Developmental Characteristics and Mechanisms of Children' s Distinction Between Fantasy and Reality: Postprint

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Abstract

Fantasy refers to imagination oriented toward the future, associated with personal wishes, and not necessarily based on objective laws. Reality consists of things or phenomena that exist in daily life or are consistent with the laws of our existence. Accurately distinguishing between fantasy and reality is beneficial for protecting children' s imagination while ensuring their personal safety. Domestic and international research has found that children' s ability to distinguish fantasy from reality improves with age; it is influenced by external factors (emotional tone of experimental materials, character and theme types) and internal factors (individual emotional perception intensity, experience); language, metacognition, theory of mind, and cognitive neuroscience may be the mechanisms underlying children' s distinction between fantasy and reality. Future research needs to explore the possible moderating effects of various mechanisms between children' s age and their ability to distinguish fantasy from reality, as well as the cognitive neuroscience of children's confusion between fantasy and reality. On this basis, effective measures that both protect children' s imagination and ensure their personal safety should be further clarified.

Full Text

The Developmental Characteristics and Mechanisms of Children' s Distinction Between Fantasy and Reality

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Abstract

Fantasy refers to imagination directed toward the future and associated with personal desires, not necessarily based on objective laws. Reality refers to things or phenomena that exist in daily life or are consistent with the laws of our existence. Accurately distinguishing between fantasy and reality helps protect children' s imagination while ensuring their personal safety. Research both domestically and internationally has found that children' s ability to distinguish fantasy from reality improves with age; it is influenced by external factors (emotional valence of experimental materials, character and theme types) and internal factors (individual emotional perception intensity and experience). Language, metacognition, theory of mind, and cognitive neuroscience may constitute the mechanisms underlying children' s distinction between fantasy and reality. Future research needs to explore the possible moderating effects of various mechanisms on the relationship between children' s age and their ability to distinguish fantasy from reality, as well as the neural mechanisms underlying children's confusion between fantasy and reality. On this basis, effective measures that both protect children' s imagination and ensure their personal safety should be further clarified.

Keywords: fantasy; reality; children

Imagination is the process of transforming existing mental representations to form new images, including fantasy that is associated with personal desires and not necessarily bound by objective laws (Peng, 2004). Children' s media, such as animated cartoons, contains substantial fantasy content. For example, in *Ultraman*, the character Orb Ultraman flies into the sky to defeat the monster Maga-Basser. For children, fantasy is a double-edged sword. On one hand, it can stimulate children' s imagination, provide them with joy, and offer emotional solace when they feel powerless (Tower, Singer, Singer, & Biggs, 1979). On the other hand, children's limited cognitive understanding of the world, combined with their strong imitative abilities, may lead them to adopt fantasy-based behavior patterns, resulting in erroneous or even dangerous actions (Bandura, 1977; Richert & Schlesinger, 2017). Numerous incidents have been reported in recent years. For instance, in May 2010, a four-year-old boy who idolized the flying Ultraman believed he could also fly and jumped from his eighth-floor apartment, fortunately surviving without life-threatening injuries. Similarly, in March 2017, a five-year-old girl attempted to "fly" from the eleventh floor with an umbrella, imitating a cartoon scene, and suffered severe injuries.

This double-edged sword creates a dilemma regarding how to both protect children' s imagination and ensure their personal safety. The key to resolving this dilemma lies in understanding whether children can accurately distinguish between fantasy and reality, where reality refers to things or phenomena that exist in daily life or are consistent with the laws of our existence (Woolley, 1997). Previous domestic research has examined the developmental trends and influencing factors in children' s ability to distinguish fantasy from reality, but the underlying mechanisms remain unclear. Therefore, this paper analyzes rel-

evant research from both domestic and international sources to clarify issues concerning the developmental trajectory, influencing factors, and mechanisms of children' s distinction between fantasy and reality, providing a foundation for identifying effective measures that protect children's imagination while ensuring their safety.

1. Developmental Trends in Children's Distinction Between Fantasy and Reality

Fantasy content originates from individuals' reprocessing of memory representations in the brain (Peng, 2004). Therefore, children are not born with fantasy; rather, as the structure of their cerebral cortex develops and matures, memory emerges around ages 2–3, followed by the emergence of fantasy (Miao, Lin, Liu, Lü, & Zhong, 2010). Due to insufficient personal knowledge and limited cognitive resources, children' s early fantasy often consists of free associations without clear purpose or coherent themes. Only as they grow older and their understanding of the physical and social world improves does fantasy begin to acquire purpose and meaning around ages 4–5 (Wang, 2010).

Research has categorized the content of fantasy and reality into events and characters, demonstrating that children can accurately distinguish fantasy events from real events by ages 5–6, and fantasy characters from real characters by ages 7–8, reaching adult levels of performance (Li, Boguszewski, & Lillard, 2015; Martarelli & Mast, 2013; Martarelli, Mast, Läge, & Roebers, 2015; Maftei & Măirean, 2017). Li et al. (2015) extracted fantasy and reality events from animated videos and asked children aged 4–6 and adults to distinguish between them. Results showed that four-year-olds' ability to distinguish fantasy events from reality was lower than that of six-year-olds and adults, while five- and six-year-olds performed similarly to adults. Additionally, Martarelli and Mast (2013) presented fantasy and reality characters to children aged 3–8 and adults, asking them to make distinctions. They found that 5–6-year-olds' ability to distinguish fantasy characters from reality was lower than adults' , whereas 7–8-year-olds showed no significant difference from adults.

Children accurately distinguish fantasy events from reality at a younger age than they do for fantasy characters. This may be because fantasy events often violate physical principles and rarely occur in real life, making younger children more likely to express surprise and conclude that such events do not exist. In contrast, children frequently encounter people dressed as fantasy characters in real life, such as Snow White at Disneyland, which may evoke positive emotions and lead children to believe in the existence of fantasy characters (Li, 2014; Li et al., 2015).

2.1 External Factors

Children distinguish fantasy from reality based on contextual cues provided by stimulus materials, with different contexts leading to different judgments.

Existing research suggests that the emotional valence of experimental materials (positive, neutral, negative), character type (real person, cartoon), and theme type (fantasy, science, daily life) may influence children' s judgments about fantasy and reality (Qiu, 2016; Metlicar, 2014; Woolley & Van, 2006).

First, the emotional valence of experimental materials affects children' s distinction between fantasy and reality. Researchers have shown that children can typically distinguish neutral fantasy and reality objects accurately, while believing that positive fantasy and reality objects exist in real life and that negative fantasy and reality objects do not exist (Qiu, 2016; Metlicar, 2014; Samuels & Taylor, 1994). Samuels and Taylor (1994) presented pictures of neutral and negative fantasy and reality objects to children aged 3–5 and asked whether the pictured content existed in real life. Results indicated that children believed neutral reality objects existed and fantasy objects did not, while negative fantasy and reality objects were both believed to be nonexistent. Qiu (2016) presented pictures of positive emotional objects to preschool children and asked them to judge whether the objects could appear in real life. Results showed that children aged 3.5–4.5 believed positive fantasy and reality objects existed in life. This may be because children regulate their emotions by believing positive objects exist and negative objects do not (Carrick & Quas, 2006; Woolley, 1997).

Additionally, research has examined how different types of negative emotional materials affect children' s distinction between fantasy and reality, showing that children believe frightening and angry objects do not exist in real life, while sad objects do (Carrick & Ramirez, 2012; Metlicar, 2014). Carrick and Ramirez (2012) showed pictures of sad and frightening fantasy and reality events to children aged 3–5 and asked whether the pictured content could happen in real life. Four- and five-year-olds claimed that sad events might happen, while frightening events would not. Metlicar (2014) obtained similar results and demonstrated that children also believed angry fantasy and reality events would not occur in real life. This can be explained by approach-avoidance mechanisms: sad events elicit attention or empathy, creating an approach mindset, whereas frightening and angry events may threaten health or cause negative emotions, creating an avoidance mindset. Children reduce negative emotions by denying that frightening and angry events will occur.

Second, character type in experimental materials influences children' s distinction between fantasy and reality. Animated cartoons are a very important "friend" in children' s development, containing substantial amounts of both fantasy and reality. Increasingly, cartoons feature both real human actors and cartoon characters, such as in the live-action version of *Balala the Fairies*, which includes the human character Ling Meiqi and the cartoon character Xue Feifei. Research has termed such programs combining real people and cartoon characters "live-action animation" (Chen, 2016; Lai, 2017). Major video platforms like iQiyi and Youku also have a "live-action" category under their animation sections.

In live-action animation, settings and character images are relatively consistent

with real life, which may more easily lead children to credulously judge fantasy content as real. Li et al. (2015) supported this view by extracting fantasy and reality events from *Happy Planet* (live-action) and *SpongeBob SquarePants* (cartoon) and asking children aged 4–6 to distinguish them. Results showed that compared to fantasy events from *SpongeBob SquarePants*, four-year-olds were more likely to believe that fantasy events from *Happy Planet* could occur in real life.

Third, the theme type of experimental materials affects children' s distinction between fantasy and reality. While watching cartoons or reading picture books, children encounter many novel things. Due to their limited understanding of the world, they may lack the ability to make direct judgments about whether something is fantasy or reality and instead make indirect judgments based on the theme type of the experimental materials (Woolley & Van, 2006). Woolley and Van (2006) randomly assigned children aged 3–6 to fantasy, science, or daily-life theme groups and read them corresponding novel stories. Afterward, they asked participants to judge whether the stories existed in real life. Results showed that children tended to classify novel stories presented in daily-life or scientific ways as reality, while classifying fantasy-themed stories as fantasy. This may be because children' s prior knowledge and experience have taught them about the authority of science and the universality of daily-life objects, making them more likely to believe stories presented in scientific and daily-life themes.

2.2 Internal Factors

Existing research suggests that individual emotional perception intensity and experience may influence children' s judgments about fantasy and reality (Petkova & Cain, 2017; Samuels & Taylor, 1994; Woolley, Boerger, & Markman, 2004).

First, regarding individual emotional perception intensity. Due to differences in emotional perception intensity, different individuals perceive the same emotional event differently, which in turn affects their judgment of fantasy or reality (Petkova & Cain, 2017; Samuels & Taylor, 1994). Samuels and Taylor (1994) showed preschool children pictures of neutral and frightening fantasy and reality events, asking whether the events would happen in real life and how frightening they found the pictures. Results showed that compared to children with lower fear levels, children with higher fear levels were more likely to believe that frightening events would not happen in real life. This may be because children who experience intense fear need to regulate their negative emotions by denying that the events will occur.

Additionally, children distinguish fantasy from reality through existing direct or indirect experience (Martarelli, Gurtner, & Mast, 2015; Woolley et al., 2004). Woolley et al. (2004) introduced preschool children to a fantasy character—the Candy Witch—one week before Halloween, explaining that she would visit their homes on Halloween night to exchange candy for toys. Children were divided

into two groups: an experimental group where the Candy Witch actually visited and exchanged candy for toys, and a control group where no visit occurred. After Halloween, children were asked whether they believed the Candy Witch existed. Results showed that compared to control group children, four- and five-year-olds in the experimental group were more likely to believe in the Candy Witch' s existence.

3. Mechanisms of Children' s Distinction Between Fantasy and Reality

In recent years, a few researchers have explored the mechanisms underlying children' s distinction between fantasy and reality from perspectives including theory of mind, language, metacognition, and cognitive neuroscience, to better predict and understand how children distinguish and comprehend fantasy and reality (Abraham, Von Cramon, & Schubotz, 2008; Aguiar & Taylor, 2012; Martarelli et al., 2015).

Regarding theory of mind, "theory of mind" refers to individuals' reasoning or cognition about their own and others' mental states and their relationship to behavior (Gopnik & Astington, 1988). A common test method for theory of mind is the "false belief" task, which includes measuring children' s ability to distinguish mental from reality states. Children' s distinction between fantasy and reality depends on abilities formed when distinguishing mental from reality states (Martarelli et al., 2015). Therefore, children' s ability to distinguish fantasy from reality may be related to their performance on false belief tasks. Martarelli et al. (2015) examined 4–5-year-olds' ability to distinguish fantasy from reality and their performance on false belief tasks, finding a positive correlation between the two. Corriveau and Harris (2015) obtained similar results.

Regarding language, language is a social phenomenon—a symbol system composed of highly structured sound combinations or constructed through writing and gestures, and simultaneously a behavior that uses these symbols to exchange ideas (Peng, 2004). Children use language to understand the world, exchange ideas, and express emotions. Therefore, children' s language development level may predict their ability to distinguish fantasy from reality. Carrick and Quas (2006) examined 3–5-year-olds' ability to distinguish fantasy from reality and their language development level, finding a positive correlation between the two. Martarelli et al. (2015) and Corriveau and Harris (2015) obtained similar results.

Regarding metacognition, metacognition refers to "cognition about cognition," which monitors, controls, and evaluates cognitive content and processes (Brown, 1978). In other words, while completing cognitive tasks, people also take their own cognitive activities as objects of cognition, obtaining relevant knowledge that affects cognitive processes and outcomes through introspection and other means, forming judgments about cognitive results that in turn affect the subject' s cognitive activities. Therefore, children' s metacognitive abilities may influence their distinction between fantasy and reality to some extent (Woolley &

Ghossainy, 2013). If children have low metacognitive abilities and believe their understanding of something is relatively comprehensive, they are more likely to make judgments based on their own knowledge. However, due to their limited knowledge and experience, they are likely to make incorrect judgments. Conversely, if children have high metacognitive abilities and recognize that they do not fully understand something, they are more likely to obtain additional information from knowledgeable others, thereby making more accurate judgments. Aguiar and Taylor (2012) demonstrated this view by asking 4-6-year-olds to answer 24 questions, giving them two choices: answer independently if they were certain of the correct answer, or consult an expert puppet if uncertain. Results showed that four- and five-year-olds had low metacognitive abilities, often overestimating their knowledge and making incorrect independent judgments, while six-year-olds had higher metacognitive abilities, knowing when to answer independently and when to seek the expert puppet' s help, thereby answering correctly.

Regarding cognitive neuroscience, a few studies have shown that distinguishing fantasy from reality is associated with the medial prefrontal cortex and posterior cingulate cortex (Abraham et al., 2008; Abraham & Cramon, 2009). Abraham et al. (2008) asked adults to judge whether content described in sentences could occur in real life, using functional magnetic resonance imaging to measure brain activation during judgment. Results showed that compared to judging fantasy events, judging reality events activated the medial prefrontal cortex and posterior cingulate cortex. This may be because these brain regions are frequently involved in evaluative judgments, episodic memory retrieval, and self-referential tasks (Hu, 2015; Zhang, 2015; Cavanna & Trimble, 2006). Although we have considerable knowledge about fantasy worlds, the real world is more relevant to us and we know more about it. Therefore, the real world more easily triggers automatic memory retrieval and self-referential processing, activating the medial prefrontal cortex and posterior cingulate cortex (Abraham et al., 2008).

4. Summary and Future Directions

4.1 Summary

In summary, children' s ability to distinguish fantasy from reality improves with age and is influenced by both external and internal factors. Theory of mind, language, metacognition, and cognitive neuroscience may constitute the mechanisms underlying this ability.

Existing research has shown that preschool children may confuse fantasy with reality, believing that fantasy characters and events with positive emotional valence exist in real life (Qiu, 2016; Metlicar, 2014). Additionally, empirical research and incident reports demonstrate that confusing fantasy characters with positive emotional valence may bring children joy and provide emotional solace when they feel powerless, while confusing fantasy events with positive emotional valence (particularly those violating physical principles) may create

safety hazards (Qiu, 2016). Therefore, children' s ability to distinguish fantasy events from reality can be improved in two ways to protect their imagination while ensuring their safety.

From parents' and teachers' perspectives, first, physical principles should be gradually introduced in daily life according to children' s level of scientific understanding. For example, demonstrating an egg falling from a height can help children understand gravity and recognize that people or objects cannot float without external force. Second, attention should be paid to developing children' s language, metacognition, and theory of mind abilities to improve their overall cognitive understanding of the world.

From a cultural communication perspective, first, live-action animation should not present fantasy events with positive emotional valence. Second, cartoons or picture books with scientific or daily-life themes should not present fantasy events. Finally, relevant cultural departments should establish rating systems for cartoons and picture books; for example, those for children under 5–6 years should not present fantasy events.

4.2 Future Research Directions

First, existing research has shown that children' s ability to distinguish fantasy from reality improves with age and may be related to language, theory of mind, and metacognition (Abraham et al., 2008; Aguiar & Taylor, 2012; Martarelli et al., 2015). Future research should explore the possible moderating effects of language, metacognition, and theory of mind on the relationship between children' s age and their ability to distinguish fantasy from reality, to clarify the contributions of various mechanisms to this ability at different developmental stages.

Second, compared to preschool children, adults can more accurately distinguish fantasy from reality. Research has shown that compared to judging fantasy events, adults' judgment of reality events activates the medial prefrontal cortex and posterior cingulate cortex (Abraham et al., 2008; Abraham & Cramon, 2009). Do children show similar brain activation patterns when distinguishing fantasy from reality? Future research could use functional near-infrared spectroscopy (fNIRS), which is more suitable for children, to explore the neural mechanisms underlying children' s confusion between fantasy and reality.

Third, cartoons are a very important "friend"in children's development. Children spend considerable time watching cartoons daily, gaining extensive knowledge about the world from them (Chen & Wang, 2014; Dong et al., 2015). Therefore, future research could extract fantasy and reality clips from cartoons to investigate age differences, influencing factors, and mechanisms in children' s ability to distinguish fantasy from reality in animated content, helping producers, parents, and teachers create and select cartoons that better support children' s development.

Finally, future research could use laboratory observation methods to video-record parent-child interactions while watching cartoons together (such as discussing or evaluating fantasy plots) and ask children about their judgments of fantasy and reality in cartoons and their reasoning. This would explore differences in interaction behaviors between different caregivers (parents, grandparents) and their effects on children' s ability to distinguish fantasy from reality, providing data support and effective methods for parent-child co-viewing interactions.

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Note: Figure translations are in progress. See original paper for figures.