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Windmills of the Young Mind (2): Interpreting and Contextualizing Preschool Children's Perception of the World

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Abstract

The authors of the paper aim to highlight that visual literacy, accompanied by lexical pliancy, already at the stages of pre-school education, provides a basis for multimodal thinking, interdisciplinary synthesis, and cognitive flexibility, which are crucial for a child to advance personally and later professionally. The development of a child across cognitive, physical, and social-emotional dimensions of learning is encompassed by the framework of Education for Sustainable Development. The present article outlines the results of a one-year project, “Sustainable Model Design for Conceptual System and Lexical Framework Pliancy Analysis for Perceptual Data Processing of the Preschool Age Actors” (2024–2025), conducted by the Institute of Digital Humanities of the Faculty of Computer Science, Information Technology and Energy of Riga Technical University (RTU) and RTU Liepaja Academy. The research project explores the conceptual system and lexical framework pliancy for perceptual data processing exhibited by pre-school children (5 to 7 years old) to perceive their surrounding environment, comprehend the contextual framework, and communicate efficiently. Preschool children from three preschool educational institutions in three different counties of Latvia have been engaged in the experimental study conducted from March to April 2025. Storytelling with drawings has been used as a method of data collection. Five concepts – *dream*, *future*, *freedom*, *homeland*, and *security* – have been chosen for the experimental study. A total of 169 children’s drawings and corresponding narrative transcripts have been obtained. The current article continues the line of inquiry developed in a previous study, which introduced the conceptual framework and research methodology (see Ivanova et al., 2025). The analysis of children’s drawings reveals that even at a young age, they can operate on multiple conceptual levels. They can define concepts by examples or opposites, focus on self or society, and imagine immediate and distant futures, as well as imaginary worlds and fantasies. The findings of the research demonstrate that efficient cognitive development not only strengthens pre-school children’s capacity to recognize and interpret elements of their surrounding world but also creates the basis for more sophisticated information processing skills. The findings offer evidence-based insights that can guide policymakers, institutional leaders, and sector stakeholders in designing development agendas aligned with Education for Sustainable Development.

Keywords: Cognitive development, Early Childhood Education for Sustainability, multimodal storytelling, perceptual data processing, preschool children, sustainable development.

Introduction

In a world **facing** urgent environmental, social, and economic challenges, transformative change in education is essential, requiring substantial shifts in content, methods, and pedagogical approaches toward systems that are flexible, inclusive, and deeply human (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2025). Education is a fundamental driver for this change, shaping the individual's knowledge, values, and beliefs and ultimately fostering sustainable practices and mindsets (Salite, 2024; Assadourian, 2017).

Early childhood, often defined as the period from birth to age 8, is a crucial developmental phase during which children acquire knowledge about the world. Early Childhood Education for Sustainability (ECEfS) is vital if children are to actively contribute to shaping the present and future, underscoring the significance of the values, attitudes, knowledge, and experiences they acquire at a young age. Studies indicate that in recent years, ECEfS has gained increasing attention from the research community (e.g., Davis & Elliott, 2024; Engdahl & Furu, 2022), and has also been promoted by institutions such as the World Organization for Early Childhood Education.

ECEfS emphasizes holistic learning, in which children's cognitive, socio-emotional, and behavioral capacities develop in interconnected ways. Preschool children's drawings and narrations provide a uniquely rich picture into this process because they externalize innate cognitive structures, early conceptual associations, and emergent understandings of sustainability-related ideas. The idea that children perceive and communicate concepts, both innate and learned, quickly through a combination of images and words rather than only via verbal mechanisms, is widely recognized. What is more important is the way how pre-school children integrate new information into their knowledge framework and how this new information shapes their perception of the given phenomenon, enriching them both cognitively and creatively, as it is most evident when analysing various manifestations of verbal-visual relationship in the communication process. The authors of the given research are aware of the enormous influence the Piagetian theories have made on the development of various cognitive theories, developmental psychology and generic epistemology, as well as of the premises of the transmediation related theories making it "absolutely clear that visual texts are on the equal footing with verbal texts" (Sipe, 1998, p. 107). However, the authors accentuate an interesting proposition that visual literacy accompanied with lexical pliancy already at the stages of pre-school education provides a solid grounding for multimodal thinking, interdisciplinary synthesis, and cognitive flexibility, which are crucial for a child to advance personally and later professionally, being ready to pursue the following stages of scientific and academic excellence.

It is of utmost significance that children are provided with opportunity to communicate their mental images "representing the world to himself by an image or spatial schema that is relatively independent of action" (Bruner, 1966, p. 21) with peers and adults not only in the guided, but also in the semi-guided and even unguided settings. The ability to talk images is the ability to create genuine cognitive representation of the reality from the standpoint of the particular child and as the child grows his/her understanding of the knowledge concept(s) encoded within mental image(s) changes establishing even greater

number of links to other concepts, other frames and even other images, finally leading to the ability to “represent our experience of the world by using symbols” (Bruner, 1966, p. 31), which is further developed and improved through language acquisition mechanisms. In other words, visual literacy enhances lexical pliancy, whereas lexical pliancy leads to the creation of a series of related and even unrelated images, which in their turn enrich the vocabulary of children, make them think in multiple contexts simultaneously, and pave the road for the development of higher orders of awareness and emotional intelligence.

The present article outlines the results of a one-year project, “Sustainable Model Design for Conceptual System and Lexical Framework Pliancy Analysis for Perceptual Data Processing of the Preschool Age Actors” (2024–2025), conducted by the Institute of Digital Humanities of the Faculty of Computer Science, Information Technology and Energy of Riga Technical University (RTU) and RTU Liepāja Academy. The article continues the line of inquiry developed in a previous study, which introduced the conceptual framework and research methodology (see Ivanova et al., 2025).

The experimental study was performed in three preschool educational institutions in three different counties of Latvia (Riga, Liepāja, and Alūksne) from March to April 2025. The inclusion criterion for participating children was that they were between 5 and 7 years old. There was no intention to form groups similar in terms of gender, age proportions, and native language. Parents of children who met the inclusion criteria were informed about the study and asked to sign the informed consent form (see Ivanova et al., 2025). A total of 169 children’s drawings and corresponding narrative transcripts were obtained. The study was conducted with the permission of the Research Ethics Committee of Riga Technical University No. 04000-10.2.3-e/10. The pseudonymized study data (drawings and narratives) are stored in the Zenodo repository.

Five concepts – *dream*, *future*, *freedom*, *homeland*, and *security* – have been chosen for the experimental study to collect data on the pre-school children’s understanding of the proposed concepts through drawing, by researchers taking detailed notes on children’s language use. The choice of concepts has been rooted in the abilities of the given concepts to engage into establishing conceptual relations both vertical and horizontal within the multiple thematic frames, to boost polarization of opinions and views on the definition and scope of the concept in various cognitive frames and/or knowledge structures, to encompass the meanings of other related concepts, to represent the conceptual frame, which is not monolithic in its nature, but rather manifests a collection of distinct yet related concepts being able to create distinct autonomous conceptual frameworks analyzed through multiple terminological lenses. The concept of *freedom* is crucial for exhibiting cognitive skills, the concept of *dream* is required to boost curiosity and creativity, the concept of *homeland* serves as anchor bridging new knowledge with innate cultural, societal and linguistic knowledge structures, the concept of *security* creates mental and physical state required to advance, whereas the concept of *future* is significant to plotting the array of information a certain vector for development.

When children depict concepts such as *future*, *safety*, *freedom*, *homeland*, or *dream*, they visualize how they perceive relationships, responsibility, social cooperation and community, identity, and well-being, which are core themes in Education for Sustainable Development (ESD). Their drawings reveal early forms of systems thinking, values (what

they represent as good, safe, or meaningful), and early anticipatory thinking (imagining future scenarios). Their accompanying narratives deepen this insight by showing how children use language to convey their ideas and position themselves as actors within their environment.

The subsequent sections of the paper introduce the development process of the sustainable model suitable for analyzing pre-school children's perceptual apparatus of designated concepts within individual and language conceptual systems. The key stages and underlying principles of the model are presented, explaining the categories chosen for the multimodal analysis of the data obtained. The detailed interpretation of the empirical findings, including qualitative and quantitative analyses, as well as instances of visual data and transcript excerpts from the accompanying story, is provided to illustrate the model.

Methodological Foundation: A Model for Analysing Pre-school Children's Perceptual Apparatus of Designated Concepts

The section outlines the methodological foundation of the study and explains the development of the coding scheme. The analysis draws on Halliday's (1978) understanding of natural language as a social semiotic system and its extension to multimodal communication by Kress and van Leeuwen (1996). Mode is defined as "a socially shaped and culturally given semiotic resource for making meaning" (Kress, 2010, p. 79), whereas representations that involve multiple modes are referred to as "multimodal ensembles". The multimodal approach treats images not as mere illustrations but as independent texts that communicate meaning through color, shape, layout, and other semiotic modes. Halliday's original distinction between the ideational, interpersonal, and textual metafunctions of language was reinterpreted by Kress and van Leeuwen (1996) as the framework of representational, interactive, and compositional functions in their work on visual grammar. In line with this tradition, the present study focuses on three aspects of children's multimodal artefacts: (1) what the message is about; (2) who the message is concerned with; (3) how the message is structured (Table 1). It is important to stress that one mode can fulfil several metafunctions simultaneously, for example, a color may be used to denote different people or objects as a tool of representation, affect the audience on an interactive level, or highlight specific elements as a means of composition (Kress & van Leeuwen, 2002, p. 350).

Table 1

Metafunctions of Language (Adapted from Halliday, 1978; Kress & van Leeuwen, 1996, p. 43)

Language metafunctions		Questions	Examples
Halliday (1978)	Kress & van Leeuwen (1996)		
Ideational	Representational	What is this message about?	Depiction of processes, relations, events, and participants
Interpersonal	Interactive	Who is the message concerned with?	Subjectivity/objectivity of the text, positioning of the author/reader, closeness/openness of the text
Textual	Compositional	How is the message structured?	Layout, composition, rhythm, pace, space, color

Representational metafunction of the text expresses the speaker’s experience of the world and refers to the meaning of the message in terms of its signifier and signified – who are the participants (people, objects, elements) of the message, is there any action involved, how does the setting affect the meaning of the message. *Interactive metafunction* refers to relations between the author of the artifact, the audience, and the depicted participants. Kress and van Leeuwen (1996, pp. 148–149) identify systems of contact (demand vs. offer), social distance (intimate, social, impersonal), and attitude (involvement/detachment via horizontal angle; power/equality via vertical angle). *Compositional metafunction* concerns the organization of meaning through information value (left/right, top/bottom, and center/margin), framing, and salience. The producer of a message uses a range of resources to shape the meaning of the text: layout, composition, rhythm, pace, colors, and many more. For instance, the left side conveys the “given,” the right – the “new”; the top holds idealized meaning, and the bottom concrete or grounded meaning. Framing indicates whether elements belong to the same conceptual domain, while salience directs attention through size, color intensity, or foregrounding.

The three metafunctions have provided a basis for the introduction of the coding scheme (Table 2), created through iterative pilot testing and refinement. During this process, several issues have been identified and addressed, for example, ensuring that the designed model analyzes the drawing and the narration separately, integrating developmental cues grounded in psychological research, and defining the overall emotional tone of the text. Categories based on representational, interactive, and compositional meanings (parts 2 and 3 of Table 2) have been expanded to include semantic dimensions, such as emotional tone (points 1.2 and 1.3), conceptualization strategy (4.5), and temporal or spatial framing. Verbal commentary has played a crucial role in clarifying ambiguous symbols, temporal relations, and emotional meanings, and it has also facilitated the identification of image–text synergy or tension (2.11, 2.12, and 4.2). The scheme also includes medium-related parameters (2.2., 2.3), such as the use of different modalities (e.g., writing, collage, comics) and materials (e.g., pens, pencils,

watercolor). The finalized model has been complemented with teacher's/ researcher's notes, thereby summarizing the analysis and suggesting follow-up questions (part 4 of Table 2).

Table 2

Categories of Analysis in the Finalized Model (Numeration Added)

1. Quick Overview	1.1. Concept 1.2. Summary 1.3. Dominant Emotion 1.4. Tone Flag
2. Structured Analysis	2.1. Type of representation 2.2. Other elements (writing, etc.) 2.3. Materials 2.4. Colors 2.5. Participants 2.6. Emotions on figures (visual cues) 2.7. Relations between participants 2.8. Processes 2.9. Circumstances: Culture/Nature 2.10. Composition (including spatial/axes analysis): Vertical/Horizontal; Center/Saliency; Fullness 2.11. Child's textual explanation (key lines, paraphrased) 2.12. Image-text synergy / tension 2.13. Information & emotive value
3. Visual Grammar Highlights	3.1. Representational (what happens) 3.2. Interactional (viewer relationship) 3.3. Compositional (layout → meaning)
4. Teacher/Researcher Notes	4.1. Developmental cues (5-7 typical) 4.2. Concordance/conflict (drawing vs. words) 4.3. Potential well-being attention points (non-diagnostic) 4.4. Suggested follow-up questions (open-ended) 4.5. Child's understanding of the concept

The participants depicted a target concept (*future, homeland, safety, dream, freedom*) as an object, emotional state, relational condition, or an event. Sometimes this depiction was concrete (e.g., a caring figure of a parent representing safety), whereas in other cases a child used a symbolic or metaphoric form (e.g., hearts, smiley faces, suns). In line with the idea of coding orientation (Kress & van Leeuwen, 1996, pp. 165–166), the coding scheme addresses the type of representation chosen by the author – realistic, abstract, fantasy, etc. (point 2.1 of Table 2). These orientations helped identify whether children framed the concept in concrete experiential terms, in affective or symbolic terms, or through schematic generalization. For instance, the use of monochrome colors can be associated with a higher level of abstractness. The scheme also makes a distinction

between positive definitions (what the concept *is*) and negative definitions (what the concept *is not*). Positive strategies often feature harmonious colors, balanced layouts, or affectionate symbols; negative strategies may rely on contrasts, separation of conceptual zones, or cautionary signs. Mixed strategies may place safe and unsafe elements within distinct spatial frames. Identifying these strategies helps clarify how children reason about abstract ideas, whether through affirmation, opposition, or contrast (e.g., freedom as a release from confinement, or peace as an absence of war). The identification of the child's conceptualization as positive or negative has been derived from numerous factors and summarized under point 4.5 of Table 2.

Emotional tone (positive, mixed, negative) is usually determined through integrated analysis of color palettes, facial expressions, body postures, spatial proximity between characters, and circumstances. Core emotions emerge from specific semiotic cues, for example, bright, saturated colors and open stances often signal positive emotions, while fragmented layouts or darker palettes may convey tension or uncertainty. Children commonly encode emotions symbolically, for example, using hearts for affection or rainclouds for worry, thereby requiring analysis that attends to both literal and metaphorical meaning.

The distinction between natural and cultural elements (point 2.9 in Table 2) draws on Kress and van Leeuwen's ideas of color provenance and shape symbolism. The color provenance addresses the questions "where the color comes from, where it has been culturally and historically" and "where we have seen it before" (Kress & van Leeuwen, 2002, p. 350). For instance, earthy tones refer to nature, whereas neon or saturated colors are identified as man-made. Accordingly, in contemporary Western society, squares, rectangles, and triangles are perceived as indices of technological order, whereas curved shapes are associated with organic matter (Kress & van Leeuwen, 1996, pp. 53–56). Natural elements, such as grass, sun, flowers, or sky, often encode emotional warmth, stability, or organic safety. Cultural elements (e.g., buildings, fences, roads, signs) situate the concept within social norms or rule-based settings. Examining the balance between these domains provides insight into whether children anchor the concept in embodied experience, symbolic affect, or institutional behavior.

Temporal and spatial analysis of the multimodal ensemble is based on a list of parameters: temporal and spatial cues in verbal narration, depiction of processes as active or passive, composition (presence or absence of comic-like frames, arrows, etc.). Temporal framing appears in the drawing through sequencing, parallel scenes, or divided zones implying before/after relations. In the verbal narration, it is signaled by time-related expressions such as *after*, *then*, and similar markers. Spatial framing is interpreted through baselines, sky-ground distinctions, clustering, and separation of elements. These compositional cues reveal whether the concept is viewed as a stable state, cyclical condition, or situational process. A stable green ground line and skyline, for example, often corresponds to feelings of security or order, while detached or floating elements may indicate uncertainty (Lowenfeld & Brittain, 1987, pp. 149–159). Overall, the finalized scheme synthesizes the principles of multimodal analysis (representational, interactive, and compositional functions) with the insights of developmental psychology (the presence of developmental cues). With a visual grammar as a basis, the designed

model incorporates semantic categories such as dominant emotion, overall tone, conceptual strategy, and types of meaning tension. The subsequent section describes how the qualitative dataset has been processed using an analytical instrument developed specifically for the current study.

Automated Multimodal Analysis: A Model for Analysing Pre-school Children's Perceptual Apparatus of Designated Concepts

The qualitative analysis of the dataset has been automated using a Custom Generative Pre-trained Transformer (GPT) specifically architected for this study. While the research team has initially evaluated API-based alternative, including the ChatGPT API (OpenAI), Gemini API (Google), and Claude API (Anthropic), these solutions have necessitated significant software engineering overhead regarding request authentication and payload formatting. The decision has been made to utilize the Custom GPT interface to minimize technical debt, thereby allowing resources to be allocated toward semantic validation and research design rather than codebase maintenance. This approach has facilitated direct interaction with frontier multimodal models.

The primary analytical instrument, the "Child Drawing Insights" GPTs, has been constructed on the GPT Builder platform through iterative refinement. The system prompt has undergone dozens of trials to calibrate the model's analytical focus. A critical architectural component is the integration of Retrieval-Augmented Generation (RAG), wherein the model has been grounded with specific reference documents, such as a summary of Lowenfeld and Brittain's, (1987) developmental theory and templates of the desired report format (Table 2). They ensure the analysis remains theoretically situated and consistent in tone.

To maximize the efficacy of the vision encoder, strict protocols regarding input modalities have been enforced. Preliminary testing has indicated that when drawings are embedded within PDF or MS Word documents, the model's document parsing layer frequently prioritizes text, resulting in the exclusion of visual data or superficial descriptions. Consequently, all drawings have been ingested as standalone native graphical formats (JPEG or PNG). This ensures the input bypasses the text extraction pipeline and is processed directly by the visual encoder, facilitating the high-fidelity extraction of features such as stroke pressure and spatial composition. The accompanying narratives are passed to the model in text format.

The data analysis phase coincided with rapid advancements in Large Language Model (LLM) architecture, necessitating benchmarking and iteration across versions including GPT-4o, GPT-4.1, and GPT-4.5. The methodology was finalized with the adoption of "GPT-5.0 Thinking" in August 2025, which united advanced reasoning capabilities (previously found in o1 and o3) with generalist multimodal functions. To ensure internal consistency across the dataset, all final data processing was re-executed using the GPT-5.0 Thinking engine, as it yielded the most detailed and consistent outputs among the tested variants.

Each image has been analyzed as a discrete task within a "New chat" window, preventing cross-contamination and maintaining the high-fidelity application of the system instructions throughout the dataset. A significant operational challenge observed

during batch analysis has been the phenomenon of persistent performance degradation. Despite the advanced capabilities of the underlying model, a distinct drop in analytical quality has been noted after processing sequences of 50–60 images, characterized by a transition from detailed, theory-rich descriptions to abbreviated summaries. Notably, this degradation has not been rectified by initiating new chat sessions or clearing browser caches, suggesting an undocumented resource throttling associated with the specific Custom GPTs instance identifier. To mitigate this issue, a periodic instantiation strategy has been implemented, creating duplicate instances of the Custom GPT to circumvent these instance-level constraints and restore the model's baseline analytical depth.

The final analytical workflow has required the model to execute a hidden Chain-of-Thought process. The system has been instructed to identify visual primitives (shapes, colors, and fullness) prior to interpretation to prevent hallucination, and to systematically apply the Kress and van Leeuwen's matrix (Table 1) regarding participants, as well as spatial composition analysis (axes and zones). Furthermore, the model has analyzed the child's accompanying narrative to cross-reference visual data with textual data, identifying areas of concordance, elaboration, or conflict. Each drawing-text pair has been treated in a separate chat session, producing a single, structured report per concept.

Dataset Analysis

The section provides a detailed analysis of 169 children's drawings, each illustrating an abstract concept ("Future", "Dream", "Freedom", "Homeland", or "Security"). Using a structured schema (Table 2), key attributes have been extracted from each entry. *Quantitative* results highlight the frequency of each concept, the distribution of emotional tones (positive definitions vs. mixed or negative depictions), and the prevalence of core emotions such as joy, anticipation, and trust across the dataset. Further, a *comparative thematic analysis* has been performed, focusing on natural elements (e.g., animals, plants, weather phenomena) versus cultural elements (e.g., buildings, national symbols) in the drawings. This distinction is particularly relevant to ESD, as it highlights how pre-school children perceive and prioritize natural systems alongside human-made environments, which is an essential step in promoting early environmental awareness, cultural understanding, and responsible citizenship. Finally, the children's *conceptualization strategies* have been identified, noting patterns such as positive definitions versus negative ones, the scope of understanding, and the temporal or spatial scale involved.

Quantitative Overview of Concepts and Their Associated Categories

The concept "Dream" is the most common option in the dataset, comprising nearly half of all entries (Table 3). This high number may reflect the richness of children's dream imagery and the variety of interpretations it allows, from fantastical adventures to safe scenes. The concept "Security" (19%) is the second most frequent theme, followed by "Homeland" (13%) "Freedom" (11%), and "Future" (10%) that are somewhat less common but still well-represented, each offering distinct cognitive challenges, such as homeland encouraging personal/geographical identity, freedom calling for philosophical

definitions, and future requiring temporal imagination, ranging from next-day routines to sci-fi scenarios.

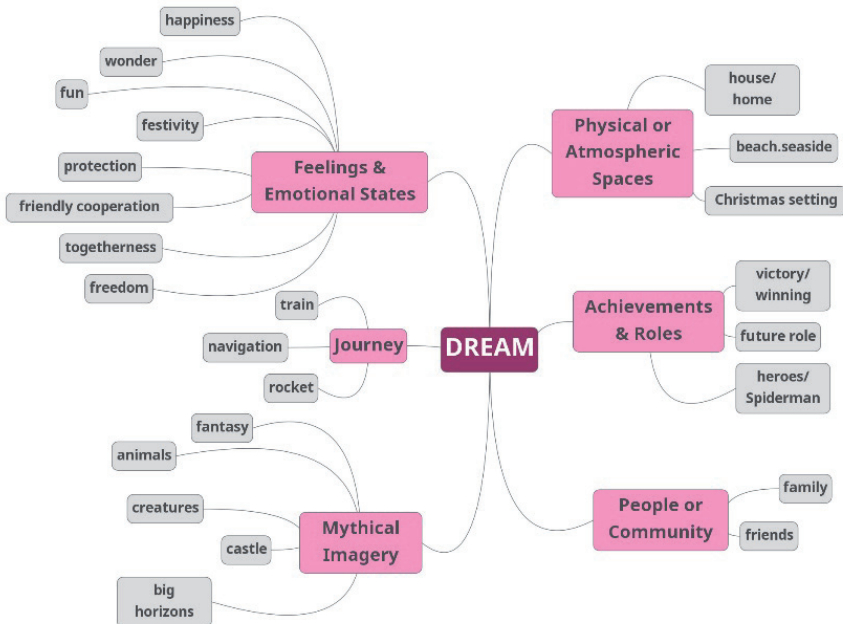
Table 3
Frequency Distribution of the Concepts

Concept	Frequency of entries
Dream	80 (≈47%)
Security	32 (≈19%)
Homeland	22 (≈13%)
Freedom	19 (≈11%)
Future	16 (≈10%)
Total	169 (100%)

The concept “Dream” emerges from the dataset as a versatile and essential mental space for pre-school children, who associate it with their wishes, social roles, and identities. The dream is also a critical space for processing anxiety in children. The dataset contains numerous examples where pleasant imagery is juxtaposed with frightening narratives, revealing the role of the dream in managing difficult emotions.

Figure 1

A Visual Map of the Respondents' Associations With the Concept “Dream”



The concept of security appears in the children’s drawings as an understanding of rules. One of the most straightforward yet powerful images shows a girl hugging her parents, with the direct explanation: “Security means being close to my parents”. The concept is entirely embodied in the physical and emotional closeness of the family member(s). These depictions frame safety as a shield against dangers that feel too large to manage alone. For preschool children, emotional security derived from family bonds is the foundational basis for the development of a more practical understanding of security.

Figure 2

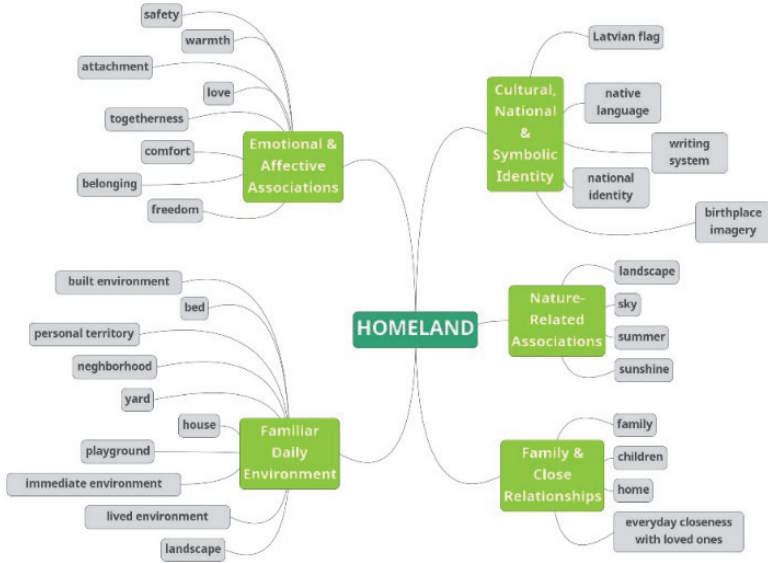
A Visual Map of the Respondents’ Associations With the Concept “Security”



The *Homeland* drawings show how a children’s sense of belonging expands from the immediate, tangible world of their own home to broader ideas of identity, origin, and national symbolism. The most foundational understanding of homeland is related to home. The children’s understanding of the concept also includes abstract national and linguistic symbols. This represents the most cognitively advanced understanding within the dataset. This progression (i.e., from my home to our flag and our country) complies with the theories of cognitive development (Piaget, 1952; Goswami, 2008), thereby demonstrating the shift from concrete, experience-based thinking to more formal, abstract, and symbolic reasoning.

Figure

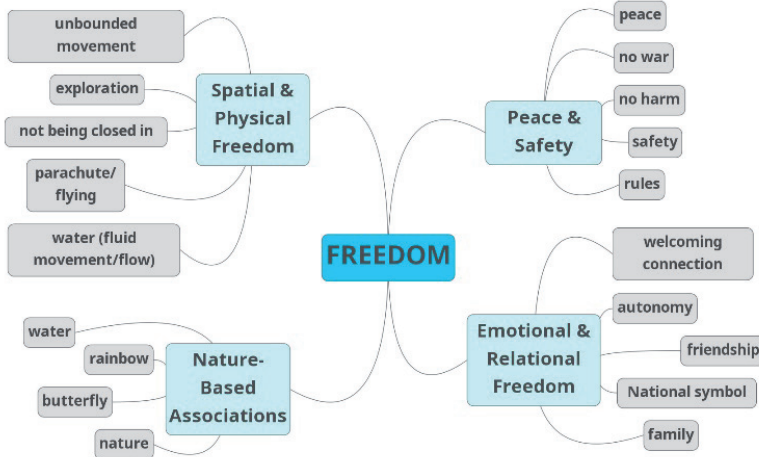
A Visual Map of the Respondents' Associations With the Concept "Homeland"



Freedom is frequently associated with an individual activity within a natural setting. Nature serves as a symbolic space free of human rules, allowing for self-realization. The presence of open sky, water, and meadows in children's drawings demonstrates that nature creates the atmosphere, where the self can act without social mediation. Pre-school children also perceive freedom as the ability to act and move within a secure social framework.

Figure 4

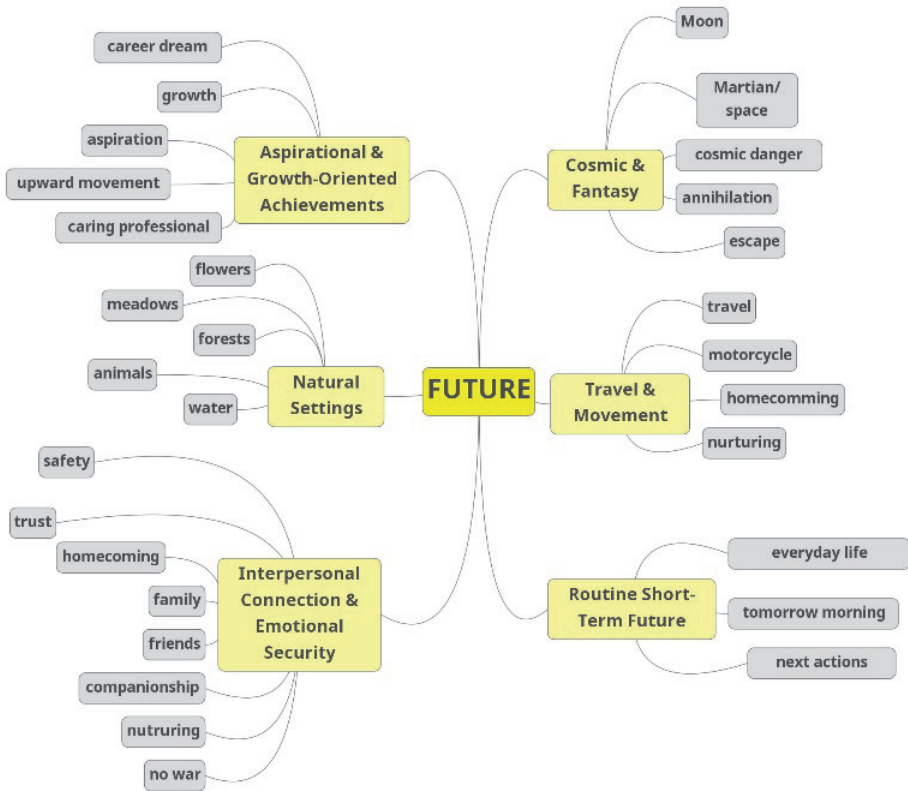
A Visual Map of the Respondents' Associations With the Concept "Freedom"



The concept of future is depicted as a dynamic space, demonstrating that children perceive the future not only as a wish or desired state but also as a project to be created (i.e., goals to be achieved). Many *Future* drawings are distinguished by a focus on planned adventures and logistical thinking. While children’s understanding of a dream may involve wishing for an ice-cream house, their perception of the future is related to planning a journey. This indicates the engagement of early executive functions, such as planning, sequencing, and flexible thinking (Diamond, 2013).

Figure 5

A Visual Map of the Respondents’ Associations With the Concept “Future”



The visual maps of the concepts underscore the nuanced and systematic ways in which children use visual representation to construct meaning for complex, abstract ideas, blending concrete experience with imaginative potential.

Interpretation of the Emotional Tone in Children’s Visual and Oral Representations of the Concepts

Table 4 presents the number of instances in each tone category (Positive, Mixed/Complex, or Negative/Concerning) across the concepts.

Table 4
Emotional Tone Distribution Across the Concepts

Concept	Positive	Mixed/Complex	Negative/Concerning
Dream	60	20	0
Security	26	6	0
Homeland	20	2	0
Freedom	14	4	1
Future	12	3	1
Total	132	35	2

A vast majority of drawings are emotionally positive in tone, as outlined in Table 4. About three-quarters of all entries (132 out of 169) carry a positive tone. These include almost all *Homeland* depictions (children overwhelmingly portrayed *homeland* with pride, love, and security), most *Security* scenes (children tended to illustrate *security* in empowering or happy ways), and many *Dream* fantasies, which are often joyful. The mixed/complex tone is the next most common, accounting for roughly one-quarter of the entries (35 drawings). Mixed tones appear when children's depictions include both positive and negative elements, and emotions in tension. For example, many *Dream* drawings, while fundamentally positive, have small scary elements or uncertainties, such as a friendly dream that nonetheless features monsters or "puzzling visitors", for example, the dinosaur or ghost in an otherwise beautiful dream, leading to a mixed tone. *Freedom* and *Future* concepts also exhibit mixed tones; for example, a *Freedom* drawing that defines freedom as "no war" (i.e., hopeful for peace yet acknowledging conflict). A few *Security* drawings incorporate threats (such as storms and near-accidents) that are resolved by security measures, giving a complex tone of "danger managed by caution".

The negative/concerning tone is rare, appearing in only two entries (~1% of the dataset). Children generally included some hopeful or optimistic element even in darker scenarios, avoiding purely negative depictions. This aligns with the observation that children often seek resolution, even when they introduce harmful elements (e.g., heroes saving the day or stating that, in the future, the bad things will be gone). It is noteworthy that *Homeland*, *Security* and *Dream* concepts have no negative-tone entries at all. To sum up, *Dream*, *Homeland*, and *Security* drawings are predominantly positive, while *Freedom* and *Future* drawings, though mostly positive, include a higher proportion of mixed tones. Only *Future* and *Freedom* have one negative entry, where the children focus on war or destruction. This suggests that while young children are capable of imagining fearful or complex scenarios, they more often incorporate optimistic, solution-oriented thinking into their understanding of these abstract concepts.

Examination of the dataset has revealed that certain emotions dominate the drawings, with joy, anticipation, and trust appearing most frequently (see Table 5).

Table 5
Dominant Emotions of the Dataset

Dominant emotion	Interpretation
Joy	Joy or happiness is the dominant emotion for roughly two-thirds of the drawings. Children portrayed many joyful situations (family fun, playing etc.) or explicitly mentioned happiness. Joy is widespread in <i>Dream</i> and <i>Homeland</i> drawings (e.g., “children feel happy” in the future kindergarten or dream worlds).
Anticipation	Anticipation is present in over half of the entries, often paired with joy. Many children expressed anticipation or excitement about something, for example, looking forward to a future event (holidays, ice cream, etc.). Anticipation appears in <i>Future</i> and <i>Dream</i> drawings, where looking ahead or imagining “what comes next” is inherent.
Trust	Trust is a dominant emotion in many drawings, particularly those that emphasize security, family, or friendship. Trust appears as both security (feeling secure with a person or in an environment) and hope in positive outcomes. It is represented in <i>Security</i> , <i>Homeland</i> , and <i>Freedom</i> drawings where children trust in parents or heroes.

The analysis of the dataset demonstrates that joy is the most pervasive emotion, reflecting children’s tendency to infuse their concepts with happiness. Anticipation (hopeful excitement) and trust (a sense of safety) are nearly as pervasive, underscoring that children often view these abstract concepts in an optimistic light. The prominence of *joy*, *trust*, and *anticipation* complies with developmental expectations for preschool children, who frequently emphasize positive interpersonal feelings. It also aligns with Plutchik’s (1980) notion that basic emotions can co-occur – many entries have combined emotions (e.g., joy and anticipation frequently, or fear and trust). The dataset explicitly identifies cases of multiple emotions, as in the child’s depiction of the Future as becoming a doctor (A_001_M_6_5), which has joy, anticipation, and trust “with touches of longing”. Thus, the most common emotional themes in these drawings are happiness, excitement for the future or the imaginary, and feelings of safety/trust, demonstrating an overall optimistic emotional landscape.

Other notable emotions included love, pride, curiosity/surprise, fear, and sadness, as summarized in Table 6.

Table 6
Other Notable Emotions of the Dataset

Emotion	Interpretation
Love (and affection/ belonging)	It is frequently present in <i>Homeland</i> and <i>Security</i> drawings (family love, hugging parents, and hearts symbolizing love of homeland or family). It is not usually the sole dominant emotion, but it is combined with trust or joy.
Curiosity/Surprise	It appears in several <i>Dream</i> and <i>Freedom</i> entries, where children explore something new (space, unknown creatures) or add an element of surprise (e.g., a little surprise when seeing something unexpected). Curiosity is rarely alone; it is usually mixed with excitement.
Fear	It is comparatively less common since most children do not center fear, even if it is present, they resolve it. Fear appears in a <i>Freedom</i> drawing about war (fear of conflict underlying the hope for peace), and in certain dream scenarios (fear of a ghost or monster before being saved). However, fear is almost never left unresolved; it is usually accompanied by hope or relief.
Sadness	It appears even rarer than fear. A few drawings indicate loneliness or missing someone (e.g., a homeland entry with "note of loneliness" or a safety entry missing dad). Overall, sadness is minimal in the drawings as children do not tend to focus on sad feelings in their concept depictions.

Negative emotions like fear or sadness appear but are usually context-specific (e.g., fear of a specific danger, sadness about missing someone) and do not serve as the central message. Instead of pure fear or despair, children's drawings conveyed an overall atmosphere of hopefulness. For example, even when dealing with war (*Freedom* concept), the child's framing – "*freedom = no war*" – is inherently hopeful for peace. This indicates that children's conceptualizations, while capable of acknowledging negative aspects, are essentially hopeful and solution-oriented.

A particularly noteworthy finding is the frequent appearance of agentic emotions like alert, determined, and confident, especially within the *Security* concept. This finding indicates that security, for these children, is not understood as a passive condition of ease but as an active and alert behavior characterized by such practices as observing rules, setting boundaries, and maintaining proactive awareness (e.g., R_002; R_004; R_014; A_020).

Figure 6

Examples of Security Drawings

Notes: On the left: Text labels (“Me”, “Mum”; arrows; names of signs), vertical headline “DROŠĪBA” (SECURITY) as a title. On the right: big text says “I will cross only on green,” and a speech bubble says “I won’t take a candy!”



A (R_002)



B (R_004)

Figure 6 presents two *Security* drawings. On the left, security is treated as being with a trusted adult and following clear public rules, i.e., a balanced, practical view that joins care with responsibility. On the right, security is understood as following rules in traffic situations and assertive boundary setting with strangers; the drawing functions as a child-made security poster. The *Security* drawings of the dataset suggest that security is understood as a skill to be developed through learning and practice, revealing the absorption of effective security instruction and the development of a more mature cognitive framework for engaging with the world.

Comparative Thematic Analysis of Natural and Cultural Elements

The content of each drawing has been categorized into natural and cultural elements to identify how children balance nature and human-made aspects when visualizing abstract concepts. For the analysis, natural elements have been defined as features from the natural world or imagination, i.e., not man-made. This includes flora (trees, flowers, grass), fauna (animals, birds, mythical creatures like unicorns or friendly monsters), landscapes (sun, clouds, rain, sky, mountains, celestial bodies like stars and planets), and natural phenomena (rainbows, weather, fire, etc., as long as not depicted as controlled by humans). Even fantastical elements grounded in nature (e.g., “flying islands”, magic bushes, and a rainbow waterfall) are treated as natural elements since they are not human artifacts. Cultural elements, in turn, have been defined as features introduced by human society or made by people, such as built structures (houses, buildings, roads, etc.), vehicles and machines, social symbols, clothing/uniforms and tools/weapons, technology, and toys. Using these definitions, each entry has been classified for the distinct natural and cultural elements present. Table 7 ranks the five concepts from highest to lowest in terms of natural and cultural element richness, with 1 indicating the strongest presence and 5 – the weakest.

Table 7

Ranking the Concepts by Prevalence of Natural vs. Cultural Elements

Concept	Rank (Natural Elements)	Rank (Cultural Elements)
Dream	1	5
Freedom	2	4
Security	3	2
Future	4	3
Homeland	5	1

It should be noted that, on average, children combine both natural and cultural elements in their drawings, but certain concepts demonstrate an emphasis on natural themes. Nearly all *Dream* drawings include natural elements, for example, sunshine, sky, rainbow, clouds, animals, plants, and even cosmic landscapes (other planets, meteorites). Dreams often take

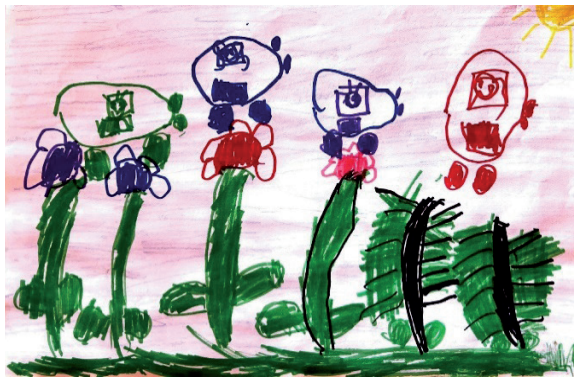
place outdoors or in imaginative nature settings (gardens, seaside, flying in the sky). Even when cultural elements appear in dreams, they are often included in a nature-rich context (e.g., a dream of a mushroom house with rooms – a fusion of natural and human habitat).

Figure 7

Examples of Dream Drawings



A (R_018)



B (A_007)



C (R_015)

The concept “Dream” has the highest prevalence of natural elements, fitting as many children escape to magical outdoor scenes in their dreams (Figure 7). In dataset terms, the dream category includes very few drawings that look like typical human environments – they are mostly imaginary worlds. Hence, cultural content is minimal or highly transformed (e.g., candy and presents floating, rather than realistically depicted shops or such – L_026).

Strong natural context is also present in many *Freedom* drawings. Sky imagery is prevalent; freedom is often represented by open skies, birds flying, rainbows, and scenes of nature. Although some freedom drawings have cultural elements, nearly all also include significant natural elements (sun, sky, nature as the space of freedom). Freedom, as a concept, evokes vast natural spaces (open air, fields) in children’s minds, thereby aligning freedom with nature’s openness. The concept of freedom for many children is associated with the absence of restraint, which sometimes they show by breaking cultural constraints (e.g., an open door labeled EXIT – a single cultural element that represents removing all others; R_003).

Figure 8

Examples of Freedom Drawings



A (L_014)



B (L_001)



C (L_011)

Security drawings combine natural elements with cultural elements. They frequently featured vehicles (cars, buses, police cars), roads and traffic infrastructure (crosswalks, traffic lights, stop signs), buildings (kindergartens, houses), and text/symbols (Figure 6). As the drawings are often situational (roads, homes, etc.), they have more cultural content, but they still consistently include natural backdrops. For instance, traffic scenes have sunny skies, clouds, trees, or grass along the road (R_005; L_029). The analysis of the drawings demonstrates that *Security* ranks in the middle position. Nature is present in most *Security* drawings because children rarely draw a setting without a sky or ground, but it is usually a supporting context rather than the primary focus.

Moderate natural content and technology structures are characteristic features of *Future* drawings. The dataset reveals that *Future* drawings vary, as some are nature-centric (especially those imagining an ideal future climate or environment), while others are technology-oriented. On the one hand, children imagine the future with abundant flowers, lots of animals, and sunshine. On the other hand, *Future* drawings focus on cities, flying cars, and buildings with relatively little nature. Future ranks lower in natural prevalence: natural elements are present, but in many *Future* depictions the emphasis is more on cultural progress (houses, vehicles, gadgets) than on nature.

Figure 9

Examples of Future Drawings



A (L_031)



B (A_016)

Homeland drawings present houses, buildings, and people, often depicted large and in a central position (e.g., A_012). Essentially, the concept of homeland is portrayed as places and objects culturally significant to the child – their home, the flag, even the hospital where they were born (L_052). Natural elements certainly appear but are usually secondary. Children often draw the sun, sky, grass among things at home, showing that they associate homeland with nature, but visually the natural elements appear less frequently than cultural ones.

Figure 10

Examples of Homeland Drawings



A (A_012)



B (R_022)



C (L_052)

The following observations have emerged from the analysis of the natural and cultural content in the dataset:

- *Dreams* usually take place in imaginative natural worlds with minimal real-world structure – lots of animals, weather, celestial motifs, and only occasional cultural items (ranking highest in nature, lowest in culture);
- *Freedom* is often depicted in natural settings (open air, landscapes) to symbolize liberation, with some strong cultural symbols appearing in a minority of drawings (such as chains/bars to break or national symbols);
- *Security* drawings combine natural and cultural elements, illustrating the built environment (roads, vehicles) within the natural landscape;
- *Future* is depicted by focusing on futuristic technology/buildings, thus making it moderately cultural, balanced by some nature.
- *Homeland* drawings are predominantly based on the cultural reality – the home, the flag, the people – using nature mostly as a background rather than the central element.

These trends reflect how each concept guides children's perception: *Homeland* and *Security* are tangible, present-day ideas. *Dream* and, to some extent, *Freedom* encourage children to think beyond ordinary experience, thus inviting more nature and fantasy. *Future* is presented as projecting familiar cultural elements into the days ahead (flying cars, new buildings). However, it should be noted that all drawings feature, to some extent, both natural and cultural content. The examples illustrate that while we can separate natural and cultural content analytically, in the drawings, they often coexist to enrich meaning.

Synthesis of Children's Conceptualization Strategies

The analysis of the dataset demonstrates that children use three strategies to conceptualize abstract ideas: (1) modality (i.e., positive vs. negative definitions), (2) scope of concept (i.e., personal vs. social), and (3) temporal and spatial scale (i.e., immediate/local vs. distant/fantastical).

With regard to **modality**, children often define abstract concepts either positively, i.e., stating what the concept *is*, showing its presence, or negatively – describing what the concept *is not*, often illustrating the absence or opposite of the concept. Most children defined concepts in terms of positive existence – they depicted examples or ideal instances of the concept. For example, many portrayed *Freedom* by showing someone enjoying an activity freely (or *Security* by showing safe behavior. Similarly, *Future* was often defined by positive aspirations, e.g., “*I will be a doctor who helps everyone*” (A_001). *Homeland* was positively described by listing beloved elements. In all these cases, children focused on what they were willing the concept to embody.

Some children used the approach of explaining a concept by highlighting its opposite or the condition in which a particular bad thing was absent. The vivid example is one boy's definition of freedom: “*Freedom is when there are no wars in any country.*” Here, he defines freedom *by the absence of war* – a classic negative definition. His drawing showed two figures with guns (symbolizing war) and basically communicated that freedom means *no conflict*. Another example is a girl's dream of endless summer with no winter – she defined her ideal future by saying “*winter will not exist*”, thus defining the perfect future by the absence of something she dislikes (winter). *Security* was also sometimes defined this way: one child explained security as *not doing dangerous things*, i.e., defining security by negating unsafe behavior.

The analysis of the dataset has revealed that preschool children use negative definitions mostly for concepts that involve a moral or desired state in contrast to a bad current state. *Freedom*, especially, was often approached via its negation (no war, no prison). This reflects the influence of adult discourse (“freedom means no chains, no oppression”). In contrast, *Dream* and *Homeland* were rarely defined negatively. It should be noted that both aforementioned strategies can appear in one drawing. For instance, the *Freedom* drawing with guns uses negative imagery (guns, war) to imply the positive concept (peace, freedom). This is an age-appropriate strategy as preschool children tend to explain things by saying what it *is not*, especially abstract ideas that they know in contrast.

In terms of modality, it can be concluded that most children favored positive definitions, illustrating the concept with concrete examples (e.g., *Security = careful walking with the mom*; *Homeland = my nice home*). The dataset has demonstrated that children make sense of abstract concepts either by ideal examples or by contrast with the negative, and both forms of reasoning are grounded in their experiences.

The Scope of Concept: Children's drawings vary in whether they perceive the abstract concept on a personal level or a social level (or sometimes blended both). This scope difference is evident in the narratives and the characters included in the drawings. In terms of personal scope, many children personalize the concept, relating it to themselves

or an intimate circle. They often illustrate themselves as the central character in the drawing (it is typical in children's art). For example, *security* is often about the child's own experience: "Mom and I holding hands on the stairs", "I ride safely with my mom" – centering on the child's personal security. In *Freedom*, personal scope appears when children show themselves doing something freely. *Dream* concepts are the most personal on average, with many dreams essentially being a child's wish (getting ice cream, becoming a footballer, having lots of presents) – all centered on the child's own desires.

The concepts are also interpreted in a broader societal sense, including other people, community, or humanity. This is notable in some *Freedom* drawings that invoke nations. *Homeland* sometimes is elevated from just "my home" to "our country", e.g., a child drew multiple buildings with national flags and talked about homeland in terms of countries and victory. *Dream* drawings also have a collective scope, suggesting friendship for everyone. *Security* sometimes is drawn as a group activity, e.g., a group of children all following rules together at a crosswalk or in kindergarten. *Future* occasionally has a social scale: one child's drawing presents an entire town of the future with improvements. The analysis leads to the conclusion that the children's interpretation scope can be influenced by the concept itself. Concepts like *Homeland*, *Freedom* and *Safety* have obvious collective dimensions, whereas concepts *Dream* and *Security* are often taught in personal terms.

Temporal and Spatial Scale: Another strategic difference is the extent of time and space over which children use their imagination to interpret a concept. It is especially evident in the "time-oriented" concepts *Dream* and *Future*, and, to a lesser extent, in *Freedom* (can have spatial metaphors of open space) and *Motherland*, which can involve a geographic scale.

Some children interpreted *Future* in the short-term/immediate sense, essentially as *the near future or next steps in daily life*. This very local time scale (just hours ahead) shows how a 5–7-year-old might understand "future" in concrete terms – tomorrow rather than decades ahead. In contrast, others took the future to mean far-off adulthood or beyond. Several drew themselves in grown-up roles or imagined technology not yet real (flying cars, living on the Moon) – that is a long-term future. For *Dream*, the temporal scale is slightly different (since dream happens when asleep). However, some dreams referred to events happening *the next day or a special occasion*, for example, a child dreamed of Christmas with gifts and family, i.e., a near-future anticipation in a dream. *Freedom*, *Security*, and *Homeland* also have implicit temporal aspects. *Homeland* drawings mostly depict the present (their current home), not homeland in the past or future (except one referencing birth year 2019 (L_052), linking past to present homeland story). *Freedom* drawings could be timeless ideals, except for the one linking freedom to future peace.

Spatial Scale: Many drawings stayed local, depicting familiar places. *Homeland* is often literally the child's home or yard. *Security* is usually a local environment, like one street, one playground, home, or school – known surroundings. *Dream* and *Future* have the widest spatial ranges. Some *Dream* drawings are very local (a dream of a bedroom with something happening or a garden at home). Others depict an "alien planet" in a dream or flying through space among stars. *Future* is treated similarly: a few children drew their own town, while others imagined outer space (Moon) or a broad "world of

the future” concept.

Fantastical vs. realistic content can also be examined within spatial scale. A *distant* spatial scale (outer space, entire world, imaginary lands) often corresponds with *fantastical content*. For instance, *Dream* drawings with far-off settings (space, other planets) are inherently fantastical (aliens, magic). A *Freedom* drawing at cosmic scale (like imagining freedom in terms of the entire sky and cosmos) becomes a fantasy of floating in space. Meanwhile, drawings that concentrate on immediate surroundings are more realistic (e.g., *Homeland* is seen as a yard). Children’s ability to use and combine these scales demonstrates their imaginative capacity and cognitive framing.

Children’s conceptualization strategies vary along dimensions of definition mode, scope, and scale. Many children favor positive, concrete definitions centered on themselves or familiar contexts. Some use a strategy of defining by the opposite and consider broader implications. Children may ground the concept in the present-day experience (spatially and temporally), or extend it into a creative, imaginative time-space (another planet, future generations, etc.).

The analysis reveals that children, even at early ages (5–7 years), are capable of blending concrete experiences with imaginative elements to express abstract ideas, often grounding significant concepts in familiar terms (e.g., defining *Homeland* through one’s house, family, and local nature) while also occasionally alluding to broader themes like peace, rules, or environmental care. This multifaceted understanding underscores the richness of children’s conceptualizations and the important role visual storytelling plays in revealing them.

Tentative Findings

The dataset demonstrates that preschool children aged 5–7 are not merely passive illustrators of their world but are active participants engaged in the complex world of meaning-making. They use a rich visual-symbolic language to construct, test, and refine their understanding of life’s most significant concepts (Furu et al., 2021). The analysis has identified several key cognitive and semiotic strategies that are consistently used across the dataset. First is the strategy of definition by opposition. Children frequently understand the meaning of a concept by perceiving what it is *not*. For example, *Freedom* is understood as release from confinement, and *Security* is seen as the resolution of danger. This approach reveals a capacity for abstract reasoning that goes beyond simple, positive definitions. The second strategy is the use of a concrete metaphor. Children make abstract feelings and relationships tangible by embodying them in physical forms (Lakoff & Johnson, 1980). A family’s love becomes a literal “heart-house” that one can live inside. A dream of abundance becomes a “rain of candies”. This process of metaphorization is a foundational tool for making the intangible world of emotions and ideas comprehensible and communicable. The third strategy is the consistent use of symbolic mapping. As demonstrated in the Dataset Analysis Section, children systematically map the natural world onto concepts of autonomy and individuality, while mapping the cultural world of objects, rules, and relationships onto concepts of society, security, and belonging. This reveals a deep, underlying cognitive structure for organizing their experience of

the self in relation to the world. The conceptual spaces of *Future* are not static but are dynamic areas for the self. In these spaces, children actively engage in planning complex sequences (e.g., a motorcycle trip), problem-solving (e.g., a mirror to see past a storm), and regulating difficult emotions (e.g., using positive visuals to explore scary ideas). This rich interplay of strategies shows not only creativity but also how children use drawings to process complex ideas by transforming them into terms they can draw – whether that means showing what they love, showing what they fear, placing themselves in the picture, or symbolizing big ideas through small scenes. Each drawing, therefore, offers insight into the child's conceptual mind: sometimes very egocentric and immediate, other times surprisingly empathetic or global – but usually optimistic in tone and vibrant in imagination. The dataset, as detailed in the previous section, affirms these observations with concrete examples from the children's drawings and narratives.

Children demonstrate a remarkable ability to situate abstract concepts along a spectrum from the deeply personal and individual to the broadly social and collective. The scope of their conceptualization varies systematically across the five concepts, revealing a developing capacity to navigate and integrate different social scales. At one end of the spectrum, *Dream* stands out as the most intensely personal and individual concept. A vast majority of *Dream* narratives are focused on the self's unique desires, aspirations, and imaginative worlds. *Future* occupies a middle ground, blending personal and social frames. Many children envision a personal future career. The future is where personal ambition and social contribution intersect. *Security* is conceptualized predominantly in social and relational terms, although it is experienced personally. The feeling of being safe is individual, but the mechanisms for achieving it are consistently depicted as social. *Security* is co-created through relationships with trusted others – family members, teachers, and the broader community – and by adhering to shared societal rules. Security, therefore, acts as a crucial conceptual bridge, connecting the child's personal well-being to the social structures and interpersonal bonds that guarantee it. At the far end of the spectrum, *Homeland* and *Freedom* are the most explicitly social and collective concepts. *Homeland* is consistently defined through shared national symbols, such as the Latvian flag, and a collective sense of place, often including the family as the core social unit within the nation. *Freedom*, similarly, is linked directly to the nation and the collective experience of peace versus war. These concepts are understood not merely as personal feelings but as shared conditions of a community or a nation-state. This continuum demonstrates the children's developing cognitive map of the social world, from the inner self to the family, the community, and the nation.

Conclusions

The findings of the study demonstrate that cognitive development not only strengthens pre-school children's capacity to recognize and interpret elements of their surrounding world but also creates the basis for more sophisticated information processing skills. When visual and verbal modes of communication interact, children begin to develop the multimodal literacy necessary for engaging with today's high-density knowledge frameworks. These competencies align with the aims of Education for Sustainable

Development, which calls for flexible thinking and holistic understanding from an early age. By demonstrating how children construct meaning through drawings and narratives on the predefined concepts, the research contributes to the foundational processes through which pre-school children begin to develop the cognitive, communicative, and sustainability-oriented capacities essential for participating thoughtfully in a dynamically evolving world.

The insights derived from the research carry significant practical implications for educators and parents. The profound connection between relational security and a child's overall sense of security suggests that fostering a classroom environment of trust and secure attachment is essential. Security curricula focused on abstract rules (e.g., "stranger danger") should be balanced with activities that reinforce the perception of security as a "supportive environment" with known, trusted adults. The identified security architectures – protectors, rules, and relationships – provide a valuable framework for intervention. A child preoccupied with external threats may benefit from work that strengthens their sense of relational security (the foundational layer) and their understanding of predictable rules for cooperating in their environment. The data on *Freedom* underscores the developmental importance of unstructured, child-led play, particularly in natural settings. Nature serves as a unique and vital space for children to develop a sense of autonomy, agency, and self-realization. Educational programs should prioritize and allocate time for such exploration.

Children's drawings provide a direct insight into their conceptual and emotional worlds. The frequent tension between a drawing's visual tone and its accompanying narrative can serve as a significant diagnostic indicator. A child who draws a cheerful scene while telling a frightening or sad story is communicating a complex emotional state and demonstrating their attempts at regulation. This "visual-narrative gap" can be a starting point for educators' and parents' exploration. Within this framework, preschool educators play an essential mediating role. First, they should create learning environments where children feel free to express their thinking through multimodal forms (e.g., drawing, storytelling, dramatic play, observation outdoors), which is foundational for ESD's inquiry-based and meaning-making pedagogy. Educators should guide children's attention to relationships, consequences, and multiple perspectives, helping them transform intuitive ideas into flexible cognitive frameworks. Their dialogic questioning and reflective conversations promote children's vocabulary growth, conceptual clarity, and the ability to articulate complex ideas – skills closely related to ESD competencies such as critical thinking, systems thinking, and self-awareness.

The effects produced by the proposed approach on curriculum design, education policy shaping, study materials development, and the education process can be traced in future research projects. The greatest ambition the authors of the given research suggest is that enhanced visual literacy, combined with advanced lexical pliancy, forms the prerequisite for establishing consequent terminological competence of the future specialist, especially in the STEM+ (science, technology, engineering, and mathematics) thematic setting, as it exhibits the greatest evolutionary and even revolutionary advancement pace. The findings offer evidence-based insights that can guide policymakers, institutional leaders, and sector stakeholders in designing development agendas aligned with Education for Sustainable Development.

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