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EFFECT OF REALITY-DISTANCING ON FALSE BELIEF

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THE EFFECT OF REALITY-DISTANCING ON
CHILDREN'S FALSE BELIEF UNDERSTANDING

A Master's Thesis

by

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To All Children



THE EFFECT OF REALITY-DISTANCING ON CHILDREN’S FALSE
BELIEF UNDERSTANDING

Graduate School of Economics and Social Sciences
of
İhsan Doğramacı Bilkent University

by

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THE EFFECT OF REALITY-DISTANCING ON CHILDREN'S FALSE BELIEF
UNDERSTANDING

By Ece Tuğlacı

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ABSTRACT

THE EFFECT OF REALITY-DISTANCING ON CHILDREN’S FALSE BELIEF UNDERSTANDING

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July 2023

The socio-cultural theory has emphasized the effect of the co-constitutive nature of the narrative discourse on FB understanding, whereas simulation theory asserted that imagination is a cognitive ability that scaffolds perspective-taking which underlies children’s developing abilities to understand FBs. Elements of fantasy have been indiscriminately used in correlational and intervention studies that examined the factors that affect children’s understanding of FBs. However, there are two evidence-based reasons to expect that children would benefit from fantasy elements (i.e., increased levels of engagement and reality-distancing inherent in fantastical media contexts).

The current project aims to examine the effects of varying degrees of fantasy on false belief (FB) tasks. To do so, the present studies utilize FB tasks (i.e., contents FB and change of location) in which children are presented with FB tasks that include fantastical and realistic characters as protagonists within fantastical and realistic settings, respectively. Study 1 tested the effects of the degree of fantasy and the order of receiving manipulations. The increasing degree of fantasy increased preschoolers' performance on FB tasks. Study 2 explored the same effects with a more targeted sample using an additional fantasy-orientation measure. The results replicate the effect of the degree of fantasy and suggest encountering fantastical content before realistic content selectively scaffolds younger children's performance on FB tasks. This is despite their lack of orientation toward enjoying fantastical content. Thus, the discussion of the findings and future studies emphasizes the significance of reality-distancing provided by the fantastical content included in FB tasks.

Keywords: Theory of Mind, Fantastical Fiction, Realistic Fiction, Reality-distancing
Fantasy Orientation

ÖZET

GERÇEKLİKTEN UZAKLAŞTIRAN İÇERİĞİN ÇOCUKLARIN YANLIŞ KANI BECERİLERİ ÜZERİNDEKİ ETKİSİ

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Sosyo-kültürel teori, anlatının yanlış kanı (YK) anlayışı üzerindeki yapıcı doğasının etkisini vurgularken, simülasyon teorisi, hayal gücünün, çocukların YK'ları anlama becerilerini geliştirmesinin altında yatan, perspektif almayı destekleyen bilişsel bir yetenek olduğunu ileri sürer. Çocukların YK'ları anlamalarını etkileyen faktörleri inceleyen korelasyonel ve müdahale çalışmalarında fantezi unsurları gelişigüzel kullanılmıştır. Bununla birlikte, çocukların fantezi unsurlarından fayda sağlamasını beklemek için kanıta dayalı iki neden vardır (fantastik medya bağlamlarının doğasında bulunan dikkat-arttırma ve gerçeklikten uzaklaşma).

Bu proje YK görevlerinde deęişen fantezi içerięi derecelerinin etkilerini incelemeyi amaçlamaktadır. Bunu yapmak için, mevcut iki çalışma, hikaye karakteri ve yeri olarak yüksek fantezi içerięi derecesi (fantastik kurgu) ve düşük fantezi içerięi derecesi (gerçekçi kurgu) içeren YK görevlerini (içerik YK ve yer deęişikliği) kullanmıştır. Çalışma 1'de, fantezi içerięi derecesinin ve manipölasyonları alma sırasının etkileri test edilmiştir. Artan fantezi içerięi derecesi, okul öncesi çocukların YK görevlerindeki performansını arttırmıştır. Çalışma 2' de ek olarak fantazi yönelimi ölçeęi kullanarak daha hedefli bir örnekleme aynı etkileri araştırılmıştır. Sonuçlar, artan derecede fantezi içerięinin etkisini tekrarlamış (*replicate*) ve gerçekçi içerikten önce fantastik içerikle karşılaşmanın, küçük çocukların yüksek fantazi yönelimleri olmamasına rağmen YK görevlerindeki performanslarını seçici bir şekilde desteklediğini göstermiştir. Sonuçlar ve gelecekteki çalışmalar, görevlerde yer alan fantastik içerik ile gerçeklikten uzaklaşmanın çocukların YK performanslarındaki önemini açısından tartışılmıştır.

Anahtar Sözcükler: Zihin Kuramı, Fantastik Kurgu, Gerçekçi Kurgu, Gerçeklikten Uzaklaştırma, Fantezi Yönelimi.

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TABLE OF CONTENTS

ABSTRACT.....	iii
ÖZET	v
ACKNOWLEDGMENT	vii
TABLE OF CONTENTS.....	viii
LIST OF TABLES	xi
LIST OF FIGURES	xii
CHAPTER I	1
1.1. False Belief.....	2
1.2. Theories of False Belief Development	4
1.2.1. Simulation Theory	4
1.2.2. Socio-Cultural Theory.....	5
1.3. Perspectively-rich Contexts and FB Development.....	6
1.3.1. Pretend Play	7
1.3.2. Narrative Discourse	9
1.3.3. Storybook Reading	10
1.4. Fantastical Content	13
1.5. Boundaries of Setting and Protagonists in FB Tasks	14
1.6. Two Possible Hypothesis for Fantastical Fiction’s Effect on FB.....	15
1.6.1. Engagement	16
1.6.2. Reality-Distancing.....	17
1.7. The Current Study	20
CHAPTER I	23
2.1. Participants	24

2.2. Materials.....	24
2.2.1. Demographic Information Questionnaire	24
2.2.2. False Belief Measures.....	25
2.2.2.1. Contents False Belief Task	25
2.2.2.2. Change of Location Task	26
2.2.3. Day and Night Task.....	27
2.3. Design	28
2.4. Procedure	28
2.5. Results	33
2.5.1. Preliminary Analysis: EF, FB, and their interrelations.....	33
2.5.2. Correlational Relations between Cognitive Measures	36
2.5.3. Relations between Degree of Fantasy, Age, Order, and EF on FB	37
2.6. Study 1 Discussion	40
CHAPTER III	42
3.1. Participants	43
3.2. Materials.....	43
3.2.1. Demographic Information Questionnaire.....	43
3.2.2. False Belief Measures.....	43
3.2.3. Day and Night Task	43
3.2.4. Dimensional Card Sort Task.....	44
3.2.5. Fantasy-Orientation Measure	46
3.3. Design	47
3.4. Procedure	47
3.5. Results	48
3.5.1. Preliminary Analysis: EF, FB, and Fantasy Orientation.....	49

3.5.2. Correlational Relations between Child Variables	53
3.5.3. Relations between Degree of Fantasy, Age, and Order on FB	54
3.6. Study 2 Discussion	56
CHAPTER IV	57
REFERENCES	65
APPENDIX.....	72



LIST OF TABLES

Table 1. Percentage of Children Who Passed Individual ToM Tasks	35
Table 2. Age-Controlled Correlations Between FB Scores and EF.....	36
Table 3. Percentage of Children Who Passed Individual ToM Tasks.....	50
Table 4. Age-Controlled Correlations Between Age, FB Scores, and EF.....	53

LIST OF FIGURES

Figure 1. Experimental Procedure	32
Figure 2. Children's EF Performance by Age and Gender.....	36
Figure 3. Children's FB Performance by Age and Degree of Fantasy	39
Figure 4. Children's FB Performance by Age and Order.....	39
Figure 5. Example Book Covers for Storybooks.....	46
Figure 6. Distribution of Participants, Based on Their DCCS Performances.....	49
Figure 7. Children's EF Performance by Age and Gender.....	50
Figure 8. Children's FB Performance by Age and Gender.....	51
Figure 9. Children's Fantasy Orientation Score by Age.....	52
Figure 10. Children's FB Performance by Age and Order.....	55

CHAPTER I

INTRODUCTION

In the theory of mind (ToM) literature, it has been widely hypothesized that preschoolers' experiences with perspectively-rich contexts such as pretend play (Jenkins & Astington, 1996; Youngblade & Dunn, 1995), narrative discourse (Astington & Pelletier, 2005; Guajardo & Watson, 2002), and storybook reading (Adrian et al., 2005) support the development of false belief (FB) understanding. However, researchers do not distinguish between the varying degrees of fantasy in pretend playing and narrative discourse for children's ability to understand false beliefs.

There is a recent surge of interest in studying children's learning in fantastical versus realistic storybooks (see for a review, Hopkins & Weisberg, 2017). Further, children can successfully learn about complex

socio-cultural phenomena such as emotions and mental states from stories. Classical FB tasks include realistic fictional stories that consist of realistic fictional characters and settings (i.e., Maxi has a false belief about the location of an object). Yet, no study has investigated the effect of varying degrees of fantasy included in FB tasks on children's understanding of such mental states.

There are two reasons to expect that including fantastical fiction in FB tasks might aid children's FB understanding. The first is motivational: children may process the task material more deeply because the fantastical elements might increase their engagement with the testing process (Hopkins & Lillard, 2021). The second is cognitive: fantastical stories may help children overcome the curse of knowledge (Farrar & Ostojic, 2018) and any egocentric bias (Epley, Keysar, Van Boven & Gilovich, 2004). While these biases are not identical, the reality-distancing component of stories with fantastical fictional elements may help children overcome both when engaging in FB understanding.

The current project investigated whether preschoolers' FB understanding (i.e., content, location FB) varied by the degree of fantasy (fantastic fiction and realistic fiction). Specifically, two studies investigated how using characters and settings with varying degrees of fantasy on FB tasks affects children's FB understanding.

1.1.False Belief

Individuals can contemplate others' perspectives and grasp their thoughts by distinguishing between themselves and others' (Helming, Strickland &

Jacob, 2014). Children's capacity to comprehend their own and others' mental states, as well as form predictions about other agents' behaviors based on those mental states, is referred to as Theory of Mind (ToM) ability (Wellman, Cross & Watson, 2001). Further, FB understanding is a significant indicator of ToM as it requires attributing a mental state to others that can contradict one's own beliefs (Wellman & Woolley, 1990). Many studies focus on FB understanding since its conceptual and empirical relations to mental state understanding are well established in the developmental psychology literature (Wellman et al., 2001).

Among the literature, scholars frequently focus on two FB tasks: change of location and contents FB (Salter & Breheny, 2019; He, Bolz & Baillargeon, 2011; Gopnik & Astington, 1988). These tasks have also been utilized to assess the FB performance of Turkish preschoolers. One study with a Turkish sample showed that 39.1% of 3-year-olds, 42.9% of 4-year-olds, and 81.6% of 5-year-olds passed the change of location task (Burumlu-Kisa, Sahin-Acar & Ilgaz, 2023). A second study utilizing the content FB task as a measure of FB understanding demonstrated that 37% of Turkish preschoolers succeeded on the contents FB task (Ilgaz, Allen & Haskaraca, 2022). According to the age groups, 17.0% of 3-year-olds, 40.0% of 4-year-olds, and 58.0% of 5-year-olds passed the content s FB task. Overall, change of location and content FB tasks show similar development in Turkish samples as in other groups.

1.2. Theories of False Belief Development

Many influential theories on ToM understanding exist within the developmental psychology literature. We want to mention two of these theories that have significantly influenced our understanding of the relation between fantasy and FB understanding: (a) simulation theory and (b) socio-cultural theory. Here we will examine each theory and its presuppositions, emphasizing the theoretical gaps in both theories' approach to the relation between fantasy and FB understanding.

1.2.1. Simulation Theory

Simulation theory suggests that understanding others' thoughts that differ from one's own depends on one's ability to take others' perspectives through a sort of simulation of the self but in the position of the other (Goldman, 2006; Gallagher, 2008). Recent neuroscience studies support the notion that self-awareness is necessary for imagining oneself in another person's circumstances (Morin, 2011). Moreover, Vogeley et al. (2001) demonstrate that the activation in the brain is shared between the other- and self-conditions for taking different perspectives during story reading. Thus, simulation theory asserts that individuals take the perspectives of others by imagining themselves in the other's circumstances (Goldman, 2006). Consequently, contexts rich in perspectives may be expected to aid FB understanding, such as pretend play and role-playing (Harris, 2005).

Supporting this theoretical link, some early findings of Jenkins and Astington (1996) suggested that children's pretend play was significantly

associated with their comprehension of FB. However, researchers do not distinguish between the effect of roleplaying fantastical or realistic characters on FB understanding abilities. Because according to simulation theory, any perspectively-rich context can aid FB understanding, whether fantastical or realistic.

Suppose that imagining oneself in another person's circumstances is easier during fantastical roleplay as it may be more immersive than realistic roleplay. In that case, fantastical elements might be more privileged in aiding individuals to take the perspective of others compared to realistic elements. Hence, it may be important to study how roleplay of characters with different degrees of fantasy can contribute to FB understanding differently.

1.2.2. Socio-Cultural Theory

Socio-cultural theory asserts that ToM and related FB understanding abilities are constructed within social interactions (Nelson, 2005).

According to socio-cultural theory, language is entwined with culture and vital for social interaction given that children use language to jointly form the meaning within these encounters (Ilgaz & Allen, 2020).

The emphasis on language is often studied in terms of children's exposure to narrative discourse. Several studies have demonstrated the impact of narratives, such as folktales and storybooks, on children's understanding of false belief. For instance, research has shown that children who are read more by their parents exhibit a better

understanding of false belief than children who are not read frequently (Adrian et al., 2005).

As with roleplay, the research on narrative discourse does not consider the degree of fantasy they include. Socio-cultural theory does not distinguish between narratives that have fantastical or realistic elements and their possible effect on false belief understanding. However, narratives can include excessively fantastical (e.g., fables) or realistic elements (e.g., everyday conversations about neighbors).

Suppose that narratives with varying degrees of fantasy include different levels of mental state words. In that case, narratives with varying degrees of fantasy may affect children's FB understanding differently. Hence, it is important not only to equate narratives for studying the effect on FB understanding but also to be aware that different degrees of fantasy in narratives may contribute to FB understanding differently.

1.3. Perspectively-rich Contexts and FB Development

Three perspectively-rich contexts define childhood: (a) pretend play, (b) narrative discourse, and (c) storybook reading. To understand the development of FB understanding in children, we will investigate the interplay between FB understanding and the abovementioned perspectively-rich contexts. Each perspectively-rich context for imagining oneself in another person's perspective will be explored with its relation to FB understanding.

1.3.1. Pretend Play

Pretend play is a form of play that includes nonliteral objects and actions (Weisberg, 2015). One of the main components of early pretend play is *object substitution* which can be defined as using one object in place of another. Object substitution can occur using real objects (e.g., banana-as-telephone) and body parts (e.g., hand-as-comb). During preschool, the gestural substitution then progresses into imaginary object gestures (e.g., shaping the empty hand as if holding a telephone, Suddendorf, Fletcher-Flinn, & Johnston, 1999). Due to the meta-representational parallels between object substitution during pretend play and FB understanding, the researchers focused on the relation between them. Consequently, Suddendorf and colleagues (1999) asserted that more sophisticated object substitution is related to higher performance on FB tasks.

Roleplay of oneself in another person's and characters' circumstances is another component of pretend play. Children selectively imagine themselves in another character's circumstances during roleplaying (e.g., pretending to eat differently in as cat versus a person). This may imply that children can attribute different mind/body states according to the characters they pretend to be. Moreover, children face different requirements of roleplaying when it is for fictional or realistic characters (e.g., pretending to cook mud while pretending to be an ogre but pretending to bake a cake while pretending to be a baker). This may imply that children can also attribute different mind/body states according to the reality status of the characters they pretend to be (Lillard & Sobel, 1999).

Jenkins and Astington (1996) demonstrated that children's roleplaying was significantly associated with their comprehension of FB. Also, by using longitudinal data, Youngblade and Dunn (1995) discovered that children's earlier participation in pretend play correlated positively with their FB performance seven months later. Thus, as Harris (2005) asserts, pretend play may provide a context that facilitates FB understanding for children.

Studies on pretend play do not distinguish between the content of roleplaying (e.g., roleplaying imaginary characters versus realistic characters) on children's FB understanding. Research targeting the content of pretend play often focuses on imaginary companions (Taylor & Carlson, 1997). As children are often aware that their imaginary companion is unreal (Taylor, 1999), having imaginary companions may exemplify one of the forms of fantasy production during pretend play.

Having imaginary companions is related to taking the perspectives of others (for a review, see Taylor, Shawber, & Mannering, 2012). For instance, a recent study illustrated that having imaginary companions is linked to attributing more mental states to nonhuman objects (Tahiroğlu & Taylor, 2019). As Taylor and Carlson (1997) demonstrated, engaging in pretend play including imaginary companions predicted preschoolers' FB understanding. Thus, the content of pretend play that children engage in can affect their development of FB understanding.

1.3.2. Narrative Discourse

Intervention studies targeting FB understanding have shown relations between narrative discourse and FB understanding. Everyday conversations are unique in providing a natural context to contemplate and articulate the mental states of third persons' (e.g., the subject of the topic). An intervention study with a middle-childhood sample suggests that conversations targeting mental states significantly enhance FB understanding (Lecce et al., 2014).

Some intervention studies have purposefully used stories with FB themes. In a series of studies, Guajardo and Watson (2002) introduced preschoolers to interventions that include storytelling sessions to emphasize the mental state words in the stories. Accordingly, these storytelling sessions included four stories (e.g., 'Hog-Eye') with *anthropomorphic* characters that do not conform to the norms of reality (e.g., a pig who tricks a wolf into sparing his life). The results suggested that FB understanding improved significantly after the narrative sessions, compared to the baseline FB understanding.

Oatley (1999) asserted that narratives that include imaginary content could aid our understanding of complex real-world situations by presenting real-world scenarios within cognitively flexible imaginary scenarios. Suppose contemplating third-person's mental states is easier in a narrative that includes content that does not conform to the norms of reality than in realistic content. In that case, the content of narratives that children engage in can affect their FB understanding.

1.3.3. Storybook Reading

Children can learn vocabulary and facts about the physical and social worlds from storybooks. Stories can also simultaneously include realistic elements as well as fantastical elements that do not conform to the laws of reality. To successfully learn from stories, children should overcome the *reader's dilemma*, which refers to the readers' difficulty in deciding which aspects of the story can be applied to real-world and which cannot (Weisberg & Hopkins, 2020; Hopkins & Weisberg, 2017). Previous literature suggests that preschoolers can successfully distinguish between the properties of the worlds that the real or fictional characters belong to (Skolnick & Bloom, 2006; Sharon & Woolley, 2004; Woolley & Van Reet, 2006), thus learning from stories appropriately.

Several studies have been conducted on learning from stories that contain varying degrees of fantasy, such as learning vocabulary and facts. Studies focusing on children's vocabulary learning from storybooks can include varying degrees of fantasy. For example, a recent intervention study investigated children's ability to learn vocabulary from realistic storybooks (e.g., about farms) and fantastical storybooks (e.g., about dragons) (Weisberg et al., 2015). The results demonstrated that children could learn target words from both realistic and fantastical storybooks.

Studies focused on learning physical facts from storybooks can include varying degrees of fantasy. For instance, children can also learn facts about the physical world (e.g., a stick can be used to retrieve an object that is out of reach) from anthropomorphic (Epley, Waytz, Akalis &

Cacioppo, 2008; Geerdts, Van de Walle & LoBue, 2016) and fictional characters (Richert & Schlesinger, 2016) in stories and transfer appropriate solutions to real-world situations.

To study children's learning of physical facts from storybooks that include varying degrees of fantasy, Hopkins and Lillard (2021) have conducted a detailed investigation. In a series of learning studies, children needed to transfer solutions presented in stories to a real-life setting. The design included four degrees of fantasy: fantasy with fantastical settings and protagonists, reality with realistic settings and protagonists, and two other lower degrees of fantasy in which either the setting or the protagonist was fantastical. Results indicated that the setting with the highest degree of fantasy revealed a more successful solution transfer to real settings than other lower degrees of fantasy.

We should note that while fantastical fiction liberally violates the rules of physical reality, it refrains from violating the facts about social-psychological reality. For instance, social constructs such as friendship, values such as virtuousness, and mental states such as emotions, beliefs, or false beliefs operate according to social reality as we know it. As the match of social-psychological reality between real world and the story world is established, the reader's dilemma does not hold for the facts about socio-psychological reality. Thus, children can learn about socio-culturally complex phenomena such as emotions, mental states, and social virtues from storybooks (e.g., 'Alice's Adventures in Wonderland') as well as take the perspectives of characters in storybooks.

Zunshine (2006) has argued that fictional stories might promote understanding of others' mental states. It may be the case because storybooks contain more mental-state expressions that offer higher chances of contemplating third-person's mental states than real-world situations (Dyer, Shatz & Wellman, 2000). Supporting this theoretical link Adrian and colleagues (2005) demonstrated that preschoolers who are read more regularly have higher FB understanding than children who are read less by their parents. Consequently, Boyd (2006) argues that storybooks that include fictional content unintentionally train our FB abilities.

Adult studies also argue that engagement with literary fiction (Kidd, Ongis & Castano, 2016; Kidd & Castano, 2013) and fictional movies (Castano, 2021) is related to FB performance regardless of the similarity level with fiction (Kidd & Castano, 2017). For example, lifelong fiction readers possess higher social abilities than nonfiction readers (Mar, Oatley, Hirsh, dela Paz & Peterson, 2006). On the contrary, Panero and colleagues (2017) found no support for the claim that literary fiction has an impact on enhancing theory of mind ability.

The standard ToM battery (Wellman & Liu, 2004) utilizes fictional stories that include settings and characters (i.e., Maxi) that carry realistic fictional features such as conforming to a human shape and having human names (Wimmer & Perner, 1983). For example, in change of location task, Maxi may search for a chocolate in various places, and the characters involved in the story have an impact on the story (i.e.,

changing the place of the chocolate). However, it is yet to be explored whether FB tasks with fantastical content and stories with realistic content differ in facilitating mental state understanding.

1.4. Fantastical Content

Realistic fiction refers to the features of the story that conform to the norms of reality, such as characters and settings bound to the physical reality of the real world. In contrast, fantastical content can be broadly defined as the setting and protagonist features that cannot exist in the real world (e.g., having blue skin and living in mushroom houses). As a result, fantastical fiction refers to characters, settings, or events that violate physical and biological reality. Fantastical fiction (which denotes a high degree of fantasy with a fantastical setting and protagonists) and realistic fiction (which includes a low degree of fantasy with a realistic setting and protagonists) defines the far ends of varying degrees of a fantasy continuum.

Within the continuum of fantasy, there may exist combinations of fantastical fictional characters in realistic settings (e.g., Spiderman in New York) and realistic fictional characters in fantastical settings (e.g., humans in the Star Wars universe). Recent research suggests that preschoolers can distinguish between realistic fiction and fantastical fiction (Kibbe, Kreisky, & Weisberg, 2018). Thus, the current project, which aims to investigate the effects of the degree of fantasy on FB understanding, included realistic fiction and fantastical fiction conditions.

1.5. Boundaries of Setting and Protagonists in FB Tasks

The standard FB tasks include realistic fictional characters (i.e., Maxi) as protagonists for the task stories, depicted with realistic fictional features, such as conforming to a human shape and having human names (Wimmer & Perner, 1983). Throughout the years, researchers investigated children's performance on ToM tasks by utilizing various characters as the protagonists of the tasks (Wellman & Liu, 2004).

For FB tasks, the most realistic depictions of the protagonists are established by utilizing the participating child's mother (Avis & Harris, 1991), another child actor (Moses, 1993), or an experimenter (Perner, Frith, Leslie & Leekam, 1989; Repacholi & Gopnik, 1997). These actors served as the protagonists of the FB task stories. Other attempts to include realistic characters within the tasks were accomplished by utilizing pictures of real children as the protagonists (Custer, 1996). However, none of these attempts revealed differences in children's FB performance compared to standard tasks.

On the other hand, although there are attempts to depict the story protagonists as far from reality, most of these attempts do not go beyond the realistic fictional level set by the standard FB tasks. For example, puppets (Hickling, Wellman & Gottfried, 1997) and dolls (Slaughter & Gopnik, 1996) are often used by researchers for FB tasks. However, toys and dolls often possess realistic features such as conforming to human shapes and having human names (Hickling, Wellman & Gottfried, 1997).

Thus, these manipulations do not exceed the norms of reality by going beyond realistic fiction.

Uniquely, some researchers utilized animals as the protagonists for the FB task stories (Clements & Perner 1994). These anthropomorphic characters had human names (i.e., Sam). However, they are not depicted as fantastical characters since they do not conform to fantastical features such as talking. Thus, such manipulations of utilizing animal characters as the protagonists of the FB task stories do not exceed the norms of reality beyond realistic fiction.

Overall, the manipulations within the FB tasks remain limited to altering the character features between reality and realistic fiction that do not yield FB performance differences. Also, no study establishes conditions in which the story's setting is completely bound to fantastical fictional features along with the story characters. Thus, the literature on children's FB understanding can be expanded by studying the effects of FB task characters and settings bound to fantastical fictional features.

1.6. Two Possible Hypothesis for Fantastical Fiction's Effect on FB

Two reasons exist for studying conditions in which the FB tasks' story character and setting are bound to fantastical fictional features: (a) engagement (motivational) and (b) reality-distancing (cognitive). The current section will discuss each possible reason to predict the effect of varying degrees of fantasy on children's FB understanding.

1.6.1. Engagement

Contemplating others' perspectives might be akin to engaging in fictional worlds (Dore & Lillard, 2015). The first reason for studying the effect of fantastical fiction on FB understanding pertains to children's engagement. Fantastical content may be initially more engaging than realistic content. Consequently, fantastical fiction might increase children's engagement with the test materials and the testing process, resulting in enhanced task performance (Hopkins & Lillard, 2021).

In a series of learning studies, Hopkins and Lillard (2021) manipulated the level of fantasy that the stories include by altering the degree of fantasy that setting and protagonists of the stories include. They end up with four degrees of fantasy ranging from reality with realistic settings and protagonists to fantastical fiction with fantastical setting and protagonists. Children were tasked to transfer solutions presented in the stories to a real-life setting.

The results demonstrated that the fantastical condition revealed a more successful transfer than other lower degrees of fantasy. The findings are discussed to illustrate that fantasy leads to deeper processing of the test material, resulting in enhanced performance.

Interestingly, when the task is reordered in the abovementioned study so that the problem and solutions will precede the fantastical content, the effect of fantasy in leading to a successful transfer of the solution to the real setting was lost for the fantastical fiction condition (Hopkins & Lillard, 2021). Thus, the findings suggest that including fantastical fiction

within the tasks is not what aids children's engagement with the task.

However, the order of introducing fantastical fiction elements before the task increases children's engagement with the task material.

In that case, it can be expected that a FB task with a fantastical setting and the protagonists can increase engagement with the FB task as the FB story with fantastical elements will be introduced before the test questions. Additionally, the effect of fantastical elements preceding the initial task may be widespread on subsequent tasks or may be lost as subsequent tasks are introduced. Hence, it is yet to be studied whether the discussed effect of fantastical elements is diffusive on subsequent tasks.

1.6.2. Reality-Distancing

The second reason for studying the effect of fantastical fiction on FB understanding pertains to *reality-distancing*. For the current project, reality-distancing can be defined as the combination of (a) the social distance and (b) the self distance between the features of two characters. The current section summarizes the abovementioned concepts and their relation to the effects of utilizing FB tasks with fantastical elements.

Farrar and Ostojic (2018) describe *social distance* as the degree of difference between the environmental features of two settings. There are two reasons to suspect that social distance can aid FB understanding. First, fantastical fiction can offer more cognitive flexibility than realistic fiction for someone to interpret the situation and emotions of others, requiring more metaphorical thinking due to a lack of similarities with the real world (Silva, 2013).

Second, the curse of knowledge might be observed at elevated levels when the information is about the real world since the information about the real world is more salient and harder to override. This version of the curse of knowledge bias is also dubbed “*reality bias*” due to its increased activation when processing information about reality. Accordingly, information about a story world (as presented in the tasks) that conforms to norms of reality as we experience it may be harder to override than information about a fictional or a fantasy world (Cabrera & Cabrera, 2016).

Farrar and Ostojic (2018) have shown that the social distance between the real world and the fantastical world of the story protagonists does not affect adults’ false belief understanding. However, whether social distance affects children’s false beliefs as it requires more metaphorical thinking or as it decreases the curse of knowledge remains to be studied.

Moreover, *self distance* is described as the degree of difference between the features of the child and story characters (White & Carlson, 2016).

White and Carlson (2016) demonstrated that pretending fantastical (i.e., Batman by wearing a cape) during executive function tasks yields an increase in executive function performance of preschoolers compared to not pretending. A similar finding is revealed in another study by Thibodeau and colleagues (2016), in which preschoolers in the fantasy-play intervention condition performed better in executive function tasks than their peers in the non-imaginative play intervention condition.

Children are particularly vulnerable to *egocentric biases*, which alter their evaluation of other characters' features being similar to themselves. As FB understanding requires children's distinction between themselves and others, eliminating egocentric biases through self-distancing might be beneficial for aiding FB understanding. Considering this information, it is plausible to expect that younger children who see fantasy characters as vastly different from and distant to self (Woolley, & Ghossainy, 2013; Woolley, Boerger & Markman, 2004) may find it easier to inhibit egocentric biases when engaging in a fantasy character's false belief.

As reality-distancing is described as the combination of the social distance between the environmental features of two settings and the self distance between the features of two characters, reality-distancing may help children overcome the curse of knowledge (Farrar & Ostojic, 2018) and the egocentric bias (Epley et al., 2004) by inducing social and self distancing accordingly.

While these biases are not identical, the reality-distancing component of stories with fantastical elements may help children overcome both when engaging in FB reasoning. Thus, children may perform better in FB tasks with fantastical elements than those with realistic content. Overall, studying the effect of the degree of reality-distancing on FB reasoning may provide insight into the underlying processes of mental reasoning in children.

1.7. The Current Study

Preschoolers' experiences with perspectively-rich contexts such as pretend play (Jenkins & Astington, 1996; Youngblade & Dunn, 1995), narrative discourse (Astington & Pelletier, 2005; Guajardo & Watson, 2002), and storybook reading (Adrian et al., 2005) support the development of false belief abilities. However, researchers do not distinguish between the effect of roleplaying fantastical or realistic characters on FB understanding abilities and the research on the effect of narrative discourse on FB understanding is not distinctively focused on narratives with varying degrees of fantasy.

There is recent interest in studying children's learning in fantastical versus realistic storybooks (see for a review, Hopkins & Weisberg, 2017). Despite the conflicting findings on children's vocabulary and facts about the physical world, children can successfully learn about socio-culturally complex phenomena such as emotions and mental states from stories. Classic FB tasks include realistic fictional stories that consist of realistic fictional characters and settings (i.e., Maxi has a false belief about the location of an object). Yet, no study has investigated the effect of varying degrees of fantasy included in FB tasks on children's performance.

Two reasons are discussed to expect that including fantastical fiction in FB tasks might aid children's FB understanding. First, children may more deeply process the task material in the tasks including fantastical elements as fantastical elements increase their engagement with the

testing process (Hopkins & Lillard, 2021). Second, fantastical stories may help children overcome the curse of knowledge (Farrar & Ostojic, 2018) and the egocentric bias (Epley et al., 2004) through reality-distancing.

To that end, Study 1 investigates development of FB task performance with the possible interactive effects of degree of fantasy on 3-, 4-, and 5-year-olds' for two types of false belief tasks (i.e., content false belief and change of location). The current project modified the classic FB tasks to investigate whether preschoolers' FB understanding (i.e., content, location FB) varied by the degree of fantasy (fantastic fiction and realistic fiction).

While the current study is exploratory, it proposes that the degree of fantasy would be related to children's ability to reason about false beliefs. Specifically, regarding the engagement explanation, children may perform better if they receive the fantastical fiction tasks first than when they receive the realistic fiction tasks first. On the other hand, there may exist the ease with which children engage in social-cognitive reasoning with familiar situations and content. In that case, one might also expect children to perform better if they receive realistic fiction tasks than fantastical fiction tasks.

Similarly, following the reality-distancing explanation, children's performance might increase as the degree of fantasy increases. However, children may also be more successful in realistic FB tasks than fantastical ones due to the ease with which children engage in social-cognitive

reasoning with familiar situations and content (Danovitch & Mills, 2014).

In fact, older children may be expected to show this effect stronger than younger children with less life experience and familiarity with realistic fictional stories.

Alternatively, if the results show that children perform comparably in fantastical and realistic tasks as well as across order conditions, it could be argued that neither fantastical elements nor realistic elements in FB tasks serve to lessen the cognitive burden imposed by the biases. Thus, further research would be necessary to investigate which alternative explanations could be true.

CHAPTER I

STUDY 1

In this study, we tested whether preschoolers' FB understanding is affected by the degree of fantasy (i.e., fantastical fiction or realistic fiction) included in FB tasks. The current study utilized a mixed design. Age (with levels of 3-, 4-, and 5-year-olds), the order of fantasy conditions presented (with levels of fantastical fiction FB tasks first and realistic fiction FB tasks first), and EF performance (with levels of high and low) were between-subjects variables. The degree of fantasy (with levels of fantastical fiction and realistic fiction) included in the FB tasks was a within-subjects variable.

All children completed two versions of content false belief and change of location tasks. While the current study is exploratory, we expected to see the main effect of the degree of fantasy in which children perform better on FB tasks with fantastical fiction elements over FB tasks with realistic fiction elements.

2.1. Participants

Ninety monolingual Turkish children were recruited as the participants.

Fifteen girls and fifteen boys at each of three age groups (3-year-olds, $M = 3;7$, Range: 3;1-3;10; 4-year-olds, $M = 4;6$, Range: 4;3-4;11; 5-year-olds, $M = 5;5$, Range: 5;1-5;11) participated in the current study. The sample size was determined through a priori power analysis which was conducted using G*Power software (3.1; Faul, Erdfelder, Lang, & Buchner, 2007).

Analyses on maternal education levels, job status, and family income levels were carried out to investigate the family demographics. It was revealed that 35.5% of mothers completed high-school-level education, 59% of mothers completed university-level education, and 5.5% of mothers completed higher levels of education than university-level. 72.2 % of mothers were working in a job actively, whereas 27.8% of mothers were not. Additionally, 30% of mothers reported family income levels at the minimum wage, 24.4% reported family income levels above the minimum wage, and 45.6% reported family income levels above two minimum wages.

2.2. Materials

2.2.1. Demographic Information Questionnaire

Before the experimental procedure began, the experimenter instructed the parent to fill out an online demographics form that utilizes Google Survey software. The demographics form was utilized to incorporate information regarding the participant child's age, parent age, parent education level, parent employment status, and family income levels that was operationalized

by asking how much their monthly income was different from the minimum wage in Turkey.

2.2.2. False Belief Measures

2.2.2.1. Contents False Belief Task

For the current study, contents false belief task (Gopnik & Astington, 1988) was adapted into narrative format in which children were shown a container they knew well (e.g., a candy box). They were asked to guess the container's content (e.g., candies). The surprising contents of the container were revealed to the children (e.g., pencils). The control question regarding the content of the container was asked. Afterward, the contents were put back in the container, and the children were asked what a character who had not seen inside the box would think was inside. Last control question was administered asking if the second character has seen inside the box.

Two versions of the task (fantastical fictional and realistic fictional) were created for the current study by altering the characters/setting of the canonical content FB task. First, we focused on the characters. Since familiarity can interfere with the children's evaluations of the characters' reality status (Williams & Danovitch, 2022), we opted to use familiar characters in our design. It was easier to establish the unfamiliarity of the realistic fictional characters as the stock images of realistic characters were used during stimuli creation and named with unfamiliar names (i.e., Bobo and Lena, unfamiliar names for the Turkish sample).

Copyright Act (1976) allows for the usage of artistic materials for research purposes. Thus, to ascertain that the fantastical fictional characters were also

unfamiliar to the sample, a set of characters (i.e., characters from the Spongebob TV series) were used that previous generations enjoyed watching but is not currently watched by children in Turkey.

One might argue that sponges and sea stars are organic beings. Thus, as anthropomorphic depictions of animals, stimuli may simultaneously carry fantastical and realistic features. In that case, the character may not be completely fantastical. We would answer such a possible criticism by pointing out that even most adults would not know that sponges and sea stars are animals. Given that, it would be likely that the stimuli do not contain explicit anthropomorphism for children. Hence, the characters utilized in fantastical fiction FB tasks were fantastical characters for the target sample.

Next, we selected object and location pictures from the Spongebob TV series and from stock images to create story settings. The setting of the stories, indicated by the background images and the objects present in the scene, was in harmony with the stories' protagonists' degree of fantasy. Thus, two versions of the contents FB task, including fantastical and realistic fictional characters/settings (See Appendix for the stimuli), were created for the current research using Adobe Photoshop. All participants were presented with all degrees of fantasy. Hence, all participating children saw both versions of the contents FB task.

2.2.2.2. Change of Location Task

In the change of location task (Wimmer & Perner, 1983), a character (Ch1) was shown putting a possession to one location (L1). In that character's absence, another character (Ch2) changed the location of the possession to a

new location (L2) and left the scene. The child was shown that Ch1 came back to the scene. After the control questions regarding the target objects initial and final locations, children were asked where Ch1 would look for the object. In the current research, an adaptation of this task which includes presenting Ch2 outside of the initial scene after Ch2 left the scene, used in multiple studies (e.g., Burumlu-Kisa et al., 2023) with Turkish sample, was used.

Two versions of this task (i.e., fantastical fiction and realistic fiction) have been created for the current research by following the same procedure mentioned above, by including fantastical fictional characters and realistic fictional characters as well as respective settings. All participants were presented with all levels of the degree of fantasy. Hence, all participating children saw both versions of the change of location task.

2.2.3. Day and Night Task

The participating children completed an *executive functions* (EF) task that aimed to measure the general cognitive abilities which allow children to moderate their attention (inhibition, switching) and memory (working memory). The EF task utilized for the current study was the day-night task (Diamond, Kirkham, & Amso, 2002), a specific measure of interference control that taps into the aforementioned cognitive abilities. In the current study, children completed the computerized version of the task via Qualtrics (available at https://psybilkent.eu.qualtrics.com/jfe/form/SV_0dG03KsrHsXqXau).

In the task, children were shown with pictorial stimuli depicting moon and sun. Children were tasked to say “day” when they were shown with the moon picture and say “night” when they were shown with the sun picture. In a pseudorandom order, twelve cards with pictorial stimuli (six being sun and six being moon) were shown to children after two warm up trials. The performance of children in the task were evaluated regarding the total number of correct replies in the day and night task, with a maximum score of 12.

2.3. Design

To test the hypotheses of the current research, a mixed design ANOVA was conducted on false belief scores obtained by the composite score of the performance in the content false belief and change of location tasks for each degree of fantasy. Age, order, and EF level were between-subjects variables. The degree of fantasy was a within-subjects variable for the analysis.

Therefore, the data was analyzed using SPSS (22) software and Rstudio (1.3.1056). The design and protocol of the current study were preregistered and publicly available at Open Science Framework (OSF) available at https://osf.io/jq6rx/?view_only=fe1d5d7a392c470e91106f9d5f7bc5c1.

2.4. Procedure

Because of the COVID-19 pandemic during the data collection for the current study, the children participated in this study online (i.e., personal computers and a webcam). Announcements promoting the study were posted online, and the parents contacted the experimenter via email or phone.

Children whose parents agreed to participate in the study were tested online through Zoom. The parents were asked to fill out the demographics form before the meeting. Before the study, all parents were informed that the online meetings would be recorded. Both parents' written and children's verbal consent were also obtained at the beginning of the online meeting.

The researcher introduced herself by stating her name and continued by saying, "I study at a university. I am interested in learning more about children and their ability to understand others. I want to record this Zoom meeting on my computer, in which I will keep the recording safe, so only me and you will know your identities. If you do not want to participate or continue, you can state so anytime you want to! Moreover, it is okay if you need time to decide." Then the children were asked if they were willing to start. All of these were recorded, which continued if the child agreed to participate.

Children were first presented with FB tasks followed by an executive function measure. As a result, to ensure the consistent measurement of the variables, we decided to measure children's FB understanding when their attention to the testing material is the highest at the beginning of the testing. Hence, FB tasks preceded the executive function task for each participant.

The gender of the main protagonist in realistic fictional tasks was gender-matched for the participants. The main protagonist in fantastical fictional tasks was Spongebob across all fantastical fictional FB tasks.

To eliminate the carryover effects, the same FB tasks with varying degrees of fantasy did not follow each other (See Figure 1). Before each set of FB tasks

(i.e., fantastical fiction FB tasks or realistic fiction FB tasks), each participant was introduced to fantastical fiction or realistic fiction characters and the setting of the stories, depending on the order condition (See Appendix for detailed descriptions).

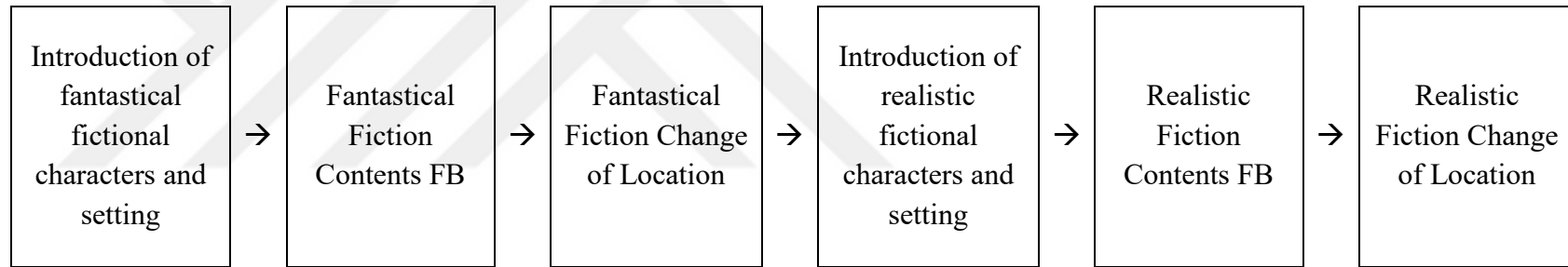
The order condition established that half of the participants were presented with FB tasks including fantastical fictional characters before FB tasks including realistic fictional characters first. The other half of the participants were presented with FB tasks including realistic fictional characters before FB tasks including fantastical fictional characters first. All children completed two versions (i.e., fantastical fiction or realistic fiction) of two FB tasks.

In an experimental trial, the place of the story (i.e., kitchen or living room) and the hidden item (i.e., candy in band-aid box or crayon in Smarties box) on two contents FB tasks (fantastical fictional and realistic fictional) were counterbalanced within age and gender groups. The place of the story and the hidden item were fixed across order conditions (i.e., the first contents FB task was always in the living room, and the hidden item was candy in the band-aid box, the second contents FB task was always in the kitchen and the hidden item as a crayon in Smarties box).

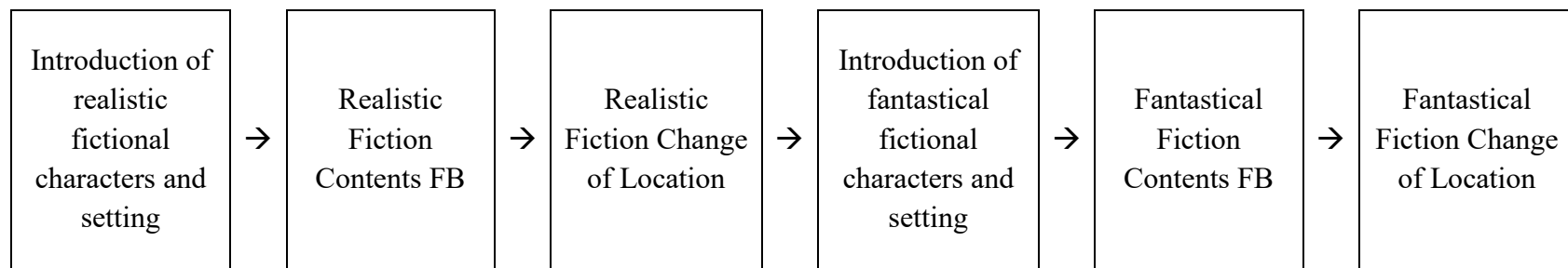
Similarly, during an experimental trial, the place of the story (i.e., kitchen or living room), the target place of the hidden item (i.e., fridge or wardrobe that are on the right), and the hidden item (i.e., dessert or hat) on two change of location tasks (fantastical fictional and realistic fictional) were counterbalanced within age and gender groups. The place of the story, the

target place of the hidden item, and the hidden item were fixed across the order conditions (i.e., the first change of location task was always in the kitchen and the target location of the dessert was the fridge, the second content task was always in the living room and the target location of the hat was the container).





Order: Fantastical Fiction Tasks First



Order: Realistic Fiction Tasks First

Figure 1. Experimental Procedure.

Note. The main experimental procedure is followed by an executive function task.

After the FB tasks, children completed the computerized version of the day-night task (Diamond, Kirkham, & Amso, 2002). At the end of the meeting, a brief debriefing session was held with the parents and the participant children, explaining the aim of the study. The testing lasted about 15-20 minutes.

2.5. Results

First, we examined children's performance on cognitive (i.e., executive function) and socio-cognitive (i.e., FB performance) abilities. These preliminary analyses were done to ascertain whether the tasks worked as expected in the online platform. Next, we examined the correlations between these cognitive variables. Finally, a mixed-ANOVA analysis was conducted to investigate the central hypothesis of the study regarding the effect of fantasy on children's FB understanding.

To improve the validity of our results, transparency, and reproducibility, we preregistered our study data on the Open Science Framework (OSF) available at https://osf.io/jq6rx/?view_only=fe1d5d7a392c470e91106f9d5f7bc5c1.

Moreover, two independent coders coded all children's responses to establish interrater reliability. The agreement between two coders for a selected sample of 25% of the data revealed that the agreement on scoring was 95%- 97%. The disagreements were settled via closer inspection of the video recordings.

2.5.1. Preliminary Analysis: EF, FB, and their interrelations

Given that the study was conducted online, we wanted to explore children's EF performance. First, the EF performance of the participating children were evaluated (Range = 0-12, $M = 8.99$, $SD = 6.49$). According to the total

number of correct replies, participating children were grouped into two EF groups: high-level (denoted by 1) and low-level (denoted by 0). The scores of children in the high-level EF group varied between 7 and 12, and those in the low-level EF group varied between 0 and 6.

Univariate analysis with EF level as dependent and age in year and gender as independent variables revealed a main effect of age ($F(2, 84) = 11.46, p < 0.001, \eta^2 = .21$). Pairwise comparisons demonstrated that EF performance of 3- and 5-year-olds were significantly different ($p < .05$) from each other, as well as the 3- and 4-year-olds' EF performances ($p = 0.02$).

Moreover, the difference between 4-year-olds' and 5-year-olds' EF performances was at the trend level ($p = 0.07$). No main effect of gender was found. When inspecting the interaction effect, no significant difference was observed in children's EF performance across age groups and gender.

These results confirmed the effectiveness of the EF level grouping method. For the rest of the analyses, EF level would be utilized as a measure for EF and added as a between-subjects measure to the main analysis.

Next, we focused on children's performance on the FB tasks. The distribution of children's performance was investigated for each FB task with varying degrees of fantasy (See Table 1). The distribution of children's performance on FB tasks revealed that the percentage of children who succeeded in each task increased monotonically by age, except for the fantastical fiction contents FB tasks.

Table 1. Percentage of Children Who Passed FB Tasks.

	3-year-olds	4-year-olds	5-year-olds
1. Fantastical Fiction Contents FB	32.6 %	25.6 %	41.9 %
2. Fantastical Fiction Change of Location	19.1 %	36.2 %	44.7. %
3. Realistic Fiction Contents FB	25.6 %	30.8 %	43.6 %
4. Realistic Fiction Change of Location	10.3 %	38.5 %	51.3. %

We conducted a chi-square test to determine whether children's performance on each FB task significantly differed from the chance level. Only for the realistic fiction change of location task, 3-year-olds ($R = -2.51$) and 5-year-olds ($R = 1.97$) performances were significantly different from the chance level (i.e., 50%). For the fantastical fiction change of location task, the difference between the 3-year-olds' ($R = -1.68$) performance and the chance level was at the trend level.

Univariate analysis with composite FB scores (i.e., number of correct responses) as dependent and children's age and gender as independent variables revealed a significant main effect of age ($F(2, 84) = 5.47, p = .01, p\eta^2 = .12$). Children's FB performance in the current study replicated the expected developmental trajectory established in previous literature (Burumlu-Kisa et al., 2023). Pairwise comparisons showed that 3- and 5-year-olds' FB performance differed significantly ($p = .001$) (See Figure 2). Moreover, 4-year-olds' performances did not differ from 5-year-olds' performances ($p = 0.13$), and 3-year-olds' performances did not differ from 4-year-olds' performances ($p = 0.25$). No main effect of gender was found.

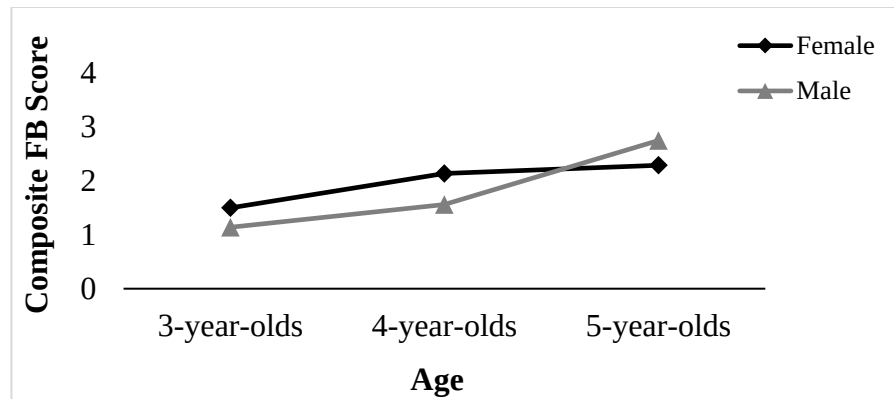


Figure 2. Children's FB Performance by Age and Gender

2.5.2. Correlational Relations between Cognitive Measures

To investigate the relations between child cognitive variables, a bivariate correlation was conducted with children's composite FB scores (i.e., the number of correct responses), FB scores in the Fantastical Fiction condition, FB scores in the Realistic Fiction condition, and EF level (See Table 2).

Table 2. Age-Controlled Correlations Between FB Scores and EF.

	EF	Composite FB	FF FB	RF FB
EF	1			
Composite FB	.30**	1		
FF FB	.31**	.92***	1	
RF FB	.23*	.90***	.64**	1

EF: Executive Function; FF: Fantastical Fiction; RR: Realistic Fiction

Note: † $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Additional correlational analyses revealed that children's age was significantly related to change of location ($r = .43, p < .001$) task performance. More specifically, children's age was significantly correlated with performance on fantastical fiction change of location ($r = .33, p = .002$) and realistic fiction change of location ($r = .44, p < .001$) tasks. Children's

age was not significantly correlated with contents FB performance.

Children's age was not correlated with their performance on fantastical fiction contents FB task performance ($p = .30$). In contrast, the correlation between age and realistic fiction contents FB task was at trend level ($r = .19$, $p = .07$). Thus, these may imply that the participants' performance on fantastical fiction contents FB might be similar and comparable across different age groups.

After this inspection regarding age groups, the correlational relations between FB tasks were examined to create the composite FB scores for each degree of fantasy. A bivariate correlation with FB tasks across varying degrees of fantasy was conducted. A significant correlation was observed between fantastical fiction contents FB and fantastical fiction change of location ($r = .25$, $p = .02$). Similarly, the correlation between realistic fiction contents FB and realistic fiction change of location ($r = .21$, $p = .05$) was significant. Due to these significant results, one composite score FB tasks was created for each type of fiction (i.e., fantastical fiction FB and realistic fiction FB) used in further analyses.

2.5.3. Relations between Degree of Fantasy, Age, Order, and EF on FB

Mixed-ANOVA analysis was conducted to investigate the central hypothesis of the study regarding the effect of fantasy on children's FB understanding. The mixed design ANOVA was conducted on FB scores (fantastical fiction and realistic fiction) with age, order, and EF level as between-subjects factors and degree of fantasy as the within-subjects factor.

In line with our predictions, there were the main effects of EF ($F(1,88) = 6.87, p < .05, \eta^2 = .08$) and degree of fantasy ($F(1,88) = 1.98, p < .05, \eta^2 = .05$) on children's FB understanding. In line with the past literature (Perner & Lang, 1999), children with higher EF scores showed higher FB understanding ($M_{HighEF} = 1.10, SD_{HighEF} = 0.11; M_{LowEF} = 0.68, SD_{LowEF} = 0.12$). Moreover, as hypothesized, children performed better in fantastical fiction FB tasks ($M = 1.00, SD = .79$) as compared to realistic fiction FB tasks ($M = 0.87, SD = .75$). Order had no main effect on children's FB performance ($p = .75$).

The hypothesized two-way interaction of the degree of fantasy and age remained at a trend level ($F(2,87) = 2.82, p = 0.07$) (See Figure 3). Follow-up analysis indicated an effect of age ($F(2,87) = 4.47, p < .05, \eta^2 = .07$) that depended on the degree of fantasy. Mirroring findings from past research on children's FB performance on realistic fiction tasks showed the expected developmental differences by age ($F(2,87) = 4.47, p = .01$). However, the same was not true for FB tasks with fantastical fiction elements ($F(2,87) = 0.41, p = .67$). This interaction was driven by the difference in 3-year-olds' performance in fantastical fiction FB tasks ($M = 0.84; SD = 0.17$) as compared to realistic fiction FB tasks ($M = 0.42; SD = 0.15$).

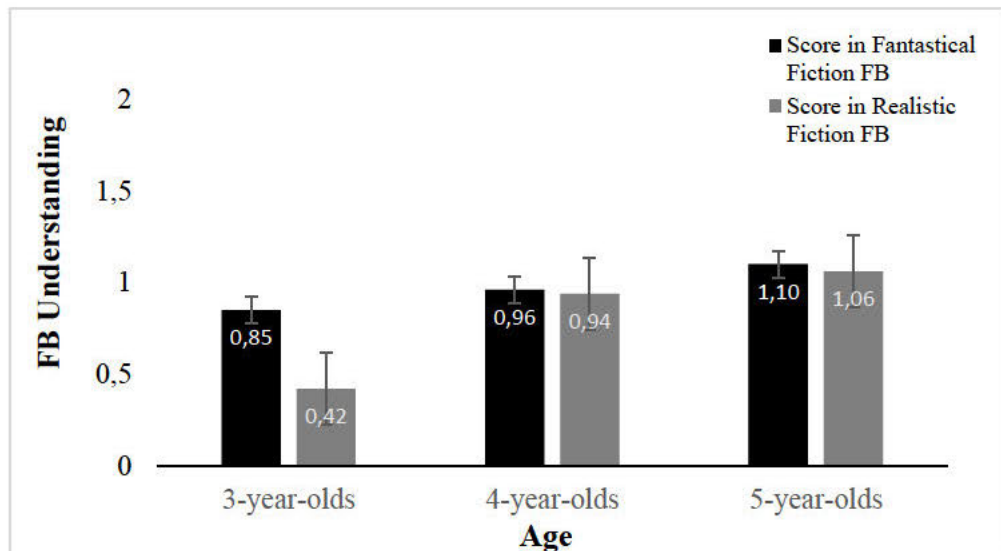


Figure 3. Children's FB Performance by Age and Degree of Fantasy.

The interaction of age and order was at a trend level ($F(2,87) = 2.90, p = 0.06$) (See Figure 4). Follow-up tests revealed that 3-year-olds who received the fantastical fiction FB tasks ($M = 0.90$; $SD = 0.20$) performed marginally better ($p = .07$) than children who received realistic fiction FB tasks first ($M = 0.38$; $SD = 0.20$).

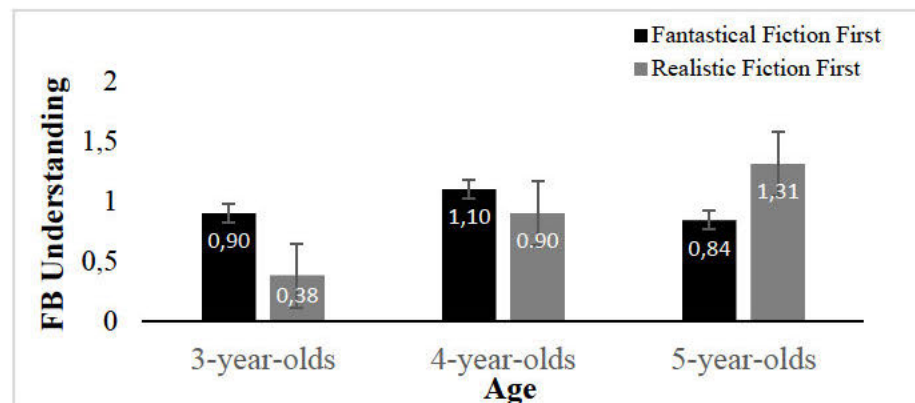


Figure 4. Children's FB Performance by Age and Order.

None of the other possible two-way interactions analyzed were significant. It was interesting that EF did not have any interactive effects with the degree of fantasy condition, but that age did.

2.6. Study 1 Discussion

First, Study 1 demonstrated the effect of fantasy on children's FB reasoning. Participants were more successful on tasks containing fantastical fiction than realistic fiction content when collapsed across age and order variables.

Second, children with higher EF scores showed higher FB understanding.

The fact that EF did not have any interactive effects with the degree of fantasy condition, but that age did, was an intriguing finding. This seems to imply that EF may not be vital to 3-year-olds' early success in FB tasks that include fantastical fictional elements. However, this study provides a reason to investigate further the interactive roles of children's engagement and reality-distancing explanations on children's FB understanding.

There are three limitations to the current study. First, the data was collected online due to COVID-19 restrictions present during data collection. The literature asserts that children's understanding of the reality status of fantastical events drops when presented on television compared to pictures (Li, Boguszewski & Lillard, 2015). Thus, online administration might have altered the effects of the degree of fantasy.

Second, the current study fails to eliminate any possible explanations for explaining the effect of the degree of fantasy on children's FB understanding. Thus, for the current study, engagement and reality-distancing effects cannot be distinguished in explaining the main effect of the degree of fantasy nor the trend-level interaction between age and order. Lastly, the intriguing findings on the main effect of EF that was not followed by any interaction effects including EF may suggest that EF measure utilized in the current study fell

short in comprehensively studying children's EF abilities. Hence, Study 1 could have utilized a more comprehensive measure for EF operationalization.



CHAPTER III

STUDY 2

Study 2 is conducted to account for the possible limitations of Study 1. To investigate the interaction effects at the trend level and eliminate possible limitations of the online format, Study 2 utilized a more targeted sample containing 3- and 5-year-olds and was conducted face-to-face.

Moreover, Study 2 utilized a well-established fantasy-orientation scale to investigate the nature of the degree of fantasy effect on children's FB understanding and distinguish between the engagement and reality-distancing explanations for explaining the effects of the degree of fantasy. Lastly, Study 2 included a more comprehensive set of EF tasks (e.g., DCCS in addition to Day-Night).

3.1. Participants

Ninety participants participated in Study 2. Among ninety participants, one child is excluded from the study due to lack of cooperation, leaving forty-four 3-year-olds ($M = 3;6$, Range: 3;0-3;11) and forty-five 5-year-olds ($M = 5;7$, Range: 5;0-5;11) as participants. Relatively equal gender distribution (22 females in 3-year-olds, 23 females in 5-year-olds) across age groups was established for the current study.

3.2. Materials

3.2.1. Demographic Information Questionnaire

The measures utilized in Study 2 were the same as Study 1 measures. Please refer to the previous chapter.

3.2.2. False Belief Measures

The FB measures utilized in Study 2 were the same as Study 1 measures. Please refer to the previous chapter. However, the researcher administered the tasks face-to-face using pictorial stimuli depicting the events in the FB scenarios.

3.2.3. Day and Night Task

The noncomputerized version of day and night task utilized in Study 2. The researcher administered the task face-to-face by showing cards to the participating children in Study 2. However, 67.8% of 3-year-olds and 88.9% of 5-year-olds passed day and night task by correctly answering in more than eight trials. The chi-square test results revealed that 3-year-olds' ($R = 1.9$) and 5-year-olds' performance significantly differed from the chance ($R = 2.7$). As a result, we opted to use day and night task as it may not be sensitive enough

to reveal the developmental trends in EF due to ceiling effects. Instead, we used DCCS, which is a more comprehensive task for operationalizing children's EF abilities than the day/night task (Montgomery & Koeltzow, 2010) that shows the expected variation by age in Turkish sample (Haskaraca & Ilgaz, 2023).

3.2.4. Dimensional Card Sort Task

Dimensional Card Sort Task (DCCS) was utilized to evaluate children's cognitive flexibility and inhibition (Zelazo & Muller, 2002). There were twenty-eight cards, each displaying an image of a blue elephant or a red automobile. Half of these cards featured a black border around the image. Three sorting activities were presented in a predetermined order for the child to learn and practice.

First, the rules for the color game were as follows: "This is a game of colors. The blue ones go here (by displaying the box with a blue automobile image), and the red ones go here (by displaying the box with a red elephant image) in the color game. This one is red and blue. Where does this one go?" Four red cards and four blue elephants were used in the two training and six test trials. No two cards of the same color occurred consecutively in the sequence of the cards, which is pseudo-random. Each correctly sorted item could earn a child one point, up to 6 points. If a child sorted five or more cards correctly, they were considered to pass the color game.

Second, the researcher presented the shape game with instructions, such as "This is a shape game. When playing the shape game, elephants go there (by displaying the box with a red elephant's image), and automobiles go there (by

displaying the box with a blue automobile's image). This is an automobile/an elephant. Where does this one go? The six test trials showed three red cards and three blue elephants. There were no consecutive cards with the same shape in the pseudo-random arrangement of the cards. Each correctly sorted item could earn a child one point, up to 6 points. If a child sorted five or more cards correctly, they were considered to pass the shape game.

Lastly, if the child succeeded in the previous round, the researcher then explained how the border game works: "In the border game, if the card has a black border around it, we play the color game; if the card has no border around it, we play the shape game. This card has/does not have a border around it have one. Where does this one go?" Seven red automobiles and seven blue elephants were in the two training trials and 12 test trials.

Two cards without a border and with a border were used to teach the game to the child during the training. There were no consecutive cards with the same rule in the next 12 test trials; therefore, the sequence of the cards was pseudo-random. Each correctly sorted item could earn a child one point, up to 12 points. If a child sorted nine or more cards correctly, they were considered to pass the border game.

According to the scoring guideline (please refer to Zelazo, 2006), 0 was denoted children who failed in the color game, 1 was denoted to children who succeeded in the color game but failed the shape game, 2 was denoted to children who succeeded in the color and shape games but failed the border game, and 3 was denoted to children who succeeded across all games.

3.2.5. Fantasy-Orientation Measure

There might be individual differences in fantasy orientation for children (Boerger, Tullos & Woolley, 2009). Thus, researchers have utilized various fantasy orientation measures to investigate the relation between fantasy orientation and FB development (Dore & Lillard, 2015). To investigate the fantasy orientation characteristics of the sample, Study 2 utilized a well-established fantasy orientation measure. Eisen, Taggart, and Lillard (2023) utilized a fantasy orientation measure in which children are presented with ten pairs of books, five pairs including anthropomorphic characters, and five pairs not including anthropomorphic characters in fantastical fiction odd. The current study adapted the fantasy orientation measure above in which children were shown five pairs of book covers without any pictures, either fantastical fictional or realistic fictional, in a pseudorandom order (See Figure 5). In line with the aims of the current study, children were not presented with storybooks that included anthropomorphic characters.



Figure 5. Example Book Covers for Storybooks.

After a brief description of one sentence was given for each book, children were asked which one of the storybooks they liked the most (See Appendix for the detailed description of each stimulus and procedure). After their initial response, children were asked a memory check question in which they must answer what each book is about.

The memory check question was asked for one book from each pair, and the questioned book was selected in a pseudorandom order for each pair of storybooks. The description, initial response, and memory check processes were repeated for each storybook pair. The following formula was utilized to calculate the fantasy orientation score for each participant:

$$\text{Fantasy-orientation score} = \frac{\text{Total Number of Fantastical Fiction Books Preferred}}{\text{Total Number of Correctly Remembered Book Pairs}}$$

Thus, the fantasy orientation score of the participants ranged between 0 and 1.

3.3. Design

To test the hypotheses of the current research, a mixed design on false belief scores obtained by the composite score of the performance in the content false belief and change of location tasks for each degree of fantasy (i.e., fantastical fiction FB and realistic fiction FB) was conducted. Age and the order were between-subjects variables. The degree of fantasy was a within-subjects variable. For the current study, EF level was included in the further analyses as a control variable.

Therefore, the data was analyzed using SPSS (22) software and Rstudio (1.3.1056). The design and protocol were preregistered and publicly available on OSF (Please refer to Study 1).

3.4. Procedure

The sample was obtained by following the same recruitment procedure as Study 1. Both parents' written consents were obtained prior to the testing. Next, the children's verbal consent was obtained at the beginning of the

meeting. This time, the participants were tested face-to-face in their preschools, in a quiet room.

The FB tasks utilized in Study 2 were the same as Study 1 measures. However, different from Study 1, the tasks were administered face-to-face using pictorial stimuli that depicted the events in the FB scenarios.

After the FB tasks, children completed the EF tasks (DCCS and day-night tasks in order). Lastly, the children completed the fantasy orientation measure. At the end of the meeting, a brief debriefing session was held with participating children, explaining the aim of the study.

The testing session lasted about 25-30 minutes.

3.5. Results

First, we examined children's performance on cognitive measures (i.e., executive function and FB performance) and their fantasy orientation. These preliminary analyses were done to ascertain whether the tasks worked as expected. Next, we examined the correlations between the cognitive variables. Finally, a mixed-ANOVA analysis was conducted to investigate the central hypothesis of the study regarding the effect of fantasy on children's FB understanding.

To improve the validity of our results, transparency, and reproducibility, we preregistered our study data on the Open Science Framework (OSF) available at https://osf.io/jq6rx/?view_only=fe1d5d7a392c470e91106f9d5f7bc5c1.

Moreover, two independent coders coded all children's responses to establish

interrater reliability. The agreement between them for a selected sample of 25% of the data revealed that the agreement was 98%.

3.5.1. Preliminary Analysis: EF, FB, and Fantasy Orientation

Building upon Study 1, children's EF levels were operationalized by the status of pass/fail for each DCCS game. Children were effectively separated into three groups based on their EF level (See Figure 6). No child failed in color game.

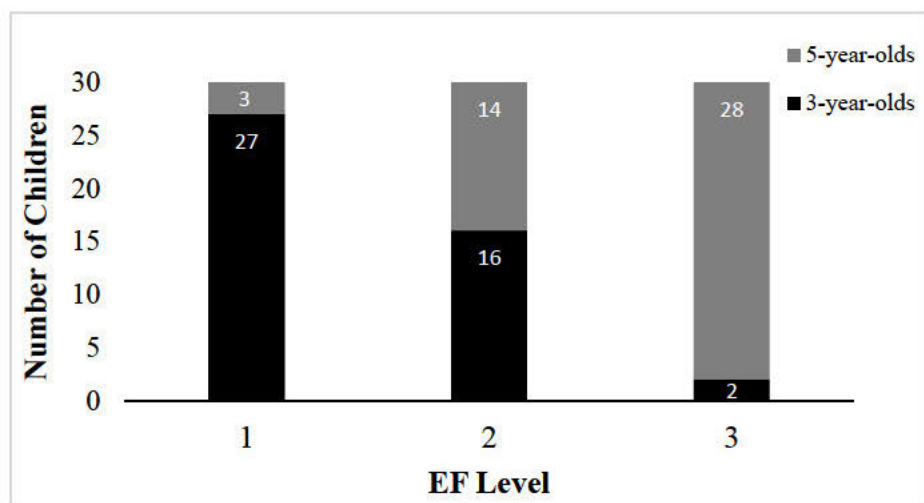


Figure 6. Distribution of Participants, Based on Their DCCS Performances.

Univariate analysis with EF level as dependent and age in year and gender as independent variables revealed a main effect of age ($F(1, 85) = 71.71, p < .001, \eta^2 = .46$). Pairwise comparisons showed that EF performance of 3- and 5-year-olds were significantly different ($p < .001$) from each other (See Figure 7). Thus, the relation between age and EF level suggests that the sample followed the expected developmental trajectory of EF.

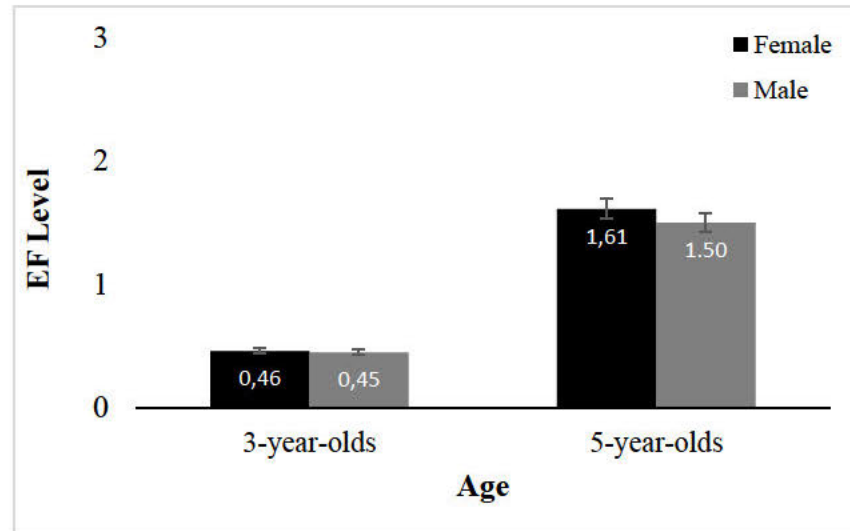


Figure 7. Children's EF Performance by Age and Gender.

Next, we focus on children's performance on FB tasks. The distribution of children's performance was investigated for each FB task with varying degrees of fantasy (See Table 3). The distribution of children's performance on FB tasks revealed that the percentage of children who succeeded in each task increased by age.

Table 3. Percentage of Children Who Passed Individual FB Tasks.

	3-year-olds	5-year-olds
1. Fantastical Fiction Contents FB	35.7 %	64.3 %
2. Fantastical Fiction Change of Location	26.5 %	73.5 %
3. Realistic Fiction Contents FB	27.3 %	72.7 %
4. Realistic Fiction Change of Location	14.6 %	85.4 %

Univariate analysis with composite FB scores (i.e., number of correct responses) as dependent and children's age and gender as independent variables revealed a significant main effect of age ($F(1, 85) = 5.47, p < .001, \eta^2 = .47$). Children's FB performance in the current study replicated the developmental trajectory established in the previous literature (Burumlu-Kisa

et al., 2023). Moreover, the pairwise comparisons illustrated that the FB performance of 3-year-olds and 5-year-olds were significantly different ($p < .001$) from each other (See Figure 8).

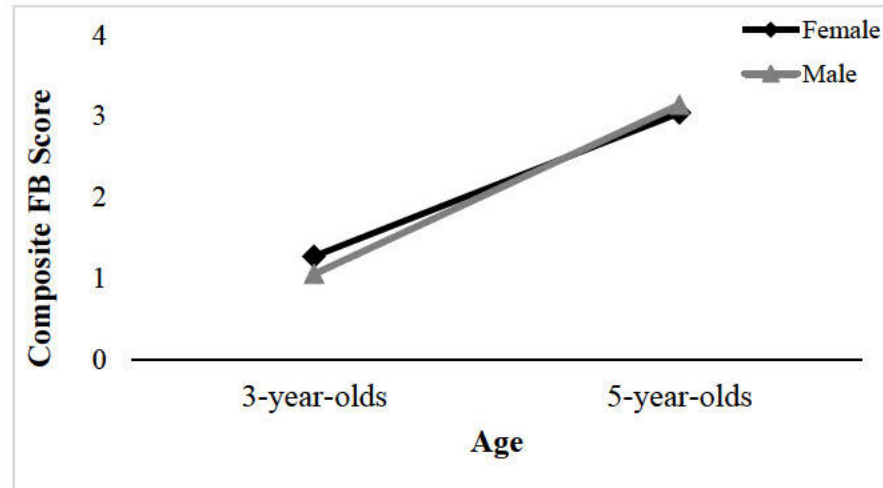


Figure 8. Children's FB Performance by Age and Gender.

Compared to Study 1, Study 2 revealed improved FB performance of the participants overall. Due to COVID-19 restrictions during data collection, Study 1 was conducted online. Online tasks might have made it harder for children to attend and succeed in FB tasks. The face-to-face task administration utilized in Study 2 might have eliminated the possible limitation, supported by the overall higher FB performance of the participants in Study 2 compared to Study 1.

We conducted a chi-square test to determine whether children's performance on each FB task significantly differed from the chance level. For each version of the change of location task (i.e., fantastical and realistic), 3-year-olds' ($R < -1.96$) and 5-year-olds' ($R > 1.96$) performance were significantly different than chance level (i.e., 50%). For the realistic fiction contents FB task, 3-year-olds' ($R < -1.96$) and 5-year-olds' ($R > 1.96$) performance were

significantly different from the chance level. Children's performance on fantastical contents FB task was not different from chance level.

The last preliminary analysis was focused on children's fantasy orientation. Children's age was significantly related to fantasy orientation score ($r = .22$, $p = .04$). After this inspection, the effects of age and gender on fantasy orientation were examined. Univariate analysis with fantasy orientation scores as dependent and children's age and gender as independent variables revealed a significant main effect of age ($F(1, 85) = 4.47$, $p = .04$, $\eta^2 = .05$). Moreover, the pairwise comparisons illustrated that fantasy orientation scores of 3-year-olds and 5-year-olds were significantly different ($p < .05$) from each other in which older preschoolers showed greater orientation towards enjoying fantastical content over realistic content compared to younger preschoolers (See Figure 9).

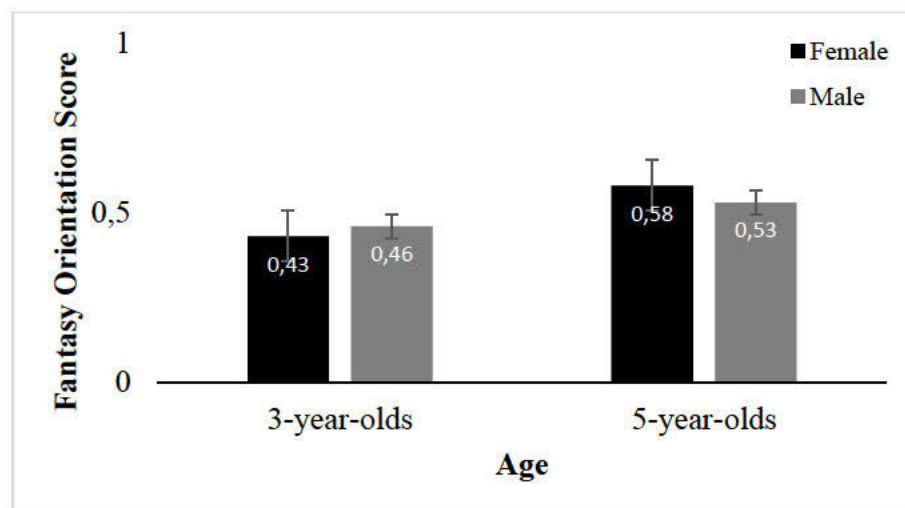


Figure 9. Children's Fantasy Orientation Score by Age.

Previous literature indicates that younger children (e.g., 3-year-olds) draw more rigid lines between reality and fantasy as compared to older children (e.g., 5-year-olds) (Williams & Danovitch, 2022; Woolley, & Ghossainy,

2013; Woolley, Boerger & Markman, 2004). Moreover, recent research suggests that 3-year-olds prefer to continue sentences with realistic sentences than 5-year-olds (Weisberg, Sobel, Goodstein & Bloom, 2013). Thus, the results suggesting lower fantasy orientation for 3-year-olds than 5-year-olds were in line with the previous research conducted with similar samples.

3.5.2. Correlational Relations between Child Variables

To investigate the relations between child variables, a bivariate correlation was conducted with children's composite FB scores, FB scores in the Fantastical Fiction condition, FB scores in the Realistic Fiction condition, fantasy orientation scores and EF level (See Table 4). As the fantasy orientation did not correlate with any cognitive measures, we opted out from using it in further analyses.

Table 4. Age-Controlled Correlations Between Age, FB Scores, and EF.

	EF	Composite FB	FF FB	RF FB	Fantasy Orientation
EF	1				
Composite FB	.31**	1			
FF FB	.18†	.83***	1		
RF FB	.35***	.80***	.35**	1	
Fantasy Orientation	.05	<.001	.14	-.15	1

EF: Executive Function; FF: Fantastical Fiction; RR: Realistic Fiction

Note: † $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Additional correlational analyses revealed that children's age was significantly related to contents FB ($r = .47$, $p < .001$) and change of location ($r = .68$, $p < .001$) task performance. More specifically, children's age was significantly correlated with performance on fantastical fiction change of

location ($r = .52, p < .001$), realistic fiction change of location ($r = .65, p < .001$), fantastical fiction contents FB ($r = .37, p < .001$), and realistic fiction contents FB ($r = .45, p < .001$) tasks.

After this inspection, the relations between FB tasks were examined. A bivariate correlation with FB tasks across varying degrees of fantasy was conducted. A significant correlation was observed between fantastical fiction contents FB and fantastical fiction change of location ($r = .30, p < .01$). Similarly, the correlation between realistic fiction contents FB and realistic fiction change of location ($r = .35, p < .01$) was significant. Due to these significant results, one composite score FB tasks was created for each degree of fantasy (i.e., fantastical fiction FB and realistic fiction FB) used in further analyses.

3.5.3. Relations between Degree of Fantasy, Age, and Order on FB

Mixed-ANOVA analysis was conducted to investigate the central hypothesis of the study regarding the effect of fantasy on children's FB understanding. The mixed design ANOVA was conducted on FB scores (fantastical fiction FB and realistic fiction FB) with age and the order as between-subjects factors and degree of fantasy (fantastical fiction and realistic fiction) as the within-subjects factor. The EF level was included in the analysis as a control variable.

Replicating our results on Study 1, there were the main effects of EF level ($F(1,84) = 9.06, p < .01, p\eta^2 = .10$), degree of fantasy ($F(1,84) = 5.81, p = .02, p\eta^2 = .07$) on children's FB understanding. Additionally, the main effect of age was significant ($F(1,84) = 23.43, p < .001, p\eta^2 = .22$) on children's FB

understanding. The order had no main effect on children's FB performance ($p = .38$).

In line with the past literature (Perner & Lang, 1999), children with higher EF levels showed higher FB understanding ($M_{DCCS1} = 1.17$, $SD_{DCCS1} = 0.76$; $M_{DCCS2} = 1.87$, $SD_{DCCS2} = 1.38$; $M_{DCCS3} = 3.33$, $SD_{DCCS3} = 1.09$). Additionally, as hypothesized, children performed better in fantastical fiction FB tasks ($M = 1.18$, $SD = .07$) as compared to realistic fiction FB tasks ($M = .95$, $SD = .06$). Mirroring findings from past research on children's performance on FB, the analysis showed the expected developmental differences by age when collapsed across the degree of fantasy.

While there was no main effect of the order, the trend level interaction effect between age and order in Study 1 was significant ($F(1,84) = 7.04$, $p = 0.01$, $\eta^2 = .22$) in the current study (See Figure 10). Follow-up tests revealed that 3-year-olds who received the fantastical fiction FB tasks ($M = 0.91$; $SD = 0.12$) performed significantly better ($p = .02$) than 3-year-olds who received the realistic fiction FB tasks first ($M = 0.54$; $SD = 0.11$). None of the other possible two-way interactions were significant.

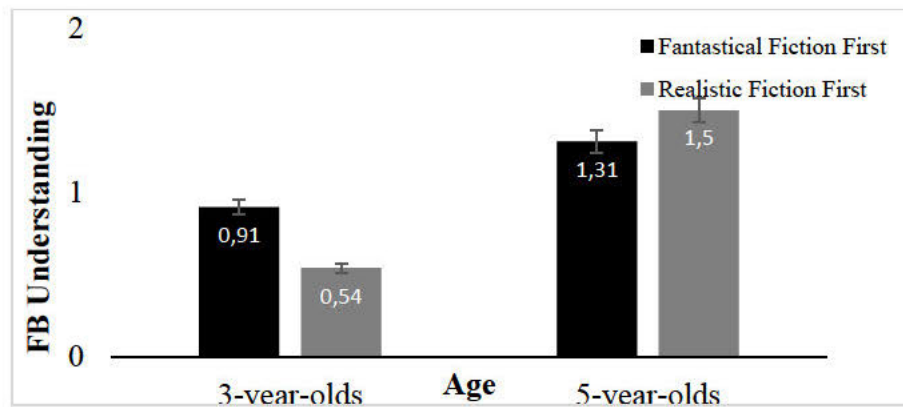


Figure 10. Children's FB Performance by Age and Order

3.6. Study 2 Discussion

Study 2 is conducted to account for the possible limitations of Study 1. Study 2 utilized a more targeted sample containing 3- and 5-year-olds and was conducted face-to-face. Moreover, Study 2 utilized an established fantasy-orientation scale to investigate the nature of the degree of fantasy effect on children's FB understanding. Lastly, Study 2 included a more comprehensive measure of EF (i.e., DCCS).

First, Study 2 replicated the main effect of the degree of fantasy established in Study 1. The participants were more successful in tasks containing fantastical fiction than realistic fiction content when collapsed across age and order. Second, children with higher EF scores showed higher FB understanding.

Thirdly, by going beyond Study 1, Study 2 demonstrated that the trend-level interaction effect between age and order is significant. The fact that the order of the type of fiction presented first selectively affected 3-year-olds' FB performance is an intriguing finding, especially when we consider 3-year-olds lack orientation towards enjoying fantastical content over realistic content. This seems to imply that engagement may not be an important component of 3-year-olds' early success on FB tasks, as fantastical fiction content scaffolds their FB performance regardless of their initial low levels of orientation towards the fantastical fiction content.

CHAPTER IV

GENERAL DISCUSSION

Elements of fantasy have been indiscriminately used in correlational and intervention studies that examined the factors that affect children's understanding of FB. In theoretical work, fantasy has featured mostly as an incidental factor of most interactive childhood contexts. For instance, socio-cultural theory has emphasized the effect of the co-constitutive nature of the narrative discourse on FB understanding without explicit focus or consideration of fantasy (e.g., Nelson, 2010). Perhaps the only theoretical position that touches on issues related to fantasy is simulation theory. Harris (2005) argued that imagination is a cognitive ability that scaffolds perspective-taking which underlies children's developing abilities of understanding FB. However, neither theoretical position has explored whether pretend play or narrative discourse contexts with and without fantastical elements affect FB differently.

Given that children can learn socio-culturally complex concepts such as emotions, virtues, and mental states from stories that include fantastical elements, one may argue that the reader's dilemma does not hold for learning facts about the social world from fantastical stories. In addition, there are evidence-based reasons to expect that children would benefit from fantasy elements of stories in making meaning of false belief themes. These include increased levels of engagement and reality-distancing inherent in fantastical media contexts. Accordingly, fantastical elements may aid children's FB understanding. In other words, stories with varying degrees of fantasy can influence children's understanding of mental states differently. Hence, the current study utilized FB task stories with varying degrees of fantasy to investigate whether children's FB understanding change with two levels of fantasy included in FB stories.

The combined results of the previous two studies illustrated two important points. The results aligned with our expectations that children would perform better on FB tasks with fantastical fiction elements than on FB tasks with realistic fiction elements. The intriguing interaction of age and order showed that 3-year-olds who received the tasks containing fantastical fiction elements first performed better than 3-year-olds who received the tasks containing realistic fiction elements first. This effect was not observed for 5-year-olds.

One key finding of the current project was related to the effects of the degree of fantasy on preschoolers' FB understanding. The results of the two studies revealed a consistent effect of fantasy. Preschoolers performed better in FB tasks containing fantastical fiction than tasks containing realistic fiction

elements. Thus, an increasing degree of fantasy was related to higher success in FB tasks.

The findings can be explained equally well with increased engagement or heightened reality-distancing. In reality, both of these factors may be in operation interdependently. On the one hand, children may find FB scenarios with fantastical elements more engaging because they find them fun. On the other hand, reality-distancing can also eliminate egocentric biases through inducing self-distancing and the curse of knowledge through inducing social-distancing.

While the current project could not differentiate between these two possibilities which would lead to higher levels of engagement, Study 2 showed that 5-year-olds who were inclined more towards fantastical themes did not benefit from the fantastical fiction version of the FB tasks. In addition, there was no relation between success on FB tasks and fantasy inclination. Thus, the engagement hypothesis falls short in explaining the main effect of the degree of fantasy if the explanation relies on children's orientation towards engaging with fantastical elements.

Consequently, the reality-distancing component might have scaffolded children on FB tasks by providing them with a perspectival context free from either cognitive biases. This explanation favors the simulation theory account with an emphasis on perspective-taking. However, the component (i.e., self- vs. social-distancing) responsible for this effect remains unclear as the current project does not allow distinguishing the effects of the two.

Another possibility for the effectiveness of fantasy may include interactive and additive effects of both engagement and reality-distancing. The current project utilized novel fantastical elements which may have simultaneously increased children's attention (and engagement) to the task and their ability to overcome the constraints of reality. Specifically, in the current project, both the characters and the setting of the standard FB tasks were altered to include fantastical fiction elements. Compared to self-distancing induced by the alterations made solely in character features on FB tasks (White & Carlson, 2016) and social distancing induced by the alterations only made in the story setting (Farrar & Ostojic, 2018), the current project established a complete reality-distancing on the dimensions of character and setting features. Thus, the reality-distancing provided in fantastical fiction tasks might constitute the novelty of the fantastical content.

Instead of presenting information to children in a more literal sense, children are presented with stories that include fantastical elements. Children's stories that include fantastical elements are not a modern phenomenon (Sullivan, 2001). It is possible that such stories have persisted against the test of time because they serve a purpose for child development. They may allow children to exercise and advance their understanding of the psychological world (Zunshine, 2006). Hence, the significance of fiction as a cultural phenomenon, its transmission and modern exercise should be investigated with its cognitive and social implications from socio-cultural and cultural evolutionary perspectives.

Another key finding of the current project pertains to the interactive effect of age and order (i.e., fantastical fiction first, realistic fiction first) on children's FB performance. Following the trend level interaction in Study 1, Study 2 revealed that 3-year-olds who received the tasks containing fantastical fiction elements first performed better than 3-year-olds who received the tasks containing realistic fiction elements. Five-year-olds did not benefit differentially from either order. As previously discussed, fantasy may improve children's performance due to two factors (engagement and reality-distancing). It is possible that 3-year-olds who are less capable in socio-cognitive reasoning than 5-year-olds are more open to these effects, even though they are not more fantasy-oriented than older children.

The current project provided robust evidence showing that fantastical elements support children's socio-cognitive reasoning. However, disentangling which of several possible explanations (novelty, enjoyment, social-distancing, self-distancing) or their combination may constitute the reason(s) for this effect remains unclear. Several future directions would provide more insight into the mechanism by which fantasy helps children's socio-cognitive reasoning.

First, future research can include self and social distancing conditions separately to examine the different effects of the fantastical fictional elements on egocentric biases and the curse of knowledge. For inducing self-distancing between the participating child and the story character, the fantastical characters in realistic settings might be used in FB tasks. Thus, the effects of fantastical fiction can be discussed regarding egocentric biases. Similarly,

realistic fictional characters in fantastical settings might be used in FB tasks to induce social distancing. Thus, the effects of fantastical fiction regarding the curse of knowledge can be discussed.

Another future direction of the current study is related to the varying degrees of fantasy. Fantastical and realistic fiction could be construed as polar ends of the fantasy-reality continuum. In the current project, fantastical elements were incorporated into every aspect of the FB scenarios (i.e., character, actions, setting). Hopkins and Lillard (2021) included four degrees of fantasy in their learning study. They demonstrated that the setting with the highest degree of fantasy revealed a more successful solution transfer to real settings than other lower degrees of fantasy. Given the prevalence of fantastical fiction that introduces young children to the intricacies of the social-psychological world, it would be beneficial to know what degree of fantasy helps children reason more effectively in this realm. Hence, future research should investigate the effect of fantasy according to its varying degrees. For instance, the current project utilized characters, especially the younger age group may not have known are animals (starfish and sponge). Including anthropomorphic characters from better-known animal categories (e.g., a talking cat) that may simultaneously carry fantastical and realistic features might be important for understanding the nature of the relation between fantasy and FB understanding.

The current project showed that fantasy helps, especially younger children, in false belief reasoning. A plausible question concerns whether all young children are supported by fantasy equally. The current project suggests that

fantasy orientation is unrelated to children's FB performance, regardless of whether the FB task includes fantasy elements. However, other important correlates of FB and fantasy could constitute individual differences (e.g., language, visual perspective-taking). Future work could investigate these potential individual differences by including measures that target these abilities (e.g., vocabulary).

Additionally, future work should include more insight into children's pretend abilities. Children are not only the recipients of fantastical content in stories; they actively create them in their pretend play. Thus, the content of children's pretend play may give us a complete picture of children's involvement with fantastical elements. Despite the lack of pretend play studies focusing on the content of pretend play (whether fantastical or realistic), White and Carlson (2016) present a good reason to suspect that fantastical and realistic pretend play can affect cognitive abilities differently. Thus, the same effect of varying degrees of fantasy in pretend play can be investigated for FB understanding.

Lastly, it might be possible to get an insight into the direction and stability of the reported effects by using intervention studies that track the effect of interventions on the targeted performance of the individuals through time. For example, Thibodeau and colleagues (2016) asserted that fantasy-play intervention aids executive function performance. Thus, adopting a similar intervention program may be interesting to investigate the changes that may occur in children's FB performance and determine whether the effect of fantasy can induce changes in children's FB development.

In conclusion, the current project expands the literature on children's FB understanding by introducing a novel manipulation targeting the setting and the character features of the FB tasks to include fantastical or realistic elements. In conclusion, the reality-distancing component in FB tasks with fantastical elements might eliminate egocentric biases by inducing self-distancing and the curse of knowledge by inducing reality-distancing. Thus, the reality-distancing component might scaffold children on FB tasks by providing children with a flexible context to contemplate others' perspectives, which is favored by the simulation theory account. Hence, the current project highlights the need to further investigate the complex interplay between fantastical fictional content and children's FB understanding by going beyond the methods utilized here.

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APPENDIX

Stimulus Shown	Experimenter's Statement
	Spongebob and Patrick live in the magical sea. They can engage in burning campfires underwater and look at their skin color! Spongebob is yellow and Patrick has pink skin. (Adult Testimony) I have found a game including Spongebob and Patrick, would you like to play it with me?
	Look, there is a box Spongebob is holding! What do you think is inside this box?
	Let's see what is inside. Mmmm, it is really a candy inside. Okay, what is inside the box? (Memory Question)
	Now Spongebob puts the candy back in the box and leaves the room.
	Here comes Patrick. Patrick has never seen inside this box. What does Patrick think is in the box, a band-aid or a candy? Did Patrick see inside this box? (Control question)



Spongebob hands Patrick a chocolate!



Patrick stashes the chocolate in the kitchen cabinet.



Then Patrick walks outside to play with the jellyfishes.



However, Spongebob locates the chocolate, places it in a fridge since it can melt there.



Spongebob departs to get some rest.
Where did Patrick leave the chocolate?
(Control Question)
Where is the chocolate now? (Control Question)



Patrick arrives, demands the chocolate.
Where will Patrick seek the chocolate?



There are Lena and Bobo. They live in a city as we do. They like to play games together. (Adult Testimony)
I have found a game including Lena Bobo, would you like to play it with me?



Look, there is a box Bobo is holding!
What do you think is inside this box?



Let's see what is inside. Mmm, it is really a crayon inside.
Okay, what is inside the box? (Memory Question)



Now Bobo puts the crayon back in the box and leaves the room.



Here comes Lena. Lena has never seen inside this box. What does Lena think is in the box, a candy or a crayon?
Did Lena see inside this box? (Control question)



Bobo hands Lena a hat!



Lena stashes her hat in the wardrobe.



Then Lena walks outside to play with his friends.



However, Bobo locates the hat, and places it in the bag since Lena may need the hat while going outside.

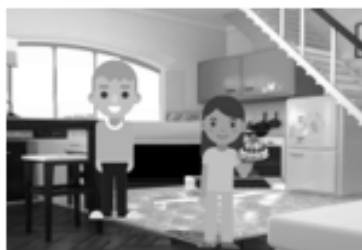


Bobo departs to get some rest.
Where did Lena leave the hat? (Control Question)
Where is the hat now? (Control Question)



Lena arrives, demands the hat. Where will Lena seek the hat?

Stimulus Shown	Experimenter's Statement
	There are Lena and Bobo. They live in a city as we do. They like to play games together. (Adult Testimony) I have found a game including Lena Bobo, would you like to play it with me?
	Look, there is a box Bobo is holding! What do you think is inside this box?
	Let's see what is inside. Mmm, it is really a candy inside. Okay, what is inside the box? (Memory Question)
	Now Bobo puts the candy back in the box and leaves the room.
	Here comes Lena. Lena has never seen inside this box. What does Lena think is in the box, a band-aid or a candy? Did Lena see inside this box? (Control question)
	Bobo hands Lena a cake!



Lena stashes the cake in the oven.



Then Lena walks outside to play with his friends.



However, Bobo locates the cake, places it in a fridge since it can melt there.



Bobo departs to get some rest.
Where did Lena leave the cake? (Control Question)
Where is the cake now? (Control Question)



Lena arrives, demands the cake. Where will Lena seek the cake?



Spongebob and Patrick live in the magical sea. They can engage in burning campfires underwater and look at their skin color! Spongebob is yellow and Patrick has pink skin. (Adult Testimony)
I have found a game including Spongebob and Patrick, would you like to play it with me?



Look, there is a box Spongebob is holding!
What do you think is inside this box?



Let's see what is inside. Mmm, it is really a crayon inside.
Okay, what is inside the box? (Memory Question)



Now Spongebob puts the crayon back in the box and leaves the room.



Here comes Patrick. Patrick has never seen inside this box. What does Lena think is in the box, candy or a crayon?
Did Lena see inside this box? (Control question)



Spongebob hands Patrick a hat!



Patrick stashes the hat inside of a seashell.



Then Patrick walks outside to play with the jellyfishes.



However, Spongebob locates the hat, places it in a box since it can get wrinkled there.



Spongebob departs to get some rest.
Where did Patrick leave the hat? (Control Question)
Where is the hat now? (Control Question)



Patrick arrives, demands the hat. Where will Patrick seek the hat?

Stimuli Shown		Experimenter's Statement
Food Storm	Rain Storm	In the Food Storm book, clouds form in the sky, and suddenly food begins to pour in. In the Rain Storm book, clouds form in the sky, and suddenly, it starts to rain. What was Food Storm about? (Control Question) Which one would you like the most?
Lost Orange Ball	Lost Magic Wand	In the Lost Orange Ball book, a boy searches for his lost orange ball. In the Lost Magic Wand book, a boy searches for his lost magic wand. What was Lost Orange Ball about? (Control Question) Which one would you like the most?
A Day with My Dog	A Day with My Dragon	In the A Day with My Dog book, a boy and his dog are playing in the garden. In A Day with My Dragon book, A boy and his dragon are playing in the castle. What was A Day with My Dragon about? (Control Question) Which one would you like the most?
Invisibility Cloak	Red Cloak	In the Invisibility Cloak book, A child wears a cloak that makes her invisible. In the Red Cloak book, A child wears a warm red cloak. What was Red Cloak about? (Control Question) Which one would you like the most?
Airplane Trip	Flying Carpet Trip	In the Airplane Trip book, a boy takes a plane ride around the world. In the Magic Carpet Trip book, a child takes a journey on a flying carpet around the world. What was Airplane Trip about? (Control Question) Which one would you like the most?