Neutra Through a Dark-Adapted Eye:

Using design to visualise the relationship between concept, theory and form.

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Abstract

Design knowledge is typically compartmentalised into graphic, spoken and written modes of communication. In architectural scholarship, this situation is described as the separation between the architect’s ideas (theory as it is developed), words (theory as espoused) and deeds (theory as applied). To date, the methods used to connect these three dimensions of a design have tended to privilege words over images; reinforcing the traditional academic practices and values of the architecture discipline. In this project, design, as a mode of critical thinking, is adopted to propose one alternative way of reading the often-fraught relationship between form, theory and concept. The complexity of this relationship is demonstrated through the process of reinscribing the theoretical foundations and conceptual armature of Richard Neutra’s Kaufmann Desert House, into the design itself. In this way the language of architecture is used to illuminate the concordances and discrepancies between ideas, arguments and forms.

Visualising the intangible

What if we could simultaneously visualise a work of architecture, its theoretical underpinnings and the conceptual armatures responsible for its form? Such a feat would require a special kind of (in)sight; a type of vision attuned to both the present and the past as well as the tangible and the intangible. When considered through such a lens, the relationship between architecture and the machinations of its underlying theory could be formally interrogated. This proposition relies on the possibility of merging the languages and techniques of scholarship and architecture. Or more specifically, of proposing a critical elucidation of theory through the application of the graphic conventions more commonly associated with design. An ideal test case for this proposition is Richard Neutra’s Kaufman Desert House; both a seminal example of the International style and a design that has been intricately shaped by early methods in experimental psychology. In this design research, the laboratory machines that underpin Neutra’s theory of sight, and shape the form of the design, are reinstated as an integral part of the house and its context. The first step towards constructing this alternative reading involves revisiting the psychological trope, the “dark-adapted eye”. This critical aperture supports the production of a design that both dramatises the particular conjunction of the theory and form present in the Kaufman house and begins to respond to the bigger issue of visualising the merging of form and ideas into a single construct.

A dark-adapted eye is one which has been deprived of light for so long that it is able to perceive the subtle, or previously hidden, facets of a space or form. The dark-adapted eye is even potentially able to detect light that passes through thin walls, or is absorbed by dense surfaces, allowing the observer to sense levels of transparency and solidity which cannot otherwise be differentiated by standard human vision. Nineteenth century experimental psychologists, lead by Wilhelm Wundt and the Leipzig school, were fascinated by this property of the human eye which, along with the role of scotoma (blind spots or patterns in the viscera) altered human perceptions of space and in turn shaped the body’s response to the environment. Wundt published these initial observations about the various properties of the human eye in his 1874 work, *Principles of Physiological Psychology*. This book laid the foundations for almost all subsequent studies of bodily responses to space and form. One of the reasons the work was so successful was that its arguments were founded on some
of the first empirical research ever undertaken in human psychology. In particular, Wundt (1901) had
developed a range of mechanical devices for modelling and testing the relationship between the
mind, the senses and the environment. Some of the most important of these laboratory apparatus
include the Stroboscope, the Perimeter, the Opthalmotrope and the Kymograph.

Wundt’s Stroboscope was a machine that produced a fast, visual oscillation pattern; an effect that
tricked the mind into experiencing an illusion of motion and could also trigger seizures and involun-
tary muscular contractions (Popplestone and McPherson 1980). Wundt’s Perimeter was a device
for methodically simulating the extent of a subject’s eyesight, allowing for careful calibration of visual
acuity, colour reproduction and light sensitivity (Zimmermann 1903). For this reason, the Perimeter
has some similarities to Renaissance perspective devices. In contrast, the Kymograph, originally
developed by physiologist Carl Ludwig in the 1840s, translates a range of muscular and nervous re-
sponses into a line graph on a revolving drum (Titchener 1918). Originally used for measuring blood
pressure, Wundt adapted it to measure the way muscles in the eye respond to changing visual con-
ditions. Finally, Wundt’s laboratory also featured Knapp’s Opthalmotrope – a pulley-driven machine
that simulated the complex interrelationship between muscles surrounding the eyes (Popplestone
and McPherson 1980). In combination, these machines, along with the coordinating power of Her-
ing’s Scale (a calibration device), represent the supposedly stable foundations of the theory of visual
empathy; the idea that the way the body reacts to a given environment is governed by the eye’s
response.

In 1910, a young architecture student, Richard Neutra, was studying at the library of the Technische
Hochschule in Vienna when he “discovered the writings of Wilhelm Max Wundt in the library” (Lam-
precht 2000 42). Inspired by Wundt’s ideas, and the way in which laboratory apparatus could be
used to predict the body’s response to form and light, Neutra (1954) set out to develop a design
method wherein architecture could be used to control human vision and, by extension, associated
reflex responses. After setting up practice in Los Angeles, Neutra completed a range of projects that
demonstrated his understanding of human physiology; an understanding founded on the capacity
certain machines to model and predict phenomenological response. This approach to theory and
design was famously demonstrated in the Kaufman Desert House in Palm Springs, California.

The Kaufmann Desert House was completed in 1946 for the same client who had previously com-
misioned Frank Lloyd Wright to design “Falling Water” in Pennsylvania. Often described as one of
the greatest works of the International Movement (McCoy 1960), the design features a loose cruci-
form plan wherein a rigorously orthogonal set of glass and solid walls frame what were once spec-
tacular views of the surrounding landscape. Today the house is surrounded by suburban homes and
the landscape has lost its original desert character. However, in 1949 the plan of this house was fea-
tured on the cover of Time magazine. Depicted with the sun shining through the plan from behind,
like rays of light emanating from an eye, the world is cast into shadow except for the those spaces
illuminated by the lines on Neutra’s blueprint. This is a strangely perceptive depiction of Neutra’s vi-
sion of architecture as both sensory apparatus and as catalyst for enlightenment.

If we view Neutra’s Kaufmann Desert House, through a dark-adapted eye, and ignore its current
suburban surrounds, we can perceive the continued presence of a range of machines surrounding,
supporting and undermining the house. Each of these devices – the Perimeter, Stroboscope, Kymo-
graph and Opthalmotrope – act as sensory substitutes, authorising the creation of particular forms
in the house. Collectively they appear as if part of an industrial landscape that had been developed
in the nineteenth century but is still present in the current era. The Stroboscope envelops the entire
house, undermining its foundations, and separating it from the surrounding landscape. The Perim-
eter and the Opthalmotrop are positioned to replicate the location of the visitor in Neutra’s famous
perspective of the exterior. The Kymograph is divided into two parts, its operating platform is located
near the service areas, while its recording apparatus is closer to the living zones. The central drive-
shaft connecting the two halves of the machine divides the master bedroom in two and separates
the house into solid and void zones. The cogs which cause the recording spool in the Kymograph
to rotate are connected to the hearth of the house, the cyclic heating and cooling of the core being
recorded, like muscular contractions, on the graph. The lowest of these cogs is also cut into the surface of the land, inscribing a second slot into the earth; an oil filled, machine-generated arc which contrasts with Neutra’s rectangular swimming pool. Finally, Herings colour correction scale, which Neutra relied upon to allow silver structures to blend into the landscape, connects the machines. This quadrant shaped, calibrated cut into the ground-plane is generated from the perspective arc Neutra used to shape the house’s primary vistas.

While conventionally depicted as a pristine, white, geometric object, when viewed through a dark-adapted eye, a stark industrial presence is revealed. Like artefacts in the visual cortex left behind by the faint traces of radiation in the darkness, these machines are the lasting defects, the blind spots of the method, that allow the minimalist, International style aesthetic to continue to operate as Neutra planned.

References


plan perspective view

exploded axonometric

site plan