.² This situation is changing, in part driven by a heightened awareness of global climate change. These changes in the weather, and the resulting impact of local ecosystems, heighten our awareness of comfort. Noted scholar of science and technology studies Shelia Jasanoff has written "modern environmentalism includes at its core a widely acknowledged, if only imperfectly realized, ethical imperative to renegotiate human beings' relationship with nature in light of new scientific understanding."³ Thermal comfort is a way to renegotiate that relationship.

A nascent yet growing awareness of thermal comfort is reflected in contemporary architecture culture. Architects are using comfort as part of creative design strategies that are informed by old accounts as well as current events. By engaging with historical notions of comfort to propose contemporary design strategies, they are expanding the relationship of the present to the past. In parallel, historians are looking at the past through a contemporary lens, seeking to trace the ephemeral experiences of comfort.⁴ Historical approaches to thermal comfort were more varied before its standardization in the 20th century. As questions about comfort grow, so too does the potential contribution of history as a driver of design.

In what follows I will briefly trace two intersections between history and design related to thermal comfort. The first examines the archaic idea of fire and the more recent one of the glass house, two potent symbols of comfort. The second looks at how the profiles of thermal comfort are

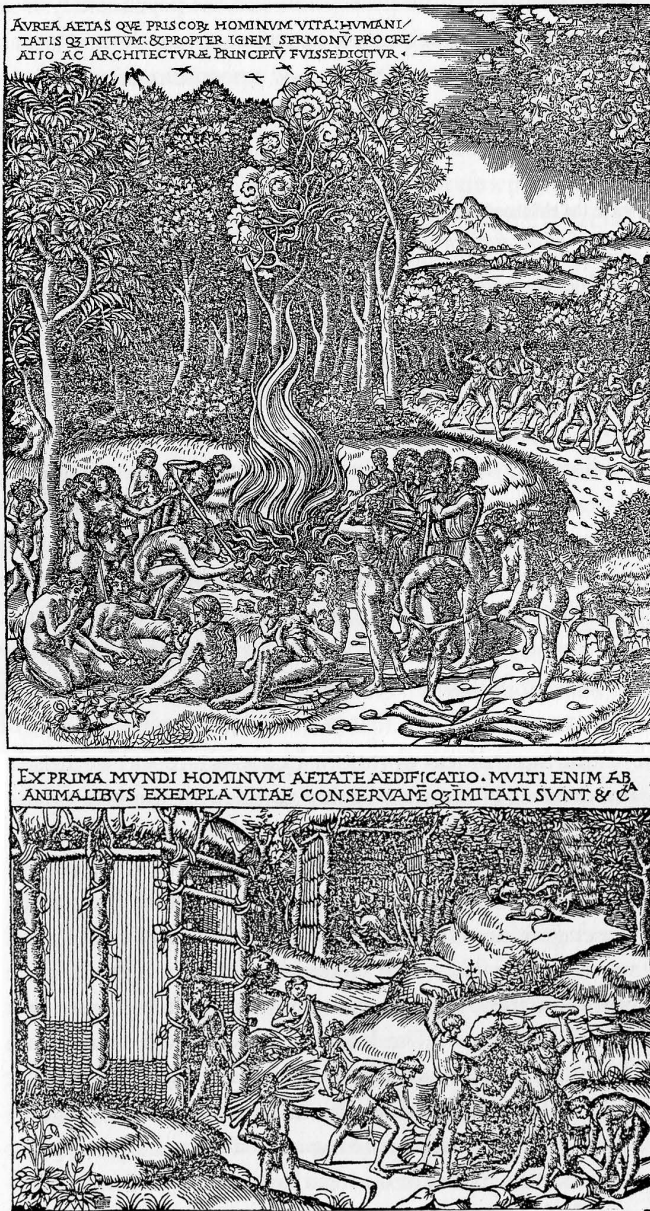


Figure 1. The discovery of fire and the building of the first shelters, from Cesare Cesariano's 1521 translation of Vitruvius's *Ten Books of Architecture*.

historically contingent and culturally determined. Exchanges between design and history around the topic of thermal comfort are irregular and episodic. Sometimes they are consciously recognized, and other times not. Making such connections explicit will help to further strengthen ties between the two domains.

II.

Thermal comfort appears in architecture's earliest known treatise, Vitruvius's *Ten Books of Architecture*. Vitruvian *utilitas* contain the seeds of modern comfort. Located between the structural solidity of *firmitas* (firmness) and the aesthetic pleasure of *venustas* (beauty or delight), *utilitas* proposed that architecture should be convenient. Etymologically the words convenient and comfortable are closely related. For Vitruvius, such comfort began with two sources, shelter and fire. Cesare Cesariano's

translation of the *Ten Books of Architecture* includes a pair of engravings showing this dual origin. One image depicts a primitive tribe using logs to build huts, while in another they build a bonfire. (Figure 1) These images reappear at the beginning of Reyner Banham's *The Architecture of the Well-Tempered Environment* (1969, 2nd ed. 1984) and Luis Fernández-Galiano's *Fire and Memory* (1991, English translation 2000), two of the best known histories of the architectural environment written in the last fifty years.⁵ Each author offers a different interpretation of Cesariano's images. Banham sees them as representing a choice between the "structural solution" of shelter and the "power-operated solution" of fire. His book, inspired by Giedion's *Mechanization Takes Command* (1948) and colored by his own technological optimism, elaborates on the "power-operated solution." Although the idea of "well-tempered" figured prominently in Banham's title, his focus was on the development of the technology for comfort, rather than the idea of comfort itself. Fernández-Galiano, on the other hand, sees combustion and construction as inextricably entangled, a unique combination of ordered and object-oriented fixity of building with the disordered fugacity of fire. His book is an open work that addresses many aspects of fire—its symbolic, economic, political trajectories—but it doesn't address the lived, sensuous history of thermal comfort.

Unlike Banham's and Fernández-Galiano's books, Lisa Heschong's *Thermal Delight in Architecture* (1979) celebrates the experience of thermal comfort. Short and unillustrated, it was an appeal to consider how the thermal function of building could be used as part of a design approach that countered the prevailing energy-intensive, steady-state thermal comfort which, she argued, had dulled people's appreciation thermal differences. Thermal comfort for Heschong has the potential for "sensual, cultural roles, and symbols that need not, indeed should not, be designed out of existence in the name of a thermally neutral world."⁶ Heschong wrote the book as her master's thesis at MIT, and it was based in part on her experience working on a solar house.⁷ The subject of thermal comfort in the pre-modern and vernacular buildings she discussed in the book fit well with the passive solar architecture movement of the 1970's and early 1980's, and is tied to that historical moment. Her nuanced appreciation of thermal difference seems to have been taken-up neither by architects nor historians, yet it has never gone out of print.

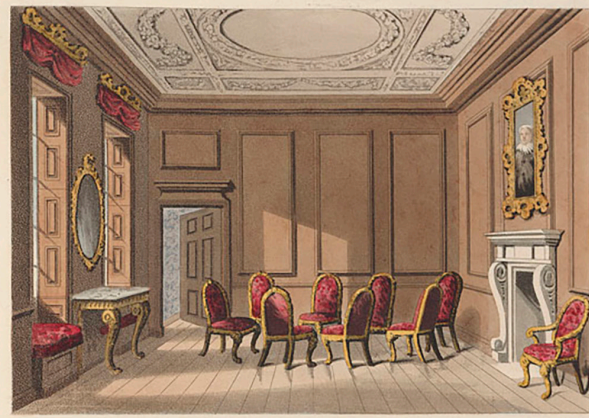
Typically, technological accounts that focus on how comfort is provided, such as Banham's, tend to be more enduring. These generally follows a familiar narrative of loss where fire as a symbolically and materially rich source of thermal comfort is eroded as the technology of heating became more efficient and less visible, buildings became larger, and people's tolerance for discomforts diminish. The general historical outline is as follows. Beginning with the open central fireplace of medieval halls, social changes and technological developments led to wall fireplaces, and then more efficient stoves, where the fire itself was enclosed. In the nineteenth century, these were replaced by building systems fueled by coal, and later by ones fueled from centralized power stations. Today, outlets, thermostats and the air diffusers provide the thermal comfort the fireplace once did. Not surprisingly, the disappearance of the fire, and its associated symbolic meaning, paralleled

the leveling of thermal comfort to a narrow band of temperature and humidity. While some twentieth-century architects have tried to reconcile this split between archaic symbol and modern technology—for example Frank Lloyd Wright in the First Jacobs House (1937) or Philip Johnson in his Glass House (1949)—the presence of fire has been reduced to nostalgia or simply eliminated from most architectural experiences. In 2014, the Fireplace section of the Rem Koolhaas-curated 14th Venice Biennale, entitled *Fundamentals*, largely follows this same narrative: fire’s trajectory is charted from its Promethean promise to symbolic extinction.⁸

The glass house offers another historical narrative which more directly engages ideas of thermal comfort. The glass house combines aspects of the Vitruvian hut and bonfire. It contains thermal energy from the sun, as the fireplace contains thermal energy of fuel. Unlike the centralized bonfire or the opaque hut, thermal comfort in the glass house results from balancing the flows of solar and combustive energies to achieve desired interior conditions. Initially these conditions were to satisfy the biocentric needs of plants, not the anthropocentric ones of people. In 1721, Richard Bradley, Professor of Botany at Cambridge, first described the relationship of plants and temperature, a realization led to horticulturists becoming some of the first real heating experts. The Scottish botanist and garden designer John Claudius Loudon coined the term “artificial climate” to describe the conditions provided in such glass houses.⁹ While today the term is associated with mechanically-conditioned buildings, at the time such climates were to allow “the horticulturist to exhibit spring and summer in the midst of winter.”¹⁰ In other words, they provided the thermal conditions—the environmental comfort—for plants from warmer environments to be raised in colder ones.

Such “artificial climates” for plants were combined with living spaces for people in the form of the private conservatory, a type of interior space that enjoyed great popularity in the nineteenth century. The conservatory fit into the larger development of modern thermal comfort—the self-conscious satisfaction with the relationship between one’s body and its immediate physical environment—that began to emerge during the eighteenth century.¹¹ We can see such a novel thermal space, and read about the comfort it provided, in Humphry Repton’s *Fragments on the Theory and Practice of Landscape Gardening* (1816). Repton, one of the best know landscape designers of eighteenth-century Britain, demonstrated this improvement with a pair of before and after images showing how a conservatory transformed a “dreary living room” into the height of “comfort” and “luxury.”¹² (Figure 2) Combining the thermal spaces of glass house and fireplace, Repton’s proposal merged their historical associations into a contemporary work that was both stylistically and thermally novel.

While the vogue for conservatories faded later in the century, the idea has been revisited in contemporary practice. The French architects Lacaton & Vassal have made a career merging greenhouse technology and a range of project types, from single-family houses to public housing, educational and civic buildings.¹³ (Like Repton, they often pair before and after images to show how their projects transform spatial and thermal conditions.) As architects, they see themselves as “climate optimists,” more like the greenhouse designers who attentively shape the interior



INTERIORS



Figure 2. Humphry Repton, “Interiors,” *Fragments on the Theory and Practice of Landscape Gardening*, 1816. [Image: Frances Loeb Library, Harvard University]

thermal environment in a relationship with the exterior, than mechanical engineers who designs to protect from worst case scenarios. Their projects often include a layering of thermal spaces that is integral to the architectural approach. One example, their FRAC museum in Dunkirk France, preserves an existing industrial hall while mirroring it with a new light and translucent “ghost” building. (Figure 3) This strategy allowed them to preserve the civically important volume of the existing structure for a single monumental display space, while providing smaller gallery, work and event spaces in the new volume. Through nesting and layering, these new spaces create a variety of comfort zones within the building that are calibrated to program as well diurnal and yearly climate conditions.

The firm Fake Industries Architectural Agonism’s entry for the Guggenheim Helsinki 2014 competition (which was one of six finalists) takes a similar design-based approach to thermal comfort. While recognizing the tight environmental controls necessary for many gallery spaces, their proposal, called *47 Rooms*, designed different thermal experiences as part of the museum. (Figure 4) Using the model of the sauna



Figure 3. FRAC (Fond Régional d'Art Contemporain) Nord-Pas de Calais, Dunkirk, France, Lacaton & Vassal, 2013.

as a public space, the designers created a series of thermal onions where areas of tighter atmospheric control are nested within areas that have less control. Such a strategy allowed the team to design the museum's comfort experiences on a civic scale. These conditions were realized using mechanical equipment as well as building, landscape and furniture elements in a way that links comfort and design at a variety of scales and with different types of technology.¹⁴

In both examples—the mirroring of a civic monument and the creation of public thermal experiences—the architects used glass houses to create layered comfort, and also tap into its cultural and symbolic meaning. We are reminded that the “greenhouse effect,” which describes the literal phenomena of trapping radiant energy in a glass building, is also an architectural metaphor describing the process behind global warming. Here two civic institutions are shaped through the positive thermal experience of the “greenhouse effect” in ways that historically projects new relationships between the public realm and environmental phenomena through the experience of thermal comfort.

III.

Thermal comfort is not an historically fixed idea, but has evolved over time. In *The Civilizing Process* (1939), Norbert Elias describes the

decreasing thresholds of tolerance and increasing delicacy toward sensuous experiences since the Middle Ages. Smells, sounds and other sensations that were once considered acceptable were later found to be uncivilized. Against the background, the French historian Alain Corbin has brought greater historical focus to different modalities of attention, and hierarchies of the senses to demonstrate how the environment itself is a cultural construct that reflects changing systems of appreciation and interaction between human desires and the physical world.¹⁵ To take one example, he describes how the changing reception of different water temperatures for bathing (as both therapeutic and sybaritic experiences) were part of the development of English coastal towns like Brighton in the eighteenth and nineteenth centuries.¹⁶

Architectural historians and designers have made similar arguments about the relative importance given to different senses. Drawing on the phenomenological ideas of Maurice Merleau-Ponty, Juhani Pallasmaa's *The Eyes of the Skin: Architecture and the Senses* (1996) “proclaim[s] a sensory architecture in opposition to the prevailing visual understanding of the art of building.”¹⁷ This project, which grew from earlier work with Steven Holl and Alberto Pérez-Gómez, argues for a haptic architecture that understands the role of the body as a locus of perception.¹⁸ Often seen as expanding on Steen Eiler Rasmussen's *Experiencing Architecture* (1959), their polemical goal was to argue against the acceleration and “de-sensulization” of human experience, and to advance what they saw as architecture's timeless task of providing “authentic” experience. Such

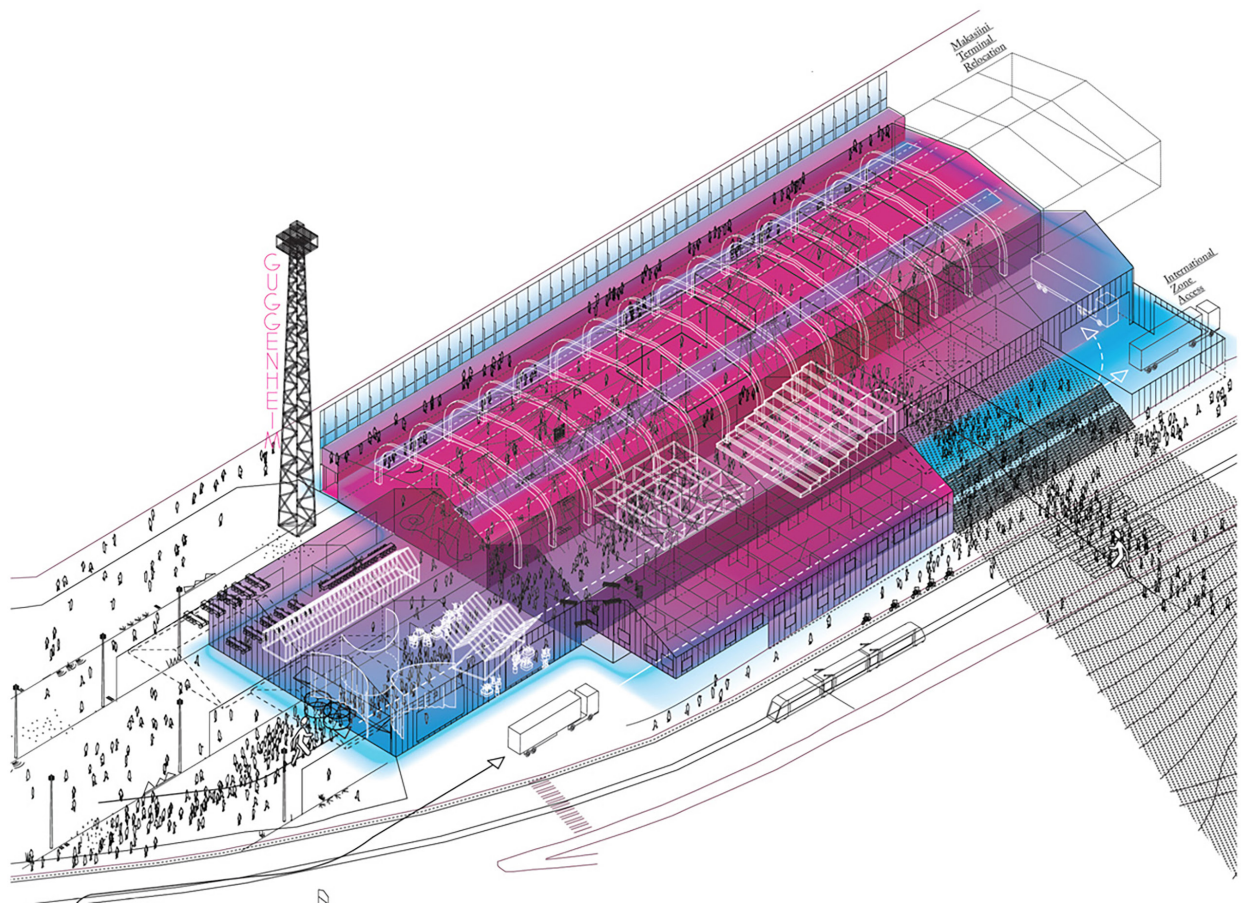


Figure 4. 47 Rooms, Guggenheim Helsinki competition, Fake Industries, 2014.

experiences were tied to the architectural ideas of tectonic language, tactility, craft and embodied memory. Unlike Corbin's historical project to understand how environmental experience is culturally constructed and ever-evolving, such a project is historically aware but not historically specific. Although developed in response to real contemporary concerns, its nostalgia-tinged approach does not address an idea of thermal comfort as a driver of design in specific ways.

Other historical approaches take a less polemical, more focused approach to the question of design affects sensuous experience. In doing so, they are able to link historical developments and contemporary production. Architectural historian Vittoria Di Palma does this in her analysis of Diller Scofidio's *Blur* (Yverdon-les-Bains, Switzerland, 2002) and Herzog and de Meuron's *Laban Dance Center* (London, England 2003) through a discussion of surface.¹⁹ Di Palma draws a parallel between the two buildings and historical approaches to representation, specifically the technique of atmospheric perspective (where pictorial depth is shown with changes to color and clarity) and the cloud paintings of Constable and Turner. In such images, the dissolution of surface subverts the objecthood of what is being depicted to allow the ephemerality of the atmosphere to be expressed. In reading the two buildings, Di Palma sees to role of ephemerality in architectural experience as challenging its architecture's constructedness. The obscurity and indeterminacy of these

buildings required completion by the viewer's imagination, turning the act of seeing into a self-reflective experience.

Although Di Palma's analysis focuses on vision, an analogous experience of thermal sensation can be found in *Cloudscapes*, an installation at the 12th Venice Biennale in 2010 by the Japanese architect Tetsuo Kondo and the engineering firm Transsolar. (Figure 5) For the project, the design team created a cloud which hovered magically in the vast brick hall of the Arsenale building. Visitors experienced this opaque yet ephemeral vapor by walking along a 43-meter ramp that took them from the ground, up through the cloud to an open space under the ceiling, and back down again. Although the process of forming and maintaining the cloud required sophisticated mechanical equipment, visitors were left only to perceive the resulting environment, one that was both natural and artificial.²⁰ Like Di Palma's analysis of blurriness and vision, the thermal experience of the cloud—moving from a stratum of cooler, drier air at the ground, through the warm, humid vapor of the cloud to dryer and warmer air at the top—led visitors to become aware of their own thermal experiences. While typically comfort results from an equally artificial yet unrecognized technologically-mediated interior environment, here the dynamic, transient, even surreal experience of walking through a cloud created such consciousness as part of a designed space.

A similar framing of experiences that blurs the boundaries between constructed and natural thermal conditions can be found at the Taichung



Figure 5. Cloudscapes, 12th Venice Biennale, Transsolar Climate Engineering + Tetsuo Kondo Architects, 2010. [Image: Tetsuo Kondo]

Gateway Park in Taiwan. Designed by the French landscape architect Catherine Mosbach and Swiss architect Philippe Rahm, the park modulates the sub-tropical exterior climate with overlays of cooler, dryer and cleaner zones. Beginning with the park's existing microclimates, the designers modulate thermal differences to create varied thermal conditions related to proposed programmatic activities. They do this with both trees and plants, as well as a collection of "meteorological devices" including atomizers, dehumidifiers, radiant panels and ultrasonic bug zappers. This landscape-based approach to comfort recalls its eighteenth-century origins where the picturesque aesthetic gave designers the creative freedom to break with formal architectural imperatives such as symmetry, hierarchy and canonical style and explore the subjectivity of taste, opportunities for leisure and to satisfy a new-found interest in the exotic.²¹ As the Mosbach and Rahm explain in a video describing the project: "to go to the park is like traveling instantly to other latitudes, altitudes, seasons where the climate is more comfortable."²² The park's naturally and technologically-mediated thermal experiences connect with other geographical spaces as well as historical and seasonal times through the experience of thermal comfort.

Recalling Elias's thesis, these examples move the experience of thermal comfort in an un-civilizing direction. That is, historians in their writing, and the architects through their designs, seek to expand the narrow and expected register of thermal comfort to encompass types of experiences that are both new and old. Instead of refining sensibilities to the point of socially unquestioned banality or lapsing into nostalgic reverie, these projects point to a direction where habits are unlearned and expectations set aside to allow the participant to gain self-awareness as part of a sensuous communal experience. Such calls for improved civic thermal literacy requires a close historical attention and contemporary environmental awareness, specifically to the clues offered by the exterior world.

IV.

The interaction of history and design when addressing thermal comfort is different from the one Joseph Rykwert described with ergonomic comfort. While Rykwert's "question of method" argued for the relevance of history in design teaching, with thermal comfort the methods in question (historical research and design practice) intertwine in mutually-beneficial ways such that the line between historical consciousness and design imagination is blurred. Such interaction is necessary to develop the attentions that are necessary to detect ephemeral environmental manifestations. Such conditions have historically shaped the natural and built environments, and are of ever increasing relevance today due to the effects of climate change. Thermal comfort, like climate, is not a stable

index of energetic balance. Instead climate and comfort are conditions in flux on which human activity and decisions have a direct impact. Thermal comfort is a microhistory of culture.²³ As such, the evolution of thermal comfort is fluid. It has the ability to disturb our historical certainties and architectural habits in ways that lead to a re-enchantment with our collective heated position.

ENDNOTES

1. Reprinted in Joseph Rykwert, *The Necessity of Artifice* (New York: Rizzoli, 1982), 23.
2. See P.O. Fanger, *Thermal Comfort: Analysis and Applications in Environmental Engineering* (New York: McGraw-Hill Book Company, 1972).
3. Shelia Jasanoff, *Science and Public Reason* (New York: Routledge, 2012), 95. Quoted in Daniel A. Barber, "The World Solar Energy Project c. 1954," *Grey Room* 51 (Spring 2013): 91.
4. See, for example, the conference "Building Environment and Interior Comfort in 20th-Century Architecture" held at the École Polytechnique Fédérale de Lausanne on September 12-13, 2012 under the direction of Franz Graf and Giulia Marino.
5. Fernández-Galiano's book, written over twenty years after Banham's, cites Banham's use of the images, and includes the images as well as their history. Although he discusses them, Banham does not attribute the images to Cesariano, nor does he include them in his book.
6. Lisa Heschong, *Thermal Delight in Architecture* (Cambridge: MIT Press, 1979), 17.
7. Personal communication with the author. Fernández-Galiano wrote *Fire and Memory* after similar experiences in Spain. See his "Memorias termodinámicas: Lecciones del pasado," *Arquitectura Viva*, no. 178 (October 2015): 13-16.
8. Rem Koolhaas et al. eds. *Elements* (Venice: Marsilio, 2014), 1002-1156. The essay by Sébastien Marot, "Hearthbreaking" (pp 1106-1123) provides a nuanced insight into the place of fire within recent architectural historical writing.
9. John Hix, *The Glass House* (Cambridge: MIT Press, 1974), 29.
10. John Claudius Loudon, *Remarks on the Construction of Hothouses* (London: The Architectural Library, 1817), 2.
11. John E. Crowley, *The Invention of Comfort: Sensibilities & Design in Early Modern Britain & Early America* (Baltimore: Johns Hopkins UP, 2001).
12. Humphry Repton, *Fragments on the Theory and Practice of Landscape Gardening* (London: Architectural Library, 1816), 58.
13. Like Fernández-Galiano and Heschong, Anne Lacaton and Jean-Phillippe Vassal were educated in the energy-conscious 1970's, and attribute their interest in the design of the thermal environment to this training. See "Two Conversations with Patrice Goulet" in *2G Libros: Lacaton & Vassal* (Barcelona: Editorial Gustavo Gili, 2010): 130-155.
14. "47 Rooms" <http://designguggenheimhelsinki.org/images/static/stage-two-submission/3-pdfs/GH-5059206475.pdf> accessed October 3, 2016.
15. For a description of Corbin's historical project see Sima Godfrey "Alain Corbin: Making Sense of French History," *French Historical Studies*, vol. 25 no. 2 (Spring 2002): 381-398.
16. Alain Corbin, "L'Emergence du désir du rivage ou la spécificité d'une forme de fascination de la mer," in *Le Ciel et la mer* (Paris: Flammarion, 2014), 39-63.
17. Juhani Pallasmaa, *The Eyes of the Skin: Architecture and the Senses*, 3rd ed. (New York: Wiley, 2012), 43.
18. Steven Holl, Juhani Pallasmaa and Alberto Perez-Gomez, *Questions of Perception: Phenomenology of Architecture* (San Francisco: William Stout Publishers, 2006).
19. Vittoria Di Palma, "Blurs, Blots and Clouds: Architecture and the Dissolution of Surface" *AA Files* No. 54 (Summer 2006): 24-35.
20. Nadir Abdessemed and Matthias Schuler, *Transsolar KlimaEngineering Tetsuo Kondo Architects Cloudscapes* (Ostfildern: Dr. Cantz'sche Druckerei, 2010).
21. Crowley, *The Invention of Comfort*, 203-230.
22. "Phase Shifts Park: An Atmospheric Fable" <https://www.youtube.com/watch?v=UDr-6UtlUu8> accessed October 3, 2016.
23. Eduardo Prieto, "La cultura del bienestar: Poéticas del confort en la arquitectura de los siglos XIX y XX," *Cuaderno de Proyectos Arquitectónicos*, no. 4 (2013) 22-31.