



CATOLICA
ESCOLA DAS ARTES

PORTO

VISUAL REPRESENTATION IN THE DRAWINGS
OF CHILDREN FROM 6 TO 9 YEARS OLD:
CREATING AN ANIMATED PROJECT

Dissertation presented to the Catholic University of Portugal
for obtaining the Master's degree in Sound and Image

Inês Peres Mesquita

Porto, September 2022



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Acknowledgments

Throughout the development of this research, I had the support of several people who, in one way or another, helped me reach this moment.

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Abstract

Drawing has been one of humanity's most widely used forms of expression. It has been used for communication since the prehistoric period, long before written communication was developed, and for artistic purposes, both as final objects and as drafts for the development of other pieces. Although many abandon it in adulthood as a primary tool of expression and communication, everyone experiences it at some point in their life, especially during childhood. Children use it as part of their play, to create narratives from simple characters or actions, and to express their perceptions of the world around them. With this in mind, this research work's aim was to study the aspects of cognitive and visual development that represent children from 6 to 9 years old, the impact of creativity and imagination on their artistic activity and the playful way in which children face the act of drawing and their own drawings. Furthermore, this research focused on the characteristics of children's visual representation and how their drawings could be incorporated in an animated project.

The research was developed in two distinct components, a theoretical and a practical one. After a continuous observation and monitoring of the drawing process of children between 6 and 9 years old, the research evolved through a literary review of the various theories of children's drawing and art, as well as the role of artistic education and external influences for children's artistic development. At a cognitive level, perception, symbolic thought, the concepts of imagination, creativity and play were studied, and a revision of the drawing and denotative systems and the canonical views was also addressed. Some of the main characteristics common to most of the drawings corresponding to this age group were compiled. Then, through the organisation of drawing sessions with a group of children between 6 and 9 years old, a careful observation was led, making it possible to verify some of the theoretical investigation in practice. These drawing sessions were organised reflecting the various authors previously reviewed, with the aim of presenting activities that were not limiting to the child or with some defined endpoint. Although only three sessions were organised specifically for the project, the monitoring of these children was continuous, taking place throughout the year, so practice and theory were constantly nurturing one another. Afterwards, the drawings and audio recordings resulting from the sessions presented the starting point for the making of animated experiments. In this way, considering that animation and drawing are closely related, we approached animation as a tool to reflect on the children's drawing process, as well as to praise and value some of its characteristics.

This research allowed us to achieve an understanding about the impact of drawing and artistic activities in children's development: that drawing, combined with play, works as a means for children to investigate and get to know the world, to understand the relationships that are established around them, as well as exploring the possibilities of representation and meaning. In addition, it allowed us to understand the role of the environment and that external adult support should be guiding and assisting in artistic activities, without, however, limiting and restricting children to their adult vision. Moreover, the fact that the vocabulary and terms used to describe children's art are generally comparable to adult art helps to propagate the theory that children's drawings are fraught with errors and faults.

Keywords: Drawing; Visual representation; Cognitive development; Animation; Playfulness

Resumo

O Desenho tem sido uma das formas de expressão mais utilizadas pela humanidade. É utilizado para comunicar desde a pré-história, muito antes do desenvolvimento da comunicação escrita, e para fins artísticos, tanto como objetos finais quanto como rascunhos para o desenvolvimento de outras peças. Embora muitos o abandonem na idade adulta como principal ferramenta de expressão e comunicação, todos o vivenciam em algum momento da sua vida, principalmente durante a infância. As crianças utilizam-no como parte das suas brincadeiras, para criar narrativas a partir de personagens ou ações simples e para expressar as suas percepções do mundo em seu redor. Com isso em mente, este trabalho de investigação teve como objetivo estudar os aspetos do desenvolvimento cognitivo e visual que representam as crianças dos 6 aos 9 anos, o impacto da criatividade e da imaginação na sua atividade artística e a forma lúdica com que as crianças encaram o ato de desenhar, bem como os seus próprios desenhos. Para além disso, este estudo concentrou-se nas características da representação visual infantil e no modo como os desenhos das crianças podem ser incorporados num projeto de animação.

A pesquisa foi desenvolvida em duas componentes distintas, uma teórica e uma prática. Após uma contínua observação e acompanhamento do processo de desenho de crianças entre os 6 e os 9 anos, a investigação evoluiu através de uma revisão bibliográfica das várias teorias do desenho e da arte infantil, bem como do papel da educação artística e das influências externas para o desenvolvimento artístico das crianças. A nível cognitivo, estudou-se a percepção, o pensamento simbólico, os conceitos de imaginação e criatividade e a brincadeira, e foi também abordada uma revisão dos sistemas de desenho e denotativos e das vistas canónicas. Assim, foram compiladas algumas das principais características comuns à maioria dos desenhos correspondentes a esta faixa etária. De seguida, através da organização de sessões de desenho com um grupo de crianças entre os 6 e os 9 anos, pôde ser conduzida uma observação atenta, permitindo verificar na prática uma parte da investigação teórica. Estas sessões de desenho foram organizadas refletindo os vários autores revistos anteriormente, com o objetivo de apresentar atividades que não fossem limitantes para as crianças nem com um objetivo final definido. Ainda que apenas três sessões tenham sido especificamente organizadas para o projeto, o acompanhamento destas crianças foi contínuo, decorrendo ao longo do ano, de maneira que a prática e a teoria se foram alimentando constantemente. Posteriormente, os desenhos e áudios resultantes das sessões representaram o ponto de partida para a realização de experiências animadas. Desta forma, tendo em conta que a animação e o desenho estão intimamente relacionados, abordamos a animação como uma ferramenta para refletir sobre o processo de desenho infantil, bem como para enaltecer e valorizar algumas das suas características.

Esta investigação permitiu a compreensão do impacto do desenho e das atividades artísticas no desenvolvimento das crianças: que o desenho, aliado ao brincar, funciona como um meio para a criança investigar e conhecer o mundo, compreender as relações que se estabelecem à sua volta, bem como explorar as possibilidades de representação e significação. Além disso, permitiu compreender o papel do meio envolvente e que o apoio externo adulto deve ser guiando e assistindo as atividades artísticas, sem, no entanto, limitar e restringir as crianças à sua visão adulta. Além disso, o facto de o vocabulário e termos utilizados para descrever a arte infantil serem geralmente comparativos à arte adulta ajuda a propagar a teoria de que os desenhos infantis são repletos de erros e falhas.

Palavras-chave: Desenho; Representação Visual; Desenvolvimento Cognitivo; Animação; Brincadeira

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“Children draw for fun.” (Georges-Henri Luquet, 1927/2001: 1)

1. Introduction

1.1. Context and Motivation

From when we are little, we carry out activities to express the images we create within ourselves of the world around us and the experiences we undergo. Drawing is, in fact, one of the earliest types of human expression, dating back to the cave paintings, long before the appearance of written communication. It can be a vehicle to express ideas, sensations, to tell stories: in essence, to communicate. Either with simplified symbol systems or with many details to try to resemble real life, drawing is the most common artistic practice among children, and it crosses every child's path at some point throughout their youth. It is actually the first way in which children express themselves on paper. Spontaneous children's drawings (the kind of drawings children produce on their own impulse, not responding to any limiting school exercise, for example) are largely appealing, due to the particular and distinctive characteristics they present and to the apparent freedom and freshness in which they assemble complex scenes. In fact, children's drawings have been either overvalued or undervalued. On one hand, artists such as Franz Cižek and Pablo Picasso became fascinated with these drawings, even considering them a specific art style that needed to be considered like that (Marín, 2003: 56). On the other hand, many researchers looked at them as full of errors and deficiencies that should be amended until they finally corresponded to (considered) correct representations (Matthews, 2003: 2). Many people's beliefs about children's visual development derive from a stage theory, that is characterised as a continuous evolution from lesser ways of drawing through consecutively more sophisticated stages until children finally "fix the errors" in their drawings and are able to produce correct and faithful representations of reality. This theory understands the endpoint of development to be visually realistic images, which could be justified as following the Western European approach regarding representation that started in the Renaissance, where fidelity to the visual world is valued (Matthews, 2003: 13). However, at the end of the 19th century and the beginning of the 20th, perspectives on drawing began to change and children's drawings ceased to be considered only as an agglomeration of errors and deficiencies that needed to be assessed, starting to be valued as a genuine manifestation of children's understanding of the world, not only intending to represent it in a visually realistic way, but also conveying their personal views to it (Marín, 2003: 28).

Having worked in a drawing atelier for the last couple of years, with children from 6 to 12 years old, we started to realise how differently younger children faced the act of drawing, seeming much more confident than older ones and having more fun doing it. Over the last years we have been closely watching their processes of drawing and listening to the descriptions and narratives constructed as they produce them, creating lines of thought and associations between subjects in such a natural and obvious way. Most of the time each drawing has a story behind it, usually with a lot of movement, for which the drawing works almost like a frozen frame of it. Either presenting specific objects, animals and people scattered on the white surface or composite drawings full of details and elaborate scenarios, most of the children spend time creating stories while drawing, superimposing new traces on their own drawings as these stories unfold, adding and overlapping with a playful sense, almost like a constant back and forth between play and pencils. Nonetheless, we realised that, from a certain point on, some children allow themselves to be invaded by doubts and thoughts of inability, resulting in a lack of confidence in their own drawings and storytelling. With this in mind, the desire to comprehend children's drawing processes started to feel very appealing, since the observation of children's drawings over the years led to some assumptions regarding this process being established. Thus, we chose this topic due to the desire to validate (or not) the assumptions we had. On the other hand, taking into account the depth of movement that these drawings convey (despite the depiction being static) and attentively observing their production, it also inspired a great desire to give them actual movement and depict the stories and thoughts that sustain each of them.

1.2. Objectives

Considering all of this, the broad main goal of this dissertation was to understand children's (from 6 to 9 years) drawing processes and particularities, and how these drawings could be incorporated in an animated project. Working with children regularly, it was our intention to understand this age group better, in order to provide a greater accompaniment to their development. As such, it was essential to recognise why young children's drawings seem so different from adults' drawings, understanding what the primary issues for children in their drawings are, the visual characteristics that compose them and the pictorial systems used in their production.

Over the years, the study of children's drawings encompassed several theories that recognised them as a group of flaws and errors, with younger children lacking in skills and, thus, not being able to represent what they intended to truthfully. These theories were the result of the development of a Western mentality very focused on realism, following the Renaissance period and its ideals of perfection, which defended that the ultimate goal in drawing development would be to achieve visual realism, and that children would evolve through stages of development until they reach that goal. In this sense, another question that needed to be answered was if in fact all children want to achieve realism and, if not, what their intentions are when drawing. Moreover, this also raised the issue of whether the drawings produced are simply the result of children's lack of skill or if there are other factors that play a role in them, internally and externally. This required an analysis of children's cognitive development throughout their childhood, understanding how their visual perception and brain work and to what extent play, imagination and creativity influence their drawing production. It was also our goal to structure and develop drawing sessions that allowed and encouraged imagination and creative thinking, by suggesting exercises that stimulate drawing without constraints and limitations. These sessions were not supposed to be ruled or normative, but rather to offer starting points for the development of lines of thought and narratives through drawing. Another goal for this project was to create animated experiences from the drawings produced during the sessions. Thus, the aim was to understand how children's drawings can be part of an animated project, analysing cases in which it had already been done, and to give movement to these drawings and portray the stories and thoughts that sustain them.

1.3. Methodology

The methodology implemented for the development of this research project presents two distinct components, one theoretical and one practical, which unfold in small moments that merge throughout its development, complementing and contaminating each other. In this way, the project stands as a back and forth between theory and practice. The methodology followed a qualitative approach, and it is considered practice and community-oriented, given the high importance, for this project, of not only the relationship with the study group but also of the practical moments of it, as well as the animated experiences.

The first moments of attentive observation of children aged 6 to 9 years old drawing freely can be considered the first moments of this project. This phase had an informal character, and it had the aim of absorbing the way in which children draw when no rules are given, accompanied by hearing their thinking processes as their stories unfold. This helped to raise impressions about how this group of children faced the act of drawing itself and the playful character that underlies it, as well as the reasons behind the satisfactory and unsatisfactory reactions to their finished drawings. To this extent, it served to elicit some ideas, questions and interests that were, later, the starting point for the development and construction of the theoretical investigation. As such, in a second moment a bibliographic revision of relevant authors was carried out, identifying, understanding and relating the fundamental concepts and authors to interpret the topic in question, as well as the different perspectives from which it has been analysed. Hence, with regard to the studies of children's drawing, a review was carried out of the theories of child's development, especially the stages theory and its variants according to the numerous writers (e.g. Luquet, 1927/2001; Lowenfeld & Britain, 1964; Piaget, 1997) who proposed them. Subsequently,

the research also covered the field of visual perception and visual representation, as well as the concepts of symbolic thought, imagination, creativity and playfulness, concepts and areas that proved to be important throughout the research. After reviewing the various authors, the age range of the group of children was restricted to 6 to 9 years, as these ages appeared several times as limiting a specific stage of development. In addition, ages 9 and 10 seem to represent the moment when children develop their self-criticism, leading to the drawing's block many children feel at this age, so it seemed logical that the age limit for this project would be 6 to 9 years old. Alongside, three practical drawing sessions were organised and developed for children within this age group, in order to try to more carefully observe what was previously studied. This way it was possible to watch this group of children in the light of the concepts and authors researched, intersecting the theories with the observations made and thus corroborating or not the different themes under study. These drawing sessions intended to be an organised moment of free drawing, following several approaches and methodologies of drawing. The aim was to watch and personally hear their drawing processes, paying attention to how these children approached the exercise suggestions given and what courses their drawings took. Although only three sessions were structured and developed specifically for the project (with the exercises and stimuli to be defined by us), the monitoring and observation of the processes of construction of these children's drawings continued throughout the year. The material resulting from these sessions were also to be the starting point for the animated project, as the drawings were collected and the audio was recorded. In this sense, the last step of this project consisted of incorporating some of these drawings into animation experiments. As such, we surveyed some of the ways in which children's drawings were previously included in artistic projects, and essentially in animation, in order to understand the treatment we would like to give them. Plus, a selection of some techniques to use (and the corresponding discarding of others) was necessary, as well as the decision about which drawings to incorporate and how to work out the narrative of the animation. Thus, since animation and drawing are closely linked, we wanted to use animation as a way of praising and valuing children's drawing, both in terms of its visual characteristics and narrative ability, placing the focus on the drawing process and not on the final object.

1.4. Structure/Road Map

This research is divided into five main chapters, three of them related to the theoretical research and two reflecting on the practical project, that are consequently divided into subchapters.

Thus, Chapter 2 contextualises drawing as the first means of expression and communication (even prior to written communication), and the field of children's drawing and child's art, analysing its historical development throughout the centuries. In this sense, the theory of stages was studied according to its perspectives, as well as the theories of psychological and social development that were related to drawing.

Chapter 3 addresses some concepts of cognitive development, such as perception, symbolic thought, imagination, and creativity. In this way, we reflected on the relationship between seeing and knowing, and the relationship of both with drawing, as well as on the distinction between semiotic systems (signs and symbols) and the use of the latter in children's artistic expression. Thus, the notion of the internal model, its development throughout childhood and the way in which drawing can serve as an introduction to these systems was addressed. The concepts of imagination and creativity were also researched, trying to understand how they are related and the impact of the environment on creative stimulation. In addition, it describes the influence of playfulness on the child's development (not only at an artistic level), as well as the role that adults and family members should have in this process. Finally, this chapter presents the two internal descriptions of object representation — the object-centred and viewer-centred descriptions —, as well as their application to the stage theory.

Chapter 4 presents the visual representations made by children from 6 to 9 years old, enumerating the most commonly encountered visual characteristics and strategies in their drawings, the elements and themes preferably addressed, and the types of narrative strategies used. As such, it reflects

on the notion of realism and the aspects valued by children in the act of drawing, which do not necessarily go against those of adults, and on the role played by external influences (both adults, other children, and even photographic images). Furthermore, the drawing systems and denotative systems are described, as well as the idea of canonical views and extendedness, in relation to the views preferentially used by children when portraying objects and scenes.

Chapter 5 and chapter 6 reflect on the practical component of this dissertation. Thus, chapter 5 describes the drawing sessions, the motivations that led to their organisation and structure in this way and the activities itself. It also includes a reflection on which activities worked best and which did not. Chapter 6 addresses the development of animated experiments from children's drawings, presenting a description of the ways in which these drawings were incorporated over time in artistic projects. Thus, this chapter reports the process of developing these animations, from the moment of selecting the drawings and techniques to be used until the final assembly, addressing the various decision-making throughout the process.

The entire dissertation is accompanied by drawings collected during the various moments of monitoring the children, in order to exemplify and visually explain the various subjects reviewed, as well as to accentuate the theoretical-practical character of this project. As such, even though a lot more drawings were collected, we chose to incorporate those that we considered to be the best examples for each of the characteristics studied.

2. Children's Drawing and Child's Art

From prehistoric times, drawing has been used as an expressive way of aesthetic manifestation, as well as a form of communication. Since the cave paintings in Antiquity and the Middle Ages, individual expression through graphic representations on various supports (blocks of clay, leather, fabrics, stone, papyrus, among others) and with different materials (from their own hands to pieces of wood and feathers) facilitated communication between groups. It is, however, from the Renaissance onwards that drawing starts to detach itself from the religious character that all forms of art had until then, gaining perspective and striving to depict reality as it is perceived (Faria, n.d.). It is also at this point that the intention to study drawing as a form of knowledge begins to be demonstrated.

Understanding children's drawing as a form of expression and reflection of the child's growth, as well as their way of being and experiencing the world, only occurred after a rupture in the way of looking at childhood itself (Imbroisi, 2016). These issues were first raised in the 18th century, through the research of Jean Jacques Rousseau. In his studies, Rousseau considered the child to be a developing entity distinct from the adult, with its own personality, wants and needs. From the 19th century onwards, several academics and teachers studied children's drawings, using it to examine child development, and discriminating against various beliefs on the topic (Bombonato & Farago, 2016: 174). The study of children's drawings has always been (and continues to be) a clearly multidisciplinary subject of research and a constant source of fascination. This research comes from two different sources: Romantic artists of the late 18th and early 19th centuries, and scientists of the late 19th century (Jolley, 2009: 8), although most contemporary studies on this issue were created from an educational standpoint (Marín, 2003). While artists were drawn to the expression and freedom of these images in comparison to the conventions of drawing at the time, scientists were interested in examining the portrayal of realism in these same pictures, based on the adult standard (Jolley, 2009: 8).

Given this scenario, it is understandable that theories contradict each other — while some authors defend a more realism-focused perspective, believing that the drawing is a copy of the observed reality (where the ultimate goal is to achieve visual realism) and devaluing sensations and emotions in favour of technique, others consider a more artistic perspective, emphasising the child as an active subject and its drawings as self-expressive, serving as a mirror of its emotions and concerns, feelings and experiences (Quaglia et al., 2015: 81; Bombonato & Farago, 2016: 174). Similarly, the effect of society in general on children's artistic production has been studied, with two primary strands emerging initially. The first one holds that children's creation must be free of external intervention or teaching, whereas the second holds that teachers and adults must “fix the errors” in children's drawings until they reach the endpoint of creative growth (considered, here, as the production of realistic images) (Matthews, 2003: 35). Thus, we will present some of the most relevant theories that have contributed to the development of this field of research and its contradictions.

2.1. Children's drawing as a field of research — the beginnings

Although John Ruskin (1857) was the first known author to publish a study on children's drawings, it was the Romantic artists who were initially captivated by their apparent simplicity and innocence. These drawings demonstrated ingenuity and expressiveness, and escaped from realistic representational conventions, aspects that were in line with the romantic ideals sought by these artists (Jolley, 2009: 8). As previously stated, Rousseau's research began to address the challenges surrounding the study of children's drawings. At the end of the 18th century, Rousseau developed the myth of the noble savage, in which he contended that humans are born good, pure and innocent and that civilisation corrupts them (Vygotsky, 2004: 50). In an analogous way, and echoing his theory, Leo Tolstoy believed that the person at birth is the prototype of harmony, truth and kindness, and that children are closer to the purest ideal of mankind, which would be wrecked by education (Vygotsky, 2004: 50). In this sense, he connected children and their drawings to primitive men and their art. The theory of recapitulation, which explained the similarities between child art and primitive art, persisted in art education well into

the late 1940s (Willats, 2005: 221-222), and served as the foundation for many of the intelligence tests and theories developed in the years since, such as Florence Goodenough's "Draw-A-Man" test (1926), which used drawing as a tool to measure intellectual maturation and to understand children's psychological advances (Goodenough, 1926). Thus, many theorists at the time saw artistic progress as an evolutionary process from the primitive stage of savagery (i. e. child art) to a stage of intellectual enlightenment — considered to be civilisation, generally shaped by aspects of Renaissance art, such as the use of perspective, three-dimensionality, light and shadow, and so on (i. e. adult art). These views were founded on a comparison of children's and adult's drawings, with little consideration for understanding factors relating to the child's personality or their aesthetic sense (Quaglia et al., 2015: 81). More progressive art educators, on the other hand, have interpreted the theory of recapitulation differently, regarding the later stages of artistic evolution as a deterioration from a previous, innocent golden period (Willats, 2005: 221-222). For them, both children and primitive societies were able to express themselves freely, uniquely and creatively until they were corrupted by society in order to "rule" their freedom of expression (Willats, 2005: 3). These two conceptions of the theory of recapitulation interacted, in parallel, with two accounts of childhood innocence: visionary innocence and perceptual innocence (Costall, 1997). Visionary innocence praised children's artwork with all of its natural imperfections; however, the natural expression of the child, fostered by imagination, could be corrupted by exposure to realistic and perspective art (Costall, 1997). On the other hand, perceptual innocence considers that there is an internal image of the world, which Costall (1997) refers to as the sensory core, essentially perspectival. All young children have this sensory code in its purest state, but by the time drawing becomes more regular this core has already been damaged by too much knowledge (Costall, 1997). Similarly, the concept of childhood innocence and the innocent eye finds that the child loses its primitive innocence at a very early stage and stops seeing what is truly in front of it, instead beginning to see what its knowledge and logic say it is there — their sensory perceptions are corrupted, as concept formation takes away innocence from what they see (Sully, 1895: 396).

Ebenezer Cooke made the first contribution to the subject in 1885/1886, publishing an article in which he championed freehand drawing, without the need for mechanical reproductions, which inhibited children's freedom and the development of their imagination (Lopes, 2001: 15; Marín, 2003: 80). On the other hand, in the same year, James Sully (1895) used the term "children's art" for the first time, describing it as an individualised but embryonic art, and suggesting that children's representations should be modified since they contained faults and imperfections (Sully, 1895). As a result, we can say that these two writers served as a starting point for the two major trends that emerged in the study of children's drawing. Corrado Ricci (1887) published several drawings made by children in a book for the first time, and noticed their difficulty in recreating what they observed, assuming that their purpose was to represent what they know of an object, rather than its real appearance (Ricci, 1887).

Some expressionist artists were drawn to and studied children's art. Franz Cizek (1865-1946), an artist who subsequently became a children's educator, aimed to demonstrate the psychological advantages of the organic evolution of children's drawings, claiming artistic significance for them and embracing those considered flaws as a vital aspect (Marín, 2003: 197). According to the artist, "the most wonderful thing is that the more the work of a child is filled with so-called "faults", the more beautiful it is. The more a teacher removes these faults from the productions of the child, the more tedious and lacking in individuality they become" (Viola, 1936: 24). Cizek supported the child's spontaneity and expressive freedom, arguing that the "flaws" in its drawings should be encouraged rather than rectified, and he created an art class for children in which he encouraged them to draw freely (Willats, 2005: 218-219). These classes were used to build models for what would eventually become Western art schools and studios in the years to come (Lopes, 2001: 23). In theory, the position of these early art educators was the most extreme variation on the theme — that children draw things differently because they see them differently. Children, in their opinion, draw so imaginatively and expressively because they have a pure and innocent vision of the world that has not yet been tainted by realistic standards (Willats, 2005: 216). However, it appeared strange that these flaws so valued by Cizek were inherent to the way children perceive the world, a question that remained unanswered (Willats, 2005: 18). All of these authors published their works before the 20th century, laying the groundwork for the theories established in the following century.

Thus, the 20th century witnessed the rise of some of the most prominent and influential figures associated with the study of children's drawings. Levistein (1905) and Kerschenteiner (1905, 1914) had similar theories in that they claimed that children include in their drawings the main aspects of the concept they have of a certain object and not about the objects themselves — that is, it is the concepts they have of the objects in question that work as models, not the objects themselves (Lopes, 2001: 19). Still, Levistein addressed how symbols and images functioned as a language for children, arguing that they draw to convey something about what they are drawing rather than to make accurate reproductions of objects (Lopes, 2001: 19). Kerschenteiner believed that the child is unaware of the third dimension and lacks the ability to characterise space. The theory continued by stating that the process of children's drawing development was divided into four stages (excluding, however, the scribbling and random markings phase that precede the drawing itself) (Kerschenteiner, 1914). As a result, he assumed that the infant was initially in the stage of *schemata*, which is distinguished by the fact that it draws from memory rather than nature — it draws what it knows about things and not what it observes of things (Kerschenteiner, 1914). When the child draws, it frequently adds things that are not actually in what it is seeing or leaves out many others that it is seeing but does not believe should be included in that picture. At this point, its drawing is supposed to work nearly as a list: “and indeed one can explain these things to oneself as follows: while the child is drawing he is thinking about the object he is depicting, as if he were describing it to himself” (Vygotsky, 2004: 77). The theorist also considered that the absence of details is due to the child's technical limitations. The following stage was known as the development of form and line stage. The child increasingly acquired a greater resemblance to reality, and drawings at this stage are often composed of a combination of schematic symbols and an approximation to reality (Vygotsky, 2004: 78). According to Kerschenteiner, the third stage was realistic depiction, in which traces of schemes and symbols completely vanished from the drawings, but these still did not present perspective or three-dimensionality: they were usually contour drawings with a more realistic, albeit two-dimensional appearance (Kerschenteiner, 1914). Children ultimately accomplished observational drawing in the last stage, which involves the use of light and shadow, perspective and an understanding of movement (Kerschenteiner, 1914).

From the observation of many children's drawings, Georges Rouma (1913) differentiated against several stages of visual development. A preliminary stage occurred when the child adapted its hand to the technical instrument used, which progressed to a stage where the child names the lines it draws on paper (Rouma, 1913). The child then signals what it intends to draw in advance and, eventually, the child identifies the lines it has generated by chance with specific things (Rouma, 1913). Rouma also enumerated certain stages in the evolution of human figure representation, including the tadpole stage, stage of transition, representation of the frontal view, passage between the frontal view and the profile view, and, lastly, the profile view representation (Rouma, 1913).

2.2. Realistic perspective

The decades from the 1920s through the 1950s were regarded as the golden period of research into children's drawing. John Dewey (1925) considered art to be an experience. He criticised instructors who acted as observers only, as well as the notion that teachers must protect children from external contamination (Dewey, 1925). He felt that children should not be allowed free to do anything they wanted and that instructors should work with problems and subjects of interest to the child. In this sense, to assist them in their growth teachers should start from problems and issues of interest to students to guide them in their development (Dewey, 1925). This viewpoint was not highly respected at the time, since the groundwork was being laid for the freedom of expression movement that remains today. However, other authors, like him, subsequently began to question this strongly libertarian point of view. Florence Goodenough (1926) developed a method for measuring intelligence through the drawing of the human form, a topic she thought was significant in the drawings of children under the age of ten (Goodenough, 1926). For the child, drawing acts as a language and not as a means to create something purely aesthetic. In terms of visuals, she observed that the children's drawings were nearly exclusively

a graphic enumeration of elements, with conceptions of proportion and spatial connections appearing only later (Goodenough, 1926: 12). Furthermore, she claimed that when children draw something in front of them, almost nothing resembles the object and its representation, since the child first draws what it knows and perceives and only afterwards does it attempt to portray something (Goodenough, 1926: 12). As a result, the copy differs little from the same figure drawn from memory, with the more significant items being highlighted at the expense of those considered less important (Goodenough, 1926: 12-13).

One of the most significant perspectives in the study of children's drawing (which continues to impact psychologists and educators today) proposed that children go through many phases of development until they reach a level of visual realism (Matthews, 2003: 2). This view analysed the relationship between the evolution of drawing and human cognitive development, connecting children's drawings to primitive art, which progressed through several stages until reaching its peak in adulthood (visual realism). Georges-Henri Luquet (1927) was the first to suggest this hypothesis, later supported by Jean Piaget (1977). In a simplified version, this theory argued that children under the age of seven draw what they know and only later learn to draw what they see (Luquet, 1927/2001). The author argued that the child's natural tendency towards realism is the driving force behind the development of graphics, stating that all children attempt to make representations that are as close to reality as possible, but that their sense of realism varies with time (Luquet, 1927/2001). Furthermore, he highlighted the joyous nature of children's drawing, stating that creative activity gradually evolves from a sort of exercise to a form of play, which led him to consider drawing a peaceful game with a playful purpose to which the child surrenders and abandons at any moment (Luquet, 2001: 155). The theorist was interested in studying the drawings that children make spontaneously, without being asked to do so, which turned out to be a rather innovative perspective at the time (the majority of experimental studies until then carried out specific tasks that children should undertake) (Jolley, 2009: 21). In this way, his work was recognised as incredibly noteworthy, not only because of its uniqueness, but also because it was developed from his daughter's drawings, making it the first study to combine all of the drawings created by the same child within a short period of time (from 3 to 8 years old) (Luquet, 2001: vii). Luquet concluded that children shift between multiple forms of representation, all of which were equally acceptable, emphasising the "realism" of each one of them rather than merely the ultimate stage (Luquet, 1977; Costall, 2001). The four stages defined by Luquet were: fortuitous realism, failed/missed realism, intellectual realism and visual realism. Scribbling was the child's first encounter with drawing (around age two, corresponding to the fortuitous realism stage). Luquet considered that when children draw they feel as if they are making something and that this is sufficient for them, as they do not believe they are capable of drawing genuine depictions of reality (Luquet, 1977). The child observes what grownups do and attempts to repeat it in the same way, at first drawing by imitation, and it is only later that it notices a vague resemblance between the markings it has left on the paper and what it understands from the real world (Luquet, 1977: 174). As soon as the child feels it can depict what it knows that belief dominates its subsequent artistic development (Luquet, 1977: 113-114). The child gradually realises that it is producing a symbology through drawing and its drawings start to be named ("this is a bird"; "this is a car"), enduring additions or adjustments as a result of this recognition (Luquet, 1977: 113-114):

"Luquet refers to an Italian girl aged 2 years 6 months who upon noticing a similarity between her scribble and a bird then added two vertical lines for legs. The child is therefore making a (post-hoc) realistic interpretation of her drawing that she had not intended when setting out to make the drawing" (Jolley, 2009: 11).

Thus, this stage was subdivided into two parts: involuntary drawing (when the drawing is simply a motor gesture made for pleasure with no attribution of meaning) and voluntary drawing (when the child draws without the intention of representation, but eventually recognises something and attributes a meaning to it) (Luquet, 1977: 115). As individuals become more aware of the coincidental similarities between markings generated and representations throughout time, an increasing number of people begin to draw for the sake of representation (Luquet, 1977: 115). Thus, from involuntary doing, children move

on to an intentional drawing process, which corresponds to the stage of failed realism (generally assigned from 3 to 5 years of age). After discovering the relationship between shapes and objects, children attempt to copy identifiable objects, but there are a variety of challenges at the motor, cognitive and graphic levels that children are still unable to overcome, resulting in drawing mistakes (Luquet, 1977: 118-119). The author mentioned some, such as lack of attention or synthetic incapacity (when the child is unable to execute the relationships between the separate components of the drawing) (Luquet, 1977: 118-119; Luquet, 2001: 100). Because of the child's lack of attention, some of the elements that it perceives are not included in the drawing, and those that are included have technical errors in terms of position, orientation and proportion (Luquet, 1977: 121). The child solely examines its point of view, disregarding and exaggerating information based on the degree of importance to it (Luquet, 1977: 121). The following stage is known as intellectual realism (usually regarded between the ages of 5 to 10, approximately), and adults believed the drawings generated during this period to be more easily recognizable, yet still odd since they do not present a realistic depiction of an object. These drawings were labelled intellectually realistic as they demonstrate what the child intellectually perceives about an object or scene, what it knows about the object: according to Luquet, children at this stage drew from their internal mode of the topic, rather than from a visual mode (Luquet, 1977: 64).

“There is a general tendency for conceptual knowledge to be dominant over perceptual experience in children's drawings up to the age of 8 or 9 (thus “impossible views” are portrayed), and only after those ages are considerations of viewpoint and perspective admitted” (Freeman & Janikoun, 1972: 1116).

Children regarded a drawing to be representational when it contained the criterial traits that help to define what is being presented, incorporating only the details they consider relevant for this purpose and in its most distinctive full shape (Luquet, 1977: 128; Jolley, 2009: 13-14). Thus, this representation (known as canonical representation) corresponded to the view that enhanced an object's rapid recognition by presenting a greater number of specific characteristics relevant to its correct representation (generally the frontal, lateral and three-quarter views): “the information that best discriminates it from other objects, given what the perceiver knows, derived from the views from which it is most often seen” (Palmer, 1999: 421). Luquet referred to this as “exemplarity”, and, in effect, it indicates that children do not wish to draw the objects in unusual forms or in shapes that would make the drawing difficult to read and comprehend (Luquet, 1977: 128). In practice, the drawing would include as many essential details as feasible, that could be seen from any angle, while ignoring, for example, elements that were covered up by another object, which should be excluded (Luquet, 1977: 128). As a result, the author claimed that we frequently encounter drawings from this stage with certain inconsistencies, such as transparencies (e.g., people inside houses) (Luquet, 1977: 134-135), aerial views with some details in frontal view (e.g., aerial maps of cities with cars and trees visible from the front) (Luquet, 1977: 138-139) and separation of details. According to Luquet, children ultimately discovered that while their drawings depicted the distinctive elements of the objects in their entire shape, their representations were not accurate and did not match how these same objects were actually perceived in real life (Luquet, 1977: 153). This inspired them to want to draw in a more visually realistic style, which meant depicting an object or scene as if seen from a certain angle, based on the observer's perspective and not on the object itself (Luquet, 1977: 153). The drawings produced at this stage (considered the final stage of drawing development) were referred to as visually realistic, and they resulted from the child's understanding that the relationships between the various elements of an object change depending on the point of view from which they are observed (Luquet, 1977: 153-154; Jolley, 2009: 17-18). Thus, the child now starts to draw what it sees instead of what it understands about a particular situation or an object, including only the features that are observed from its point of view and in the shapes they have in that perspective, rather than their whole shape: “In essence, they are attempting to draw visual models (even if they do not have a physical model in front of them) rather than internal models” (Jolley, 2009: 18). The discovery of drawing rules and conventions, with an emphasis on object proportion, spatial relations, opacity and perspective, marks this stage, bringing children's representations closer to adult creations (Luquet, 1977: 154). Although children eventually achieved

visual realism, Luquet (2001) contended that this was more a stage of intention, as only a small number of them succeeded in achieving it. According to the author, no rigorous and evident line existed between the stages, and children's drawings developed through several types of realism, only the last of which was the desire to reproduce the visual aspects of objects (Luquet, 1977: 155-156; Jolley, 2009: 19-20). However, he did not explain the transitions between stages (neither evolutionary nor regressive), nor even the reason why, in some circumstances, drawing ended up being abandoned by children between 10 and 12 years old (Jolley, 2009: 19). The concept of the child's intrinsic model, to which Szuman (1927/1990, 2008) also referenced, was established with Luquet, an internal model of the child that determines what are the fundamental traits for the idea that it has of a given object, and which serves as the foundation for schematic drawing (Luquet, 1977: 64-65). Luquet's methodological suggestion proved him to be a continuation of Čižek's philosophy, promoting the child's freedom to draw what it wants, in its own style and without impositions, only making recommendations or proposing subjects when requested (Marín, 2003: 197). His work had a great influence on many of the subsequent scholars in this field, such as Claire Golomb (2002, 2004) and John Willats (1997, 2005). Cambier (Wallon et al., 1993), however, believed that Luquet made one mistake: he equated the development of children's realism to adult visual realism, considering that the child seeks to imitate the adult realism model. Thus, Cambier considered that the child's notion of realism comes from a self-centred perspective, which they consider to be absolute. The fact that Luquet regarded an idea of realism through the lens of adult realism led to children's drawings being judged and graded from a point of view of imperfections, lacks and weirdness (Didkowska, 2017: 71).

The idea of the intrinsic model established by Luquet was later continued by Stefan Szuman (1927/1990, 2008). Because both works were published in the same year (Luquet, 1927; Szuman, 1927), there is a resemblance between their methods of thinking (Didkowska, 2017: 70). Szuman and Luquet were both interested in how a person's inner self is reflected in a drawing, in terms of form and content, and argued that children draw what they know about an object rather than what they see, which was justified by their intense imaginative effort (as children, according to them, draw everything from their experience and imagination) (Luquet, 1977: 64-65; Szuman, 1927/1990). Szuman addressed the concept of ideoplastic art in children's drawings, citing Verworn's theory (1908), which distinguished physio plastic art (art that copies external models) from ideoplastic art (art that begins with an individual's imagination, transforming the model it perceives according to its idea of that same object) (Szuman, 2008: 12). The psychologist believed that children construct internal models (intrinsic models) of objects, by translating objects into simplified concepts and schemes, which they then use to draw. In this way, the psychologist explained why, until the age of ten, children have little interest in or desire to imitate reality, despite the fact that it is their awareness of their environment that allows them to develop these internal models:

“When a child is creating a drawing based on imagination, the effect is limited to what is contained within that imagination — an incomplete, simplified image of reality and this is the image expressed by a changing scheme” (Didkowska, 2017: 68).

These schemes, being inconsistent, changed over time as the child grew. According to Szuman, the last level of *schema* development would be the perfect scheme (or type), a realistic form that describes the object it represents in great detail (unlike the *schema*, which is a general form) (Didkowska, 2017: 69). Thus, Szuman identified three development phases: the period of doodling, during which *schema* development began (until around 3 years old); the period of *schema*, which corresponded to ideoplastic art (from 4 to 12 years old approximately); and the post-schematic period, during which the child starts to develop towards physio plastic art (from 12 onwards) (Didkowska, 2017: 69). However, in the same way as Luquet with visual realism, he considered that this stage of development is only attained by a few and that it is prompted too soon by illustrations, photographs and naturalistic paintings that involve the child:

“In our European cultural environment, the patterns provided by adults — painters — are too difficult, naturalistic and too artificial to imitate. The child is not able to use them naturally, without prior instruction, in order to develop in the direction where the drawing activity is leading him spontaneously. A child in our cultural circle is all too soon influenced by illustration in books, by photographs and the cinematograph” (Szuman, 1990: 69).

Parallel to the discoveries specifically related to drawing, research on the physical, psychological and social development of children proliferated, with writers such as Jean Piaget, Lev Vygotsky and Célestin Freinet standing out. Their insights influenced the subject in question, and we believe it is not possible to discuss children’s drawing without considering their theories. The contributions of the Swiss pedagogue Jean Piaget were significant, as they endowed artistic effort with a cognitive component, later developed in subsequent research (Piaget, 1997). Piaget’s major study focused on understanding the origins of intelligence using a clearly evolutionary approach, attempting to discover how knowledge evolves as the child grows, and conceiving the theory that learning occurs via the gradual development of intellectual structures (Piaget, 1997). Piaget incorporated Luquet’s ideas into his own theory of cognitive development, though he organised Luquet’s modes of representation into a hierarchy, with children progressing in successive steps from the seemingly lowest level (at the beginning of development) to the highest level (at the end of development) (Costall, 2001). This was not what Luquet planned, as the author considered all of the modes that children employed as equally acceptable, emphasising the realism of each one of them (Costall, 1993; 1995; 2001).

“Visual realism, the tendency for children to draw what they see rather than what they know, presupposes that seeing makes no use of knowing. (...) It is this awareness that manifests itself in children’s graphic representation. Intellectual realism and visual realism are not competing concepts or theories; they represent two sides of the same coin. Children cannot know what they cannot see, and they cannot see without knowing, for seeing is a way of knowing” (Eisner, 2002: 112).

Like this, Luquet did not regard visual realism as a progression of intellectual realism, rather as distinct representational systems, each with its set of qualities and benefits (Luquet, 1977: 190-191; Jolley, 2009: 19-20). In addition, he sought to reinforce that the stages were not fixed and closed moments in which each child inserted, but rather that their transition was gradual and often mutually contaminated, with typical representations of one stage appearing in the next, for example (Luquet, 1977: 175). In the light of Luquet’s studies, Piaget’s approach, on the other hand, portrayed children’s growth as a hierarchical progression through the various phases, beginning with scribbling and culminating in aesthetically accurate drawings, through consecutive corrections (Matthews, 2003: 30). Piaget organised the stages of evolution into four parts: sensorimotor, preoperational, concrete operational and formal operational (Piaget, 1997). The first stage, sensorimotor (approximately from birth to 2 years of age), corresponded to the moment when the child learned about the world around them by their senses and object manipulation, constructing action schemes to mentally assimilate what surrounds it (Piaget, 1971: 42-43). Piaget, like Luquet, believed that at this time the child draws for enjoyment, with little regard of the drawing itself. The drawings gain layers as the youngster draws over the same area multiple times, the most crucial being the movement associated with it (Bombonato & Farago, 2016: 190). Children started the preoperational period at the age of 2, which lasted until they were 7 years old. This was the beginning of imagination and memory. According to the author, the child learned to mentally portray numerous situations, to simulate events and make connections between drawing, thought and reality (Piaget, 1971: 50-51). Thought remained egocentric (self-centred), children failing to see other people’s points of view, for example (Piaget & Inhelder, 1969: 120-121; Lopes, 2001: 37). Children in the third evolutionary stage, known as concrete operational (corresponding to Luquet’s intellectual realism), became capable of creating more sophisticated linkages while still relying on the concrete world to achieve abstraction (Piaget & Inhelder, 1969: 71). Until this point (about 8

years old), the author believed that the mental picture of children is the most important aspect in drawing and duplicating images (Piaget & Inhelder, 1969: 71; Freeman & Janikoun, 1972: 1116). This stage highlighted the discovery of the colour-object association, a quality that in the previous stage solely relied on their sensations, with no regard for the portrayal of colour being equal to the real world (Bombonato & Farago, 2016: 192). According to Piaget and Inhelder (1969), this period represented a turning point in children's cognitive development because, with the advent of logical and operational thinking, the child was able to solve problems internally rather than only on the physical plane (Piaget & Inhelder, 1969: 101). The child entered the formal operational stage (or visual realism for Luquet) at the age of ten or eleven, being able to think of all conceivable relations logically. This stage was distinguished visually by realism, objectivity, depth and the deliberate use of colour (Bombonato & Farago, 2016: 193). However, Piaget's definition of the beginning and conclusion of the various stages has undergone some changes over the years, with Piaget and Inhelder (1969) shifting the transition from intellectual to visual realism around the age of seven or eight years old. Piaget and Inhelder (1969) also addressed issues related to children's drawing, attempting to bridge the gap between graphic development and other aspects of mental development, and reaffirming Florence Goodenough's perspective on conducting cognitive development tests based on drawing.

This theory of stages (both Piaget's and Luquet's) served as a starting point for many subsequent investigations. In this way, several studies emerged during the 1970s and 1980s attempting to evaluate if children's drawings truly fit at each stage as the child matured or whether the children could easily hop to a higher stage, through tasks and instructions that they would have to perform, given by an adult (Jolley, 2009: 19). Because the studies showed that children could be easily manipulated to represent a certain object in different ways (corresponding to other modes of representation, characteristic of stages in which they were supposedly not inserted), researchers concluded that children's drawing did not develop through stages (Jolley, 2009: 20).

2.3. Socio-cultural and artistic approaches

It is also crucial to remember the work of Lev Vygotsky (1978), one of the main pedagogues who investigated the impact of imagination and knowledge on individual growth. Vygotsky proposed a sociocultural theory of intelligence, emphasising the role of culture in the construction of meaning and its relevance in human cognitive development, arguing that intelligence is constructed from the reciprocal connections of an individual with the environment and society (Vygotsky, 1978). Language (signs and words) is an important mediating tool in the socialisation process (Vygotsky, 1978: 7). Vygotsky argued that imaginative and creative approaches in pedagogical processes help children gain a greater mastery of reality, valuing the role of artistic expression in understanding reality and defending art education based on artistic experiences introduced as early as possible, without being forced or based on adult stereotypes (Vygotsky, 1978). While Piaget's ideas guided us towards a sort of curricular activity that was primarily focused on discovery learning, Vygotsky's notion of the zone of proximal development (Vygotsky, 1978: 85) advocated for something entirely different. The zone of proximal development is, according to the author, the gap between the actual level of development, as measured by the capacity to solve a problem independently, and the potential level of development, determined by problem solving under adult supervision or in collaboration with another partner (Vygotsky, 1978: 86). This approach helped to understand children who struggled when tested but did better in the presence of people educated about the subject in question. According to Vygotsky (1978), much of learning takes place through social contact with someone who understands more than the learner (who does not necessarily have to be an adult) (McLeod, 2022). Unlike Piaget, Vygotsky thought that learning fosters growth. The author considered that children are unconcerned with reality, that they are more symbolists than realists, and that they produce pictures from memory (albeit sometimes they may stand in front of the object they intend to draw) (Vygotsky, 1978: 112). Furthermore, he relates the impact of someone's cumulative experiences to their imaginative constructions. In his studies, he did not specify evolutionary stages, but he believed that these stages in the production of drawings are more or less common for children of the same age (Vygotsky, 1978). On the other hand, Célestin Freinet (1984), a

contemporary of Vygotsky and Piaget, conceived the school as an active component of social change, supporting the use of free expression and creativity in the production of each work in the classroom. Freinet's educational technique emphasised the freedom that children should be allowed to regulate their own learning and rhythm, offering a range of activities based on experimentation as teaching tools: free drawing, free writing, tour-lessons, outdoor investigations, and so on (Freinet, 1984). In this sense, he proposed the game as a key activity for learning and attributed as much importance to manual activities as to intellectual ones, calling into question monotonous educational chores (Freinet, 1984). However, allowing the child that much independence on its own was deemed too extreme (Lopes, 2001: 35).

Near the middle of the 20th century, Herbert Read (1943) and Viktor Lowenfeld (1947/1964) initiated the art education movement and looked at the study of children's drawing from a more artistic point of view, giving rise to the theory of free expression, which has gained great propulsion in the approach to children's drawing to the present. This artistic approach focuses on studying how children draw, rather than what they draw, and on understanding the mental processes that are activated in them during this activity, while also taking into account the pleasure and enjoyment that children have when drawing (Jolley, 2009: 8-9; Lange-Küttner, 2011). Read (1958) argued that children have a kinaesthetic imagination that could not be reduced to pure motor behaviour (Read, 1958: 126). According to the author, art should be the foundation of education, playing a critical part in the process of social integration. The philosopher stated that the child uses symbols and signs to describe his feelings in relation to a certain object or scene, having in himself a vast set of psychological meanings, and that the mental functions involved in art are thinking, feeling (perception), sensation and intuition (Read, 1958). According to Read, children's art should be self-expressive and spontaneous, and parents and educators must act as stimulators of this same freedom of expression (Read, 1958).

Like Read, Viktor Lowenfeld and W. Lambert Britain (1947/1964) stated that each drawing reflects the aesthetic, social, physical, intellectual and emotional growth of the child who produced it (Lowenfeld & Britain, 1964: 2). Similarly, they valued spontaneity and free expression in children's creative production and encouraged parents and educators to promote children's use of art as a form of self-expression while not interfering with the pictures generated, in a way that respects the natural growth of children (Lowenfeld & Britain, 1964: 216). Thus, they argued that assistance should be centred on the artistic process rather than the finished product, condemning colour drawings and any attempt to teach the rules and conventions associated with drawing (Lowenfeld & Britain, 1964: 22). According to the authors, this style of education would negatively impact children's creative abilities, conditioning them and leading to their frustration. Lowenfeld and Britain (1964) also believed that children's general development was closely linked to their creative development. For the authors, children were dynamic beings and art was, for them, a means of expression and a language of thinking, which develops as they grow up, following changes in their way of seeing the world (Lowenfeld & Britain, 1964: 1). There is also a certain parallel between Piaget's and Lowenfeld's ideas, particularly in regard with the formulation of theories of learning linked to development, as well as the belief in a stage development (Marín, 2003: 236). In his studies, Lowenfeld classified children's creative processes into several stages of development, naming them the scribbling stage, the pre-schematic stage, the schematic stage, the dawning realism, the pseudo realistic stage and the decision stage, and characterised each stage based on its general characteristics, typical ways of representing the human figure and the resolution of space and colour (Lowenfeld & Britain, 1964). Each stage came before the next, and in the last stage (which lasted until adolescence) two distinct styles emerged: a naturalistic style or an expressionist/surrealist style (Lowenfeld & Britain, 1964). For the professor, the first four stages were fundamental. In the first phase, the scribbling stage (from 2 to 4 years old), the child drew without any goal, merely for the pleasure of movement, not having much control of the drawing and resulting in a series of disorderly scribbles that, as time passed, became gradually organised (Lowenfeld & Britain, 1964: 94-95). At the end of this initial phase, the child begins to identify its scribbles, naming them, associating them with objects or situations, and telling stories related to those same scribbles (Lowenfeld & Britain, 1964: 99). This moment marks a turning point in the child's thinking, which until now was satisfied only with the movement produced. From this moment on, it starts to correlate its drawings with imagined circumstances, demonstrating that its thinking has shifted from kinaesthetic (defined by movements) to imaginative (defined by figures) (Lowenfeld & Britain, 1964: 115). The pre-schematic

stage (from 4 to 7 years old) is announced by the appearance of circular figures with lines, which seem to imply a human or animal figure, indicating the earliest efforts at representation. If, on the one hand, scribbles begin to gain more symbolism and become more easily recognisable, on the other hand children are in a phase of experimentation and discovery, so they experiment and change the *schemas* and symbols they have of various objects and figures several times (Lowenfeld & Britain, 1964: 117). Human figures are typically the major feature of the drawing (and are even in the middle of the sheet) at this stage, and all other elements are carelessly dispersed around them, with no awareness of space (Lowenfeld & Britain, 1964: 119-120). Furthermore, the drawings depict the significance that children place on objects, with exaggerated sizes on the represented elements, omissions and disproportions (Lowenfeld & Britain, 1964: 120). Because children at this stage pick colours by affinity and personal taste, the choice and application of colours is completely emotional, rather than having a representational role; yet, the painting continues with the qualities of the previous stage, showing itself scribbled (Lowenfeld & Britain, 1964: 121). The third phase, the schematic stage (from 7 to 9 years old), refers to the point at which children build and crystallise their graphic schemes to represent each element. This graphic scheme is made up of a set of simple geometric shapes and matches to the child's intellectual and linguistic notion for each object, idea and figure (Lowenfeld & Britain, 1964: 140). They are not closed forms, they change and transform themselves not only as the drawings progress (via various techniques such as exaggeration of some parts, the omission of less important areas or the modification of the forms when representing emotionally strong situations) (Lowenfeld, 1957: 143), but also as children grow and other experiences cause them to add new details to their internal schemes. At this point, these *schemas* allowed the child to convey its beliefs about the world in a symbolic-schematic way through drawing, without being interested in copying what they see (Lowenfeld, 1957: 132-133). The notion of the space of the sheet becomes more established here, with each element represented in its proper location and a relationship between all of the drawing's elements being established (Lowenfeld & Britain, 1964: 141-142). Lowenfeld and Britain (1964) added that the child at this stage draws a straight line at the bottom of the sheet over which it arranges the remaining elements and a straight line at the top of the sheet symbolising the sky (Lowenfeld & Britain, 1964: 148-149). Other visual characteristics of this stage include the use of colour according to the real, the drawing of several different time sequences in the same image, the elevation as a depth indication and the overlaying of interior/exterior elements via x-ray drawing (Lowenfeld, 1957: 151-152). The dawning realism develops subsequently, between approximately nine and eleven years old. This phase continues to maintain a more symbolic than representative quality, even though the child is more aware of the world and of itself, and realises, for the first time, its inability to faithfully represent objects in the way it sees them (Lowenfeld, 1957: 182-183). This period's drawings became more detailed and smaller, and they began to deviate from geometric designs, particularly in the portrayal of the human figure. The graphic schemes characteristic of the previous stage also tend to be left behind, as well as the usage of the baseline and transparencies (Lowenfeld, 1957: 187-188). Thus, according to Lowenfeld, there is a clear path towards understanding perspective, by using a ground plane (instead of the baseline) and placing figures and elements along that plane, with overlaps between elements signalling the spatial relationships between what is further ahead and further back (Lowenfeld, 1957: 188-189). At this point, children develop a strong critical awareness of their work and tend to prefer hiding their drawings rather than showing them (Lowenfeld, 1957: 233; Lowenfeld & Britain, 1964: 183-184). From the pseudo realistic stage (between 11 and 12 years old) the final product becomes the child's primary concern (until then, the emphasis was on the process of making the drawing), emphasising the reasoning and self-criticism that eventually leads to the decision stage (from age 12 onwards), where children who are interested in the visual arts improve their skills while other children abandon them (Lowenfeld, 1957: 433-434; Lowenfeld & Britain, 1964: 214-215). Lowenfeld and Britain (1947/1964) believed these stages to be very consistent in all children, specifically the first four stages of development: while there were differences based on the environment in which they lived and the instruments they used, children of all cultures would experience these stages (Lowenfeld & Britain, 1964). The authors linked each developmental stage to how children perceive reality, believing that their drawings reflected their maturity, perception, thinking, imagination and emotions, with each child having a unique style of depicting reality (Lowenfeld & Britain, 1964). The author also distinguished two types of perception and expression: visual and haptic. If, on the one hand, visual people observe reality as spectators and limit their contact with the outside world to vision; on the other hand, haptic people are more sensitive

to their bodily experiences, feelings and sensations, relying more on kinesthesia than vision and connecting more with their surroundings (Lowenfeld & Britain, 1964: 260-261). Although Lowenfeld and Britain used an aesthetic approach to children's drawings, they kept close to a realistic perspective when it came to categorising child development into stages. Like the creators of the visual realism viewpoint, Lowenfeld and Britain considered that the acquisition of knowledge and skills was gradual and progressive, bringing the drawings increasingly closer to reality (Thompson, 2002). More recently, some concerns have been expressed about how the total liberation advocated by Lowenfeld and Britain could lead to the deprivation of the child of an important formal knowledge that could prevent it from abandoning graphic representation at some time in its life (Lopes, 2001: 49).

Children's drawing studies changed their points of view and interests over the second half of the 20th century, shifting the focus from aspects common to most children to the distinctive particularities of each given circumstance (Marín, 2003: 76). Rudolf Arnheim (1974, 1997), a psychologist trained at the Gestalt school, attempted to apply this same feature to children's drawings. The psychologist explored the realm of visual arts in order to illustrate that vision is neither an antecedent to thought, nor is it an exclusively sensorial and passive process; on the contrary, visual perception is a dynamic and complex cognitive process (Arnheim, 1997). Arnheim (1974, 1997), like the followers of this school, felt that drawing was the result of a complex interaction between perceptual (visual) and behavioural/expressive (motor) forces (Arnheim, 1974). The psychologist argued that the general concept children have of an object is the result of their perception — of observing the objects, inventing synthesised graphic equivalents for those objects based on their various experiences, and then reproducing those *schemas* as a stand for the referents in their environment (Arnheim, 1974; Willats, 2005: 39-40). Thus, these drawings were symbolic and expressive rather than striving for realism (Jolley & Rose, 2008: 230). This process was thought to be a knowledge-based drawing, since children actually draw what they know, but this knowledge comes from their visual experiences and an equally visual style of thinking, and cannot be regarded as a substitute to seeing (Arnheim, 1974: 164):

“My contention is that the cognitive operations called thinking are not the privilege of mental processes above and beyond perception but the essential ingredients of perception itself. I am referring to such operations as active exploration, selection, grasping of essentials, simplification, abstraction, analysis and synthesis, completion, separating, putting in context. (...) I see no way of withholding the name of “thinking” from what goes on in perception. No thought processes seem to exist that cannot be found to operate, at least in principle, in perception. Visual perception is visual thinking.” (Arnheim, 1997: 13).

This perspective was considered more positive in relation to the study of children's drawings because it believed that at least the younger children were satisfied with their productions (Jolley & Rose, 2008: 230), as opposed to what was said about their drawings having errors and flaws that they themselves would recognize. While this perspective was quite influential, it was not universally accepted, not only because it was based on Gestalt psychology, but also because Arnheim failed to explain how children's drawings provide graphic equivalents for real-world objects (which is justified by the lack of sufficient technical vocabulary at the time, which was then developed) (Willats, 2005: 42).

2.4. Drawing as a problem-solving tool

Thus, most recent studies of children's drawing have treated drawing as a problem-solving tool, in the sense that children must cope with challenges as the topics they aim to express grow (Quaglia et al., 2015: 83). In the 1980s, Howard Gardner (1980) proposed a categorization that aimed to assess the degree to which a child's cultural background influences their artistic productions. This classification

was separated into three periods that were not well defined: the mastery of universal patterns (between 1 and 5 years of age), the flowering of drawing (between 5 and 7 years) and the apogee of cultural influences (between 7 and 12 years old) (Gardner, 1980). This model attempted to solve some of the limitations of the preceding models and was often known as the U-shaped curve, given that the drawings suffered a decline in their aesthetic quality around the age of nine or ten (Gardner, 1980). The first years of artistic production would then be characterised by a freer and more spontaneous drawing, which resulted in aesthetically interesting images (although not on purpose) (Gardner, 1980). On the other hand, in the later years of childhood, children became increasingly concerned about using drawing conventions and standards, striving for more accurate representation strategies and failing to use them, resulting in aesthetically inefficient drawings (corresponding to the decline period, to the bottom of the U) (Gardner, 1980). Finally, in adolescence, children reverted to aesthetically pleasing drawings because the norms have been internalised and they were able to put them into practice (Gardner, 1980). Furthermore, Marjorie Wilson and Brent Wilson (1981, 1984) sought to demonstrate, using collections of children's drawings from the 19th and 20th centuries, how particular visual qualities were prevalent in those times, varying according to specific areas of the world (Wilson & Wilson, 1981, 1984). On the other hand, they have also stated that all images produced are impacted by other images (both of other children and in general), implying a new hypothesis that contradicts imagination and direct observation (Wilson & Wilson, 1977).

Claire Golomb (2004) addressed Arnheim's theory of development by discussing the many ways in which children assemble their drawings. As a result, she considered that the child initially selects basic graphic equivalents for the things, namely geometric, symmetrical shapes and right angles (Golomb, 2004: 30). After a while, these early equivalents become unsatisfactory since the child, according to the author, seeks forms of representation that are closer to reality, forcing it to adjust its *schemas* (Golomb, 2004: 78). In this approach, drawing works as a problem-solving activity and it is up to the child to come up with its own solutions to the problems it faces, both in terms of form and emotional expression (Golomb, 2004: 6). Furthermore, she also demonstrates that different children generate a broad range of different drawings, which she uses to counter the theory of realism, which holds that children seek to achieve realism by drawing from nature and comprehending a series of graphical errors (Golomb, 2004: 3). For Golomb, if this idea were correct, children's drawings would have a considerably more limited range of topics and graphics (Golomb, 2004).

In order to explain the evolution of children's drawing, in 1999 Paul Duncum developed a new model, which he termed "multiple trajectories and arrival points" (Duncum, 1999). Given that the most commonly used models at the time (Lowenfeld's, from the mid-20th century, and Gardner's, from the 1980s) had deficiencies, he developed a new model, capable of integrating the complexity of the sociocultural contexts in which the evolutionary process occurs and capable of displaying the plurality of trajectories found in children's drawings (Marín, 2003: 489). However, it should also overcome the idea that previous hierarchical models had. For Duncum (1999), the fundamental problem of the children's model was the use of the aesthetic characteristic of adults' drawings as a model of comparison for the children's drawings. Thus, the model he provided looked at the development of children's drawings as having a similar core (the scribbling phase), which would later begin to branch out into several different paths (although few trajectories would reach adolescence, since many children give up drawing) (Duncum, 1999). Duncum's model intended to provide a pluralistic and diverse picture of children's drawing development, allowing for the consideration of some aspects linked to children's drawing that earlier models had overlooked (Duncum, 1999).

2.5. Focus on the drawings

From the late 20th century to the present, numerous hypotheses have emerged that question the previously dominant knowledge regarding child development in visual representation. Thus, John Matthews (2003) criticised the previously valued theory of stages (which considered children's drawing to have defects that would need to be corrected from a lower stage, the primitive stage, to a higher stage

of visual realism, measuring children's performance considering adult paradigms). On the contrary, the author sought to explain child development by identifying the different modes of representation used by children and considering them to reflect their own intentions, motives and priorities (Matthews, 2003). For him, the idea of intellectual and visual realism would be more apparent than real, "there are no stages in children's drawing development. It is a continuum which undergoes transformations woven together in dynamic, co-operating, perceptual-motor systems" (Matthews, 2003: 109). One of the problems that he discovered in the stage theories of development had to do with the presumed end point that development achieved (considered, most of the time, visual realism; nevertheless, this end point varies from time to time and place to place, depending on different cultures) (Matthews, 2003: 191). Whatever the ultimate goal was, it would always be the socially accepted "proper" portrayal, after the children had managed to overcome their faults in thinking and expression (Matthews, 2003: 191). Matthews disagreed with this view, stating that, by comparing children's productions with the kind of images produced by adults and artists (the "correct" form of representation), much of the meaning and importance of children's representation would be lost (Matthews, 2003: 3). Furthermore, he considered that stage theories failed to show how the passage between stages was processed, arguing that what occurred between stages was far more important than the stages themselves (Matthews, 2003: 191). For the author, the child would not simply stop drawing according to one stage to instantly move on to drawing according to the next stage. On the other hand, Matthews also criticises the explanation traditionally attributed to scribbling as a purely physical process and the discovery of body coordination, which would be important only when the child begins to recognise fortuitous similarities between the marks it accidentally left on paper and some real-world object (Matthews, 2003: 11-12). According to the author, the distinction between what is considered sensorimotor and mental activity was meaningless because artistic practices are intermodal, with kinaesthetic and proprioceptive properties (related to the perception or sensitivity of the position, weight and balance of one's own body and its parts), haptic and visual (Matthews, 2003: 19). Simultaneously, some language studies suggested that the development of visual representation in the form of drawing and painting stems from other actions previously explored (such as a sign language developed in childhood), which accumulates in the background as new actions are developed successively (Allot, 2001; Matthews, 2003). Thus, for the author, the drawing is part of a family of expressive and representative actions that are formed over a series of previous actions and scribbling would be important in the sense that the drawings produced at this time were part of a systematically carried out research process by children, in order to understand the potential for expression and representation of various visual materials and media (Matthews, 2002: 45). The child would be able to better grasp the forms and actions that lead them there when the experiences were repeated, adding layers of meaning and emotion as the experiences accumulated (Matthews, 2003). Matthews also thought it was critical to try to comprehend what was in these children's initial drawings in order for the parents and educators to promote a follow-up and development of their representational thinking, as well as the use of symbols and signs (Matthews, 2003). "Because people cannot 'see' what children's early drawings are 'about', it is presumed that there is no content at all (...) Early drawings are about shapes, the shapes on the paper and the shapes of the movements which produce them and their relationship to objects and events in the world" (Matthews, 2003: 88-89). Although children progressively generated images more easily recognizable by adults as attempts to reproduce reality, these images were viewed as either lovely or as full of errors that needed to be corrected in order to offer an accurate representation of reality (Matthews, 2003). Matthews attempted to show that these assumptions were wrong and that younger children were also able to represent in their drawings basic differences in shape, size and proportion in relation to the objects they observe (Matthews, 2003). For Matthews, the spatial arrangement of colours and shapes incorporates feelings, intuitions and notions of harmony, balance and composition, making it hard to interpret children's drawings without considering the composition of their images (Matthews, 2003: 68-69). He also addressed the role of education in children's representational development, emphasising the importance of children's spontaneous drawings in the way they understand the world and considering them essential for their intellectual and emotional development (Matthews, 2001), and fighting against the notion that children would be unable to learn and progress on their own, without the knowledge and assistance of an outside person who would correct their flaws. However, on the other hand, Matthews rejected the libertarian approach of Cizék and other theorists who followed him, who saw adult involvement as harmful to children's creativity, arguing that children should have complete freedom to produce and mature at their own pace.

Thus, the writer considered that, in fact, while certain educational systems were excessively castrating and damaging (Bruce, 1991), some assistance and discreet adult accompaniment was required for children's visual development to really evolve (Eisner, 1997; Kindler, 1997; Matthews, 1984; 1994; 1999; 2002 in press; Athey, 2007). However, as children draw, they also find solutions on their own to solve the problems and situations they face, and this individual process is as vital for their development as it is gradual, and the consequence of a constant interaction between what unfolds within itself and what is part of its surroundings (Matthews, 2003; Athey, 2007). To assume that visual development only has to correspond to society's expectations regarding the child's representational development is limiting (Matthews, 2003: 2). Matthews argued that the idea of reality was not true and universal but rather a human construction that varies according to a person's age and context, so the concept of drawing realistically, according to him, was incorrect, since developmental changes would alter the child's conception of reality and change its priorities in terms of what to draw (Matthews, 2003: 2).

Another author whose work has stood out from the end of the 20th century to the present is that of John Willats (1997, 2005), who analysed what the lines of children's drawings signify, and the spatial relationships contained in them. Although Willats also agreed that the child's ultimate desire would be to achieve visual realism and be able to produce accurate representations of the world, his approach partly followed Arnheim's line (Willats, 2005; Jolley, 2009). Thus, its main objective was always to try to show the various drawings systems that children use in order to create effective representations of the real world:

“(...) it is impossible not to be struck by the fact that the drawings by the older children are in some sense better than the drawings by the younger children. But better in what sense? Better as works of art? Better because they look more like adult pictures? Or better because they look more like the real world? (...) I argue that drawings by older children are better than those by younger children in the sense that they are more effective as representations. By more effective as representations, I mean that the objects they are intended to depict can be seen in them, clearly and unambiguously” (Willats, 2005: 145).

Willats mentioned that the best-known drawing development scheme was that of Luquet and that it was generally resumed to the latter two stages, intellectual and visual realism. However, Willats did note that the examples usually given to illustrate these stages used different drawing systems (because most psychologists assumed that all drawings produced by children would be line drawings): whereas drawings in oblique projection or perspective were generally considered visually realistic, drawings in orthogonal projection were referred to the category of intellectually realistic (Willats, 1997). Thus, Willats (1997, 2005) sought to show that neither Luquet's theory nor those that followed it took into account the changes that occur in child development at the level of denotation systems, since most of the scholars who developed them belonged to the field of psychology and were inevitably more focused on the mental processes involved in drawing and how these changed as children grew (Willats, 1997, 2005). In Luquet's example, suggesting that children draw what they know and not what they see does not correspond to descriptions of the drawings themselves, but to their mental states (Willats 1997, 2005). For Willats, these mental processes could only be extrapolated from the drawings, which would be impossible without first precisely understanding the representational systems that children employ (Willats, 1997). However, in the absence of a formal and precise scheme to describe these representational systems, Willats questioned the validity of the deductions in respect to mental states (Willats, 1997: 287). Thus, Willats sought to formulate a progression of drawing systems that could present the various ways in which real-world spatial relationships could be represented by lines in the image, summarising them into five systems: topology, orthogonal projection, horizontal and vertical oblique projections, oblique projection and perspective (Willats, 1997, 2005). Luquet's intellectual realism was usually associated with transparencies (Luquet, 1977: 134-135), the use of multiple points of view (Luquet, 1977: 138-139) and the exemplarity of forms (each detail being drawn in its most characteristic and recognizable form, regardless of perspective) (Luquet, 1977: 71-72; Freeman, 1972).

On the other hand, Piaget's approach corresponded to an advance over Luquet's, in that he identified multiple distinct drawing systems with numerous different stages of development, including the association of the first stage with topological geometry (Willats, 1997: 289). However, according to Willats, the sequence Piaget described for the following stages was incorrect. On the other hand, the drawing systems described by Willats deconstruct the notions of intellectual and visual realism: whereas topology can be associated with intellectual realism, orthogonal, oblique and perspective systems move between both intellectual and visual realism (Willats, 1997, 2005). As a result of Willats' decision to focus on the drawings themselves, he was able to provide a scheme capable of presenting the variety of drawing systems that children build to deal with the depiction of objects and scenes (Jolley, 2009: 28). On the other hand, Willats stated that as soon as children detect mistakes in their drawings they seek to eradicate them, and this process of corrections (through the interaction between picture production and perception) contributes to their growth (Willats, 2005). From his point of view, what children wanted to achieve were the so-called effective representations (images in which the represented elements can be clearly recognized), so that their mistakes are considered anomalies by themselves, even though many adults look at them with fascination (Willats 1997, 2005). The omission of the psychological part of Willats' approach to children's drawing led him to gain too much freedom in his interpretation of the drawn lines, not considering that sometimes marks are accidental and have no particular meaning or spatial relationships (Jolley, 2009: 28-29).

Thus, if on the one hand Luquet's persistent emphasis on the psychological aspect of the child provided a richness in this sense to his theory (which Willats' lacked), on the other hand Willats' theory comprised more information in relation to what the lines of a drawing signify and what their spatial relationships are (Jolley, 2009: 29). In this sense, the two theories complement each other, by providing contributions that the other lacked; nonetheless, both failed to address the expression of children's sentiments and ideas in their works (Jolley, 2009: 34). In fact, any of the numerous theories on child art has been fully accepted as the only definitive one, as they all contain valuable insights, but also some weaknesses. One of the flaws that some of the theorists considered was the assumption that children have a desire for realism. This was mostly due to the Western culture that emerged in the Renaissance, which considered and considers realism to be the ultimate end (Golomb, 2002; Matthews, 2003; Quaglia et al., 2015). Although not all societies consider visual realism to be the goal, all demands and expectations regarding children's drawing are related to children's correctness until they acquire a way of depicting reality that is socially accepted as "correct" (Matthews, 2003: 191). Another of the flaws considered throughout the study of children's drawing is the lack of vocabulary simply associated with this age group: all of these theories of development are approached in comparative terms with the capabilities of adults, attributing terms to characteristics of children's drawing that are, inevitably, an automatic comparison with adult productions — for example, some drawings were called “fold-out” drawings due to their similarity to an unfolded drawing, such as the open plan of a cube, “but as Arnheim (1974) has pointed out, this is a misnomer, because nothing, for the child, was ever folded in, in the first place! This term, like others given to various kinds of children's drawing, reflects adults' — not children's — lack of understanding” (Matthews, 2003: 160). Finally, several authors have investigated the theory that many of the errors observed in children's drawings (such as transparencies, differences in size and turned or upside-down drawings) would actually be solutions devised by children to overcome problems encountered when attempting to represent three-dimensionality on two-dimensional surfaces (Arnheim, 1974; Freeman, 1980; Matthews, 2003; Anning & Ring, 2004).

3. Cognitive Development

Children use drawing to express themselves and construct ideas. There is a tendency to believe that the arts and sciences coexist in society but do not cooperate; however, studies of children's drawing revealed that representation (depiction) is the result of the knowledge and perception of those who perform it, which reflect their personality, emotions and attitudes, and are dependent on the constant changes of the aesthetic and cultural conventions into which they are inserted (Didkowska, 2017: 67). Elliot Eisner (1997), for example, considered children's drawings to be the basis of all thought and to play a central role in their cognitive development, expressing all the information, experience and mental processes that children learn and acquire through time (Eisner, 1997). Similarly, Lowenfeld and Britain (1947/1964) contended that children's artistic productions mirrored their perception, thinking, emotions, imagination and maturity. However, at the age of ten (approximately), many children begin to look critically at their drawings and conclude that they do not have enough talent to achieve good results (or to meet the expectations that adults have), giving up drawing (Unsworth, 2001: 10). To comprehend the mental and visual processes that children go through to represent their ideas is important, in order to understand their drawings and development, as well as the emergence of the critical spirit that leads to the abandoning of drawing. Cognitive psychology is a relatively new field that analyses the mental processes underlying behaviours and how the brain organises the acquired information, and it may help to better comprehend the relationship between object perception and its representation in the form of a drawing (Kunz, 2010: 299): “mientras que el estudio de la Visión se basa en un entendimiento de los constreñimientos operacionales del sistema visual, la Psicología de la Percepción intenta explicar los procesos mentales internos paralelos, ya sean conscientes o inconscientes” (Kunz, 2010: 299)¹. As a result, we consider it necessary to understand these cognitive processes and their function in children's artistic development.

3.1. Perception

“Drawing is first seeing, perception” (Unsworth, 2001: 7)

Perception refers to the functions that enable the capture of inputs from the environment for subsequent processing of this information, which is the foundation of understanding the world. Although we experience the world in a multi-sensory way (through all our senses), vision takes precedence over the others in almost all activities since much of the information we receive is visual, and the way the world was built is a reflection of that (Marín, 2003: 110-111). Several authors, including Luquet and Piaget, considered that looking at seeing and knowing as two distinct capacities would be fruitless, claiming that the relationship between the two was quite complex and that thought and vision developed through mutual influences, in a constant relationship between perception, cognition and representation (Matthews, 2003: 95). Similarly, drawing, according to Betty Edwards (2012), is tightly related to thinking and vision, stimulating, on the one hand, new connections in the brain while, on the other, reflecting one's capacity to perceive in their ability to draw (Edwards, 2012). This implies the importance of perception in thinking and of thinking in drawing which, consequently, influenced all other areas of knowledge (Edwards, 2012). However,

“The arts are neglected because they are based on perception, and perception is disdained because it is not assumed to involve thought. In fact, educators and administrators cannot justify giving the arts an important position in the curriculum

¹ “While the study of vision is based on an understanding of the operational constraints of the visual system, the psychology of perception attempts to explain parallel internal mental processes, whether conscious or unconscious” (author's translation).

unless they understand that the arts are the most powerful means of strengthening the perceptual component without which productive thinking is impossible in any field of endeavor” (Arnheim, 1997: 3).

Thus, research on visual perception as an essential aspect for artistic creation developed sharply during the 20th century. Arnheim (1997) introduced the concept of active vision and examined its potential applications in art and education. The author argued that any idea one has of an object is generated through perceptual observation and that there is an interaction between seeing and thinking: “My earlier work had taught me that artistic activity is a form of reasoning, in which perceiving and thinking are indivisibly intertwined. A person who paints, writes, composes, dances, I felt compelled to say, thinks with his senses.” (Arnheim, 1997: v).

In order to understand how vision works, it is necessary to first comprehend the mechanics of visual perception, that is, how these types of stimuli are captured, processed and interpreted (Marín, 2003: 118):

“Given that drawing is a domain in which stimulation and percepts are tightly intertwined, the psychology of perception is the natural scientific framework for those who want to understand drawings. (...) Drawings rely, for efficient and strong communication, on the activity of our perceptual system” (Massironi, 2002: 2).

As with photographic film, light penetrates our eyes, and everything we can perceive visually is due to its existence (Marín, 2003: 116). The distinction, however, between film and retina is that photographic film just registers light changes, while the human visual system perceives the world and interacts with it, interpreting and modifying it based on prior experiences: “ver significa organizar, comprender, dotar de significado a los estímulos luminosos. En ocasiones lo que vemos es muy diferente de lo que tenemos delante de nuestros ojos” (Marín, 2003: 116)². Thus, an education of vision (according to Edwards, through drawing) was considered necessary, in order to educate the eye to apprehend all the available visual information (Edwards, 2012).

Gestalt psychologists researched how minds organise and interpret perceived visual information. In this approach, they considered that vision is not a mechanical and objective record of the real world, but rather a creative apprehension of reality, since the way a person analyses the surrounding environment is significantly influenced by the culture and personal experiences of the viewer: “todo percibir es también pensar, todo razonamiento es intuición, toda observación es invención” (Marín, 2003: 115)³. Thus, the followers of this school also defended that the visual aspect of any element depends on the place and function they occupy within a greater scheme, prioritising the whole above the individual parts (Marín, 2003: 115). To this end, at the beginning of the 20th century they created a set of laws or principles of visual perception that was used to explain how incoming external stimuli are organised in the brain into patterns that make the greatest sense. There is no concrete number of principles, however some of the best known are the following:

— Principle of proximity: the elements that are adjacent to each other tend to be perceived as a single homogenous group.

² “Seeing means to organise, to understand, to give meaning to the light stimuli. Sometimes what we see is very different from what we have in front of our eyes” (author’s translation).

³ “All perceiving is also thinking, all reasoning is intuition, all observation is invention” (author’s translation).

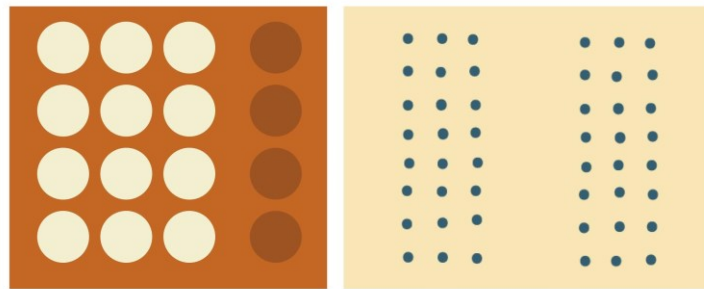


Figure 1 — Principle of proximity.

— Principle of similarity: the similarity principle states that elements that are similar in shape, colour, or size, tend to be perceived as a group.

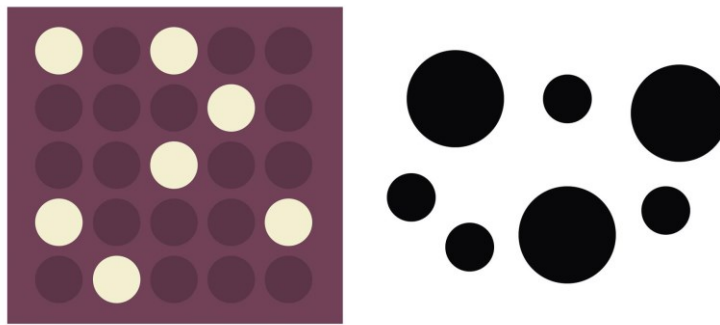


Figure 2 — Principle of similarity.

— Principle of continuity: this principle determines that points connected in a straight or curved line are viewed in relation to each other, as opposed to elements that are positioned randomly.

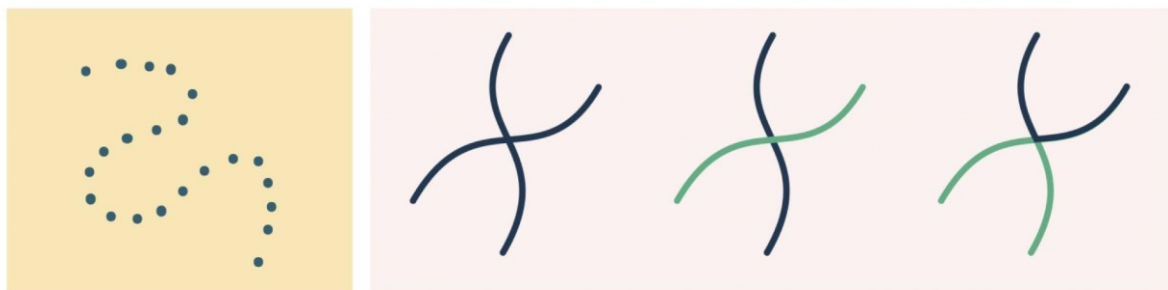


Figure 3 — Principle of continuity. In the figure on the right, for example, when confronted by the first image we tend to read it as two continuous lines that intersect (as in the middle image) and not as two halves (as in the image on the right).

— Principle of closure: this principle determines that, in an obviously unfinished form, the mind seeks to fill in the missing components to complete it, so that it presents itself with its completed contour.

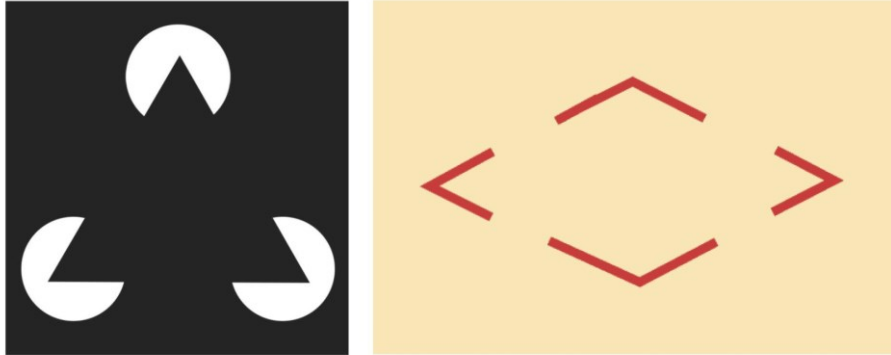


Figure 4 — Principle of closure.

— Principle of common region: this principle states that the mind has a propensity to group elements that are inside the same closed region in order to differentiate them from other groups.

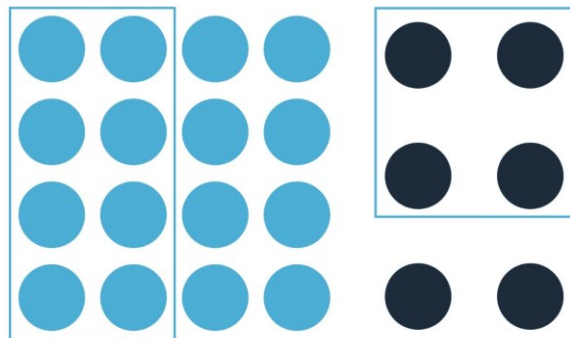


Figure 5 — Principle of common region.

— Principle of common fate: this principle determines that elements that seem to point or move in the same direction appear to belong together, as a single entity.

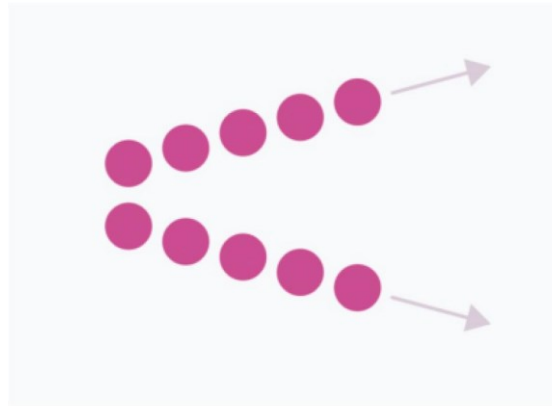


Figure 6 — Principle of common fate.

— Principle of figure-ground: this principle establishes that an element in a picture is automatically perceived as being in the foreground or background, and it is not feasible to understand it as being in both at the same time. Thus, the figure would be the area that draws the spectator's attention and the background would be the remaining, with areas that are constantly favoured (the figure) at the expense of the others.



Figure 7 — Principle of figure-ground.

— Principle of good figure: this principle describes perception's tendency to adopt the simplest conceivable forms, allowing for easy reading in apparently confusing compositions. As a result, more complex patterns and pieces would be broken down into parts and recognised in simplified forms in the mind.

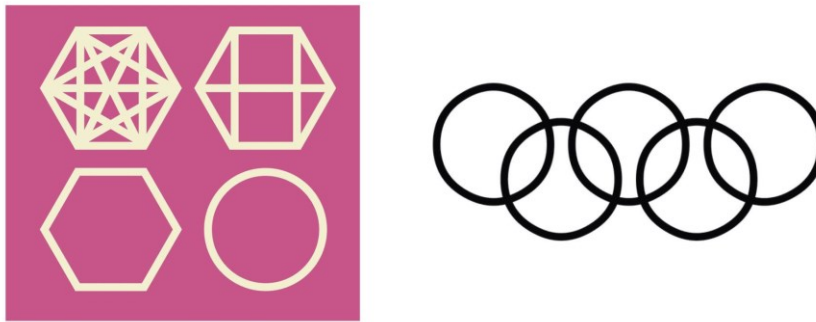


Figure 8 — Principle of good figure.

James Gibson's Ecological Perspective (1950) was one of the most influential theories in the study of the impact of perception on human knowledge. Thus, the ecological perspective was founded on a new understanding of the environment and sought to be the basis for a new theory of vision. Gibson (1950) argued that the branches of optics were not appropriated for the study of visual perception, and that visual perception was not limited to sensations, but that the emphasis should be placed on the attention given to the information of light — thus, the essence of ecological optics was to demonstrate that there is, in fact, information in the environmental light (Gibson, 1950). Later, Betty Edwards (2012) highlighted the existence of two brain hemispheres that, although visually identical, had distinct methods of perceiving, seeing and knowing the world around them (Edwards, 2012). Thus, the main distinctions between the two hemispheres were, according to the author, between thinking and feeling, intellect and intuition: the left side being associated with all the activities involving logic and rationality (such as language, numerical skills, analysis and planning) and the right side corresponding to the visual, holistic and subjective (the usage of metaphors and imagery solutions and understanding how things exist in space, for example) (Edwards, 2012). Given the supremacy attributed to linguistic, logical and rational activities in society, it was previously assumed that the left side was the dominant side due to the nature of its capabilities, and that the right side was a subordinate side, less developed and less capable (Edwards, 2012). According to the author, the consolidation of this division between the two cerebral hemispheres (called lateralization) does not occur until approximately the age of ten, and the development of drawing has been intimately related to the changes that occur in the brain (Edwards, 2012). Thus, at this time children's self-criticism becomes more and more evident, as well as the frustration when the drawings do not turn out "good", and, as a consequence, many children assume that they cannot draw and abandon their artistic endeavours. However, according to Edwards, the issue is not that children are unable to draw, but that the left half of the brain (which stores the previously consolidated symbolic information) pulls ahead and prevents the right side from seeing things as they are (Edwards, 2012). On the other hand, Lowenfeld (1964) criticised the role of the school in sensory instruction. Although it was quite clear for him that learning was created through the senses, he believed that only Art Education permitted and fostered the development of this type of sensorial experiences, through activities involving the experimentation of textures, colours and shapes (Lowenfeld & Britain, 1964: 6; Marín, 2003: 121). For the teacher, activities such as touching, seeing, listening and tasting required active engagement from the children and were a source of tremendous pleasure and satisfaction (Lowenfeld & Britain, 1964: 6).

Within human perception, the area of neuroscience distinguishes two forms of perception: one dedicated to comprehending what things are and the other dedicated to understanding where things are. While some argued that this was due to intrinsic conceptions of objects, others defended that the connection between babies' and children's perceptual systems and the world is continuously activated by certain stimuli (Thelen and Smith, 1994; Thelen et al., 2000). Regardless of how it manifests internally, externally it would be reflected through artistic activities, such as drawing and painting

(Matthews, 2003: 25). Therefore, Matthews maintained that children's moments of artistic expression should not be split into isolated fragments and analysed in parts because the nature of this activity is profoundly multimodal and involves a constant interrelation between sensory and perceptual modes (Matthews, 2003). Children perceive the world around them, as well as their own experiences, as falling into one of two categories — good or bad —, and hence choose what to represent and how to do it (Longobardi et al., 2012). As a result, up to a certain age children are unconcerned in identifying similarities between the marks they make on paper and the objects they see and know in real life. Especially in the scribbling phase, the lines drawn, and the gestures produced express emotions, being graphically characterised according to the emotion connected with it: either happiness or discomfort; prevailing light and round lines in one, and thick and broken lines in the other, respectively (Quaglia et al., 2015: 85). Furthermore, the elements perceived and recalled are not random, but those that marked their experiences in a positive or negative way, and children attempt to portray them through their dynamic aspects rather than their formal characteristics (Quaglia et al., 2015: 87). Over time, as they grow, the assimilation of the formal and visual properties of these elements into the drawing grows, eventually replacing the depiction of their dynamic qualities (Quaglia et al., 2015: 87). Furthermore,

“Our minds perceive, register, and classify in terms of the known. When it comes to drawing, the known is, of course, all the drawings an individual has seen — the drawings of others as well as his own. These images, we claim, provide the basis for the mental configurations from which an individual draws” (Wilson & Wilson, 1977: 8-9).

3.2. Symbolic Thought

Intelligence is the faculty that allows humans to analyse and synthesise their surroundings, assimilate knowledge, remember events, translate the abstract into concrete and vice-versa, construct connections, relationships and meanings, among many other skills (Marín, 2003: 122). Similarly, symbolic thinking is society's ability to employ various forms of symbols to analyse the world and build these links (Marín, 2003: 122). The formation of this sort of thinking occurs during infancy (Kress, 1997).

According to Matthews, this form of meaning was divided into two categories: symbols and signs. While symbols visually depicted the shape of a particular thing (for example, the symbol corresponding to Santa Claus) — which he called visual or pictorial symbols, as Piaget —; signs did not physically resemble what they intended to represent (such as letters, words and numbers) (Matthews, 2003: 144). Even though they have the same foundation in human perception, the way people learn to read both of them (to read signs and to read images) differs. Drawings offer shapes and relationships in the brain in a way different from words: “unless I have been taught the meaning of the English word ‘horse’, no amount of staring at the word ‘horse’ (...) will enable me to see the animal” (Matthews, 2003: 144). As a result, the author believed that each image must be read differently in order to comprehend the differences and connections between symbols and signs (Matthews, 2003: 144):

“Si observamos una línea quebrada y pensamos en su significado podemos interpretarlo como un gráfico estadístico, como el contorno de una cordillera, el perfil de un serrucho, el tejado de una nave industrial, la dentadura de una bestia, o de muchas otras maneras. El modo en el que se lea dependerá del contexto”(Marín, 2003: 108-109)⁴.

⁴ “If we look at a broken line and think about its meaning, we can interpret it as a statistical graph, as the outline of a mountain range, the profile of a handsaw, the roof of an industrial warehouse, the teeth of a beast, or in many other ways. How it is read depends on the context” (author's translation).

Thus, creative production demands children to identify visual symbols in order to represent some experience, idea or feeling, making it not only a highly symbolic but also a cognitive activity (since the ability to think about something that is not present and finding a way to express it is a very big cognitive development) (Seefeldt, 1995). The symbol corresponds to the item that represents something else and constitutes a clearly communicative convention between humans, because these are representations that allow people to identify a reality with something else, either directly or indirectly. Symbolic thinking, in this sense, enables thinking, imagining and producing through the use of symbols (Marín, 2003: 122).

Throughout history, the appreciation and usage of symbols in artistic expression has evolved across time and civilisations, as have the meanings ascribed to visual constructions (Marín, 2003: 125). Thus, each civilization developed its own visual representation systems: whereas in Egyptian and Romanesque art the expression of ideas and concepts through symbols was central in artistic works (and in the most appropriate form possible — axonometric perspective, combination of profile views with frontal views, etc), in the Renaissance the concern was on achieving a naturalistic representation, using the conical perspective to give the illusion of three-dimensionality, for example (Marín, 2003: 125).

Several authors have examined the subject from a variety of fields of study. Luquet (1927/2001) and Szuman (1927/1990) proposed the idea of the intrinsic model, a model that served as a basis for schematic drawing. According to Szuman, children used their perception to form a mental representation of the observed objects, a sort of *schema* that they later used in their artistic activity (Didkowska, 2017: 68). This intrinsic model, in this way, converts objects into ideas, which change and evolve as time passes and experiences accumulate. The author added that these images developed from the children's imagination were not copies of the perceived objects, nor were they meant to be; on the contrary, they were schematized and simplified versions of them (Didkowska, 2017: 68). From the point of view of cognitive psychology, Howard Gardner (1982) stated that the human mind was able to produce open and creative symbol systems, capable of inventing, reproducing and altering products; systems of thought and meaning (Gardner, 1982: 5). Gardner emphasised two views of younger children's symbolization capacity: the cognitive approach (by Piaget and Bruner), which saw symbolic activity as an eminently intellectual endeavour, and the affective approach, which concentrated on describing the function of these symbols in the affective and emotional life of children (Gardner, 1982). The philosopher Ernst Cassirer (1975) classified man as a "symbolic animal" and defined the essence and notion of a symbol, noting that, historically, the symbol has its roots in religion, only later moving to the artistic field (Cassirer, 1975). Susanne Langer (1957), following Cassirer, believed art forms to be the most complex symbolic forms known, attaching a crucial purpose to the mental image and characterising a work of art as "an expressive form created for our perception through sense or imagination, and what it expresses is human feeling" (Langer, 1957: 15). Thus, symbol and meaning, according to the author, should be combined in a good work of art, which should not be a copy of a real object, but the plastic concretization of the same object's mental image (Langer, 1957). The mental images formed regarding a specific object not only inform about it, but also modify it, because these images are also the outcome of all the child's prior emotional perceptions and experiences (Marín, 2003). Piaget (1999) defended human intelligence's adaptability, distinguishing it from that of animals by its symbolic capability, which would give access to object conceptions even if they were not present. According to the psychologist, children's symbolic thought was readily manifested during their play, drawings and use of language (Marín, 2003: 124). Piaget's ideas paralleled those of Lowenfeld, who considered in his studies of child development in stages that the drawings corresponding to some of them (namely the pre-schematic and schematic stage) had a high symbolic quality. For the author, a child approached the definition of a concept by progressively establishing a symbol to represent it, which it then repeated indefinitely until fresh experiences caused it to modify its concept/symbol (Lowenfeld & Britain, 1964: 138). Vygotsky (1978), on the other hand, disagreed with Piaget, defending the importance of social interaction (with other children or with adults) in the processes of thought maturation. According to the author, the cultural environment in which the child developed mediated symbol configuration, with children representing everything they know about an object, instead of what they see (Vygotsky, 1978). In addition, Ernst Gombrich (2000) examined the historical evolution of

realistic art and the motivations that led artists to strive to achieve a form of representation that was near to reality. Regarding children's drawings, he highlighted the differences between the intentionality of their drawings and that of adults, claiming that children use formulas or symbolic equivalents that seek to represent real objects and that the evolution of their drawings towards realism follows an imitation of adults rather than a search for more realistic representations (Gombrich, 2000).

Since the 1960s and 1970s, the methodological foundation of linguistics has been employed to approach the work of art and the visual image from the perspective of semiotics. Semiotics was described as the science of signs based on Ferdinand de Saussure's ideas (1916/2011), in which he distinguished two sides of signs: the signifier (form) and the signified (content), which were linked through cultural conventions: the concept (the meaning) being represented by a formal sign (Saussure, 2011). Thus, it begins with the assumption that visual images are a means of communication, implying an emission, a reception and a message to transmit. This process occurs in a sociocultural context and involves the use of codes to give meanings to numerous visual aspects common to a culture (that are regarded as principles of organisation or relational systems) (Eco, 1979). These codes are based on social and cultural standards for their interpretation, therefore the image's meaning is valid in its symbolic representational system (Marín, 2003: 389-390). According to Umberto Eco (1979), the main philosopher and semiotician who established a theory of codes and applied it to the visual arts (and other human sciences), signs thus responded to a cultural codification, since their representation regarded the cultural rules of the group to which they belong (Eco, 1979). These codes would thus be any set of rules established by a culture and agreed upon in advance by all parties (Eco, 1979: 65-66). As all pictures have a significance (what we perceive when we interact with it), a visual construction constitutes the physical part of a symbol. This symbolic character presents us with content (it says something, expresses itself) and implies communication through an expressive medium (Eco, 1979: 8).

However, Philippe Wallon (Wallon et al., 1993) suggested that, although the intrinsic model was the drawing's basis for children, there was also an external model, which contributed to the drawing's construction in the same way (Wallon et al., 1993). Drawing, on the other hand, was defined by Arnheim (1974, 1997) (and the other followers of Gestalt psychology) as the intersection of two brain-determined processes: a perceptive (visual) and an expressive (motor). He emphasised a visual kind of thinking, as producing images included synthesising the general features of everything that had been previously perceived — hence, the information that sustains the drawing is knowledge based on all prior visual experiences (Arnheim, 1997). Furthermore, he believed that children draw things and shapes in a synthesised and simplified manner because they perceive them similarly. As children develop, they begin to create more complex shapes. On another level, Anna Stetsenko (1995) defended the drawing surface as the best place for children to experiment and learn about the roles of both symbols and signs (Stetsenko, 1995). Drawing allows children to investigate, comprehend and assimilate the differences and similarities between symbols and signs, their correspondences in the real world and the ways in which objects, events and sounds can be represented in two dimensions, as well as to comprehend how different visual structures work (Matthews, 2003: 146). Children are introduced to semiotic systems (symbols and signs) for the first time through drawing, because this activity allows them to better understand that, although a mark is just a mark, it can also represent something else (Stetsenko, 1995). According to Piaget (1997) and Vygotsky (1966), in early childhood, the child believes that the word corresponding to the name of the object is an integral component of the object itself, since words and objects are deeply connected in the brain, and it is through play that they develop the ability to differentiate them (Vygotsky, 1966: 12-13). In order to be able to investigate these relationships and test the boundaries of symbols and signs, Matthews thought that children need to freely encounter the possibilities of both visual symbols and conventional signs, escaping the barriers often erected by adults in regard to the two categories (Matthews, 2003: 144-145). Similarly, Nancy Smith (1979) highlighted the need for children to explore and play with these notions without being limited to the conventions assigned to them (although children grasp the differences between letters, numbers and images from an early age) (Smith, 1979).



Figure 9 — Two drawings in which signs (in this instance letters) are not only used to fill up the background but are also incorporated into the drawn elements themselves. As such, in the second image, the structure from which the various components are created are the child’s favourite letters (because they are in her name and surname).

In this way, they form free associations and assign different meanings to their symbols during their play, which Matthews considered crucial for the development of the ability to think about thinking (called metacognition by psychologists) and to reflect on problems of representation through representation itself (Matthews, 2003: 139). In addition, children are naturally attracted to marks and movements that do not serve any representational purpose, so they inevitably freely navigate between marks for their own sake and marks with representational intent (Bruce, 1991).

Thus, the majority of psychologists agreed that, up to a certain age, children's drawings are a type of graphic report of the object they intend to represent, characterised by a strong symbolic quality, the use of flexible and geometric schemes to represent all kinds of elements, the inclusion of a baseline and the change of the elements’ sizes according to their affectivity (Vygotsky, 1978). When children draw, they tend to remember the most recently memorised symbolic shapes, which require less mental effort, since these types of symbolic representations have already been translated into a two-dimensional configuration (Wilson & Wilson, 1977: 8). So, “these anamorphic configurational signs are always more simple and more abstract than the phenomenal objects to which they relate. The graphic configurations are frozen in time and space; they are seen from a single vantage point and retain a single position” (Wilson & Wilson, 1977: 8). From the moment their drawings begin to lose their symbolic character and approach a more realistic representation, children begin to lose interest in spontaneous drawing (Marín, 2003: 126).

3.3. Imagination and Creativity

‘Imagination is a necessary ingredient of perception itself’ (Kant, 2000: 239)

A creative act is any human act that leads to the development of anything new, whether a physical act or a mental and emotional construct that lives solely inside its creator (Vygotsky, 2004: 7). Creativity is a very wide term that is often associated with innovation and originality in a variety of fields, including the visual arts, which have historically been seen as particularly creative activities (even to the point of considering that any activity that wants to be considered art should have a creative character) (Marín, 2003: 126). Furthermore, creativity and imagination are used in common language as near-synonyms, and it is frequent to hear someone remark “use your imagination” when another one

is blocked on a novel approach to something (Gaut, 2003: 148-149). However, this was not always the case, since it was not until the Renaissance that a major shift occurred when looking at innovation as a vital aspect in the production of works of art (Marín, 2003: 126-127). Previously, during the classical period, the expression “to manufacture” supplanted the expression “to create”, as painting and sculpture were considered copies of nature, with no creative component being attributed to them (Marín, 2003: 126). Thus, from the 18th century onwards, the notion of creativity and imagination became intertwined, starting to appear regularly in art theories, and becoming intimately related to artistic activity throughout the Romantic period (Marín, 2003: 127). Thus, while these notions relate to a variety of fields, including scientific ones, they were and continue to be an identity mark of the visual arts that can be cultivated through education. However, despite the fact that “mental imagery has been a fairly constant topic in philosophy of mind, as has artistic creativity in aesthetics, and both issues have been hotly debated in psychology and cognitive science” (Beaney, 2005: preface), the concern to understand and clarify the various concepts of imagination and creativity (what it means to imagine and to be creative) was significantly smaller, as well as the relationships between these two concepts (Beaney, 2005: preface). However, because imagination and creativity are both quite complex ideas, we opted to merely offer a quick introduction to each of them and tie them to the topic at hand: children’s drawing.

3.3.1. Imagination

From the 17th to the 19th centuries, imagination was given a prominent role in human cognitive activity, together with perception and thought (Beaney, 2005: preface). Although the word ‘imagination’ is commonly used to refer to what is not real or true, in actuality, as the foundation of all creative activity, imagination is a component of great importance in all aspects of human life — in this sense, we can consider that almost everything built by the human hand (contrary to what is natural) was the result of imagination and created based on it (Vygotsky, 2004: 9-10). Imagination pervades so much of what we do and so profoundly that it allows us to think not just about what is present and real, but also about what is absent, unreal and even absurd, creating the illusion of conceptual unlimited powers (Beaney, 2005: 1-2): “without imagination, nothing in the world could be meaningful. Without imagination, we could never make sense of our experience. Without imagination, we could never reason toward knowledge of reality” (Johnson, 1987: ix).

In general, imagination is described as the mental ability to generate images and conceptions about objects not visible to the senses, to integrate information in unusual ways and to conceive and simulate alternative scenarios (Beaney, 2005: 4). Although what is imaginary is frequently regarded as illusory (in contrast to what is real), it is also possible to imagine something that happened or that might happen in the future (Beaney, 2005: 4-5). Thus,

“Someone who is imaginative is someone who is creative. As far as the connotations of ‘imaginative’ are concerned, they suggest a more positive view of ‘imagination’ than do the connotations of ‘imaginary’. But taken together, it might be argued, the two sets of connotations indicate the two poles between which our talk of imagination takes place” (Beaney, 2005: 5).

In addition, Berys Gaut (2003) stated that while imagination can involve the creation of images (imaging), one is not required for the other, since imaginative thoughts do not always need to be accompanied by mental images (as when imagining a row of numerals) or vice-versa (for example, in dreams and memories, which are accompanied by images but are not considered imagination) (Gaut, 2003: 152). Moreover, imagery lacks some of the key properties of imagination, because having an image of something does not imply picturing it: “imagery is confined to the copyable and the picturable, but imagination is not” (Beaney, 2005: 235).

Leslie Stevenson (2003), on the other hand, enumerated twelve conceptions of imagination, which related imagination with sensory perception, thinking and aesthetic creation; however, in a way that was considered very vague and general, given the number of things that he included within the concept of imagination (such as believing or remembering, which several authors later demonstrated cannot be considered imagination) (Beaney, 2005: 12). Now, the contrast with perception is essential for imagination: whereas in the first (perception) we are aware of what is ahead of us in spatio-temporal terms, in the second (imagination) we are aware of what is not present, leading Michael Beaney to believe that what we imagine can be real, absent (at the time of imagining), possible or impossible (whether we believe in it or not) (Beaney, 2005: 9). Furthermore, imagination is linked to thinking in general, since even when we envision something physically existing, that thought might be impacted (though unconsciously) by other thoughts about other things. To further comprehend this link, it is necessary to distinguish between memory and imagination. Jean-Paul Sartre (1995) originally argued for a complete separation of the two, with one originating from perception (memory, which would start from something perceived) and the other from the mental world (imagination, which would arise from nothing) (Silva, 2018: 20). Now, imagination, according to Gaston Bachelard (2011), is not based on nothing, because it is the ability to distort, modify and substitute perceptual images with those of the imagination (Bachelard, 2011: 1). Thus, “para haver memória, pressupõe-se a necessidade da percepção do real e, para haver imaginação, a necessidade das anteriores. Este trio relaciona-se de inúmeras formas, contagiando-se e co-gerando-se continuamente” (Silva, 2018: 19)⁵. This interaction between perception, memory and imagination serves as the foundation for Beaney’s (2005) definition of imagination, which becomes more reasonable than Stevenson’s and Gaut’s, as it considers this constant process of contamination. Thus, according to Beaney, ‘imagining’ entails thinking about something that is not physically present and that may or may not be real or true, without committing to believing in that thought (Beaney, 2005: 23).

Vygotsky distinguished two sorts of activities in human beings, one reproductive (or memoristic) and the other creative (or imaginative) (Vygotsky, 2004: 7-8). The first type, the reproductive, is strongly associated with memory and consists of the replication or repetition of previously acquired patterns and behaviours, such as drawing by sight, writing or following some specific model: “what is common to all these instances is the fact that my actions do not create anything new, but rather are based on a more or less accurate repetition of something that already exists” (Vygotsky, 2004: 7-8). This form of action is made possible by human brain plasticity and is significant in that it permits adaptation to the world and society by allowing the development of habits and routines that may be repeated under certain conditions (Vygotsky, 2004: 7-8). Vygotsky used the example of a paper sheet folded in half, the fold of which stays wrinkled (as a result of the modification produced) and which aids in the recurrence of the same action in the future: only one blow would be enough for the sheet to be doubled again (Vygotsky, 2004: 7-8). However, if brain activity were limited to preserving previous knowledge and experiences, the human being would only be able to function in stable and predictable conditions, and any sudden events that had not previously been encountered would result in a blockage and failure in the necessary reaction (Vygotsky, 2004: 8). Thus, in addition to reproductive activities, there are creative or imaginative activities. This type differs significantly from the others in that it allows for the imagination and creation of new situations through the combination of past and present experiences and elements, generating new behaviours:

“When, in my imagination, I draw myself a mental picture of, let us say, the future life of humanity under socialism or a picture of life in the distant past and the struggle of prehistoric man, in both cases I am doing more than reproducing the impressions I once happened to experience. I am not merely recovering the traces of stimulation that reached my brain in the past. I never actually saw this remote past, or this future;

⁵ “In order to have memory, the need for the perception of the real is presupposed, and, in order to have imagination, the need for the previous ones. This trio interacts in countless ways, continually infecting and co-generating each other” (author’s translation).

however, I still have my own idea, image, or picture of what they were or will be like” (Vygotsky, 2004: 9).

Thus, considering the example of the folded sheet presented by Vygotsky, the imaginative activity would be to look at the sheet and imagine a butterfly (Silva, 2018: 20).

While Aristotle and Immanuel Kant saw imagination as a fundamental part of the mind, serving as a bridge between the sensory and the intellectual (providing the images without which thought could not take place), René Descartes considered that this faculty was not essential, claiming that the presence of these images in the brain could be questioned (Descartes, 1997, 2008; Kant, 2000; Beaney, 2005: 1). Thus, Descartes conceived the imagination as a sensorial faculty (sensory imagination) depending on the body and corporeal representations and rejected it as a component of the essence of the mind (criticising it, as concepts, in his opinion, are more important in understanding than images) (Descartes, 2008). Furthermore, he defined the idea of ‘object of imagination’ (Descartes, 2008: 16-17), which is an ambiguous term that distinguishes between mental images themselves and what those images are images of: “for while it might be natural to take ‘object of imagination’ to mean what is imagined — i.e., what the relevant image is an image of — it could also mean the image itself, which is what the ‘mind’s eye’ looks at in acts of imagining” (Beaney, 2005: 49). Descartes also contrasted imagination from simple conception, stating that

“If I am dealing with a pentagon, I can certainly understand its shape, like that of the chiliogon, without the help of the imagination, but I can also imagine it, that is, by applying the eye of the mind to its five sides, and at the same time to the area contained within them, and here I observe very plainly that I need to make a particular mental effort in order to imagine, that I do not make when understanding. This further effort of the mind clearly indicates the difference between imagination and pure intellection” (Descartes, 2008: 73).

Thus, according to the author, images belonged to the imagination (they are corporeal) and ideas (or concepts) to the conception (they are mental), noting that what is thought without an image is an idea of the mind and what is conceived with an image is an idea of the imagination (Descartes, 1997: 186).

On the other hand, David Hume separated impressions and ideas based on the power and vivacity with which they emerged in the mind. As a result, he considered that impressions had more strength and that ideas were weaker pictures of impressions (Hume, 2003: 1). Thus, impressions consisted of sensations, passions and emotions, as these are perceived more immediately (feeling), while ideas would be the weakest mental images corresponding to these impressions (thinking) (Hume, 2003: 1). Nonetheless, the author also distinguished between simple and complex perceptions, applying these terms to both ideas and impressions (Hume, 2003: 2). In this way, simple ideas and impressions resemble each other. On the contrary, complex ideas do not have impressions immediately corresponding to them, just as complex impressions are not exactly copied to some idea (Hume, 2003: 2). According to the author, all knowledge is founded on sensory experience and the apprehension of impressions or ideas: “we cannot form to ourselves a just idea of the taste of a pineapple, without having actually tasted it” (Hume, 2003: 4). The author was sceptical about the role of reason in the apprehension of knowledge, however, he accepted that sensory experience is not self-sufficient in generating the knowledge we have. Thus, he defended the existence of another mental faculty to perform this function — the imagination. Hume said that simple and complex ideas arise from simple and complex impressions, and that the only way to develop new ideas is through the division and recombination of existing ideas and simple impressions (the role attributed to imagination) (Hume, 2003): “I can form the idea of a unicorn, for example, by decomposing the idea of a rhinoceros into the idea of a horn and the idea of a hornless rhinoceros, and then combining the idea of a horn with the idea of a horse” (Beaney, 2005: 71). Thus,

Hume believed that we begin with simple impressions, which our memory replicates and turns into ideas; that are then separated and recombined by the imagination to generate new ideas (Hume, 2003: 5-6).

Finally, Kant's approach is similar to Hume's in that he considered that human cognition develops from the receiving of representations (sensitivity) and the identification of something from these representations (understanding) (Kant, 2000: 193).

“Without sensitivity no object would be given to us, and without understanding none would be thought. Thoughts without content are empty, intuitions without concepts are blind. It is thus just as necessary to make the mind's concepts sensible (i.e., to add an object to them in intuition) as it is to make its intuitions understandable (i.e., to bring them under concepts)” (Kant, 2000: 193-194).

According to Kant, only by combining these two faculties was cognition conceivable, and neither is capable of the other's function (Kant, 2000: 194). Thus, his notion of experience included sensitivity, imagination and understanding, with imagination serving as a bridge between the perception of impressions through the senses and their conceptualization through understanding (Kant, 2000): “the impressions delivered by our senses are of no use unless they can be controlled and reproduced by the imagination, and understanding can only get to work on intuitions that have already been synthesised by the imagination” (Beaney, 2005: 95). Kant further distinguished between productive and reproductive imagination (active and passive imagination), based on the fact that, during perception, we passively receive sensory impressions (or intuitions, in Kant's terminology), whereas in imagination we actively generate sensory images (also called intuitions) (Kant, 2000). Gregory Currie and Ian Ravenscroft (2002) made a similar distinction between recreative and creative imagination, considering recreative imagination the ability to mentally recreate states that are complementary to perceptions, beliefs, desires, and so on; and creative imagination corresponding to the creation of something valuable (Currie & Ravenscroft, 2002). Furthermore, in Kant's opinion, imagination also plays a critical part in schematism, that is, in the development of *schemas* to generate pictures suited to concepts. Thus, in his view, these *schemas* are the result of imagination and serve as rules for organising intuitions: “the concept of a dog signifies a rule in accordance with which my imagination can specify the shape of a four-footed animal in general, without being restricted to any single particular shape that experience offers me or any possible image that I can exhibit *in concreto*” (Kant, 2000: 273). In this way, experiencing a dog and understanding what a dog is implies the ability to develop and identify other images of dogs.

Thus, the concept of imagination is more difficult to define than that of creativity, because it has a vast range of applications, many of which are unrelated to its core sense (Gaut, 2003: 151-152). In this sense, the concept of imagination is regularly used to describe cases of false beliefs (in which we believe something wrongly), to remember something through images (as when we tell someone to imagine someone's face) — and, consequently, as a synonym for ‘imagery’ — or as a synonym for creativity, for example, a use that was previously considered trivial in the way the two concepts relate (Gaut, 2003: 151-152).

3.3.2. Creativity

According to popular belief, creativity is the domain of those who create great works of art and make big scientific discoveries, an ability only allowed to a few talented individuals, society's “geniuses” (Vygotsky, 2004: 10). However, this view is not entirely correct, as creativity is also present anytime a person imagines, modifies and creates something new, “no matter how small a drop in the bucket this new thing appears compared to the works of geniuses” (Vygotsky, 2004: 10-11). Likewise,

Howard Gardner (1982) addressed the possibility that the concept of ‘creativity’ was a post-Renaissance Western society invention, since the notion of creative genius or creative hero does not exist in other cultures (Gardner, 1982). Thus, creativity is viewed as a personal trait and as an ability to solve problems and combine existing knowledge in new, socially valuable ways (Marín, 2003: 127): “it is this ability to combine elements to produce a structure, to combine the old in new ways that is the basis of creativity” (Vygotsky, 2004: 12). In this approach, creativity becomes the rule rather than the exception, recognising that all human beings possess creative abilities that must be nurtured and enhanced through education (Marín, 2003: 127). These creative processes can be noticed from early childhood, particularly during play: children, for example, take on the roles of characters, create scenarios in their minds and imagine what they want to be when they grow up (Vygotsky, 2004: 11-12). Although children are already familiar with all these elements (due to their previous experiences), it is the inventive combination of all of them that makes them creative activities — rather than being mere reproductions of what they observe (Vygotsky, 2004: 11-12). Thus, one of the most significant concerns in educational psychology is related to creativity and childhood, the development of this creativity and its importance in the child’s overall development (Vygotsky, 2004: 11).

Most individuals see creativity as a mystery since they cannot explain how their ideas arise (Boden, 1994: 75). However, Margaret Boden (1994) considered that the concept of creativity is mysterious in the sense that the concept itself appears contradictory. As such, despite the concept’s enormous scope, its essential meaning (creative making) is what is truly termed creation and requires three characteristics in order to be acknowledged as such (Gaut, 2003: 149). According to Gaut, the first characteristic would be for the work to be original; nevertheless, this individual trait would not be sufficient to characterise an idea as creative — as the word ‘creative’ is often employed as a value judgement, simply combining two or more elements in a new way would not be deemed creative (Gaut, 2003: 149):

“The idea of a winged horse, understood as combining the idea of a horse with the idea of wings, is something that can be accidentally or mechanically generated. But you might feel that the mere accidental or mechanical generation of something would not be regarded as a creative act” (Beaney, 2005: 171).

Thus, unless it has value or meaning (which would mean that not only is the combination new, it is also interesting) (Boden, 1994: 75-76), the simple combination of two elements (in this case, the idea of wings and the idea of the horse) is not in itself creative. As a result, it would be essential to distinguish between valuable and meaningless combinations, a distinction that is impacted by the culture in which they are inserted, because the value ascribed to a thing varies according to each person and group — what is valued by a group is not necessarily valued by the other (Boden, 1994: 77). Like Gaut, David Novitz’s (1999) second condition follows the same logic, nonetheless the author describes it as ‘surprising’ (Novitz, 1999: 77). However, this adjective did not appear to be the most fitting, since anything surprising implies an audience (so if no one saw it, the product would no longer be surprising and therefore creative) (Beaney, 2005: 189). On the other hand, some ideas are also surprising in the sense that they could not have occurred at all before (Boden, 1994: 76). Thus, Boden sought to emphasise two senses of creativity: P-creativity and H-creativity. While the former is psychological in nature, implying that for a legitimate thought to be P-creative, the individual who has it could not have had it before (regardless of whether more people have had it previously); the second (H-creative) is historical, relating to an idea that, aside from the individual never having had it before, no one could have had it at all until then (Boden, 1994: 76-77). Hence, all H-creative ideas are also P-creative too. Moreover, history has a great weight in the development of ideas, since whether a concept survives or not is determined by a variety of historical circumstances, such as war, the economy, the environment, among others (Boden, 1994: 77). However, for something to be termed creative a third condition must be satisfied; yet this condition is the least agreed upon among the various theorists who have written about the subject. This topic corresponds to how the act of creation is produced, omitting casualties, accidents and mechanical processes immediately: “random processes alone, if they happen to produce

anything interesting at all, can result only in first-time curiosities, not radical surprises” (Boden, 1994: 79). Thus, creativity, according to Gaut, would mean the production of something original (that is, new) and valuable by flair, attributes deemed necessary for the creative process to be regarded as such (Gaut, 2003: 151). On the other hand, Boden proposed ‘radical originality’ as the third condition, while Kant differentiated the creation’s ‘exemplary’, valuing the inspiration it should bring to others (Boden, 1994: 78-79; Kant, 2007: 113). According to Boden, a simple new idea is an idea created through the same set of rules as other familiar ideas; while, on the contrary, a radically original idea does not. Thus, “as the comparison of Gaut’s, Kant’s and Boden’s accounts of creativity suggests, creativity is typically defined in terms of originality, value and something else — ‘flair’ (Gaut), ‘exemplariness’ (Kant) or ‘radical originality’ (Boden)” (Beaney, 2005: 191). Novitz, on the contrary, proposed a recombination theory as an alternative to the theory of creativity (Novitz, 1999: 77-78). For the author, there are recombinations that are neither intentional nor the result of extensive research and learning, but that are “simply a matter of serendipity — sometimes the freak chance and happy result of simple play; sometimes, too, the result of comparatively uninformed trial and error strategies that are subsequently put to valuable and surprising use” (Novitz, 1999: 77-78). Finally, Boden also mentioned the importance of constraints in enabling creativity, rather than being their opponents: in this way, eliminating all kinds of constraints would destroy the ability to think creatively (Boden, 1994: 79).

In 2003 Ricardo Marín (2003: 130-131) also highlighted some indicators (main and secondary) used to classify creative thinking, which were described as follows:

- Originality (the unique and unrepeatable), that has been regarded as the most distinguishing trait of creativity since the Renaissance;
- Flexibility (contrary to rigidity and stereotype), integrally tied to divergent thinking and the ability to provide multiple responses to each problem, which gained strength in post-modernity;
- Productivity, or the ability to produce and respond as quickly as possible;
- Elaboration, which refers to the ability to produce works in a precise and detailed manner;
- The analysis, or ability to decompose a whole into parts;
- The synthesis, to summarise, schematise and organise;
- Communication, the ability to convey a convincing message;
- Sensitivity to problems and the ability to see the perspective of overcoming them;
- The redefinition, or the ability to identify different functions than usual for something;
- The inventive capacity to carry out projects that contribute to substantial advancements in some discipline.

Finally, Viktor Lowenfeld and W. Lambert Britain (1964) emphasised the natural character of children for developing their creative capacity, as well as the need of preserving this capacity free of external contamination (Lowenfeld & Britain, 1964: 20-21). Thus, in his opinion, society should avoid restricting physically and psychologically children’s natural curiosity and willingness to explore (Lowenfeld & Britain, 1964: 20-21). As such, creative thinking should be incorporated into the school curriculum to counteract the current trend of focusing education on convergent thinking (where a correct answer to each question is expected) rather than on divergent thinking (characteristic of creativity, enabling the openness to the new and different) (Lowenfeld & Britain, 1964: 10).

3.3.3. The impact of imagination and creativity on children’s development

Following a brief contextualization of each of the concepts and some of the theories that supported them, it is important to understand the relationship between the two. In an attempt to understand it, Gaut identified three key differences: between display and search models, between passive and active creativity and between the source and the vehicle of creativity (Gaut, 2003).

Thus, according to the author, the display model maintains that the imagination serves as a way of exhibiting the results of the creative process to the person who created them, but gives another mental

capacity (such as the unconscious) creativity's true mode of operation (Gaut, 2003: 155-156). This signifies that the creative idea is generated by the unconscious and is only afterwards displayed to the subject's consciousness through an imaginative act. This conception of creativity is what underlies the classic theory that inspiration occurs as a revelation in a person's mind, in a way that the subject itself cannot explain (Gaut, 2003: 156). However, this approach relegated imagination to a secondary position in creativity, which does not provide the complete picture of the interaction between these two faculties. Thus, it would be beneficial to distinguish between two aspects of creativity: passive and active creativity. Passive creativity occurs when someone is not aware of the creative process that has occurred, with the outcome just popping into the subject's head (where the display model fits, employing imagination to exhibit the outcome) (Gaut, 2003: 156). Active creativity, on the contrary, entails a deliberate and intentional creative process that involves actively trying out many approaches and ideas until the final solution is found (Gaut, 2003: 157). In this case, the solution does not simply appear unprepared, but is the result of a process of experimentation and discovery, which appears to be more important in the arts than passive creativity:

“A painter may for instance suddenly ‘see’ how his painting will look, but much of the subsequent work will involve scrutinising the painting as it is being made, imagining how it could be improved by altering it in various ways, trying out these changes, observing the results, making more alterations, and so forth” (Gaut, 2003: 157).

In this scenario, imagination is a central aspect of the creative process. Gaut believed that the display model adequately represented passive creativity, but that it failed to demonstrate the function of imagination in active creativity (Gaut, 2003: 157). Thus, the definition of search model arises, a distinct and more promising model in the function attributed to imagination throughout the creative process. According to the search model, the creative person experiments with different approaches through imagination until they find the best possible solution for a particular scenario (Gaut, 2003: 157). Therefore, the search model appears to do more justice to active creativity (which also values experimentation in search of the ideal possibility). However, this paradigm also had some flaws, considering that the role of imagination is confined to experimenting with different methods, compared to a much more creative pre-selection that has already been done before (Gaut, 2003: 158). Moreover, it was also necessary to distinguish between the role of imagination both as a source and vehicle of creativity. Thus, by being actively creative, the subject employs its imagination to test several approaches until it finds one that satisfies it — using it as a vehicle (medium) through which all options are investigated (Gaut, 2003: 158-159). Gaut criticised the Romantics, who regarded imagination as the source of all creativity, and said that imagination could only function as a vehicle rather than being the source of all creation, since it might be employed in non-creative and mechanical ways (Gaut, 2003: 159). Thus, Gaut concluded that there is a link between imagination and creativity in the sense that imagination is involved in the creative process as a vehicle for active creativity (Gaut, 2003: 159). However, just because imagination is ideally suited to being the vehicle of creativity does not mean that it is always used to be actively creative. Moreover, imagination appears to have no inherent aim (its purposes are external), allowing it a freedom of use without the risk of irrationality that other faculties (such as belief) lack (Gaut, 2003: 160). In this way, these characteristics give imagination the ability to serve as a vehicle for active creativity since it allows free experimentation without compromise regarding its truth and action: “imagination allows one to be playful, to play with different hypotheses, and to play with different ways of making objects” (Gaut, 2003: 161). On the other hand, creative applications of imagination do not even require any form of external purpose, being identified only through the outcomes produced (Gaut, 2003: 161). Thus, Gaut separated display and search models, passive and active creativity and source and vehicle of creativity, with the first two distinctions approaching each other (given that the display model captures passive creativity and the search model does a better job of capturing active creativity (Gaut, 2003). However, Gaut appears to contradict himself in concluding this question,

“For if imagination is the vehicle rather than source of creativity, then this seems to fit the display rather than search model. Ideas may not be simply ‘popping into one’s head’, but even in the more active process of searching, the role of the imagination would now seem only to be to display the results of that search (so that the selection can take place)” (Beaney, 2005: 201).

As a result, a third paradigm emerged to describe the role of imagination in creative activity, known as the connection model. This model considered that imagination may be involved in both the search and display of new ideas; nevertheless, the emphasis would be on building excellent links between the various ideas, a function corresponding to imagination (Beaney, 2005: 201). Consequently, “the imagination may have both a reproductive role, in recalling and displaying previous ideas or results, and a productive or creative role, in selecting and connecting some of those ideas or results” (Beaney, 2005: 202), thus linking Gaut’s ideas with Kant’s ideas of reproductive and productive imagination.

Likewise, Vygotsky (2004) established a theory about the creative process and the importance of imagination in emotion and thought, which aided in understanding the link between reality and imagination. As such, the author concluded that the emotional reality of imagination is the connecting link between art and reality, since art impacts human emotions, which are always real (Vygotsky, 2004: 17-18). In this regard, Vygotsky included the psychoanalytic theory of art (first proposed by Freud (1955)) into his research, considering that art is a means of releasing unconscious emotions and assigning to imagination the central expression of an emotional reaction: “when the artist creates his art, he gives realistic material an aesthetic form, which touches upon the emotions of the readers and makes them interpret the work of art and bring it to life by using their imagination” (Lindqvist, 2003: 248). In this process, it is essential that the emotion created by art generated new and complex actions, since art permits the expression of elements that are not articulated in daily life, with long-term educational and influential potential in society (Vygotsky, 2004: 20-21). Vygotsky further emphasised that consciousness served to interpret emotions (through imagination), functioning as the connection between emotion and its meaning (Lindqvist, 2003). However, in addition, the author argued that creativity is the foundation of art and science and that all humans, even children, are born creative. The author related creativity and imagination, and considered it to be the basis of creative activity, revealing itself in all aspects of human existence and differentiated it from reproduction (which consisted in the replication of previously created and assimilated behaviours and patterns) (Lindqvist, 2003: 249). However, the author underlined that reality and imagination could not be deemed diametrically opposed, since:

“The creative activity of the imagination depends directly on the richness and variety of a person’s previous experience because this experience provides the material from which the products of fantasy are constructed. The richer a person’s experience, the richer is the material his imagination has access to. This is why a child has a less rich imagination than an adult, because his experience has not been as rich” (Vygotsky, 2004: 14-15).

In this sense, Vygotsky contended that the child’s imaginative activity was influenced by their experiences; hence, the more materials the child had at their disposal (that is, the more experiences they had), the greater and more productive their imaginative activity would be (Vygotsky, 2004: 15). Furthermore, the use of imagination in children’s play as they get older is crucial to their growth, and the role of arts is equally vital as a vehicle for children to learn to express their own ability for imagination (Unsworth, 2001: 10-11; Beaney, 2005: 2). This question (about the influence of previous experiences on imagination) is equally relevant when attempting to envision a universe or a period that we have never physically encountered, including a complicated and new correlation of previously perceived elements (Vygotsky, 2004: 16). As a result, we may picture the desert because this idea entails modifying certain known aspects of reality until they establish a new reality: “if I did not have a concept

of lack of water, sand, enormous spaces, animals that live in deserts, and so forth, I, of course, could not generate the concept of this desert” (Vygotsky, 2004: 16). These imagining situations are only possible because they are led by other people’s experiences, which broaden one’s imaginative experience and possibilities (through the ability to conceptualise something through the experience of others) (Vygotsky, 2004: 17). It would be impossible for individuals who had never seen or described the desert to picture it if no one had ever seen or described it. Thus:

“Imagination is a completely essential condition for almost all human mental activity. When we read a newspaper and find out about a thousand events that we have not directly witnessed, when a child studies geography or history, when we merely learn what has been happening to another person by reading a letter from him — in all these cases our imagination serves our experience” (Vygotsky, 2004: 17).

In this regard, Vygotsky stated that imagination is equally emotional and intellectual (“feeling as well as thought drives human creativity” (Vygotsky, 2004: 21)) and that this is the reason why it fosters creativity.

Imagination is a cycle that alters pieces of reality before re-entering reality with a new shape and with the potential to change it (Vygotsky, 2004: 21). Thus, “what we call the act of creation is typically only the climactic moment of a birth that occurs as a result of a very long internal process of gestation and fetal development” (Vygotsky, 2004: 25). This point may be reached only after the initial perception of external factors (which accumulate and form the basis of the experience) and the subsequent processes of dissociation and association (Vygotsky, 2004: 25). The process of dissociation refers to the split of each complex perception into multiple smaller components, disrupting the natural way in which it is viewed and favouring some elements over others that are forgotten (Vygotsky, 2004: 25-26). This process is highly significant since it allows us to rework our impressions. On the other hand, the association process corresponds to the subjective or objective reunification of previously dissociated elements in new ways (Vygotsky, 2004: 28). Between these two processes, the separated elements undergo a change, enduring alterations and distortions through the influence of imagination. This includes the exaggeration and minimization processes, which play a very important role in children’s imagination in general:

“The impressions supplied by reality are transformed through these processes, increasing or decreasing their natural size. Children’s passion for exaggeration, like the passion of adults for exaggeration, has a very profound internal basis — the influence of our internal feelings on external impressions. We exaggerate because we want to see things in an exaggerated form, because this exaggeration corresponds to our needs, to our internal state” (Vygotsky, 2004: 26).

Thus, every will or desire acts as a stimulant for creativity, triggering the work of imagination.

However, another factor that has an influence on creation is the environment, since the degree of stimulation in an environment is proportional to its level of complexity (Vygotsky, 2004: 31). As a result, because all creators are products of their period, all works always contain a social component and “no invention or scientific discovery can occur before the material and psychological conditions necessary for it to occur have appeared. Creation is a historical, cumulative process where every succeeding manifestation was determined by the preceding one” (Vygotsky, 2004: 30). In this sense, creative activity cannot be the same in childhood and adulthood because these factors differ at different stages of development, as do the child’s interests: “the child’s relationship to his environment, which, through its complexity or simplicity, traditions, and influences stimulates and directs the process of creation, is very different from the adult’s” (Vygotsky, 2004: 31). Thus, imagination operates differently

throughout the child's development. Furthermore, there is no consensus on when we are most imaginatively rich: if, on the one hand, the child's imagination is considered to be richer than that of the adult, on the other hand, children's experiences are considerably smaller, so, as a consequence, their imagination would be poorer (reaching maturity only in adulthood) (Vygotsky, 2004: 31). Thus, some argued that infancy is the period when fantasy and imagination are most developed and diversified, claiming that children can "make anything out of anything" (Goethe cited in Vygotsky, 2004: 32) and that this ability diminishes with age. This aspect was also supported by the clear disparity between children's fantasy and adult's reality (children are frequently said to live in the world of imagination), as well as the distortions, errors and fantastic stories integrated in their drawings (Vygotsky, 2004: 32). However, this viewpoint is not scientifically substantiated, because children's experiences are effectively smaller, simpler and poorer than that of adults, as are their interests and relationship with the environment (Vygotsky, 2004: 32). In this way, not only was the material available (resulting from the experiences) inferior to that of adults, but the combinations of elements formed were also deemed inferior, both in terms of quality and diversity:

"A child's mental development does not merely consist of acquisition of quantitative and qualitative concepts, but also of quantitative and qualitative associations among these concepts. The more highly developed the child, the greater the number of concepts and ideas he can combine into a unified whole" (Vygotsky, 2004: 59).

However, it is concluded that "the child can imagine vastly less than the adult, but he has greater faith in the products of his imagination and controls them less, and thus imagination, in the everyday, vulgar sense of this word, that is, what is unreal and made up, is of course greater in the child than in the adult" (Vygotsky, 2004: 34). During the transitional period between childhood and adulthood, children begin to take a creative look at their surroundings, no longer satisfied with the drawings and *schema* they produce and losing interest in the fanciful stories and games they used to immerse themselves in, so they eventually stop drawing: "the fact that the work of the imagination in the form it took during childhood declines in adolescents is clearly demonstrated by the fact that children of this age generally lose their bent for drawing" (Vygotsky, 2004: 35). This shift is explained by the maturation of the adult brain, confronting subjective imagination and objective logic (Vygotsky, 2004: 35). Thus, while creative expression does not cease entirely, its expressions grow increasingly uncommon.

Drawing is the most prevalent creative activity in children, drawing regularly and without being forced to, which leads us to believe that it is this activity that provides children with better tools to express themselves and their concerns (Vygotsky, 2004: 42). However, the major feature of children's creation is syncretism, which indicates that the various artistic areas are not separated in production, blending into one (Lowenfeld & Britain, 1964: 146-147; Vygotsky, 2004: 60-61). Thus, the children draw and dictate the story at the same time, linking visual and literary creations. Their works evolve with them, altering as they reach new stages of development (Arnheim compared creativity to ascending a ladder, where it is required to follow the order of the steps and all of them are equally important) (Arnheim, 1974: 170). Changes in the environment, on the other hand, are equally stimulating for creativity, because familiar surroundings do not elicit many emotional reactions (necessary for creation): thus, emotions are formed when the human equilibrium is shaken, either positively or negatively (Vygotsky, 2004: 54). Subsequently, children release and express these feelings through imagination and play, constructing their own interpretation of what they experienced and felt (Lindqvist, 2003: 249). The child observes and apprehends impressions from the real world and attempts to imitate and repeat them until it moulds them in a way:

"(...) a nine-year-old boy, who after he had learned about excavating machines, for several days without respite pretended to be one. To the extent possible he made his body assume the form of a wheel, and tirelessly waved his fists, which represented the scoops attached to the "wheel", to shovel up the dirt" (Vygotsky, 2004: 70).

Thus, Anna Petrova (1925) stressed that children's imagination is not restricted to daydreaming but may also be used to create situations and conditions that would not be conceivable otherwise (Petrova, 1925). All creative actions and products of creativity may be explained by the process of interaction between tactile and visual perception, while keeping in mind that the value of creativity in childhood is in the process itself, rather than in the final product — “it is not important what children create, but that they do create, that they exercise and implement their creative imagination” (Vygotsky, 2004: 72). Thus, freedom and spontaneity are essential characteristics to be considered when seeking to nurture and stimulate children's creativity, which means that these activities should not be coerced or influenced externally by adults (Lowenfeld & Britain, 1964: 24-25). “For this reason instruction in drawing cannot be a mass and general phenomenon” (Vygotsky, 2004: 84), limiting adults to the role of assistants.

3.4. Play

*“Play is the child's real-life school, which educates him spiritually and physically”
(Vygotsky, 2004: 71).*

Children's creative processes are clearly apparent from a very young age and are frequently related with play. Several authors, including John Matthews (2003), considered play essential not only for learning but also for the child's life in general, as it allowed children to free themselves from the restrictions and limits imposed by society in relation to objects and actions, temporarily changing their way of thinking and acting (Matthews, 2003: 27). This process, known as assimilation by Jean Piaget (1954), differs significantly from when children are learning to master a specific skill or object — in this case, known as accommodation by Piaget, although they also adapt their thinking to the demands of that learning, the goal is to master that action or object (Piaget, 1954; Matthews, 2003: 27). While they must be distinguished from one another, accommodation and assimilation nourish each other throughout life. Thus:

“A child who sits astride a stick and pretends to be riding a horse; a little girl who plays with a doll and imagines she is its mother; a boy who in his games becomes a pirate, a soldier, or a sailor; all these children at play represent examples of the most authentic, truest creativity. Everyone knows what an enormous role imitation plays in children's play” (Vygotsky, 2004: 11).

However, their playful activities are not just reproductions of their earlier experiences, but creative reworkings of them, producing new realities, constructions and interpretations of the world (Freire, 2000; Vygotsky, 2004: 11). Vygotsky (1966), as Piaget, believed that the release of objects and actions from their traditional purposes allowed children to develop new clouds of thoughts and hypothetical scenarios. This way:

“Play provides a safe psychological space for children to think about frightening realities. In play, children can run and rerun the disappearance and reappearance of significant objects and people, so as to get used to their feelings about how things, and people, come and go, where they are when they are ‘gone’ and how they might return” (Matthews, 2003: 28).

According to Johan Huizinga (1998), a person constructs another world through play, a poetic world, a fantasy of the outer world. By adopting the characteristics of different universes, the game creates its own, a free and conscious activity outside of regular life that unfolds inside its own time and space constraints and according to its previously determined rules (Huizinga, 1998). Thus, even though all children understand that “it’s only play”, the game is treated seriously during that time: “genuine and spontaneous play can also be profoundly serious. The player can abandon himself body and soul to the game, and the consciousness of its being “merely” a game can be thrust into the background” (Huizinga, 1998: 20-21). In this way, the game contains a deviant function in relation to reality, since, through the game, a temporary deviation is created, consciously suspending it (Huizinga, 1998). Furthermore, play is connected to the development of all kinds of forms of representation (Bruce, 1991), including the comprehension and use of symbols and signs, as well as the construction of thought. Nancy Smith (1979) even stated that symbols and signs should be integrated into children’s play in order for them to completely comprehend how they function.

The educational devaluation of the intellectual and emotional range of play was criticised by Matthews, who believed that children should be permitted to develop and explore these multiple associations and relationships freely (Matthews, 2003: 110). Through the handling of toys and objects in multiple directions (sometimes in ways that adults do not expect) and creating imaginary universes, the child acquires knowledge about the real world: “by rotating a handheld toy through a range of orientations and systematically taking a number of sightings of the object at different points in time and space, she builds up an understanding of what might be seen from different positions” (Matthews, 2003: 110). Likewise, if the child is allowed to be unconcerned with the barriers between different representational systems, their two-dimensional and three-dimensional thinking relate and interact with each other (Matthews, 2003: 122). However, for Matthews it would be essential that adults do not intervene assertively and imposingly with children’s play, without classifying children’s toys and controlling their usage according to the purposes assigned by society. On the other hand, Vygotsky believed that the stimulation and guidance of children’s play would be beneficial for their growth and rise in creative responses (Vygotsky, 2004: 65).

Children’s creative will, like play, is spontaneous and arises from the instant urge to express themselves, therefore a child rarely spends long hours in the production of a single drawing, or even returns to it more than once (the drawing is often presented as finished after some time working on it) (Vygotsky, 2004: 67). Furthermore, both children’s artistic creativity and their play are directly related to their interests and own experiences. Moreover, children’s creativity is syncretistic, which means that the various arts are all merged together, and have not been separated yet (Vygotsky, 2004: 60-61). The child concurrently draws and talks, telling stories or describing what it is drawing, writes texts, expresses itself with its body and gestures, in a continual interrelationship between numerous activities that contaminate and stimulate each other — “this syncretism points to the common root that unites all the different branches of children’s art. This common root is the child’s play, which serves as the preparatory stage for his artistic creation” (Vygotsky, 2004: 67). As such, drawing and play are intertwined, stimulating and encouraging, together, the child’s development. Thus, play helps to direct the drawing and acts as a guide for understanding the world: “when he refers to “a car... going round the corner” while painting, he has ‘transported’ (to use Dennie Wolf’s, [1983, p.1] term) a familiar scenario from his play with toy cars over into the activity of painting” (Matthews, 2003: 27). Drawing and play then function as collaborative activities to discover and think about the world, as well as to form conscious and unconscious relationships between elements, continually moving ideas and thoughts amongst one another (Lowenfeld & Britain, 1964). Thus, spatial movements performed with the entire body repeatedly during play (for example, going in, going out, going under, ascending and descending movements, etc.) are subsequently mapped in two-dimensions onto the physical surface of the drawing, in a process of discovery that is not instantaneous, but continuous, and that requires the same discoveries to be made at different times and in different contexts in order to be internalised in the form of concepts (Matthews, 2003: 85). Capturing information from an object freely through drawing, on the other hand, allows for the discovery of possible views of these objects, which are subsequently solidified through play (as in the case of perspective and vanishing points, for example, for which the hide and seek aids to assimilate this knowledge) (Matthews, 2003: 86). In this sense, the significance of play for the child

is tied to the possibility of growth in terms of the abilities and strengths that it provides, even if unconsciously, for the child (Vygotsky, 2004: 65).

3.5. Object-centred and Viewer-centred descriptions

The way an object is perceived and, consequently, drawn is strongly influenced by its description, as “un objeto debe ser visto como aquello que es, pero también debe ser visto en su relación con otros objetos” (Kunz, 2010: 301)⁶. There are two types of internal representations of forms — object-centred descriptions and viewer-centred descriptions — which cohabit and play different functions during the perceptual process and in the internal storage of perceived things (Kunz, 2010: 301-302). The term object-centred arose from David Marr’s (1978, 1982) perspective on visual perception, which proposed that the visual system perceives point sensations about a specific object, which it then uses to generate three-dimensional internal descriptions of it, regardless of changes in points of view or observation conditions (Willats, 1997: 151). Marr (1982) referred to this type of description as object-centred because it concentrates on the specific properties of the object itself rather than the point of view and position from which it is observed. These descriptions help to recognize the corresponding objects when viewed in other contexts, positions and points of view (Willats, 1997: 151). So,

“Object-centred descriptions are by definition three-dimensional and cannot be directly transferred onto the picture surface. Pictures can be derived from object-centred descriptions (as they are in computer programs), but this necessarily involves some kind of transformation from three dimensions to two” (Willats, 2005: 188).

In this sense, attempting to create a two-dimensional representation based on this description leads to the production of drawings that are more difficult to comprehend (Kunz, 2010: 302). However, the visual system does not directly apprehend these descriptions, but rather generates them internally from the convergence of numerous point sensations captured in the various positions from which it observes (Willats, 1997: 151-152). As a result, Marr labelled the images corresponding to these point sensations as viewer-centred, since they are dependent on the observer’s position and point of view (Marr, 1982). These descriptions alter anytime the position of both the observer or the object being observed changes, corresponding at each moment to a view of it (Kunz, 2010: 302). Drawings derived from this type of description are often recognized as providing views and work best in representational terms. However, sometimes it is useful to have both mental representations of an object simultaneously, specifically when attempting to understand objects of great complexity (Kunz, 2010: 303).

Later, some authors (Cox, 1985; Freeman, 1987; Willats, 1981, 1987) have proposed the reinterpretation of Luquet’s idea of intellectual and visual realism in light to Marr’s conceptions of object-centred and viewer-centred descriptions: Maureen Cox (1992), for example, linked intellectual realism with object-centred descriptions and visual realism to viewer-centred descriptions (Willats, 1997: 151). Furthermore, according to Luquet (1927/2001), children’s drawings during the intellectual realism phase are derived from their internal model, an idea that is very close to the definition of object-centred description, in the sense that both correspond to the model internally produced by the child to represent the entirety of a given object (Willats, 2005: 236). On the other hand, Alan Costall (2001) stated that the relationship between Luquet’s and Marr’s theories could not be so linear, nor could children’s drawings themselves be object-centred descriptions, because they are, by definition, three-dimensional and cannot be directly translated into a two-dimensional surface (Willats, 2005: 188).

Given that most research on the development of children’s drawing were conducted by psychologists, the emphasis was mostly on trying to understand the mental processes that drive

⁶ “An object must be seen as what it is, but it must also be seen as being in relation to other objects” (author’s translation).

children's artistic production (Willats, 1997: 287). Nonetheless, Willats contended that these processes could only be understood from the examination of the drawings specifically, but "in default of any accurate, comprehensive formal scheme for describing the representational systems in children's drawings, the validity of any such inferences must remain doubtful" (Willats, 1997: 287). Having said that, Willats considered that, in the light of Marr's (1982) conceptions, it can be interpreted that, in general, younger children base their drawings on object-centred descriptions (taking into account the irregularities and errors that appear in these drawings and whose justification could be attributed to the fact that they are derived from object-centred descriptions) and older children base their drawings on viewer-centred descriptions (Willats, 1997). However, according to the author, one could only speak of a generalised tendency to do so, noting that it would be too simplistic to present this distinction solely on the basis of the presented anomalies, and that it was equally important to study the drawing and denotation systems used in the production of these images (Willats, 1997).

4. Visual Representation

“The central question in picture perception is: How do lines of ink or patches of paint come to represent features of real or imagined worlds?” (Willats, 1997: 7).

Drawing is the most prevalent creative activity among children, and it manifests itself even before they can speak (Matthews, 2003: 34; Vygotsky, 2004: 42). However, not all their drawings, paintings and sculptures can be termed drawings or children’s art, because many of these works are the product of mandatory school exercises with defined rules (such as colouring books, in which children cannot “go beyond the lines”) (Marín, 2003: 59). According to Marín (2003) and Matthews (2003), these sorts of images are, in fact, drawings produced by children, but do not correlate to their most typical drawings. Thus, spontaneous children’s drawings are those drawings produced freely and without any constraints, and through which children communicate their worries and build their thoughts (Marín, 2003: 59-60; Matthews, 2003: 3-4; Vygotsky, 2004: 42). The observation of this style of drawing presents a number of concerns that many theorists have attempted to explore and understand, such as:

“¿por qué dibujan las niñas y niños? ¿Por qué es la figura humana su motivo preferido? ¿Cómo representan el espacio y usan el color? ¿Cuáles son las influencias culturales en los dibujos espontáneos infantiles? ¿Por qué los esquemas gráficos que utilizan para representar el sol, las casas, las montañas o los árboles son tan universales? ¿Cuándo conviene dejar dibujar libremente y cuándo conviene comenzar a enseñar a dibujar?” (Marín, 2003: 54)⁷.

As such, we will address some of these issues throughout this chapter, gaining a knowledge of children’s visual development and its most significant formal and conceptual aspects.

Although these drawings are particularly appealing to adults due to their expressive quality, Gardner believed that this expressiveness stems from the anomalies they contain, a consequence of children’s productive incapacity: “(...) drawings by the young child may be uncontrolled forms which come forth simply because the youngster is unable to produce anything more faithful to the real world” (Gardner, 1980: 100). This perspective arose from the widespread tendency to regard good creative expression (and its endpoint) as an exact replica of reality (Matthews, 2003: 24). However, as Matthews (2003) indicated, the concept of realism is not unique, varying for each person (and especially for each child) according to their age and context, corresponding to a human construction rather than to an objective fact (Matthews, 2003: 209). As a result, several authors heavily criticised the assumption that the goal of the drawing would be an exact representation of the observed reality. While Dennis Atkinson (2002) said that there is no such thing as an independent true reality, Arnheim noted that drawing is primarily an interplay of different forces (Arnheim, 1974). Thus, even if the child explores the idea that one action and one image might represent another action and another image (considered the basis of visual representation and expression), this is, in fact, only a way of learning to play with these objects and ideas (Matthews, 2003). Matthews (2003) argued that children’s drawing and painting contribute significantly to the development of children’s thinking and feeling, as well as their formation of descriptions about the world. In this sense, picture formation would correspond to the two-dimensional mapping of the developed and explored internal relationships (Willats, 2005).

⁷ “Why do girls and boys draw? Why is the human figure their favourite motif? How do they represent space and use colour? What are the cultural influences on children’s spontaneous drawings? Why are the graphic schemas they use to represent the sun, houses, mountains, or trees so universal? When should one allow them to draw freely and when should one start teaching drawing?” (author’s translation).

However, because psychologists conducted the majority of studies on the development of children's drawing, the focus has always been on the mental processes intimately associated with this development (Willats, 1997, 2005). As such, they believed it was critical to comprehend the mental strategies employed by children in the transcription of ideas to the drawing surface in order to understand their graphic manifestations (Vinter et al., 2013). Willats (1997), on the other hand, emphasised the study of graphic representations themselves, arguing that "to make sense of children's drawings we have to begin by understanding the complex interplay among the mark, denotation, and drawing systems, and the changes in these systems that take place during development" (Willats, 2005: 142).

4.1. Drawing Systems and Denotative Systems

As previously stated, conventional knowledge held that younger children draw what they know and older children (abruptly from the age of eight onwards) draw what they see. Nonetheless, in light of Marr's (1982) concepts (object-centred and viewer-centred descriptions), it is generally accepted that younger children base their drawings on object-centred descriptions (the faces of a cube being described as squares, for example) and older children in viewer-centred descriptions (cube faces described as square distortions) (Willats, 1997). Thus, as there are some drawings (the so-called fold-out drawings and the drawings with flat bases, for example) that are very difficult to explain without employing object-centred descriptions, the suggested distinction seems quite evident; yet, Costall (2001) contends that this may not be that straightforward (Willats, 1997, 2005). Thus, only observing the drawings would not be sufficient to conclude that the "correct and finished" drawings would be generated from viewer-centred descriptions, while the drawings with anomalies would be produced from object-centred descriptions (Willats, 1997). As such, a complete understanding of children's drawing, according to Willats, would require the study of the drawing and denotation rules used in the production of the drawings, as well as the internal descriptions to which they were applied and their alterations throughout development (Willats, 1997, 2005). Thus, Willats' viewpoint enabled a better classification of children's drawings, concentrating, for this purpose, on concrete drawings that employ technical resources to portray visual information on the two-dimensional surface.

In this sense, Willats noted the presence of two representational systems to describe how information is translated into images — the drawing systems and the denotational systems —, which are selected based on the visual aims of each person and/or cultural period (Willats, 1997, 2005). Children's drawing rules differ from those of adults because they seek to discover the systems required to transform their ideas (from a three-dimensional universe) into something physical (and a two-dimensional surface), developing and exploring a variety of them as the number of elements they want to represent increases (Lowenfeld & Britain, 1964). Matthews also considered that the observation and presence of pictures made by other individuals (namely adults) around them would be crucial for the understanding of these types of systems: "to think of this as mere 'copying' is to misunderstand development altogether" (Matthews, 2003: 196). Thus, whereas drawing systems map an object's spatial connections on paper, denotative systems denote what the characteristics of an object correspond to in the image (what they represent) (Willats, 1997: 93).

In interpreting a series of drawings, Willats (1997, 2005) enumerated five systems for translating real spatial relationships to the equivalent relationships in an image, named in terms of the complexity of their rules:

- Topology
- Orthogonal projection
- Horizontal and vertical oblique projections
- Oblique projection
- Perspective

Although linear perspective is the most well-known system in Western culture, other systems, such as isometric and orthogonal projection, are also often used (Willats, 1983: 79). With the exception of topology, all of these systems are considered projective systems and may be seen in children's drawings, who develop them as they grow (using different systems at different ages) (Willats, 1997: 10). In this way, "whereas topology can be associated with intellectual realism, the projective systems (orthogonal, oblique, and perspective) give more information on the developmental systems children move through between the extremes of intellectual and visual realism" (Jolley, 2009: 27-28). Thus, topology is based on the most basic and immutable spatial relationships, such as proximity, continuity, separation, spatial order, and enclosure, not including properties related to the scales and real shapes of the elements (characteristics of the orthogonal projection); and corresponds, for example, to caricatures, maps, schematic diagrams and to younger children's drawings (Willats, 1997).

"Topology is often described as "rubber sheet" geometry. If a figure is printed on a rubber sheet and the sheet is stretched or twisted, basic spatial relations such as proximity and enclosure will remain unchanged, although the distances between the marks may change and straight lines may not remain straight" (Willats, 1997: 70).

Thus, two shapes are regarded topologically comparable if they have the same topological properties (for example, a circle and a square, both enclosed by a contour that separates the inside from the outside in a two-dimensional space) (Willats, 1997: 70). According to Piaget and Inhelder (1956), the inclusion of these relationships was already obvious in the drawings of younger children, with proximity and spatial order being the first to show (around the age of two). Thus, even if the markings produced are not discernible as representations, the elements drawn are arranged in their places and proximity (for example, the parts of the human body, where the scribbles corresponding to the legs are generally positioned below the torso and head) (Willats, 1997, 2005):

"Por ejemplo, si se pide a un niño que dibuje una bola sobre una mesa, podrá representar dos garabatos que no presentan ninguna semejanza con los dos objetos pedidos, pero en principio designará el garabato que está encima como 'bola' y el que está debajo como 'mesa'. La proximidad de los dos garabatos podrá también representar la relación 'encima de'" (Kunz, 2010: 335)⁸.

As the drawings begin to reveal more representational features, the remaining topological attributes (continuity, separation and enclosure) emerge (Kunz, 2010: 335). Thus, the enclosure property is frequently used to depict objects that are surrounded by others (such as people within houses), which leads to the appearance of transparencies (often called transparency error by Willats). These transparencies are the consequence of children's reluctance to cut out the shapes and omit part of them: "the use of occlusion and hidden-line elimination disrupts the child's understanding of the identity of the object, which for a while depends on its coherent, entire boundary" (Matthews, 1999: 46). As a result, figures are typically drawn with full outlines and as if they were transparent, as the absence of lines distorts the overall portrayal of objects (in the child's perspective) (Kunz, 2010: 318). In addition to the transparency issues, the drawing order is planned depending on the importance of each element, which leads to the overlapping of closed lines. Willats even used the example of drawing a human figure, in which the head is normally placed first, given its prominence, followed by the remaining details and hair, which sometimes results in the marking of elements superimposed on each other (Willats, 2005: 184-185). Thus, the author contends that the more complicated the scene to be drawn, the more careful

⁸ "If a child is asked to draw a ball on a table, it can represent two scribbles that bear no resemblance to the two objects requested, but it will designate the scribble on top as "ball" and the one on the bottom as "table". The proximity of the two scribbles may also represent the relationship "above" (author's translation).

its planning must be, in order to avoid adjacent errors (Willats, 2005). However, by applying topological relationships in their drawings, children create a representational system that is effective in meeting the goals they have at that age (Kunz, 2010: 337). In the case of continuity, for example,

“What is at stake here for the child is not a matter of giving a sense of space or depth, but rather of working out some simple topology — that is, of continuity: of how to put the legs of a table on the table while also showing its top, or of how to make the sides and the top of a box go together as one knows they do. At such crucial times, children are rather like engineers faced with the daunting challenges of assembling the drawings in their drawings intelligibly, rather than with concerns about giving a visual impression of depth” (Patrick Maynard, 2005: 79-80).

While projective systems (perspective, oblique projection and orthogonal projection) can be defined in terms of primary and secondary geometry⁹, topology and inverted perspective can only be defined using secondary geometry (Willats, 1997: 12). In this sense, the orthogonal perspective is described as a system in which the projection rays are parallel and meet the image plane at right angles (primary geometry) or as a system in which the front, side or top faces of objects are represented in their true shape (secondary geometry) (Willats, 1997: 43-44). Horizontal oblique projection, in terms of primary geometry, is characterised as the projection of parallel horizontal rays intersecting the picture plane at an oblique angle with the horizontal plane (and the same for vertical oblique projection, intersecting the image plane at an angle oblique with the vertical plane) (Willats, 1997: 46-47). Defined with secondary geometry, the horizontal lines in the picture are used to represent both side to side and front to back directions in the scene (Willats, 1997: 46-47). Finally, perspective, which during the 19th century was considered the best representational system of all, adopted by the Western society. Over time, research carried out has revealed that children generally begin with simpler systems, which progress (through the contact with rich environments) to more complex and powerful systems — considered, in Western culture, to be linear perspective, the system that provides less ambiguous views of scenes or objects —; but “we have to be careful, however, to avoid thinking of drawing as simply a matter of progression to more complex systems” (Willats, 1983: 79). It is also crucial to realise that just because children do not use all drawing methods does not imply they cannot create them (Willats, 1997). Thus, despite this evolution, the system most commonly used by children is the vertical oblique projection (Willats, 1983: 79). Furthermore, Matthews argued that including depth in drawing production is just one of the child’s possible concerns when drawing (rather than the end point), and that premature learning of each drawing system would have negative effects on children, requiring waiting for each child to be ready to make that leap rather than rushing them (Matthews, 2003: 186). According to the author, children’s pictorial growth is the result of the interaction between perception and production, through the intellectual combination of children’s pictorial devices (what they see emerging in the drawing surface) and those they perceive around them (Arnheim, 1974; Matthews, 2003). Furthermore, Matthews claims that children pick and combine potential representational systems in a variety of ways in order to produce hypothetical worlds (and not necessarily just to represent depth) (Matthews, 2003: 167).

Thus, defining systems in terms of secondary geometry appears more realistic than describing systems in terms of primary geometry, enabling a better understanding of drawing development. However, because some drawings appear to merge two systems into one, it would be impossible to determine which projection method was used automatically and only by observation (Willats, 1997: 169). Using the distinction made by Luquet (between intellectual and visual realism), visually realistic drawings are often in oblique projection or perspective, and intellectually realistic in orthogonal

⁹ George Booker (1963) distinguished secondary geometry as the two-dimensional geometry of the drawing surface and primary geometry as the three-dimensional geometry of the projection of rays from the real scene to the eye of the observer, intersecting them with the drawing plan. Willats believed that secondary geometry would be better for describing the production of drawings (Willats, 1997: 10-12).

projection (Willats, 1997, 2005). However, neither Luquet's theory nor some of the later theories take into account denotative systems and their modifications throughout development. Thus, Marr (1978) stressed the importance of analysing two components in each representational system, later supported by Willats: both the coordinate systems (object-centred and viewer-centred) and the shape primitives used in the representation (that is, the elements that are defined by the coordinate systems) — named by Willats, drawing and denotation systems (Willats, 1997: 151). Although drawing systems aid in understanding the ways in which the line is used to represent spatial relationships, it is also necessary to understand what each line represents and to define a system of words to describe the three-dimensional world and two-dimensional images (Willats, 2005). As Wolheim considered, we often “use the same word to refer both to the lines in a drawing and to the edges of perceived objects” (Wolheim, 1973: 22), since we actually see these lines as representations of edges. However, contrary to popular belief, children frequently use lines to depict things other than the edges of objects, such as volumes and surfaces (Willats, 1997). As such, Willats created a second representational system known as the denotational system, which mapped the primitives of reality (e.g. faces, edges and corners) onto the drawing surface primitives (points, lines and regions), assisting in understanding what the primitives refer to, to what denote (Willats, 1997). Picture primitives and scene primitives are seen as the smallest units of information present in images and scenes. Thus, denotative systems correspond to how what is seen is transformed into what is drawn (and meanings are assigned to these images): “por ejemplo, un punto en un dibujo puede significar un orificio, suciedad o, en un dibujo de un niño una peca o un lunar en la cara, una línea, una raja, un pelo, un alambre, entre otros muchos” (Kunz, 2010: 307)¹⁰. There are three types of shape primitives, based on regions, lines and points that can denote elements not initially contemplated — for example, regions can denote volumes or faces of objects:

“Different pictures use different kinds of shape primitives: zero-dimensional primitives or points, one-dimensional primitives or lines, and two-dimensional primitives or regions; and the first step in the analysis of a picture is to decide whether the primitives are zero-, one-, or two-dimensional” (Willats, 1997: 94).

These picture primitives are represented in the drawing through physical marks, made with any material. As children use lines from their first artistic productions, it could be considered, at first sight, that their denotative systems would not evolve. However, in the first system used by the child the closed regions mostly stand for three-dimensional volumes, and the relationships between the objects are defined through the topological properties of touching and enclosure (Willats, 1997: 104-105). As they grow, the regions begin to represent flat surfaces (such as the sides of a house), which translates into images that are considered anomalous (such as fold-out drawings); and it is not until children are around 10 years old that they incorporate a system in which the lines represent edges and contours, beginning to produce drawings that work better as representations (in addition to this type of drawings demonstrating evidence of the use of more advanced projective systems) (Willats, 1997). However, for these markings to be part of a denotative system, they must be created intentionally, having the function to represent some characteristic of the object, such as a direction or dimension (Kunz, 2010: 307). Furthermore, the fact that a child does not use a particular drawing system on a regular basis does not imply that it does not know how to do so, as well as the relationships established with the denotative systems, which do not have to be the same (Matthews, 2003: 162). Thus, two people can use the same drawing system but different denotative systems for the same drawing, as well as several projective systems (Kunz, 2010: 308). Different representational systems are appropriate for different purposes. The mark system also evolves in other ways, as children realise that patches of scribble can be used to represent textured areas (such as hair, fur or smoke) (Willats, 2005: 164). Once the child associates these scribbles with textures, it deliberately incorporates them for this purpose. These perceptions and changes occur frequently throughout children's visual development as a result of the interaction between

¹⁰ “For example, a dot in a drawing can mean a hole, dirt or, in a child's drawing, a freckle or mole on the face, a line, a crack, a hair, a wire, among many others” (author's translation).

production and perception: the child produces marks in drawings (accidentally or with some intention) and then realises that they can be adapted to serve other purposes (Willats, 2005: 164-165). Furthermore, children begin to draw with simpler systems than those in the images they see around them (which employ more sophisticated drawing systems), discovering these systems on their own, exploring them and finding solutions to their problems through the relationship between what they produce and what they see (Willats, 1983: 79). Thus,

“The course of development in children’s representation of smooth forms can be seen in terms of a complex interplay among the mark systems, the denotation systems, and the drawing systems, with each system coming to the fore at different times like the instruments in an orchestra. The primary mechanism driving this development depends on the interaction between picture production and picture perception” (Willats, 2005: 167-168).

In this way, Willats encouraged the analysis of drawings in terms of drawing systems, denotative systems, and the relationships between the two; however, Jolley (2009) argued that simply observing the drawings would not allow a clear distinction between what the primitives stand for (especially when it comes to regions denoting entire volumes versus regions denoting the outline of a two-dimensional shape) (Jolley, 2009: 28-29). Thus, if children create projectively possible images of cubes (in orthogonal, oblique or perspective projection), it would be very difficult to determine whether these drawings would have reproduced the edges of a cube (as in a viewer-centred description) or if they would have been made by reproducing a graphic symbol for the cube (as in an object-centred description) (Willats, 1997). Similarly, Moore (1986) sought to investigate whether children base their drawings on either object or viewer-centred descriptions, concluding (through an exercise using coloured faced cubes — one colour for each face) that younger children, unlike the older ones, include the hidden faces of the object in their drawings (corresponding to the theory that younger children derive their drawings from object-centred descriptions and older children from viewer-centred descriptions) (Moore, 1986).

“The two 9-year-olds who produced this type of drawing used just one colour, showing that their drawings were intended to represent only one face of the cube. In contrast, all six of the 7-year-olds used all six colours, in vertical or horizontal stripes. This seems to show conclusively that these children intended their drawings to represent the cube as a whole” (Willats, 1997: 180).

Although the observation of the finished drawings does not allow a correct comprehension of the description from which the drawing is derived, the best way to understand this question is to ask the children to draw the same object from several points of view (Willats, 2005). Thus, if the drawings differ depending on the point of view, the children are drawing from viewer-centred descriptions, and if the child produces the same drawing from all points of view, it is deriving their drawings from object-centred internal models (Matthews, 2003). On the other hand, Jolley also criticised the fact that these studies are based on shapes and objects that are not so commonly targeted by children’s drawings (such as cubes and tables), arguing that the research should be expanded to include natural and spontaneous drawings generated by children (Jolley, 2009: 28).

4.2. Canonical Views and Extendedness

The supremacy of a realistic Western vision that the best images are those that portray, as faithfully as possible, the real world has taken root in society. As a result, it is quite common to look at

children's drawings (as well as those from other eras and cultures) and consider them inferior (since the representation systems they use do not bring them close to realism). However, Willats (1997, 2005) claimed that the goal of drawings was not to faithfully replicate reality, but to provide effective shape representations. Thus, an image would be effective as a representation if it could offer a possible view of an object's general position (based on one or more projection systems), so that its most specific features are reflected in the drawing (Willats, 1997, 2005). Similarly, Richard Wolheim defined representation in terms of "seeing in", stating that a visual representation "is a two-dimensional configuration in which something or other can be seen and, furthermore, one in which something specific can be recognized" (Wolheim, 1977: 182). For an image to function as an effective representation, it should be able to clearly identify in it the shapes of the three-dimensional object that the author desires to depict (Wolheim, 1977). Thus, older children's drawings generally work better as representations than younger children's, as they are more sophisticated and generated with projection systems that portray the object in a general position (such as oblique projection or perspective). Furthermore, there are systems (such as silhouettes, as it is difficult to visualise the object drawn in three dimensions) that automatically do not provide as good representations as drawings mostly in line — and even more so if shadows are added, rather than plain line drawings (Willats, 1997: 217).

"A number of writers had suggested that children's drawings are based on known stereotypes, and if this is the case children should have great difficulty in drawing unfamiliar objects, that is, objects they have never drawn before and for which they have no stereotypes" (Willats, 2005: 89). Thus, according to Luquet, children draw from their internal mode (corresponding to the criterial features of the topic), with the main features in their full shape and not occluded in any way (Luquet, 1977: 128-129). Likewise, Arnheim (1974) considered that children's drawings are symbolic and that children build graphic representations to correlate to elements encountered in their surroundings. Thus, while drawing a known object, children rely on a set of internal formal representations that they have established over childhood, through constant repetition and memorization (Willats, 1997). This sort of representation resides in memory and is the result of countless interactions and experiences with a wide range of objects belonging to a certain category:

"We have all seen thousands of cups and saucers, but we have not stored all of them in memory. We have stored some; but more importantly, we have formed a generalised impression of this class of objects that serves as a type of master model to which new items may be compared. We recognize and classify a variety of disparate objects (cups and saucers) as members of a class by rapidly comparing them with an 'idealized' image of the class" (Solso, 2001: 237).

In this way, several views of each type of object are gradually registered in memory, ready to be used and manipulated at any time: "in a two-way process, his internal picturing guides his drawing and, reciprocally, what he draws — as it appears on the paper — helps his internal picture to develop. Drawing helps him rotate objects in his imagination" (Matthews, 2003). However, this is not to say that children can only draw what they already know and know how to draw. Thus, when confronted with objects they are not so comfortable with, children adapt their existing *schemas*, integrating them in new ways (Matthews, 2003: 178).

Several authors (Hochberg, 1972; Freeman, 1980; Cox, 1992; Willats, 1997; Palmer, 1999) have identified the term "Canonical Representation" to describe the form that enables the immediate recognition of an object. According to Palmer (1999), although objects are more easily recognised from a variety of points of view, the brain saves a preferential view, which is thought to offer the most representative characteristics of the object, allowing its correct identification. Cox (1992) used this term to define drawings that incorporate the main features of objects, while Hochberg (1972) considered the angle at which the object must be placed so that all its defining elements are visible. Thus, children usually draw with this type of canonical view, embedding objects in positions that allow for the perception of defining features in the simplest two-dimensional way (Arnheim, 1974). These positions

are not the same for all objects; nonetheless, the front, side and three-quarter views are the most prevalent. As such, its drawings present numerous points of view simultaneously, using a specific view for each displayed shape (so that each one is represented in its key features) (Luquet, 1977: 72). Thus, “one would expect that horses should be depicted in the side view to show the defining mane, leg, and tail relationships and people should be depicted in the front view to show the symmetry of features” (Ives & Houseworth, 1980: 591). However, a canonical representation also needs to be dynamic and to reflect the extendedness of the object, in such a way that the canonicity of the view is the maximum possible extent of the object — the drawing of vehicles or horses in profile can reflect the fact that these objects be longer than round (Ives & Rovert, 1979; Longobardi et al., 2001). These two properties (extendedness and canonicity), thus, complement each other.

Likewise, some representations are better than others because they more correctly show the extendedness of the object. This property was defined as “the property of being saliently extended in one or more directions in space” (Willats, 1997: 97), and it is the first shape property to be represented by children in their drawings, along with topological properties and regions denoting whole volumes. This property is used to describe how drawn shapes can be expanded to reflect the extendedness of the corresponding features in their internal shape descriptions (Willats, 1997: 76-77). In children’s early drawings it is possible to find lines representing long volumes (like the arms or legs) and round regions representing round volumes (like the head). As such, Stern (1930) considered that there are symbols (circles and strokes, used to correspond to lumps and sticks) that arise naturally in children and do not need to be learnt:

“Presumably because the roundness of a circle or small round region reflects the roundness of shapes such as an eye or a head, and the longness of a line or a long region reflects the longness of shapes such as arms and legs. I refer to properties such as roundness, longness, and flatness as extendedness” (Willats, 2005: 68).

Thus, round regions would be used to represent lumps (objects equally extended in all three dimensions in space, which do not necessarily have to be round — such as heads, houses and potatoes) and long regions to represent sticks (objects extended in only one dimension, such as arms or legs) (Willats, 2005).



Figure 10 — These drawings exemplify the usage of round regions to represent objects equally extended in three dimensions in space (lumps) and long regions to represent objects extended in one dimension in space (sticks).

“Thus, although a round region provides a *possible* view of a stick, the view it provides is an unlikely one, and it is easy to see why a long region might be a much more natural symbol for a stick than a round region. A long region in a picture reflects the fact that a stick is long in three-dimensional space, and in addition corresponds to the most probable view of a stick” (Willats, 1997: 79-80).

On the other hand, children seem to have no natural symbols for flat surfaces (discs or slabs, like hands), with some children preferring round regions to represent them and other lines (as both provide possible views), yet neither is the best choice (Willats, 1997). Another way in which children’s drawings develop into more effective representations is by applying shape modifiers of diverse shapes to round and long regions. Thus, these shape modifiers are typical of drawings that represent secondary shape properties (such as “having flat sides” or “having corners”, using, for example, straight lines to stand for these secondary shape properties) (Willats, 1997, 2005). In addition, Arnheim also believed that the chosen orientation can indicate complementary information about the object: “young children perceive objects with reference to what can be done with them: a mug without a handle suggests children the kind of movement similar to what they would perform with a glass” (Quaglia et al., 2015: 88), so the guidelines in which objects are drawn indicate the dynamic qualities of each of them — such as the movement they perform (Arnheim, 1974; Quaglia et al., 2015: 88).



Figure 11 — In the image on the left it is possible to see how the house is usually drawn in a frontal view, as well as the human figure and the flowers, since their most characteristic elements and their extendedness are thus better observed. The image on the right portrays an example of how vehicles are mostly drawn in side view, taking into account the movement they perform.

In this way, animals and vehicles are usually drawn in a side view, as their movement takes place in this line of action. On the other hand, the door to a house is frontal, so the preferred views of drawn houses are frontal (Arnheim, 1974; Longobardi et al. 2001).

4.3. Visual characteristics of 6-9 years old’s drawings

Drawing has an important role in childhood, being the earliest means of expression for children (beginning at a very early stage, with the drawing of mere marks on paper), functioning as language and amusement, and as the stage to universe constructions and staging itself (Willats, 2005; Bombonato & Farago, 2016: 172-173). Through this activity (mostly carried out alone and with its own rules), children develop their autonomy and attention (Bombonato & Farago, 2016: 179). These drawings often draw attention due to the spontaneity, freshness and harmony with which they represent the most complex visual scenes; however, as they grow, these drawings change and become increasingly eloquent and

elaborate, until around the age of ten, when the interest and spontaneity manifested until then is lost and often disappears (Marín, 2003: 54-55). As a result, younger children appear to be better gifted for drawing and visual expression than older children, as if a setback has occurred, contrary to all other areas (intellectual and social), where growth seems to be more or less continuous and evolving in time (Piaget, 1955: 22).

In the beginning, the children base their drawings on topological relationships, on the use of a denotative system in which regions stand for whole volumes and on the representation of the extendedness of the elements, eventually progressing to a projection system (both oblique projection and perspective) produced with line drawing and with the correct representation of the points of occlusion (Willats, 1997: 320). In this way, children use the line to express emotional states (both happiness and discomfort), to separate forms and to think about continuity, separation and the inside-outside relationship (Matthews, 2003: 89). Children perceive reality as falling into two categories — good or bad events —, so the situations and elements remembered (and represented) are not random, but rather those whose impact (both positive and negative) stayed in the child (Quaglia et al., 2015: 87). Furthermore, play serves as a guide for drawing and for understanding the relationships established in the real world (also directly materialised on the drawing surface), which serves to resolve and explore these relationships consciously and unconsciously (Matthews, 2003). These interactions are investigated during play, either through movements performed with the whole body in space or through the handling of miniature objects in imaginary and hypothetical universes: “early drawing and painting involve many movements, not only those of the drawing hand. Drawing actions are discovered from earlier actions” (Matthews, 2003: 42). As people often cannot see clearly what the drawings are about, they assume that they are “nothing”, being reduced to shapes scattered in space. However, Matthews (2003) suggested that “early drawings are about shapes, the shapes on the paper and the shapes of the movements which produce them and their relationship to objects and events in the world” (Matthews, 2003: 89).



Figure 12 — Here we can see a series of drawings in which some individual elements can be identified as more familiar forms, but are generally considered as being nothing, as representing nothing. However, it is this type of drawing that Matthews described as being about shapes on paper and the movements that produce them, as well as experimenting with colours, materials and lines.

In this way, children initially represent both the shapes of objects and their movements (not only of hypothetical events but also of real situations, without much concern that the traces and objects resemble each other), and only later begin to classify them, both the shapes and the lines (Matthews,

2003: 36; Lange-Küttner, 2011). Thus, the child makes small changes to its *schemas* depending on what it is drawing, which “underlines how important it is, when considering how a drawing is made, to also consider the content, because these interact together. What Ben draws will affect how he uses the rules he knows about drawing” (Matthews, 2003: 133). As a result, the drawn elements change their meanings according to the context and the way they are produced (in terms of pressure, speed and intensity) (Matthews, 2003: 135). Moreover, the use of colour at this period is quite liberated, often associating colours with specific movements/actions, as if each movement or mark had its own colour, distinct from the others (Matthews, 2003: 89-90). According to the author, the imaginative and dynamic ability of children to use drawing elements to work out their ideas in connection to their world and their experiences is what gives children’s drawings such strength. In this way, they begin to realise that what they draw may symbolise and stand for other elements, therefore connecting what emerges on the drawing surface to what happens in the real world and creating descriptions of reality through drawing (not copies, but rather discoveries about it):

“The drawings Ben makes reflect the way in which he builds, as he grows older, an internal description of reality in which all its different aspects — height, width, depth, mass, weight, movement, plus the imagined psychological states of imaginary people in this world — are coordinated. This is eventually so fully worked out that he is able to imagine himself moving through it to any position and, from that position, imagine what the view would be like” (Matthews, 2003: 156).

In the beginning, children seem to focus on the dynamic aspects of objects and the environment around them rather than the static ones (Lange-Küttner & Vinter, 2008). As children grow, they aim to include drawn information about the shapes of objects that interest them, but they do not always depict possible views of them (which causes some drawings to appear strange to adults’ eyes) (Matthews, 2003: 211). Thus, the expressiveness of lines and shapes combines with the objects portrayed, changing the focus on graphic forms and gestural expressiveness to the drawing’s contents (Quaglia et al., 2015: 87).

As seen before, children’s creative activity is typically syncretic, implying the non-separation of the various types of individual art (Vygotsky, 2004: 67). As such, language and writing are also incorporated into the drawings, related to movements, shapes and colours: “language helps organise the drawing but, in turn, the drawing is extending his language” (Matthews, 2003: 141). In this way, the drawings are accompanied by oral vocalisations and sounds produced with the mouth (such as battle sounds, for example, corresponding to shots and explosions), as well as the insertion of onomatopoeic forms and little speech bubbles to enrich the actions shown in the image (Matthews, 2003: 171; Quaglia et al., 2015: 86).



Figure 13 — Examples of children’s drawings where onomatopoeias, small sentences and even individual letters are inserted. As in the examples presented here, mathematical accounts often fill the background, or even the letters and numbers themselves belong to the drawing (serving as a structure for the construction of the elements).

Furthermore, the drawing is inspired by the child’s own theatrical body motions, which frequently interrupt the drawing to play the role of the characters and themes on which he is drawing, gesticulating and acting, to immediately collect the materials and continue to draw (Matthews, 2003: 171). Lowenfeld (1964) stressed the relevance of touch in apprehending haptic and kinaesthetic knowledge and proprioceptive information in these situations — related to movement, posture, balance, and joint and limb positions (Matthews, 2003: 171). In this way, through the child’s acting, it can internalise images regarding these aspects that it subsequently applies in the drawing. Thus, the distorted forms that emerge are not so much distortions caused by a lack of knowledge, but rather a desire to imbue the drawing with movement.

The interest in studying and determining the defining features of this visual language emerged when children’s drawings began to be viewed as a form of expression of the child itself, reflecting their way of seeing and conceiving the world (leaving aside the idea that these images were defective and with errors) (Marín, 2003: 60). Thus, while each person has their own way of drawing, spontaneous children’s drawings of the age group studied present several characteristics that set them apart from other types of images (Marín, 2003: 58-59):

— the principle of exemplary form and the principle of simultaneity of points of view: the child chooses to depict an element or object in the way that best conveys its main characteristics. In this way, each part of the object and each object in the scene will be displayed from the point of view that encompasses the greatest amount of information possible, even if the views of each object conflict with each other (Luquet, 1977: 71-72; Marín, 2003: 64-65). Thus, the child values the presentation of the object as a whole, incorporating information gathered through several different means (not only visual, but also touch, movement and language), which together correspond to the identity of the object (Matthews, 2003: 97). Matthews (2003) considered that the traditional distinction between intellectual and visual realism does not provide a suitable approach to children’s drawing because it considers that younger children are unable to draw views of objects. In this sense, the author considered that children are indeed capable of drawing views of objects, however, they place a higher value on the complete incorporation

of their characteristics, preferring not to sacrifice their structure and main elements in favour of the correct portrayal of the view (Matthews, 2003: 97).

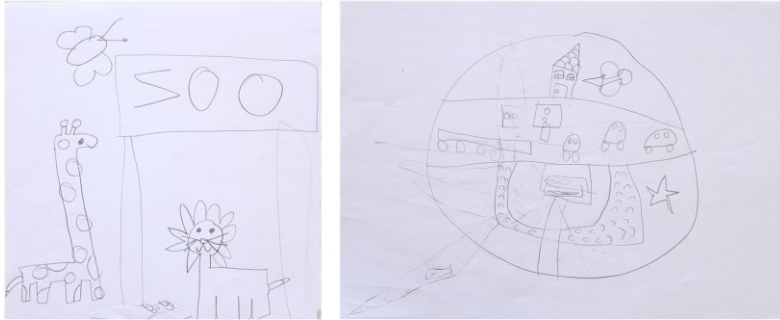


Figure 14 — The principle of exemplary form and the principle of simultaneity of points of view. As can be seen in the drawings presented, sometimes the same image has a multiplicity of points of view, since the various elements are drawn in order to maintain their structure and distinctive features. Thus, while in the figure on the left the lion is in profile but its head is in frontal view, the image on the right is an aerial view of a city, however, the vehicles are drawn in profile view and the house in frontal view.

— the principle of rebate: the elements shown are “reflected” on the visual plane to constantly exhibit their most extensive form (which goes against Willats’ idea of extendedness). As such, mainly vertical features (such as people, houses or trees) are depicted in frontal perspective, whereas largely horizontal elements (such as fields, pools, tables or roads) are represented in aerial view (Luquet, 1977 :138-139; Marín, 2003: 64).



Figure 15 — The principle of rebate. Following the previous principle, these images also present a multiplicity of points of view resulting from the figures’ rebate, in order to present the greatest possible extension of the shape. As such, in the first image the pool is in an aerial view, while the animals are in a profile view and the trees and humans in a frontal view, and in the second image the animals’ baskets are presented as seen from above.

— the principle of the importance of size: each element will acquire the necessary size for a correct reading of it to be elaborated (in order to be understood clearly), as well as the most important elements of the drawing (at an emotional or functional level), which usually are drawn with a larger size than the other elements (considered secondary or less important) (Lowenfeld & Britain, 1964: 177; Marín, 2003: 63) Thus, the head (being one of the bodily parts with the most expressive value) will usually be larger in comparison to the rest of the body, for example, or the visual elements that execute some action. The

intentional use of sizes appears after the first accidental variations, as the child understands its different possibilities (namely in terms of drawing depth), through the interaction between production and perception (Matthews, 2003: 158). In addition, Willats (2005) claims that children think about the elements of an object in the order in which they assign them importance. However, this principle is not universally accepted, and many people regard the size's variation in children's drawings to be disproportionate, resulting from a failure in the drawing planning (Freeman, 1980; Thomas & Tsalimi, 1988). According to Atkinson (2002) and Matthews (2003), this can be very damaging for the child and stems from a misunderstanding of their priorities in relation to the information they want to include in a drawing, as well as from assumptions rooted in society about what is considered the correct representation of proportion (Atkinson, 2002). However, Matthews also stated that the theory that the larger the element of the image drawn, the greater the emotional meaning attributed was overstated and would overshadow other important issues in relation to children's drawings (such as the representation of depth relations, the distance between the child and the drawn element, and the attribution of movement) (Matthews, 2003: 168).



Figure 16 — The principle of the importance of size. Bearing in mind that this principle is not very consensual, we observe three examples in which the difference in sizes between the objects was used for different reasons. Having followed the production of all the drawings, we can affirm that, while in the first image the birds were the first elements to be drawn, occupying the entire sheet and not leaving much space for the poultry to be drawn (however, according to the author, there would be no problem, since the birds would transform when they wanted to go home, decreasing in size); in the second and third images we understand that the elements of larger size have a justification associated with them. Thus, in the second image the leg of the player kicking the ball is longer than the other (in order to give the illusion of movement) and the upper limb represented in the very centre of the image is a consequence of the television shots used in football matches (since this drawing was produced while the child was simultaneously reporting the game he was drawing and considered that “a close-up of the yellow card” appeared); while in the third image the largest pistol was the last to be drawn, as it would be a “very very large” pistol compared to the other two.

— the principle of multiple application: given a limited graphic vocabulary, the same shapes serve to represent a variety of things. Thus, by distinguishing between extensive and rounded shapes (represented by a circle) and longitudinal and long shapes (represented by a line), the various elements to be represented will be included in one of the two categories (for example, a circle represents the sun, the head, the body of some animals and the treetops; whereas straight lines represent the rays, the paws, the arms, the grass, etc) (Marín, 2003: 60-61; Willats, 2005: 68).

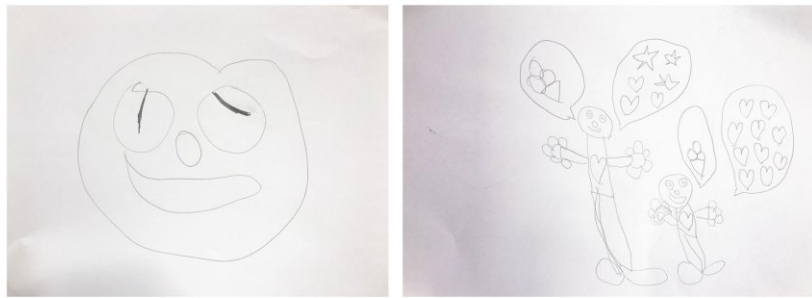


Figure 17 — The principle of multiple application. Round shapes are used to represent the faces, the eyes, the noses, the hands, the fingers, the shoes and the ice cream balls inside the speech bubble.

— the principle of perpendicularity: the relationship between an object and its base of support is preferably perpendicular, regardless of the spatial orientation of the base. Thus, to distinguish two intersecting elements (such as a house's chimney and roof, the trees and the ground, the arms and the trunk), the perpendicularity of these elements is preferably employed (at a 90-degree angle crossing) (Lowenfeld & Britain, 1964: 150; Marín, 2003: 62-63).



Figure 18 — The principle of perpendicularity. In these examples the arms and torso of the figures make a 90-degree angle to each other, as well as the hats and their brim.

— the principle of isolation of each element of a set: when depicting a set composed of numerous equal components, each element is drawn independently and in its characteristic arrangement, as if they were separate units, such as grass or the fingers in a hand (instead of representing the whole set through a stain) (Marín, 2003: 63-64).

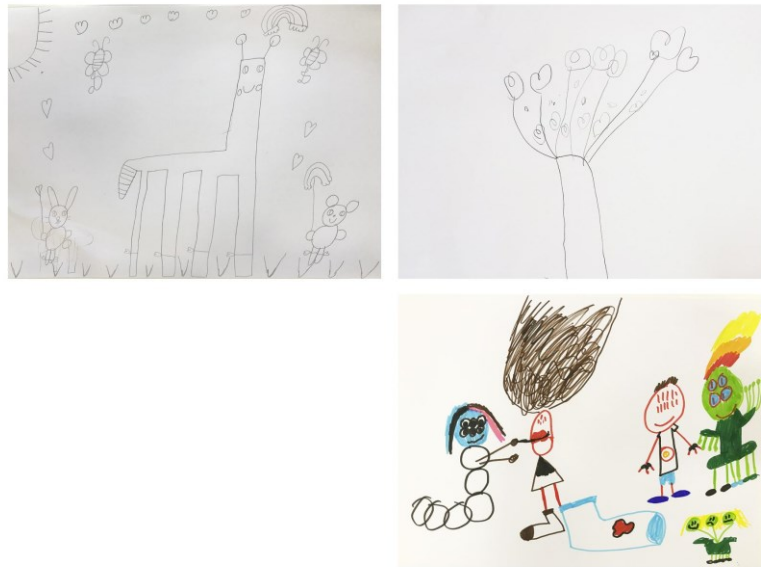


Figure 19 — The principle of isolation of each element of a set. In the first image the grass is composed of small V shapes, individually drawn; in the second image the branches of the tree, as well as its leaves; and in the last image the fingers of the green character's hands, as well as the various eyes of all the figures.

— the baseline principle: Lowenfeld (1964) argued that children from the age of 6 draw on a baseline, which is a horizontal line that crosses the bottom of the drawing surface and supports all drawn elements (Lowenfeld and Britain, 1964: 148-149). This line corresponds to the floor and aids in the representation of three-dimensional space in a two-dimensional drawing by indicating the elements that are closer to the viewer (at the bottom of the drawing) and the elements that are further away (at the top of the drawing), as well as those higher up and those lower down (Marín, 2003: 61). Sometimes this line coincides with the lower edge of the paper or is multiplied in numerous levels, corresponding to several depth planes (Marín, 2003: 61). Symmetrically, the upper surface of the drawing can also be crossed by a horizontal blue line or by a row of clouds, which corresponds to the skyline.



Figure 20 — The baseline principle. In all the examples presented the skyline is represented, sometimes larger and including clouds, and in two of the examples the ground line is also represented (in the lower images). Also, in the first image we can see an example of the use of the upper part of the drawing as a representation of the elements that are further away — in this case, the train stop is far from the characters, so it is drawn in a much higher position than the other elements and without a line to lean on.

— the principle of “x-ray vision” or transparency: all of the elements that are required to clearly describe an image are incorporated in the drawing, although some parts have to be made transparent (such as the walls of the houses, for example, in order to make visible the action that is taking place inside it) (Lowenfeld & Britain, 1964: 159-160; Luquet, 1977:134-135; Marín, 2003: 65).



Figure 21 — The principle of x-ray vision. Drawings that clearly demonstrate the principle of transparency: in the first image we can see what is happening inside the house and in the second image, which represents a pregnant dog, we can see the various puppies inside the belly.

— the principle of the territorial imperative: each drawn element is positioned in its own area, with no overlaps or hidden elements, so that everything is seen in its full extension and main characteristics (Marín, 2003: 64). As a result, the size and position of some features can be conditioned by this principle, because if they are drawn second, they cannot interfere with the elements previously drawn (Marín, 2003: 64).



Figure 22 — The principle of the territorial imperative. Two examples in which the central characters were drawn first and the remaining elements were added later, filling in the background so that nothing overlaps.

In this way, taking into account the characteristics mentioned above, children’s drawings adopt an internal logic that can only be legitimate in a two-dimensional space (Quaglia et al., 2015: 87). Thus, children draw objects in a general and simplified manner, incorporating in the image the elements that they consider necessary for the creation of this specific image. However, “whether or not the depiction resembles the object depends on the criteria adopted by the child, and what the drawing is made for” (Didkowska, 2017: 73), as well as a traditional idea that reality has to be exactly like the reality we see. Thus, children’s drawings might be seen through the lens of errors and failures, but Matthews considered that this approach is harmful, since it misinterprets how children construct their representations and the intents that they have when drawing (Matthews, 2003). Thus, what is important for a “correct” representation from the adult point of view (such as, for example, the rectangularity of tables and houses) will not necessarily be relevant for children (“the important information about the table is that there are Christmas packages ‘on top of’ it” (Matthews, 2003: 126)). Furthermore, what is real for a child is not always the same as what it is for an adult:

“But look at the sun. It is encircled with gun holsters and has a cowboy hat, complete with sheriff’s star. When I questioned him about this he looked at me as if I was simple and explained, ‘It’s because it is in a Cowboy Country!’” (Matthews, 2003: 170).

Thus, children’s drawings and drawing methods are not fixed; they are fluid, varying according to what they want to draw and the context in which they do it (Matthews, 2003: 171). What the lines and elements signify change from moment to moment, in line with the child’s way of thinking.

There is a set of themes and figures that regularly appear in children’s drawings: thus, if the human figure is the first element to appear (and to be recognised) frequently in children’s drawings since the end of the scribbling phase (and remaining as the favourite element throughout the entire development), the landscape elements (namely the sun, the house, the trees and the clouds) and the family are the following elements to gain strength in representation (Marín, 2003: 67-68; Matthews, 2003: 67).



Figure 23 — A set of images that represent the main themes that appear in children's drawings: the human figure (on top), landscapes and natural elements (in the middle) and the family (bottom).

On the other hand, the majority of drawings made by children aged 6 to 9 years are not representations of static scenes, but rather narrations of events (simple or complex), structures of movement in time where the drawing works almost as a freeze of a representative image of such an event (Willats, 2005). These imagined actions and trajectories are explored by children in their play (both with their whole body and with toys), in a constant movement between the two-dimensional drawing surface and the three-dimensional world of play (Bruce, 1991). Thus, although in 1927 Luquet identified four types of narrative drawing, Duncum (1993) expanded on this subject and considered ten types of narrative strategies that can be found in children's drawings:

— Narrative Action: the lines that appear in the drawing depict an action or a sequence of events, such as a line that crosses the paper that represents the flight of a bird or an aeroplane.

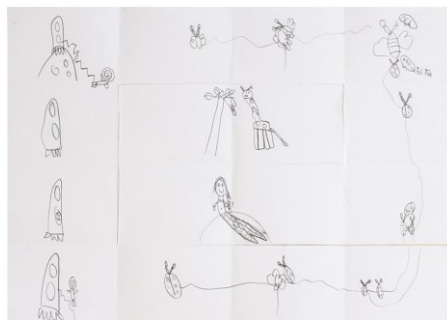


Figure 24 — Narrative Action: the line represents the flight of a butterfly and of a ladybug.

— Physical Action: this category, which is most prominent among children aged 2 or 3, contains drawings that refer to a broader action or game that may have evolved from the drawing itself. The author himself recognizes this category as problematic and whose investigation needs to be deepened (Duncum, 1993: 23).



Figure 25 — Physical Action: the drawing started with the subaquatic elements and later developed into a game.

— Superposition: the successive components of an action are superimposed on the same drawing, one on top of the other, making it difficult to distinguish all of the actions in the final object unless the complete process has been followed.



Figure 26 — Superposition: the action develops on top of the other, with patches of colour in the places where it develops and covering the elements drawn below.

— Repetition: in this sort of drawing, some components of the scene (such as the main elements of the story, for example) are repeated numerous times in successive moments of the action performed. As a result, the scenarios remain stationary and the main element is what is represented repeatedly to demonstrate the story's passages (each element drawn corresponding to a different moment in space and time). This concern for the passing of time is explored through the child's play and incorporated into the drawings (Matthews, 2003: 126).



Figure 27 — Repetition: the main character and her cat are drawn in the various rooms of the house, as the action unfolds.

— Juxtaposition: contrary to the preceding category, in this category the character remains immobile, drawn only once, and the different places of the action are drawn close to each other.



Figure 28 — Juxtaposition: the various rooms of the house are designed contiguous; however, the main character is inside the house and we do not have visible access to its actions.

— Graphic Event: a form of action that does not necessarily presuppose an antecedent or a consequent, just being exactly that scene drawn, without referring to what triggered it or what would happen afterwards.



Figure 29 — Graphic Event: in these cases, the drawings represented were drawn without any accompanying story, being just a graphic representation of some momentary situation.

— Sequence Event: the drawn image is part of a larger sequence, from which only one scene was selected to be drawn.



Figure 30 — Sequence Event: each of these drawings is part of a larger narrative sequence, told orally and represented through these images.

— Simultaneous Event: the inclusion, in a single drawing, of multiple events that are spatially connected but without extending over time.



Figure 31 — Simultaneous Event: in each of the drawings, each character is performing a different action simultaneously, but the children developed the narratives in none of the cases, either orally or visually.

— Separate Objects: simply one element or character reflects the entire narrative sequence, elaborated in a more realistic way and with a lot of details, summarising the whole story in itself. As such, having followed the drawing moment and collecting the resulting images, we did not find any example that corresponded to this category among the children we followed.

— Comic strip: a representation approach in which the story is told through successive vignettes, similar to a comic strip. However, in the case of children’s drawings, it is not necessary to present all the conventions of the adult genre.



Figure 32 — Comic strip: in both cases, the action develops over several vignettes, in the first example even including text in some moments of the story.

All these narrative strategies can be found in children’s drawings, although with different frequencies depending on the age group. Thus, while the comic strip is more common in older children, the most common forms of action in younger children include narrative action, physical action, repetition and juxtaposition. Moreover,

“Some narratives are entirely graphic, but most are extra-graphic, the drawing itself sometimes being merely the tip of an iceberg of narrative fantasy. It is this extra-graphic dimension that necessitates consulting with children to determine in what way and to what extent drawings are narrative” (Duncum, 1993: 27).

Thus, when trying to interpret children’s drawings and understand “what it is about”, one should not make assumptions without first consulting the child and comprehending what the lines denote and the spatial relationships they establish (Jolley, 2009), or even watch the process of the drawing’s construction and the way it unfolds.

When the transition to another level of development takes place, the child and the nature of its creations change: not only do the *schemas* for each object change, but the entire system of representation changes and develops (Vygotsky, 2004: 43; Willats, 2005). These changes are generally the consequence of children’s dissatisfaction with some of the drawings generated, as well as a change in their representational priorities, and are the result of the constant relationships between production and perception (Willats, 2005; Light, 2009: 227). Consequently, the need to find more effective ways to represent the scenes and elements they want arises. However, the representational systems used so far are not simply abandoned, but rather reorganised and merged into more complex pictorial systems (Wolf, 1989; Athey, 2007). Furthermore, once these systems are fully internalised, the child employs them widely and may apply them to the drawing of new objects and elements it had never drawn before (Matthews, 2003; Willats, 2005). Thus, the development of children’s visual representation is marked by the alternation between two distinct stages: the stages of the first type, during which children use coherent systems that appear correctly elaborated and obey the rules of the projection in question, tuning these systems instead of moving to more complex ones; and the stages of the second type, transitional stages to more complex representation systems (after a period of exploration of the previous system) in which the drawings produced contain “mistakes” necessary for the development process (Willats, 1983: 82).



Figure 33 — In this image we can see an example where two representational systems are applied simultaneously, probably the result of a transition between the two. Thus, the child begins to apply a system to the windows (which are simple forms, cubes), however, the remaining shapes are still too complex.

However, these errors should not be seen only as milestones in the creation of more advanced systems:

“Correctly, or luckily, exploited, these mistakes can become a powerful means of expression. Recognition by the child of the potential value of a “mistake” depends on a constant interplay between production and perception during the course of the drawing process: an interplay which the teacher may interrupt by a too heavy-handed

intervention. Development is not just a mechanical drive towards the more advanced systems, although most children will at some stage see perspective as a goal, and be dissatisfied if they cannot achieve it” (Willats, 1983: 82).

4.4. The role of external influence

Children are frequently seen as naturally gifted artists, spontaneous and creative, a belief that emerged with Cizek and Marion Richardson, who were intrigued by the type of drawings that children produced when they were not in school or under the supervision of an adult (Willats, 2005: 193-194). Similarly, several artists (such as Picasso) admired and envied the spontaneity, immediacy and primal freshness that they attributed to these drawings, which were free from the conventions of forms, and even sought to approach this mode of expression (Marín, 2003: 56). On the other hand, Cizek drew a parallel between children’s drawings and primitive drawings, arguing that the only difference between the two is that children experience a creative block at adolescence— attributable, in his opinion, to schools (Viola, 1936: 24-25). This opinion was unanimous among several art educators throughout the 20th century, who looked at the influence of adults as limiting children’s creativity (which should naturally blossom and be used in all areas of a child’s life) (Willats, 2005: 215). Thus, “young children’s art expressions are not very much learned from copying others, but are spontaneous products of the individual’s own eye-hand-brain development and visual feedback from their own scribbles” (Kellogg, 1973: 8). Thus, according to Kellogg (1973), failure to recognise that the ability to create is innate and entirely self-taught in children would lead to a misunderstanding of children’s drawing as a discipline (Kellogg, 1973: 8). Furthermore, in Richardson’s (1948) opinion, children are easily corrupted, so it would be necessary to protect them from the influence of adults, their images and artistic education, in order to retain their inventiveness and emotional sensitivity to colours, textures and shapes.

Thus, “the art of the child from the ages of two to eight does appear to be spontaneous, springing from inner wells of creativity, and to contain universal symbols” (Wilson & Wilson, 1977: 5). Cizek believed that the apparent anomalies in these drawings were what gave them spontaneity and expressiveness; nevertheless, most of the time these features praised by adults are not intentionally produced (Viola, 1936: 24). According to Willats, children, realising the anomalies that their drawings have, seek to change their representational systems (in order to overcome and eliminate such anomalies and, consequently, to approach a more effective form of representation) (Willats, 2005: 229). During the second half of the 20th century, two major trends emerged regarding the way children’s drawing was taught: on the one hand, the creative and natural tendencies, which defended children’s spontaneous development and their free resolution in relation to their graphical methods; on the other hand, the trends that focused on the relationship between children’s drawings and great works of art (Marín, 2003: 98-103). Thus, Lowenfeld (1957/1964) and Freinet (1984), within the creative and natural approaches, considered that the drawing arises and develops in the individual in the same manner as other maturation and development processes. In this way, the drawing teaching should focus on motivating and comprehending the depth of children’s graphic characteristics, while also creating a climate conducive to creative and natural self-expression, with no concern or imposition for learning the representational techniques characteristic of adult art (Marín, 2003: 98-103). Lowenfeld (1964) claimed that art is a means of expression for children, and that children’s thinking differs from that of adults’, therefore their expression must also be different and adapted to each one (Lowenfeld & Britain, 1964: 21). Through the method advocated, the child would be able to achieve, through experience, the mastery of drawing and colour:

“A partir de este momento, sabe andar, y las explicaciones que le pueden ser dadas no modificarán su forma de andar; sabe hablar, y sólo tiene que perfeccionar su arte; sabe dibujar y pintar, y será susceptible de afrontar experimentalmente las dificultades que

dominará según los mismos procedimientos de impregnación viva” (Freinet, 1984: 23)¹¹.

On the other hand, Wilson and Hurwitz (1987) defended learning drawing through the study of great works of art, arguing that these artists established, for a long time, visual solutions to satisfactorily address issues related to drawing. In this way, when examining these works, children would be able to adapt and deepen their own strategies in order to achieve greater quality in the drawings produced (Wilson & Hurwitz, 1987). This learning was considered to be done through drawing from observation, drawing from memory, drawing from imagination (or fantasy), and the experimental, together with the study of the subject and symbols addressed by the work in question, its form and composition, its stylistic and expressive problems, the aesthetic issues and the representation of movement, time and emotions (Wilson & Hurwitz, 1987). Thus, the goal would be for children to continue drawing subjects that interest them and with the characteristics of children’s drawing, but to do so while employing the strategies and graphic solutions gained from the great artistic works (Wilson & Hurwitz, 1987). As such, from each drawing produced by a child, the authors proposed to identify the graphical problem it had and then analysing the way in which this problem was addressed by numerous artists over the ages (Wilson & Hurwitz, 1987). Finally, each child should create their own drawing applying the method learnt from studying the work of art. However, through this teaching method, some of the most characteristic traits of children’s spontaneous drawings would disappear, “de ahí que este modelo de enseñanza del dibujo planteé con toda rotundidad el dilema entre “arte infantil” frente a “aprender a dibujar”” (Marín, 2003: 102)¹². However, Matthews contended that early teaching of drawing techniques (to the detriment of creativity) is harmful to the child, as “rigid, prescriptive practices, anywhere, impair children’s ability to respond creatively and to initiate original ideas” (Matthews, 2003: 102). In this way, children need permission to play and draw, exploring and making associations between symbols, signs and visual structures, and thus developing. Furthermore, unlike Vygotsky (who considered that a richer environment with more experiences would enable the creative development of children), Čižek defended that such an environment would be destructive: “too many books, pictures, visits to theatres, cinemas, etc are bad for the child. The child is so strong and rich in his own imaginative world that he needs little else” (Čižek cited in Viola, 1936: 20-21). Thus, according to Matthews, all that was required was an interest and understanding of the child and the role of the arts in child development, in order to create “a field of discourse, an area of shared understanding about form, shape, colour and meaning, which permeated all our actions and conversations” (Matthews, 2003: 138). In this manner, the child would do the majority of the work alone, seeking solutions to solve the various issues that they encounter in the drawing (through the interrelation between production and perception), and would only require the assistance of adults for some types of learning of very specific transitions (Matthews, 2003; Willats, 2005: 170). In this sense, children’s drawing functions as a conversation between what the child wants to achieve and what it actually produces, with many opportunities arising from this interaction, which are taken advantage of by the child (Matthews, 2003). Although some of the things are accidental, the child incorporates these accidents into the inter relational process.

This deeply held conviction that children’s art develops naturally and independently has resulted in its transformation into something moulded in the eyes of adults: largely eliminating obvious adult influences, but guiding children’s art, in a subtle way, in the direction of what is the adult conception about it (Wilson & Wilson, 1977: 5). Thus, “we encourage those things which fit our image of a “natural” or a “creative” or a “spontaneous” child art while turning a blind eye to the very drawings — the copied ones — that could reveal the true nature of artistic learning” (Wilson & Wilson, 1977: 5). Thus, another issue concerns the role of models in children’s own drawings. In a study of interviews with more than 100 participants, Wilson and Wilson (1977) concluded that almost all children’s drawings could be

¹¹ “From this moment on, it knows how to walk, and the explanations that can be given to it will not modify its way of walking; it knows how to speak, and it only has to perfect its art; it knows how to draw and paint, and it will be able to confront experimentally the difficulties that it will master according to the same living impregnation procedures” (author’s translation).

¹² Hence, this drawing teaching model categorically poses the dilemma between “children’s art” versus “learning to draw” (author’s translation).

traced back to the original graphic source of inspiration: either drawings produced by parents, siblings or other images, such as television, journalistic and photographic images (Wilson & Wilson, 1977).

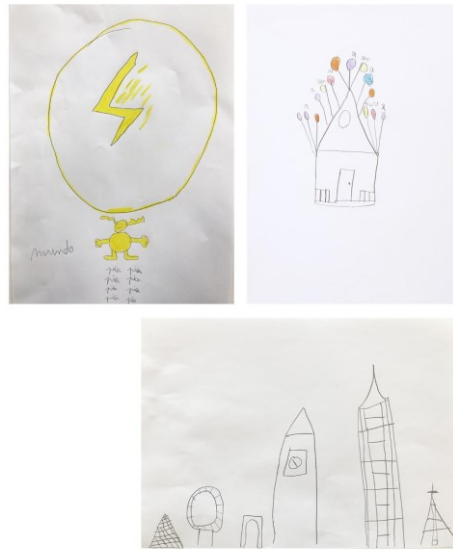


Figure 34 — Three examples of drawings which are clearly influenced by external graphic sources: the first Pikachu (from *Pokémon*), the second *Up*'s house, and the third portrays monuments from all over the world: Louvre's pyramid, the London Eye, *Arc de Triomphe*, Big Ben, Empire State Building and the Eiffel Tower.

However, while this issue is widely debated (with authors such as Viola (1936) viewing picture copying as harmful), it appears that most people (including children) draw from influence and imitation (Wilson & Wilson, 1977: 7-8; Duncum, 1999: 36). Thus, children are influenced by external images that seem to them to hold solutions to representational challenges that they face at a specific point in their development, as well as by the people around them (Wilson & Wilson, 1977: 8; Willats, 2005: 170). Children who have older siblings or family members with a regular artistic activity are often influenced and even “taught” by them (through observation and example) — “so, too, do siblings and peers “teach” one another how to draw as well as what to draw” (Wilson & Wilson, 1977: 8). The authors’ justification for this question lies in the way the world is perceived and in the process of transforming this perceived information so that it can be incorporated into the drawings (Wilson & Wilson, 1977: 8). In this sense, we perceive countless versions of the same object or scene in countless positions; however, we are unable to recall them all:

“Thus these *other-than-for-making-drawings perceptions* are of no particular use for *making-drawings programs* simply because they are too numerous, too complex, too general and particularly because they are too vague to provide sharp mental images from which to draw” (Wilson & Wilson, 1977: 8).

Thus, the ideal configurations for the drawing are those that were previously perceived from other images, due to the fact that they have already been translated from three dimensions to two, having already been simplified and abstracted (requiring a minor mental process of translation) (Wilson & Wilson, 1977: 8). In addition (and as we have seen before), the cultural and visual context in which children live has a great influence, not only on the elements represented, but also on the technical and graphic strategies with which they are implemented (Vygotsky, 1978). Children gather information from their surroundings (both “real” experiences and pictorial objects — illustrations, drawings by other

people, images from television, among others) according to the interests they are developing (Matthews, 2003; Wilson & Wilson, 1977), so a richer environment would provide them with more available information. Plus, the concept of the zone of proximal development (Vygotsky, 1978) (which was identified here previously) is equally important to understand that some of the knowledge is learned through social contact with other people more experienced in a given subject or discipline, regardless of whether they are adults or peers of the same age range. However, this gathering of knowledge does not imply that children copy their surrounding world, but rather deliberately reconstruct the experiences they have had, creating a world of their own through drawing (Matthews, 2003). As a result, Matthews (2003) condemned the ban on children using pre-existing images as visual influences and stated that

“Although a rich pictorial environment is almost certainly necessary for the full development of drawing, and adult advice, given at the right moment, may be helpful, in learning to draw children often have to act as their own caretakers, or rather, their own drawings have to act as caretakers for them, through the interaction between production and perception” (Willats, 2005: 172).

5. Development of drawing activities

The development of the drawing sessions aimed to allow and enhance creative thinking and imagination through the suggestion of open exercises to a group of children from 6 to 9 years old, observing the various paths each child takes from a common starting point. As such, it was in our interest to understand, by working with this group of children, some of the issues researched in theory. The outcomes of these sessions were also meant to form the basis for the development of the animated experiments. For this, not only were the final drawings archived, but photographs were also taken during the production of the drawings, and a sound recorder captured the dialogues and narratives that accompanied the production of the drawings, in order to obtain as much material as possible to work with. As Matthews (2003) described, “the paintings and drawings themselves form a good record of development. But do not forget that it is not just the ‘finished works’ which are important. Much of children’s actions will have expressive and representational value and meaning” (Matthews, 2003: 201). Image recording during the drawing sessions would have been the ideal solution to analyse the variation of movements and posture of each child in relation to the act of drawing and the different activities; however, due to logistics and the will to maintain the anonymity of the children, we chose to resort to observation and audio recording.

In this sense, 14 children between 6 and 9 years old participated in three weekly drawing sessions with activities enhancing freedom of expression and imagination. The participants’ anonymity and confidentiality were safeguarded, with the collection of only their first names and ages, after written authorization from their parents (by signing an informed consent, which can be found in Appendix 1). This way, with this information alone, it would not be possible to identify the children. This was also why we preferred to simply record the audio and leave out any images of the children’s faces.

Organising these sessions, the main concern was to choose activities that offered a wide variety of options to the children, without limiting them to a supposedly clear and right direction. It was also important to us that children did not feel treated as inferior or as a less developed person, so, as Vygotsky (2004) suggested, the activities chosen and their organisation were not thought of as specific for children that age, but as activities that anyone of any age group could perform: our intention was to understand how this specific group of children faced these open drawing activities, just been given a topic/starting point and interpreting them in their own way. As these sessions were prepared and scheduled, another concern we had was that children would feel pressured and forced to draw, which would lead to blockages and frustrations. As the author mentioned, “when we attempt to foster children’s creativity, including in the visual arts, we need to observe the principle of freedom, which is generally an essential condition for all kinds of creativity. This means that the creative activities of children cannot be compulsory or forced and must arise only out of their own interests” (Vygotsky, 2004: 84). In this sense, with the organisation of each session, we sought to achieve a balance between the interest we had in the children actually drawing and their own willingness to do so, even within structured activities. For such, we looked for activities with specific external stimuli and others nearly completely free, with simply a blank sheet as a stimulator. In addition, “in working with younger children it is often necessary to be very flexible. When teachers teach by taking their lead from children, it is necessary to have a strategy that provides an overall structure while making it possible to quickly move in different directions” (Duncum, 1999: 36), so we also had a set of extra activities prepared, in case none of the proposals were exciting enough. Finally, the suggested exercises did not exactly have an endpoint, so any deviation from them would only be seen as another step in a succession of events, not constituting any problem. Likewise, as Lowenfeld and Britain commented, our role as coordinators of these sessions also sought to be as neutral and silent as possible, observing, guiding and assisting when requested, but not forcing the children to draw or follow any specific direction (Lowenfeld & Britain, 1964). The materials available for them were all the marking materials that were suitable for drawing sessions of this type and for the proposed activities, so paints were left aside, and the selection fell on pencils, coloured pencils, oil pastels, crayons and markers. Within the various materials available, each child had them all within their range of action and could freely choose and change according to their will and intention. These sessions were not supposed to be ruled or normative, but rather to offer starting points for the

development of lines of thought and narratives through drawing. Thus, for each day two activities were chosen that stimulated the children, through external factors and without constraints and limitations, but that did not conduct them towards any specific end.

5.1. First drawing session

For the first session, the proposed activities were based on the Exquisite Corpse and *The Boy and the World* (Abreu, 2013). The Exquisite Corpse is a collective exercise in which each participant is invited to build a part of a drawing without knowing what their colleagues did on their part. On a folded sheet, the first person draws the corresponding part, folding it at the end, in order to hide what was represented. Thus, the next person to draw does not have access to this information, just seeing a few lines and shapes that reach the edge of the fold, from which they can build their part of the drawing. This game appeared in the 1920s, in Paris, in the form of text — where each person wrote something on a piece of paper and folded it before moving on to the next — and later adapting it for drawing, by the hands of Yves Tanguy, Jacques Prévert, André Breton and Marcel Duchamp, hence becoming forever connected to Surrealism (Gotthardt, 2018). This artistic movement sought the exaltation of the subconscious and the irrational, with the imagination manifesting itself freely and being an escape from reality (Imbroisi & Martins, 2022). Games were used by the surrealists as a way of accessing their subconscious and, in this sense, the Exquisite Corpse was developed. This interactive and collaborative game relied on free play and unpredictability, allowing to expand minds and develop creativity, with the participants being able to do whatever they wanted from the lines they had on the sheet (Gotthardt, 2018). Here we opted to make one Exquisite Corpse in text with all children and a total of drawing corpses equal to the total number of children present in the sessions, so that each one could make, at least once, the first, second and third parts (Figure 35). The exquisite text corpse proved to be less exciting for them (although they loved reading the final story and the grotesque of the situation), but we considered that this activity could serve as a starting point for the animation, since automatically a narrative would be created. On the other hand, the Exquisite Corpse in drawing was quite successful, with a general amazement shared by all the children when opening the sheets and seeing the results obtained, naturally proceeding to an unfolding of theories about possible stories and scenarios for those characters. In the end, this exercise led to the children asking to repeat it and do more.



Figure 35 — Four examples of Exquisite Corpses produced in the first activity of the drawing sessions. After passing through the three children (corresponding to the three divisions of the sheet), some of them continued to be created through layers, as seen in the third figure. Over more than an hour of work on the same image, the author was so immersed in the process that the elements were overlapping (no longer being possible to see what was underneath).

For the second exercise, we decided that we would like to present an excerpt from a film and use that same excerpt as an inspiration for the drawings. However, we did not want it to be too

explanatory and figurative, so as not to overly condition the meaning that the children would give it; nor could it be of very long duration, since the interest of the exercise fell more on the drawing part. So, after researching possible films, we ended up choosing to show the first 6 minutes of *The Boy and the World*, by Alê Abreu (2013).



Figure 36 — Stills from the film *The Boy and the World*, by Alê Abreu (2013). Here it is possible to visualise the simplified lines and shapes that move away from realism and toward a childish aesthetic, as well as the profusion of colours employed and the irregularity of the line. In addition, the texture of the coloured pencil (the material used in the film’s production, drawn frame by frame manually — which means that each image of the film (each frame) corresponds to a drawing) is clearly understood. Also, the blue stain corresponding to the sky (in the image in the lower right corner) is comparable to the treatment given to this element by children, which is commonly depicted by a blue line or stain on the upper edge of the drawing surface.

Several factors led to the choice of this film. Not only would we like to bring a film that escaped the growing realism of the large animation studios that children are used to, but we also wanted it to have a visual universe they could identify with. We believe that the pressure for an approximation to reality, including in cinema, contributes to children reaching a moment of blockage and frustration at a certain point, when they want to represent something and they cannot make it resemble what they see — the real world — as, for example, when they try to represent characters from their favourite films. In this case, the first few minutes that we decided to present do not constitute a very complex narrative and it can even be considered that they are more of visual, sound and musical delight: a child who wanders in a forest and crosses paths with various animals and natural environments. The representation of all those elements is quite simple, consisting of basic colourful shapes/stains that draw our attention, sometimes even in a more abstract way. On the other hand, none of the figurative elements (the child, animals and plants) are portrayed in a realistic way, but that is enough to allow us to identify what they possibly represent, as it is possible to see in Figure 35. In this way, drawings that approach a child’s aesthetic come to life in a feature film, and even the materials and techniques used (coloured pencils, crayons, ink and collages) create a bridge between this film and the main material choices of this group in question (and children in general) — from what we could observe from the results of the various sessions held, coloured pencils and crayons are the preferred material for these children to draw with. Thus, we considered that this excerpt from this film would be a good stimulus for this type of exercise,

since the sounds, music and colours presented encourage sensitivity and raise sensations and emotions. However, when the film was shown, the children were very absorbed in it and did not want to stop, so we gave in to their will and allowed for the film to run for a few more minutes. However, this inevitably resulted in a more narrative scene unfolding (where the child says goodbye to the departing father), which clearly influenced the children's artistic direction. On the other hand, we also concluded that children used drawing to depict specific scenes in the film (those they valued the most, which in this case were related to the moment of the farewell), rather than using the film (or elements of the film) only as inspiration for subsequent drawings (Figure 37).



Figure 37 — Drawings created during the session's second activity, in which we clearly comprehended that the moment of the father's parting was the most memorable. However, some children chose to represent this moment of the train departure in a way that differed from the one depicted in the film: thus, as shown in the image in the lower left corner, there were several drawings that introduced the three characters leaving or the three characters remaining happy at home.

5.2. Second drawing session

We chose to connect the second session with the first activity, by starting with the corpses produced by the children and building stories around them. As such, the first proposed activity was for each child to choose the corpse that appealed to them the most and add layers to it the way they liked: paint it, change it, build a story around it, interpreting it in their own way. The decision to include this exercise came from the combination of an exercise we did during the first year of the master's degree (exactly in the same way, the creation of Exquisite Corpses and the subsequent development of characters) and the reactions provoked in the previous session, during the visualisation of the corpses when opened. The children's astonishment when seeing the results of their drawings was general and they used adjectives such as "very crazy", "very imaginative", "funny" and "ridiculous" to characterise them. In addition, we also noticed that the presence of the recorders (as an external object that was unknown to the children) sparked enormous enthusiasm and curiosity, leading them to always want to be talking to them, trying out the buttons, acting as reporters interviewing the other children, and so on; all of which, we believe, contributed to the successful completion of this exercise. When asked to imagine what these characters' lives could be like, and given permission to draw on what has already been drawn or reinterpret it on other blank sheets, most children immediately knew what to do and began to draw while describing orally what they were doing. Some opted to give the character a life, illustrating its house, what it does, how it is; while others attempted to represent a specific event in which the character participated, the unfolding of an action that begins and ends with those drawings. On a practical level, some children ended up drawing on the same page as the original corpse, adding details as the story progressed and becoming a layered drawing, where, as Matthews (2003) points out, the process was far more important than the final object. On the other hand, other children used new sheets

to represent the unfolding of the narrative, nearly dividing it into film frames, where each sheet/drawing corresponded to a moment of the action (which, combined with the others, comprised the narrative sequence) (Figure 38).



Figure 38 — The tactics used in the examples shown in response to this exercise differed. In the first two images, we observe the narrative unfolding in the image itself, through small drawings adjacent to the main character, subsequently developed on another sheet, but always superimposing the actions on top of each other, covering what had been previously drawn. In the two other examples, the action takes place over several sheets; however, while the first image (lower left corner) describes the events as if they were frames, each image freezing the main character and the key point of the action, the second image (lower right corner) only depicts the various scenarios where the action takes place, without making reference to the character.

The second activity of the second session was inspired by the collages present in the second part of *The Boy and the World* (Abreu, 2013) (although the rest of the film was not presented to the children, it unconsciously served as an inspiration for us as we decided on the activities). A set of cuttings taken from magazines — previously cut by us — were left at the children's disposal on a central table so they could choose freely and at their own pace. Similarly, we decided to make the magazines themselves available, so that they could see if any image appealed to them more. From what we could observe, the majority of the children chose some of the images that we had previously selected, but they also used magazines to select their own ones. This exercise was perhaps the one that, for the next phase of the project (the animated exercises), proved to be less fruitful, since many of the resulting final objects were presented as images constructed entirely from magazine cuttings. However, two or three children used the entirely cut-out pictures as a foundation or framework for their own drawings, resulting in interpretations and adjustments to the cut-outs (Figure 39). Many of the children also incorporated the cut-out images in their drawings only as an adornment rather than as an intrinsic element of the painting and it was also the task they considered to be completed the quickest.



Figure 39 — The examples provided demonstrate the three preferred approaches in carrying out this proposal. As a result, the first image, which is entirely composed of cutting, based on only a few drawn details (such as the grass and road). However, in the second image the drawing serves as a complement to the cuttings, incorporating it in the first scene and presenting the following scenes contiguously. Finally, the cutting in the second and third images acts as inspiration for the development of the drawing, not being incorporated into the drawing itself, but recreated in it.

5.3. Third drawing session

For the third and final session, our choice of activities was based on a factor that we had previously observed (and that we have come to confirm). We had already realised from regular weekly classes that exercises involving folded blank sheets were very stimulating for children and that they themselves do it intuitively many times, so we decided to organise this session specifically around this type of exercises. In this way, the first exercise proposed on this day was to start from a sheet folded into three or four parts (regardless of whether the sizes of the parts are the same or not) and construct drawings that, when closed, present a form and, when opened, disclose what is planned on the inside. This activity produced the most results, as each drawing was completed very quickly, and the children kept on wanting to do more. Likewise, despite the scary mouths being a constant for the “inside” of the page (and figures with eyes and mouths gaining quantitatively in terms of representation), we concluded that there was a wide range of results (Figure 40).



Figure 40 — Although the firsts examples (the upper images, with a scary mouth revealed on the open sheet) were the most recurrent result for this activity, the following two examples demonstrate the second approach used, that of portraying elements and objects that “grow” on the open sheet.

Based on the previous exercise and the Exquisite Corpse and continuing the notion of folded white sheets as enthusiastic, we presented the second exercise of the session: a “folded notebook” consisting of a white A4 sheet folded into little rectangles. This exercise at first caused more confusion, perhaps due to the open way in which the sheet is presented, but as some children started to draw, the others were also motivated, and quickly this exercise became one of the group favourites. In general there were two different approaches to this proposal: on the one hand, there were those who used the folds as mere square demarcations and chose to make a drawing in each square (or draw on the sheet in general ignoring the demarcations), while on the other hand, there were those who used the folds as enablers of several different particularities, that changed the overall presentation of a character depending on how the sheet was folded, which can be seen in figure 41. From the moment that some children began to draw this type of characters, the others were immediately influenced and automatically began to use these sheets in the same way, leading to most of the results obtained being of this typology.

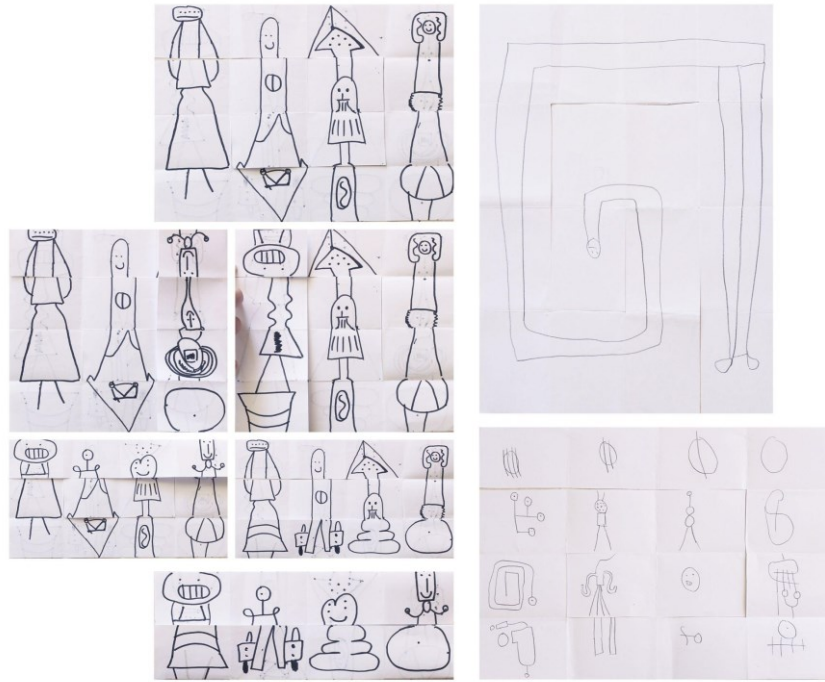


Figure 41 — Three examples of drawings produced by children in the context of the “folded notebook” activity. Some children chose to use the sheet in its entirety, as if the rectangular demarcations did not exist (although in the second example — in the upper right corner — the structure of the drawing follows the cut-outs of the sheet), while others chose to produce a small drawing in each of the rectangles, sometimes with a relationship between them, sometimes without any visible physical relationship (as in the last image presented — in the lower right corner). Finally, the most popular approach in this activity was the construction of characters and creatures whose composition changes as the folding lines are employed, such as in the image on the left.

As there were still some corpses from the previous session that had not been chosen by any child to work on them, some of the participants asked if they could take them to make other drawings (when they considered that they had already finished the proposed exercises), so they developed more images and stories from these corpses. The activities provided for the several sessions attempted to comply with what was mentioned by Duncum (1999), facilitating playfulness and spontaneity through exercises that allowed for dispersion and non-linear narrative sequences. Among all the exercises suggested, as already mentioned above, the Exquisite Corpses (and subsequent stories), the folded sheets that hide a part of the drawing and the “folded notebooks” were the most popular — that is, all the exercises that somehow involve folded blank sheets — contrary to what we previously thought: that blank sheets could be scary and lead to blockages. However, as Rhoda indicates, “an empty piece of paper is stimulus to begin drawing. The drawing stops whenever a satisfying gestalt has been processed by the brain” (Kellogg, 1973: 9). In the same way, the end of a drawing was always given by the author himself, when it was already satisfied with what it had conveyed, respecting the rhythm of each child in the group and without forcing a homogeneity. We also feel that these tasks were more engaging due to the greater ease in constructing narratives (albeit small, related only to a specific action, for example) and the subsequent desire to narrate them to a recorder.

Although these sessions specifically organised and structured for this project took place over three afternoons, it should be noted that the work with the children continued throughout the year, so the observation and reflection of the drawings did not stop (especially after the readings about the various authors discussed in the previous chapters, which allowed a different look at the gestures, posture and resulting images of the children, as well as a more active listening).

6. How to incorporate the drawings in an animated project

The development of this project arose from a very strong and long-standing desire to provide actual movement to the drawings that the observed children generated. Not only because the great majority of these drawings condense a narrative sequence into a single image (which, of course, connects with movement), but also because the drawings themselves stimulated us visually and provided a directorial challenge. Thus, in addition to the theoretical research carried out, the goal of this project was to start with some drawings produced by children aged 6 to 9 years old and make a short animated film. However, even though we had some certainties regarding some of the technical aspects of this project, several decisions had to be taken, and, for that, reflected and researched.

We knew from the start that we did not want to have too much influence over the animated production. As with the drawing activities, our intention was not to specify all aspects related to the development of this animation in advance. Moreover, as animation and drawing are intrinsically related, both the activities and animation were thought and developed simultaneously. Thus, as the narrative is (usually) one of the first things to be considered in the conception of a cinematographic project, we reflected on the necessity to define it in advance (before the activities) and, therefore, could condition the drawings that the children would generate. As the drawings would serve as the foundation for the animation, we were interested in somehow finding a way to connect them in order to establish some common thread between all of them. However, and taking into account all the theoretical research carried out, we also did not want to compel children to draw on extremely well-defined topics that did not allow them to freely express their will. Thus, through the analysis of Clara Silva's (2018) master's project, called *Relação Fabular entre Desenho e Escrita: caso prático na Pediatria do Hospital de São João*¹³ (Figure 42), we understood that our interest was not to follow an approach similar to this one, not because it was inadequate, but simply because one of the issues that motivated us in the initial development of this project and that we would like to observe and analyse in the sessions was the narrative dimension of children's drawings, widely used to "tell stories", as well as their syncretic qualities (Vygotsky, 2004). As such, we were interested in being able to facilitate this narrative freedom, liberating children from previously imposed and fixed instructions, and attending the sessions concentrating on the process and components of these children's drawing, which were conditioned solely by small open stimuli.

¹³ Over the course of many weeks, this master's project developed storytelling and illustration workshops in the Paediatrics internment at Hospital de São João. Thus, over the sessions, children illustrated certain fables, written and presented by Clara, which culminated in a book format compilation of both the stories and the artwork (Silva, 2018). This project piqued our attention because of the strong interaction built with the children, which we intended to cultivate on our own, as well as in terms of reflection on drawing and the concepts related to it (such as imagination and creativity), albeit following different directions than ours.



Figure 42 — Pages from Clara Silva’s master’s project *Relação Fabular entre Desenho e Escrita: caso prático na Pediatria do Hospital de São João* (2018: 61, 63, 65). In each image you can see the stories on the left, which were read to the children in the context of the activities, and the drawings on the right, which illustrated the respective narrative. The drawings were produced by the children on a shared piece of paper that covered the wall.

As a result, we chose to structure the activities as described earlier in this chapter, expecting that they would remain open enough to allow each child to interpret and follow the paths that most interested them, but also hoping to find some thread that would help unify the approaches and results of the various interventions.

After each session, we organised the content collected (both visual and audio) in order to make it easier to pick and access it throughout the project’s subsequent stages. Considering the amount of drawings on hand and the time available for the animation production, we knew that it would be impossible to work on all of them (at least in this specific project). As a result, the selection of images to be used and the construction of the narrative walked side by side at this stage, with two main aspects that stood out: on the one hand, it was possible to identify three exercises in which the children’s adhesion had been very high (resulting in more drawings to choose from) and where the narrative question would be almost immediately resolved — the Exquisite Corpse, the folded sheets that reveal the hidden interior when opened and the “folded notebook” —, on the other hand, there were some specific drawings that immediately captivated us, both for the visual solution adopted and for the idea of movement and composition that was automatically awakened in us. Thus, the Exquisite Corpse and the folded drawings not only had extremely dynamic qualities, but the children themselves had worked on the narrative at a visual and sound level (recorded on the audio recorders), so they appeared to be a plausible choice to develop at first look. However, the stories were fairly sophisticated and detailed, and given the time available, we felt that if we did not choose only one of the stories, the project’s quality would be compromised. On the other hand, it did not seem very easy or correct to select a corpse drawn by just three children (and whose story was developed by only one) as a representation of the entire project developed with 14 children. As a result, we picked several drawings from each child, both for the aesthetic element provided and because they “spoke” to us, as we continued to return to these pictures that individually attracted us to animate (some of them presented in Figure 43).



Figure 43 — Some examples of the images selected as the main hypotheses that drew us to animate, produced by the children.

However, the difficulty of narrative development persisted, as did the necessity to comprehend how to merge drawings and elements of such disparate features, both aesthetically and thematically, into a single film. Therefore, we conducted an analysis of some films and projects that link animation to children’s drawing in order to understand how both areas have been combined, highlighting the project *Pequeños Dibujos Animados* (Mario Torrecillas, 2008), the Instagram page *Things I have drawn* (Tom Curtis, 2015) and the short films *My Favourite Animal* (Lara Lee, 2010) and *Being Ourselves* (Karrat Animation, 2018).

Pequeños Dibujos Animados (PDA) is an audiovisual initiative that, through workshops with children from 6 to 12 years old and from 12 to 15 years old, creates animated short films, narrated and drawn by them. Thus, they involve children in all stages of production, the entire creation process being guided by them, and the team behind PDA’s function being merely to encourage and show the best methods to structure children’s ideas (PDA Films, n.d.). As a result, children are the protagonists throughout all the stages of the process, as the final short film is a reflection of their concerns and vision of the world, which “por la manera en que han sido creadas (dejando que los niños se expresen libremente y sin prejuicios) suelen tener una fuerte carga cultural, social e innovadora.” (PDA Films, n.d.)¹⁴. Furthermore, all projects employ a variety of techniques, ranging from stop-motion¹⁵ to traditional 2D animation (drawing on paper or other two-dimensional surface), and even including real-life video (Figure 44).

¹⁴ “Due to the way they have been created (letting children express themselves freely and without prejudice) they usually have a strong cultural, social and innovative content” (author’s translation).

¹⁵ Stop-motion is a technique used to make physical objects move. Thus, each film image (*frame*) corresponds to a photographic image, which is captured repeatedly as the object is slightly changed in position, and then sequenced in the computer to create the illusion of movement.



Figure 44 — Stills from the short films *El Hogar — Te cuento desde Guatemala* (2012) (the images above) and *If I am Not I cannot be* (2017) (the images below), both by *Pequeños Dibujos Animados*, in which the presence of the child’s gesture in the entire construction of the images is obvious.

This project drew us in, not only because of its intrinsic values (encouraging creativity through drawing and storytelling and using cinema as an educational and communicative tool), but also because of the central role assigned to children, to their thinking and visual expression, as well as the visual aspect of the animations themselves, where one can clearly see the children’s traits and the freedom they have been given. Working with children from all over the world, the strong presence of the culture and context in which each child grows and develops, as well as the impact that these experiences have on their artistic expression, is well recognised in this project, as is the selection of events described based on those experiences that most marked them, both positively and negatively.

Things I have drawn (2015) is a project created by a parent and his two children, with the aim of imagining “a world in which the things kids draw are real” (*Things I have drawn*, n.d.). Thus, the project began with the transformation of both children’s two-dimensional drawings into textured images using Photoshop, which retain the proportions and details of the original drawings but are inserted in realistic environments (Figure 45), and then expanded to include drawings of other children from all over the world (*Things I have drawn*, n.d.). Although this particular project does not relate drawing to animation, we believe it was important to include it in our research process because it focuses on the unique characteristics of children’s drawings and allows us to reflect on their way of experiencing the world as well as the various different notions of reality and realism.



Figure 45 — Some images produced within the project *Things I have drawn*, digitally built in Photoshop from children’s drawings.

However, on the other hand, the treatment of the images raised some concerns about the possible perpetuation of the comparative theory of children’s drawings (in relation to adult drawings and the observed reality), as well as the idea that children’s drawings are a flawed attempt at realism, full of errors, because, in some images, the over-realistic background and textures in contrast with the recreated two-dimensional elements can lead to these creatures looking like just strange deformations of objective reality (as in the case of the first two images in figure 44 — the cow and the horse — and especially in the latter, where even the head of a real horse appears at the back, which inevitably leads to the drawn creature being seen in comparison with the real horse).

My Favourite Animal (Lara Lee, 2010) is an animated short film composed on audio recordings of children describing their favourite animal. Following that, the author drew each animal independently as the audio played, so that the drawing (and the creature portrayed) evolved and gained details incrementally. In this short film, we valued the author’s work in breaking free from her preconceived notions about each of the animals described (penguins, cows, horses and kangaroos) and focusing solely on the children’s descriptions, employing a visual language composed of simple and geometric shapes, and lines similar to those made of scratching materials. Thus, it was the author’s intention to explore the space between imagination and the pre-defined concepts society has of what is known, playing with the way things would look “if there were absolutely no preconceptions on the part of the receiver” (Lee, 2011: 321). We believe that, as in the previous project, the approach used for this animation enhances thinking about what is considered “the real” and the possibilities enabled by the release of fixed conceptions of realism, but with a technical-formal choice that, in our opinion, works best for this exploration (steering away from realistic textures, colours, and shapes, as you can see in Figure 46).

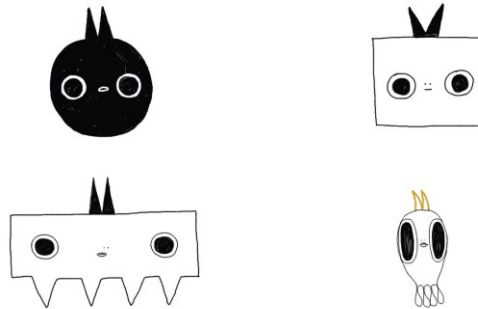


Figure 46 — Sequence of frames taken from the short film *My Favourite Animal*, by Lara Lee (2010), corresponding to the description of a cow, whose shape varies as a result of the details supplied by the accompanying audio.

Being Ourselves (Karrot Animation, 2018) is an animated short film developed by Karrot Entertainment from the drawings of 12 children who won a drawing competition incorporated in Children’s Mental Health Week 2018 (BAFTA Kids & Teens, 2018). Thus, the premise for each child was to create a self-portrait in which they could visualise what makes them special, and the winning drawings would subsequently be animated (BAFTA Kids, 2018). In this scenario, the majority of the children’s drawings were used as cutouts, with the elements remaining as drawn by the children and the portions cut, stretched and manoeuvred in order to be animated. In this method, only the movement was added from the animators into the objects and characters previously drawn by the children, preserving their aesthetic features, as well as the expressiveness and texture of the lines (Figure 47).

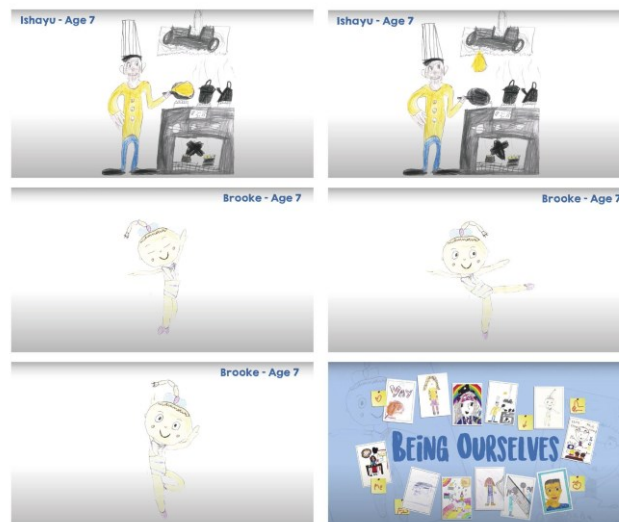


Figure 47 — Stills from Karrot Entertainment’s short film *Being Ourselves* (2018). The last image depicts the 12 winning competition drawings that were selected to be animated.

After seeing several examples of projects that begin with children’s drawings, and without wanting to force a narrative into all the drawings collected, the best decision seemed to be to abandon the idea of a traditional linear narrative that would unite all of the previously produced drawings into a single story (since the selected drawings did not have any connecting threads). Instead, we decided to create small loop actions for each of the drawings that would work separately and sustain themselves individually. In this way, we would be able to work on the drawings we were most excited about in a more natural way (without forcing a narrative) and with the possibility of working on more drawings as

the project progressed — given that they are small individual animations, adding more would not interfere with the structure of the previous ones. To that purpose, the observation of the films *My Favourite Animal* and *Being Ourselves* was critical, since both short films are divided into small videos that may operate alone (although, in both cases, there is a common thread at the thematic level that links all the animations).

After deciding to forego the usual linear narrative, the next question to consider was the technique to be employed. In this sense, another desire we had before beginning the project was to do honour to children's drawings at all levels, including texture and expression, thus the use of three-dimensional technology (3D) did not seem the most appropriate, especially realistically. Thus, while it can provide interesting visual results in some aspects (such as 360° representation with volume of creatures and elements that only exist in a two-dimensional plane — since they do not correspond to the reality of the world around us), it did not seem to us to be the most relevant option in the context of this specific project, because the focus was on drawing and visual expression. In this way, the visual aspects of *My Favourite Animal*, *Being Ourselves* and the short films by *Pequeños Dibujos Animados* (particularly those produced with scratch-off materials, as in *El Hogar — Te cuento desde Guatemala* (2012)) were much closer to what we were looking for, considering that we were interested in retaining visual qualities similar to the children's drawings themselves, in terms of shapes, textures and depth. Thus, it was in our best interests to preserve the richness of the texture of the materials used to create the majority of children's drawings, which in these specific activities were graphite pencils and coloured pencils. To that purpose, we could use the children's original drawings, cutting them out and moving them around the surface (using stop-motion), similar to the *Pequeños Dibujos Animados* films (such as the case of *If I am Not I cannot be* (2017)). However, it was in our interest to give the drawings vitality and fluidity, allowing the various elements to be moved and distorted in all angles and orientations if desired, thus traditional 2D animation seemed to be the most appropriate option. Apart from that, and unlike this this project (PDA), which collaborates with children from the preconception to film completion, in our project the only contact sessions with children specifically dedicated to the project were the three drawing sessions, making it difficult to develop an animation with characteristics and approaches similar to PDAs, incorporating children in all the phases of the project (including in the animation itself). Furthermore, and taking into account that the entire project was centred on drawing, its process and its particularities, we realised that it would be important that the animation production process be centred on drawing as well. As a result, we determined that the ideal approach to adopt would be traditional 2D animation on paper, in which each drawing would be produced separately using graphite and coloured pencils, through the auxiliary use of a light table.

Moreover, we attempted to simplify the movements, to work in small loops (though not all of the movements we chose corresponded to this particular point) and to be drawn in accordance with the characteristics of each specific drawing, sometimes formal, but also thematic, seeking to enhance some of the more specific traits of children's drawing (such as drawing with transparencies, as can be seen in figure 48), or to explore its narrative capabilities (as the example in figure 49).

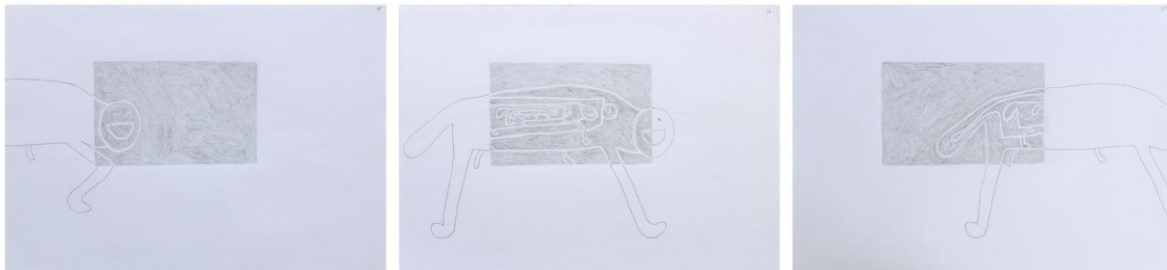


Figure 48 — Sequence of frames of one of the animations included in this project, based on the image presented above and which portrays an example of enhancing a formal characteristic of children's drawing. We realised right away that we would like to appreciate the transparencies so often

incorporated in children's drawings and labelled as "mistakes". Knowing the intention of the drawing (to represent a pregnant dog), we chose to play with the x-ray machines that allow us to "see through transparency" and expose what is hidden inside.

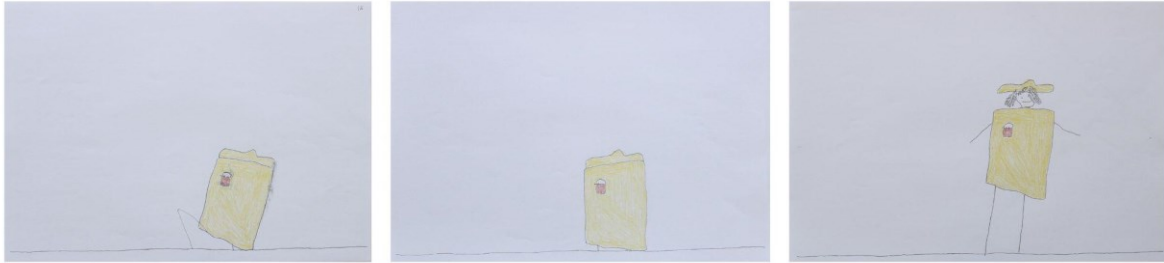


Figure 49 — Stills from one of the animations belonging to the project, based on the image above, which portrays the moment of the father's parting in *The Boy and the World* (Alê Abreu). According to the drawing's author, the father is sad because he is leaving (hence the rain on top of him). Thus, taking into consideration that the form of the father in the drawing resembles a house (the body to the structure of the house and the hat to the roof), we tried to play with the idea that there are people who feel like home and that it rains when they leave.

As such, in order to preserve the original dynamic aspect of the line as well as its imperfections, the animated drawings were created over the child's drawing, rather than altering it or imposing a more defined and assertive line on a line that is freer and more spontaneous (Figure 50).

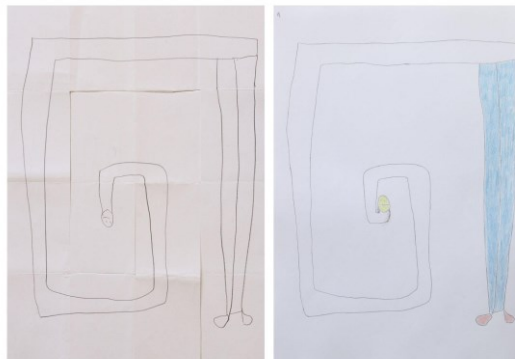


Figure 50 — On the left side the original drawing made by the child and on the right side the first drawing produced in the development of this animated segment, drawn on top of the original in order to preserve the child's lines.

One concern that emerged during the development of the animation itself (already at the stage of sketching the movements) was whether the drawings needed to be cleaned up. In the usual process of building an animation (which, although not mandatory, corresponds to what is common), the movement that objects and elements develop is usually thought and defined in a sketch (called "rough", in which the drawings are faster and sketched, and whose objective is to define the times of the action and the way the movement unfolds). Subsequently, the rough is cleaned (called the "clean-up" or "final frame") for the final sheets, fine-tuning the details of the movement and adding all of the elements' characteristics, as well as the final aesthetic treatment. So, from the start of the animation, our goal was to rough and then clean the drawings, resulting in the final frames. However, after the rough of the first animation was completed, we understood the power that the marks left on the paper had (the result of

trial and error in understanding the movement to be executed), both procedurally and in terms of texture. As such, the apparently “dirt” stains generated by erasing on the paper, as well as the marks of previously drawn and subsequently erased lines, were part of the project’s development process, which, according to Matthews (2003), is far more essential in children’s drawings than the final object.



Figure 51 — Two frame sequences from the short film *El Hogar — Te cuento desde Guatemala* (2012), in which both the markings of the previously drawn lines (in the upper images, corresponding to the frames drawn to indicate the arm’s movement) and the rubber marks on the paper are visible (in the lower images, the result of the use of the same drawing surface to portray the entire movement of the vehicles).

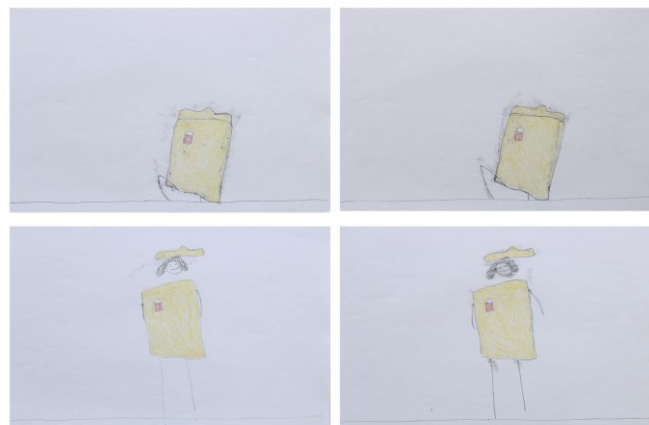


Figure 52 — Frames created for this project that show the marks and dirt left by the rubber on the paper as a result of the search for movement and action times.

Plus, as Torre (2015) described, “the act of erasing should not be seen as a backwards step in the creation of a drawing, for it too propels the drawing forward” (Torre, 2015: 146). As such, we understood the dimension of these markings and the need to preserve the roughs as the final frames of this animation rather than cleaning them up, as can be seen in Figure 51 and Figure 52. However, unlike in *El Hogar — Te cuento desde Guatemala*, where each action took place on a single sheet (photographed and erased each time, in order to draw the next step of the action, repeatedly), in our project each frame of the animation was drawn on a separate sheet, so the marks caused by erasing were initially an accident, resulting from the search for the most appropriate movement for a given action: “drawing, therefore, is not just the act of applying a line, but is also the act of modifying a line” (Torre, 2005: 146).

As previously said, we picked coloured pencils as the preferred materials for painting the animations since this is one of the scratching materials that children use the most and, more particularly, in the context of the activities carried out in the framework of this project. At first we considered the

possibility of giving the drawings produced for each animation to the respective author of the original drawing, with the intention that it would paint them and, consequently, its aesthetics remain genuine and spontaneous. However, after further consideration and in the light of the authors previously studied, we concluded that this would not be the most appropriate method, since some of the animations were made up of about 40 frames that were only slightly different from each other, resulting in a very repetitive activity. According to Vygotsky (2004), children's artistic activities should not be forced or compulsory, which led us to set aside the initial idea. As a result, the decision fell on the children only defining the colours of each animation, thus leaving the painting to us (Figure 53).



Figure 53 — Final frames of two of the animations produced for the project, after painting.

Later, while digitising the numerous drawings to construct the video in a computer editing tool, we found that the texture of both the graphite pencil and the coloured pencil (particularly the coloured pencil in large painted areas) was lost, resulting in a very smooth and uniform stain. As a result, we concluded that photographing the drawings one by one would be the best method to maintain the richness of the scratched texture of the pencil (essential, in our opinion, for the project).

Although one of our goals when creating small animations for each drawing was for them to work individually and independently of one another, it was also our intention for them to be sequenced and condensed in the same video. Thus, the concern of editing the animation arose. As there was no apparent common thread that unified all the drawings, both thematically and formally (apart from the fact that they were all made by children), we understood that the children's drawing process itself was the unifying element of all these drawings. Thus, we re-listened to and re-organised the audio recorded during the activities developed with the children and identified some moments of individual and collective dialogue that captivated us by the discursive naturalness and the descriptive and narrative dimension of the drawing process, in line with Vygotsky's (2004) idea of syncretic activity, in which all areas, namely drawing, gesture and speech, are interconnected. In this regard, we decided to select an excerpt from a conversation to complement the animated sequence composed of the various small pieces of movement. Not referring directly to the images depicted in the animation, the audio accompanies and complements them, referring, once again, to the drawing development process, valued throughout the research and being its central theme. In addition, the font used throughout the animation's text (both in the title and in the credits) fell on an alphabet written by one of the children during the project's first practical session. After observing the way in which he wrote his name, we immediately knew that this should be the type of letter used. Thus, we obtained an alphabet and a numerical sequence drawn by the child, which made perfect sense to accompany the animation (Figure 54).



Figure 54 — On the left, a piece of the alphabet drawn by one of the 6-year-olds, after signing the first drawing produced in the context of the activities (on the right).

Throughout the development of this animated project, we realised that the entire way we looked at it placed a very strong focus on the drawing process. Right from the start, the very fact that we did not want to control too much one of the usually most defining elements of a film (such as the narrative and thematic) was the starting point for a process that proved to be very spontaneous and unpredictable, which placed the emphasis, above all, on gesture. Looking back, we can see that the development of this animation was a way of thinking about the drawing process itself (so intrinsically linked, in fact, to the field of animation) and the children's drawing process, looking carefully at the defining characteristics of this field and working on them, incorporating and emphasising them even in the animated sequences. Nonetheless, we sought to assume and embrace the accidents, after comprehending their procedural and aesthetic dimensions, as well as bringing to animation the syncretic and discursive relevance of children's artistic work.

7. Conclusion

Historically, animation and drawing have always been linked, since “animation has often involved some degree of drawing” (Torre, 2015: 152). In this sense, we aimed to understand how animation and children’s drawing specifically can be related and used to think about the drawing process. Thus, by closely observing for over a year the drawing process of a group of children aged 6 to 9 years and organising drawing sessions structured specifically for this project, we were able to verify and corroborate some of the issues studied, simultaneously, at the theoretical level.

Drawing has been used as a fundamental source of expression and communication since Prehistory, long before written communication, and is the preferred artistic activity in childhood (being its first means of expression on paper). So, although at some point many people abandon it, everyone experiences it throughout their life, especially in childhood. However, from the Renaissance onwards, the endpoint of drawing development became realism, with people starting to perceive children's drawings as a collection of errors and failures that needed to be corrected. As a result, in order to understand whether children’s interest is to faithfully represent the observed reality, we analysed the evolution of this field of study over time and perceived the various theories of child development that have emerged and the perspectives from which they were defended. Thus, we understood the beginning of the theory of child development by stages and the differences between its various aspects, and we distinguished both the realistic perspective (which focuses on drawing as a copy of the observed reality), and the artistic perspective (which values drawing as a reflection of the child, its emotions, concerns and experiences). Furthermore, we related these perspectives to the traditional perspective of recapitulation theory, which compared children's art with primitive art, looking at artistic progress as an evolution from a savage state to a state of intellectual enlightenment (adult art and realism); and with the most progressive approach to this theory, which considered children and primitive societies as the purest human state, later eroded by the society that ruled them. Thus, we conclude that there is no consensus regarding children's intention to produce realistic images, however, more recent studies have stated that, above all, drawing works as a problem-solving tool for children, through which they explore and discover solutions to the issues they face as they grow.

However, we conclude that societies have a general requirement for children to achieve a form of representation accepted in the society in which they are inserted (whether that is visual realism or not), but that this vision is limiting, since the concept of “real” is a social construction that varies according to the age and the contexts in which people are inserted. Thus, we understand that children's perspectives of reality are self-centred and that they believe them to be absolute, changing as their priorities in relation to drawing also change. In addition, we conclude that throughout their growth, children have different conceptions of realism and that these are different from adults, valuing and attributing importance to different aspects. In this way, we consider it necessary to deconstruct these beliefs rooted in society, as well as the preconceptions and assumptions we make of children's artistic productions. In addition, we conclude that another problem in the study of children's drawing is that, in general, most of these studies have always started from the adaptation of existing concepts from other domains (such as psychology) and from a comparative perspective between children’s drawings and adult drawings (or drawings considered sophisticated), both developmentally, aesthetically and conceptually. Thus, the lack of vocabulary simply associated with this group (children) and the lack of

a specific category for the study of these drawings immediately conditions the way they are perceived and studied, since the terms used are automatically in comparison with adult's drawings. As such, this approach results in the meaning and role of children's artistic expression being always seen from the point of view of errors and deficiencies that need correction.

On the other hand, to understand drawing we consider it important to study the mental processes associated with it. In this sense, we sought to understand the relationship between perception, cognition and representation, as well as the way information is organised in the brain, concluding that children perceive the world as a set of good or bad experiences and that they remember those that brought them either happiness or discomfort (hence reflecting on what they choose to draw and how they do it). Furthermore, we conclude that symbolic thinking develops in childhood, that drawing is the first moment when children understand that the marks they produce can stand for something else and that they are more symbolic than realistic. As such, we understand that the drawing surface must be freely used to explore and understand the differences and limits between symbols and signs. Still, we distinguished the concepts of imagination and creativity, and we researched the relationship between the two and children's artistic creation. In this way, we conclude that all people are born creative, that imagination is an essential condition in almost all human mental activities and that the complexity of the environment and the experiences we live is proportional to the development of imagination and creativity. Thus, although it is understood that adults have a greater imaginative capacity than children (because they have experienced more things), children have more faith in their own creations and control them less, which is essential for development. We also conclude that creative activities are present from a very early age, especially during play (often combined with drawing), and that their role is fundamental for development and learning. In this way, we understand that children's spontaneous drawing and play are interconnected, and that the possibilities of experimentation provided by both are extremely important, as they allow the creation of numerous hypothetical scenarios and lines of thought, as well as the understanding of possible views of object's representation and drawing solutions. As such, we conclude that children's creative activity is essentially syncretic, continuously alternating between various areas: the child draws, speaks, gestures, dramatizes and plays, all at the same time.

We also understand that the role of educators and teachers, as well as external influences (both from the environment and from television and images, for example) is not consensual, with two extreme positions related to it: on the one hand, child's artistic development must be free and without external interventions (protecting them from all kinds of external influences), on the other hand, it must be corrected until children reach the maximum point of creative development (considered, in Western society, to be realism). Thus, we conclude that the role of adults should be to guide and encourage freedom of expression and artistic development, without imposing rules and conventions associated with drawing from an early age, since the early teaching of any drawing technique limits the creative response of the child and leads to frustrations. As such, accompaniment should respect the child's natural development and let it discover most solutions on its own, providing assistance at more specific moments of transition or when required. In addition, we conclude that the cultural and social environment in which the child is inserted has an influence on the drawing, not only on the elements represented, but also on the graphic and technical solutions used.

Furthermore, we distinguished the drawing and denotative systems and understand their use throughout childhood, taking into account the goals and problems that the child encounters at a certain age. In addition, we consider it important to deconstruct the predefined ideas we have about children's drawing, since the simple observation of a drawing (without following its construction process or knowing the child's intentions) would be insufficient to understand the systems used. Likewise, we conclude that children seek to draw images that work as effective shape representations, where the main characteristics of the object are portrayed, as well as its extendedness and dynamic properties. We also understand some of the most distinctive visual features of children's drawings corresponding to this age group, as well as the themes and elements mostly represented, and the narrative strategies used.

Through the organisation and structuring of drawing sessions with the children, we were able not only to observe the theory studied, but also to put it into practice, both in the construction and preparation of the sessions and in the role we adopted during them. As such, we organised these sessions based on activities that were not very regulated, but that were at the same time stimulating, both through external elements and through the manipulation of white sheets of paper. We believe, however, that we were more successful in some activities than others. Subsequently, we analysed some projects and short films where animation and children's drawing are related, understanding how this relationship was established. Also, we selected some drawings produced by the children and used them to develop animated experiments, thinking about the drawing process (and specifically the children's drawing process) and valuing some of its main characteristics. Considering the time constraints, we believe that the project produced fewer animations than expected; nonetheless, it is our intention to continue to develop animated experiences from the material we have collected, both visual and auditory.

Thus, we conclude that spontaneous drawing can be a learning and exploration tool for the child, allowing it to play with concepts, objects and ideas, to form descriptions of the world and to develop intellectually and emotionally. As such, we believe society should avoid restricting children's curiosity and willingness to explore, allowing them to develop their creative thinking through stimulation and guidance. Still, through the example of the *Pequeños Dibujos Animados* project, we believe that the development of artistic projects of this dimension with children (incorporating them even in the animation construction process) would be extremely enriching and enhance intellectual and emotional growth. In addition, we were able to confirm with this project the impact that the sociocultural context has on the children who are part of it.

Regarding future research on the subject, we believe that it would be important to further explore the idea of the environment's influence on children's artistic development, exploring the realistic patterns of Western society and the possibility that these are blocking creative thinking and encouraging realism (and, consequently, frustration, considering that most of the images that children see from an early age in films, for example, are realistic and figurative, which leads to them feeling frustrated when trying to draw them). Still within the same topic, it would be interesting to study the impact of a more diversified environment (with less focus on realistic images, and more diversification in the offer presented) throughout childhood and understand if it would have any impact on the delay (or non-existence) of the artistic crisis in early adolescence, and the consequent abandonment of drawing. Moreover, we believe that the appreciation of the artistic component in the general development of children still has a long way to go and that the development of projects with children that unite various artistic areas can be fundamental for their learning, development and self-knowledge, as well as self-confidence.

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Appendix I

Consentimento Informado

Visual representation in the drawings of children from 6 to 9 years old: creating an animated project

Eu, _____, na qualidade de encarregado de educação de _____, de _____ anos, autorizo a sua participação nas sessões práticas do projeto de Mestrado a realizar pela estudante Inês Peres Mesquita. Este projeto, realizado no âmbito do mestrado em Animação da Universidade Católica Portuguesa, tem como objetivo estudar a representação visual nos desenhos feitos por crianças entre os 6 e os 9 anos e a sua incorporação num projeto de animação.

Para alcançar os objetivos, o trabalho será desenvolvido em relação direta com um grupo de crianças desta faixa etária, em sessões práticas de observação de desenhos desenvolvidos. Os trabalhos recolhidos servirão de base para a realização de uma curta-metragem de animação e eventuais pequenas experiências de animação, procurando incorporar, tanto quanto possível, as particularidades estudadas da representação infantil. O projeto será desenvolvido em dois momentos principais: um primeiro de natureza prática, através do trabalho direto realizado com um grupo de crianças, sob a forma de sessões de desenho acompanhadas da sua observação atenta, do registo dos desenhos produzidos e do registo de áudios captados durante a sua elaboração, e de um segundo momento de cruzamento das observações e dos resultados práticos obtidos com uma investigação teórica sobre conceitos e autores considerados de relevância para o projeto. O trabalho culminará com a realização de um filme de animação a partir dos desenhos recolhidos nas sessões práticas, que serão estruturados e organizados de forma a enaltecer as particularidades estudadas sobre a representação visual das crianças.

Afirmo que fui esclarecido de forma clara e total relativamente ao projeto, havendo da minha parte total entendimento acerca do mesmo. Todas as dúvidas por mim colocadas foram devidamente respondidas. Afirmo, ainda, ter conhecimento da necessidade da gravação de áudio

nas sessões, bem como da captação de imagens, por fotografia ou digitalização, dos desenhos realizados, assim como do seu processo de criação (imagens dos desenhos na sua fase de desenvolvimento). Afirmo saber que, em momento algum, serão incluídas imagens, quer na dissertação como no filme, contendo a cara das crianças, cujo anonimato será sempre preservado.

Afirmo ter conhecimento que os desenhos recolhidos nas sessões serão trabalhados, e mesmo alterados, pela autora do projeto, tornando-se em imagens novas. Afirmo ter conhecimento que, sendo os desenhos incorporados num projeto artístico, este poderá vir a ser divulgado fora do contexto da dissertação, concretamente em candidaturas a conferências e festivais de

filmes de animação, bem como nas redes sociais. Afirmo ter conhecimento da obrigatoriedade de utilização de máscara por todas as crianças durante a realização das sessões.

Com base no que me foi exposto, manifesto a minha autorização para que o meu educando participe nesta atividade. Autorizo que os desenhos realizados pelo meu educando sejam fotografados e/ou digitalizados, bem como incluídos e divulgados na dissertação de mestrado e no filme de animação. Autorizo a gravação de áudio das sessões, bem como a utilização, caso se revele importante, de excertos relativos ao comentário dos desenhos, que acompanharão os desenhos animados. Autorizo a captação de imagens do processo de realização dos desenhos, podendo nestas imagens aparecer as mãos das crianças ou as suas silhuetas vistas de costas (nunca mostrando a cara ou feições que as tornem reconhecíveis), podendo estas imagens vir a ser incorporadas na dissertação de mestrado, como registo das sessões realizadas, mas nunca no filme de animação. Autorizo, ainda, a utilização do nome próprio da criança e a sua idade ao longo da dissertação de mestrado e nos créditos do filme (ex: Inês, 7 anos). Alternativamente, o encarregado de educação poderá eleger um nome próprio fictício para identificar o seu educando.

Nome fictício (preencher apenas se não autorizar a inclusão do nome próprio):

Porto, ____ de _____ de 2022

(Assinatura do encarregado de educação)