

MAX UNDERWOOD

INSIDE THE OFFICE OF CHARLES AND RAY EAMES

Do not seek to follow in the footsteps of the masters. Seek what they sought.”¹
MATSUO BASHO, ZEN POET (1644–1694).

The mere mention of CHARLES and RAY EAMES delivers to an older generation an immediate, collective smile. Countless of us from a not-so-distant era remember with fondness our first experiences of their innovative designs, or “gifts,” as the Eameses affectionately referred to their creative works.² We lovingly recall relaxing within the embrace of an *Eames Lounge Chair and Ottoman* (1956), vividly remember watching with childlike wonder the exponential journey in the film, *Powers of Ten* (1977), or fondly relive the silent approach, through a flowering meadow and a magically-lifting coastal fog, to the mythical *Eames House* itself (*Arts and Architecture Case Study House #8*, 1949).

Charles and Ray Eames (1907–1978 and 1912–1988) dedicated their lives to the endless search for connections. They celebrated the embodied experiences of life. In their endeavor of discovery, they exalted an evolving nature of the ideas, artifacts and phenomenon in order that they might better define, enrich and sustain our daily lives.

One of the most enduring hallmarks of the Eames design legacy was its direct process of discovery and insight. This process, in addition to the particularities of any design itself, was essentially a means for celebrating and communicating these discoveries to people of every age. The breath and depth of the Eames’ thirty-seven years of creative work from 1941 to 1978 is simply staggering: They forged over 900 pioneering designs for furniture, toys, exhibitions, film, graphics and architecture.³

Another generation is now poised to inherit Charles and Ray’s “gifts.” As this generation seeks to better understand the

Eames legacy, it is important to examine what occurred inside the Office of Charles and Ray Eames, for it is primarily the incubation itself, enshrined by Charles and Ray Eames, that gave birth to such as plethora of ideas, innovative processes, profound insights, and landmark creative works.

Charles and Ray: the formative years “I don’t believe in this ‘gifted few’ concept, just in people doing things they are really interested in doing. They have a way of getting good at whatever it is.”⁴

CHARLES EAMES.

As we look back on the formative years of Charles and Ray’s lives, prior to the founding of their office in 1941, we are immediately struck not only by the wealth of their lived experiences, but by their perseverance and resilience to overcome personal, family and professional adversity. Time and time again, throughout their lives, whether it was the early death of their fathers, the hardships of the Great Depression, divorce, or the outbreak of World War II, they both demonstrated incredible fortitude to push beyond such obstacles.⁵

Born in Sacramento, California, on December 15, 1912, Ray Kaiser arrived into a family immersed in the theatrical tradition. Her father, ALEXANDER, managed the local Vaudeville theater and Ray fondly recalled wonderful evenings at the theater and the dinners that followed with many international stars, including AL JOLSON and the ballerina ANNA PAVLOVA. As the years progressed, Alexander’s theater would be among the first to introduce the new art form of motion pictures to Ray and his northern Californian audiences. In high school, Ray excelled in art. The pages of class notebooks from her favorite subjects – History, English, and French – were filled



with endless drawings. At seventeen, her world changed radically with two earth-shattering events: her father’s sudden death from a heart attack, and the advent of America’s Great Depression. During the turbulent years that followed, as her family relocated to the East coast and moved frequently, Ray found solace in her daily artistic pursuits. In 1933, when the family settled in New York City, Ray began a six-year intensive study with the painter HANS HOFMANN, where her renowned sense of perception, color, shape and structure were refined and honed to perfection. As she later recalled, “My interest in painting is the rediscovery of form through movement and balance and depth and light using this medium to recreate in a satisfying order my experiences of this world with a desire to

increase our pleasure, expand our perceptions, and enrich our lives.”⁶

Charles Eames was born on June 17, 1907 in St. Louis, Missouri, the gateway to the American frontier and western expansion. His father, CHARLES SR. fought in the Union army during the American Civil War, became a Pinkerton detective after the war and then a special agent for the Missouri Pacific Railroad. Like his father, Charles was curious about the events and people around him, was an avid reader of instructions, and loved to draw. In 1921, following the death of his father, shot by train robbers, Charles began a variety of after school learn-by-doing jobs to help support his struggling family. From the age of fourteen, his range of work experience included a print shop, grocer, drug store, lighting fabricator,

▲ Charles and Ray Eames, October 1976.
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construction and a steel mill. In his limited free time, Charles discovered his father's hobby, photography, and over the years perfected his artistic and technical skills. This became the foundation for his life-long reliance on still photography and film as a way of perceiving and seeing deeply into the task at hand.

In 1925, Charles attended Washington University on a scholarship and studied architecture for two years. At the time, the School of Architecture was immersed in a neo-classical Beaux-Arts curriculum, and Charles was dismissed after his second year for his advocacy of FRANK LLOYD WRIGHT. He then began working as a draftsman in a local architect's office. In 1929, he married his first wife, CATHERINE WOERMANN, daughter of a local Saint Louis contractor, and a year later their only child, daughter LUCIA, was born. On their honeymoon, they traveled to Europe, where Charles was exposed to new modern architecture and the work of MIES VAN DER ROHE, LE CORBUSIER, and the Bauhaus. Charles observed that "it was like a cold shower, a true awakening for a Midwesterner."⁷ Upon their return in 1930, Charles opened his own architectural office, which soon failed due to

the fallout of the Great Depression. During these hard times, and with the added responsibilities of a family, Charles engaged in a series of odd jobs to make ends meet. He designed opera sets, completed measured drawings of the New Orleans cathedral for the Historical American Building Survey, and finally, frustrated with the lack of work in America, moved to San Luis Potosi and Monterrey, Mexico for almost two years.

Upon his return from Mexico in 1935, Charles re-established his architectural practice, and completed several major commissions including the *St. Mary's Catholic Church* in Helena, Arkansas, and the *JOHN and ALICE MEYER Residence* in Huntleigh Village near Saint Louis, with its innovative aluminum windows and poured concrete floors. As Charles fondly recalled, "Going into practice in the 1930's is really something. And it's the greatest thing that could happen, because you practice architecture and you have to do everything. And we did some little churches, we did some houses and residences, and if there was a sculpture to do, you carved the sculpture. If there was a mural to paint, you painted the mural. We designed vestments, we designed lighting fixtures, and rugs; you helped build

the building."⁸ It was during this same period that the great Finnish architect, ELIEL SAARINEN, then the director of the Cranbrook Academy of Art in Michigan, contacted Charles after seeing photographs of *St. Mary's Catholic Church* in *Architectural Forum* magazine, and subsequently offered him a fellowship to join the Architecture and Urban Planning program in 1938.

At Cranbrook, Charles revived his learn-by-doing philosophy, and not only explored each of Cranbrook's various allied art studios, but found time to work part-time in Eliel Saarinen's architectural office, where he met the new junior partner, Eliel's son, EERO. Charles and Eero quickly became close friends and professional collaborators, who would share many projects through their lives until Eero's untimely death in 1961. Most importantly, it was at Cranbrook where Charles refined his conceptual thinking and design process, while teaching in the new Industrial Design Department, working in the Saarinen office, and dabbling in the new medium of film.

Following her mother's death in 1940, Ray Kaiser audited classes at the Cranbrook Academy of Art, where she met and assisted Charles Eames and Eero Saarinen in preparing designs for the Museum of Modern Art's 'Organic Designs in Home Furnishings' competition. Their designs for mass-produced molded plywood furniture, an ergonomic one-piece chair shell, comprised of compound three-dimensional curves, won first prize in the both the Chairs and Case Goods categories.

In 1941 Charles divorced Catherine, married Ray Kaiser and moved to Los Angeles, California, as Ray said, "so they could just get some work done."⁹ After unsuccessfully searching for work, Charles decided to follow his recent passion for film and went to work designing and building sets for the MGM film studios, while Ray continued to paint and do freelance commercial graphic design. In the evenings and on weekends the Eameses continued their molded plywood investigations in their RICHARD NEUTRA designed *Strathmore Apartment* (1941). Through endless hands-

on trial-and-error experiments with their "*Kazam! Machine*,"¹⁰ Charles and Ray slowly learned how to produce a perfect compound curved shell in response to the constraints of material, fabrication and comfort. As with all subsequent Eames designs, the final form was not willfully predetermined, but grew out of recognizing, accepting, and rigorously working through all the constraints of the particular design problem under consideration.

Following Pearl Harbor and America's entry into World War II, Charles and Ray found themselves in hard times and at one point even contemplated joining the Ringling Brothers and Barnum Bailey circus as clowns. But fortuitously, Dr. WENDELL SCOTT, a Navy surgeon came for a visit, and explained the military's pressing need to solve a problem with their metal splints and litters. The problem being the metal traction splints would vibrate when accidentally struck, re-injuring the arm or leg of a wounded soldier due to this movement. Almost in unison, Charles and Ray suggested an answer – molded plywood! Within weeks, the Eameses had developed a prototype molded plywood splint and were subsequently commissioned to produce these splints for the war effort. By war's end in 1945, Charles and Ray, with 15 staff members in their Venice, California office, had manufactured over 150,000 splints and stretchers. In addition, they found time to endlessly investigate new experimental post-war molded plywood applications that included glider shells, chairs, children's furniture and animals.

The characteristics of Eames Design "There is no Eames style, only a legacy of problems beautifully and intelligently solved."¹¹

BILL LACEY.

For the Eameses, design was much more than making products. Design was a way of being, a daily practice on their journey towards personal mastery, not a preconceived process or wrote activity. Throughout their lives, Charles and Ray made design their life and celebrated the gift of life through their design work. Rarely did sepa-

▼ Charles and Ray visiting the **Eames House** during construction, 1949. © LUCIA EAMES, DBA EAMES OFFICE.





▲ Eames Lounge Chair and Ottoman, 1956. ©LUCIA EAMES, DBA EAMES OFFICE.

ration exist between their personal and professional lives. As an example, the joy of an impending grandchild's birthday party would spill over into the Office with unique gifts being designed, and decorations, interactive games and food being created and prepared.

When asked to define design Charles would reply, "Design is an insightful plan for arranging elements in such a way as to accomplish a particular need."¹² Charles and Ray believed that every design project, or "design problem" as they were called in the office, was unique and required the formulation of a distinctive creative process. Every Eames design articulated the need being addressed, expressed the process which formed it, and the specific problem of origin it, thus becoming the resultant pleasure of its own solving. To this day, the breath, depth and level of new insights gleaned from each creative process and subsequent design "gift" are simply mind-boggling.

How did the their creative process work in the Office? When clients, visitors or new staff members would question how the creative process and design really works, Charles or Ray would share the story of the Nobel Prize winning physicists TSUNG-DAO LEE and CHENG NING YANG. Lee and Yang's process of discovering that parity conservation doesn't hold for weak interactions, is beautifully described in the May

12, 1962 *New Yorker* magazine article. As Yang observed, "We learned that physics should not be a specialist's subject, physics is to be built from the ground up, brick by brick, layer by layer. We learned that abstractions come after detailed foundation work, not before."¹³ The major lesson was that the creative process is never set, but rather follows the inquiry of the problem at hand. Discoveries are made incrementally, day-to-day, through perseverance, endless experimentation and carefully weighing various alternatives.

To better comprehend the Eames creative process, it is important to explore some of the major characteristics used in the Office.

1) *Do only challenging problems*

Each day, one was continually struck by the interesting and challenging problems that the Eameses took on. Problems, that know one ever considered being problems, until Charles and Ray identified them with solutions. Problems and investigations might arise from their own observations and personal interests, or from explorations already under investigation in the Office, or the stack of inquiry letters on Charles' desk, or a close friend's observations, that in time might bear the fruit and become a "design problem." Questions created problems as well; examples being, "How does communication work in the age of mass communication?" (*A Communications Primer*, 1953), or "What is the difference between how computers and humans think?" (*Think*, 1964). Each problem was mentally stimulating, physically absorbing and demanding, as well as fun to solve. These were not simple problems, where the process is already known and only a solution needed. Simple problems, finite in nature, that did not inspire further questioning, were not of interest to the Eameses. Rather, Charles and Ray were always drawn to the challenging problems, those that required a sensibility to remain open, active, to continuously be a spawn for ideas that translated to future work in various areas of inquiry.

2) *"What is interesting?"*

The Eameses always advocated that the design problems undertaken should be re-

warding and of great personal interest. As Charles advised, "Do not take any job with whose objectives you do not agree, and don't take a job as a stepping stone to something else. Get involved in things that are of value to you and don't get involved in things that you do not value."¹⁴ It was their belief when one worked on things of value, that an inexhaustible curiosity would be sparked and a natural passion for hard work would emerge. When Charles would come to a staff member's desk to discuss a particular facet of a design problem being worked on, he would ask one question, "What is interesting?" not, "What have you been working on"? or, "Are you finished?" This one simple question immediately brought clarity to the heart of the problem under consideration. As well, it confirmed ones depth of inquiry as they continued to push towards new discoveries. It was Charles and Ray's belief that the design problems that were of genuine interest to them, when passionately solved, would be of interest to a great many other people.

3) *Respect constraints*

Charles and Ray had distrust of willful creative expression based on their wealth of knowledge and vast accumulated experience. At the outset of any problem, they always insisted on identifying the limitations and constraints within which a designer must work. Charles continues, "Design depends largely on constraints. The sum of all constraints. Here is one of the few effective keys to the design problem – the ability of the designer to recognize as many constraints as possible – the willingness and enthusiasm for working within these constraints – the constraints of price, of strength, of balance, of surface, of time, and so forth. Each problem has its own peculiar list."¹⁵ The Eames creative process was not a docile submission to constraints, only a respect for them, as one worked from part to whole, from the particular to the general. As Charles elaborated, "Design is an act of faith and discipline, and where the restrictive lines are not clearly delineated, the designer must find them or draw them. The rules of the game do not require docile submission to constraints, only respect for them. Learn the difference

between being forced to make compromises and the necessity to recognize constraints. I have never been forced to accept compromises but I have willingly accepted constraints."¹⁶ The best graphical representation of these constraints in action is Charles's 1969 design process sketch for *What is Design?* which identifies the three major spheres of influence; society, client and design, who's individual constraints converge to define the area of investigation of a design problem.¹⁷ In the Eames Office, one quickly learned the difference between being forced to make compromises and the necessity to willingly recognize and respect constraints.

4) *Make connections*

The boundaries of design are the boundaries of problems, not disciplines. Charles and Ray fully understood that progress and insight typically occurred on the edges of a discipline, as well as between them. Solving any design problem began with extensive research and observation of major issues and conditions from various fields of knowledge surrounding the topic of inquiry for the specific problem under investigation. Charles loved the infamous eleventh edition, twenty-eight-volume set of the *Encyclopedia Britannica* (1910). He considered these volumes to be a wealth of new perceptions, thoughts and analogous methods for attacking and modeling tough new problems representative of the time, not merely a storehouse of knowledge. With the assistance of the Eames staff, and internationally recognized researchers and specialists, Charles and Ray would delve intensely into the question or circumstance under investigation, seeking not just literacy, but deep involvement. Essential questions and potential investigations for each problem were carefully posed after everyone was fully immersed in all aspects of the problem. Research in the Eames office always went beyond the point where most designers would stop satisfied, and far beyond what was originally thought necessary. "Oh, that is just something you learned in school,"¹⁸ Charles would comment when he thought one was not thinking hard enough. He kept asking questions and probing deeper until everything had been

considered. New discoveries or “connections” started to emerge as everyone in the office became energized by the rich rewards of sustained rigorous inquiry. One of the keys to the Eames creative process is the art of solving complex design problems by making connections; connections between everything – ideas, values, events, objects, materials, details and other people’s lives. As Charles explained, “Eventually everything connects – people, ideas, objects. The quality of the connections is the key to quality per se.”¹⁹ Daily, the Eameses pushed and inspired everyone to understand such connections and celebrate them by translating them into physical form. But it didn’t stop there. Charles and Ray wanted each resultant design solution to inspire its users to discover these connections as well, to learn from them, and experience the fun and reward of making their own new connections that would subsequently be shared. As Charles would comment, “Ideas are cheap. Always be passionate about ideas and communicating those ideas and discoveries to others in the things you make.”²⁰ For example, the film *Toccata for Toy Trains* (1957) seamlessly connects play with the enduring beauty of antique toy trains by contrasting personal memories of past train travel with the threat of the automobile, by creating a race between a toy car and a toy train – the race of technology. Charles and Ray’s goal was to offer a kind of wide-eyed, wondrous way of seeing and understanding the significance of the connections between events and the things we experience daily.

5) *Seek to be curious and see anew*

When first meeting Charles and Ray, one was struck by their incurable curiosity, a thirst for knowledge, and a passion for seeing things anew. They were never afraid to explore a new area of investigation and re-interpret themselves because of it. During the development of their first major exhibition, *Mathematica: A World of Numbers and Beyond* (1961), Charles and Ray endlessly searched for ways to bring math alive for the child and the scientist. As their design evolved, the Eameses continually searched for new ways of perceiving abstract math-

ematical concepts, physically envisioning these processes, developing fresh insight on how mathematicians think and work, and endlessly investigating ways a visitor might be inclined to share these ideas. The result was a landmark shift in museum exhibition design, the invention of the interactive exhibit. As a visitor “played” with the soap bubbles in the minimal surface display, or challenged anxious children to multiplication answers with the multiplication cube, abstract mathematical concepts came alive as living phenomena that could be joyfully discovered by all. As Charles summarized, “One of the great secrets of science is the genuine fun and pleasure that scientists get out of it. One of the great purposes of this exhibition is to let the cat out of the bag.”²¹ The lasting impact of this simple interactive exhibit can be seen in the Nobel prize winners, who commented years later that their success in science and math was spawned from their own childhood visit to the Eames’s *Mathematica* exhibit.

6) *“Real learning comes through primary experiences”*

Reflect for a moment about how you learned to ride a bicycle. A caring parent or friend effortlessly rode the bicycle, and then gave lengthy verbal directions on how to ride it, and ultimately ran along side as you first tried to pedal and steer. You failed, time and time again, but ultimately you taught yourself to ride the bike through direct or primary experience. Charles and Ray believed “real learning comes from primary experiences,”²² physical interactions of our living body with the world around us. No matter what the design problem was that the Eameses were working on, they were always striving to immerse themselves in the primary experience of the problem, and ultimately sought ways in which the end users could share in those rich experiences. During the development of the *National Fisheries Center and Aquarium*, (1966–1969), Charles and Ray not only filled their office with shells and marine biologists, they installed several large 250 to 1,000 gallon aquariums with live marine life. This was the vehicle to begin to understand how a

salt water aquarium functions as observed, recorded and learned from the daily habits of its potential inhabitants: the hermit crab, starfish, jellyfish, octopus, shark, etc. As Charles described, “We’re working on an aquarium in the office, so naturally we have an aquarium. We have a lot of marvelous little animals, mostly invertebrates and some fishes, that sort of cluster together, have high territoriality in the way they act and behave. And if those little animals feel too much of a stream, too much of a current flow, they’re uneasy. These animals are sort of geared

to the status quo. On the other hand, there are the pelagic animals. And if that current stops, they’re in trouble. They’re dependent on change. Their whole idea of security is essentially when the current is flowing by them. That gives them oxygen upon which they live, and that sort of frees them from other predators, it brings them closer to food. They’re very secure in change. And I have a feeling in a way that we as a society and as a group are gradually becoming pelagic in our feeling. That if anyone is going to really feel secure, he must have not an insistence

▼ Charles and Ray refining the sling locations of the **Aluminum Group Chair**, 1958.
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▲ Charles and Ray photographing an early ¼-inch scale model of the **Mathematica** exhibition, 1960. ©LUCIA EAMES, DBA EAMES OFFICE.

on the status quo, but he must feel secure in change. I think that we've all now experienced this in a sense, where if you recognize a change and it's sort of like being in a place that you have never been before, and suddenly things become orientated, and a value appears that you'd never known before. And it seems to me that this is an aesthetic feeling."²³

7) Engage in the hands-on process of envisioning, modeling, and prototyping
 "One should be prepared to follow an investigation with a restudy of the problem, to look upon detailed problems as if they were being attacked for the first time; to restate solutions in terms of theory and in actual prototypes; and fully explore their cultural meaning. In order to insure the validity of such an investigation and such restatement it will be necessary to bring together and bring to bear on the questions all the disciplines which can restate the questions of familiar problems in a fresh clear way. The task of translating the details will be difficult, painful, and pricelessly rewarding."²⁴

CHARLES AND RAY EAMES.

Unlike normative design practices of their time, which separated the activities of the design office from fabrication, production, and construction, the Eameses seamlessly united these activities within their office. Work within the Eames Office maximized the intimate physicality of each problem and the fundamental understanding that comes from learning directly from primary experiences. New perceptions, or as Charles and Ray called them "a new depth of vision,"²⁵ might occur by increasing the number of simultaneous activities to enhance everyone's direct experience of a question under study. These typically included physical modeling at multiple scales and sometimes an essential object, an event, a scale model, or a full-scale inhabitable mockup, to test drive and "walk through an experience in order to regroup and try again."²⁶ As Charles commented, "The thing about models, about using them, is that a model doesn't have to be a total theory of a field. It doesn't have to be a golden thread that sort of leads you through a labyrinth. A model, a true model, in the experimental and feeling-your-way sense, can just be a kind of tentative walk

through the experience by which you can retreat, consolidate yourself, regroup, and take a try again."²⁷ Simultaneous design investigations utilizing text, graphics, films, multiple scale models and full size prototypes converted abstract questions and tentative ideas into powerful primary experiences for careful consideration by clients, long time friends, office staff, and specialists in the areas under investigation. Following these enlightened conversations, new perceptions, connections, and a deeper understanding of the problem would evolve and immediately direct the next investigation. It was Charles and Ray's belief that the essential qualities of a problem would exist as long as an individual keeps them in play. Thus, as the world continued to change, the Eameses were constantly seeking new ways for envisioning information and modeling their emerging understanding of it as new and insightful connections came into focus.

8) Use film and photography as essays
 "They're not experimental films, they're not really films. They're just attempts to get across an idea."²⁸

CHARLES EAMES.

After growing up with both of their fathers involved in photography, and at the dawn of the motion picture age, it should come as no surprise that Charles and Ray would utilize still and motion picture cameras throughout their lives to inform their design. Of significance were their efforts to record visual notes and visual essays as a means of communicating rich and complex experiences and to critically re-see the world around them. For the Eameses, film and photography were not simply ways of recording things or events. They were essential ways of analytically and interpretively immersing a viewer in the primary experiences of a particular subject, to evoke their sense of wonder and intellectual curiosity. Over the years, Charles and Ray developed the ability to recognize abstract beauty in everyday occurrences and convey that beauty to a wide audience via photography and film. During their career they made over 130 essays, multi-screen slide

shows and short films, ranging in such diverse topics as Mexico's Day of the Dead celebrations (*Day of the Dead*, 1957), daily life in America (*Glimpses of the USA*, 1959), and the introduction of computers (*Think*, 1969; *Computer Landscape*, 1971).²⁹ "Films," Charles said, "come as a result of two situations: It's either a logical extension of some immediate problem we are working on, or it is something we have been wanting to do for a long time and can't put it off any longer."³⁰ Many times, as a current investigation, an exhibit model, or furniture prototype was entering a critical stage or nearing completion, Charles would grab a movie camera and shoot "a casual couple hundred feet of film,"³¹ while Ray or another staff member would shoot a couple of rolls of print and slide film. Then, like anxious children in a candy store, Charles, Ray and members of the staff would gather around the light table, followed by the conference room to see what illusive new perceptions they had captured. Removed from their immediate work at hand, these visual notes and visual essays became essential tools for gaining critical distance to their work, as well as a method for re-seeing and raising new questions. Clients, invited guests or staff members would spend many a lunch hour in an impromptu Eames essay festival, where past and present investigations would effortlessly blend in the flickering images floating within the darkened conference room.

9) Do concurrent problems coupled with simultaneous design activities
 "We work because it's a chain reaction, each subject leads to the next."³²

CHARLES EAMES.

The Eames office was filled with the fruitful interplay between concurrent design problems, and simultaneous design activities, across a broad range of inquiry that included furniture, exhibitions, graphics, toys, film and architecture – all that effortlessly fed and informed one another.³³ As a result, Charles, Ray and the staff were constantly energized by the activities and potential new collaborations. People were busy researching, drawing, building, photo-

graphing, editing, as others talked to clients, experts, scientists, friends and entertained the invited guest. In 1976 for example, as work continued on the refinement of their traveling exhibition, *The World of Franklin and Jefferson* for its Paris début, which included French translations of all the exhibition panels, a new film and two books were introduced. During this time, Charles and Ray also found time to investigate EDWIN LAND's new SX-70 camera and create the film *Something about Photography*, propose a new exhibition on computing (*IBM 590 Proposal*), continue work on a Leather and Teak Sofa, and work on four new films, *Powers of Ten*, *Daumier*, *Atlas* and *Look of America*.

10) Seek constant refinement through endless iteration

"Invention is the hardest kind of work and requires intense application of every faculty. There is no guesswork about it. There is no unfailling principle of luck in it. The goal must be reached by process of elimination. Every factor must be studied, examined, and then eliminated if it is not what you want, until you have narrowed the entire problem down to two or three points. Then it is possible that luck or accident may play a minor part, and someday the whole thing will dawn upon your mind and see the goal you have been working for. Genius is 1% inspiration and 99% perspiration. Accordingly, a genius is often a merely a talented person who has done all of his or her homework."³⁴

THOMAS ALVA EDISON,
WHO PATENTED 1,093 INVENTIONS IN HIS LIFE.

Within the Eames office, the period of refinement and elaboration continued for as long as necessary, in most cases for as long as the design problem remained fresh. It was the phase of their creative process that took up the most time and involved the most difficult work. Everyone working at the Office developed the discipline to suspend judgment, create with rigor, and develop patience as solutions evolved and more fully revealed themselves. Many new insights and trajectories emerged as Charles and Ray were presumably just putting finishing touches on an initial insight. They were fully engaged in

this fluidity and strived to eliminate imperfections through constant iteration and refinement. A chair might be in production for several years, always under constant investigation relative to newly available materials or manufacturing techniques, and ultimately further refinement. An example is the original DCW plywood chair (1946). The rubber shock mounts were originally secured in place by an electronic cycle welding process, where radio waves would cure the bonding agent. This proved to be an inadequate solution, and after endless trial and error by the Eames Office working in collaboration with members of the HERMAN MILLER production line staff, a new resorcinol phenolic adhesive and production process of heat and pressure was ultimately developed.³⁵ Remember creative work is never done. It is an endless reiterative process that eliminates imperfections with each subsequent refinement.

Awakening consciousness: a staff member's first day in the Eames Office "The Eameses have so strongly influenced the way we sit, store things, build, play, communicate, teach, learn, and think, it would almost seem that diversity is their genius. Not so. What their genius represents is not merely minds versatile enough to move in many directions, but minds so wholly centered, that they bring precisely the same talent and experience to bear upon problems that seem vastly different from each other."³⁶

RALPH CAPLAN.

What would a new staff member do on their first day of work in the Office of Charles and Ray Eames? Rather than immediately going to work on a specific task, they would be unexpectedly asked to play all day with a toy, the *Musical Tower* – sixteen-foot high xylophone tower toy, developed by the Eameses in the mid 1950's. Why? As the new staff member endlessly rearranged the xylophone keys and released the marble throughout the day, experimenting with different combinations of musical sounds, everyone could hear and share in this person's curious discoveries, as well as frustrations. By days end and through this seemingly simple exercise, this new person had revealed their personality,

maturity, and most importantly, their personal and professional consciousness to everyone in the office.³⁷

Great practitioners are conscious to the world – awake to the core of their being. Each day they strive to live consciously, supported by the experiences that develop and inspire their intellectual and emotional persona. They continue to transform and expand their knowledge into a unique capacity to perceive the world and offer life-giving response. Their ever-increasing consciousness empowers them to adapt, discover new ideas and methods of inquiry, and to direct their future in meaningful ways.

It is my observation that great practitioners are conscious individuals first; that they embrace this aspect of their lives to the point that it spills into daily work and professional life. They don't simply replicate a core disciplinary knowledge, but seek to advance it through their own insights, offering new ways of seeing and inhabiting our world.

Throughout our lives, we must each consider the translation of our own consciousness as a human being into an expanded professional context – to vision the depth of our values, ethics, and beliefs about design, test them, and bring them to life through discipline and critical work. Therefore, education must be more than professional training. It must nurture and sustain a trajectory for lifelong evolution and growth. Each student of design must be encouraged to question, challenge current models, and generate keen alternatives to what design is today. In the 'real world', enlightened clients seek out the conscious designer, rather than the trained designer, to identify and propose solutions to the unprecedented conditions of our rapidly changing world.

"Everybody really knows that education goes on all the time, everywhere, all through our lives, and that it is a process of waking up to life. It takes a heap of resolve to keep from going to sleep in the middle of the show. It's not that we want to sleep our lives away. It's that it requires certain kinds of energy, certain capacities for taking the world into our consciousness, certain real powers of body and soul to be a match

for reality. That's why knowledge and consciousness are two quite different things. Knowledge is like a product we consume and store. All we need are good closets. By consciousness I mean a state of being "awake" to the world throughout our organism. This kind of consciousness requires not closets, but an organism attuned to the finest perceptions and responses. It allows experience to breathe through it as light enters and changes a room. When knowledge is transformed into consciousness and into will, ah then we are on the high road indeed."³⁸

M.C. RICHARDS.

Seek to be involved and care deeply "One must obtain not just literacy but deep involvement and profound understanding."³⁹

CHARLES EAMES.

Throughout their lives, Charles and Ray Eames not only sought to understand the rich and fertile landscape of indigenous offerings worldwide, but also were deeply involved in the endless search for the fundamental connections between personal experiences, artifacts, phenomenon, and our larger world. A dinner guest arriving at the *Eames House* on a moonlit evening would be greeted by the smiling faces of their gracious hosts, a table whose linen cloth was covered, similar to an elegant Japanese Kaiseki meal, with 20–30 small imported dishes of seasonal foods from around the world and adorned with colorful flowers and candle light. In this enchanting atmosphere, free of everyday cares, these simple international tastes and wares would provoke stimulating conversations about past travels, world cultures and current events, as well as remind each departing guest of their need to become more awake to their surroundings, and more fully alive and present in their daily lives. With each of their designs, the Eameses shaped ideas, events and circumstances, while redefining the way people perceived, thought and felt about living, and living in the world.

In 1969, when asked by MIT to help infuse the universities' science and technological curriculum with art and aesthetics, the Eameses rejected the idea of adding

► Charles (in lift), Ray (behind lift truck) and their staff outside 901 filming the picnic scene for **Powers of Ten: A Rough Sketch for a Proposed Film Dealing with the Powers of Ten and the Relative Size of the Universe**, 1968.

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an obligatory art appreciation or art history course. Instead Charles and Ray designed an alterative situation, where these future scientists could not only experience for themselves first hand the aesthetic possibilities of their own discipline, but were required to convey those new aesthetic discoveries and joys to others. The Eameses recommended that each MIT student be challenged to develop packets of information for teaching local elementary school children about the fun and the richness of science. Ultimately these future scientists had to share and convey the beauty of scientific inquiry and profound insight.

“One could be sure that in the past when a man would rise to the point of producing work of greater quality, it was not through any conscious attempt to excel but rather because he cared about what work he was doing – he was committed to his work. This has become something rare – because being committed means becoming involved and to become involved means giving something of oneself. It is only the rare ones today who seem to care that much. Yet, that quality that makes for excellence – that commitment – is more important to us today on a daily operational basis than perhaps ever before. At least one of the reasons this is true is quite simple. The nature of the problems we face changes even as we work with them. We cannot tell from what disciplines or from what art of preparation for the next step will come. We cannot fall back on the lore of the art because that lore does not exist. There is however, a tradition that is held in common by natural philosophers, explorers, pioneer woodsmen – anyone who is in his daily life has been compelled to face new problems. That is tradition of respect and concern for the properties and the quality of everything in the world around them. To excel in the structuring of a problem we must be committed to a concern for quality in everything in the world around us. We must learn to care deeply.”⁴⁰

CHARLES EAMES.

The design laboratory of the Eames Office
Situated ten blocks from the Pacific Ocean

and Venice Beach, within a bustling neighborhood of artists, craftsmen and manufacturing shops, 901 Washington Boulevard, an unassuming twelve thousand square foot warehouse was home to the Office of Charles and Ray Eames from 1943 to 1988. Upon entering the creative world of this design laboratory for the first time, one was immediately overcome with a sense of delight, wonderment and awe. It was like walking into the circus big top on opening night or diving into the ocean teeming with a school of fish for the first time. One was greeted by the receptionist’s smile, a welcoming handshake, and was immediately transformed into their honored guest. One was then ushered down a narrow hallway that quickly revealed the main universe of the Eames Office – a vast open warehouse space, perfectly lit by large skylights, and subdivided by layers of flexible partitions, temporarily attached to the wooden bowstring trusses above by c-clamps. Within seconds there was a tsunami of visual, sensual and emotional stimuli as one took in the cacophony of inspirational design artifacts, observed staff activities, and ultimately met Charles and Ray Eames.

One could not walk anywhere in the Office without pausing to admire, play with, or reflect upon the significance of any one of the hundreds of magical design artifacts that filled every nook and cranny of the office. These beautiful objects gathered from throughout the world, were inspirational touchstones of admired design and offered valuable lessons and eternal design truths. “We are not collectors.” As Ray would remind a guest, “We found things and kept them as examples of the principles or aspects of design. We kept it to show it, to use it, to share it, to give insight to others and ourselves.”⁴¹ Each became the genuineness for a question being asked or a solution being developed. Simple objects from the past, such as toys, were seen by Charles and Ray as specific cultural artifacts that revealed the same quiet elegance, truthfulness of materials, and expert craftsmanship that they sought in their own work. Many times clients, collaborators, friends or a new staff member would be shown several of these objects as tools for extending their aesthetic appreciation or



for better understanding the significance of the problem at hand. The richness of these objects was endless, as was their ability to inspire, stimulate and sustain creativity.

In addition to the hundreds of design touchstones, there were infinite resources within 901. There were drawers and shelves filled with raw materials, a workshop with an endless variety of tools and jigs, numerous still and movie cameras, demountable walls covered with information from specific problems, and a fully equipped darkroom. In addition, there was a conference room for meetings and screenings, numerous drafting and layout tables with identical baskets of drafting equipment, an extensive library, delicious food and strong coffee prepared by a full time office chef, the beauty of fresh cut flowers, stimulating consultants, and a multi-talented staff ready to be transformed at any moment by a new question or fresh insight. As work progressed on any design problem, all of these resources came into play and any combination was legitimate. The only criterion was whether the resources really had the capacity to deal with the inquiry at hand.

The office was always filled with Charles and Ray's long time friends, collaborators, and new consultants who contributed fresh questions, perceptions and insights to daily work. Friends like BUCKY FULLER, PHYLIS and PHILIP MORRISON, LEE KRASNER, SANDRO GIRARD, Eero Saarinen, GEORGE NELSON, KONRAD WACHSMANN, or BILLY WILDER would be invited over to see a new film essay, a prototype, or a model in progress. Similar to reviewing dailies in the film industry, Charles and Ray could then observe the trajectory of their developing work, notice details, discuss problems, and debate insights with their trusted friends and staff. "Listening does not take place unless you are willing to be changed by who you are listening to."⁴² This forum also allowed the Eameses to pay close attention to their own goals, to access whether the work was indeed proceeding in the manner to which they aspired, and what changes needed to be made.

Work within the Eames office was "a difficult form of play"⁴³ where everyone, includ-

ing an honored guest, quickly developed an ability to simultaneously play and work hard, becoming immersed in numerous pleasurable offerings of hands-on discovery. As Charles commented, "It makes me feel guilty that anybody should have such a good time doing what they are supposed to do."⁴⁴ Anyone who entered this design laboratory of the Eames Office always gave more time and energy than they had ever dreamed possible.

Their significance and legacy "The Eames' desire to move freely in a world of enormous and unlimited possibilities is combined with an acute sense of discrimination and taste, an ability to select among the unlimited possibilities, and return considerable richness to the world."⁴⁵

EAMES CELEBRATION.

Charles and Ray Eames firmly believed that design had a moral and ethical responsibility to recover and connect us to the lost spirit of humanity within the context of the nuclear cold war, post World War II population increases, and the rise of mass media. At the beginning of their shared career, they instinctively began to address this disconnect through the investigation of the fundamental phenomenological relationships between the body and the ephemeral experiences and essential elements of our lived daily existence – furniture, toys, and architecture. Charles and Ray began their furniture designs, like other modern designers of their time, by testing the functional and technological limits of emerging modern materials and newly declassified wartime production processes. But it was their attention to increasing the connections between intimate experience, tactile memory, ergonomics, kinesthetics, and sensual materiality, that would transform their painstaking investigations in plywood, steel, plastic, and aluminum into timeless classics. Similarly, when Charles and Ray began to investigate childhood play and the design of their interactive toys, filled with gaps for imagination and open-ended discovery, they would celebrate the interaction between the child's developing mind, body and their immediate environment within their ever-expand-

ing world. In 1949, with the design and construction of their own house, *Case Study House #8*, Charles and Ray redefined the vital connections between body, place and home through their architecture. Unlike other period modernist houses, which were abstractly juxtaposed against their natural sites and sparsely inhabited without any trace of preceding generations, the Eameses magically connected the body, landscape, artifacts, and seasonal changes with the rituals of daily life. Constructed for \$1.00 per square foot, utilizing off-the-shelf prefabricated materials, the house was an indoor-outdoor stage for life, filled with beautiful touchstones that effortlessly drifted in and out of the ephemeral skin of the house, to merge with the meadow landscape and the daily ebb and flow of their lives.

With the dawn of the television age and the rise of mass media communications in the late 1950's, the Eameses shifted their primary focus from the design of furniture, toys and architecture, to the design of new spaces for the emerging information age. These spaces were filled with simultaneous layers of complex information, multi-media images, and ephemeral phenomenon, which sought not only to present new information, but also personalize and connect with the visitor's own life in meaningful ways. For example, in the 1959 cultural exchange program in Moscow, between the US and the Soviet Union superpowers, Charles and Ray developed a totally new type of communication experience – the multi-media presentation, *Glimpses of the USA*, consisting of seven large billboard screens filled with over 2,200 still and moving images, presenting the wonders of a typical day in American life. As the cold war politics of the infamous Nixon-Kruschev kitchen debate on capitalism and communism ensued outside the American pavilion, Soviet families warmly connected with the joys and dreams of the American family. Yet it was the Eameses simple ending, a bunch of flowers, the beloved Russian forget-me-nots, that would ultimately link each of these global citizens to their shared responsibility to preserve the collective spirit of humanity.

By the early 1960's, as Charles and Ray were asked to convey larger and more complex amounts of information in shorter periods of time, their multi-media spaces of visual information evolved and became all encompassing spatial information environments. Filled with dense interactive experiences, each of the Eameses' information environments enveloped its visitor with the joys of discovering knowledge and ways of thinking by using both their mind and their physical body. For example, in 1964, when TOM WATSON, the president of IBM, wanted to introduce the computer at the New York World's Fair, he called Charles and Ray. Rather than presenting this new technology on a revolving pedestal, the Eameses, working with Eero Saarinen, proposed an immersion experience in complex thinking, thus linking the powers of the human mind and the computer's digital mind. In a suspended state of time, visitors became absorbed in hands-on interactive exhibits (*Mathematica* and *the Computer court*), a multi-screen film essay on complex thinking processes (*Think*), and a gift of the English dictionary on microfilm, which any child could read with a magnifying glass after returning home. In addition, as American political and business interests began to spread throughout the globe, Charles and Ray were always present as ambassadors of the cross cultural information exchange, seeking ways to introduce the American public, political and business leaders, to the cultural riches of the people and places that they needed to respect and embrace. For example, in their exhibition *Nehru: His Life and His India*, (1965), the Eameses presented the cultural diversity of India in images, as well as spatially, using an interactive environment filled with relics, food, and song, so that each viewer was compelled to multisensually explore and define for themselves the new relationships among artisan crafts, historical events, and the newly independent Indian people.

As the information age exponentially expanded in the mid 1970's, with the emergence of mobile phones and desktop computers, the Eameses began to explore the dawning digital age and the "age of

choices.” Charles keenly observed in 1978, “our ability to gather information has outstripped our ability to model it. Beyond the age of information is the age of choices. Where the art and discipline of choice has to be raised to a new level and combined with a fairly rigorous view of the nature of the information. The key to improved choices is developing improved models. For example FRANK OPPENHEIMER’s *Exploratorium* in San Francisco.”⁴⁶ It was that endless search for developing improved models of choice, using new mobile digital technologies, that drove them to investigate instant photography (*SX 70*, 1976), personal computing (*IBM 590*, 1977), and videodiscs (early DVD, *Polavision*, 1977), and which has become the foundation for many current design investigations, as these essential relationships continue to be explored.

The examination of the logogram that Charles and Ray developed for their office and used throughout their career, a simple asterisk, seems an appropriate way to conclude. Why an asterisk and not their names or an image of one of their creative works? Because, Charles and Ray wanted a symbol that represented not themselves, the office, or their resultant designs, but one that reflected their higher ideals and values – the creative process and life long search for profound connections “among the unlimited possibilities and return considerable richness to the world.” What is phenomenal is that the asterisk is used in many disciplines of inquiry. In astronomy, it is used to mark the “fixed star of reference” on charts. In physics, the asterisk is the symbol of a laser, a beam of intensely concentrated light. In medicine, it is the symbol of birth. In religion, the asterisk is the symbol of the point where worshiper response begins. In printing, it is the symbol of a footnote, an extension or elaboration of an insight or idea. In invention, as one glance through an inventor’s notebook, the asterisk is the symbol of profound insight or a new idea.

Now, 28 years after it’s closing, the magical place known as the Office of Charles and Ray Eames has vanished.⁴⁷ In spirit it has moved on, and joined the ranks of the other landmark creative environ-



ments, which in their own time and place were the incubators of human inquiry, innovation and craftsmanship at the highest level of humanity. MICHELANGELO’s studio, THOMAS EDISON’s laboratory, WILLIAM SHAKESPEARE’s theater, ORVILLE and WILBUR WRIGHT’s bicycle shop, WATSON and CRICK’s Cambridge laboratory, BEETHOVEN’s study, and HEWITT PACKARD’s garage, are representative of a few such places of creative inquiry and served as agents of enormous cultural change, and who’s influence continue to impact our lives today.

The true legacy of the Office of Charles and Ray Eames is not solely the furniture, films, exhibitions, toys, architecture or celebrations they created, but the wonderfully rich and creative process that gave birth to these creations. Charles and Ray considered their work a formulation of seeing, thinking and making in new and courageous ways. It was a fusion of problem solving, creative thinking, reiterative testing of an idea and a way of working that continues to spur our imaginations today, and for many generations to come.

As a staff member departed the Eames Office to pursue the next phase of their life, Charles’s parting words were, “Remember the standards here, don’t let them down.”⁴⁸

MAX UNDERWOOD

- 1 Attributed to the Japanese Zen poet, Matsuo Basho (1644–1694).
- 2 “The motivation behind most of the things we’ve done was either that we wanted them ourselves or we wanted to give them to family and friends. And the way to make them practical is to have the gifts manufactured.” Charles Eames from the documentary *An Eames Celebration* (New York: WNET, 3 February 1975).
- 3 For a complete survey of creative work refer to John & Marilyn Neuhart, *Eames Design: The Work of the Office of Charles and Ray Eames* (New York: Abrams, 1989) and www.eamesoffice.com.
- 4 Charles Eames quoted in Bill Lacey, “Warehouse Full of Ideas” *Horizon*, September 1980, p. 27.
- 5 For more details on Charles and Ray’s formative years see John & Marilyn Neuhart, “Charles and Ray Eames: Chronology” *Eames Design* (New York: Abrams, 1989) pp. 17–25. And Eames Demetrios, *An Eames Primer* (New York: Universe, 2001) pp. 47–105. And “Charles Eames and St. Louis” *Washington University Architecture News* Winter 1998, pp. 4–5.
- 6 Ray Eames, *California Arts & Architecture* September 1943.
- 7 Charles Eames, from the documentary *An Eames Celebration* (New York: WNET, 3 February 1975).
- 8 Eames Demetrios, *An Eames Primer* (New York: Universe, 2001) pp. 59–60.
- 9 Ray Eames, from the documentary *An Eames Celebration* (New York: WNET, 3 February 1975).
- 10 For details see John & Marilyn Neuhart, “1941, Experimental Molded Plywood Chair Seats” *Eames Design* (New York: Abrams, 1989) pp. 26–27.
- 11 Bill Lacey “The Eames Legacy” *Los Angeles* June 1989, p. 77.
- 12 Charles Eames from the film *Design Q&A 1972*.
- 13 Jeremy Bernstein, “Profile: Tsung-Dao Lee and Chen Ning Yang” *New Yorker* May 12, 1962, pp. 49–102.
- 14 Charles Eames, Charles Elliot Norton Lectures in Poetry #5, Harvard University, March 29, 1971.
- 15 Charles Eames from the film *Design Q&A 1972*.
- 16 Charles Eames from the film *Design Q&A 1972*.
- 17 John & Marilyn Neuhart, *Eames Design* (New York: Abrams, 1989) p.13.
- 18 Deborah Sussman from Donald Albrecht, *The Work of Charles and*

- Ray Eames: a Legacy of Invention* (New York: Abrams, 1997) p. 185.
- 19 Charles Eames narration from a film on the “ESU” storage system 1961, quoted from Ralph Caplan, *Connections: The Work of Charles and Ray Eames* (Los Angeles: UCLA Art Council, 1976) p. 15.
- 20 Charles Eames from Deborah Sussman, Donald Albrecht, *The Work of Charles and Ray Eames: a Legacy of Invention* (New York: Abrams, 1997) p. 185.
- 21 Charles and Ray Eames Collection, Library of Congress, Box #218.
- 22 Charles Eames, Charles Elliot Norton Lectures in Poetry #4, Harvard University, March 15, 1971.
- 23 Charles Eames, Charles Elliot Norton Lectures in Poetry #1, Harvard University, October 26, 1970.
- 24 Charles and Ray Eames, *Eames India Report* (Venice: Office of Charles and Ray Eames, April 1958).
- 25 Charles Eames quoted in Digby Diehl, “Charles Eames Q & A” *Los Angeles Times WEST Magazine*, October 8, 1972.
- 26 Charles Eames, Charles Elliot Norton Lectures in Poetry #6, Harvard University, April 26, 1971.
- 27 Charles Eames, Charles Elliot Norton Lectures in Poetry #6, Harvard University, 26 April 1971.
- 28 John and Marilyn Neuhart, *Eames Design: The Work of the Office of Charles and Ray Eames* (New York: Abrams, 1989) p. 192.
- 29 See *The films of Charles & Ray Eames*, to date 5 volumes have been released on video and DVD, available from www.eamesoffice.com and Beatriz Colomina, “Enclosed by Images: The Eameses’ Multimedia Architecture” *Greg Room* number 2, winter 2001, pp. 6–29.
- 30 Eames Demetrios, *An Eames Primer* (New York: Universe, 2001) p. 149.
- 31 Charles Eames, Charles Elliot Norton Lectures in Poetry #4, Harvard University, 15 March 1971.
- 32 Charles Eames, Charles Elliot Norton Lectures in Poetry #5, Harvard University, March 29, 1971.
- 33 The “Chronology: The Work of the Office of Charles and Ray Eames 1941–1978” is a loose insert “gift” which accompanied, John and Marilyn Neuhart, *Eames Design: The Work of the Office of Charles and Ray Eames* (New York: Abrams, 1989).
- 34 George Bryan, *Edison: the Man and his Work* (New York: Garden City Publishing, 1926).
- 35 John and Marilyn Neuhart, *Eames Design: The Work of the Office of*

- Charles and Ray Eames* (New York: Abrams, 1989) pp. 60–61.
- 36 Ralph Caplan, *Connections: The Work of Charles and Ray Eames* (Los Angeles: UCLA Art Council, 1976) and Ralph Caplan, Herman Miller: *Adventures in Design* lecture (Zeeland: Herman Miller, 1978).
- 37 You can see and hear the musical towers in the documentary film, *Eames Demetrios, 901: After 45 Years of working* (Santa Monica: Pyramid, 1989).
- 38 M.C. Richards, *Centering: In Pottery, Poetry and the Person* (1964) pp 15–16.
- 39 Charles Eames, “Making Connections” *Aspen Design Conference*, June 1978, (unpublished outline and notes, p. 1, Charles and Ray Eames Collection, Library of Congress, Box #58).
- 40 Charles Eames on excellence from “Slide Show: G.E.M.” from John and Marilyn Neuhart, *Eames Design: The Work of the Office of Charles and Ray Eames* (New York: Abrams, 1989) p. 319.
- 41 Pat Kirkham, “Introducing Ray Eames (1912–1988)” *Furniture History* #26, 1990, pp. 140–141.
- 42 Alan Alda, *Scientific American Frontiers on Fresh Air*, 3 Feb 2005.
- 43 Charles Eames from Elizabeth Sverbeyeff Byron, “All About Eames” *House and Garden*, February 1984, p. 124.
- 44 Charles Eames from Herman Miller for the Home Catalogue (Zeeland: Herman Miller, 1994).
- 45 *An Eames Celebration* (New York: WNET, 3 February 1975) and “Charles Eames” *Portfolio Magazine*, Number 2, Summer 1950.
- 46 Charles Eames, “Making Connections” *Aspen Design Conference*, June 1978, (Unpublished outline and notes, p. 2, Charles and Ray Eames Collection, Library of Congress, Box #58).
- 47 The Eames Office is no longer a design office, but is now dedicated to communicating, preserving and extending the work of Charles and Ray Eames. See www.eamesoffice.com for more details.
- 48 Jeannine Oppewall from Pat Kirkham, *Charles and Ray Eames: Designers of the Twentieth Century* (Cambridge: MIT, 1995) p. 89.