WITH ARCHITECTURE

The Building Toy in the Arena of Play

1800 to the Present

KATONAH MUSEUM OF ART

acknowledgments

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Karen Hewitt

Karen Hewitt
Guest Curator

The Building Toy/The Toy Building: Symbol, Structure, and Style

Karen Hewitt

Impermanence

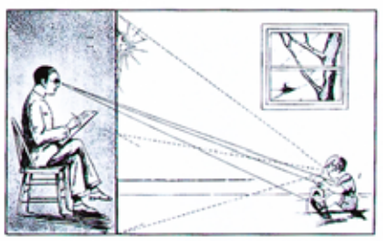
Architectural and engineering structures are commonly viewed as permanent forms – buildings and bridges are built to endure – but the building toy presents a provocative contradiction. Impermanence is not only a requisite stipulation of its design; it is, in fact, its defining characteristic. This primary feature of the building toy, its mutability, stands in sharp contrast to the solid buildings decorating toy box covers, from dignified temples representing "heroic moments" in architectural history to popular vernacular log cabins or the latest engineering marvels. It is both the potential, inherent in a boxed set of non-representational modular forms, and the particular, the culturally specific architectural structure that can be created with these forms, that have linked the building toy with an educational, or, as earlier generations phrased it, an "instructive" purpose.

Three distinct but overlapping applications have allied the building toy with both learning and play. The first centers on the building unit as a surface for displaying symbols – letters, words, and narratives; the second addresses the activity of building; and the third focuses on the specific structure that can be built. These applications result from the unique character of the building toy as a collection of loose, modular parts which, when considered individually, have little interest or importance, but when stacked or joined, assume a new function and identity. The evolution of the building toy is intertwined with the developmental history of the child as builder, with the commercial history of manufacturing, marketing, and consumption, and with the aesthetic and technological history of architecture itself.

The word "architect" comes from the Greek words "archi," meaning "chief," and "tecton," meaning "builder." In the 19th century, when architecture became an autonomous profession, clear distinctions emerged among the roles of the builder, the engineer, and the architect. This separation of roles was, in part, a result of the industrial revolution, which created new divisions of labor, new technologies, and new specializations within the building industry and gave rise to different courses of training and standards of evaluation. For the child builder – who is both the director and the worker, the designer and the structural engineer, the client and the critic – these distinctions are irrelevant.

Block Play

In the late 1890s, G. Stanley Hall initiated the Child Study movement. Since then, the growth and development of the young child have been carefully examined.



In the 1920s, Jean Piaget's seminal work on the stages of cognitive growth led to other research studies that used data from controlled experiments and observations of children's spontaneous play. In block play, the following developmental activities have been noted: blocks are put in the mouth, dropped from highchairs, carried from place to place, put in and out of containers, placed in lines or stacked,

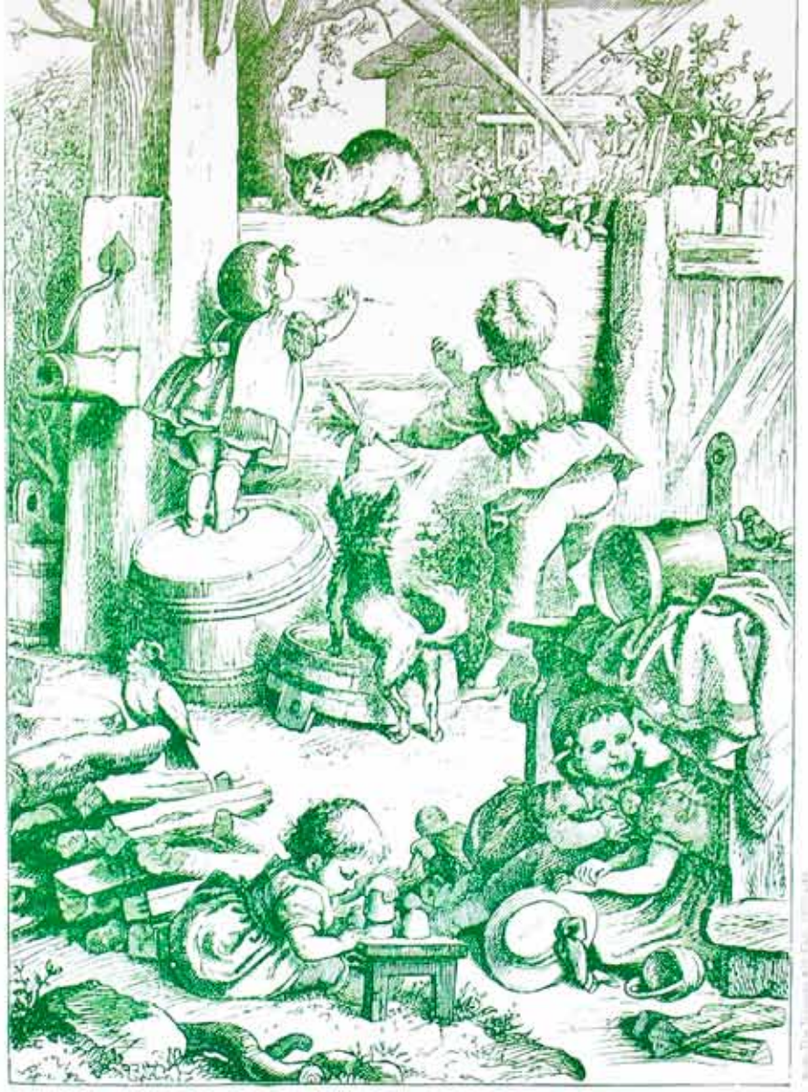
p10: (inset) – Children with Unit Blocks. ©Ann-Marie Mott, Bank Street School for Children, NY.

p10: (background illustration) – Playroom from Herzblätchens Zeitvertreib 1894, in *Die Kindheit – Kleidung und Wohnen, Arbeit und Spiel: Eine Kulturgeschichte*. Ingeborg Weber-Kellermann. Insel Verlag, 1979. p139.

built into enclosures, made into bridges, and finally assembled into schemas that are richly embellished. Early in this sequence, at about the age of eighteen months, the child becomes capable of putting the blocks together to form a recognizable structure. This cognitive leap moves his interaction with blocks beyond perceptual and structural levels and into an increasingly social world.

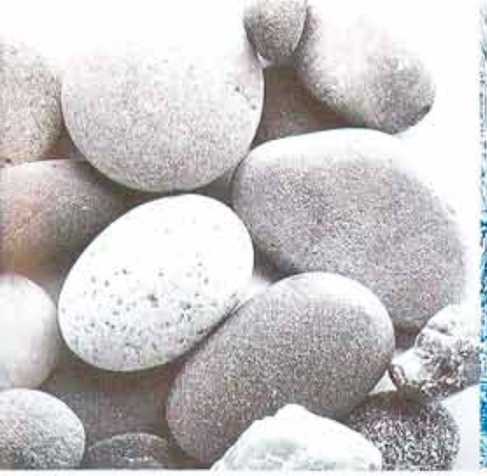
The Building Site

The building site, or where a child builds, has a direct effect on the building process. The 19th- and early 20th-century building toy was designed to be used indoors and was often pictured in a cozy domestic tableau. In a 1915 stereoscopic photograph, two children are building with an Erector Set, surrounded by family members. However, most building, like most children's play, is a private affair and often so ephemeral that it is difficult to record. The intense concentration of a little girl building amid the pleasant chaos of stacked wood, rocks, dogs, cats, birds, and other children is captured in a drawing from an 1870s issue of *The Nursery*. Even modern video technology cannot begin to document the multiplicity of views and fateful decisions that occur within the fleeting moments of construction. This is particularly true when children build with non-toy objects such as boxes and tin cans or sticks and stones.



The Natural World

The natural world contains abundant building "units" for children to investigate: heavy stones to pile, sticky burdock to connect, twigs to tie and weave. Natural materials present unique and interesting construction problems which are usually tackled in a child's private world apart from the protective and prying eyes of any adult. The "units" are irregular and unpredictable; their facets are not identical, and they cannot be readily stacked. It is not always easy to find the "right" piece, and the search is part of the process. The danger of collapse adds to the appeal.



engineers recall playing with blocks and construction materials as a major activity of childhood. Frank Lloyd Wright wrote of his memories of building with the Froebel blocks that his mother bought at the 1876 Philadelphia Centennial Exposition: "A small interior world of color and form now came within [the] grasp of little fingers." Buckminster Fuller recalls: "One of my first days at kindergarten the teacher brought us some toothpicks and semi-dried peas and told us to make structures." Some architects and artists who attended

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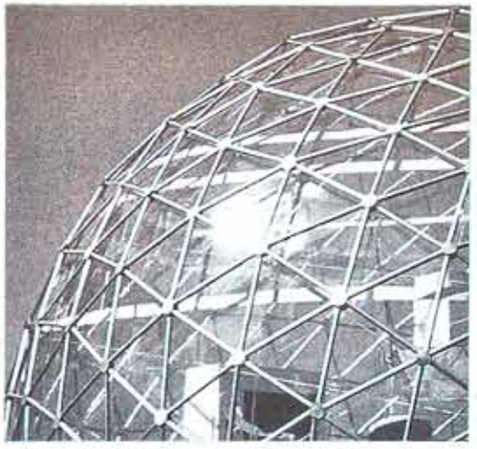
The Cube

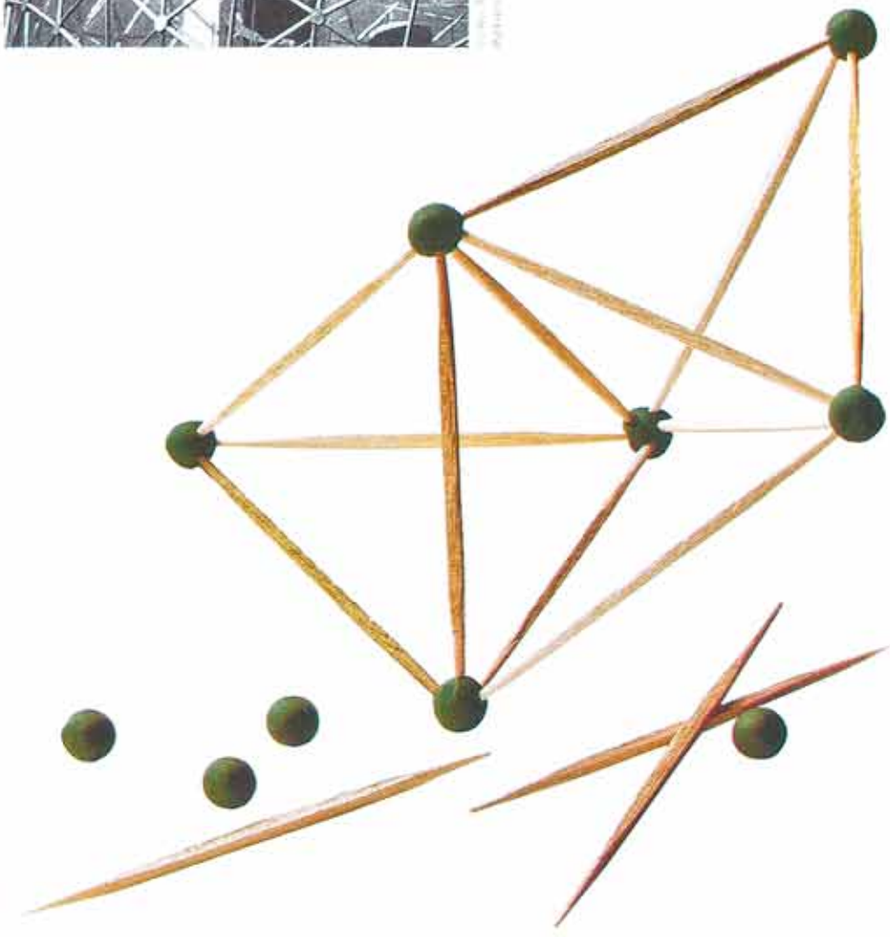
There is a sharp contrast between nature's building units and blocks. The building block or cube is streamlined and has properties that ensure stability. As Dr. George Forman has noted, "...the cube presents the child with a module that can be reiterated in ways that yield predictable and almost necessary results. Once the child lays one cube aligned and next to another, all subsequent placements of this type will yield a row that gets longer but never taller or never curved. Once a child understands this algorithm, he/she can use this knowledge to reduce the number of surprises thereby controlling the building process."

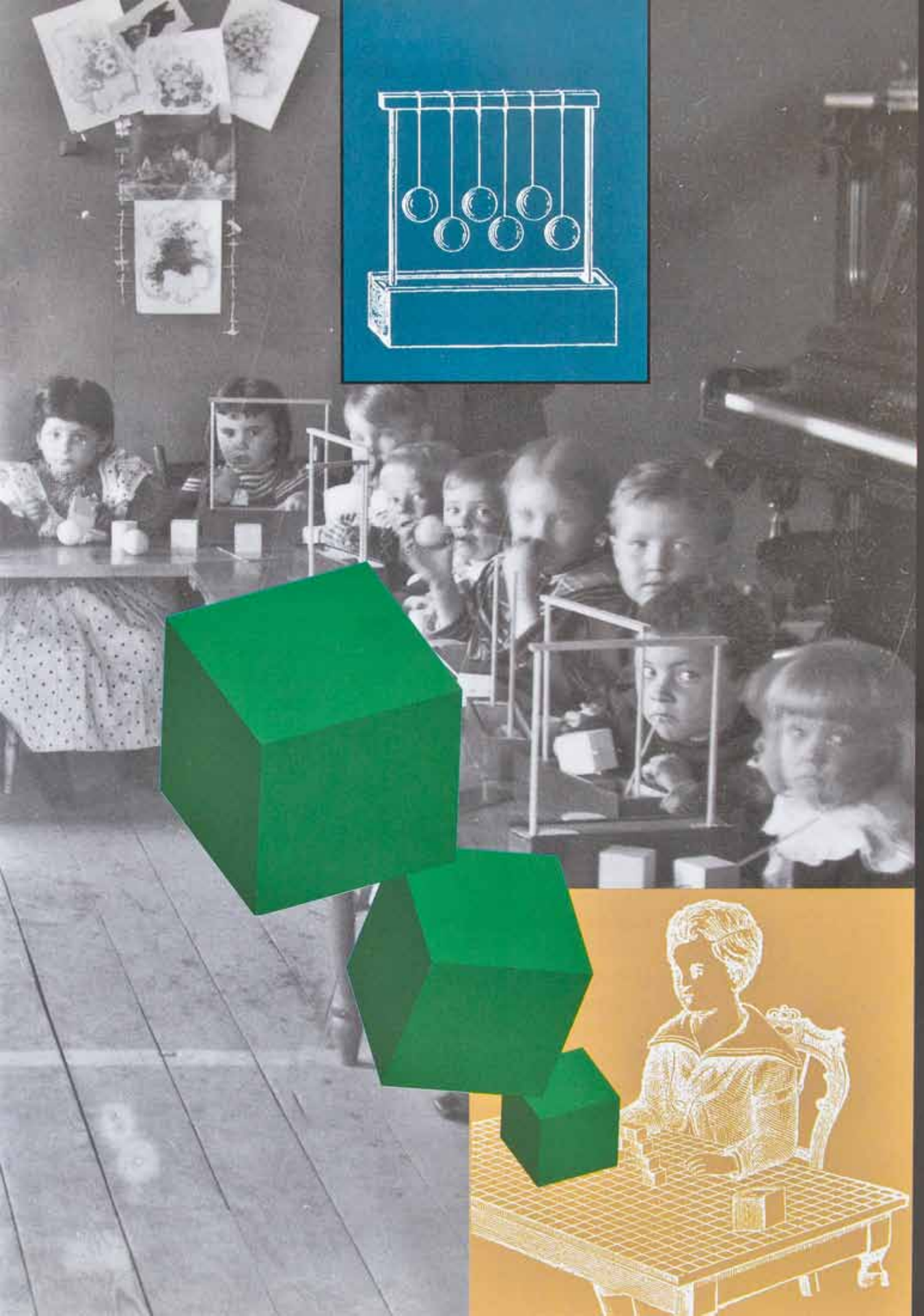


Theory and Educational Artifacts

Many theorists have studied children at play, but only a few have combined theory with the design of educational artifacts. Friedrich Froebel, Maria Montessori, Caroline Pratt, and Patty Smith Hill were the pioneering four who not only wrote passionately and prescriptively about how building materials should be used by children but also designed those materials. Their creations were neither frivolous nor gaudy and were never considered as "toys."

Friedrich Froebel, a 19th-century German educator, who trained as an architect, is renowned as the "Father of the Kindergarten." His work had a major influence on the direction of early childhood education in Europe and America. Indirectly, it may also have affected the course of much of 20th-century architecture. It is more than coincidental that many architects and

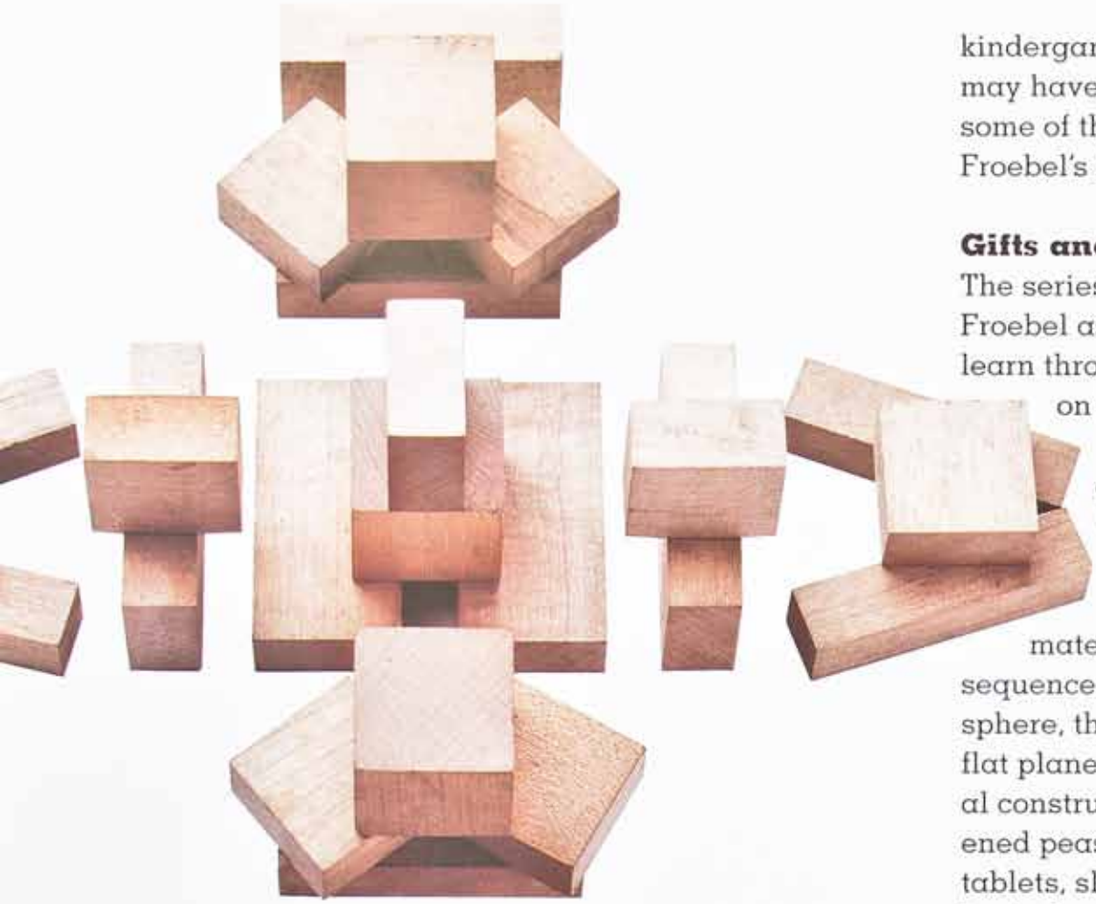


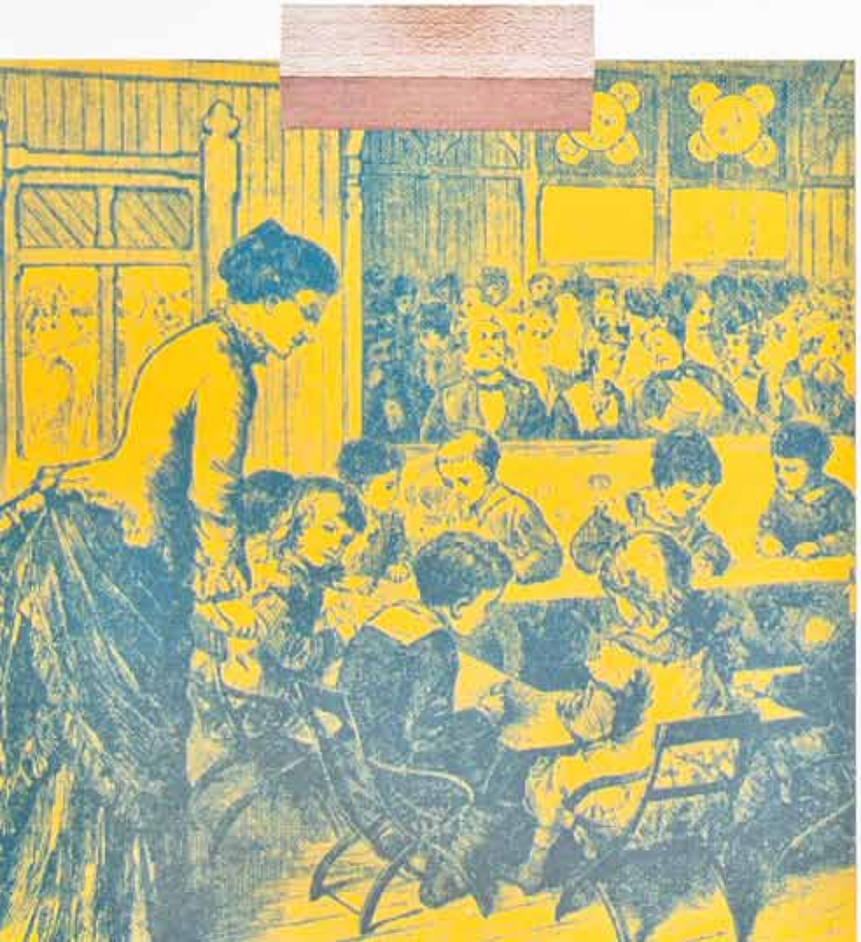


The fact that children were given physical objects to manipulate as the basis for learning revolutionized early childhood education. Froebel saw learning as a self-initiated activity and play as the root of learning.

Bennington's Experimental Kindergarten, 1876. Courtesy, Images from the Past, Bennington, VT

Inset: Gift #2 (Sphere, Cylinder and Cube), Milton Bradley Co., c. 1890. Collection: Norman Brosterman





kindergartens in the late 19th and early 20th centuries may have been influenced by Froebelian materials, and some of them became teachers at the Bauhaus, bringing Froebel's ideas into its basic design course.

Gifts and Occupations

The series of Gifts and Occupations were designed by Froebel as part of a systematic method for children to learn through play. They were highly symbolic, based on German Idealist thought. Froebel believed that when children "played" with his materials, they would understand the unity of the world through diversity and the relationship of the part to the whole. Based on the construction and transformation of forms, the materials were presented in a strictly determined sequence. The child began with solid shapes – the sphere, the cylinder, and the cube. Next he moved to the flat plane and to the line, returning to three-dimensional construction again with points and lines, using softened peas or wax pellets and sticks. With blocks, tablets, slats, and sticks, the child would build three basic forms: "forms of life," representing objects from the world – houses, furniture, trees; "forms of knowledge," giving physical substance to abstract ideas – numbers and geometry; and "forms of beauty," creating imaginative designs for aesthetic appreciation where symmetry is the dominant organizing principle. Froebel's Gifts and Occupations underlie all building toys to this day.

Learning from Play

Although Froebel's work was based on highly abstract ideas, symbolized by blocks and other three-dimensional materials, the fact that children were given physical objects to manipulate as the basis for learning revolutionized early childhood education. Froebel saw learning as a self-initiated activity and play as the root of learning. The Kindergarten Movement, which started in

(lower left) – Instruction of Children in the Kindergarten Cottage. *Historical Register of the Centennial Exposition.* 1876

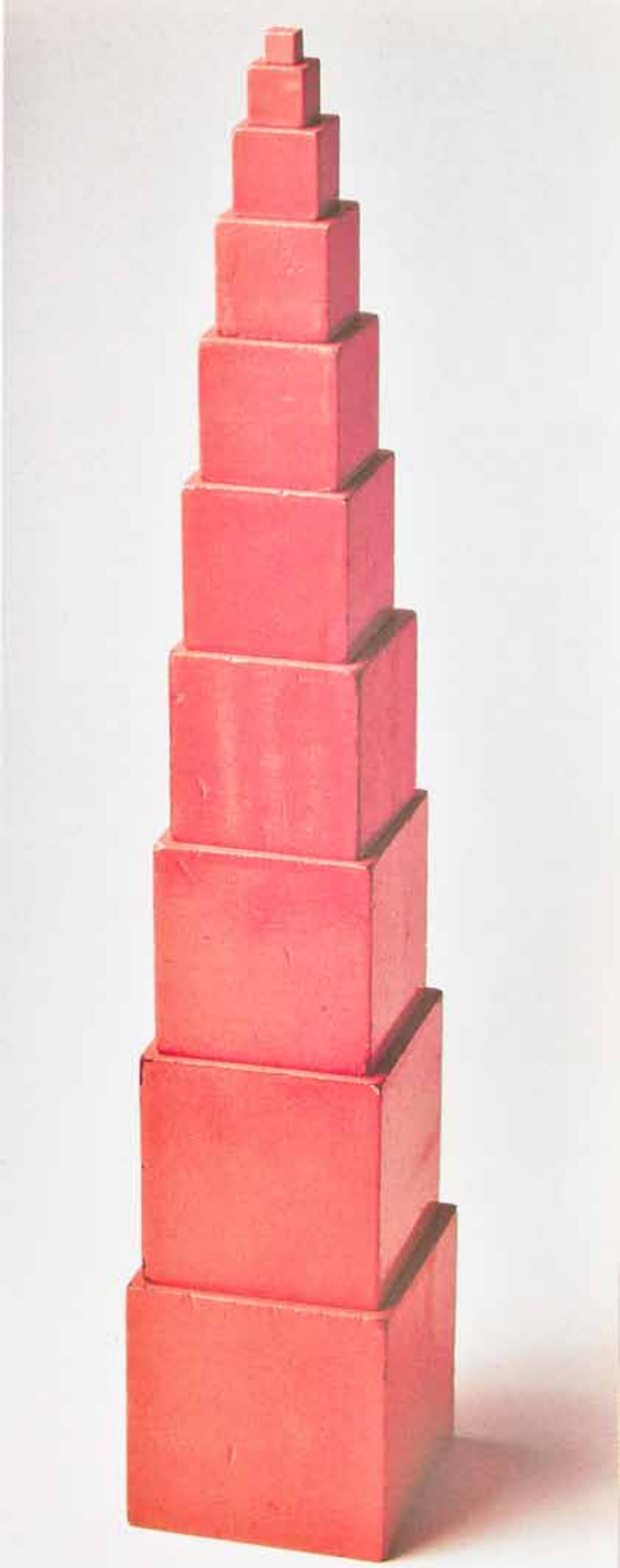
page 17: (left) – Children in a Montessori Classroom. c. 1919. from *Een Montessori Moeder.* p9.

page 17: (right) – The Pink Tower. 1985. Collection: Nienhuis Montessori. USA

Germany in the 1840s, quickly spread to the United States through the efforts of educators who had observed the Froebelian Kindergartens in action. Milton Bradley, an enterprising American lithographer, became deeply interested in these new educational ideas. In the 1870s he began to manufacture Gifts and Occupations, adding some variations in scale and content.

A Sensitive Period

Forty years later in Italy, Maria Montessori developed another series of didactic materials based on the systematic training of the senses as a way for children to understand the world. She observed that children between the ages of two and six experience a "sensitive period" during which they are interested in the placement of objects. In *Secrets of Childhood* Montessori wrote, "Nature endows a child with a sensitiveness to order; it is a kind of inner sense that distinguishes the relationship between various objects rather than the objects themselves. It makes a whole of an environment in which the parts are mutually independent. "Her" sensorial materials" were designed to isolate a specific attribute such as height, length, width, or depth. The Pink Tower is meant to be built up from an incremental series of cubes, beginning with the largest. The resulting structure, a child's rosy skyscraper, is taken down and rebuilt over and over again at will. The materials were precisely crafted and either painted with a single color or left natural. They formed part of the prepared learning environment in the "Casa dei Bambini," a daycare center for young children living in the slums of Rome in 1907.



Cooperative Building

In 1913, Carolyn Pratt, an educator who received woodworking training in Sweden, developed "unit system" blocks for her classroom at The City and Country School in New York City. These plain, modular wood blocks were designed on a larger scale, in reaction to Froebel's Gifts. Both "unit system" blocks and Patty Smith Hill blocks (c. 1910), which used metal rods to keep the large structures together, invited cooperative building. The Schoenhut Company, manufacturers of Patty Smith Hill blocks, explained in their catalogue, "As these blocks made tall, long and wide construction possible, it was soon evident that one child needed the assistance of another child and division of labor became a necessity even in child society. Thus the construction, not the teacher, demanded child cooperation." The child's building environment became more like a real construction site, with a noisy hubbub full of the give-and-take among builder, client, and critic. It was a far cry from the building activities encouraged by Froebel and Montessori where children worked, on a confined table or rug, often avoiding both the conflicts and the instant exchange of ideas.

Sweet Learning

The materials designed by Froebel, Montessori, and Pratt were austere and monochromatic, and they tended to emphasize the structural relationships among the units. In contrast, the alphabet and picture blocks manufactured by Jesse Crandall, S.L. Hill, and R. Bliss seemed to be dipped in honey, sweetening learning for the young child in the mid-to-late 19th century. These dazzling blocks, based on the original "conceptual"

(left) – Diagram of Patty Smith Hill Blocks

(below) – Unit Blocks. Background photo: Four-year-old group playing with Unit Blocks at Ann Reno Institute Demonstration School, c. 1940

alphabet blocks described by John Locke in *Some Thoughts Concerning Education* (1693), were marketed to a new and broader audience. They needed to catch the consumer's attention and did so by taking advantage of the latest in 19th-century chromolithography printing technology.

The ABCs of Block Building

Adults presumed, or at least hoped, that alphabet and story blocks would lead their children to an understanding of symbol systems, enticing them to learn their ABCs, to arrange numbers in sequence, to read simple words, and to follow a narrative order. The lavishly drawn images used by the McLoughlin Brothers were a natural extension of their highly successful children's book business. Perhaps they reasoned that once the presses were rolling, why not wrap some of the illustrations around plain wooden blocks. It did not seem important to the McLoughlins or to other manufacturers that the stories were too difficult to be

(right) – Mammoth Story Blocks. Marriage of Jenny Wren to Cock Robin. Patented by I.A. Crandall. 1881. Private collection.

read by the average three-year-old shown in their advertisements. Successful sales meant appealing to adults as well as to children.

Building the Tallest/Spanning the Longest

For the young child, the pictures on the cubes were the lure. Once attracted, what did children do with these blocks? From images on playing cards and in books, it seems that building was the prime concern. A trade card of the late 1890s depicts a young child in a high-chair, constructing with dominoes rather than matching the number patterns. Certainly, this might be due only to her age, although an equally revealing image from 1875 entitled The Young Architect shows a slightly older child in a typical Victorian setting using his blocks just to build. Manufacturers got the point. Construction was the child's main interest. His passion (and that of many adults) was to build the tallest possible structure or span the widest possible space. Crandall's Mammoth Story Blocks (1881) and sets of Mother Goose Blocks stacked over five feet high must have had great appeal to a four-year-old who was only three feet tall himself. One of the covers for S.L. Hill's Alphabet Blocks pictures two children standing proudly next to a structure equal to their height. The block as a building unit was clearly the main attraction, but children could move back and forth between the images, the story line, and the structural elements.

Hill's Spelling Blocks. Patented by S.L. Hill. 1858. Collection: Arlan Coffman. Santa Monica, CA

The BOY CONTRACTOR

(below) – City Made From Blocks. Illustration from *In City and Country*. The Unit Activity Reading Series. Nina Banton Smith. p38.

"Children" Meant Boys

Like literacy, tectonics, the science or art of building, was also touted by manufacturers on box covers and in catalogues to convince parents of the educational value of their building toys. Developing literacy required assistance, but children could discover physical principles – what makes buildings stand up – on their own. It is interesting to note that the titles of toys, as well as their box-cover and advertising graphics, indicate that "children" usually meant boys (e.g. The Boy Contractor: Practical Architecture for Boys, 1900). When girls were shown, they were usually helping the boys or cheering on the sidelines, but in reality, girls did play with blocks and build with construction sets. In 1997, marketers continue to separate "boy's toys" from "girl's toys." Translated, this means fewer building toys are purchased for girls.

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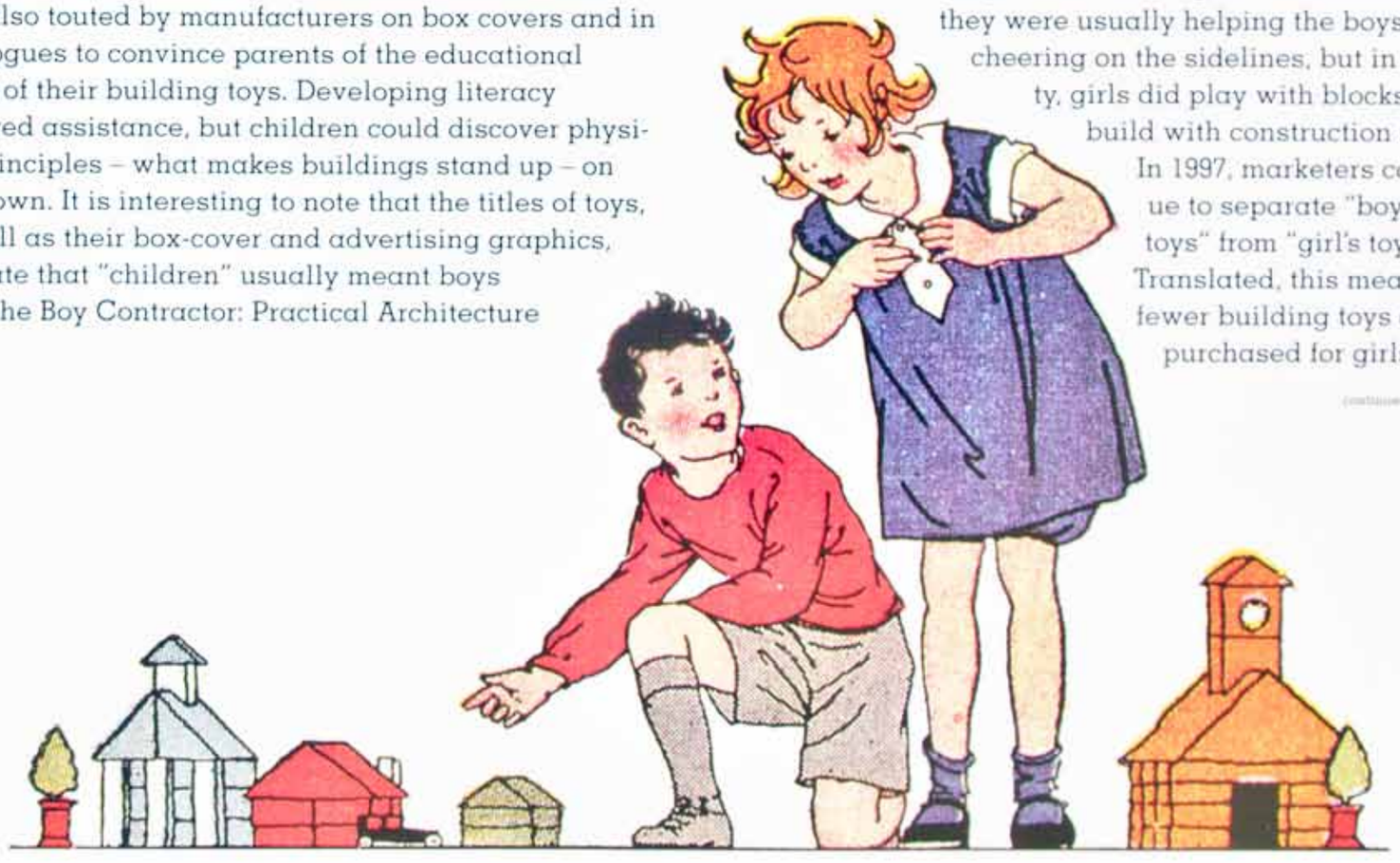
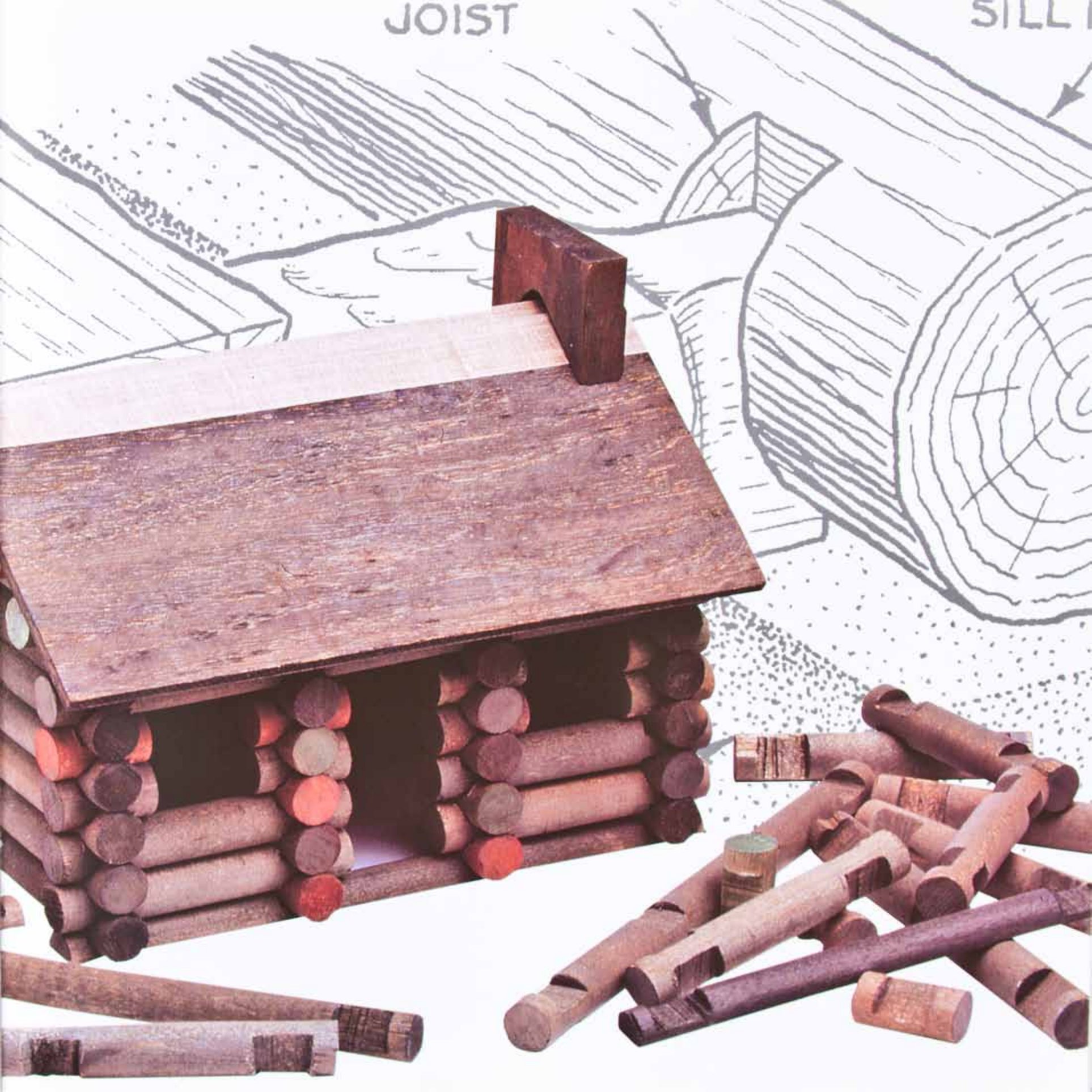


"...it is still crafts-manship – the work of someone who does not separate the work of the mind from the work of the hand. It involves a circular process that draws you from an idea to a drawing, from a drawing to an experiment, from an experiment to a con-struction, and from construction back to an idea again."

– Renzo Piano

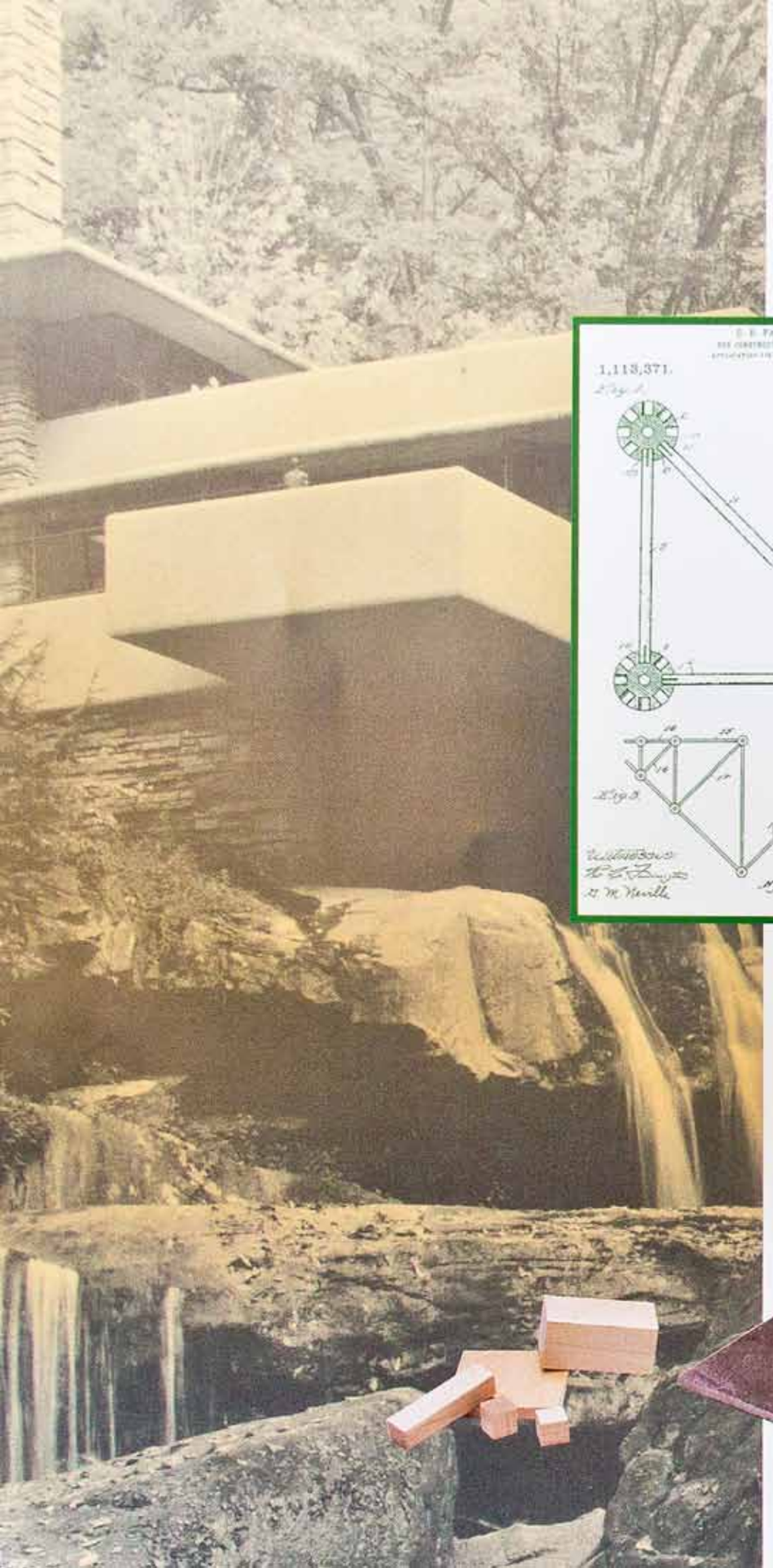
Lincoln Logs, designed by John Lloyd Wright, 1920-21. Collection: Arlan Coffman, Santa Monica, CA

Child playing: ©Ann-Marie Mott, Bank Street School for Children, NY


JOIST
SILL

Stack/Frame

Building toys utilize two basic construction methods – stacking and framing. Stacking relies on compression. Framing uses a combination of compression and tensile construction. Modeled after buildings in the real world that rely on loadbearing walls (stacking) or frame construction for strength, the building toy has the advantage of not needing a deep foundation. The 19th-century architectural theorist, Gottfried Semper, divided the process of building into two basic methods: stereotonics, or the piling up of heavy elements, and the tectonics of the frame, or the joining of lightweight linear components. Froebel's Gifts, Montessori's The Pink Tower, and all the variations of block forms produced in the late 19th and early 20th centuries exemplify stereotonics. Tinkertoys, Erector Sets, and Curtain Walls demonstrate the tectonics of the frame.



(far left) – Fallingwater. Photograph by Robert P. Ruschak. Courtesy of the Western Pennsylvania Conservancy.

(left) – Patent application for the Tinkertoy, invented by Charles H. Pajeau. 1914.

(below) – Wood and slate model. Collection: Archiblocks, REO Interests.

From Wood to Pixels

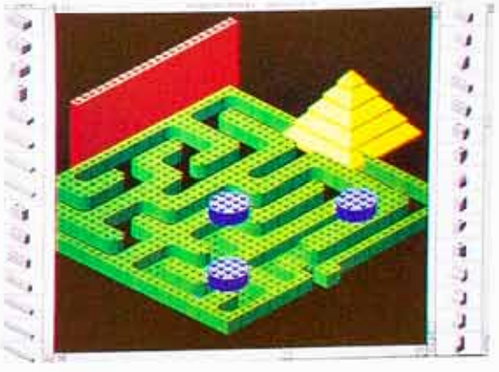
Variations in materials also determine how toy buildings stay together. Most 19th-century building toys were made of solid wood, or used wood box frames that could nest. Richter's Anchor Blocks, composite stone-like blocks patented in 1880, were made of a mixture of compressed and dyed sand, chalk, and linseed oil with a slight grit to prevent them from slipping; Ives Struktiron (1910) was fabricated from thin steel with metal nuts and bolts; and Tudor Blocks (1945) used rubber forms that meshed together. Bakolite, an early plastic, was used in some toys in the 1930s, followed by improved plastics and lightweight foam in the 1940s and 1950s. The heft of wood and stone-like blocks epitomizes the stacking experience and bears a closer resemblance to most building materials used in the real world. The introduction of colored, cast-glass bricks in Bruno Taut's Dandanah, The Fairy Palace (1919) was the earliest use of color-saturated transparent building materials that had weight. Computer "blocks" (Gryphon Bricks, CDROM 1995) are made of pixels on the screen and stack visually, but any resemblance to the actual building process stops there. There is no information about weight when a child "piles" with a mouse. Some computer programs have been created to be used in conjunction with "real" blocks, so the child can move back and forth between the computer-designed structure and the real one.

Drawing the Impossible

Writing about CAD (Computer Aided Design) in his book *Architecture and Complexity,* Lucien Kroll states that "it is the architect who creates, not his pencil." Renzo Piano elaborates on this idea: "...An architect must be a craftsman. Of course any tools will do. These days, the tools might include a computer, an experimental model, and mathematics. However, it is still craftsmanship – the work of someone who does not separate the work of the mind from the work of the hand. It involves a circular process that draws you from an idea to a drawing, from a drawing to an experiment, from an experiment to a construction, and from construction back to an idea again." Instruction books with diagrams of real and potential buildings have traditionally been packaged with building toys, fostering an ability to move from two-dimensional images to three-dimensional structures. And the drawing process, on the computer or on paper, allows children to design structures that are physically impossible to construct so that they learn not only what blocks can do, but more importantly, what blocks cannot do. The history of architecture is replete with images of impossible buildings and visions of unrealized ideas.

Gothic Buildings for Architectural Amusements. 1870. Collection: Paul Neuman.

Diamond Building Blocks. 1920. Collection: Paul Neuman.



Computer screen image made from Gryphon Bricks CD-ROM. 1996. Collection: Gryphon Software Corporation.

Bring Coney Island into Your Home

Toys that required the child to manufacture the basic building units provided lessons in structural design. Many feature the child as an industrious, happy worker, a concept that surely must have appealed to parents.

The disciplined atmosphere of the work place was promised in The Cruver Company's The Boy Contractor, in Harbutt's Plasticine Builder for the Young Architect (1900), in Doco's Metal Construction Set (1920), and in The Cement Block Machine (1950s). Using a more fluid material, Jesse Crandall put the Sandometer on the market in 1874, offering parents the dubious promise of "The Coney Island Beach brought to Your Home." Machines for "manufacturing" sand or mud pies or snow bricks continue to sell into the 20th century.

(top left) - Konkrete Bild-m-up Moulding and Building Set #1. 1933.

(top right) - Crandall's Building Blocks. 1870.

(bottom, left to right) - Columns and Arch from Gothic Buildings for Architectural Amusements. 1870. •Greek Temple. c. 1932. F. Ad Richter & Co. •Sky-Hy. 1930. The Embossing Company. •Gothischer Baustyl/Architecture. Gothique/Gothic Structure - Third quarter. 19th Century. S.F. Fisher. •The Peking Palace. 1850.

Simple Connections

A by-product of the manufacturing process became the inspiration for one of the earliest construction sets with a flexible joining system. Charles Crandall, who used a finger joint machine to fashion boxes for his line of croquet sets, observed his children building with some of the discarded scraps of jointed wood. With typical American ingenuity and compelled by the need to reduce costs by utilizing everything at hand, he created a series of sensational construction toys. Building toys with modular interlocking parts developed rapidly in the early part of the 20th century. With sets like Meccano, Erector, Tinker Toys, and Curtain Wall Builder, children could create taller and generally more daring structures that imitated the steel framework construction of contemporary skyscrapers.

Architectural Styles

Literacy and structural design were not the only lessons packaged with building toys; children could also encounter differences in architectural styles. In many sets, the shapes of the building units themselves direct the type of structure that can be built. A triangular pediment resting on a post-and-lintel wall shouts "Greek;" an arch proclaims "Roman;" and light frame struts with curtain walls assert "American skyscraper." It would be

hard to build a Greek temple with Tinker Toys and impossible to make a Buckminster Fuller geodesic dome out of Anchor Blocks. Toys that reference a particular structure or period in architectural history are more readily marketable to older children and their parents.

The Use of Color

Although we have known since the early 19th century that the Greeks used bright colors in their temples, the popular image of classical architecture remains monochromatic. This absence of color is evident in many building toys with classical references (although Richter's Anchor Blocks did have subtle reds and blues as well as grays). Today, some architectural blocks for young children feature bright primary colors less for historical accuracy than as a marketing strategy. But for the most part, children who build with these toys are not concerned with principles such as "truth to materials," "form follows function," or "ornament is crime." They might happily combine every modular part produced during the 200-year history of the building toy – every color, shape, texture, and material – and come up with something not unlike a "Deconstructivist" structure by Frank Gehry.

The Important Buildings

Popular taste in architecture is indicated by the choice of buildings that appear most often on box covers or on diagrams and instruction sheets. Those that are left out are as revealing as those that are most frequently included. Favorite specific structures include the Greek temple pictured on Richter's Anchor Blocks (reflecting Germany's fascination with Greek culture since the middle of the 18th century) and The Peking Palace (one of a number of toys that point to the late 19th-century attraction to the cultures of China and Japan). Other sets of "heroic" buildings and important engineering feats include The Alhambra (1870), The US Capital Building (c. 1870s), The Great East River Suspension Bridge (1881), and The Waterloo Bridge (1850s). Some building toys mirror a general style rather than a specific structure. Examples are The Gothic Building Blocks (1850), John Lloyd Wright's Lincoln Logs (1920s), and the Rex Mars Space Station (1950s).

Designers or Directors

Do children have a personal building style? Research has shown that they do repeat certain combinations, but only for a limited period of time – sometimes a day, sometimes several weeks. A cylinder perched on top of a cube topped off by a half-dome might be assembled as a combination by one child and then picked up by other children playing in the same group. Dr. Howard

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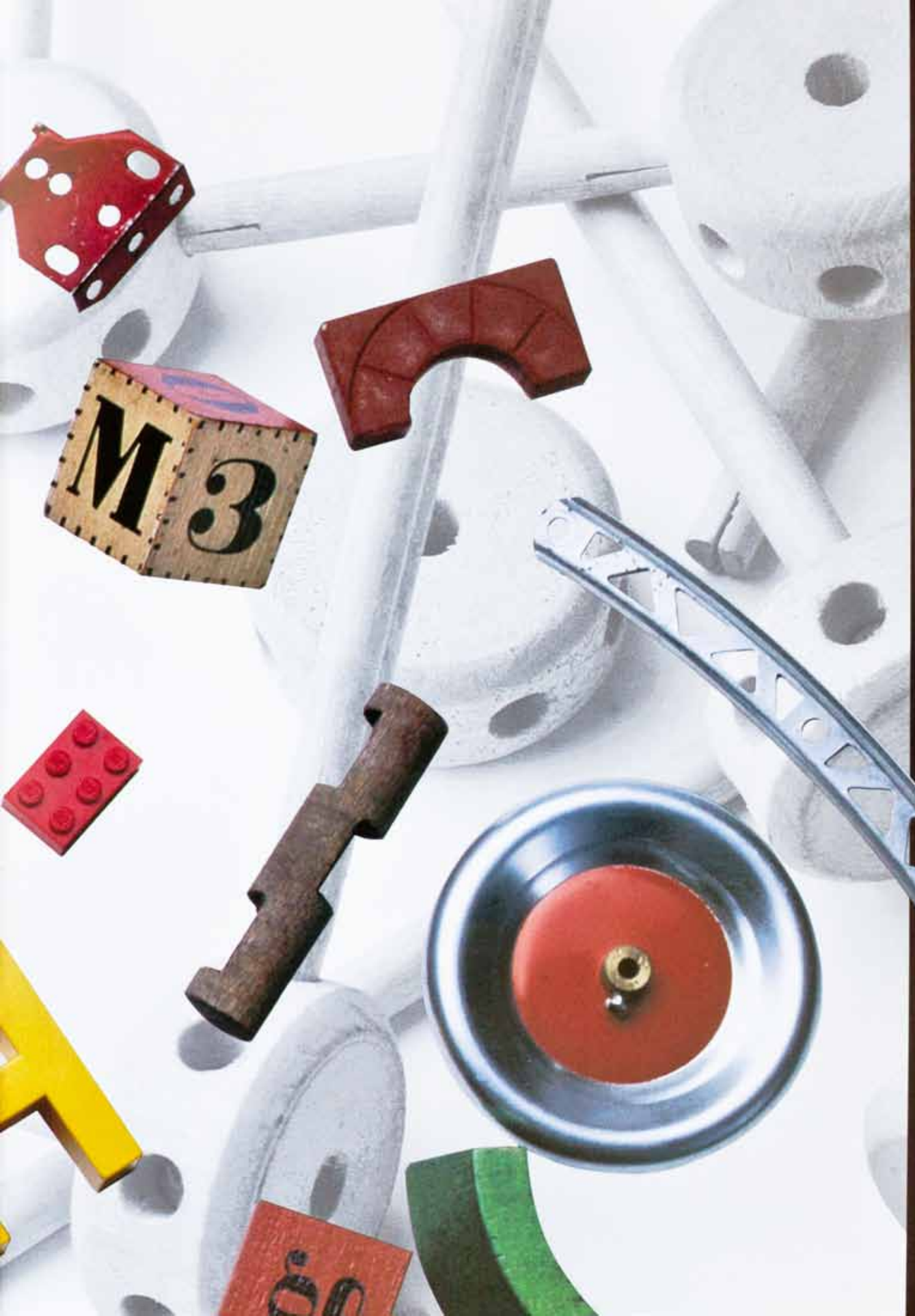

It is the moment of destruction when stones tumble and blocks collide, when recognizable forms collapse, when old, and perhaps boring ideas totter and apparent chaos ensues, that the child can refocus and become an innovator again.

Gardner has noted that some children have a disposition towards a particular manner of building; they may be patterners or dramatists, preferring a spatial or a temporal approach.

Moments of Destruction

The building toy satisfies a child's universal need to investigate, construct, destroy, and rebuild. Whether children are assembling loose pieces of wood, stone, composite material, cardboard, metal, plastic, or virtual blocks on CD ROM, adults are confident about the educational and aesthetic value of their play. However, it is the moment of destruction, when stones stumble and blocks collide, when recognizable forms collapse and apparent chaos ensues, that allows children to refocus and become innovators again. This is also the moment that many adults prefer to forget, or even to eliminate. The 1996 advertisement for Gryphon Bricks, a computer program for children, extols the virtue of virtual reality as "no more stepping on sharp pieces in the middle of the night."

The Adult World and the World of the Child

The opposing concepts of building and destruction illuminate the differences between the adult world – which invents, manufactures, markets, and ultimately consumes the product – and that of the child – which uses the product in ways not intended, understood, or even recognized by the adult. There is a vast disparity between what children actually do and what adults want them to do, between what children actually learn and what adults want them to be taught – in short, between the history of children and the history of childhood. The active voice of the child is lost if the building toy is put on a pedestal and viewed in a frozen moment in time, outside the arena of play.

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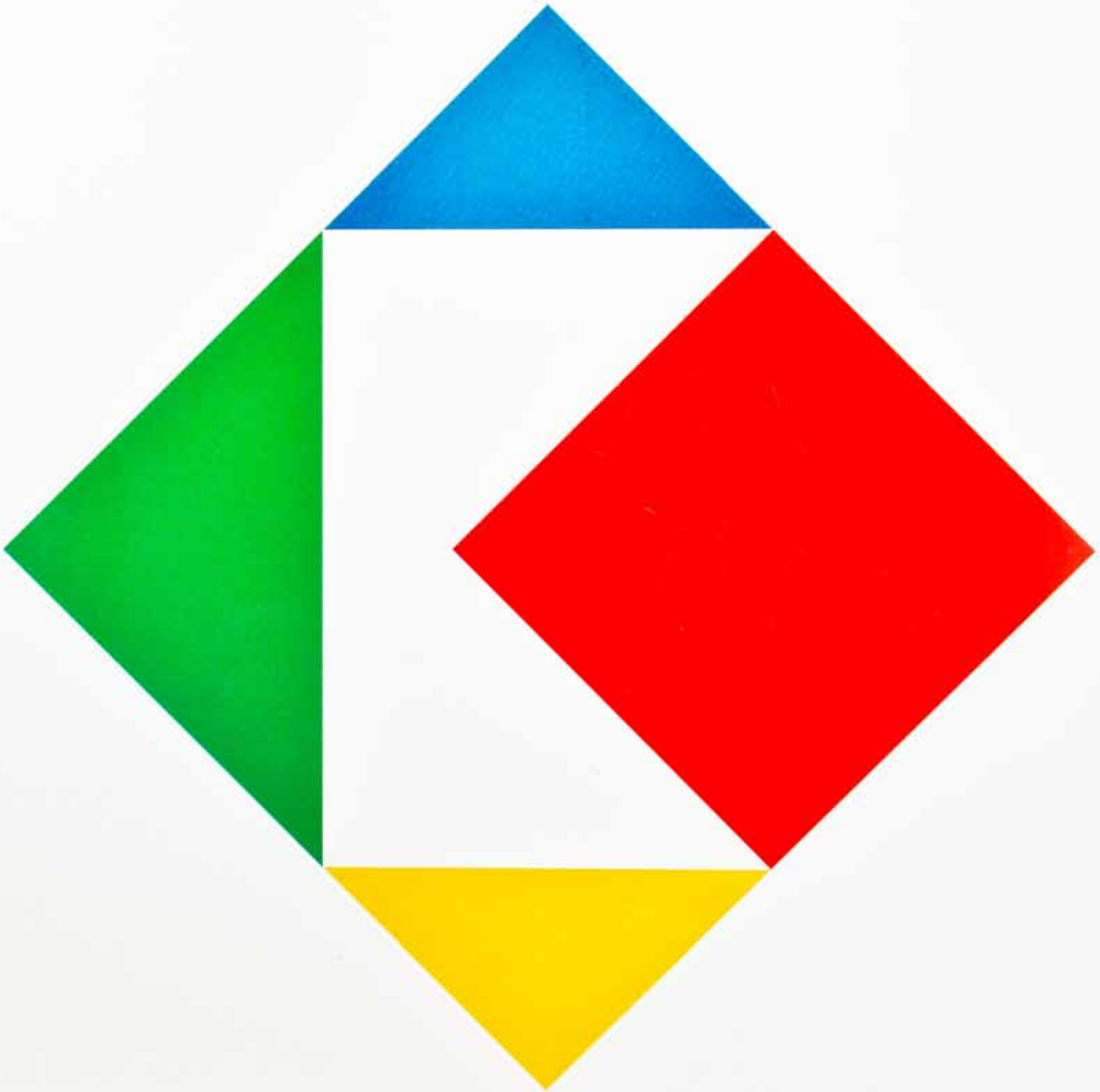
p31: (inset) – Erector Set, 1940. A.C.Gilbert and Co.. Collection: Louis Boselli.

(background photo) – Eiffel Tower. ©Lanny Nagler, Hartford, CT


ERECTOR
100 TOYS IN ONE

KATONAH MUSEUM OF ART

ROUTE 22 AT JAY STREET



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