Photography Matters: Balthazar Korab's Legacy in the Saarinen Office

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ABSTRACT

This paper begins with the premise that architecture is (re)created through photography, as photographers play a crucial role in the public dissemination and critical reception of architecture. While designers, educators, historians and consumers of architecture often ascribe a calculated objectivity to the photographic images thereof, it is undeniable that any representations of original sources (buildings, landscapes, cities) are *inflected* by the approaches, sensibilities and practices that photographers bring to bear on their subjects. As such, this paper will examine the unique contributions made to the disciplines of architecture and photography by Balthazar Korab (b. 1926) by examining two specific projects from the Saarinen office (TWA Terminal and Miller House) with which Korab had direct and sustained involvement during the processes of design, construction and documentation. Korab's portfolios of these projects offer a unique opportunity to reexamine distinctive representations of canonical architecture produced by a photographer with unique insights into the design and constructions thereof.

INTRO: DRAWING WITH LIGHT¹

It's right there in the name, *Photography*. Scrutinize its etymology and one discovers the word is based on a combination of the Greek *phos*, meaning "light" and *graphê*, meaning "representation by means of lines" or "drawing."² In combination, this roughly translates to "drawing with light."³ There, yoked together in the very name given to the discipline (photography) and the thing itself (photograph) are the dual authorities of *representation* (drawing and painting) and *natural sciences* (physics and chemistry) and the assertion of their necessary alliance.

To an extent, the inevitability of this alliance was forecast by the lives and careers of the men most widely credited for the *inventions* and earliest developments of what became photography. Louis-Jacques-Mandé Daguerre was a Frenchman for whom one of the earliest and most successful processes of direct or "positive" plate images bears his name, the *daguerreotype*.⁴ Joseph Nicéphore Niépce (Daguerre's partner prior to Niépce's death in 1833) is credited with the earliest known surviving *photograph*, an image that vaguely depicts silhouettes of rooftops taken from his attic window in 1827. Niépce was a French-born physicist who devoted much of his life to the invention and design of various mechanical devices and research experiments in chemistry and lithography.⁵

At the same time that Daguerre and Niépce were developing their efforts to fix illuminated images, in England there were parallel experiments in early photographic techniques undertaken by, among others, William Henry Fox Talbot, who is credited with one of the earliest and most-successful developments of a "paper negative." This technique had the distinct advantage, over the daguerreotype, of producing multiple "positive-print" reproductions using the "paper negative" image. Talbot was trained as a mathematician and physicist with a "kaleidoscopic play" of interests ranging from the science of light, phosphorescence, flame-colors, and, of course, photographic imagery. ⁶ In the case of Talbot, much of the motivation for his experiments in "fixing" the illuminated images produced within his camera obscura and camera lucida came from a frustration with his own inability to actually *draw* the images projected within those devices. So, in 1844, when Talbot published a detailed description of his photographic developments he titled the book, of all things, The Pencil of Nature. Talbot's emphasis given to a drawing tool in the title of a book on photography was completely understandable when considering that "by the early nineteenth century most well-educated individuals were schooled in perspective and figure drawing, which was considered a skill as important for personal development as handwriting."7 Equally significant is the fact that in 1877, when later reminiscing of his earliest exploits in photography, Talbot wrote that his country house, Lacock Abbey, was "the first that was ever yet known to have drawn its own picture."8

However, while it is arguable that these earliest forays into architecture photography were consistently produced according to the prevailing language and conventions of drawing and painting, emerging innovations in the technology of photography, along with a flourishing publishing industry, began to create independence among photographers to gain greater control over their individual approaches and interpretive practices when photographically presenting their subjects.9 Through travelogues and expeditions to foreign lands (mainly to survey colonial settlements and military outposts, archaeological sites of excavation, and 'grand tours' to the most widely acclaimed sites of classical antiquity), there was no shortage of architectural styles widely available to practicing architects to incorporate into the new and increasingly eclectic forms of architecture. Thus a stylistic eclecticism grew in popularity in no small measure to the increased diffusion of original sources through photographic publications.¹⁰ In short, the technological, mechanical and chemical advances in photography began to drive the design sensibilities of practicing architects through the ubiquity of architecture represented ever increasingly through *light* rather than *drawing*. Consequently, this "served to broaden the debate on architectural photography from the constricted nineteenthcentury preoccupation with its role *vis-à-vis* sketching to a more critical examination of the way buildings were photographed and the influence of photographs on architectural taste and production."¹¹

It is, however, in the experimental photography and pictorial manipulations of light-sensitive materials pursued in the 1920s and 1930s by Surrealist artists (i.e. Man Ray, Maurice Tabard and Hans Bellmar), the artists, architects and designers of the Russian Avant-Garde (i.e. Alexander Rodchenko and El Lissitzky), and those practicing and teaching at the influential Bauhaus school in Dessau, Germany (i.e. László Moholy-Nagy and Walter Peterhans) where one sees a near complete visual and rhetorical liberation of photography (light) from the traditional conventions of architecture representation (drawing).12 With the advent of such transformative techniques, photographers, it would seem, were not only liberated from a previous adherence to the conventions of drawing when approaching architectural subjects, they were also empowered to explore more active and *reflective* uses of photography as a productive tool within the very processes and practices of design.

THE REFLECTIVE PRACTICES OF PHOTOGRAPHY

Architecture and Photography, together they pose a curious set of predicaments and opportunities. Thev always have, really. Initially yoked together by a range of mutually-beneficial technical, commercial and disciplinary practices, the coupling of architecture and photography has ever since engendered numerous guandaries regarding their inevitable and, at times, intractable entanglements. At their most productive, these entanglements result in a reciprocal give-and-take wherein photography is extended beyond mere representation and participates in the actual processes of design and the production of architecture. As such, it would seem reasonable to imagine among the multiple histories of architecture photography one would encounter the occasional examination of reflective and productive exchanges between these two disciplines. And vet, while the stylistic, formal and critical assessment of architecture-photographically-considered is consistently presented through most surveys of architectural photography, it is striking that the vast majority of these accounts give little, if any, attention to the uses of photography as an active and instrumental part of the actual design process.

Certainly, there are a number of independent and discrete accounts of photography employed as part of the design

and production of architecture. For example, Mies van der Rohe's use of collage and montage as tools for design development has been examined in the recent exhibition *Mies in Berlin* and the accompanying catalog by the same name.¹³ Antoni Gaudi's innovative use of photography to analyze and interpret complex structural models and his photography of live human, animal and vegetal subjects for the accurate modeling of ornamentation has too been widely and thoroughly covered in accounts of his life and work.¹⁴ And the pioneering use of models and photography employed by Frei Otto and his partners at the Institute for Lightweight Structures in Stuttgart, Germany have been the subject of thorough study to wide acclaim in countless publications on his career's work.¹⁵

However, while these and other studies offer important and detailed accounts of photography actively utilized in the design of architecture, such reflective practices tend to remain disconnected and noticeably absent from major historical surveys of architectural photography.¹⁶ Furthermore, in the exceptional cases when photography is demonstrated to be an active agent within the design process, the results of those practices are rarely discussed as having any influence upon the subsequent photographic representations of the architecture once completed. In other words, the photography of architecture is most typically presented as that which *follows* the completion of the thing itself (in this case buildings), and rarely, if ever, as that which is actively pursued during the processes of design from conception, to construction, through completion, and beyond.

BALTHAZAR KORAB: ARCHITECT OF PHOTOGRAPHY¹⁷

It is important to note that Balthazar Korab has always considered himself to be "an architect who produces photographs rather than a photographer who is knowledgeable about architecture." In short, he was trained as an architect first and became a photographer through the very practices of architecture and design, a fact that is not insignificant to a broader understanding of his work and the unique contributions he has made to the production, representation and critical assessment of Modern architecture.

Balthazar Korab was born in Budapest, Hungary in 1926. He was given a strong education and developed an early interest in the arts, languages, music and poetry, and was particularly drawn to painting, sculpture and figure drawing. By early childhood he had developed a refined set of artistic sensibilities and was determined to pursue a career as a painter but was "encouraged" by his parents to instead parlay those talents into a more "respectable" career in architecture, as his uncle had done before him.¹⁸ In the Fall of 1945, shortly after the end of the Second World War, he enlisted in university classes to study architecture at the Budapest Polytechnic, and though the general conditions of the city were still "miserable and overwhelming," he found some solace and distraction in his studies and guickly gained a reputation in the school for his strong design abilities.¹⁹ His time in the University coincided with the Soviet occupation of Hungary and major political upheavals which led to the unjust imprisonment of his father in 1948. Shortly after his father's release from prison, Korab made a decision to flee the country with his younger brother Antoni and his architecture schoolmate László Kollár.20 With assistance from a network of Hungarian expatriates in France, Korab ultimately moved to Paris in 1950 and Balthazar completed his studies at the *École des Beaux-Arts* in 1955. His time and work in Paris at that time marks a critical transition in Korab's training and would prove instrumental for his future collaborations as both a designer and photographer of architecture.

Based on his successes in schooling and his experiences periodically working for renowned architects such as the Swedish firm Backström & Renius and the Swiss-born, Parisian architect Le Corbusier (Charles-Édouard Jeanneret-Gris), it is not without reason to contend that Korab's academic and professional training as an architect provided him with a heightened sensitivity to the material, spatial, technical and conceptual maneuvers by which architects infuse architecture with rhetorical and symbolic value. In fact, Korab himself has said of his approach "what affected my photography most is the fact that I knew about architecture because I had designed and drawn it," and that "architects know how to interpret space, because they understand how a building works."²¹

EERO SAARINEN AND ASSOCIATES

Upon the completion of his studies in Paris, Balthazar Korab had been planning to make his next move to Brazil and work for the renowned Brazilian architect Oscar Niemeyer who had gained an international reputation for his sculptural formalism, innovative structural solutions, and his design "collaboration" with Le Corbusier on the United Nations Headquarters in New York City (1947). In the meanwhile, however, Korab's new bride Sally Dow, originally from Royal Oak, Michigan, convinced Korab to spend a month in Michigan before making a more permanent move to Brazil.

Shortly after their arrival to southeast Michigan, Korab became restless, but relieved to discover that the office of Eero Saarinen and Associates was only a few miles away, in the town of Bloomfield Hills. He cold-called the office and was granted an interview with Eero Saarinen to whom he presented a series of photographic reproductions of his *Beaux-Arts* drawings from Paris. Eero conferred with his junior partner Kevin Roche and they immediately offered

Balthazar a cigar and a job with a starting wage of \$2.75 an hour. He was asked to return after lunch to begin working and was immediately given design responsibilities on several projects in the office, including the Miller House in Columbus, Indiana and the TWA Flight Center at Idlewild Airport in New York City (later John F. Kennedy International Airport), among others.

Because the Saarinen office designed through the use of large-scale models, full-scale mock-ups and iterative prototyping, Korab was asked to begin using photography to document the design development process. At the time he joined the office, he did not yet consider himself to be a "photographer," per se, but he willingly accepted the responsibilities to photograph the models and prototypes used to explore various alternatives for each project. Throughout his tenure in the office (1955-58) Korab's photography became an indispensible tool for design which also gave him a tacit knowledge of the design intentions underlying the projects he was eventually assigned to photograph upon completion.

What is most crucial to this particular study is the extent to which both Saarinen's and Korab's training, sensibilities, and approach to architecture were aligned to create a fortuitous and exceptional collaboration. In addition to his side-by-side practice of architecture with his father Eliel, Eero had a wealth of training in graphic and plastic arts, so it is of little surprise that Eero would go on to manage his own architecture office in the model of a collaborative studio or atelier. Those in the office were engrossed in a constant flurry of design activities exploring multiple iterations for every possible design solution. "But," in the words of Gunnar Birkerts, "through this process, we arrived at a refined result because there were so many people involved in the solution," a sentiment corroborated by Cesar Pelli, who worked in the office for eight years (1954-61). "Research," according to Pelli, "was integral to almost everything we did. There was always an investigation of another way of doing something, a way that had not been used before."22 And Richard Knight, who succeeded Korab as in-house photographer in the office, wrote of the work environment, "it was more an atelier, an informal studioworkshop, than a professional corporation. Most everyone worked at a drawing board, freely exchanged information, and helped out on whichever project needed attention."23 Therefore, it is of little surprise that Korab's introduction into this studio would require him to draw upon all of his artistic and visual skills to negotiate multiple forms of production to work through projects of vastly differing scales and programs.

Miller House: Columbus, IN, 1953-57

One of the first projects to which Korab was assigned was the house for J. Irwin Miller and his family in Columbus,

Indiana (1953-57). Saarinen had already designed (with interior designer, Alexander Girard) a lake front house in Ontario Canada for the Millers (1950-52), but their house in Columbus was to be their primary residence in their home town.²⁴ Korab was tasked with designing and modeling multiple proposals for the sculptural fireplace that - along with a vertical screen, sunken seating area, a circular dining table and a built-in storage unit made of rosewood was to punctuate the main living area in the center of the house. (Fig. 1) While designing and photographing numerous interior models for the development of this space, Korab cultivated a keen awareness of Saarinen's intentions to create an interior, artificial landscape comprised of sculptural furniture, free-standing elements, a rich tapestry of upholstery and fabrics (designed by Girard), and the Miller's extraordinary art collection. (Fig. 2)



Figure 1: Miller House model, c. 1955, photograph by Balthazar Korab.

Korab, involved throughout much of the design process for the building, was also knowledgeable of the important (if not central) role played by the landscape architecture for the house that was designed by long-time Saarinen collaborator, Dan Kiley. Selective views of the exterior were framed by floor-to-ceiling windows that created a visually-seamless connection between the ever-changing landscape outside, with the highly choreographed interior architecture that also received seasonal variations in the upholstery, carpets and drapery designed by Girard.



Figure 2: Miller House interior, c. 1957, photograph by Balthazar Korab.

As a result his sustained involvement with the design development of the house. Korab's transition from photographing modeled interiors, to ultimately documenting completed house (1957), was, highly influenced by his understanding of the intimate connection and inseparability between the house, its interior and the landscape within which it was situated. (Fig. 3) Furthermore, it is not surprising to note that since the completion of the design, Balthazar Korab has maintained a career-long relationship with the Miller's producing what is likely to be the most comprehensive and diverse collection of images of the house and property, assembled over a forty-year period. Within this extensive portfolio, Korab has produced a collection of images that depict the house at nearly every time of day, amongst various climatic conditions, through every season of the year. On one occasion, he even hired a pilot to fly high above the house to afford an aerial perspective that delivers an even greater understanding of the project within the larger context of Columbus, Indiana and the broad Midwest landscape.



Figure 3: Miller House view of exterior wall and landscape, c. 1957, photo by Balthazar Korab.

TWA Flight Center, New York Idlewild Airport (Now JFK International), 1956-62 Charged by the president of Trans World Airline in 1956 to capture "the spirit of flight," and to design "a building in which the architecture itself expresses the drama and specialness and excitement of travel,"²⁵ Eero Saarinen and Associates began a long process of design and production that quite arguably established new expectations for a modern form of monumental architecture. And, "like all poetic visions, it was timeless, drawing upon the past, anticipating the future, although it was firmly grounded in the present, and at all times dependent on the machine technology of our industrial civilization." ²⁶

Through an incremental, and at times painstaking, process of working form into monumental expressivity, spatial continuity and structural stability, large-scale models proved to be the method of working best suited for the terminal's design. (Fig. 4) With an initial team of designers that included Kevin Roche, Cesar Pelli, Edward Saad, Leon Yulkowski and Norman Pettula, countless models were constructed, deconstructed, and reconstructed in effort to attend to all of the complex spatial, structural, programmatic and functional challenges. Nearly impossible to draw on paper, the project progressed almost entirely through models of varying scales, materials and degrees of complexity, and throughout the process, Balthazar Korab was charged with photographing all of the evolutionary phases from beginning to end. Of his own involvement, Korab has said:

I myself experimented with a new instrument; the camera, often splitting my time, day and night, between my pencil and my Leica... we developed a way where the camera and its handler became an integral part of the design process... We were intrigued by the extent to which Eero grew dependent on the images, particularly during the TWA studies. Both form and space could be conveyed conveniently with my small Leica.²⁷



Figure 4: TWA Terminal model, c. 1957, photograph by Balthazar Korab.

While instrumental to the very processes of design, Korab's photography was also an indispensable tool for conveying to the clients a sense of how the architecture would appear, if not feel, upon completion. Because the models were often times roughly built and pieced together from various iterations, the clients were typically shown only slide presentations of models that had been augmented through literal "smoke and mirrors." Again, Korab:

I was quite skillful with photography, and for our models we used smoke-and-mirror effects – and I mean that literally. For the TWA project, we had a model where you could almost stick your head into half the shell. So out of that half model, we added the mirrors and cutouts of people; then blew smoke to create depth, and took the photograph. It gave an impression of being in the space... The clients were shown a slide show of the photographs, and the effect was so successful that they bought the whole project without even seeing the model.²⁸ As the building entered the complex construction phase of the project, Korab was also tasked with the enormous efforts to document the translations from models to drawings to building. Unlike most photographers of architecture, however, Korab was already quite familiar with the project's formal and spatial qualities, its interior configurations, and the potential lighting conditions that he could reasonably anticipate. Through his work with the TWA models, he had been rehearsing the photography of this project for years prior to any contractors ever breaking ground. And now, during the phase of construction, he was essentially photographing what amounted to a representation in reverse, a full scale model. (Fig. 5)



Figure 5: TWA Terminal construction, c. 1960, photograph by Balthazar Korab.

By the time of its completion in 1962 Balthazar Korab had essentially photographed the TWA Terminal hundreds, if not thousands of times. Through his camera, he had moved among its interiors, experienced the flow of its spatial continuity, and had captured the complex dynamism directed by Saarinen's vision long before the project's official opening. In a very real sense he had been preparing for this assignment for decades and was perhaps the most ideal photographer for the job. His early pursuits of painting and sculpture along with his own designs produced as a student of architecture had together prepared him for the theatrical qualities of light, color, form and material that were sympathetic to, if not synonymous with, Saarinen's sensibilities as exemplified in the TWA Furthermore, his self-taught skills as a Terminal. photographer allowed him to utilize the camera in a rather improvisational manner without being encumbered by the disciplinary rules of photography or the traditional conventions of architectural representations. It is perhaps not surprising then that one of Korab's most celebrated and widely-published photographs is a striking image of the Terminal interior produced shortly after its opening in 1962. (Fig. 6) Unfortunately, due to his untimely death in 1961,

Eero Saarinen did not live to see the completion of TWA Terminal; however, thanks to the photographic exploits of Balthazar Korab, Saarinen had, no doubt, passed on having *experienced* one of his most masterful works of architecture.



Figure 6: TWA Terminal interior, c. 1962, photograph by Balthazar Korab.

ENDNOTES

¹ The following texts have been instrumental for the introduction to this paper: James Ackerman, "On the Origins of Architectural Photography," in Origins, Imitation, Conventions: Representation in the Visual Arts (Cambridge, MA and London: The MIT Press, 2002), 95-124; Rudolf Arnheim, "A Study in Spatial Counterpoint," in Steve Yates ed., Poetics of Space: A Critical Photographic Anthology (Albuquerque: The University of New Mexico Press, 1995), 7-22; Martin Caiger-Smith and David Chandler, eds., Site Work (London: The Photographer's Gallery, 1991); Robert Elwall, Building With Light: The International History of Architectural Photography, (London and New York: Merrell, 2004); Robert Harbison, "Decoding the Cipher of Reality: Fox Talbot in His Time," Aperture, No. 125 (Fall 2001): 2-8; Cervin Robinson and Joel Hershman, Architecture Transformed: A History of Photography of Buildings from 1839-Present (Cambridge, MA and New York: The MIT Press, 1987); Eve Blau and Edward Kaufman, eds., Architecture and Its Image, exh. cat. (Montreal: Canadian Center for Architecture, 1989); Weston Naef, "Daguerre, Talbot, and the Crucible of Drawing," Aperture, No. 125 (Fall 2001): 10-15; Richard Pare, Photography and Architecture 1839-1939 (Montreal: Canadian Center for Architecture, 1989); John Szarkowski, The Photographer's Eye (New York: Museum of Modern Art, 1966); Mary Woods, Beyond the Architect's Eye: Photographs and the American Built Environment, (Philadelphia: University of Pennsylvania Press, 2009)

² Oxford English Dictionary, online edition accessed through http://dictionary.oed.com.floyd.lib.umn.edu/entrance.dtl ³ Though the word *photograph* was not the first or only used to describe the nascent techniques of "fixing" a lightproduced image (William Henry Fox Talbot originally preferred "photogenic drawings" for example), its ultimate adoption and persistence is telling as to the appropriateness and effectiveness of its usage. See, Weston Naef, "Daguerre, Talbot, and the Crucible of Drawing," Aperture, No. 125, Fall 2001, pg. 10. For early photographic processes in general, see Beaumont Newhall, *The History of Photography* (New York, 1982).

⁴ Daguerre was trained as an architect, practiced as a designer and painter of stage-sets and large-scale panorama, and the *inventor* of dioramas. See Elwall (2004), 12-13; Naef, "Daguerre, Talbot, and the Crucible of Drawing," *Aperture*, No. 125, (Fall 2001): 10-15; Walter Benjamin, "Paris, Capital of The Nineteenth Century," in Peter Demetz, ed., *Reflections: Walter Benjamin, Essays, Aphorisms, Autobiographical Writings*, (New York, NY: Schocken Books, 1986),149-151; some information on Louis-Jacques-Mandé Daguerre sourced from the Encyclopædia Britannica, Eleventh Edition, 1911, (vol. 7, pg. 730), online in the public domain at http://www.archive.org/details/EncyclopaediaBritannica1911 HQDJVU;

⁵ see Pare (1989), 13; entry on Joseph Nicéphore Niépce sourced from the Encyclopædia Britannica, Eleventh Edition, 1911, (vol. 19, pg. 672) online in the public domain. http://www.archive.org/details/EncyclopaediaBritannica1911 HQDJVU

⁶ see Harbison, "Decoding the Cipher of Reality: Fox Talbot in His Time," Aperture, No. 125 (Fall 2001): 2; Ackerman (2002), 96-97; Elwall (2004), 13; Pare (1989), 13-15; some information on William Henry Fox Talbot sourced from the Encyclopædia Britannica, Eleventh Edition, 1911, (vol. 26, pg. 368), online in the public domain. http://www.archive.org/details/EncyclopaediaBritannica1911 HQDJVU

⁷ Weston Naef, "Daguerre, Talbot, and the Crucible of Drawing," Aperture, No. 125 (Fall 2001): 12-14.

⁸ as quoted in Ackerman (2002), 97; originally published in Gaston Tissandier, *A History and Handbook of Photography* (London, 1878).

⁹ In fact, within the first century of photography's existence as a commercially and artistically-viable practice, advances in film speed, cameras technology, half-tone printing and an emerging print media culture all coalesced to give photographers of architecture increasing authority over the design sensibilities of professional architects. For discussion architecture and the development of print media industry see Robert Elwall, "The Specialist Eye," in Caiger-Smith & Chandler, eds., *Site Work* (London: The Photographer's Gallery, 1991), 63-76; Elwall (2004), 50-51 and 86-90

¹⁰ see Ackerman (2002), 115; Elwall (2004), 50-51; Pare (1989), 21.

¹¹ Elwall (2002), 89.

¹² Physical manipulations to photographic materials such as collage and montage, the transformation of light-sensitive materials such as photograms and double exposure, along with the use of dynamic perspectives, extreme oblique

angles and abstract framing devices dramatically established new sensibilities and radical approaches for the photography of architecture. As demonstrated by the various techniques and curricula developed by such Bauhaus leaders as Moholy-Nagy and Peterhans, photography and light-based arts were employed to express new concepts of space, time, motion and speed through their constructivist teachings dedicated to the mutually-beneficial development of art, design and industry. See for example, Magdalena Dabrowski, Leah Dickerman, Peter Galassi, eds., Aleksandr Rodchenko (New York: Museum of Modern Art, 1998); Jeannine Fiedler, ed., Photography at the Bauhaus (Cambridge, MA: The MIT Press, 1990); Alexander Lavrentiev, Alexander Rodchenko: Photography 1924-1954 (Edison, NJ: Knickerbocker Press, 1996); El Lissitzky, "A. and Pangeometry," in Poetics of Space: A Critical Photographic Anthology, ed. Steve Yates (Albuquerque: University of New Mexico Press, 1995), 67-75; László Moholy-Nagy, "Space-Time and the Photographer," in Poetics of Space: A Critical Photographic Anthology, ed. Steve Yates (Albuquerque: University of New Mexico Press, 1995), 150-56; Man Ray, "The Age of Light," in Classic Essays on Photography, ed. Alan Trachtenberg (New Haven: Leete's Island Books, 1980), 167-68.

¹³ see in particular Detlef Mertins, "Architecture of Becoming: Mies van der Rohe and the Avant-Garde," in *Mies in Berlin*, eds., Terence Riley and Barry Bergdoll (New York: Museum of Modern Art, 2001), 106-133; and Adres Lepik, "Mies and Photomontage, 1910-38," in *Mies in Berlin*, eds., Terence Riley and Barry Bergdoll (New York: Museum of Modern Art, 2001), 324-329.

¹⁴ see Ignasi de Solà-Morales, *Antoni Gaudi* (New York: Abrams, 2003); Robert Descharnes and Clovis Prévost, *Gaudi: The Visionary* (New York: The Viking Press, 1971).

¹⁵ Winfried Nerdinger,ed., *Frei Otto: Complete Works Lightweight Construction, Natural Design* (Basel, Boston and Berlin: Birkhäuser, 2005); Sabine Schanz, ed., Frei Otto, Bodo Rasch: Finding Form Towards an Architecture of the Minimal (Axel Menges, 1995)

¹⁶ for example Robert Elwall, *Building With Light: The International History of Architectural Photography*, (London and New York: Merrell, 2004); Cervin Robinson and Joel Hershman, *Architecture Transformed: A History of Photography of Buildings from 1839-Present* (Cambridge, MA and New York: The MIT Press, 1987); Eve Blau and Edward Kaufman, eds., *Architecture and Its Image*, exh. cat. (Montreal: Canadian Center for Architecture, 1989) make no mention of photography utilized as a tool for design or the production of architecture.

¹⁷ This biography is written from interviews between Balthazar Korab and the author unless otherwise indicated. Some details have been gleaned from an unpublished interview between Balthazar Korab and Marlayna Schoen.

¹⁸ Interviews 06/16/2006 and 11/11/2006

¹⁹ For example, due to his advanced skills in drawing and painting he was the first student at the Polytechnic to be offered a position as a teaching assistant for a course on drawing, painting and sculpture.

²⁰ Interview 06/16/2006

²¹ Interview, November 13, 1997

²² Pelli as told to Belinda Lanks in "Team Eero," *Metropolis*, November, 2008, 74.

²³ Richard Night, *Saarinen's Quest: A Memoir* (San Francisco: William Stout, 2008), 23.

²⁴ see Christopher Monkhouse, "The Miller House," in *Eero Saarinen: Shaping the Future*, eds., Eeva-Liisa Pelkonen and Donald Albrecht (New Haven and London: Yale University Press, 2006), 236-241.

²⁵ as quoted in Jayne Merkel, *Eero Saarinen* (London and New York: Phaidon, 2005), 205.

²⁶ Allan Temko, *Eero Saarinen* (New York: Brazillier, 1962), 35; see also Eeva-Liisa Pelkonen and Donald Albrecht, eds., *Eero Saarinen: Shaping the Future*, (New Haven and London: Yale University Press, 2006), 75-79, 83-90, 301-303; David DeLong and C. Ford Peatross, eds., *Eero Saarinen: Buildings from the Balthazar Korab Archive* (London and New York: Norton Press, 2008), 294-317; Merkel (2005), 205-216; Temko, (1962), 33-48.

²⁷ as quoted in David DeLong and C. Ford Peatross, eds., *Eero Saarinen: Buildings from the Balthazar Korab Archive* (London and New York: Norton Press, 2008), 20, 410-11; and reiterated during numerous interviews with the author.

²⁸ as quoted by Paul Makovsky in "Team Eero," *Metropolis*, November, 2008, 76; and reiterated in numerous interviews with the author.