



Pareidolia in childhood- and early- onset schizophrenia: Perceptual pattern detection, predictive processing and reality testing

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Abstract

Pareidolia is the tendency to see meaningful or familiar forms in ambiguous sensory information, such as seeing faces, animals or people in clouds, shadows or irregular textures. It is a normal perceptual phenomenon and should not be considered a pathological one. However, increased pareidolic responding has been reported in schizophrenia and as a result might provide a useful behavioral paradigm to investigate abnormalities in perceptual organization, predictive processing, salience attribution, and reality testing. This narrative review focuses on pareidolia in childhood-onset schizophrenia (COS) and, where relevant, the broader category of early-onset schizophrenia (EOS). A diagnostic clarification is needed: childhood schizophrenia is not a separate diagnostic category in DSM-5-TR or ICD-11. COS is a clinical and research term for schizophrenia with onset before 13 years, and EOS is usually for schizophrenia with onset before 18 years. COS is very rare, with estimates being as low as 0.04% of children, while schizophrenia more generally occurs in late adolescence and early adulthood. Recent literature on pareidolia, visual illusions, perceptual organization, visual distortions, hallucinations and predictive processing has been reviewed in detail. It is well known that children and adolescents with schizophrenia spectrum disorders may experience visual abnormalities and visual interpretation, but no direct evidence has been presented for pareidolia in COS. However, pareidolia should be viewed as a potentially informative perceptual phenomenon rather than a diagnostic feature of COS. Future work can explore whether changes in pareidolic responses can help to understand how sensory prediction, perceptual organization, salience attribution and reality monitoring in early psychosis develop.

Keywords: Childhood-onset schizophrenia, pareidolia, visual perception, predictive processing, psychosis

Introduction

Pareidolia is the perception of a meaningful or recognizable pattern in an ambiguous or objectively meaningless stimulus. A familiar example is seeing a face in a cloud or an animal in a rock formation. This is not pathological and happens every day in healthy people. It is the capacity of the brain capacity to organize incomplete sensory information by integrating sensory evidence with contextual information, expectations, stored representations and perceptual knowledge.

The phenomenon may also be relevant for psychosis as schizophrenia can lead to perception, cognition, salience attribution and reality monitoring disturbances. Studies (e.g., Abo Hamza et al., 2021^[1]; Mavrogiorgou et al., 2021^[24]; Smailes et al., 2019^[28]) show increased pareidolic responding in adults with schizophrenia compared to healthy controls and indicates that ambiguous visual stimuli may be processed differently in schizophrenia. Nevertheless, extrapolation from adult schizophrenia to children is very problematic because the developing brain, cognitive systems, language abilities and perceptual mechanisms are very different over different stages (Kendhari et al., 2016^[20]).

Childhood schizophrenia is not a separate official diagnostic disorder in either DSM-5-TR (American Psychiatric Association [APA], 2022^[5]) or International Classification of Diseases-11th Revision (World Health Organization [WHO], 2019^[31], 2022^[32]) and is treated with DSM-5-TR as a disease of childhood. Childhood-Onset Schizophrenia (COS) is a research and clinical term that is used to diagnose schizophrenia that occurs before 13, in contrast to Early-Onset Schizophrenia (EOS) which occurs before 18

and is associated with adolescence. The American Psychiatric Association (APA, 2022^[5]) defines schizophrenia as a lifespan type and not as a childhood schizophrenia type but also classifies schizophrenia under schizophrenia spectrum and other primary psychotic disorders in ICD-11 (WHO, 2022^[32]).

Childhood schizophrenia is not recognized as a distinct psychiatric disorder in psychiatry as it is to schizophrenia. DSM-5-TR takes a lifespan approach to mental disorders (APA, 2022^[5]), and ICD-11 (WHO, 2019^[31], 2022^[32]) classifies schizophrenia within the group of schizophrenia and other primary psychotic disorders. Thus, the clinically appropriate terminology is childhood-onset schizophrenia (COS) when the onset of schizophrenia is before 13 years of age. If it occurs during adolescence, early-onset schizophrenia (EOS) is the prevalent name for schizophrenia. COS should be used for the <13-year group, and EOS for the <18-year group. Correll et al. (2024)^[12] also discuss COS and EOS in the 2024 study and report that as many as 8 percent of schizophrenia cases are diagnosed before age 18.

This distinction is essential because schizophrenia is not exclusively a childhood or adolescent condition. WHO (2026)^[34] reports that schizophrenia most commonly begins during late adolescence and the twenties, with somewhat earlier onset in males than females. Childhood-onset cases represent an exceptionally small proportion of schizophrenia cases. Current literature places COS below 0.04% of children, although its estimates vary considerably across studies and populations throughout the world (Merck & Co., 2024)^[25]. Table 1 below shows the terminology of schizophrenia that has been used in literature.

Table 1: The Terminology of Schizophrenia

Term	Meaning	Developmental Boundary
Schizophrenia	Official diagnostic disorder	Across the lifespan
Childhood-onset schizophrenia (COS)	Research/clinical descriptor for schizophrenia beginning in childhood	Before age 13
Early-onset schizophrenia (EOS)	Schizophrenia beginning unusually early	Before age 18, therefore includes adolescence
Adolescent-onset schizophrenia	Descriptive term for onset during adolescence	Approximately 13-17 years
Childhood schizophrenia	Informal/older terminology	Not a separate DSM-5-TR or ICD-11 diagnosis

The purpose of this review is therefore not to suggest that pareidolia is a defining characteristic of childhood schizophrenia. Instead, it examines whether pareidolia can provide

a useful model for understanding how ambiguous visual information may be processed in children and adolescents who develop schizophrenia at an unusually early developmental stage.

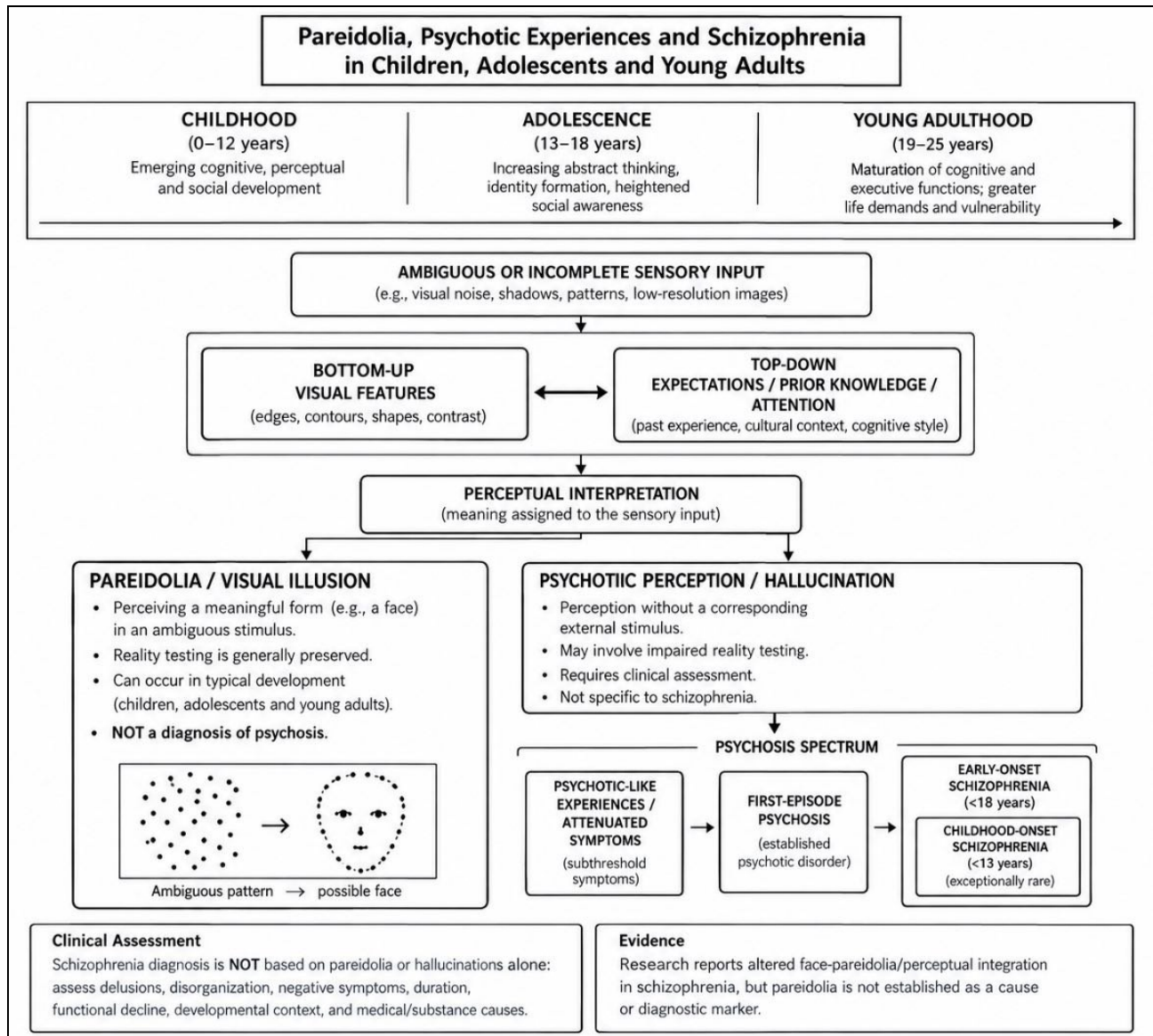


Fig 1: Schizophrenic Conditions in Children, Adolescents and Young Adults

Figure 1 above illustrates an important conceptual distinction between pareidolia and schizophrenia. Pareidolia is a perceptual phenomenon, whereas schizophrenia is a psychotic disorder characterized by disturbances in reality testing, thought, perception, behavior, and functioning (Abo Hamza et al., 2021) ^[1]. Pareidolia can occur as part of ordinary human perception in children, adolescents, and young adults who do not have a mental disorder (Joy, 2024) ^[17] and, therefore, should not be interpreted in isolation as evidence of schizophrenia (Smailes et al., 2019) ^[28]. The

clinical significance of a pareidolic experience depends on the broader developmental, cognitive, behavioral, and clinical context in which it occurs.

Research Methodology

The author of this paper uses a structured narrative-review approach informed by the principles of the Scale for the Assessment of Narrative Review Articles (SANRA; Baethge et al., 2019) ^[6]. Literature published primarily between 2020 and 2026 was considered, supplemented by

earlier seminal research where necessary to establish the historical definition and epidemiology of childhood-onset schizophrenia.

Literature searches focused on combinations of the terms *childhood-onset schizophrenia*, *childhood schizophrenia*, *early-onset schizophrenia*, *adolescent schizophrenia*, *pareidolia*, *visual perception*, *visual illusion*, *visual distortion*, *visual hallucination*, *perceptual organization*, *predictive processing*, *salience*, and *reality monitoring*. Searches were conducted using PubMed/MEDLINE, major scholarly databases and authoritative professional and governmental sources, including the American Psychiatric Association (APA), World Health Organization (WHO), National Institute of Mental Health (NIMH), and American Academy of Child and Adolescent Psychiatry (AACAP).

Priority was given to recent peer-reviewed empirical studies, systematic and narrative reviews, and authoritative diagnostic or epidemiological sources. Studies directly investigating pareidolia were prioritized, while research concerning visual illusions, visual distortions, hallucinations, perceptual organization, and predictive processing was incorporated to provide mechanistic context. Since direct research on pareidolia specifically in COS is extremely limited (Alkelai et al., 2023) ^[2], adult schizophrenia and broader early-psychosis literature were used cautiously to explain possible mechanisms. Findings from adult populations were not treated as direct evidence concerning children. This distinction is particularly important because developmental differences may influence visual perception, cognition, language, metacognition, and reality monitoring.

Literature Review

Diagnostic Status and Developmental Terminology

As far back in the early 1980s, Cantor et al. (1982) ^[9] argued that childhood schizophrenia should be recognized when genuine schizophrenic psychosis (especially formal thought disorder) is present, and that age of onset or failure to demonstrate developmental deterioration should not by themselves exclude the diagnosis. They challenged the idea that schizophrenia in young children should be excluded simply because they were too young. Cantor et al. (1982) ^[9] studied 19 children and 11 adolescents diagnosed to be psychotic since childhood, and who, otherwise, satisfied the DSM-III (APA, 1980) ^[3] criteria for schizophrenia at that time. More importantly, some of these subjects had developed clear psychotic symptoms before 30 months of age. Their central argument was that the disorder of concern should be defined primarily by its characteristic traits, rather than by age of onset alone. What was especially crucial during that time was that DSM-III criteria for schizophrenia included a requirement for deterioration from a previous level of functioning. Cantor et al. (1982) ^[9] found that some children with unmistakable psychosis did not meet the developmental-deterioration criterion. Therefore, they argued that this criterion could cause genuine childhood schizophrenia to go unrecognized.

Moreover, childhood schizophrenia was distinguished from autism spectrum disorder (ASD) by the presence of a disorder of thought or associative processes. Cantor (1988) ^[8] treated childhood schizophrenia as a serious psychotic disorder of childhood, characterized by disturbances in the child's relationship with reality, thought processes, perception, affect and behavior, not merely developmental

delay or unusual social behavior. This is particularly important historically because childhood schizophrenia was a diagnostic concept used before the modern separation of ASD and schizophrenia. Consequently, some children who historically would have been described as schizophrenic would today be evaluated under quite different diagnostic-differential formulations.

In this review, the author treats childhood schizophrenia (Cantor, 1988) ^[8] the same as childhood-onset schizophrenia (Driver et al., 2013 ^[13], 2020 ^[14]) and also refers the term to schizophrenia as a childhood disorder, rather than a childhood-specific disorder. This author does not claim schizophrenia as a disease only in children and adolescents, however. Schizophrenia typically occurs in late teens and early adulthood. As well, WHO (2026) ^[34] currently reports that onset is most common in the late teens and twenties. This paper uses "childhood-onset schizophrenia (COS)" to describe onset before 13 and "early-onset schizophrenia (EOS)" to describe onset before 18. This distinction is especially important for this SANRA-adhered review since otherwise the title of the paper could incorrectly imply that schizophrenia is only a childhood/adolescent disorder.

DSM-5-TR does not establish a separate diagnostic category called childhood schizophrenia. In fact, schizophrenia is a spectrum cluster/category (including schizophrenia, schizoaffective disorder, schizophreniform disorder, brief psychotic disorder, and delusional disorder) diagnosed using the same core diagnostic framework over the lifespan and developmental considerations are also considered in relation to children and adolescents (APA, 2013 ^[4], 2022 ^[5]). DSM-5-TR explicitly uses a lifespan approach to mental diseases. ICD-11 similarly classifies schizophrenia in schizophrenia and other primary psychotic disorders. The WHO's clinical descriptions do not define "childhood schizophrenia" as a separate diagnostic entity (WHO, 2022 ^[32], 2024 ^[33]).

As such, the three terms, i.e., childhood-onset schizophrenia, early-onset schizophrenia and adult-onset schizophrenia, should be properly distinguished or differentiated in any clinical assessment (diagnostic, differential or functional) for the purpose of follow-up psychiatric and/or pharmacological treatment. Childhood-onset schizophrenia (COS) is generally described as onset before age 13. Early-onset schizophrenia (EOS) is defined as onset before 18 years of age and includes adolescent-onset cases. Adult-onset schizophrenia is defined as onset after adolescence. These are terms of developmental timing rather than diseases.

Onset and Current Epidemiology

For the prevalence or onset figures, the current literature continues to describe COS as extremely rare. A recent clinical review (Correll et al., 2024) ^[12] reports that about 2% of schizophrenia cases are diagnosed before 14 and about 8.2% before 18, but estimates vary according to the definition used and whether diagnosis or symptom onset is measured. For COS to be diagnosed, it should start before 13 years of age. The commonly cited estimate is less than 0.04%, approximately fewer than 1 in 2,500 children, but as yet there are clinical sources (e.g., Leucht et al., 2025 ^[22]; Poletti & Raballo, 2024 ^[26]; Solmi et al., 2023 ^[29]) which cite about 1 in 10,000 to 1 in 40,000 children, because different populations, definitions and ascertainment methods have been used. The author of this paper uses <0.04% as an upper estimate rather than as a precise current prevalence figure.

Schizophrenia is mainly a disease of later adolescence and adulthood. WHO (2026) ^[34] estimates that about 23 million people worldwide have schizophrenia and that onset most commonly occurs during late adolescence and the twenties. COS is, therefore, exceptional. The clinical literature still reports incidence of lower than 0.04%, while, in a few cases, less than 1 in 2,500 children (Merck & Co., 2024) ^[25]. Charlson et al. (2018) ^[10], Solmi et al. (2023) ^[29] and Zhan et al. (2025) ^[35] reported incidence in approximately 1 in 40,000 children, with large differences noted in their respective case definition, ascertainment methods, and population. For adolescence, schizophrenia is far more frequent than it is in childhood and schizophrenia is rare in adults. Kéri and Kelemen (2024) ^[21] estimated that 8% of schizophrenia cases are diagnosed before 18 and about 18% had symptoms before 18 and around 2% before 14. These figures should not be regarded as a true population prevalence because diagnosis and symptom onset are different epidemiological measures.

As a result, the most accurate statement is that 'strict' childhood-onset schizophrenia (COS) is extremely rare, while early-onset schizophrenia (EOS) beginning during adolescence is uncommon but significantly more frequent than COS.

Pareidolia and Perceptual Processing

Pareidolia is an example of perceptual inference under uncertainty. The sensory stimulus itself may be ambiguous but the brain creates a judgment based on available information and prior experiences. This ability is adaptive because in real life sensory information may be incomplete or noisy.

The process illustrated in Figure 1 starts with ambiguous or incomplete sensory input, e.g., visual noise, shadows, clouds, textures and patterns or images with low resolution. However, perception is not a passive process through which sensory information is assimilated. Instead, it is the interaction between bottom-up processing of incoming sensory information and top-down influences stemming from prior knowledge, expectations, attention, experience, and context. Children are able to interpret and reverse ambiguous visual representation in the preschool years, which is associated with better integration of perceptual and cognitive processes (Giffen et al., 2011) ^[15]. In recent years, pareidolia is also proposed as the interaction of incoming sensory information with previously acquired perceptual knowledge (Rolf et al., 2020) ^[27].

Pareidolia is a visual illusion, not a hallucination. Pareidolia occurs when an individual has a meaningful configuration in an otherwise ambiguous (or meaningless) stimulus. A child looking at a cloud and seeing what looks like a human face is a textbook example. Thus, there is an external visual stimulus. Despite this, the perceptual system is able to organize and interpret what it is and what it looks like as a meaningful object. That is the reason why pareidolia is not considered pathological but is just an ordinary part of perception. Researchers have found that face-like structures can be prioritized by the visual system quickly, as there is a different level of sensitivity to facial information about human faces within a context (Bourgaux et al., 2026 ^[7]; Gupta & Dobs, 2025 ^[16]). Therefore, pareidolia has nothing to do with psychosis. In pareidolia there is an external stimulus but it is interpreted in an ambiguous way, while in hallucination we are seeing a perception that is not

necessarily caused by the external stimulus but is caused by perception of vision, which we can only feel as a result of the perception. Even hallucinations are not always a sign of schizophrenic condition.

Hallucinatory and other psychotic-like experiences can occur across childhood and adolescence along a developmental continuum, ranging from transient and possibly non-pathological experiences to persistent and clinically significant psychotic symptoms. Most children and young people who report unusual perceptual experiences do not develop schizophrenia (Maijer et al., 2019 ^[23]; Sunshine & McClellan, 2023 ^[30]).

This is particularly important if we consider psychotic-like experiences in normal and atypical development. Children and adolescents may report unusual perceptual experiences, suspiciousness, unusual beliefs, or other manifestations that are similar to psychotic symptoms without being diagnosed with schizophrenia-spectrum disorder. Recent developmental research (e.g., Kelleher, 2025) ^[18] shows that psychotic-like experiences are not a single clinical phenomenon. Some of them may be transient and relate to development and others are associated with anxiety, mood disorders, trauma, neurodevelopmental disorders and other forms of psychopathology (Kelleher, 2025) ^[18]. A small portion may be linked to increased risk of developing a psychotic disorder in the future (Kelleher, 2025) ^[18]. Thus, the presence of a psychotic-like experience should be looked at in terms of frequency, persistence, intensity, developmental appropriateness, associated symptoms, and its effect on functioning rather than as an indicator of schizophrenia.

At the more severe end of this developmental spectrum are childhood-onset schizophrenia (COS) and early-onset schizophrenia. Childhood-onset schizophrenia is mostly defined as schizophrenia that occurs before 13 years of age, whereas early-onset schizophrenia is generally defined as schizophrenia that occurs before 18 years of age. Childhood-onset schizophrenia is extremely rare and can lead to significant impairment of cognitive, social, emotional, educational and developmental functioning. Positive symptoms such as hallucinations and delusions may also occur, along with negative signs and disorganization. There is evidence concerning very early-onset schizophrenia that some children may show strong visual hallucinations and have severe clinical manifestations, but the evidence base is relatively sparse because of the rarity of the disorder (Cantor, 1988 ^[8]; Driver et al., 2020 ^[14]).

In schizophrenia, however, perceptual organization and interpretation can be altered (Kendhari et al., 2016) ^[20]. Abo Hamza et al. (2021) ^[1] reported increased pareidolic responses among individuals with schizophrenia compared with healthy controls. This finding suggests that pareidolia may provide a measurable behavioral index of altered interpretation of ambiguous visual information.

The critical limitation is that this evidence was largely obtained from non-child populations. So it can't prove that children with COS have the same magnitude or mechanism of pareidolic responses. Instead, it provides a theoretical foundation for exploring if similar perceptual mechanisms occur during childhood-onset psychosis.

Visual Illusions and Childhood-Onset Psychosis

Visual abnormalities in schizophrenia extend beyond hallucinations. They may include distortions of size, shape,

movement, color, figure-ground relationships and object perception. Research examining visual illusions in schizophrenia indicates abnormalities in the processing of ambiguous or context-dependent visual information.

These observations are relevant to COS because childhood-onset schizophrenia involves severe psychotic symptoms occurring during a period of substantial neurodevelopment. However, developmental differences make interpretation particularly challenging. Children naturally engage in imaginative play, metaphorical thinking and fantasy, and their ability to describe perceptual experiences is still developing. Consequently, clinicians must distinguish developmentally appropriate imagination and misperception from genuine psychotic phenomena.

The rarity of COS further increases the diagnostic challenge. The historical NIMH research demonstrated substantial diagnostic complexity, with many children referred for suspected COS ultimately receiving alternative diagnoses (Driver et al., 2013^[13], 2020^[14]). This reinforces the importance of comprehensive developmental, psychiatric, neurological, cognitive, educational and family assessment.

Predictive Processing

Predictive processing provides one theoretical explanation for how ambiguous information can produce different perceptual experiences. The brain continuously generates expectations concerning incoming sensory information and compares those expectations with sensory evidence. Keller and Sterzer (2024)^[19] describe psychosis within a predictive-processing framework involving interactions among sensory evidence, predictions, prediction errors and neural circuitry.

In a child experiencing psychosis, altered predictive processing could theoretically influence the interpretation of ambiguous visual information. A face-like pattern in a shadow could therefore become more readily interpreted as an actual face. However, this remains a mechanistic hypothesis rather than an established explanation specifically for COS.

Development is particularly important here. Children's predictive models, executive systems, language, social cognition and metacognitive abilities continue to mature throughout childhood and adolescence. Therefore, developmental differences may affect both the formation of perceptual expectations and the ability to evaluate whether a percept is externally real.

Salience and Reality Testing

Pareidolia becomes more clinically significant when an ambiguous perception acquires excessive personal or external significance. Seeing a face-like pattern and recognizing that it is merely a pattern represents ordinary pareidolia. Conversely, interpreting the pattern as evidence that someone is secretly observing the child represents an additional inferential process.

This distinction is particularly important in childhood psychosis because the child's developmental level must be considered when evaluating conviction, insight and reality testing. The presence of an unusual perceptual experience alone is insufficient to establish schizophrenia. The clinically meaningful sequence may therefore be conceptualized as: ambiguous sensory stimulus → perceptual pattern detection → interpretation → salience attribution → belief formation → reality testing. Pareidolia

primarily occupies the first two stages, whereas psychotic interpretation may involve later stages.

An important clinical implication represented in the lower part of Figure 1 is that schizophrenia cannot be diagnosed on the basis of pareidolia or hallucinations alone. Hallucinations are not synonymous with schizophrenia and may occur in a range of psychiatric, neurological, medical, developmental, and substance-related conditions. Psychotic symptoms may also occur in mood disorders, trauma-related disorders, and other psychiatric presentations. When evaluating children and adolescents, clinicians must additionally consider developmental maturity and the child's ability to distinguish imagination, fantasy, dreams, internal experiences, and externally generated events. Consequently, the interpretation of an unusual perceptual experience requires consideration of the complete clinical presentation rather than focusing on the perceptual experience in isolation (Sunshine & McClellan, 2023)^[30].

Nevertheless, pareidolia becomes clinically relevant when examined within schizophrenia research. Although pareidolia is not a diagnostic measure of schizophrenia, research indicates that individuals with schizophrenia may demonstrate differences in pareidolic perception and face-processing responses compared with healthy individuals. For example, Rolf et al. (2020)^[27] reported altered face tuning in individuals with schizophrenia when they were presented with non-face stimuli containing face-like configurations. Other research has similarly identified altered pareidolic responses in schizophrenia compared with healthy controls. These findings also suggest that perceptual organization, face processing, social cognition, and the interaction between sensory information and prior expectations may contribute to the perceptual experiences associated with psychotic disorder (Rolf et al., 2020^[27]). Such findings, however, should be interpreted as evidence of an association with particular perceptual and cognitive processes rather than evidence that pareidolia itself constitutes schizophrenia.

Accordingly, the relationship between pareidolia and schizophrenia is more appropriately conceptualized as an association within the broader framework of perceptual inference rather than as a causal relationship. Figure 1 therefore deliberately avoids presenting a pathway from "pareidolia → schizophrenia". Current evidence does not establish pareidolia as a cause of schizophrenia, nor does the presence of pareidolia provide a sufficient clinical marker for diagnosing schizophrenia. Instead, both ordinary pareidolic perception and altered perceptual experiences associated with psychosis can be understood in terms of how the brain integrates sensory information with prior expectations and contextual knowledge. In schizophrenia, disturbances involving perceptual organization, attention, predictive processing, social cognition, and reality monitoring may influence the interpretation of ambiguous information. These processes, however, operate within a much broader context involving multiple factors such as neurodevelopmental, genetic, environmental, and clinical factors (Collerton et al., 2023^[11]; Kelleher, 2025^[18]).

Results

The literature review produced five principal findings. First, pareidolia is a normal perceptual phenomenon and is not synonymous with hallucination. Second, empirical research indicates that pareidolic responding can be increased in

schizophrenia, although most direct studies involve adults rather than children. Third, schizophrenia is associated more broadly with abnormalities in visual perception and the processing of ambiguous stimuli. Fourth, predictive processing and salience-based models are likely to explain why ambiguous perceptual information might be taken on unusual significance. Fifth, there is no evidence of pareidolia for childhood-onset schizophrenia to indicate it is a clinical feature.

The epidemiological evidence also shows that strict COS is very rare. Currently, childhood-onset schizophrenia is believed to be less than 0.04%, but published estimates are not one single absolute prevalence (Merck & Co., 2024) [25]. According to WHO (2026) [34], schizophrenia does not exclusively occur in children and adolescents and the most prevalent cases start in late adolescence or adulthood.

Discussion of Findings

The findings support a developmental continuum rather than a separate disease called childhood schizophrenia. The term COS remains clinically useful because schizophrenia beginning before 13 years presents unique diagnostic and developmental challenges, but it should not be presented as an officially separate disorder.

Pareidolia may nevertheless be theoretically valuable in COS research. The phenomenon represents a relatively simple example of how the brain converts uncertain sensory information into a meaningful percept. If children with COS show increased false-positive interpretations of ambiguous stimuli, this could potentially provide information about abnormalities in perceptual organization or predictive inference.

However, increased pareidolia should not be interpreted as evidence that the child is hallucinating. The distinction between misinterpreting an existing stimulus and perceiving something in the absence of an external stimulus remains fundamental. Similarly, seeing a meaningful pattern does not automatically constitute a delusion. Delusional interpretation involves additional cognitive processes, including abnormal conviction and impaired evaluation of alternative explanations.

From a developmental perspective, therefore, the clinical significance of an unusual perceptual experience should be considered across the transition from childhood through adolescence and into young adulthood. Developmental stage, persistence, frequency, intensity, associated symptoms, and functional consequences are more informative than the mere occurrence of an unusual perceptual experience. For example, a child who occasionally perceives a face in a cloud is demonstrating an example of ordinary pareidolic perception. This experience is fundamentally different from that of an adolescent who persistently hears voices (auditory hallucinations) in the absence of an external source, develops fixed persecutory beliefs, demonstrates disorganized behavior or thought, and experiences deterioration in academic and social functioning. Similarly, an unusual visual experience (visual hallucinations) in a young adult warrants consideration of psychosis but should also prompt consideration of neurological, substance-related, sleep-related, affective, and other possible explanations (Kelleher, 2025 [18]; Sunshine & McClellan, 2023 [30]). Figure 2 presents a developmental model of pareidolia based on the studies of Kehheher (2025) and Sunshine and McClellan (2023).

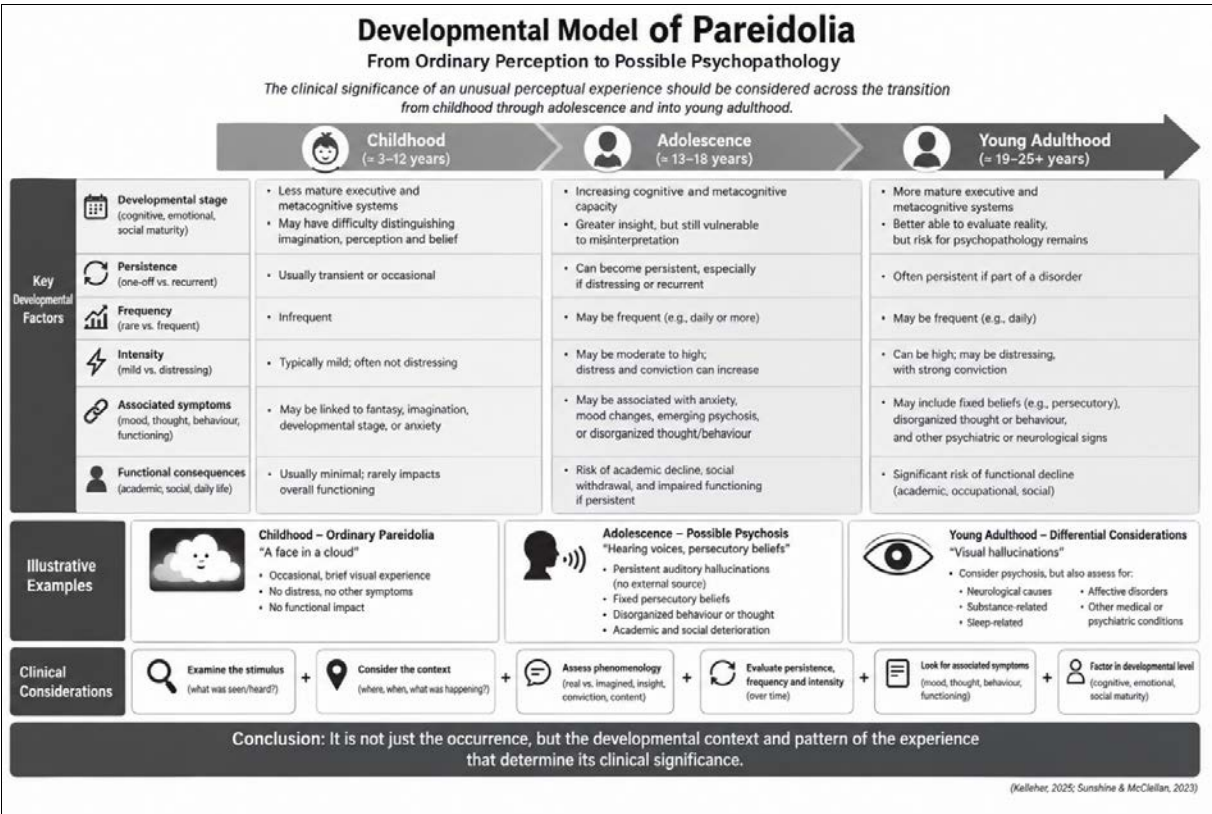


Fig 2: A Developmental Model of Pareidolia

The developmental context to understand pareidolia is particularly important. Children have less mature executive

and metacognitive systems than adults and may have greater difficulty explaining the distinction between imagination,

perception and belief. Consequently, clinicians should avoid interpreting isolated statements such as “I saw a person” without examining the stimulus, context, phenomenology, persistence, conviction, associated symptoms and developmental level.

The extreme rarity of COS also means that direct research is difficult. Large multidisciplinary studies will probably be required to obtain sufficiently large samples for meaningful comparisons. Pareidolia tasks could potentially be incorporated into such studies alongside eye tracking, neuroimaging, computational modelling and measures of hallucinations, delusions, cognitive functioning and reality monitoring.

Taken together, Figure 1 (as shown earlier) provides a developmental and clinical framework for distinguishing ordinary perceptual inference from clinically significant psychotic phenomena. Pareidolia represents the tendency to perceive meaningful forms in ambiguous sensory information and can occur throughout normal development. Psychotic-like experiences represent a broader and heterogeneous range of unusual perceptions, beliefs, and experiences that may or may not be clinically significant. Childhood-onset and early-onset schizophrenia represent rare and severe psychiatric conditions in which psychotic symptoms occur within a broader syndrome involving disturbances in cognition, behavior, affect, functioning, and reality testing. The critical issue is therefore not whether a child, adolescent, or young adult experiences pareidolia, but whether unusual perceptual experiences occur persistently and in association with other clinically significant symptoms, developmental disruption, impaired reality testing, and functional deterioration.

Pareidolia is a normal-capacity perceptual phenomenon that may be altered in schizophrenia, but pareidolia itself is neither schizophrenia nor sufficient evidence of psychosis. The clinically meaningful transition is not “seeing a face in a pattern → schizophrenia,” but rather the emergence, persistence, and functional impact of psychotic symptoms within a broader developmental and clinical syndrome. Thus, the presence of pareidolia should be interpreted according to the stimulus context, phenomenology, developmental stage, associated symptoms, reality testing, persistence, and functional consequences rather than treated as an independent indicator of schizophrenia.

Limitations

The principal limitation, as identified by this author, is the paucity of current review directly examining pareidolia in children with confirmed COS. Much of the mechanistic evidence comes from adults with schizophrenia or from broader psychosis research. These findings cannot automatically be generalized to children.

A second limitation concerns the changing terminology used in the literature. Childhood-onset, early-onset and adolescent-onset schizophrenia are sometimes used inconsistently, making prevalence comparisons difficult.

Third, epidemiological estimates for COS vary considerably because the disorder is extremely rare and studies use different definitions and ascertainment procedures.

Fourth, pareidolia is not diagnostically specific. Increased pareidolic responding can potentially arise from multiple perceptual and cognitive mechanisms and should not be used as an independent diagnostic test. Finally, this manuscript is a narrative review rather than a systematic

review or meta-analysis, and therefore does not provide pooled effect sizes.

Implications

The principal implication that the author of this paper suggests is that pareidolia should be studied as a perceptual process rather than labelled as a symptom of childhood schizophrenia. Future research should determine whether children and adolescents with COS exhibit increased pareidolic responses compared with age-matched healthy controls and children with other neurodevelopmental or psychiatric disorders.

The author also sees the need for a longitudinal research study to investigate whether altered pareidolia precedes psychotic symptoms, emerges concurrently with them, or changes following treatment. Such studies could also examine relationships among pareidolia, hallucinations, delusions, negative symptoms, cognitive functioning and social cognition.

Clinically, assessment of unusual perceptual experiences in children should include careful differentiation among imagination, pareidolia, illusion, sensory distortion and hallucination. The child’s developmental level, language ability and capacity for reality testing should be considered. A face perceived in a cloud should not be pathologized simply because the child has a psychiatric diagnosis.

Educational and family interventions should similarly avoid reinforcing an interpretation that an ambiguous percept is necessarily externally real. Instead, adults can help children develop alternative explanations and reality-testing strategies, while ensuring that unusual perceptual experiences are evaluated within a comprehensive functional clinical assessment.

Conclusion

Childhood-onset schizophrenia is a real but exceptionally rare developmental presentation of schizophrenia, generally referring to onset before 13 years. It is not, however, a separate officially recognized disorder called “childhood schizophrenia” in DSM-5-TR or ICD-11. According to WHO (2024) [33], schizophrenia itself is not restricted to children and adolescents; most cases emerge during late adolescence and adulthood.

Pareidolia can occur in children with schizophrenia just as it can occur in healthy children and adults. Current evidence suggests that pareidolic responses may be increased in schizophrenia, but direct evidence in COS remains very limited. Consequently, pareidolia should not be considered a defining symptom or diagnostic marker of childhood-onset schizophrenia. Its greatest scientific value may instead lie in its capacity to illuminate the transition from ambiguous sensory information to perceptual interpretation, salience attribution, belief formation and reality testing. Studying this sequence during childhood and adolescence may contribute to a more developmentally informed understanding of early psychosis while avoiding the erroneous assumption that every unusual perceptual experience in a child represents schizophrenia.

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