

FAPESP - São Paulo Research Foundation

Research Final Report - “Scientific Initiation” Fellowship

University of São Paulo - Architecture and Urbanism College (FAU USP)

**toys within art, architecture and design: the case of Charles
and Ray Eames**

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August 2012

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summary

The objective of this survey is to study educational toys designed by the American couple Charles and Ray Eames. The couple was extremely important in the XX century scenario of American and world design. They are widely known and studied for their furniture projects. However, they also produced architectural projects, graphic design projects, exhibitions, talks, movies and toys. Even though toys are not frequently studied, they have great importance as a social and cultural element. In the case of Charles' and Ray Eames' educational toys, they have an added interest as they are closely linked with art, architecture and, naturally, with the design they produced. Therefore, besides reviewing the theory on the value of toys, their pedagogical potential and their relation with artistic movements, this study aims at surveying and analyzing the toys designed by the couple of designers, highlighting their relation with their various work, their office method of production and also with their design concept. This study also brings a practical phase in which the design of educational toys is examined in an experimental manner and two projects are proposed.

introduction

Starting from the central elements of the study, which are the children's toys designed by the couple of designers Charles and Ray Eames, the relations between toys, art, architecture and design were considered as well. For that purpose, establishing an interaction of various subjects was necessary first to justify the relevance of the topic and next, to foster its comprehension. Even though the approaches discussed in this work started from divergent points of view and aimed at distinct objectives, all of them gravitate around toys. Regardless their great importance for the research, the references that are beyond the fields of art and architecture in which this study is inserted, were analyzed solely in the scope of this study.

The main objective of this survey is to investigate the possible proximity between toys and the artistic movements with special emphasis on the toys produced by the Eames couple. Besides that, the value of toys as social, cultural and pedagogic elements, and the function of recreation itself which, after all, is connected to the notion of creative processes, are also examined in this survey.

The first chapter is dedicated to the importance of games and of playing consideration theoretical analyses of authors in the fields of philosophy, anthropology and psychology. Also, in order to approach the focus of the study more closely, research on toys as educational elements was extensively done stressing their pedagogic potential. Names such as Johan Huizinga, Walter Benjamin, Friedrich Fröbel among others, consolidate the basis of this chapter which aims at analyzing different theories on the importance of toys.

In chapter two, the connection between toys and artistic movements is analyzed. Also, examples of pedagogic rationale and educational toys that influenced different artists are given. The chapter deals, though briefly, with the influence of children's art in the creative process of modern artists. Next, there are examples of creators in the art field who produced toys, and a relation with their other production is made. However, they are only examples with the purpose of illustrating the topic, suggesting possible ways for further research.

The third chapter reaches the focus of this survey. After analyzing the value of toys, their educational purpose and their relations with art movements in the previous chapters, it is then possible to meet the central element of this survey which is the educational toys designed by Charles and Ray Eames. In the beginning, a brief history of these professionals, their background and methods of production are presented. Also, the relation between their creation of toys and the rest of their work is discussed along with their production process and their design concept. Next, an inventory of all Charles and Ray Eames's toys and related works (movies which have toys as their main theme, children's furniture, among others) is presented. There is also a brief description of each work and image. Finally, three of their toys, regarded as the most meaningful among their production, are chosen, analyzed more thoroughly and related with the theories discussed in the first chapter. The aim of this segment is to study the three toys from the point of view of the principles presented and relate them to the context in which they were created.

The fourth and last chapter focuses on the practical phase of the research. Considered highly important for the present study, the aim of this phase is to investigate from another perspective questions related to educational toys. Based on specific readings about the design of educational toys, a series of experiments was made which resulted in two prototypes for study. The idea behind the practical phase, however, was not to present a restricted result but to widen the discussion present in the survey.

Alongside, personally it was rather important to observe how the graduation course on going in the Architecture and Urbanism College at University of São Paulo, Brazil, had such great influence in the creation of the prototype toys and, on the other hand, how my academic studies were enriched by this experience.

Thus, the research encompasses two stages which complement each other in the way they foster the comprehension of the relevance of educational toys in relation to art, architecture and design. Bearing in mind the central elements of this study, the toys by Charles and Ray Eames, different approaches to the theme are discussed aiming at the analysis of the central role toys play in the production of the couple of designers.



01. Fröbel's 2nd gift (Produced by J. W. Schermerhorn & Co., New York, c. 1870).

1st part

The aim of this chapter is to present the theories that discuss the relevance of games, of playing and of toys from different approaches. Also, included in this chapter are the names of people who studied the theme according to the focus of their research.

Starting from broad analyses that deal with the importance of playing in social cultural contexts, the chapter evolves to examine the value of the toy itself, which is the core of this survey. To achieve this aim, the importance of playing as studied in areas like Psychology and Pedagogy is investigated, as well as the main features of pedagogical toys.

It is important to stress that the focus of this research is not a theoretical analysis of pedagogical toys but their relation with artistic and architectural movements, taking into consideration specifically the toys produced by Charles and Ray Eames. However, researching such concepts, even in the depth allowed by the distance among the areas (anthropology, psychology, pedagogy and other) and the time allowed for the research, was considered of utmost importance in order to establish the grounds and analyze its main elements.

the importance of games and of playing

“Playing, essentially, satisfies”¹.

The first theoretical western writings that deal with the question of the importance of games as social cultural elements date back to the XVIII century. Although previous theories mention the topic, it is as from that date that games are treated in modern sense differentiating work and pleasure².

According to Medea Hoch, in her text “*Toys and Art. Interdependency in the Modern Age*, the philosopher Immanuel Kant (1724 – 1804) defined games in contrast with work in his writings named “Über Pädagogik [About Pedagogy]” (1776 – 77), in which he states that games must pursue, solely, pleasure, not other aims³. A few years later, Friedrich Schiller (1759 – 1805), German poet, historian and philosopher, in his On the Aesthetic Education of Man in a Series of Letters (1794), goes deeper in the theme, stating that “men play only when they are human in the best sense of the

word, and are only human when they play”⁴. The author, also explains that “of all states of men, games and only them can make men complete and unfold at one time their double nature”⁵ trying to contradict the usual idea that games are not a serious exercise. In his writings, Schiller approaches the question of games with the aim of relating them to esthetics and constructs the idea that art is the object of the playful impulse. The relevance of the author to the theme is considerable, since he is the first western theoretician to highlight the value of games, defining them as the essence of human nature⁶.

Less than a hundred and fifty years later, Johann Huizinga (1872-1945) broadens even more Schiller’s concept maintaining that games are essential to human existence. Dutch professor and historian, published in 1938 the book Homo Ludens, in which he attempts to integrate the concept of games with the concept of culture. Although other authors have recognized the importance of games in the period between Schiller and Huizinga, they were quoted later, making it possible to group points of view, since they are more specific focus. The relevance and reach of Huizinga’s point of view, however, allow a more extensive study of his works, which served as a structuring basis and main reference for the understanding of the value of games and their features in this survey.

Studying games from a historic perspective, as a cultural phenomenon, the author structures his strong belief that “it is in games and through games that civilization starts and develops”⁷. Huizinga does not define the place of games among the various cultural manifestations, but determines up to which point culture itself has a playful character.

In the first chapter of Homo Ludens, “Nature and meaning of games as a cultural phenomenon”, Huizinga defines some parameters that guide his analysis. Initially he points at the fact that games go beyond human sphere being, thus, older than culture itself. Recognizing this principle that animals play like humans, other theories explain games like a biological purpose, like an activity with specific functions. According to the author, these theories, however, leave aside the intensity involved in games and their fascination power.

And, it is in this intensity, in this fascination, in this capacity to excite that resides the very essence and the most important feature of games, though. The simplest idea that nature could have equally offered to its creatures,

all these useful functions of excessive energy discharge, of distension after effort, of preparation for quests etc, under the form of exercises and reactions purely mechanical. But, no, it gave us the tension, the joy and the fun of games.⁸

As for the relation between games and esthetics, base of Schiller's analysis, the author highlights that, although beauty is not an inseparable quality of games, as such, they tend to assume clear esthetic elements. In many types of games it is possible to observe the presence of fun, harmony and rhythm.

From the affirmation that games cannot be defined exactly in logical, biological or esthetic terms, Huizinga points to the need to limit the features of games. One of the fundamental features of games is that they are a voluntary activity and so they bring an element of freedom. Another very important characteristic, which is closely linked to the fact that they are free, is that games happen out of real life, being a break in daily life with time and space limit. "Games are an evasion from real life to a temporary area of activity with their own rules"⁹. All spaces reserved for games are "temporary worlds within an ordinary world, dedicated to the practice of a special activity"¹⁰. Other features pointed by Huizinga are: order, which is guaranteed many times by rules, the presence of mystery and secret, instability, since at any moment an exterior impact coming from the real world may invade the space of the game.

In his works, Huizinga identifies the presence of a fun factor in different cultural processes in many periods. His objective is to demonstrate that culture "appears in games, and as games, and will never lose this character"¹¹. Besides locating a playful character in Law, in War, in Philosophy, in Politics, in Poetry and in Art, the author discusses its presence in contemporary culture, concluding that the playful element has been decadent in culture since the XVIII century. Finally, Huizinga declares:

True civilization cannot exist without a certain playful element, as civilization implies a limitation and the self restrain, the capacity of not taking one's own tendencies as the ultimate aim for humanity, understanding that one is inserted in certain limits accepted freely.¹²

Huizinga's analysis is, as a result, of extreme importance for the understanding of the value of games, once it establishes close links, not only between the playful element and countless cultural manifestations in different times, as well as for the

construction of civilization itself. Considering his thoughts as the structural basis for the comprehension of the importance of games, other approaches to the theme are surveyed and are organized here according to their point of view.

The significance of games is, many times, highlighted in the field of psychology. One of the first psychologists to draw attention to the importance of this activity was Karl Groos (1861-1946). From a biological approach he investigates and compares recreation and games in animals and humans, concluding that games have an important role in the development of intelligence¹³. This activity is, according to the author, a preparation for adulthood, helping in the development of fundamental skills and competences.

Influenced by Groos, Sigmund Freud (1853 – 1939) writes in many of his works about the central role of games in human nature, According to Liane Lefaivre, co-author of Ground-up city: Play as a Design Tool, Freud, in his studies, named *The Role of Play and Daydreaming in the Poetic Imagination*, 1908, claim that “childhood play is the source of creative thinking in the adult”¹⁴.

As well as Freud, the psychoanalyst Donald Winnicott (1896 – 1971) believed in the creative potential of games. According to him, “it is in playing, and perhaps only in playing, that children or adults enjoy their creative freedom”¹⁵. Having devoted most of his studies to children, Winnicott writes in 1971 the book Playing and Reality in which he places playing in the field of psychology. The author describes playing as an activity in which children go into a state of “near absence, similar to elder children’s and adults’ concentration”¹⁶. Besides, like Huizinga, he asserts that playing has a defined time and space. Winnicott emphasizes the importance of the experience involved in the act of playing which, according to him, is in itself a kind of therapy: “the essential feature of what I want to communicate refers to playing as an experience, always a creative experience, an experience in the continuity space-time, a basic form of living”¹⁷.

The theories mentioned above are examples of different approaches that consider games and recreation as extremely relevant activities. Even though these analyses are based on different viewpoints, encompassing more or less the question, all of them stress the value of the fun experience. In order to come even closer to the central object of this survey, in a second stage theories that involve toys themselves and their social cultural function, are considered.

toys and games in the social cultural context

Focusing on the purpose of toys and games, and on their social and symbolic function, Gilles Brougerès wrote, in the XXI century, the book Brinquedo e Cultura [Games and Culture]. French anthropologist and philosopher, the author was a researcher in the area of toys and games and their relations with pedagogy. In the work mentioned above, Brougère analyses toys and games from a social cultural perspective, considering them as a product of society, which has its own specific cultural traces.

On the one hand, toys deserve to be studied for themselves, since they are important objects for what they reveal of a culture. On the other hand, before their effects on children's development, it is necessary to accept the fact that they are inserted in a social system and bear social functions which grant them purpose.¹⁸

Besides that, according to the author, toys are rich in meanings which aid in the comprehension of a certain society and culture since they connect to visible elements of reality or of children's imagination. The fact that toys reveal various aspects of society in which they are inserted had already been emphasized by Walter Benjamin (1892 – 1940) in many of his writings. Collector of children's books and interested in the cultural and historical aspects of toys, Benjamin wrote many texts about the subject, gathering them in the book Reflexões sobre a criança, o brinquedo e a educação [Reflections about the child, the toy and education]. In the text “Toys and Games- Marginal Observations about a Monumental Work”, from 1928, the author draws one's attention to the fact that “toys are conditioned by the economic culture and, especially, by the technical culture of societies”¹⁹, revealing that, observing the techniques, characteristic traces of all popular art, that can be easily found in toys.

In this sense, Benjamin explains in another text, “Cultural History of Toys”, of the same year, that the concept of toys cannot be completely understood only from the children's nature, once children are part of a society, of a people, of a class and they are not an isolated group. The author, then concludes: “in the same way their toys are not witnesses of an autonomous and segregated life, but are a dumb dialogue of signals between children and people”²⁰.

According to Brougère, socialization of children presupposes the appropriation of a culture and this happens through the confrontation with images, with representations,

with various and different forms²¹. And it is through these images that children will be able to express themselves, and toys one of the various sources of representation. Games, on the other hand, “represent a dynamic process of cultural insertion, at the same time, immersion in preexistent contents and active appropriation”²².

The active relation introduced by children is, according to Brougère, the specificity of toys when compared to other cultural supports. Many times, children’s manipulations reduce previous meanings of toys, giving space to interests deeply rooted in children’s everyday life. This cultural impregnation through toys is not, however, determination. “Learning is active in the sense that it does not submit to images but discover how to manipulate them, transform them, and even practically deny them”²³.

In “Cultural History of Toys”, by Benjamin the same thought is found. According to the author, one should not believe that children’s games are determined by the imaginary content of the toys. On the contrary, children’s imagination is what determines the games. Benjamin also observes that toys gain authenticity as they detach from the adult world, “since the more attractive, in the current sense, toys are, the more they detach from the instruments of playing; the more unlimited the imitation in them, the more they get away from live games”²⁴.

Benjamin finalizes his thoughts about the insertion of fun in everyday life with the following question: “But when a modern poet says that for each one there is an image that when contemplated the whole world vanishes, for how many people this image does not raise from an old box of toys?”²⁵

From the quoted references, one can observe that toys gather various social cultural aspects. With toys we can understand traces of a certain community, besides being a means of communication between children and the world around them. After some time, toys started to be valued as an educational element, and by mid XIX century they became pedagogic material.

toys in Education

Many authors recognized the educational value of games and toys. In the text “Fröbel and the concept of Children’s Games” (2008), the pedagogue Tizuko Kishimoto

mentions, in a chronological manner, names that examined the relevance of games in pedagogy. According to the author, Plato had already highlighted the importance of learning by playing “in opposition to the use of violence and repression”²⁶. Tizuko states that the idea of using games to foster content learning, appeared in Renaissance, when playing was seen as a free behavior, stimulating learning.

The new concept of childhood appeared in Renaissance, when, according to Tizuko, children aggregated a positive value, expressed spontaneously in games, and is broadened with the Illuminist and Romantic movements. Jean Jacques Rosseau (1712 – 1778), great influence in education, was responsible for translating illuminist concepts into pedagogy, aiming at structuring the basis for a new society. In 1762 he published Emile, or On Education in which he presents concepts on education announcing that it should not impose knowledge but stimulate and cultivate innate skills²⁷.

Rousseau’s thoughts became concrete through the Swiss pedagogue Heinrich Pestalozzi (1746-1827) and his concept of sensorial education. Pestalozzi conceived a new



02. Fröbel’s 7th gift (Produced by Milton Bradley Co., Springfield, Massachusetts, c. 1870).

03. Fröbel’s 8th, 9th and 16th gifts. (Produced by Milton Bradley Co., Springfield, Massachusetts, c. 1880-1900).



educational method which influenced pedagogic movements all over the world. In opposition to traditional methods with their endless lessons and objective assessment, the educator promoted a pedagogy in which children could have an active role, stimulating each student's natural curiosity and individual experiences²⁸. In the text "Pestalozzi in Yverdon" (1932), Walter Benjamin writes a critic review of Pestalozzi's educational Institute called Yverdon. With high appreciation both for his works and also for the educator, recognizing his value for pedagogy, Benjamin writes:

What he gave to children, without whom he could not live, was not his example, but his hand: a stretched hand, to use one of his favorite expressions. This hand was always ready, either when he helped in a game or school work, or when he caressed the front of a child passing by.²⁹

Heinrich Pestalozzi was the greatest influence on Fredrich Fröbel (1782-1852) the German educator who was the first to actually include games as an essential element in pedagogic work. He conceived the concept of Kindergarten and was an trainee in the Yverdon Institute where he could assimilate Pestalozzi's concepts. In his work, The Education of Man (1826), Fröbel highlights the importance of games which, according to him, "must be the discovery of the vital faculty, the impulse for life, products of the plenitude of life, of the joy of living existing in children"³⁰. For Fröbel, games have an intrinsic feature, presented by Huizinga, or even by Winnicott, as children's purest intellectual activity, their vital language. Playing is equally relevant. According to Fröbel, "playing is the most important phase in childhood (...) as it is the auto-active representation of internal processes (...), playing in any time is not trivial, it is highly serious and it has deep meaning"³¹.

Based on an educational philosophy which focuses on children's games, Fröbel devised the "Gifts and Occupations" (*Spielgaben und Beschäftigungsmittel*) approach. Gifts were playful objects like balls, geometric blocks, sticks, and occupations were different handcraft exercises. Although many authors propose a clear and rigid distinction between gifts and occupations, Norman Brosterman, in his book Inventing Kindergarten, insists that Fröbel did not emphasize this distinction, treating them as complementary materials which, together, add up to about twenty different activities.

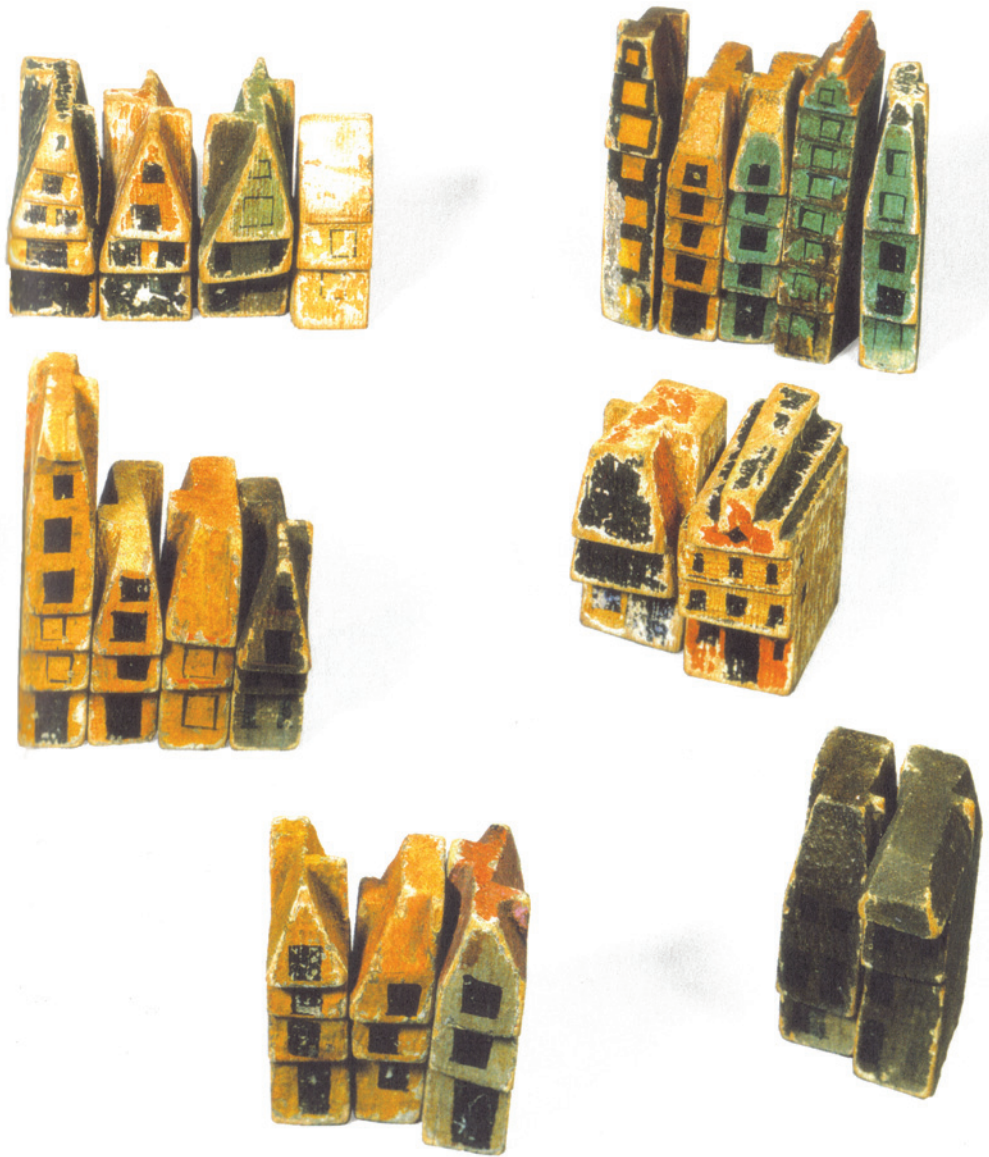
"Fröbel suggests that three aspects of each Gift should be studied: like a form of life (objects from the natural world), like a form of beauty (esthetic forms, symmetry) and like a form of knowledge (concepts of Mathematics, Geometry)"³², gifts and



04. Fröbel's 4th (bottom) and 6th (upper) gifts. (Produced by J. W. Schermerhorn & Co., New York e Milton Bradley Co., Springfield, Massachusetts, c.1880-1900).

occupations were introduced as from two months of age and their complexity increased as the child grew up and the sequence was concluded at the age of six. Besides, the system progressed from the solid to the point, passing by the line and by the plan, and next it went the other way round through tridimensional structures. The aim was that children could learn different forms and their relations, articulating them between themselves and with the space around them, perceived through this dialogue.

Through this material, technically simple, Fröbel created a rich repertoire with which children could investigate, Interact, create and Express themselves. His innovative didactic method inspired a series of educators, like Maria Montessori (1870 – 1952) who, was known for widen the use of games and toys applied to the learning of Mathematics devising the so called *Gold Material*. Also, Fröbel's gifts and occupations influenced the development of countless educational toys which have been part of children's schooling to present days.



01. Toy Town, Lyonel Feininger, 1925-55.

2nd part

The objective of this chapter is to introduce the points of relation between toys and art and architecture. As a first step there is a brief description of the educational toys that influenced the vanguard movement since they were an integral part of many artists' and architects' background. Next, a concise comment on the children's look onto artistic productions is presented and, finally, the names of artists and architects who devoted to the production of toys are listed and related to their complete works.

Considering that playing in art and architecture is an extensive topic, the chapter concentrates on the toys produced by the artists who took part in vanguard movements and were influenced by pedagogical concepts and educational toys reviewed previously. From this standpoint, the examples reckoned as the most significant ones were selected.

the educational toys that influenced the vanguard movements

The pedagogical material proposed by Fröbel, made known by his followers and expanded by other educators that supported the use of games for educational purposes, inspired a series of pedagogical toys and games commercialized in large scale. Many theoreticians, like Norman Brosterman and Juan Bordes, emphasize that these toys and the educational system that spread them, influenced the vanguard movement in art and architecture in a structural way.

In order to exemplify some of the toys, they were divided into two large groups, based in the rank suggested by Bordes in his text "Building the Avant-garde through Play: Nineteenth-century Commercial Toys derived from Educational Programms", (2010).

The first large group encompasses bi-dimensional toys such as diagrams of points, mosaic and boxes with different forms from which drawings could be created. They are toys derived from Fröbel's gifts (like the 7th, 8th, 9th and 14th), and made of various colorful geometrical elements which allowed a series of bi-dimensional compositions. The toys could both follow pre-established suggestions or be new unforeseen creations, giving freedom to children. According to Brosterman, through

these toys not only visual perception is taught but also relations between parts and the whole and basic geometry concepts, such as “the viability of abstraction and fragmentation in the creation of pictures and developed within them what amounted to an entirely new mode of perception”¹.

To the second large group belong the constructive toys or the so called “architectural boxes”². Pestalozzi had already highlighted the pedagogical potential of these types of toys, which stimulate the constructive impulse present in childhood. Constructive blocks were used in many pedagogical systems, both for the creation of forms and to foster mathematical reasoning, like the materials developed by Maria Montessori. According to Bordes, the influence of Fröbel’s gifts (3rd and 6th) pushed a large-scale production of constructive toys as from the second half of the XIX century³. The toys included in this group present the materiality of third dimension, stimulating the relations between the various parts that compose the volume, besides introducing concepts of balance, symmetry and formal decomposition using basic geometrical solids. In addition, with the use of “tables, sticks and rings, drawing, painting, activities with peas and modeling, the artistic powers of men are placed in recreation and link together the architect, the painter, the designer and the sculptor”⁴.

According to Brosterman, the first generation to get in touch with many of these toys, following Fröbel’s pedagogy, was constituted of names that years later would be recognized in the fields of modern art and architecture. The author affirms also that Piet Mondrian (1872-1944), Paul Klee (1879-1940), Wassily Kandinski (1866-1944), Frank Lloyd Wright (1876-1959), Le Corbusier (1887-1965), among others, were educated in Kindergarten, where they had the opportunity to exercise with Fröbel’s gifts. Although this affirmation is more correct for some of these names than for others, Brosterman, like Bordes, believes that the toys mentioned above constituted the basis for the vanguard movements through “an introductory course in the mechanisms of art and architecture”⁵.

Out of the examples mentioned above, the architect Frank Lloyd Wright is the one who establishes the clearest connection between the educational method he underwent in his childhood and his professional development. Besides the writings by the architect himself, included in his books A Testament (1957) and An Autobiography (1943), which describe the decisive elements of kindergarten in his background, the book Frank Lloyd Wright – Graphic Artist (2002), by Penny Flower, detects parallels between the Fröbellian pedagogy and aspects of Wright’s projects.

02. Fröbel's 19th gift (produced by A. N. Myers & Co., London, c.1860) and an English variation of the toy (Joseph, Myers & Co., London, c.1855).

03. German and English toys inspired by Fröbel's gifts (c. 1850-1860).



Flower tells about how Anna and William Wright, Frank Lloyd Wright's parents, were introduced to Fröbel's pedagogy in 1876, and got in touch with his revolutionary concepts, as well as the gifts and occupations, described in this survey previously. Anna was trained as teacher and Frank Lloyd started schooling in a kindergarten. During his life, he recognized the deep influence of the pedagogy practiced by his mother in his talent for design. According to Flower, Wright's contact with Fröbel's pedagogic toys, allowed him to explore basic figures which aroused in the architect the ability to interpret natural forms as geometric compositions. "... Mother found the 'Gifts'. And gifts they were. Along with the gifts was the system, as a basis for design and the elementary geometry behind all natural birth of Form"⁶.

During the early years of his childhood, Wright was already able to compose figures and, according to him, produced designs by using cardboard triangles and wooden blocks. "In the third dimension, the smooth maple blocks became the cube, the sphere and the tetrahedron; all mine to 'play' with"⁷. The architect describes yet how his mother learned with Fröbel that children should not be stimulated to draw casual appearances from nature without having understood before the basic forms behind everything.

For Wright, the virtue of the gifts was in the way they awakened children's mind for the rhythmic structure of nature, giving children an innate sense of cause and effect, which in another way would be away from their comprehension. He quickly became aware of the constructive patterns involved in everything he saw. He learned to see and, when he saw, he did not want to draw casual incidents of nature. "I wanted to design"⁸.

Although the number of artists and architects who actually came into contact with the educational toys proposed by the new pedagogical methods is uncertain, those concepts had great influence on the artistic movements as from the XX century. Next, the convergent points between such movements and the children's world are presented.

the child look and the toy as part of the artistic production

"The artist has to look at everything as though he sees it for the first time: he has to look at life like he did when he was a child and if he loses that faculty, he cannot express himself in an original, that is, personal way"⁹.

In addition to the pedagogical methods and their instruments, which influenced the formation of modern artists and architects as from the XIX century and early days of the XX century, childhood begins to relate to the art world in a more direct way. In search of a truthful, sensitive and immediate way of expressing themselves, artists started to use primitive art and the child look as a source of inspiration. The spontaneity and the vitality present in children's art become a valuable path to the unconscious mind and the dreams what resulted in works free of preconceptions of adult life¹⁰. Charles Baudelaire (1821-1867) in his work The Painter of Modern Art (1863) already brought up the importance of the child look: "genius is nothing but recovered infancy by will"¹¹, identifying a value that later many artists would pursue.

The relevance of the child's look in the art world became evident and was widened by Bauhaus, the most influential and best known school of Architecture and Design in the XX century. Its pedagogic project stimulated experimentation and creativity in production and, in many ways, it was connected with Fröbel's educational principles¹². Founded in 1919, in the city of Weimar, one of the greatest legacies left

by the school was its Basic Course, conceived by Johannes Itten (1888-1967). With the aid of other professors, like Paul Klee and Wassily Kandinsky, the Basic Course introduced at the student's entrance in the school, concepts of composition, color, different material and tridimensional forms, investigating basic forms as primary explorations. Itten, who had already been a primary school teacher, adapted a series of techniques based on children pedagogy in the training of the Bauhaus's students stimulating their creativity through a return to the infancy and through exercises that encouraged elementary exploration of forms and materials converging with ideas from the kindergarten pedagogy.

Alongside the establishment of relations with children's look and with Fröbel's didactic method, the Bauhaus included the design of toys as part of the student's production. The initiative came from Johannes Itten who, in a talk on November 28, 1919, invited the students to create toys. In a letter to the Viennese artist Anna Hollering, Itten describes his speech, which was named "Our game – our festivity - our work" (unser Spiel- unser Fest- unsere Arbeit), and the ideas that motivated it.

Our play – our festivity – our work.

Masters – journeymen – apprentices. Build the Bauhaus – establish – assemble – different forces – unite different forces – organize different forces – organize different forces into a single organism – add the game of forces to harmony, to the festivity.

Play becomes festivity – festivity becomes work – work becomes play. May our play become work and our work become festivity and our festivity become play – this seems to me the perfection of human activity.

Marshalling the play of forces within us – outside of us – in work oblivious to all else, as a festive act – means creating in the fashion of children. [...] Let us transform the great halls of high portraiture into workshops for the people. Let us build toys for the festivity in perfect work. Let us build trees – houses – animals – shepherds – angels – stars – as children for children.

Let us build our house.¹³

In other letters, Itten describes how days evolve in the Bauhaus, dedicated to the production of toys and his objectives with this activity.

I have had the whole Bauhaus under me for a week, because I suggested that we should make toys for the next few weeks. So I struck a powerful blow to the old academic tradition of the nude and drawing from nature and I am leading all creative activity back to its roots, to play.¹⁴

The toys that resulted from the experience were sold in a public Christmas bazaar in Weimar and the revenue was donated to some students. Some of them became icons of the Bauhaus production and the practice of creating toys had an impact on other pedagogical projects of other German schools of design¹⁵.

04. Untitled, Paul Klee, 1923 (replica from 2006-8).



Although Itten did not create any toy, only a bed for his son in 1920, according to Medea Hoch, some of his works have as a main subject the issues related to children's world, as in the case of *Children's Picture*, from 1921. Many other Bauhaus artists designed toys for their children or for their friends' children. The author mentions some examples, like Paul Klee (1879-1940), who made a series of puppets for his son, and other that in the end were produced in scale, like five toys by Alma Siedhoff-Buscher (1899-1944) a former student.

These and other examples of artists who dedicated part of their production mainly for children will be discussed next in a more detailed way. Most of these works, dedicated to the children's world, were toys, capable of communicating the idea that spontaneous expression and recreation had a central role in art. After them, artists reflected on the concepts they pursued in children's way of looking and established a dialogue with childhood itself¹⁶.

Still related to the Bauhaus, the names listed previously, Paul Klee and Alma Siedhoff-Buscher refer to two important examples of names in the art field linked to the design of toys. Klee gave great value to children art, to the point of considering his drawings from childhood as the most significant in his life¹⁷. When his son, Felix, was born in 1907, the artist was even more close to the children world, producing many toys, such as ships, a train station made of cardboard and about fifty puppets. Some of the puppets were created simultaneously to his first sculptures, which reveals that in the same way his works had an impact on the creation of toys, the opposite was also true.

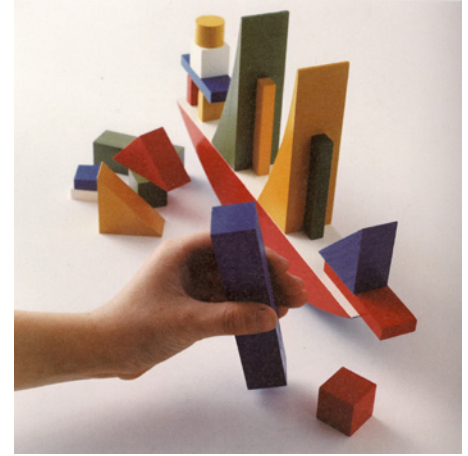
Alma Siedhoff-Buscher, former student at Bauhaus, has a relevant position among the avant-garde artists who were interested in recreation and playing. Between 1923 and 1928 she devoted her work almost exclusively to the theme, through the production



05. Two wooden dolls, Alma Siedhoff-Buscher, 1924.



06. Children playing with toy cabinets designed by Alma Siedhoff-Buscher, 1923-24.



07. Alma Siedhoff-Buscher's constructive toy, 1923 (relaunched in 1977).

of a series of toys and she published some articles about the importance of games¹⁸. Siedhoff-Buscher created, for instance, the so called *free toys* which, in opposition to the purely educational toys, had more color and allowed more figurative setting, and her famous *Wurfpuppe*) which go against the standard perfect untouchable dolls by using a rich variety of materials. Still as a student and architect she designed a series of children's furniture whose main concept was the creation of multifunctional flexible structures, like blocks to be mounted produced in large scale. Yet in the Dessau Bauhaus her works were more concentrated in graphic art, but still having children as their subject. Alma Siedhoff-Buscher's furniture and toys which were first exhibited in exposition Bauhaus Art and Technique- a New Unit (*Kunst und Technik – eine neue Einheit*) in 1923, are among the most successful products by Bauhaus and can be found in many catalogues containing the works realized in the school and also in Bauhaus books. One of her toys, regarded as a modern classic, is still produced by the company *Naef*.

Like Paul Klee, Pablo Picasso (1881-1973) also got involved with children's objects as a result of his relation with children around him. His fascination with children's art, however, was always something latent. According to Christopher Turner, in his text "Childhood Regained: Art Toys for Children", Picasso believed that he had been introduced to academic art prematurely, losing the child's instinctive perception¹⁹. In this sense, in 1956, during a visit to a children's art exhibition, the artist regretted, "when I was the age of these children I could draw like Raphael. It took me many

08. *Horse*, Pablo Picasso, Vallauris, 1960.

09. *Figure*, Pablo Picasso, 1935.



years to learn how to draw like these children”²⁰. Besides his admiration for children’s drawings, Picasso was usually in contact with the children’s world by making drawings, dolls and other toys for his children and even grand children. For Paloma, his daughter, for example, he carved a series of wooden dolls from mounting blocks and, for his grandson Bernard; Picasso made a small table into a toy horse²¹. All these objects bring Picasso’s fingerprint in them, who, on the other hand, sometimes integrated toys in his work.

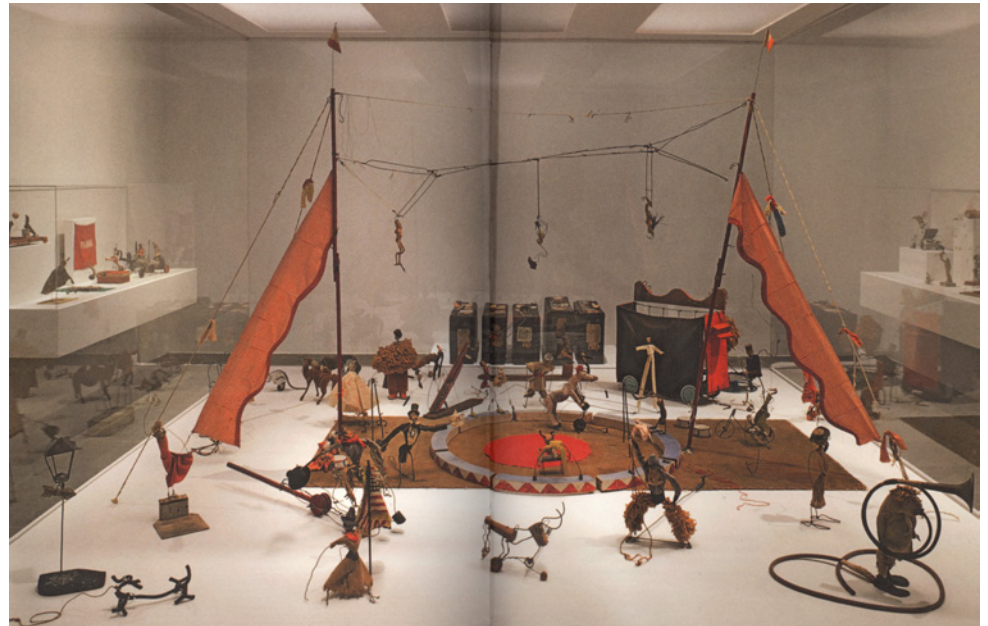
One of the most relevant examples of artists involved in the universe of children is the great sculptor and painter Alexander Calder (1898-1938). In many of his works the limit between art and game is uncertain and the two areas impact on each other. Differently from artists like Picasso and Klee, who created toys for their family children, Calder produced toys commercially. Around 1927, a time when he had not started sculpting, the artist noticed that the creation and sale of toys could mean more significant revenue than his drawings. Relating his newest production to his background as an engineer, Calder opened space in his studio for wire, pocket knives and other tools and put notions of physics and kinetics into practice²².

But it seems that during all of this time I could never forget my training at *Stevens* [Stevens Institute of Technology in New Jersey, where he graduated in engineering in 1919], for I started experimenting with toys in a mechanical way.²³

According to Joan Marter, in her book *Alexander Calder* (1991), Calder's toys bore strongly his artistic production.

They [the toys] are also an important step in the development of his wire sculpture. Through these designs, which were essentially caricatures of animals articulated in wood and wire, he isolated the essential characteristics of the animals to be represented.²⁴

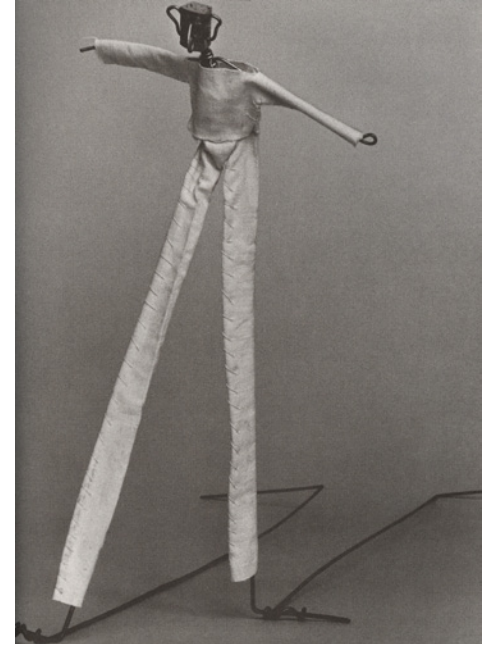
The toys came in handy in Calder's tentative of working with various materials in order to create new sensations and effects. The artist started a discussion around tactile objects, which led those touching them to a series of sensorial experiences. His toys also preceded immediately his first artistic work in large scale, called *Circus* (1926-1931). It is a kinetic and special production, which anticipates years



10. *Circus*, Alexander Calder, 1926-31.

11. Drawings for the *Circus*, Alexander Calder, 1926-32.

12. Figure from the *Circus*, Alexander Calder, Martin W. Schwartz, 1937.



of experimentation with kinetic elements. “The tiny articulated figures interact with one another or perform independently in constantly changing spatial relationships (...) The use of chance, surprise, and suspense, inherent in circus performances, is found also in the wind-driven mobiles”²⁵. Circus was Calder’s first work to attract considerable attention from critics who then showed interest in his other works. In a movie performance of 1961, Calder interacts with his work playing with the elements of his circus like a child and giving life to the different characters around him²⁶.

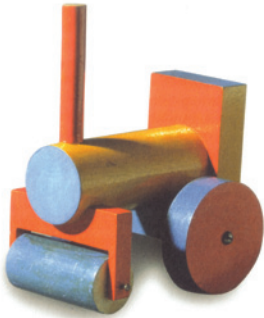
In the text “*Calder and the alchemy of balance*” by Ferreira Gullar, present in *Calder no Brasil: crônica de uma amizade [Calder in Brazil: chronicle of a friendship]* (2006), the writer starts by criticizing people who are unable to value Calder’s work properly. And, as an answer to the usual argument that Calder’s works “look like toys, a child’s thing”, and therefore losing their relevance as sculptures, Gullar counter arguments:

The amount of prejudice implicit in this answer is amazing. The person who says that is tied to empty words. Never have they inquired really the meaning of the word sculpture and what purpose does this word have for the appreciation of a work of art. Never have they tried to see in

children's toys, the meaning that transcends the apparent simplicity. [...] It is appropriate to say that children are not so simplistic and, more than us, grownups, marvel at the apparently insignificant facts in the world, at the gratuity of its forms and movements. They are much closer than us to primary experience, which is the source of all art.²⁷

The German American painter Lyonel Feininger (1871-1956) is another example of an artist who experimented with the creation of toys. His most important creation, *Toy Town* was made as a present for his three children. It is a set of many little houses and narrow buildings with chimneys and inclined roofs inhabited by weird creatures with expressive facial traces. All the elements were sculpted rustically and painted in various colors, generating a little expressionist scenario²⁸. According to Turner, the artist's attempts in the area of toys were not only a tool to stimulate his children's imagination but also a source of inspiration for his own artistic work, serving as experiments in geometry, color and space²⁹. The author draws attention to the very case of "City of Toys" which looks like a tridimensional version of one of his paintings, by the words of one of Feininger's children, who wrote: "the toys an artist has fashioned may serve to gain an insight into the formal ideas of their creator"³⁰.

13. Steamroller and little steam train, Ladislav Sutnar, 1927.



Another great representative of the avant-garde movement who was deeply involved with the children's world was Ladislav Sutnar (1897-1976). In the text "Mental Vitamins for the future- Ladislav Sutnar Toys", Iva Knoblock describes the production dedicated to children by the versatile Czech American artist, architect and designer which, according to the author, summarizes the avant- garde features of his works³¹. His toys are totally inserted in his perception of modern life as well as in his ideal for the future of society. Sutnar considered the works dedicated to children as the most beneficial for society, since they aimed at the future of humanity.

With the purpose of reflecting Sutnar's questions about modernity, his toys were conceived in a way to reduce the costs of production, making it easy mass commercialization. Also, the artist believed in active playing and in the development of the intellectual capacity, imagination and sensorial abilities through his toys, "mental vitamins necessary to the right development of a child...happy childhood = self-confidence"³². For all his career and particularly in the twenties, Sutnar was involved in the development of puppet theatres, moving toys, constructive sets of architectural blocks and others.

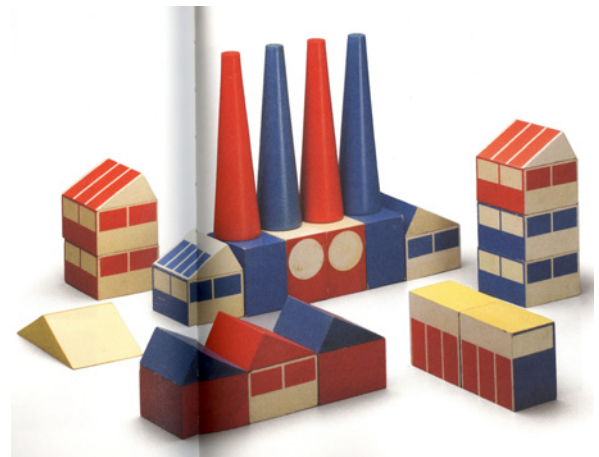
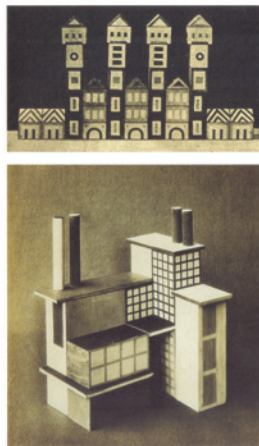
Among the best known of Ladislav Sutnar's toys are the sets of constructive blocks. The set Factory Town was developed in two versions, during the first half of the twenties. Designed for mass production, the set brought the modern concept of pre-fabricated houses through module blocks that allowed countless combinations and an exercise in the notion of space. Factory Town is regarded as the most important constructive set designed artists, architects and designers in the twentieth century³³. Years later, when he lived in New York, the artist worked on a constructive set called "Build the Town. Even though this project has remained only a prototype, its many drawings and study experiments widened even more the repertoire developed in "Factory Town" giving large recognition to Sutnar's constructive sets.

Like Sutnar and Calder, the Uruguayan artist Joaquin Torres-García (1874-1949) designed toys that were produced in large scale. Compared to the rest of his works, however, his production dedicated to children did not receive recognition but the artist did not discriminate them amid his other works, stressing the mutual influence of the different areas. "On some occasions it is difficult to state whether it was a painting that determined the final structure of a toy or whether the toy evolved into a sculpture or suggested a canvas"³⁴.

He started to create toys in the beginning of the twenties, observing his own children and his art students in Barcelona. Through his experience as a teacher, Torres-García got acquainted with Fröbel's concepts, developing his toys bearing them in mind. By

14. Projects from Ladislav Sutnar for constructive toys.

15. "Building the Town", Ladislav Sutnar, 1943.



16. Dog toy, Joaquín Torres-García, 1924 -1928.

17. Birds toy, Joaquín Torres-García, 1927-28.



observing, the artist noticed that toys were an interesting support for research and creation. And, although the economic potential of toys pushed him to design more toys, his enthusiasm for the practice was certainly present in the process. In a letter to a friend he wrote: “Finally I believe that I will have found something that, despite the fact that it pays – if it does – will make me happy doing it”³⁵.

His objective was to create toys that worked like tools for children’s perception. In other words, by using them children could get hold of the world around them. His so called “transformable toys” are creatures divided into pieces that can be reorganized and combined in such a way that the child can create their own toy and understand how it works. In spite of being more figurative pedagogical toys than other examples, their possibility of deconstruction and interaction did not limit the child’s imagination. Thanks to their relevance, Torres-García’s toys were central elements in exhibitions of his works and replicates are sold until nowadays.

Although it is an example out of the context of the other artists presented here, the works by the Brazilian painter and sculptor Lygia Clark (1920-1988) present a close

relation with toys and are worth discussing here. She took part in the neo concrete movement in the late sixties. It has been suggested that the point of convergence between her works and toys can be found in the way she fosters an active interaction of the public with them, which depend on that action. The artist writes:

We are the proposers.

We are the proposers: we are the mold; the breath inside this mold is up to you: the purpose of our existence.

We are the proposers: our proposition is the dialogue. Alone we do not exist; we are at your disposition.

We are proposers: we buried “the work of art” as such and we ask you to make the thought live through action.

We are proposers: we do not propose you either the past or the future, but “he now”.³⁶

The reference above could easily be applied to the case of toys, which are dependent on the children’s playful action. The artist, Torres-García had already drawn the attention to children’s characteristic of connecting to the present, justifying the need to make toys dialogue with what is present, as Clark writes, for children, the past is not important. As for the importance of the role of agent, who bring meaning to her work, the artist reveals:

What is, then, the role of the artist? To give to the participant the object which does not have any importance in itself, and that will only have as the participant acts. It is like an egg that only reveals its substance when we open it.³⁷

Once more her sayings meet the purpose of the toy. The possibility of relation, however, is only a suggestion that goes beyond the scope of this survey. While, in an isolated way, her works and quotations can be related to the toys, Clark’s later works qualify her to another level. In other words, when analyzed as a whole, with her studies and previous production, her works gain a new and wider understanding, which depends on an examination exterior to them.

18. Children interacting with works by Lygia Clark on exhibition in Rio de Janeiro, 1986.



The relations between toys, art and architecture can be found in many other examples. Even though the present chapter focuses on artists, architects and designers who had part of their production devoted to the creation of toys, most of them educational, the children's world can be connected to these areas from different viewpoints. The role of playing in art and in architecture is a considerably large field, with many possible approaches, such as the production of toys in urban scale, the relation between constructive toys and architectural volumetric studies, the points of convergence between toys and interactive works of art, among others.

The examples mentioned in this chapter are some of the cases, which illustrate the value of toys in the artistic field. This universe, though, could give room to many possibilities of research, with different approaches and objectives. As a study constrained by time limit, the purpose of this chapter was to present repertoire for the comprehension of the importance of toys creation and their relations with other types of artistic productions in order to come close to the toys designed by Charles and Ray Eames, focus of this survey.



01. Some cards from the *Picture Deck*, toy *House of Cards* (1952).

3rd Part

In this chapter, the focus of this survey is reached. It brings the research done about the work of the designers Charles and Ray Eames with special emphasis on the toys they produced. Even though the toys are not among their most recognized works, it is possible to relate them not only with their other works, but also with their background, their production method and their concept of art and design. So, taking these specific objects as a starting point, understanding relevant aspects of their production and identifying the importance of their toy projects is the aim of this part. After a brief description of the couple's background and their production method, an index of their toys and other related works, as well as analyses of three of their toys, are presented.

Charles and Ray Eames' Office and their Toys

Charles and Ray Eames have a central position in the history of American design. Considered two of the most important designers of the XX century, the couple ran an active office from 1941 to 1978. Nourished by the post war era, their production was inserted in the new way of life, not only in the United States but in California where the *Eames Office* was established. There, they could combine home and work, internal and external spaces, contemporary technology and traditional handicraft. In this historic context, concepts like flexibility and fast construction had a structural impact on the couple's concept of design, a modern model with quality, industrializable and low cost.

Although Charles and Ray Eames' work became Best known in furniture, their office produced work includes, besides furniture, architectural projects, graphic design projects, talks, exhibitions, films and toys.

The variety of their production can be explained partially by their different background. Charles studied architecture at Washington University, where he did not feel perfectly adequate because he objected to the restrictive curriculum based on the Beaux Arts School. After graduating, he set his own office with partners and designed various buildings. In 1938, he received from the director of the Cranbrook Academy of Art in Michigan, Eliel Saarinen, Finnish architect who was impressed by Charles' work, a scholarship for the Architecture and Urban Plan program¹. In Cranbrook, in

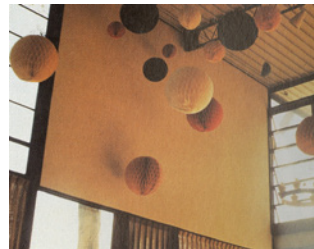
1940, Charles met Ray Kaiser. At the time Charles was the new head of the Industrial Design department, and Ray, was interested in everything related to design. Before arriving in Cranbrook, Ray had an artistic background that started at the May Friend Bennet School in Millbrook, New York, and went on in Manhattan with the classes she had with Hans Hoffmann. In 1936, Ray joined the group American Abstract Artists (AAA) that presented in yearly exhibitions works by Josef Albers, Piet Mondrian and Fernand Léger among others. In Cranbrook, Charles and Ray's relationship evolved from teacher- student to something collaborative and in 1941 they got married and moved to California where they started the Eames Office.

The complexity and ambiguity in the couple's work result from the intersection of their background. Their talent, even in different directions, merged in the same point². So the collaborative feature of their production was enriched by the subjects they added and complemented. Ray's concept of modernism, rooted in artistic abstraction, blended with Charles' that was based on his knowledge of industrial design.

As their grandson Eames Demetrios has said, "Charles saw everything as an extension of architecture and Ray saw everything as an extension of painting". He was interested in systems and structure, and while he structured the problem (and even the structure), she spatialized the structure, bringing it out of the coolness of reason into the space and tactility of the viewer.³

Besides the cross curricular character of their production, allowed by the fusion mentioned above, another factor contributes to the understanding of the significance of toys in their work, the way they produced. Both believed in an intense rhythm of production, though in an atmosphere of feast, which blurred the limits between work and pleasure⁴. The approach work/play permeated everything they produced, making Charles' phrase famous: "We have to take pleasure seriously"⁵.

02. Eames's living room during the fifties.





03. Decorated tree in front of the house of Charles and Ray Eames.

Despite the thin line that divided recreation and work inside the Office, their team worked frantically. Charles and Ray thought of work all the time, relating experiments of everyday life with their projects. In addition, they tried not to keep formal divisions between different projects so that enriching relations could be promoted in the Office.

In the Eames Office, experimentation was the usual way to get to the result and, many times, learning happened through the trial and error practice. According to Pat Kirkham, author of the book Charles and Ray Eames: designers of the twentieth century (1995), the base of the Office was this approach to problems, learning by doing, which was in accordance to the ideas of the English architect William Lethaby (1857-1931) who argued in favor of practice in the learning of design⁶. Yet the author relates Charles and Ray's office with the notion of school by the educator John Dewey (1857-1931) a community where learning happens through the practice of trial and error⁷.

Fundamental for the comprehension of the Eames Office's production method and its relation with toys, the book An Eames Primer, published in 2001 by Charles' grandson, Eames Demetrios, it discourses about the method of work and the life of the designers, based on memories of the people who were close to the couple. Full of peculiarities that illustrate the atmosphere in the office, the book brings examples like Charles and Ray's habit of collecting "good things". Drawers and drawers full of surprising objects which were used as sources for various types of projects, like films, exhibitions, photographs. Those objects were not necessarily expensive or cheap and, although eclectic, were not randomized. There were things like pieces of sample paper, pens, shells, bids and a million of other things⁸. These collections represented a repertoire which was connected with the office history and production.

The value given to everyday objects, is related to the office creative process which added to experimentation and lively atmosphere make the basis to the Eames Office project development style. In this context one can understand the relevance given to toys, which represent a structural support for one of the main functions of Charles and Ray Eames. According to Kirkham, the designers play the role of educators, extremely devoted to the communication of ideas.

The development of toys becomes, thus, something coherent in the couple's production. Demetrios highlights the fact that toys appeared all the time in the Eames work. He takes Charles' statement "toys are not really as innocent as they look. Toys



04. Ray Eames experimenting with building blocks, 1953.

and games are the preludes to serious ideas”⁹, to justify the designers fascination for toys. Charles and Ray collected them, used them in projects and in films and, many times liked to have them in the office, as a source of inspiration. The couple had a deep admiration for everything that, through the creator’s intense work and discipline, enabled a spontaneous and natural experience to the user.

The couple ‘s pleasure with toys was related to their sense of entertainment and to their belief in learning by playing. According to Kirkham, Charles and Ray Eames’ toys encouraged the expansion of children’s imagination and mental potential, as well as their practical skills¹⁰. They aimed at stimulating creativity, discovering materials and the countless possibilities of setting, asking for action, participation and responsibility for the final result on the part of the child. Based on the Pestalozzi’s and Fröbel’s precepts which were familiar to the Eames, toys instill individual participation as they are not finished products, but a starting point, a support to creation.

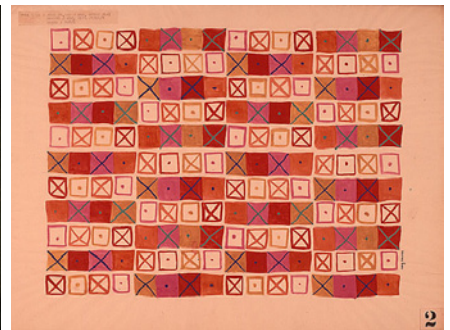
Besides the communicative function present in toys, they fit the couple’s idea that design is the unlimited rearrangement of different parts¹¹. Above all, toys represented not only their method of production but also the problem itself.

Eames once said that in the “world of toys he saw an ideal attitude for approaching the problems of design, because the world of the child lacks self-consciousness and embarrassment”. In Eames architecture everything is a toy, everybody is a child.¹²

Toys stress, as a result, a series of relevant aspects in Charles and Ray Eames’ works. Although they are not the main focus of attention around the couple, such objects, as

05. Covers for the magazine *Arts & Architecture*, Ray Eames, 1942-44.

06. Fabric pattern created by Ray Eames, 1945.



well as playing, are central in the couple's creative process. Next comes the register which describes in chronological order, all the toys and related projects produced by the Eames Office. The main source used was the work Eames design: the work of the office of Charles and Ray Eames (1989) written by John and Marilyn Neuhart and Ray Eames. With the objective of studying some of the most significant toys in a more carefully, an analysis of three of them was done as follows.

list of toys and related works of Charles e Ray Eames

Name	Year	Final stage
1. Furniture for children (p.41)	1945	5000 pieces produced and sold until 1947. Some pieces were part of exhibitions.
2. Plywood Animals (p.41)	1945	Only 5 prototypes were produced in wood. Some pieces were part of exhibitions.
3. <i>Toy Masks</i> (p.42)	1950	Prototype stage. They were not produced on a large scale.
4. <i>The Toy</i> (p.43)	1951	Produced and marketed by <i>Tigrett Enterprises</i> until 1961.
5. <i>The Little Toy</i> (p.44)	1952	Produced and marketed by <i>Tigrett Enterprises</i> until 1961.
6. <i>House of Cards</i> (p.45)	1952	Printed by the <i>American Playing Card</i> and marketed by <i>Tigrett Enterprises</i> until 1961.
7. <i>Giant House of Cards</i> (p.46)	1953	Produced and marketed by <i>Tigrett Enterprises</i> until 1961.
8. <i>The Coloring Toy</i> (p.46)	1955	Produced and marketed by <i>Tigrett Enterprises</i> until 1961.
9. <i>Alcoa Solar Do-Nothing Machine</i> (p.47)	1957	Was not produced or marketed on a large scale. Used in advertising campaigns <i>Alcoa</i> between 1957 and 1958.
10. Film: <i>Toccata for Toy Trains</i> (p.48)	1957	The film won a number of awards at festivals and continues in open circulation.
11. <i>Revell Toy House</i> (p.48)	1959	Prototype stage. <i>The Herman Miller Furniture Company</i> produced its own kit on a different scale.
12. Film: <i>Tops</i> (p.49)	1969	The film is in open circulation.
13. <i>Computer House of Cards</i> (p.49)	1970	Printed by the <i>American Playing Card</i> and freely distributed by IBM.



07. Chairs from the children furniture.

1. Furniture for children (1945)

Charles and Ray Eames produced a series of children's furniture, benches, chairs and tables, in plywood. The chairs were composed of two parts, the seat and the back, and its legs were designed with a double curvature, with the aim of strengthening the mobile. The benches and tables were made from a single piece of laminate. The furniture was made in natural wood color and other colors such as red, yellow, blue, black and magenta.

About five thousand chairs and benches were produced by the *Molded Plywood Division of Evans Products*. The pieces were sold in some stores between 1946 and 1947, however the production was discontinued due to the difficulty of marketing. Some copies came in the Eames's furniture exhibition at the Museum of Modern Art in New York in 1946.

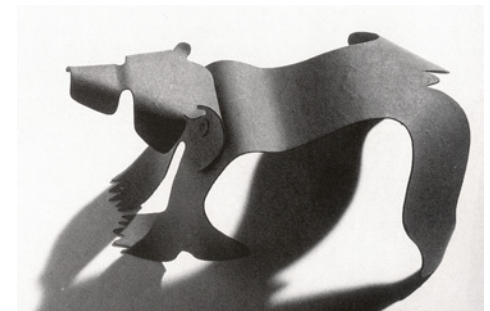
2. Molded Plywood Animals (1945)

The animals were part of the experiments with molded plywood and served as toys or children's furniture. The techniques used in other furniture could easily be adapted to four-legged animals, increasing the possibilities of experimentation with the equipment and machinery. Children could climb on top of the animals, carry them and stack them easily. The frog, bear, horse and seal were first shaped on molded metal and the elephant on cardboard. Two plywood prototypes from the elephant and three from the horse were produced. The elephant was part of the Eames furniture exhibition at the Museum of Modern Art in New York in 1946, but the original animals were never produced or marketed on a large scale.



08. Plywood elephant model.

09. Bear's metal prototypes.





10. Prototypes of rooster and eagle masks.

3. Toy Mask (1950)

The masks were the first toys designed by the Office for mass production. From the late forties to early fifties the Eames experimented with a number of masks on exhibits, photographs and theatrical productions with friends. Other experimental work done in these years was the projection of drawings (including drawings of the artist Saul Steinberg) on the faces of people, with the goal of creating a mixture of two-dimensional image with three-dimensional shape, such as a mask.

The masks were made of paper and cardboard, representing animals in a very colorful way and often big enough to form an entire fantasy. Papers in vibrant colors were added to the basic model of cardboard.

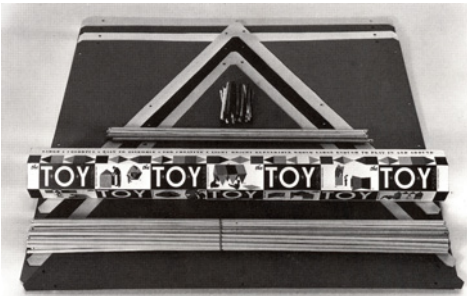
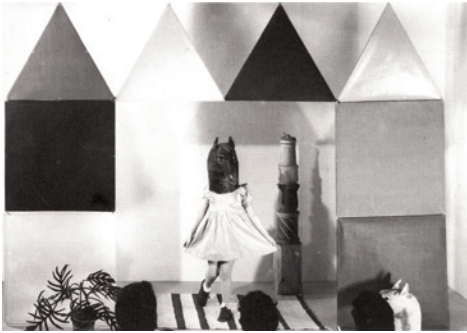
The toy industry *Tigrett Enterprises* wanted to produce the masks on a large scale and sell them as kits that could be colored and assembled by the buyer. However, the masks stopped in development stage.

11. Colorful studies for the mask's design.

12. Child wearing a bird mask.

13. Child wearing a frog mask.





- 14. The toy assembled as a setting.
- 15. The packaging and toy content.

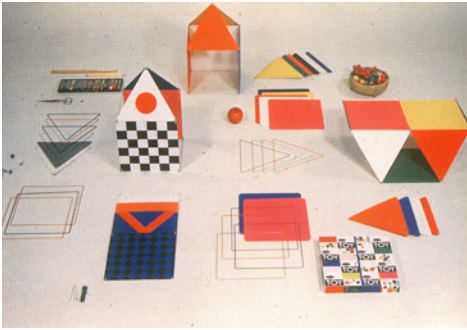
4. *The Toy* (1951)

The Toy was developed for adults, teens and children to create different objects, open or closed scenarios, decoration elements, tents, houses and so on. It was made of geometric panels (four squares and four triangles) which, according to the label, were “Large-Colorful-Easy to Assemble - For Creating A Light, Bright World Expandable Large Enough to Play In and Around”. Besides the square and triangular panels of vibrant colors (yellow, red, green, blue, magenta and black) the packaging included wooden rods with holes at the ends and small connectors, which were passed through the holes and bent to join the panels. The panels were made of water-resistant coated paper. The components of *The Toy* could be easily assembled in different ways to create architectural environments, open or closed.

At first the packaging was a large flat box, so it could fit the large rigid panels. After a change, the packaging turned into a cardboard hexagonal tube and the panels, now flexible, could be folded into the tube. *The Toy* was produced by *Tigrett Enterprises* until 1961 and was featured in a review article in *Life* magazine in July 1951. This was the couple’s second toy project and the first to be industrialized and sold in the market.

- 16. Assembling the toy.





17. Components of the toy.

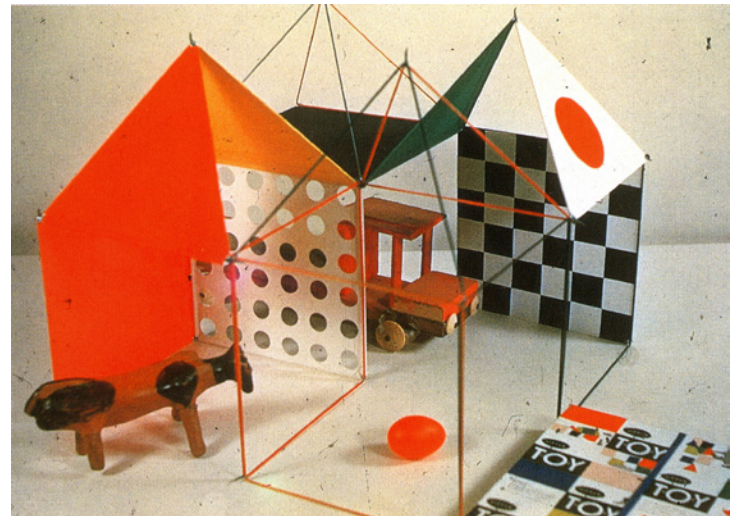
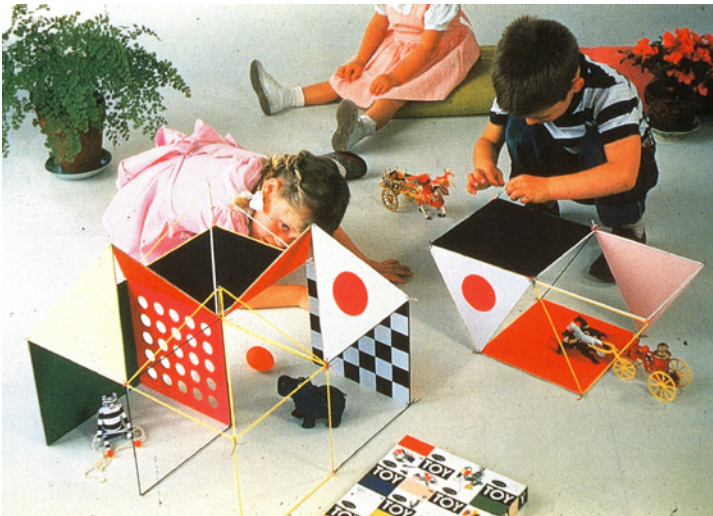
5. *The Little Toy* (1952)

The Little Toy was a smaller variation of *The Toy*. While its predecessor was designed as a constructive toy made for children and adults to play in it, *The Little Toy* was designed to play with it, building small houses, tents etc., which could be used in conjunction with other toys. *The Little Toy* consisted of geometric panels of rigid cardboard (square and triangular) with holes at the ends, triangular and square metal frames and colored connectors. The frames and panels could be attached through connectors forming a series of structures and objects. The panels came in different colors, some had a geometric impression and others were bored. *The Toy* was produced by *Tigrett Enterprises* until 1961.

The Little Toy was an expression of the couple's interest in structures and modular spaces and in the adaptation of easily available materials to new and different uses. Furthermore, the toy expresses the closeness of the Eames with the shapes and the graphics of circus.

18. Assembling the toy.

19. Interaction of the constructions with other toys.





20. Some cards from *Pattern Deck*.

6. *House of Cards* (1952)

The Eames's most famous toy consists of two sets of 54 playing cards. One of the sets has on one of its faces, a pattern or a texture, photographed from colored papers, fabrics, Japanese papers, etc... It was called "Pattern Deck" and this was the first set to be produced. In the second, "Picture Deck" were printed images of "good things", collected from numerous sources such as: "family and nostalgic objects from the animal kingdom, mineral and vegetable", including toys, household utensils (scissors, buttons) coins, jewelry, etc.. On the other side of the two sets were printed stars, the office symbol. In the first case the star was printed in black and the second in green.

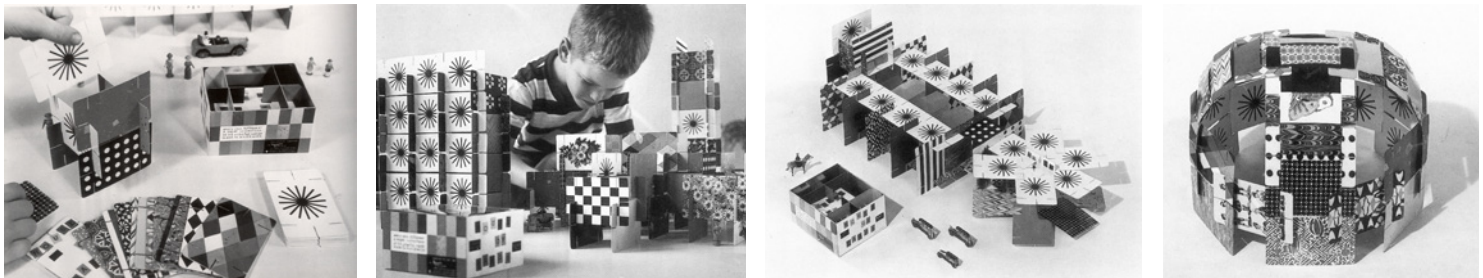
All cards had a cut on each of its short sides and two smaller cuts in each of its long sides, so that they could be slotted creating three-dimensional structures of various sizes and formats.

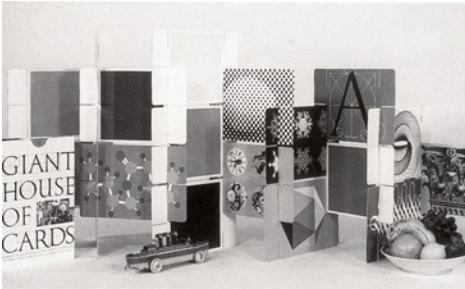
The objects and patterns photographed were chosen from numerous sources. Ray, the office staff and the artist Alexandre Girard made the selections. The final choice was in the hands of Girard.

House of Cards was printed by *American Playing Cards* and distributed by *Tigrett Enterprises*. The original cards, which eventually were sold with two sets together in a box designed by the office, were produced until 1961. The German company, *Otto Maier*, produced a selection of 32 cards, larger than the original and that mixed the two sets.

Note: The book *Eames Design: the work of the office of Charles and Ray Eames* contains a complete description of the images of all the cards.

21. Several construct ways with *The House of Cards*.





22. *Giant House of Cards's* structure.

23. Child playing with *The Coloring Toy*.

24. Top photo of the toy packaging.



7. *Giant House of Cards* (1953)

The Giant House of Cards is a larger scale of *House of Cards*. In this case, these were 20 cards (18 cm X 28 cm) made of cardboard. Because they were larger and more rigid, these cards allowed more elaborate constructions. Each card had a print of a graphic image, drawing or photograph. “Colorful panels to build with; each with a design taken from the graphic arts, the sciences, the world around us.” On the other side of the cards were printed squares of bright colors, chosen by Alexander Girard. Its size also allowed other toys and objects in the constructions. *The Giant House of Cards* was produced by *Tigrett Enterprises* until 1961.

8. *The Coloring Toy* (1955)

The *Coloring Toy* was designed by *Tigrett Enterprises* and contained sheets of cardboard, with different draw contours, wax chalks and thumbtacks. The contours should be colored, detached and stuck together with thumbtacks to create different figures, abstract or real, three-dimensional objects and structures. *The Coloring Toy* was a maturing of the *Toy Masks*, designed in 1950. In the “note to parents” in the instructions, Charles says that the toy has no intention of turning children into artists or teaching them to play, since children are much more advanced than us in these aspects. In fact, they wanted to stimulate the use of these and other materials in variable ways. In addition, *The Coloring Toy* provides a journey through the world of color, design, shapes and play, a world discovered and rediscovered by the children as part of their own creations.





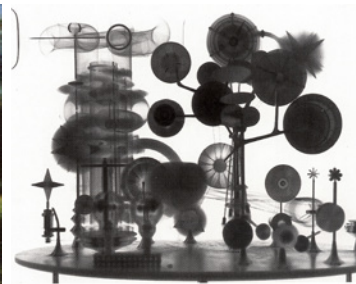
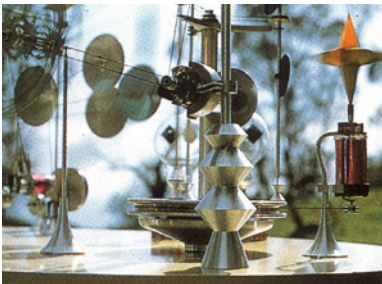
25. *Solar Do-Nothing Machine.*

26. Charles with the toy.

27. Two details of the toy.

28. The toy in motion.

29. Early study drawing of the toy.



9. *Alcoa Solar Do-Nothing Machine (1957)*

In 1957 *Alcoa (Aluminum Company of America)* promoted an advertising campaign called “Forecast Program” and invited various artists and designers to help to promote the use of aluminum, creating new aluminum products for publicity photos. The Eames Office was asked specifically to design a aluminum toy. The starting point of the project was the interaction of aluminum with light and solar energy production through the reflective properties of aluminum.

The first model had a aluminum reflector to heat the water and the steam droved a motor that turned different components of the toy. Then, Eddie Lipps, engineer and friend of the couple, introduced them to photovoltaic’s panels, which simplified the problems of power supply.. After months of experimentation the office created *Solar Do-Nothing Machine*, an object capable of converting solar energy into electrical energy that moved the devices in the toy.

The solar toy consisted of an aluminum platform that supported ten small structures with circles and stars on the ends. A polished aluminum reflector captured sunlight and reflected in the panels of photovoltaic cells, converting it into electricity. The energy conducted six small motors 1.5V (positioned on aluminum pedestals) that made a series of pulleys and sheaves start spinning.

While the toy did not have a utility, and neither were a product to be placed on the market, it was of great importance as a trial of the potential union between solar and aluminum. The solar machine was used in the *Alcoa* campaign between 1957-1958 in a variety of journals.



30. Charles and Ray in the studio in their house with the toys used in the filming.

10. Film: *Toccata for Toy Trains* (1957)

In the fourteen minutes short-film, the toys play the central role. Toy trains of different sizes, times, styles and materials, tell the simple story of a journey, through cities, fields and railways until the arrival at the station.

The toys, not only trains but also people, trees and so on, came from various collections and were pushed manually during filming to achieve the movement effect.

The film won a number of awards at festivals such as the *International Film Festival of Edinburgh*, in 1957, the *Melbourne Film Festival* in 1958 and the *American Film Festival* in 1959. The film is in open circulation.

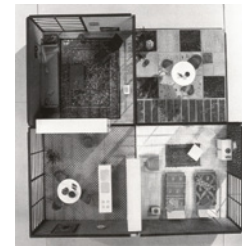
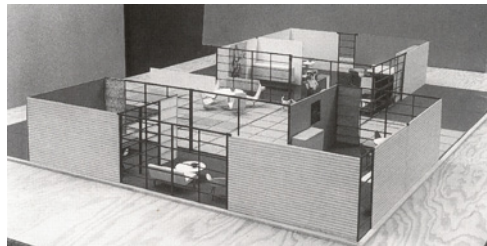
11. *Revell Toy House* (1959)

The Revell Toy House was designed by the toy industry *Revell Company*. It was a 3/4-inch scale model of a full house furnished with miniature furniture designed by the Eames. The company had intended to include in its product line “a modern toy house.” The idea was to create a system of modular panels and structural plastic grids. Different rooms and spaces could be created through the same elements in a house with one or two floors. The prototype was developed with plastic chairs, circular tables, sofas, compact Case Goods units and miniature rugs, plants, grass and other decorative objects. It was decided that the final kit would be done at scale 1in - 1m but the production of the toy by Revell went no further, since Charles found that there were many unresolved problems and difficulties in the project. *The Herman Miller Furniture Company* produced its own kit on a scale 1/2 inch in order to use it as a planning tool for layout and display of furniture.

31. Toy model.

32. Toy model seen from above.

33. Final prototype of the modular units.





34. Picture from the film *Tops*, 1969.

12. *Film: Tops (1969)*

The film *Tops* recorded scenes inspired by the art and craft of tops. During the short film, 123 tops of various sizes, materials, countries and times were rotated.

Throughout the film, Charles wanted to demonstrate his fascination for turnover tops, the beauty and physical actions of his movement, the universality of these toys and their close relationship with science.

The couple was assembling a collection of tops for many years and some were borrowed from other collections for the Film.

The film is in open circulation.

35. Card's images from *Computer House of Cards*.



13. *Computer House of Cards (1970)*

The toy was produced to be offered as a gift from the IBM Pavilion at the World Fair in Osaka, Japan and it's inspiration for the toy came from the couple's film "The Computer Glossary". Images of various elements and parts contained in a computer were amplified creating patterns, following the idea used in the original version of the toy, *The House of Cards*. The format was the same and the fifty-six cards were accompanied by a small introductory pamphlet with explanations revealing the origin of images.

The toy serves as a good glossary of technical terminology of the early seventies electronic computers. Additionally, the cards were an example of the practice of Charles in seeking an aesthetic pleasure in different disciplines. IBM used the toy, which was produced by the same company as *The House of Cards*, for many years as a gift for customers.

Note: The book *Eames Design: the work of the office of Charles and Ray Eames* contains a complete description of the images of all the cards.

three toys

three toys

The first toy analyzed was called *Toy Masks*. Although its project stopped in the development and experimentation phase, it is an important example in the Eames' production. Besides having been the first toy by the couple, conceived to be produced in large scale, investigations about its creation bring a series of relevant characteristics of playing, of its creation methodology and of the combination of different areas in one project.

The use of masks in recreation is certainly linked to two of the main features of games pointed out by Johan Huizinga. The first one is the fact that games happen in a place out of real life. "Games are an evasion from real life, to a temporary sphere of activity with its own orientation"¹³. Games are presented as a break in our everyday life, they become, however, a complement, a follow up, an integral part of life in general. As a result, being in a new world, in which identities can be totally inverted and transformed, is part of the playing universe. The second feature related to the use of masks is in the mystery involved in the game. According to Huizinga, this is an exceptional character of the game that can reinforce its fascination as it becomes a secret.

Here the "extra- ordinary" nature of games reaches its Best. A disguised or masqueraded person plays a role as if they were another person, or else, they are another person. The childhood terrors, joy, mystical fantasy and sacred rituals are entangled in this strange world of disguise and mask.¹⁴

Masks are inserted in the wide territory of *make believe*, game present not only in the children's sphere but frequently in adult entertainment. The Eames couple gets hold of the mystery of games and creates masks that, in many cases, are complete fancy dresses that take the user to a world out of everyday life.

The idea of masks came as an answer to the couple's wish to allow and provide opportunities for children's free expression and encourage it in adults' activities. They also reflect the designers' interest for ritual and for performance.

Charles and Ray's fascination with masks, masking, and masquerade relates particularly to their love and appreciation of popular play traditions, the entertainment and celebratory aspects of which foregrounded the visual (and often also the spectacular and the comic) rather than the verbal. (...)

36. Ray and a friend using Chinese masks.

37. Projection of a Saul Steinberg's drawing in the face of his wife Hedda Sterne, and beside, the original drawing. Part of experiments on the mask's creation.



The Eames enjoyed performances that featured non-verbal expression, spectacle, and pleasure.¹⁵

The Eames had their own collection of masks and explored this concept also in facial painting that changes the human face in a simple way, creating from this support, new drawings¹⁶. Before they actually started with the masks project, during the forties and fifties studied means of reproduction and image composition using, in many cases, projections. With exhibitions, photographs and theatre plays that entertained the couple and those around them, the couple experimented with the concept of personal identity transformation through new images and forms.

Among the various studies realized by Charles and Ray Eames around masks, one of the most interesting is a projection of drawings onto people's faces by using transparencies. The activity was extremely enjoyable and made it possible to research the relation between the bi-dimensional image with the tridimensional form. In one of these episodes, recorded by Charles, a drawing by the artist Saul Steinberg was used on his wife's face. The apparently simple experiment, generated an interesting effect that served as support for their later creations.

In 1950 the investigations realized in a relaxed unpretentious atmosphere, like recreation, stimulated the creation of a project in which the changing of identity happened in a more direct way. Before their decision to design masks for mass production, they had already experimented with their own collection and with masks they had produced for events in which they performed with their friends. Although the toy company *Tigrett Enterprises* had shown interest in the production of the masks, the project did not go further than the production of the prototypes. Made of

colorful cardboard and paper, they included a frog, a cat, a rooster, a giraffe, an eagle, an owl, a turtle, some fishes and birds, a dragon and a big face of clown.

Using the Brougère chart to analyze the characteristic of masks and organize them in two big groups¹⁷. The first group takes into consideration the material aspect of the toy: form/ design, color, tactile aspects, smell, sound and production of sound.

Light materials, like cardboard and paper, were chosen so that children could mount and handle the mask easily, encouraging their participation. Its surface is predominantly smooth, except for the inclusion of some materials on the surface to add differences that are sensitive to touch. Lively colors that make the masks attractive and foster interaction were used. The vibrant colors, the expressive forms and the remarkable size attract the user and provoke sensorial stimulation that goes beyond sight.

The relevance of the use of senses through the materiality of the masks is that they arouse senses, like touch, hearing and smell rather than through the use of a structure that covers the whole head and, many times, even the body like the sensorial masks



38. The office staff using prototypes from cardboard masks.



39. *Máscaras sensoriais* (Sensorial masks), Lygia Clark, 1967, in an exhibition in Rio de Janeiro, 1986.

produced in 1960 by Lygia Clark¹⁸. Covering the part of the body which is responsible for most of the human senses, masks aim at stimulate the user's perceptions which are less used because of the excessive use of sight.

Besides the sensorial stimulation, the masks created by the Eames couple reflect their interest in the psychological complexity of identity and in the possibility of transformation through disguise. So, they offer a consistent support for the creation of new characters, new images and new contexts, through which children can get to know themselves and the world around them, and construct their own identity.

So, the next step is to examine the second large group in the chart of toys and their significance. Masks represent a given reality, a modified and adapted reality with the added imaginary factor. Charles and Ray's mask of a frog is not a real frog but the materialization of their understanding of a frog, shared by a given community. With that mask it is possible to play the role of a frog from a selected reality, distorted and transformed by abstraction and imagination. Thus, the masks stimulate one of the most important functions of games pointed by Huizinga: representation.

Children represent something different, or more beautiful, or more noble, or more dangerous than what they usually are. They pretend to be princes, parents, wicked witches or tigers. Children are literally 'transported' with pleasure, overcoming themselves to such state that they nearly believe they are this or that, without losing the sense of reality entirely, though. More than a false reality, their representation is the realization of an appearance: it is imagination in the genuine sense of the term.¹⁹

The Eames' masks are a typical example of toys that best connect to the representative function. One can tell, though, that the significant figuration present in masks limits creative and inventive actions which should be stimulated by toys. However, masks are extremely stimulating toys and Charles and Ray Eames were intrigued by them as they conversed with their creative process.

The next two examples are constructive toys which, differently from the masks, were industrialized. The first of them, *The Toy* was developed in 1951 and produced by *Tigrett Enterprises* until 1961. The second of them, *House of Cards*, launched in 1952, is the most famous of their toys. Although the model was produced by the *Tigrett Enterprises* only up to 1961, replicates of the toy can be bought until now.

In two different bands, the two toys belong to the rich field of the constructive toys. Most pedagogues highlight children's constructive impulse. According to Pestalozzi, "Most children will manage to construct something in imitation of a building with any materials they can lay hold of. This desire, which is natural to them, should not be neglected"²⁰. The importance of stimulating this wish is also stressed by Fröbel:

Buildings, aggregation, is first with the child, as it is first in the development of mankind, and in crystallisation. The importance of the vertical, the horizontal, and the rectangular is the first experience which the child gathers from building; then follow equilibrium and symmetry.²¹

Besides the creative incentive, constructive toys have the educational potential connected to the apprehension of volume and of the total that results of parts. Taking this aspect into consideration, Maria Montessori explored constructive toys in the teaching of Mathematics, easing the subject through a concrete approach.

Yet constructive toys allow endless experimentation. Walter Benjamin had already revealed in the possibility of repetition the soul of games²². Through the possibility of construction followed by deconstruction, countless times as many as it is needed, the understanding of the object happens and children's curiosity is stimulated. Besides, the numberless variety settings widen the repertoire contained in each toy and encourage active participation.

The Toy is a large-scale toy that allows constructions in which children can even get into. Translating the concept of modularity and Charles and Ray Eames' modern concept, the toy is made of geometric panels (four squares and four triangles) that are structured by using wooden sticks with holes in the ends and small flexible connectors. Following the chart used previously, first the material aspects of the toy are presented. The panels made of plasticized paper are light and the surface smooth which makes them easy to handle. The geometric shape introduces two primary forms that, through compositions, establish relations between them. The vibrant colors (yellow, red, green, blue, magenta and black) enrich the constructions and their visual aspect.

As for the significances of toys, their representation are open to imagination. The construction of a house, a tower or a castle, depend on the imaginary universe of the constructor. The reality related to the toys, chosen by the designers, dialogues with the design concept of the couple. The concept of modular pieces that when mounted form tridimensional structures, was applied in other projects by Charles and Ray

Eames, like the shelf made of module units *Eames Storage Units* (1950) and the project of their house, *The Eames House* (1945-1949). “Related to the modularity and the formalism aspect of the façade of the *Eames House* and of the *ESU* storage units, *The Toy* was the modern translated in the toy form”²³.

When the reality contained in toys meets the imagination of those who play actively, their representative function appears. So, the support is only a toy when there is an interaction that transforms it. The importance of the participative action and the geometric appearance of *The Toy*, hint at a possible relation with Lygia Clark’s works. For example, the series *Bichos [Animals]*, exhibited for the first time in 1960, is similar to *The Toy* because it is composed of metal planks articulated with hinges that form tridimensional structures. Besides, the public’s participation is essential.

Animals already inserted the spectator’s participation which will be the core of her artistic project. Lygia Clark develops towards the elimination of contemplation on the part of the spectator, inviting their direct participation and suppressing little by little the very object.²⁴

40. Ray with a prototype of the toy.



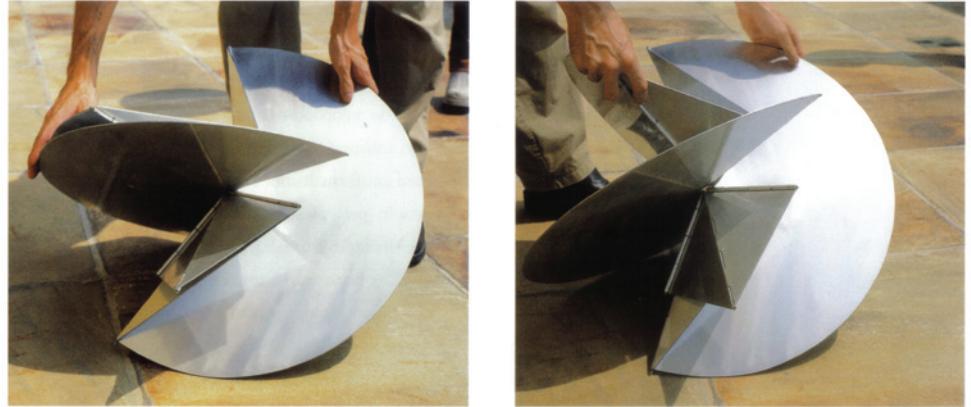
Although this suggestive relation raises a lot of interest for the analysis of toys, would demand a thorough research which would not be in the scope of this study.

The Toy’s success is highlighted by the review it received in the magazine *Life*, in July 1951, and by the production of a second toy in the same style, in small scale, though, *The Little Toy*. *The Toy* is responsible not only for opening the way for Charles and Ray Eames into the industry of toys, but also for translating a series of concepts present in their design concept in an educational toy that encompasses various potentialities of playing.

House of Cards, developed a year after *The Toy*, is the most famous toy designed by the couple. It is a constructive toy composed of 54 cards, similar to playing cards whose faces bring images collected from various sources. In one of the sets, *Pattern Deck*, these images concentrate patterns and textures, while in the other, *Picture Deck*, images of “good things”, like “familiar and nostalgic objects from the animal, mineral and vegetable kingdoms” were selected²⁵.

Through cuts made on the sides of each card, they can be fitted one to the other generating a series of tridimensional structures. With this possibility, the images selected by the couple of designers, in Charles’ words “photos gathered from all

41. *Bicho* (Animal), Lygia Clark, 1961.

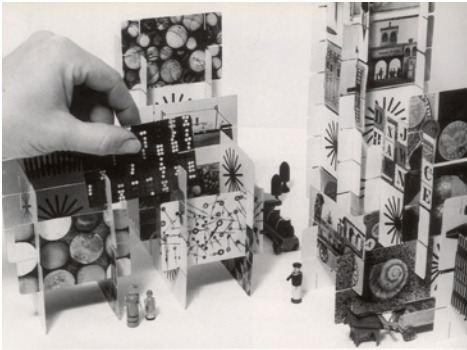
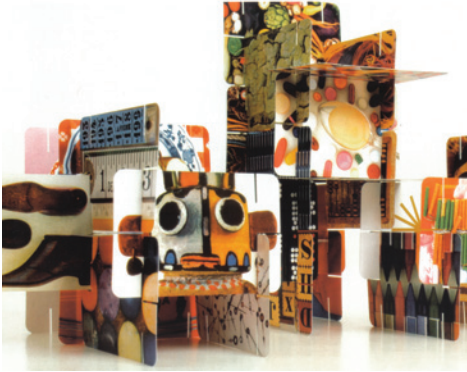


around the world and graphic designs taken from art, science, and the universe around us”²⁶, become volumetric representations that awakens one’s imagination.

According to Brougère, it is in this aspect that resides the essence of toys. “Toys are providers of representations that can be manipulated, of images with volume: it is there, undoubtedly, the great originality and specificity of toys, which is to bring third dimension into the world of representation”²⁷. Through its images and constructive alternatives, *House of Cards* can materialize this precept, and yet conveying the concepts of its designers.

Each card brings with itself a little curiosity, a surprising image, a wide variety of colors and topics. In the bi dimensional level, the toy allows numberless compositions. However, limited to its images, the toy would merely be contemplative, without other interactions. The possibility of volumetric settings adds an active participation to the interest of each image, though. Thus the cards are, only a support, a reality limited by the designers that depends, like in *The Toy*, on the agent who transform them into representations.

House of Cards is the toy that best represents the aesthetics of the Eames couple. In addition to the images that represent everything the designers valued aesthetically, the toy presents questions like modularity and viability of production, since from an only key-piece the toy can be resolved. “*House of Cards* is the toy that is most intimately related to the Eames’ aesthetics of addition, juxtaposition and ‘extra cultural surprise’”²⁸.



42. Structures made with the *House of Cards*.

Produced for more than a decade, replicates are still sold nowadays. Its success inspired the production of two other versions, one in larger scale, *Giant House of Cards* (1953), and another in which the images are related to computing, *Computer House of Cards* (1970).

The three toys mentioned above, represent successful examples of the Eames couple. Many other examples, mentioned in the toy listing, are in tune with the positive characteristics of the toys analyzed, which may lead to a much deeper research. Besides their relations with the couple's creative process, their production method and other works, the analyzed toys meet a series of pedagogical needs which makes them educational.



01. Detail of the triangular pieces of one toy idea.

4th part

The final chapter looks into the practical phase of this survey, previewed in the initial Project and carried out in the second semester. First, there is a brief explanation about the importance of practical experience that, in this case, is the design and actual production of an educational toy project. Also, references on the design of educational toys that served as the basis of the practical phase, are presented.

Although some other original ideas of toys came up in the process, only two of them were tested and resulted in prototypes for study. The two ideas will be presented here, as well as the production process, the problems that were faced and the solutions that were found along the way. In the conclusion of the chapter, the benefits of the inclusion a practical phase in this study as well as its questions and limitations are discussed.

a practical project

Even though the theories and concepts included in a survey like this constitute the backbone of a prospect practical phase, they are in fact two very distinct fields. This study was an opportunity to realize that as much as you do theoretical research aiming at covering most aspects of the topic, proposing something concrete touches a series of other variables. The accomplishment of the objectives of the practical phase depends on method, time and work space different from the theoretical one, capacity of tridimensional reasoning, familiarity with different materials, minimal knowledge of tools and the skills needed to execute the models and, most of all, the ability to translate concepts, ideas and theories into a concrete object. Learning all this is the result of many years of practical experience, not leaving aside the importance of the theoretical basis, though. This is extremely important for this phase which depends on the acquisition of the theoretical precepts contained both in the previous chapters and in the texts especially selected for this step.

The practical phase was, thus, an opportunity to experiment and to exercise a complementary method of investigation alongside the theoretical research. In addition, since the object of this study is the educational toys designed by Charles and Ray Eames whose production is focused on practical work and creation, this phase was a way to be attuned with the theme.

Owing to the constraints of time imposed to scientific initiations, the practical phase has an experimental and study character, without the claim to achieve a definite end. Their objective is to analyze different possibilities, their deficiencies and successes, presenting an open result which may suggest new solutions. In other words, the practical phase aims at broaden the discussion and the repertoire related to the design of educational toys in the artistic and architectural contexts without proposing closed answers. Indeed, the relation between the graduation in progress at the Architecture and Urbanism College and the proposed toys, hinting at the influence of educational toys in art and architecture as well as the influence of art and architecture in the educational toys studied previously.

references in the design of educational toys

For the practical phase, the reading of texts dealing with the process of the creation of educational toys and the fundamental characteristics taken into consideration in their project. Besides the essential writings by Bruno Munari (1907-1998), in his book *Da cosa nasce cosa* (1981), and the texts about the works by Kurt Naef (1926-2006), designer of toys, taken from the book *Kurt Naef, the toymaker* (2006), research was done on methodological directions in the creation of educational toys by the artists Torres-Garcia and Ladislav Sutnar.

The Italian designer Bruno Munari devotes two chapters of his book *Da cosa nasce cosa* to children's objects. In both, Munari brings important aspects that must be considered in this type of project, and successful examples. As he analyzes the so called pre-books and toys, the designer stresses the basic aspects involved in the creation of objects developed for children.

Pre-books are object books, all of the same shape but made of different materials and with different images, and that aim at introducing books to children stimulating their senses. According to Munari, as from their early years, children apprehend the surroundings through all her sensorial receptors, feeling tactile stimuli, temperature, sounds and smells. All pre-books have the same title: BOOK, which comes both on the front and on the back page so that there is no pre-determined beginning or end. This is it is easy for children to get in touch with the object as there is no wrong way to hold it. The messages are not finished stories, like fables which, according

to the designer, condition children in a repetitive way and not creatively. Repetitive closed stories destroy the possibility for children to have elastic thinking, “ready to change according to the experience and knowledge. It is important to get individuals to think, imagine, fantasize, to be creative from early age”¹. Munari also highlights the need to stimulate the ability to absorb the surprises that are part of a culture and not to reject them.

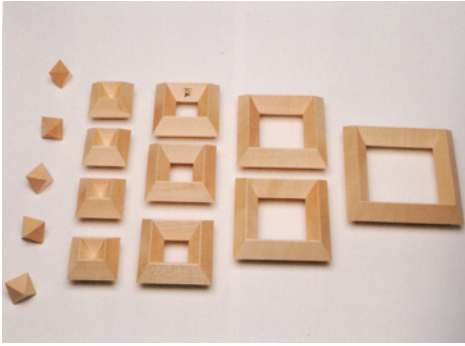
The designer defends the Idea that toys should be projected as a useful tool for children’s individual growth. Moreover, the educational function must be present in the toys, mainly in the first years of a child’s life. “An individual capable of understanding all art forms, of communicating verbally and visually, of having a balanced social behavior- all that is possible, if the child has, along the first three years, adequate games and toys”².

According to Munari, toys should be simple to use, easy to understand and communicate information that is compatible with children’s age. In this sense, he presents an example that was well received by children, the toy called “More or Less”. The toy is composed of sixty 15 X 15 cm sheets made of acetate. Printed on each sheet there is an image (a tree, rain, the sun, a bat, a window, birds, etc) in different colors. By placing the images one on top of the other scenarios and different situations are composed. “When children look at the sheets, they soon understand what they can do and they do it, without the need of explanations. First, they will do logical compositions, next they will enjoy themselves composing absurd things(...)

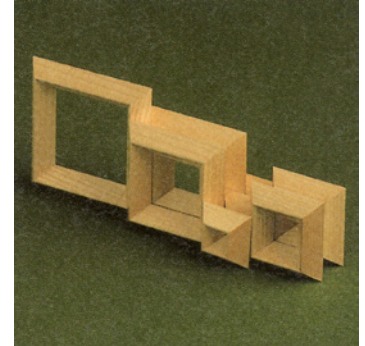
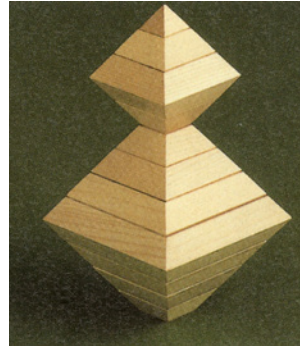
02. Children with one of the *Pre-books*, from Bruno Munari.

03. Toy *Plus and minus*, Bruno Munari, 1970.





04. Parts and assembly possibilities of the toy *Diamant*, Peer Clahsen, 1981.



The game evolves at the speed of thought which is of utmost importance. What counts is the possibility of combination, change, experimentation and repetition. The mind becomes elastic, the thought dynamic, the individual creative”³. Other meaningful examples are constructive toys which can be assembled and disassembled, teaching the combination possibilities in three dimensions and allowing children to create their own structures and understanding how they work.

The toy projected should be a tool for the development of an elastic and dynamic mentality and not static, repetitive, fossilized. “Games and toys should stimulate imagination and not come ready or finished as this limits children’s participation”⁴. In addition, Munari stresses the importance of having the collaboration of various subjects, such as psychology and pedagogy, to enrich the project.

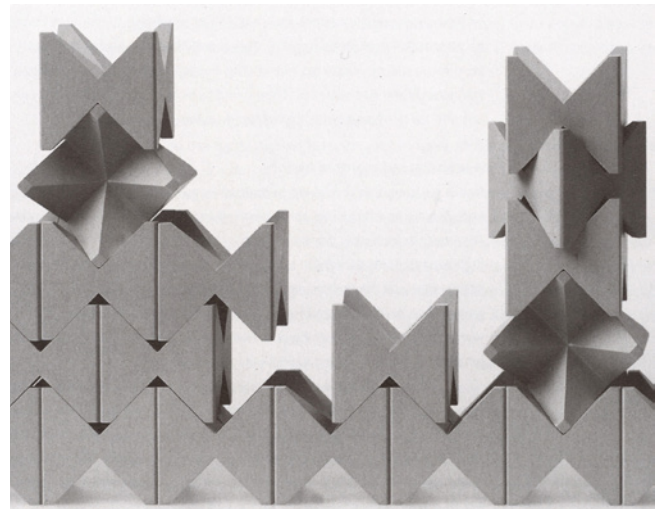
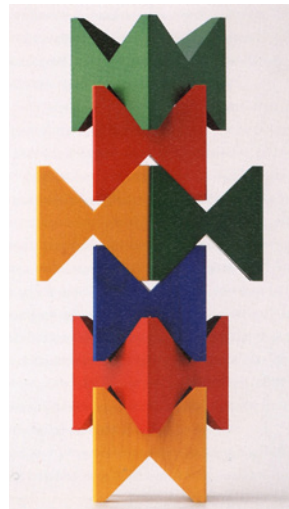
Kurt Naef was a Swiss designer of educational toys who worked in the second half of the XX century. The *Naef* brand is still one of the most successful in the field and is also responsible for the production of some of the toys designed by the Bauhaus students, like Alma Siedhoff-Buscher, mention before.

Like Munari, Naef believes that toys should allow children to develop their most valuable ability: their creative imagination. Both designers share the idea that children should understand how their toys work. In the text “Commodity or Imagination” Naef writes about the development of the production of toys with the advent of industry⁵. The author believes that even with the high incidence of electronics, toys that can be touched are timeless, still open new experiences and will never disappear. Further, despite the fascination children have for popular electronic toys, they curb

children's active participation, thus they impede encouragement and they lack real educational purpose.

The artist Joaquim Torres-García, cited before, wrote some texts about the directions that should guide the design of toys. In the text taken from "Catalogue of toys manufacturing" (1919), Torres Garcia comments on the need to establish relations between education and playing. "Children learn by playing. Then, games, for children, should be an exercise of multiple experiences and activities. Of creation and discovery. Of knowledge of things and of themselves"⁶. Furthermore, the artist points at the frequent mistake of creating toys which should supposedly entertain children. Entertainment, according to him, consists of an exercise of children's creative mind "and of the satisfaction they have in knowledge"⁷. Torres-García also comments on children's need to investigate and modify their toys, revealing the value of constructive toys and of pieces with which children can do whatever they wish, learning and creating.

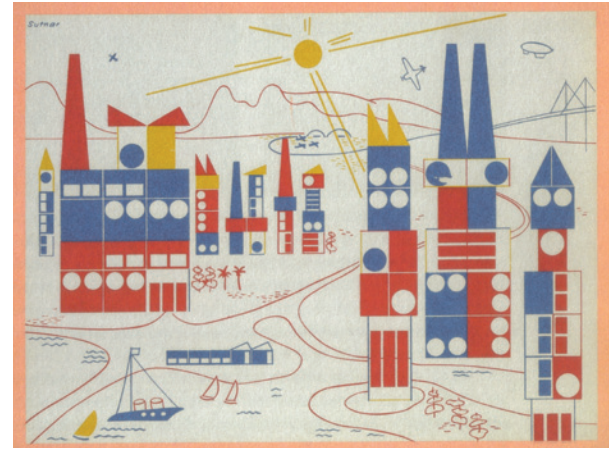
At the same time He worked on the toy "Construct the City", mentioned previously in chapter two, the artist Ladislav Sutnar wrote, similarly to Torres Garcia, a series of texts on the question of toy design. In one of them, "Solving the problem of Toy



05. Toy *Naef*, Kurt Naef, 1956.

06. A women and two men, Joaquín Torres-García, c. 1925.

07. Imaginary Town (for toy “Building the Town”), Ladislav Sutnar, c.1940.



Design”, Sutnar describes the relevant aspects of a toy project, using the example of “Construct the City”:

Features:

1. through dramatic play it educates the ability for planning, exercises patience and self-control;
2. through experimentation it liberates the imagination and the fantasy, and develops the courage to create.

Characteristics:

1. Simplicity: every stone is a house for itself;
2. Unlimited possibilities in combining forms and colours to build a great variety of factories, skyscrapers and city sections.

Ease of production:

1. Simple shapes;
2. Simple flat painting.⁸

The text reveals some of Stutnar's toys fundamental precepts, as well as his methodological and systematic approach. Even though it did not go further than the prototype stage, "Construct the City" already presented solutions that were quite developed for the toy which, according to the artist, satisfied children's pedagogical needs.

The examples presented bring relevant concepts in the area of educational toy design. This study and its practical phase were oriented by those concepts. Despite the importance of these references as the basis for this survey, it was during the practical development of the prototypes that the problems and their solutions actually appeared.

two ideas of educational toys

Besides aiming at applying relevant concepts on the design of educational toys, one of the objectives of the practical project was to relate it to contents of the graduation course at the Architecture and Urbanism College. In other words, what are the consequences of having a student of architecture and not a student of education or pedagogy developing an educational toy project? The development of the toy should be influenced by the environment where it was designed. The option for the design of a constructive toy was based on this argument.

The relevance of constructive toys has already been made evident in the analyses of Charles and Ray Eames' toys. Many pedagogues, like Pestalozzi, Fröbel and Montessori stress the educational potential of this kind of toy. Also, the unlimited combination possibilities of constructive toys, broaden their creative features and stimulate children's imagination. The relation between constructive toys and architecture happens through various aspects. Concepts present in constructive toys, like modularity, part/whole, symmetry, repetition, balance and superposition allow investigations into tridimensional spaces which is also present in architectural discussions. So, the two toys developed in this project, are closely linked to the context in which this survey is inserted. As a result both areas (design of toys and architecture) feed each other.

The first toy presented in this study is a series of triangular pieces that can be assembled to each other to form tridimensional structures. All triangles are rectangles that were



08. Open box and triangular pieces.

09. Triangular pieces created from the subdivision of two squares. The MDF plate was silkscreened in yellow and blue.



subdivided from two squares. That is, a square is divided into two big triangles, and then one of them is divided into other ones and so on, until a minimum size for a triangular piece is reached. The idea of subdividing a flat square into other geometric figures was inspired in the traditional Chinese toy called Tangram. In its case, the square is subdivided into three different geometric figures of different sizes, allowing the composition of various pictures. Some of Fröbel's Dons and other toys are also references to Tangram, increasing the number of toys that stimulate the arrangement of figures from geometric forms.

In the toy of triangles, besides the possibility of composing flat figures, each piece has three cuts (perpendicular to the sides) which allow them to fit, generating tridimensional structures. This way of assembling was based on the toy *House of Cards* (1952) by Charles and Ray Eames. With a minimum number of pieces, two squares subdivided into six triangles each, generating twelve pieces in total, the assembling possibilities are unlimited.

Still in the first tests of the toy, the surface was not treated, being smooth and uniform on both sides. In the last prototype, however, images were applied to the surface, increasing the number of variables to stimulate compositions. Also, the paint on the surface would give relief and texture sensitive to touch, making the piece even more attractive. As for the printed images, there was the intention to explore geometric figures further. Considering that the square and the triangle were already present in the toy, there was the option of creating an image using circles, the third basic geometric figure which had not been used. Taking Athos Bulcão (1918-2008)⁹ as a reference, a



10. Tridimensional assembly.



11. Tridimensional assembly (font: Claredon).

12. Tridimensional assembly (font: Futura).

13. View of the box of the toy letters.

14. Letters pieces (font: Claredon).



module composed of an empty semicircle and a quarter of a full circle was created. The same module was repeated and rotated until it filled the space of 4X4 modules, area equal to the square composed of six triangles. The picture was printed on wood, first in yellow and, after a rotation of the support, in blue. The printed composition enhanced the degree of interest of each piece, that when assembled, juxtaposed or placed over the other form new combinations of circular figures.

In brief, the toy explores geometric forms and primary colors, the composition and decomposition of forms, the children's constructive impulse and special relations of modularity, size and balance. Its production process, as well as the problems met will be presented later.

The second educational toy proposed is the toy of letters. The idea came as a result of a subject done at the Architecture and Urbanism College, called Language and Expression. The subject approaches a series of impression techniques, being typography one of them. Through the contact with typography and its little letters made of lead that are composed like the pieces of a game forming words, pages, books, one can notice the interest in the materiality of fonts. From the moment the letter becomes an autonomous piece, its design, lost in the middle of the fast reading of words and their meaning, is revealed. Its curves, straight lines and its proportions become clear, as well as the relation between all the letters of the alphabet. The font is nothing but a design and although the existence of a meaning results in the alienation of the virtues of these forms, in the children's world they may be still underdeveloped and should be explored. Indeed, a link with the introduction to the literacy process is established through something so meaningful to children: a palpable way to design.



With the aim to stimulate even more the perception of the relations between different letter and their potential as forms, after some tests each letter was divided into two parts. Each piece is a part of a letter and can be connected to its correspondent half or to any other part which will generate other letters and forms. To make this easy for children, holes were made in strategic positions in each piece (about three holes in each piece). Little wooden pegs work as connectors and they increase the assembling possibilities. In total, there are 26 letters divided into two pieces, they come to 52 pieces. Again, the assembling possibilities are countless, including the plausible 2d plan combinations like, for example, of words. The toy allows for the creation of absurd forms and structures, stimulating children's imagination.

The decision to keep the original color of wood is due to the aim of the toy, which is to focus on the forms of the pieces. After some tests, the thickness of the letters was increased so that the pieces would become tridimensional. Later in this study, the options of lighter and bi-dimensional letter fonts will be discussed as they may also be interesting for the purpose of the toy. In addition to stimulating the child's interest in the letters through their forms, the possibility of composing tridimensional structures encourages creation and active participation.

project development

Both toys were totally produced in the Laboratory of Tests and Models of the Architecture and Urbanism College. The lab technicians' support, particularly Emilio, Ricardo and Rocha, was essential for the realization of the toys. The toy of triangles counted also with Sidão's (technician in the Laboratory of Graphic Productions) valuable help. During the development of the toys there were meetings with tutors who aided decisively to the practical process. Here are some of them: Prof. Dr. Francisco Inácio Homem de Melo, Prof. Dr. Artur Simões Rozestraten and Profa. Dra. Vera Maria Pallamin. Furthermore, the practical phase counted on the help of my friends and colleagues who contributed with ideas, especially André Carvalho, Carolina Laiate, Julia Mota, Júlia Tranchesí, Sandra Jávera and Victor Campos. I am thankful to all of them.

As for the toy of triangles, the material used in the prototype was 3mm MDF. It is rigid, light, smooth and accepts a layer of paint well. The material was cut by laser



15. Diferents tridimensional assemblies (font: Claredon).



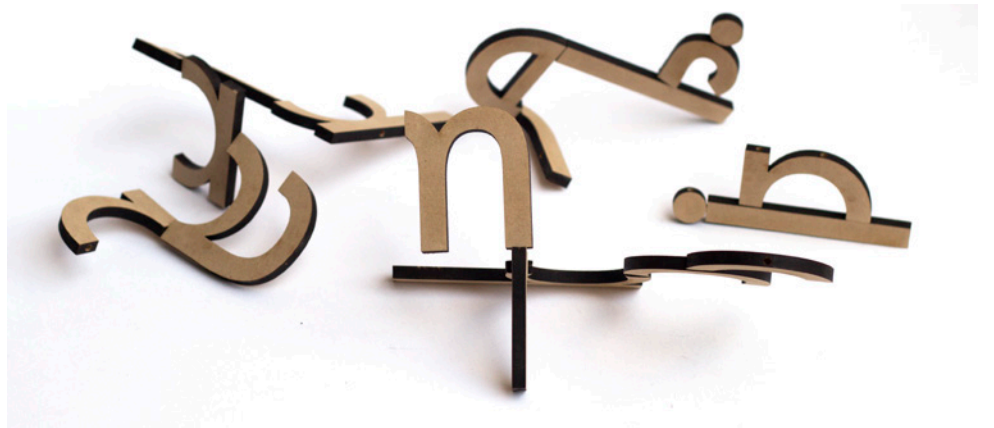
16. Two-dimensional and three-dimensional compositions with the letters (font: Futura).



17. Letters pieces (font: Futura).



18. Two-dimensional and three-dimensional compositions with the letters (font: Claredon).



19. Diferents tridimensional assemblies (font: Futura).



22. Assembly detail of the triangles toy.

from drawings made in computer. In the final prototype, the MDF plank received two layers of paint before it was cut. The drawings were printed using the serigraphy technique. A screen with a drawing made in a computer was used to print it on the wood. First, the yellow drawing was printed and next the plank was rotated and the same drawing was printed in blue.

The precision of laser cuts helps when it comes to the assembly of the toy of triangles. Also, with this technique the slightly round edges are finely finished, something that, after the first tests, became necessary. The finishing is also an interesting detail that needed to be cared for because the edges are darkened as a result of the heat produced by the laser cut. However, in the case of the material used, wood gets marked easily in the assembly areas as a result of the friction of the pieces against each other. As for the paint, even though the technique used, serigraphy, allows the print of elaborate drawings, the friction of the pieces and the use wears the paint out. However, despite the advantages of the serigraphy technique because of the texture effect it produces, the paint did not produce the result expected.

One of the solutions for this problem, can be the use of acrylic instead of MDF. Acrylic is also hard, smooth, can receive a layer of serigraphy well and can be easily cut by laser. Differently from wood, acrylic does not produce soot and therefore it would not be marked in the assembly areas. As for the paint, it would be necessary to apply some kind of protective layer to the pieces. The color should be red to complete the primary colors, yellow and blue, used in the drawing.

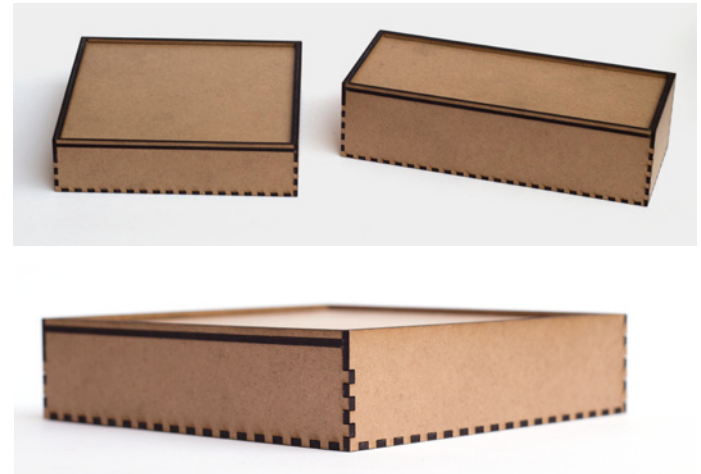
Making the toy of the letters was more difficult. The first version was made of 6mm MDF and the font chosen was *Futura* which is geometric and has a clean, coherent design. The letters were also cut by laser. After studying the result of the first test, it was felt that the thickness of the letters should be increased so that their tridimensional shape. Also, a more robust version of the font *Futura* and of *Claredon* were tested. These fonts have more personality and their shape is more interesting.



20. Tests made on different fonts.

21. Test with acrylic letters (font: Futura).





23. Box and pieces of the letters toy.

24. Two MDF boxes made to store the toys.

After the experiments, the final prototype was made in the font *Claredon*, in order to complement the first prototype made with *Futura*. To achieve the ideal thickness it was necessary to cut three 3mm pieces and glue them together forming 9mm pieces. To fix the pieces, each one had two small square cuts in which small square wooden pegs were inserted. Everything was glued with white glue pressed with the aid of cramps. After fixing all the pieces, the position of the holes was marked and next, three 7mm deep and 4mm wide holes were made in each piece. Each piece was polished to give them a smooth finish. The connectors were made from 4mm diameter wooden sticks cut into 14mm long pieces.

Although the finishing of the laser cut is satisfactory, the process of gluing the three layers of wood was not precise enough and the wood looked rather dirty. Ideally the pieces should be made of real 9mm thick wood which would require a more powerful laser machine. Interesting tests with 9mm acrylic were made, but wood looks more natural, it is more appropriate for toys and is nicer to touch. As for the connectors, the exhaustive work of sanding each of them, suggests the need to use some other material, like PVC.

With the objective of storing each game, two boxes were made of 3mm MDF and were cut by laser. Each box was designed on a computer, cut, assembled and glued with white glue. In the case of the toy of letters there are two spaces to store the letters and the connectors. The two boxes were finished to match the design of the games they hold.

conclusions on the practical phase

The main difficulty faced during the practical phase was to propose toys that would not limit children's participation and imagination. Considering that toys are merely a support, open to children's activity, knowing how much the toy should offer is a challenge. Besides, translating concepts like simplicity, stimulation of all senses, room for creative interaction and at the same time dialoguing with the subject area where this survey is contextualized, made the task even more complex.

The time limit factor, led to the proposal of experiments rather than closed answers. Those experiments are not directed to a specific group of children, do not attend to pre defined pedagogic needs and do not deal with the productivity of toys. They are only investigations around the questions proposed by the survey, that is to say, another way to study the theme. The practical phase, however, contributed to the result achieved in the final product and suggested other possible ways for future surveys.

The next step would be focusing on a specific age, around 7 years old, adapting the project to the age group selected and testing it on children in order to observe their reaction towards the toys, and finally changing them if necessary. Yet, extensive research on materials should be made and the possibility of using more powerful laser cut machines should be investigated. Next, a viability study of production in large scale of the toys could be made.

However, the experiments realized achieved their objectives, broadening the repertoire of the study, promoting a discussion about educational toys using the practical experience of designing and producing toys which made the object of this study even more real.

Learning [...] through experimentation asks for more than time, it requires deviations and serendipity. Crawling precedes walking; mumbling precedes speaking.¹⁰

final considerations

Among the expected relations between the educational toys produced by the Eames couple, their method of production and the rest of their work, the one which was most evident was the coherence present in their toys and in the creative process of the *Eames Office*. A series of aspects applied by Charles and Ray Eames in their creation method can also be verified in their toys, alongside the very experimental concept of playing which is present in their design practice.

In addition, Charles e Ray Eames's the toys argue in favor of the theories that support the idea that toys are elements capable of translating the context in which they were created and that they are worthy pedagogical instruments. As for the connections between toys and the fields of art and architecture, emphasized in this survey through specific examples, the case of the Eames couple confirms such relations as they had different backgrounds (Charles in architecture and Ray in arts) and their design concepts present in their toys.

The research allowed also the identification of a series of approaches which may trigger future studies. While the limits of the present work hindered deeper analyses of some questions brought up, having found some relations suggests possible ways to be explored. For example, the creation of educational toys by artists, the relations between Frobellian pedagogy and Bauhaus, the connection between the dons proposed by Frobel and the modernist movement in architecture, among others.

The practical phase, for instance, allowed the exploration of the experimental character of the trial and error method, also present in Charles and Ray Eames's production. In addition, using theoretical principles about educational toys in a practical approach one could broaden the reflection on the theme. Also, it was an opportunity to apply directly the tools acquired in the Architecture and Urbanism Course.

The final product is still open, concluding that new relations may be established at any moment, reinforcing the value of educational toys in the fields of art, architecture and design discussed in this study from the example of the works of Charles and Ray Eames who influenced each other. Based on theoretical concepts that guide the discussion, the combinations of connections and the experimentations are limited which will certainly give room to a new game.

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images

With the exception of some images, all images in this chapter were raised from the following source:

NEUHART, John & NEUHART, Marilyn & EAMES, Ray. Eames Design: the work of the office of Charles and Ray Eames. New York: Abrams, 1989.

Below is the page number from which each image was taken and the sources of the images 02, 03, 05, 06, 30, 34, 37, 39, 41, 42a.

01. pp.173-174; 04. p.181; 07. p.54; 08. p.56; 09. p.57; 10., 11., 12. e 13. p.145; 14., 15. e 16. p.157; 17., 18. e 19. p.161; 20. pp.171-172; 21. p.169; 22. p.181; 23. p.204; 24. p.205; 25. e 26. p.220; 27., 28. e 29. p.221; 31., 32 e 33. p.235; 35. p.352; 36. p.145; 38. p.144; 40. p.156; 42b. p.168.

02. DEMETRIOS, Eames. An Eames Primer. New York: Universe Publishing, 2001, pp.138-139.

03. KIRKHAM, Pat. Charles and Ray Eames: designers of the twentieth century. Cambridge: Massachusetts Institute of Technology, 1995, p. 186.
05. e 06. Library of Congress, Manuscript Division A-08, <http://www.loc.gov/exhibits/eames/bio.html> (último acesso 08.01.2012).
30. DEMETRIOS, op. cit., p.1.
34. KIRKHAM, op. cit., pp. 155-156.
37. KIRKHAM, op. cit., pp. 155-156.
39. BASUALDO, Carlos (org.). Tropicália: uma revolução na cultura brasileira [1967-1972]. São Paulo: Cosac Naify, 2007, p.175.
41. BRITO, Ronaldo. Neoconcretismo: vértice e ruptura do projeto construtivo brasileiro. São Paulo: Cosac Naify, 1999, p.90.
- 42a. KOENIG, Gloria. Charles and Ray Eames. Köln: Taschen, 2005, pp.63-63.

4th part

- 1 MUNARI, Bruno. Das coisas nascem coisas. Martins Fontes: São Paulo, 2008, p. 225.
- 2 Ibid., p. 237.
- 3 Ibid., p. 244.
- 4 Ibid., p. 242.
- 5 NAEF, Kurt. “Commodity or Imagination”. In: BÜREN, Charles von (editor). Kurt Naef. The Toymaker. Basel: Birkhäuser, 2006, p. 145.
- 6 TORRES-GARCÍA, Joaquin, 1919. In: ALADDIN & UNIVERSALISMO CONSTRUCTIVO DE JOAQUÍN TORRES-GARCÍA. Curitiba: Museu Oscar Niemeyer, 2007. [Exhibition Catalog], p. 14.
- 7 Ibid., p. 15.
- 8 SUTNAR, 1942, apud KNOBLOCH, op. cit., p. 241.
- 9 FARIAS, Agnaldo. Athos Bulcão. Brasília: Fundação Athos Bulcão, 2003.
- 10 ALBERS, Josef, 1928, apud LUPTON & MILLER, op. cit., p. 12.

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With the exception of images 2-7, all images in this chapter were photographed especially for this report by the researcher.

02. MUNARI, Bruno. Das coisas nascem coisas. Martins Fontes: São Paulo, 2008, p. 222.

03. SUTTON, op. cit., p.214.

04. BÜREN, Charles von (editor). op. cit., pp. 110-111.

05. Ibid., pp. 28-29.

06. SUTTON, op. cit., p.288.

07. SUTTON, op. cit., p.238.

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