

The Developmental Value of the Play Period through the Lens of Neoteny

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Abstract: The theory of "neoteny" reveals the profound evolutionary value of retaining childhood traits into adulthood, emphasizing that "youthful" qualities like curiosity, plasticity, and playfulness are essential for human development. By examining the biological and psychological foundations of neoteny, this paper explores how the extended period of play serves as a critical window for cognitive, emotional, and social maturation. Play is not merely a leisure activity but a sophisticated mechanism for brain development and social learning. Consequently, the study offers educational insights that advocate for a pedagogical approach respecting each child's unique developmental pace. By prioritizing play and the inherent spirit of exploration, education can better foster individual creativity, emotional resilience, and long-term mental health, ensuring that the foundational benefits of childhood are preserved throughout the lifespan.

Keywords: neoteny; play period; childhood value; educational implications

1. Introduction

Play, as a fundamental activity of children, has long been a focus of interdisciplinary research. However, its deeper biological foundation and cultural significance remain to be further explored. The theory of "neoteny" provides a new theoretical framework for understanding the continued value of childhood traits in adulthood from an evolutionary perspective. This paper aims to discuss the implications of this theory for the play period and extract educational insights based on its understanding.

2. The Connotation and Value of Neoteny

The neoteny theory reveals the value of childhood from the perspective of biological evolution. The English term "neoteny" is a loanword from the German Neotenie, derived from the Greek words neos ("young") and teinein ("extension"). The term neoteny was coined in 1885 when describing the sexual maturation of salamanders. It was interpreted as "the retention of juvenile features" and considered a form of human evolution. Subsequently, researchers gradually adopted this understanding and usage of the term, applying it to explain human evolutionary characteristics [1]. Initially, neoteny was defined as "paedomorphosis" caused by delayed physical development, where adult offspring retain juvenile morphological traits [2]. These include two types: precocious puberty resulting from accelerated maturation (progenesis) and neoteny due to delayed development [3]. In later publications, a more accessible definition was provided, stating that in neoteny, development slows down and the juvenile stages of ancestors become characteristics of adult offspring [4]. Many core features of human anatomy connect us with non-human primate fetuses and juvenile stages. It is posited that adult offspring exhibit characteristics of their juvenile ancestors, a phenomenon termed neoteny. The neoteny theory suggests that childhood serves as a "reservoir" for latent adaptations.

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In essence, evolutionary psychologists contend that modern humans retain Stone Age cognitive frameworks in their skulls. The key to understanding contemporary brain function lies in recognizing that its neural architecture was designed for our hunter-gatherer ancestors rather than modern lifestyles. The specialized processing of certain tasks in our brains, while less adept at others, stems from millions of years of evolutionary experience [5]. If modern infants represent Stone Age ancestors, then play-oriented children embody the tens of thousands of years of exploration by our Stone Age forebears.

Humans have evolved—and continue to evolve—toward greater "psychological immaturity." What appears as psychological immaturity is actually the persistence of youthful attitudes and behaviors into adulthood, which constitutes a valuable developmental trait. Highly educated individuals and renowned scientists often exhibit more pronounced characteristics of this nature. Adult learning capacity is also a feature of this developmental state. Similarly, physical immaturity in humans can trigger psychological traits such as curiosity, playful tendencies, emotional sensitivity, sociability, and cooperative preferences. Research conducted on thousands of individuals who achieved remarkable success in fields such as science, literature, arts, and business has highlighted this phenomenon. It has been noted that while these individuals are selected for their maturity, they are simultaneously immature. This immaturity of self-actualized individuals is termed "healthy immaturity," or a "rejuvenated innocence." This is viewed by some as a "regression that promotes self-development" and a "necessary condition for mental health." This demonstrates that many self-actualized individuals maintain a childlike state, embodying psychological immaturity.

It is evident that neoteny constitutes a holistic and multifaceted process, with each aspect intricately linked to brain evolution. This phenomenon encompasses the genetic traits of species, the social nature of culture, and the emotional and intellectual characteristics of individuals. It creates superior conditions for the self-renewal and development of social cultures while also ensuring optimal emotional, intellectual, and creative growth for individuals from birth to old age [6]. Neoteny forms the biological foundation of human childhood culture. As a biological evolutionary theory, it reveals the phenomenon of childhood traits persisting into adulthood. This framework emphasizes the extension of juvenile characteristics during biological development, demonstrating how certain early traits are carried into adulthood as part of evolutionary processes. Neoteny manifests not only anatomically—such as the similarity between human anatomical features and those of non-human primates in their juvenile stages—but also psychologically, through the continuation of "youthful" traits like curiosity, emotional expression, playfulness, and sociality in adults. These qualities hold significant value in adult learning, creativity, and social adaptation, reflecting a psychological regression toward growth.

In conclusion, the persistence of childhood traits is not merely a form of biological evolution, but also a vital characteristic of psychological growth and self-actualization. By retaining traits from childhood, individuals maintain curiosity, creativity, and a proactive learning attitude. These qualities enable them to continuously explore and grow in daily life and work, even maintaining a "childlike" mindset when facing complex challenges. This "healthy naivety" helps people find joy and fulfillment in adulthood while experiencing the enduring value of childhood innocence and the spirit of exploration through ongoing self-actualization.

3. The Significance of the "Play Period" from the Perspective of "Neoteny"

Numerous researchers have identified multifaceted functions and values in play [7]. It has been linked to the highest level of human development, viewed as the assimilation

of external objects, and recognized for advancing tool use and problem-solving abilities. Play also contributes to self-concept development, serves as a crucial force in linguistic and cognitive growth, and provides a means to vent negative emotions while adapting to environments [8]. It offers opportunities to develop motor skills and learn through minimal consequences. As a "self-activating practice," play enables experimentation with social roles and the acquisition of functional capabilities. It has been metaphorically described as a "kaleidoscope of behaviors." Recent studies increasingly recognize play's pivotal role in neural development, helping children build complex, skilled, sensitive, socially flexible, and cognitively adaptable brains. The kaleidoscopic diversity of games provides a varied and sensitive behavioral repertoire for young animals. What kind of activities possess such rich and profound adaptive functions? Analyzing games solely from cultural or biological perspectives would oversimplify the issue [9]. It is difficult to accurately define games—a complex life phenomenon—from logical, biological, or aesthetic angles. Games are concrete manifestations of neoteny in human behavior, while also serving as tools for developmental influence through neoteny. Game phenomena are widely present during the immature stages of many mammals and are most likely to emerge in organisms with flexible behaviors and particularly delayed maturation [10].

4. Educational Implications

4.1. The Continuity of Neoteny and Play from a Biological Perspective

The theory of persistent juvenile traits posits that certain developmental characteristics are retained and carried over into adulthood during species evolution. These traits—particularly curiosity, exploratory behavior, and playfulness—show particularly pronounced expression in mammalian juveniles. As a biological behavior, children's play embodies the continuation of juvenile traits, enabling them to explore and adapt to their environment through play during growth. This biological foundation underscores that play is not merely a cultural phenomenon but an innate developmental need, representing a natural behavior of young individuals. Therefore, the implication for contemporary educators is:

4.1.1. Emphasizing Children's Play and Exploratory Behaviors

The theory of persistent juvenile traits posits that children retain many early-life characteristics—such as curiosity, exploratory tendencies, and playfulness—that remain crucial for adaptation in adulthood. From a biological perspective, these "juvenile traits" enable individuals to learn, adapt to their environment, and prepare for future complex behaviors during their immature stages. Through play, children not only develop cognitive abilities but also enhance social skills, emotional regulation, and practical skills.

The implication is that in the current education system, especially in the early education stage, play should be regarded as an important part of learning, and teachers should provide children with enough space for free exploration and encourage them to acquire knowledge and skills through hands-on practice and play.

4.1.2. Prolonging the "Immaturity Period" of Children

Biologically, neoteny (a biological phenomenon where organisms remain in a juvenile state) prolongs an organism's developmental process, allowing individuals to remain in a relatively "safe" immature state for extended periods. During this phase, individuals can accumulate experience and behavioral strategies through play, exploration, and imitation. Providing them with sufficient time and space for self-discovery and skill development. Compared to adult learning, childhood learning is more exploratory and experimental, requiring greater freedom and flexibility.

4.1.3. Support for Individual Differences and Personalized Development

A central tenet of biological continuity posits that perpetuating juvenile traits enhances species adaptability. This implies that individuals can adapt to environments through diverse means, with biological adaptability rooted in flexible behavioral patterns. In education, it is essential to respect children's individual differences, support varied learning approaches, and foster personalized development.

Insight: Education should foster personalized teaching by respecting each child's interests and learning pace. Through diverse approaches like project-based learning and individualized tutoring, we can address children's varied needs in cognitive, emotional, and social skill development. A flexible and inclusive educational environment allows every child to discover the joy of learning at their own rhythm and in alignment with their interests.

4.1.4. Harnessing Behavioral Plasticity for Innovation

From a biological standpoint, neoteny grants humans a prolonged window of neural plasticity. This "open-ended" development allows for behavioral flexibility, enabling individuals to generate novel solutions to environmental challenges. Education should leverage this biological advantage by treating the classroom as a laboratory for evolutionary-style "trial and error."

Insight: Education should prioritize "divergent thinking" activities that mimic biological exploration. By moving beyond rote memorization and toward open-ended problem-solving, schools can preserve the species' innate capacity for innovation. This approach ensures that the biological "plasticity" of childhood is transformed into the functional "creativity" required for survival and progress in a complex society.

4.2. *The Continuity of Immaturity from the Perspective of Psychology*

4.2.1. Sustaining Intrinsic Curiosity and the "Beginner's Mind"

Psychologically, neoteny manifests as an enduring "juvenile" curiosity—a state of being perpetually open to new information without the constraints of adult cynicism or rigid cognitive schemas. Rather than seeing curiosity as a phase to be "outgrown," educators should view it as a psychological engine that powers lifelong learning and mental health.

Insight: Pedagogy should transition from "result-oriented" instruction to "inquiry-based" learning. By designing thought-provoking questions and maintaining an environment where "not knowing" is seen as a starting point for discovery, teachers can sustain the student's intrinsic drive. This psychological support helps students maintain a "rejuvenated innocence," allowing them to approach complex global challenges with the same fearless exploration characteristic of early childhood.

4.2.2. Emphasis on Emotional and Social Development

Neoteny extends beyond physical traits to encompass psychological characteristics. Specifically, it manifests as emotional dependence, social interaction needs, and sustained play behavior. Psychological studies reveal that children acquire not only concrete knowledge and skills through play, but also develop social competence, emotional regulation, and teamwork abilities via interpersonal interactions. Play serves not only as a cognitive development tool but also as a crucial pathway for emotional growth.

Insight: Education should prioritize children's emotional needs and social development by providing more opportunities for social interaction and emotional expression. Teachers should create supportive learning environments to cultivate empathy, teamwork skills, and self-regulation abilities. Through group collaborative learning, collective activities, and interactive games, students can grow through social engagement.

4.2.3. Support for Children's Self-Expression and Creativity

The theory of persistent juvenile development further emphasizes that many seemingly immature behaviors in children's development (such as fantasy, play, and imitation) are actually crucial components of psychological and creative growth. Leading developmental psychologists have highlighted that symbolic thinking and pretend play are essential for children's cognitive development, language acquisition, and creativity cultivation. Play and fantasy serve not only as emotional outlets but also as vital means for children to understand the world and construct their self-concept.

Insight: Education should emphasize children's creativity and self-expression, encouraging students to freely create and express their individuality. Curriculum design can incorporate elements like art, drama, and literary creation to help students express themselves and unleash their imagination through creative activities, thereby stimulating their innovative thinking. Furthermore, education should encourage students to ask questions and share unique perspectives in class, fostering their confidence and ability to express themselves in distinctive ways.

4.2.4. Respect for Children's Rhythm and Individual Differences

From a psychological perspective, the persistent infantile state suggests a "delay" in children's cognitive and emotional development. Compared to other species, human children undergo a longer developmental process, providing them with extended periods to learn, explore, and grow. This provides a theoretical foundation for psychologists to support "developmental education," emphasizing that teachers and caregivers should respect each child's unique developmental pace and avoid prematurely imposing adult-imposed standards or overly strict social expectations. Children exhibit variations in cognitive abilities, emotional development, and social adaptability, necessitating educational strategies tailored to individual differences.

4.2.5. Promoting Emotional Regulation and Coping Strategies in Children

The theory of persistent immaturity emphasizes that children retain certain seemingly "immature" behavioral traits (such as dependence and fantasy) during their immature stage. These traits not only aid in emotional regulation but also enhance their ability to cope with external pressures and challenges. Psychological research indicates that when facing difficulties or stress, children often express and regulate their emotions through play, fantasy, and role-playing. This helps alleviate anxiety, accumulate psychological energy, and strengthen their adaptability to the environment.

4.2.6. Strengthening "Healthy Immaturity"

It has been observed that "self-actualized individuals" often exhibit a "healthy naivety"—a blend of innocence, curiosity, and a spirit of exploration. This aligns with the "neoteny" theory, which posits that adults retain certain childlike traits, underscoring the significance of retaining childhood psychological characteristics in the adult world. Healthy naivety serves not only as a hallmark of mental well-being but also as a wellspring of innovation and creativity.

5. Conclusion

The theory of "neoteny" provides profound biological and psychological insights into the value of childhood and play. From an evolutionary standpoint, humans retain childhood traits such as curiosity, exploration, and playfulness by delaying development. These traits are not only a natural way for children to learn but also form an essential source for creativity, emotional regulation, and social adaptability in adulthood. The play period, as a concentrated manifestation of neoteny in individual development, is a critical stage for children's cognitive construction, social development, and emotional expression.

In today's education system, the pursuit of efficiency and outcomes often compresses children's playtime, imposing academic pressure too early and neglecting the developmental laws revealed by neoteny. Education should reconsider the educational value of play, viewing it not as an adjunct to learning but as a fundamental way for children to actively construct the world. Specifically, educators should create environments that allow for free exploration, respect individual developmental rhythms, encourage curiosity and creativity, focus on emotional and social development, and cultivate the comprehensive abilities children need to face future challenges. On a broader scale, neoteny not only pertains to children's growth but also points to the continuation and innovation of human civilization. The "healthy immaturity" of adults—the curiosity about the world, the exploration of the unknown, and the appreciation of cooperation and emotions—is the intrinsic driving force behind social progress. Therefore, respecting the play period and valuing childhood traits is not only a response to children's nature but also a safeguard for human developmental potential.

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