

METAPHOR COMPREHENSION IN PRESCHOOL CHILDREN

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Metaphor Comprehension in Preschool Children

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ABSTRACT

Metaphor Comprehension in Preschool Children

Metaphors, as part of figurative language, are a common part of children's content (e.g. books, cartoons); thus, it is vital to investigate how much children understand them. To assess preschool children's psychological metaphor comprehension, several ambiguous stories with metaphorical phrases were prepared. Children were asked to identify the emotion of the story character (revealed in the metaphoric phrase) by choosing the correct picture. Children's metaphor comprehension was investigated in relation to individual differences in cognitive abilities and metaphor-related factors. Children were more likely to choose the picture depicting the correct emotion revealed in the metaphorical phrase compared to distracters and incorrect pictures. Furthermore, a positive relationship between executive functioning (EF) abilities and metaphor comprehension was found, while no correlation was found with children's tendency to pretend play or language complexity. Analyses partially supported that when the context the metaphor is presented in is easier, children show more comprehension, and, the performance with the more familiar metaphors was higher than the less familiar metaphors. Looking at the interaction between EF and familiarity of metaphors, findings suggest that EF might have a more profound contribution to the comprehension of less familiar metaphors compared to more familiar ones. Overall, these findings replicate and extend the studies that suggest even preschool children can understand psychological metaphors and emphasize the importance of investigating the effects of cognitive and metaphor-related factors together to understand factors contributing to metaphor comprehension development.

ÖZET

Okul Öncesi Dönemde Çocukların Metafor Kavrayışı

Metaforik ifadeler, mecazi dilin bir parçası olarak, çocuklara yönelik içeriklerde (örn. çizgi film, hikayeler) önemli bir yer tutmaktadır. Bu nedenle çocukların metaforik ifadeleri ne kadar iyi anladığını ölçmek önem arz etmektedir. Anaokulu çağındaki çocukların psikolojik metaforları anlama becerisini gözlemlemek için, karakterlerin duygusunu metaforlarla ifade eden hikayeler hazırlanmış ve çocuklardan karakterin duygusunu doğru ifade eden resmi seçmeleri istenmiştir. Çocukların metafor anlama yeteneği, bilişsel faktörler ile metaforik ifadeyle ilgili faktörler arasındaki etkileşim göz önünde bulundurularak incelenmiştir. Çalışmada çocuklar metaforun ifade ettiği duyguyu doğru gösteren resimleri çeldirici ve yanlış resimlere kıyasla daha çok seçtiler. Bunun yanında sonuçlar, yönetici işlev becerileri ile metafor kavrama becerileri arasında pozitif bir ilişki olduğunu gösterdi, ancak, metafor kavrama becerileri çocukların -mı gibi oyun oynama eğilimleri veya kullandıkları dilin özellikleri ile ilişkili bulunamadı. Analizler, hem bağlam daha kolay olduğunda çocukların metaforları daha iyi anladığını hem de aşinalık seviyelerinin daha yüksek olduğu metaforları düşük olanlara kıyasla daha iyi anladığını kısmen destekledi. Etkileşim analizleri de, yönetici işlevlerin, daha az tanıdık metaforların anlaşılmasına daha fazla katkıda bulunabileceğini gösterdi. Genel olarak, bu bulgular, okul öncesi dönemdeki çocukların bile psikolojik metaforları belli bir düzeyde anlama becerisine sahip olduğunu öneren çalışmaları yinelemekte ve genişletmektedir. Ayrıca bilişsel beceriler ve metaforun ifade edilişi ile ilgili faktörlerin etkilerini birlikte araştırmanın önemini vurgulamaktadır.

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CHAPTER 1

INTRODUCTION

The development of figurative language comprehension, particularly metaphor comprehension, is a crucial aspect of linguistic and cognitive growth in children. Metaphors are pervasive in everyday communication, storybooks, and cartoons (e.g., Marriott, 2002; McCrindle & Odendaal, 1994; Taggart et al., 2019). They serve as a fundamental tool for expressing complex ideas, emotions, and abstract concepts (Vosniadou, 1987). Therefore, understanding how children acquire and process metaphors can provide valuable insights into their cognitive development and linguistic capabilities.

The definition of non-literal or figurative language dates back to the first century BC (Purcell, 1990), and the language is considered non-literal when “the language departs from the ordinary meanings of words and is applied in another sense” (Cicero, 1954 as cited in Purcell, 1990, p. 37). Metaphorical expression is one of the tropes that form figurative language by transferring a feature of a concept to another based on their resemblance (Cicero, 1954 as cited in Purcell, 1990), and it is also one of the important concepts that create abstraction in the content that children are exposed to (Colston & Kuiper, 2002; Tehseem & Khan, 2015). Despite children's frequent exposure to metaphorical expressions in various media, the extent to which they comprehend and learn from these expressions remains a topic of debate. There is contradictory evidence in the literature on whether children have a good degree of metaphoric comprehension at a young age or not. Although a substantial amount of older studies suggests that children younger than 10 cannot

comprehend metaphors (Asch & Nerlove, 1960; Piaget, 1926; Winner et al., 1976), recent studies indicate that younger children hold some level of metaphor comprehension (Özçalışkan, 2005; Pouscoulous & Tomasello, 2020; Zhu & Gopnik, 2023). The current study aims to investigate preschool children's metaphor comprehension abilities, considering the effects of both child- and metaphor-related factors.

In this section, I will first discuss the theoretical definition of non-literal language and metaphors, theories about children's metaphor comprehension, and finally, how cognitive abilities (i.e., executive functioning, language complexity and pretend play) and metaphor-related factors (i.e., complexity of the metaphorical expression, and familiarity) might be affecting the process. I will then proceed to the current study.

1.1 Theoretical definition of metaphors

The discussion of metaphors and non-literal language in general dates back to ancient Greece, as evidenced by the writings of Aristotle (ca. 350 B.C.E./2016). While Aristotle (ca. 350 B.C.E./2016) employs the term "metaphor" in his writings, his examples suggest a broader reference to figurative language. Some accounts differentiate between the types of tropes that create figurative language (e.g., metaphor, metonymy, similes, etc.); however, contemporary work, echoing Aristotle's account, also frequently uses metaphor and various tropes of figurative language interchangeably (e.g., Lakoff & Johnson, 1980; Vosniadou et al., 1984). Aristotle (ca. 359 B.C.E./ 2016), considers metaphors as an ornamental tool in art, implying their limited use. Nevertheless, he suggests that poets who possess a strong ability to perceive similarity may utilize effective metaphors to facilitate a more

profound comprehension of the defined concept. In other words, he claims that even though it is only accessible in the context of art, metaphors hold a vital function to conceptualize novel concepts. Building upon this historical definition of metaphors and their suggested meaning-making function, contemporary work offers further insights into the nature of metaphors. Specifically, contemporary accounts focus on providing clearer definitions and attempt to have a more thorough understanding of the functions of metaphors. For example, Asch (1961) examines the underlying psychological principles and implications of using metaphors. Unlike Aristotle, he suggests that metaphors are not an ornament but instead a cognitive vehicle, which enables individuals to comprehend and articulate abstract topics by employing more concrete and familiar language.

Examining another foundational theory, Lakoff and Johnson (1980) propose in their Conceptual Metaphor Theory that metaphors are composed of a base concept and a target concept. The target is conceptualized by means of the base concept in an abstract manner, thereby shaping our understanding of the target concept. For instance, the phrase “lion-hearted kid” suggests that the target concept ‘kid’ resembles a ‘lion’, which is the base concept in this case, in terms of the courage and strength s/he has. Similar to Aristotle (ca. 359 B.C.E/ 2016), Lakoff and Johnson’s (1980) definition of a metaphor is a broader one including other figurative language tropes such as metonymy (where one phrase is substituted with another closely associated phrase) and synecdoche (using the word for the “part” to stand for the “whole” or vice versa). Furthermore, their view supports the meaning-making function of metaphors for novel concepts that Aristotle had implied. However, like Asch (1961), Lakoff and Johnson (1980) propose that metaphors are frequently employed in everyday language, often without conscious awareness, and extend

beyond artistic contexts. Their assertion that metaphors play a more significant role in daily life than previously thought has sparked greater interest in metaphors within psychology and has influenced subsequent research in the field.

For instance, within the scope of the Career of the Metaphor Theory proposed by Bowdle and Genter (2005), in addition to acknowledging the meaning-making function of metaphors that Lakoff and Johnson (1980) suggested, it is proposed that how a metaphor is conceptualized and its function differs across the metaphor's lifespan. Specifically, they suggest that whether a metaphor is conventional (becomes well-known in time) or novel affects how it is conceptualized (see also Blank, 1988; Giora, 1997; Turner & Katz, 1997). According to this view, while comparison features are more dominant in novel metaphors, in conventional metaphors, the target is more likely to be perceived as a prototypical member of the group that the base concept belongs to, rather than being compared to the base. Thus, the researchers claim a stronger relationship between the target and the base in conventional metaphors, which in turn could be more effective in creating a meaning for the target from a different perspective.

Considering the aforementioned meaning-making function of metaphors, researchers suggest that metaphors might be especially useful in facilitating the understanding of abstract concepts such as emotions (Borghi et al., 2017; Fainsilber & Ortony, 1987; Fetterman et al., 2016; Kovecses, 1988, 2000). For example, Fainsilber and Ortony (1987) found that people tend to use more metaphors when they are talking about their emotions compared to actions in their memories. They interpreted these findings as indicative of people's inclination to use metaphors as a means to better grasp their emotional states. Moreover, Fetterman et al. (2016) observed that adults exhibit less negative affect when asked to describe their negative

memories using metaphorical language, as opposed to asking them to tell their negative memories with no additional prompt. These researchers also construed these outcomes as evidence that utilizing metaphorical language not only enhances individuals' understanding of their emotions but also aids in regulating their emotional experiences.

Studies investigating this function of metaphors are generally conducted with adults. However, understanding whether this function of meaning-making in the context of emotions also holds for children is important since children have fewer tools (e.g., less competency in verbal cues) than adults to understand and express emotions and they might rely more on primitive cues (e.g., facial cues) (Chronaki et al. 2015). Therefore, identifying additional mechanisms that might enhance children's emotional understanding can be beneficial. Nevertheless, before investigating whether children can utilize metaphors to gain a better understanding of their emotions in further research, it is necessary as a first step to address whether young children can understand metaphors that conceptualize psychological states, which this research aims to tap into. By gaining a better understanding of the extent that young children comprehend metaphors defining psychological states, further studies can address how metaphors may be utilized in various aspects of children's daily routines (such as books, cartoons, and educational settings) to enhance their emotional understanding.

1.2 Children's metaphor comprehension

Earlier theories about children's metaphor comprehension suggest that children younger than 10–12 years fail to comprehend the abstract relationship between the base and target concepts in a metaphorical expression (Cometa & Eson, 1978; Piaget,

1926; Smith, 1976). In line with this view, Asch and Nerlove (1960) demonstrated that only children older than 10 years can articulate the abstract relationship between the target and base concepts in a metaphorical expression appropriately. For example, in the expression “her hands are ice” younger children cannot explain “ice is cold; therefore, her hands are cold just like ice” logic verbally. Asch and Nerlove (1960) interpreted these findings as children developing the cognitive skills to comprehend metaphors only in the formal operational stage, after age 10.

Nevertheless, these initial studies relied on children's ability to articulate and verbally explain metaphors, which has led to criticism for interpreting performance scores in explanation tasks as conclusive evidence of metaphor comprehension (e.g., Deamer, 2013; Özçalışkan, 2005; Pearson, 1990; Pouscoulous, 2014, 2023; Pouscoulous & Tomasello, 2020). Verbally explaining and interpreting metaphors requires meta-linguistic skills and involves the ability to discuss language itself, which differs from comprehending the phrases (Vosniadou, 1987). Considering that poor performance on earlier metaphor comprehension tasks can stem from younger children's lack of meta-linguistic skills rather than a lack of comprehension, recent studies on the subject have used alternative methods that do not require verbal responses (e.g., Pouscoulous & Tomasello, 2020; Waggoner & Pallermo, 1989; Zhu & Gopnik, 2023). For instance, Pouscoulous and Tomasello (2020) asked 3-year-old children to select the appropriate toy from two options, which the experimenter defined using a metaphorical phrase (e.g., “the tower with the hat”) for the test group. Children in the test group performed higher than the chance level and chose the metaphorically accurate toy more often than the control group, which did not receive a definition of any kind and were just asked to choose one of the toys.

In another study by Waggoner and Palermo (1989), researchers presented ambiguous stories to children (preschoolers, first graders, third graders) and college students in which the emotion of the protagonist was only revealed with a metaphor at the end. All metaphors used were describing psychological states but differed in their complexity level: using more abstract or concrete base concepts. They determined whether a metaphor is abstract or concrete through a pilot study, where they gathered ratings from college students. An example story goes by: “Betty went to the fair with her father. Together, they went on the rides, and they played some of the games. Betty saw a big, stuffed animal that she wanted her dad to win for her. All he had to do was knock over the bottles with three baseballs. She begged him to try. He paid the man for three balls. Betty watched him throw and hoped he could do it. She would feel so sad if she couldn't take the animal home and so happy if the animal were hers. After her dad had thrown the third ball, Betty was a...” (Waggoner & Palermo, 1989, p. 162). The experimenter concluded the story using one of the four alternative metaphors indicating whether the character is feeling positive or negative emotions with variations in metaphor abstraction: concrete-happy (betty was a bouncing bubble), abstract-happy (betty was a silver minute), concrete-sad (betty was a sinking boat), and abstract-sad (betty was a used joke). At the end of the story presentation, researchers then asked participants to indicate the correct emotion of the protagonist (e.g., happy or sad) among the verbally presented options. Additionally, the researchers asked the 1st and 3rd grade participants to justify their choices. They did not ask preschoolers for justification because they observed uncooperative behavior when doing so. The results of the study showed that even preschool children performed better than chance level in choosing the correct emotion of the protagonist. Furthermore, their results showed that the performance

on concrete metaphors was higher than the performance on abstract metaphors, suggesting that the complexity of metaphorical phrases also affects the comprehension process.

In addition to meta-linguistic difficulties, researchers started to investigate various other possible difficulties that children might face in the process of metaphor comprehension (Vosniadou, 1987). For instance, in the majority of the metaphor comprehension tasks, children were just verbally presented with the metaphorical phrases and asked to interpret them (e.g., Mağden & Gündoğan, 2009; Winner et al., 1976). Both, Winner et al. (1976) and Mağden and Gündoğan (2009) orally presented metaphorical phrases (e.g., "the prison guard was a hard rock") and asked children what they thought this meant. However, this absence of context is rarely the case in real life. Children are either exposed to metaphors via media (cartoons, books, etc.), which provide a pictorial context, or in their daily conversations, which include storytelling context. Thus, higher performance could be expected in metaphor comprehension tasks that provide a context rather than presenting them as stand-alone phrases.

For example, unlike their contemporaries, Billow (1975) and Honeck et al. (1978) found that giving a pictorial context helps elementary school children's metaphor comprehension. Billow (1975) showed that presenting metaphorical expressions with a picture representing the metaphor facilitates children's metaphor comprehension compared to presenting metaphors only verbally in children aged 7 to 9. In a different line of work, Honeck et al. (1978) presented 10 non-literal proverbs along with their corresponding picture and a foil picture to children. Then, they asked children to choose the picture that had the same meaning as the sentence. Seven- to nine-year-old children in the study performed higher than the chance level.

Factors influencing the phrase complexity can also contribute to the difficulty of metaphor comprehension tasks. For instance, in a series of experiments, Vosniadou et al. (1984) read to 4- to 11-year-old children stories that included metaphorical expressions and asked them to act out the story with the given toys while manipulating the complexity of the story context and complexity of the metaphorical phrase. They changed the predictability of the story ending (less or more predictable depending on the established story context) to manipulate context complexity, expecting a higher performance with more predictable endings. To modify the complexity of the phrase, they used similes (e.g., “Paul was like a rabbit running through his hole”; p. 1599) or predicatives (“Paul was a rabbit running through his hole”; p. 1599). Researchers assumed that similes would be easier to comprehend than predicatives since the comparison between base and target concepts is overtly done in similes by using the word “like”. The study revealed that even the youngest children demonstrated a basic understanding of metaphors and their comprehension of metaphors improved as they grew older. Furthermore, the researchers found that the complexity of the phrases and the predictability of the story ending had a similar impact on children's comprehension across all age groups in the expected direction. Specifically, they observed that preschool children gave correct responses twice as much to similes compared to predicatives and also the performance in stories with a predictable ending was higher than unpredictable endings. These results align with the findings of Waggoner and Pallermo (1989), suggesting that altering the phrase complexity can enhance children's comprehension of metaphors.

Overall, these studies show that after adjusting task requirements by providing a context with stories and pictures, removing meta-linguistic demands, and

choosing less complex metaphors, even preschool children display some level of metaphorical understanding. In this current study, the aim is to discover what other personal and metaphor-related factors might affect preschool children's metaphor comprehension after controlling for the above-mentioned factors.

1.3 Cognitive factors

The research about metaphors suggests that metaphor comprehension is a cognitive and linguistic ability (Özçalışkan, 2005; Vosniadou, 1987); however, the question of how individual differences in cognitive and linguistic abilities shape metaphorical understanding is not discussed thoroughly in the literature. For instance, studies with different age groups consistently report that metaphorical understanding ability increases with age (ages between 5 and 12), which is interpreted as cognitive abilities that make metaphorical understanding possible unfolding over time (e.g., Asch & Nerlove, 1960; Waggoner & Palermo, 1989; Winner et al., 1976).

Nevertheless, it is not systematically investigated which cognitive abilities might be facilitating the process. To understand how metaphor comprehension ability might be related to these factors, it is crucial to identify the underlying cognitive mechanisms that enable metaphor comprehension. Two cognitive mechanisms that will be investigated in this study are Executive Functioning (EF) and pretend play. Both of these abilities seem to be related to dual representation which lies at the heart of metaphor comprehension, therefore; these factors have been specifically selected for detailed examination in this study.

Dual representation involves the capacity to simultaneously hold and process information in two distinct ways or formats: abstract conceptualization and concrete sensory experience (DeLoache, 2000; Uttal et al., 1995). For example, one can

mentally represent an object both as an abstract idea (e.g., a symbol of peace) and as a tangible, perceptual reality (e.g., an actual olive branch), which requires a mapping between two distinct formats and the inhibition of a concrete definition of the concept to create an abstract meaning. Similarly, during the metaphor comprehension process, one should consider the target concept by means of a base concept instead of its own, literal conceptualization. Thus, I aim to investigate EF and pretend play in which dual representation plays a fundamental role (Carlson et al., 2014; Leslie, 1987; McCune, 1995; Nielsen & Dissanayake, 2000) in relation to metaphor comprehension.

Executive functioning (EF) skills consist of high-order cognitive abilities and have three widely accepted subcomponents: inhibition, working memory, and cognitive flexibility (Miyake et al., 2000; Spiegel et al., 2021). To comprehend a metaphor, individuals need to refrain from interpreting the target concept in a strictly literal manner, which would require the inhibition of the literal conceptualization process. Moreover, when comprehending a metaphor, individuals may need to draw upon their working memory to retrieve the prototypical definition of the base concept being used. Finally, the transfer of the schematic representation from the base concept to the target concept demands cognitive flexibility.

There are several studies suggesting a relationship between dual representation and EF. For instance, Carlson et al. (2014) found a positive correlation between pretense representation and EF of preschool children and interpreted these findings as EF skills being involved in pretense in terms of “inhibiting reality and flexibly manipulating dual representations” (p. 1). In other words, these results support the notion that dual representation and EF might share similar underlying mechanisms. Nevertheless, the relationship between EF and metaphor

comprehension was not examined thoroughly with preschool children. Carriedo et al. (2016) investigated the aforementioned relationship with older children (aged 10-15) and young adults (aged 20-25) by assessing their metaphor comprehension with analogical and class inclusion reasoning tests as well as asking them to explain the meanings of metaphors. They assessed EF using several batteries for updating, inhibition, and shifting. They did not find a consistent effect of EF with different batteries on different age groups. Nevertheless, they observed EF's enhancing effect when the metaphors were more difficult to understand. Thus, although they did not find a direct effect of EF skills on metaphor comprehension, it is essential to address the same questions with a younger sample for whom EF might be a more important factor in determining metaphor comprehension performance. Furthermore, their results show the importance of examining the interplay between cognitive and metaphor-related factors.

As stated before, pretend play also involves dual representation (Leslie, 1987; McCune, 1995; Nielsen & Dissanayake, 2000) and is linked to language development (Kızıldere et al., 2020; Lewis et al., 2000); therefore, might be closely related to metaphor comprehension skills as well. Similarly, according to Vygotsky (as cited in Smolucha & Smolucha, 2012) metaphors are the linguistic expression of children's imaginative thinking and play, thus he suggests a close relationship between two concepts. During pretend play, children might treat an object as if it is something else (e.g., pretend to talk on the phone using a banana, representing the banana as a phone), act as if they are acting out to be someone else or engage in an activity as if they are doing something else (e.g., being a mother and feeding their baby) (Garvey, 1990; Lillard, 1993). In these instances, like in metaphorical understanding, children inhibit the dominant function of the target object (banana)

and conceptualize it by means of a base concept (phone). Due to the similar nature of pretend play and metaphor comprehension, some of the previous studies even treated instances of pretend play as metaphorical expressions (Billow, 1981; Winner, 1979; Winner et al., 1979; Winner et al., 1980).

However, there are major differences between metaphors and pretend play. In metaphorical conceptualizations, base and target concepts share a common quality, while this is not a necessity for pretend play. For example, children can put an object that doesn't have any perceptual or conceptual similarity to a phone on their ear and pretend to speak. On the other hand, even though metaphors violate some rules of reality, like pretend play does, this violation is based on some kind of similarity between base and target concepts. For example, the "lion-hearted kid" metaphor suggests that the bravery of the kid is what they have in common with a lion. In line with this argument, in her review of children's metaphor comprehension, Vosniadou (1987) interprets the relationship between pretend and metaphors as follows: "... pretend renamings could be best conceptualized as precursors of metaphor because, like metaphors, they are based on children's tendencies to impose a familiar schema on the object world. But this tendency alone does not make a metaphor. To qualify as a metaphor, the pretend renaming must be motivated by the perception of some similarity between the objects or events being compared" (p. 873).

The final cognitive factor I aim to investigate in this thesis is the general language competence of children. Although metaphor comprehension is considered to be a linguistic ability (Özçalışkan, 2005; Vosniadou, 1987), this component has not been extensively studied in the existing literature. Nevertheless, a few studies show that metaphor comprehension is positively related to vocabulary skills (Posucoulous & Perovic, 2023) and verbal reasoning (Carriedo et al., 2016). The

level of complexity with which children use language in their daily interactions can also be a key indicator of their ability to comprehend metaphors. Research shows that the way children employ language in their day-to-day conversations reflects their cognitive and linguistic development (Tomasello, 2005). For instance, children who demonstrate a higher level of language complexity by using more varied vocabulary, sentence structures, and linguistic devices may have a better grasp of abstract concepts like metaphors. Therefore, by analyzing the complexities of children's language, significant insights into their capacity to understand metaphors might be obtained.

Overall, metaphorical expressions, executive function abilities, and the tendency to engage in pretend play might have similar underlying mechanisms that seem to be based on dual representation ability; therefore, I expect a positive relationship between these variables. Moreover, considering metaphorical language as a more complex version of speech, I expect children who are more competent in general language use to have a better understanding of metaphors.

1.4 Metaphor-related factors

Looking at the metaphor comprehension process from another perspective, although cognitive and linguistic skills of children can explain the development of metaphor comprehension to a certain degree, there are metaphor-related factors involved in the process as well. For instance, in various studies, researchers observed that the same children understand some metaphors but not others (e.g., Keil, 1986; Vosniadou et al., 1984), which implies that metaphor-related factors also affect the comprehension process.

Supporting the common intuition, several observations show that complex metaphors are harder to comprehend (Johnson & Pascual-Leone, 1989; Vosniadou et al., 1984; Waggoner & Palermo, 1989; Winner et al., 1976). However, there is no consensus on the operational definition of “complex” vs. “simple” metaphors. Various studies used different operational definitions for the distinction. As exemplified above, Waggoner and Palermo (1989) used abstract and concrete distinction, comparing complex and simple metaphors, while Vosniadou et al. (1984) used simile and predicative distinction. Considering the definition of metaphor based on the Conceptual Metaphor Theory (Lakoff & Johnson, 1980), in a simpler metaphor, the link between the base and target should be easier to form. In other terms, the common quality of the base and target should be prototypical for the base so it can easily be transmitted to the target concept. For example, in the phrase “she shines like the sun” shining is a prototypical property for the base concept, the sun, therefore; it is easier to project that schema onto the target concept, the girl, and interpret the metaphor as she was happy. I aim to assess the complexity of the metaphors that I will use in the current study by looking at factors like target type, context, and familiarity. Below, I explain each factor in detail.

First, the complexity levels of metaphors may vary depending on the type of target concept they aim to conceptualize. One common classification for this is psychological vs. physical metaphors (Fainsilber & Ortony, 1987; Lecce et al., 2019; Nippold et al., 1984). The base concept of psychological metaphors describes the emotional state or state of mind of a person as the target concept (e.g., the metaphor “bouncing out of joy” defines a happy person). Physical metaphors, on the other hand, take perceptual phenomena like action or physical appearance as their target

concept (e.g., the metaphor “slow as a turtle” defines the slow physical action of a person).

Some researchers suggest that psychological metaphors are more complex than physical ones since the link between target and base is not as dominant as physical metaphors (Johnson & Pascual-Leone, 1989; Winner et al., 1976). Hence, it is assumed that in the developmental process, children first start to comprehend physical metaphors and then psychological ones. In fact, recent studies support the idea that even preschool children can understand physical metaphors (Pouscoulous & Tomasello, 2020; Zhu & Gopnik, 2023). For instance, Zhu and Gopnik (2023) introduced new made-up toy pictures labeled as ‘daxes’, to 3- to 4-year-old children, defining daxes as clouds or suns. Then, they presented two different children’s views about daxes: either “I think daxes can let out water” or “I think daxes can light up”. Finally, they asked the children “Whose answer is better?” (p. 4). They interpreted the results that show the above-chance level performance of children as children having the ability not only to comprehend metaphors but also use metaphors “in the service of further thinking and reasoning” (p. 7).

However, psychological metaphors are not necessarily more complex than their physical counterparts if the relationship between the target and the base is clear enough in both cases. For example, both “keçi gibi inatçı (translates as stubborn like a goat)” and “taş gibi sert (translates as solid like a rock)” have a very strong association between target and base since they are both very familiar metaphors in the Turkish language, although the former is psychological and the latter is physical. Some empirical work also points in a similar direction. In their research with 7-year-old children, Nippold et al. (1984) observed no difference between the comprehension of age-appropriate psychological and physical metaphors. However,

to my knowledge, there are only a few studies investigating how preschool children comprehend psychological metaphors (e.g., Waggoner & Pallermo, 1989). In the current study, I expect children to show metaphor comprehension with psychological metaphors.

The context in which a metaphor is presented can be another factor affecting its comprehensibility. As stated before, in life, people are exposed to abstract language like metaphors in a given context, which gives several cues to help people interpret. For example, facial expressions and intonations during a speech might help understand the metaphorical phrase a person uses to describe their emotions. These types of cues can be available to everyone since even newborns are sensitive to their caregivers' facial expressions and speech (Nelson et al., 1979). Nonetheless, deducing what someone would feel in a given scenario or during an action may necessitate higher-order reasoning and be seen as a more difficult cue. For example, seeing someone's vase broken and deducing that person will feel down when they see the broken vase can be regarded as a harder cue requiring other social and cognitive abilities than seeing the facial expression of a person. Thus, when a metaphorical phrase is presented with an easier cue (e.g., with a facial expression) the comprehension of the metaphor might be simpler compared to being presented with a harder cue (e.g., with an action that is expected to result in a particular emotion).

In addition to contextual cues, the conventionality of the metaphors is another potential factor influencing phrase complexity and, in turn, metaphor comprehension. As mentioned before, according to the Career of Metaphor Theory (Bowdle & Gentner, 2005), whether a metaphor is conventional or novel affects how that metaphor is comprehended. The relationship between the target and the base is

considered to be stronger with conventional metaphors compared to novel metaphors. However, even though a metaphor can be classified as conventional by an adult, children, might not perceive the same metaphor as conventional if they are not familiar with the phrase. In other words, although the conventionality and familiarity of a metaphor seem to be similar concepts, a nuanced difference might arise for children. It is simply because children's verbal knowledge is limited compared to adults, thus; what is conventional for adults might not be familiar to children. Therefore, it is important to control children's familiarity with the specific phrase while interpreting their comprehension performance (Vosniadou, 1987).

To conclude, I expect to replicate the results of above-chance level performance of preschoolers with the metaphor comprehension tasks in the literature (e.g., Pouscoulous & Tomasello, 2020; Zhu & Gopnik, 2023) with psychological metaphors. Additionally, I anticipate that the performance will vary based on the complexity induced by contextual cues, and familiarity. To clarify, I suggest that the easier context, and more familiar phrases, would facilitate metaphor comprehension. Finally, the study also aims to investigate the possible interactions between the levels of metaphor-related parameters and executive function, as suggested by the findings of Carriedo et al. (2016).

1.5 The current study

To investigate the interplay between the effects of cognitive and metaphor-related factors on metaphor comprehension, I employed a similar method that Waggoner and Palermo (1989) used in their study. I prepared two sets of ambiguous short stories with a metaphorical statement at the end. I read children the story and asked them to show the appropriate picture that depicts the story ending according to the

metaphorical phrase. Using a task like this, I planned to avoid meta-linguistic demands and provide a context with stories and pictures for children as they are exposed to metaphors, which is a more accurate portrayal of how they are exposed to metaphors in real life as opposed to just being presented with the phrase.

Former studies (e.g., Waggoner & Palermo, 1989) show that preschool children (approximately 4- and 6-year-olds) have some level of metaphor comprehension even with abstract metaphors yet perform poorer than their slightly older peers (7-8-year-olds). Thus, I choose to focus on 4 and 6-year-olds which is expected to provide an opportunity to study the effects of the above-mentioned cognitive and metaphor-related factors on metaphor comprehension. Furthermore, considering that dual representation abilities unfold over the third and fourth years of life (DeLoache, 1987), I aimed to recruit a sample of participants who have the ability of dual representation, which might be necessary to understand metaphors. Therefore, the study is conducted with 4- to 6-year-old children.

Overall, this study is expected to shed light on to understanding how cognitive abilities and properties of metaphorical phrases play a role in children's metaphor comprehension. To elaborate, I expected a positive relationship between cognitive abilities (i.e., executive functioning, pretend play, and language complexity) and metaphor comprehension. Furthermore, I hypothesized that comprehension of metaphors presented in an easier context and familiar metaphors would be easier compared to metaphors presented in a harder context, and novel metaphors. I also planned to examine the possible interactions between the EF and performance in understanding metaphors that have different levels of complexity (context and familiarity). I expected to see a better performance with better EF skills, and this effect is expected to be more emphasized in harder contexts, and novel

metaphors. Finally, because former studies show a positive relationship between objective SES measures and children's cognitive abilities (e.g., Anger & Heineck, 2009; Duncan & Magnuson, 2012); I planned to explore the relationship between demographic factors (e.g., maternal education, and income) and the metaphor comprehension abilities of children.



CHAPTER 2

METHOD

2.1 Participants

The study was conducted with 62 Turkish-speaking preschool children (29 boys, 33 girls) aged from 45 to 79 months ($M = 61.40$, $SD = 7.29$). An additional participant was tested but excluded from the analyses due to the parent's report of a developmental disorder. Since similar studies did not report effect size, the targeted number of participants was decided according to the reported sample sizes for the between-subject t-tests of Pouscolous and Tomasello (2020; $N = 36$) and Waggoner and Palermo (1989; $N = 32$ preschoolers). I doubled the sample size since the current study has an additional between-subject factor with the two story set structure (Story Sets A and B) and examines individual differences as well.

All children in the main study were recruited from municipality preschools and private preschools in Bursa ($N = 59$) and İstanbul ($N = 3$), which are some of the most populous and culturally diverse cities in Türkiye (TÜİK, 2024). At the end of testing, all children in the study received an age-appropriate storybook as a gift and a personalized certificate of “Participation in Science”.

The research was conducted following the human ethics guidelines and was approved (2023-38T, Date: 22.12.2023) by the human ethics committee of the Boğaziçi University: Institutional Review Board for Research with Human Subjects (Appendix A).

2.2 Materials and procedure

Families received a consent form via their preschools. The experimenter tested the children whose parents gave consent for the study, in an empty room in their respective preschools. Verbal assent was also obtained from the child before starting the study. During the study, the researcher administered the following tasks in the given order: language complexity, metaphor comprehension, executive functioning and pretend play. Testing took approximately 20-25 minutes for each child. Video recording was made during the testing except for three participants whose parents did not give consent for visual recording in which case only audio recording was made. After the data collection, parents were asked to fill out a demographic information form online via the Qualtrics platform.

2.2.1 Language complexity

Literature suggests that children's language production reflects their cognitive and linguistic abilities (e.g., Kidd, 2012; Tomasello, 2005). Therefore, to assess the complexity of children's speech, a task that enables us to observe the preferred speech of children was employed. I also expected to gather more ecologically valid observations of language production by employing a free-speech task that enables observers to see children's language use preferences without the prompts of a standardized task. To gather a language sample, the experimenter showed a short (1:35 minutes long) muted clip from a cartoon and after viewing, children were asked to tell what was happening in the cartoon. In this clip, the cartoon character Sylvester the Cat is trying to catch the bird Tweety while chickens on a farm are helping Tweety escape and hide from Sylvester. In the current study, the language

complexity of children's narratives in response to the cartoon clip was coded using a system developed by Berman and Slobin (1994).

In this system, a clause is defined as a phrase consisting of one or more predicates that describe an action, state, or event. If a clause contains only one predicate, it is defined as a simple clause, and if it contains two or more predicates, it is defined as a complex clause. For example, "Mary went home" is coded as a simple clause, while phrases such as "Mary went home because her mother called her", "Mary's mother yelled 'Come home'", "While running back home Mary fell down" are coded as complex clauses. The total number of meaningful words (repetitions included), unique words, clauses, predicates, simple clauses, and complex clauses were all tallied. To determine the child's ability to use complex language, the number of complex clauses was divided by the total number of clauses uttered by the child.

Two undergraduate research assistants from the Bogazici University Family and Child Studies Laboratory were trained with pilot language samples, and inter-rater reliability was taken from the codings of 12 language samples from the main study and narratives used in different studies. A high degree of inter-rater reliability was found between the raters on complex clause percentage measurements; ICC was .98 with 95% CI [.86, .99] ($F(11,11) = 45.01, p < .001$). Results also showed that ICCs between two raters' scores of total numbers of meaningful words, number of unique words, clauses, predicates, simple clauses, and complex clauses were also high (.99, .99, .98, .99, .98, .99 respectively, all $ps < .05$). Two raters then solved their disagreements in the 12 initially coded language samples and remaining narratives were coded separately.

2.2.2 Metaphor comprehension

Short stories that consist of 3-4 sentences were written for the study and two pilot studies were conducted to finalize the metaphor stories. The valence of the emotion depicted in the story, the number of conventional-novel metaphors, and whether the context is hard or easy to understand were assessed by the adult pilot study. Sixty undergraduate students (28 females; ages ranging from 18 to 25) participated in the pilot study in return for a partial course credit. A questionnaire and open-ended questions were given to the participants to assess if the intended meaning of the metaphor was clear. Moreover, they were asked to rate the conventionality of metaphors, which in return were used to classify the metaphorical stories as conventional or novel in the main study (see the questions of adult pilot study in Appendix B). A second pilot study with five 5-year-old children (3 girls) was conducted at a private preschool in Istanbul to ensure that children were able to follow the study procedure and understand the instructions.

All stories (Appendix C) have two alternative endings that influence the emotion the character experiences at the end of the story. One of the endings reveals a positive emotion and the other shows a negative emotion. The endings consist of metaphorical phrases which would require children to comprehend the metaphorical phrase in order to understand the emotion in the story. This design with two story sets is employed to make sure children understand the meaning of the metaphorical phrase instead of guessing what might happen regarding the build-up in the story. To ensure children saw only one of the alternative endings for each story, two story sets (A and B) are formed. Each set consists of six stories three of the stories are positive and three are negative. In addition, each story set included 3 novel and 3 conventional metaphors and in each story set, in the 3 of the stories, the test pictures

were presented in an easy context; in the remaining 3, the pictures were presented in a hard context. In the easy context, after the story presentation, children saw pictures of the protagonists' portraits revealing their facial expressions (e.g., happy, sad), while in the hard context, the picture displayed the situation in the story (e.g., a boy sharing his toy with his friends). Novel and conventional metaphors were chosen based on the ratings gathered in a pilot study with college students.

An example story reads like this: "A little girl is expecting her friend to come to her house and play together on the weekend. However, it is snowing, so she is not quite sure if her friend can make it. After a while, she thinks she heard a noise outside the door and decides to open the door." This story ends with a metaphor either describing a happy person (story set B) or a sad person (story set A), which implies whether her friend could make it or not. Children then saw three pictures: correct picture (e.g. if the story is finished with happiness describing metaphor, there is a picture where her friend is in front of the door), incorrect picture (e.g. the doorstep is empty), and one distracter. The distracter picture, which is different across the story sets, depicts the same emotional valence with the correct answer, yet, does not tap the exact feeling the metaphor describes. In the example story, if it is finished with a happiness describing metaphor, then the distraction picture shows the girl surprised because a mailman is on her doorstep carrying a box, and if it is finished with a sadness describing metaphor then the distraction picture shows the girl being scared because of a lightning. With this design, I intended to distinguish between whether children can understand the exact emotion the metaphor is describing or just understand the general valence of the emotion (positive or negative).

Children were randomly assigned to see one of the story set conditions (A = 30 or B = 32). Gender distribution (A: 16 female, 14 male; B: 17 female, 15 male; $\chi^2(1, N = 62) = .00, p = .99$) and age distribution (A: $M_{age} = 60.67, SD = 6.93$; B: $M_{age} = 62.09, SD = 7.66$; $F(1, 58) = .68, p = .41$) were not significantly different across story sets. All participants saw 2 familiarization trial stories and 6 test stories during the testing. Familiarization trials consisted of similes while test trials consisted of metaphors and proverbs. The experimenter read all the stories to the participants while a filler picture that showed the characters was displayed on a laptop screen. Then, the experimenter asked “How do you think the character should look like?” and showed the three pictures of the story (i.e., correct, incorrect, and distracter). Children were asked to point at the picture they think is congruent with the ending of the story.

The correct responses were given a score of 2, the distracter responses were given 1, and the incorrect responses were given 0 points. Individual performance scores were calculated by dividing participants' scores by twelve, which is the highest possible score to get. The performance score is used as the dependent variable, in which higher scores indicate better metaphor comprehension, in the analyses looking at the relationship between metaphor comprehension and child- and metaphor-related factors. The type of response (correct, incorrect, distracter) is used in the analysis to examine whether the metaphor comprehension levels of the children are above chance level.

2.2.3 Executive functioning

The Dimensional Change Card Sorting (DCCS; Zelazo, 2006) task that was adapted from the study of Frye, Zelazo, and Palfai (1995) to measure set-shifting abilities and

flexibility in older preschoolers was used in this study. To use the task with Turkish-speaking children the instructions of this task were translated into Turkish.

First, the experimenter shows the child two boxes with either a red rabbit or a blue boat picture on them and tells the child to put the given cards in the boxes according to certain rules. The first set of cards are in two different forms according to color and shape (red boat and blue rabbit). The experimenter tells the child that they will play the color game and that the child needs to distribute the cards to the boxes according to the color (i.e., reds go to the red-rabbit box/ blues go to the blue-boat box). At the beginning of this section, two familiarization trials are applied and the experimenter reminds the rules. Then, the child is given 6 different cards, and he/she is asked to distribute them according to the rules. During this process, the experimenter states only the relevant dimension of the cards in each trial (e.g., “Here is a blue card, where does it go?”). The children who sort at least 5 of the 6 cards correctly continue to the next level.

After the color game, the child is told that they are now playing the shape game and that he/she needs to distribute the cards according to their shape, not their color (i.e., boat cards to the blue-boat box; rabbit cards to the red-rabbit box). The experimenter reminds the rules and states the relevant dimension before each card. The child is given 6 cards and is asked to distribute them according to the new rule. Children who place at least 5 of the 6 cards correctly in this level continue to the next level.

At this final level, the same pictures are used, but half of the cards now have black frames and the rest have no frames. The child is asked to play the color game if the card has a black frame and the shape game if it has no frame and then given 12 different cards. The experimenter, again, reminds the rules (i.e., if frame color game,

if no frame shape game) and states the relevant dimension (with frame or no frame) before each card. The scores are calculated separately for each rule change (color game, shape game, and frame game) as each correct placement is scored 1 point. The total score (max possible is 24) is calculated by adding the scores for each section with higher scores indicating higher rule-changing, thus EF, skills.

2.2.4 Pretend play

Literature regarding pretend play indicates that children's spontaneous engagement in pretend play gives an insight into their competency in pretending (e.g., Dansky, 1980). Therefore, children's tendency to engage in pretend play was observed in a 5-minute free play session. Similar to the linguistic complexity tasks, the goal with this task was to provide children a space to freely engage in pretend play, resulting in more ecologically relevant findings. To quantify the observations, the Affect in Play Scale - Preschool Version (APS-P; Kaugars & Russ, 2009) was employed. APS-P was created to code the play behaviors of 4- to 6-year-old children during a 5-minute structured free play session. The reliability and validity of the scale have been found high in the assessment by Fehr and Russ (2013, 2014) and Kaugars and Russ (2009). To use the task with Turkish-speaking children the instructions for this task were translated into Turkish.

As part of the task, standard toys (e.g., a soft ball, plush bears, a car, a shark, etc.) are provided to the child to allow for free play and the expression of various emotions. After the toys are presented to the child, the researcher informs the child about the game they will play and provides examples: "These are all the toys in the box. Now we are going to make up a story using these toys. Look, here is the bear. *The experimenter makes the bear talk:* 'I'm very hungry! Where can I find some

food?' (*goes to one of the containers*) 'Look, I found cookies here. I really like cookies! Nom nom nom. Oh, there's another container here. Eww, I don't like what I found here.' Now it's your turn to keep playing and make up a story. Tell your story out loud so I can hear you. I will let you know when it's time to stop playing" (Fehr & Russ, 2014, p. 352).

If the child stops playing before 5 minutes is up, to complete 5 minutes, standard phrases such as "You still have time to play" or "Let's keep playing with the toys" are used to encourage the child to continue playing as needed. If the child does not play for 2 minutes despite encouragement, the task is ended.

The play sessions are recorded on video to be coded later. In the original scale, the coding is carried out in three main categories: Subjective codings (imagination/pretense, organization, elaboration/complexity, and interest/involvement/comfort), play type (pretend, functional, and no play), and affect. For the current study, only subjective codings and play type codings were utilized.

The type of play the child engages in, whether pretend play (e.g. using a toy car as a telephone), functional play (e.g. rolling a ball), or no play, is coded in 20-second periods. In the current study, the ratio of the periods in which the child engages in pretend play to the total number of periods child was on the task was analyzed as a measure of the child's tendency to engage in pretend play.

Then, subjective codings were done and scored on a 5-point Likert scale (1 for "very little" and 5 for "very much") for the full 5-minute period.

Imagination/pretense score was given based on children's tendency to engage in pretend play (e.g., lower points were given when children almost never engaged in pretend play, and more points were given when children formed elaborate stories

with original and creative elements). Organization score was given based on the coherence of the events children employed using the toys (e.g., lower scores for isolated, unrelated events and higher scores for coherent related sequences of events). Elaboration/complexity score was given based on the variation of children's embellishments like sound effects, character developments, themes, and use of different toys (e.g., lower points for low numbers of embellishments children shown and higher points for more embellishments). Finally, interest/involvement/comfort was coded based on children's engagement in play activity (e.g., fewer points for children speaking with the experimenter instead of playing and more points for children showing high interest in toys). The subjective codings were used as exploratory variables.

Two undergraduate research assistants from Bogazici University Family and Child Studies Laboratory coded the play sessions according to the above-mentioned criteria. Coders first had training using the 5 free play sessions from the main study and then obtained interrater reliability ratings using another 12 free play sessions. Results showed high inter-rater reliability for the overall percentage of the detection of pretend play in the free play session; ICC was .97 with 95% CI [.79, .98] ($F(11,11) = 29.14, p < .001$). Coders' imagination-pretense, organization, complexity-elaboration, and interest-involvement-comfort scores were also highly correlated (ICCs = .92, .95, .95, .97, respectively, all $ps < .05$). After resolving the disagreements on the 17 sessions they initially coded, raters coded the remaining play sessions separately. As mentioned before, 3 children did not have video recordings because their parents did not give consent for the recording, thus; their pretend play score was coded as missing.

2.2.5 Demographic form

The form given to parents consisted of basic demographic questions and metaphor familiarity questions (see Appendix D for the full list of questions). Demographic questions consisted of education, income, and perceived socioeconomic status (SES) of the parents. In addition, reading habits, and preschool attendance of the children were asked. The education score was coded from 0 = “Cannot read or write” to 10 = “Advanced degree (master's, doctorate, or specialization in medicine)”. The income scale was composed based on the minimum wage¹. For the perceived SES score parents were asked to indicate the level they think reflects their socio-economic level in society on a scale from 0 = “lowest level” to 10 = “highest level”.

For the reading habit question, parents were asked to indicate how much their children spend time reading by themselves, with an adult, or with a friend in a week using the scale from 1 = “Less than 1 hour per week” to 5 = “More than 4 hours per week”. Finally, parents were asked to indicate how long (in months) their children had been attending preschool.

With the metaphor familiarity questions, I aimed to have a parent report of children’s familiarity with the 12 metaphorical phrases that are used in the study and 12 extra metaphors from the pilot study pool. Parents were asked to rate how much they think their children are familiar with the given phrases using a Likert scale ranging from 1 = “Not familiar at all” to 5 = “Very familiar”. The mean score for the familiarities within each story was used in the analyses. Within this thesis, the operational definition of conventionality was done based on the results of the adult pilot study while the operational definition of familiarity scores was done based on

¹ The minimum wage in Türkiye in December 2023, which was approximately 11.000 TL at the time, was used to form the scale. However, the data gathering started in January 2024, and due to high inflation, the minimum wage had risen to approximately 17.000 TL by that time.

the parents' familiarity ratings. Familiarity scores were also used as a manipulation check to see if the conventionality ratings gathered from the adult pilot were in accordance with parents' ratings, considering parents' ratings as a more accurate representation of children's familiarity with a phrase.

The form is shared with parents using an online Qualtrics platform after the session with children to avoid possible training parents might give to their children based on the familiarity questions of metaphors.



CHAPTER 3

RESULTS

3.1 Preliminary analyses

Before conducting the main analyses, preliminary analyses were carried out to examine the descriptive characteristics of the dataset and to assess whether it met the assumptions required for the planned statistical analyses. As mentioned before, all analyses were conducted with 62 participants after removing one participant due to a reported developmental disorder diagnosis.

First, the properties of the metaphor comprehension stories that were created for the study were examined. Each counterpart in two story sets was designed to be equal in terms of how easy or hard it was to comprehend the metaphors and conventionality levels of the phrases based on the adult pilot study. For example, the 1st story was expected to have an easy context and a conventional metaphor in both story sets independent of its ending (A: positive or B: negative) while the 4th one was expected to have a hard context and a novel metaphor (see Table 1 for intended levels in each story). To control if story sets are similar in difficulty levels as intended, a between-subject t-test was conducted to check whether metaphor comprehension levels, by using the performance of children, differ between story sets. Results showed that there was no significant difference between the story set A ($M = 60.56$, $SD = 22.09$) and B ($M = 65.63$, $SD = 17.55$), $t(60) = -1.00$, $p = .32$. Metaphor familiarity ratings collected from parents also did not differ significantly between the story set A ($M = 3.04$, $SD = .70$) and B ($M = 2.97$, $SD = .68$), $t(57) = .38$, $p = .71$. Considering the fact that the difference between story sets were not

significant for metaphor comprehension or familiarity ratings, single collapsed scores were used for each story in further analyses. Specifically, when the performance or familiarity ratings of individual stories were examined, I did not differentiate the scores between the positive and negative endings of a story but used a single score for clarity.

Table 1. Context, Familiarity, and Performance Scores of Metaphor Stories.

Story Number	Context	Conventionality	Familiarity (<i>M</i> , <i>SD</i>)	Frequency of Correct Response (%)
1	Easy	Conventional	3.54 (1.10)	68
2	Easy	Conventional	2.78 (1.19)	27
3	Easy	Novel	2.86 (1.17)	69
4	Hard	Novel	2.78 (1.23)	58
5	Hard	Conventional	3.12 (1.20)	62
6	Hard	Novel	2.95 (1.33)	40

Although the story sets showed similar trends, individual stories' performance scores and familiarity seemed to differ from the expectations; thus, further analyses were conducted to reveal the trends. Metaphor familiarity ratings taken from parents were examined as a manipulation check to see whether the familiarity of the pair of metaphors in stories that are intended to be conventional (based on adult pilot study) (1st, 2nd, and 5th) was higher than novel metaphors (3rd, 4th, and 6th). A within-subject ANOVA showed that familiarity levels of metaphors differ significantly across stories ($F(5,54) = 4.29, p = .02, \eta^2 = .28$). As expected, familiarity ratings of the 1st story ($M = 3.54, SD = 1.10$) was higher than the 3rd ($M = 2.86, SD = 1.17$; 95% CI [.10, 1.25], $p = .01$), 4th ($M = 2.78, SD = 1.23$; 95% CI [.18, 1.34], $p = .002$) and 6th ($M = 2.95, SD = 1.33$; 95% CI [.06, 1.13], $p = .02$). However, the 1st

story did not significantly differ from the 5th ($M = 3.12$, $SD = 1.20$; 95% CI [-1.23, 1.08], $p = .78$), and 2nd story's familiarity rating was significantly lower than the 1st story (95% CI [-1.25, -1.0], $p = .02$). In fact, familiarity ratings of the 2nd and 5th stories were not higher than the novel metaphor stories (all $ps > .05$). Taking this disparity between the expected and observed familiarity ratings of metaphors in individual stories into account, the mean score of the 1st and the 5th story was used as "more familiar metaphors" and the mean score of the 2nd, 3rd, 4th, and 6th stories was used as "less familiar metaphors" metaphors in further analyses. This distinction was confirmed with a within-subject t-test that shows the familiarity ratings of "more familiar metaphors" ($M = 3.33$, $SD = .81$) were indeed higher than the "less familiar metaphors" ($M = 2.84$, $SD = .81$; $t(58) = 4.11$, $p < .001$).

Then, how gender might be linked with metaphor comprehension was analyzed, and gender effect was also not found to be significant (Girls $M = 63.89$, $SD = 19.17$; Boys $M = 62.36$, $SD = 20.97$, $t(60) = .30$, $p = .76$) thus; was not reported in the upcoming analyses either. Finally, metaphor comprehension was similar among children from the four preschools that participated in the study; $F(1,3) = 2.31$, $p = .09$.

After that, normality and outlier analyses were conducted with the main dependent (i.e. metaphor comprehension percentage) and independent variables (i.e. EF score, percentage of the tendency to engage in pretend play, and percentage of complex language usage). Skewness and kurtosis levels of variables were checked for assumption testing and normality was assumed for all variables except the linguistic complexity percentage. Data revealed that children generally used less complex language; thus, the variable showed a floor effect (skewness = -1.88, $SD = .33$, kurtosis = 4.80, $SD = .64$). Furthermore, all z scores for the variables were

within -3, +3 range except for linguistic complexity percentage which had two outliers with 80% ($Z = 3.07$) and 100% ($Z = 4.07$) complex language usage. However, since this usage is believed to be a valid representation of the children's language usage and the sample size for the variable is big enough ($N = 56$) to assume robustness, these data points were kept in the dataset. Finally, assumptions like homogeneity of variance, collinearity, etc. were checked during the analysis and reported if there was any violation.

3.2 Main analyses

3.2.1 Descriptives

Descriptives and correlations of demographics like age, gender, parent's education, income, and perceived SES and the performances in behavioral tasks can be seen in Tables 2 and 3, respectively. Results showed a significant relationship between metaphor comprehension and age, $r(60) = .27, p = .04$.

Correlation analyses also showed a significant positive relationship between metaphor comprehension and executive functioning, ($r(60) = .31, p = .02$). In contrast to hypotheses, the correlations between metaphor comprehension and other cognitive variables (pretend play and linguistic complexity) were not significant. Finally, income ($r(60) = .29, p < .05$) and mother's education ($r(56) = .36, p < .01$) were found to be positively correlated with metaphor comprehension while the correlation between perceived SES and metaphor comprehension was in negative direction, $r(60) = -.28, p < .05$.

Table 2. Descriptives of Demographic Variables and Performances in Behavioral Tasks.

Variable	N	Minimum	Maximum	Mean (SD)	Median
<i>Demographics</i>					
Age (months)	62	45	79	61.40 (7.30)	60
Mother Education	56	0	10	7.98 (2.27)	9
Income	60	1	7	5.73 (1.56)	7
Perceived SES	60	2	10	4.70 (1.60)	4
Reading Time (per week)	60	1	5	2.78 (1.37)	3
<i>Task Performances</i>					
Metaphor Comprehension (%)	62	8.33	100	63.17 (19.88)	58.33
Linguistic Complexity (%)	56	0	100	18.36 (20.13)	14.29
EF-DCCS (Sum score)	62	6	23	15.13 (5.45)	18
Pretend Play (%)	60	0	100	62.74 (30.78)	73.33

Note. EF-DCCS = Executive Functioning-Dimensional Change Card Sorting.

Table 3. Correlations Between Demographic Variables and Cognitive Factors.

Variable	1	2	3	4	5	6	7	8
1. Age (months)	—							
2. Income	-.07	—						
3. Mother Education	-.16	.20	—					
4. Perceived SES	.23	-.34**	-.26	—				
5. Metaphor Comprehension (%)	.26*	.28*	.35**	-.27*	—			
6. EF-DCSS Sum Score	.16	.19	-.03	.05	.30*	—		
7. Language Complexity (%)	.11	-.27	-.12	-.09	.09	-.14	—	
8. Pretend Play (%)	-.03	-.01	.04	.03	-.06	-.07	.21	—

* $p < .05$. ** $p < .01$.

Note. EF-DCCS = Executive Functioning – Dimensional Change Card Sorting.

3.2.2 Metaphor comprehension

To understand whether children understand the metaphors presented in stories; more specifically whether they show more correct responses compared to incorrect responses, a within-subject ANOVA test was conducted. The test revealed that the

response type (correct, distracter, incorrect) of children differs significantly ($F(2, 60) = 39.57, p < .001, \eta^2 = .57$). Bonferroni corrected pairwise comparisons further showed that children had significantly more correct responses ($M = 3.24, SD = .17$) compared to distracter responses ($M = 1.66, SD = .15, 95\% \text{ CI } [.835, 2.326], p < .001$) and incorrect responses ($M = 1.10, SD = .11, 95\% \text{ CI } [1.544, 2.747], p < .001$). Distracter responses were also observed more than incorrect responses ($95\% \text{ CI } [.056, 1.073], p = .03$).

Then, Chi-Square analyses were conducted for each story to examine individual performance patterns in stories and check if the performances were in the expected direction. Tests yielded significant results (all $ps < .001$) for all stories except the 6th story ($\chi^2 = 4.29, p = .12$) in which there is no significant difference between any of the response types. The correct response percentage was significantly higher than the chance level for the 1st, 3rd, 4th, and 5th stories (respectively 68%, 69%, 58%, and 62%), however; for the 2nd story, the incorrect response percentage was significantly higher than the expected frequency. The response distribution of the stories can be seen in Figure 1. Overall, the metaphor comprehension task revealed that participants showed a substantial amount of metaphor comprehension performance, although some stories in the set were harder to decipher than intended.

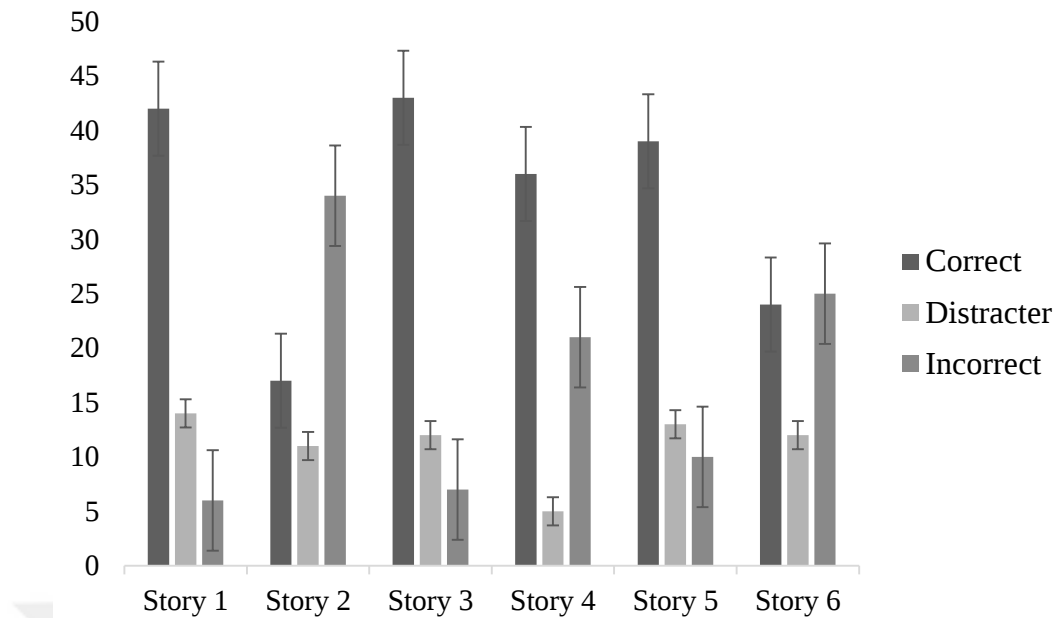


Figure 1. Number of Children per Type of Responses by Stories.

Because the Chi-Square results showed that some stories have different trends in received response type than intended, further exploration has been done. Although the sample size was lower than ideal ($N = 62$) for a factor analysis, a principal axis factor analysis with the orthogonal rotation method was conducted to see if stories load on the same latent variable. The orthogonal method was used since the correlation between stories was not higher than $r = .30$ (Table 4). Initial eigenvalues and scree plots showed that a 2-factor structure would be suitable for the data, therefore; a second factor analysis with the same methods was conducted forcing a 2-factor structure. Factor loadings show that 1st, 3rd, 4th and 6th stories load on first factor (.36, .37, .34, .70) while 2nd and 5th stories load on the second factor (.52, .28).

Table 4. Correlations of Performance in Stories in the Metaphor Comprehension Task.

Stories	1	2	3	4	5	6
1	–					
2	.08	–				
3	.22*	.05	–			
4	.09	.18	.08	–		
5	-.03	.12	.10	.02	–	
6	.21	-.07	.23*	.22*	-.13	–

* $p < .05$

In summary, while factor analysis and correlation results revealed that the stories within the sets did not exhibit the intended high correlation, there was notably stronger correlation among the 1st, 3rd, 4th, and 6th stories compared to the 2nd and 5th stories. Given that the 2nd and 5th stories loaded onto a different factor, suggesting a potentially different underlying construct, further analyses were conducted with and without these stories. The latter analyses were reported only if there were changes in the significance level. Composite scores, a common practice in similar research (e.g., Pouscoulous & Tomasello, 2020; Waggoner & Palermo, 1989), were utilized despite the less-than-ideal correlations since these stories were expected to be conceptually related.

3.2.3 Cognitive factors

Initial raw correlation analyses have indicated a connection between executive function (EF) and metaphor understanding (Table 3), but no association was found with pretend play or language complexity. To further examine the relation between

age and EF and whether they predict metaphor comprehension, a hierarchical regression with two steps was conducted.

In the first step of the regression, the age variable was added, and in the second step, the EF (DCCS Score) variable was added. First model was significant ($F(1,60) = 4.41, p = .04, R^2 = .07$), which shows age was a significant predictor ($\beta = .26, t = 2.10, p = .04$) in metaphor comprehension. The second model where DCCS score was added was also significant ($F(2,59) = 4.76, p = .01, R^2 = .14$) and showed significant improvement from the first model ($FChange(1,59) = 4.82, p = .03, R^2Change = .07$). Results revealed that DCCS score ($\beta = .27, t = 2.20, p = .03$) was a significant predictor of metaphor comprehension, while age ($\beta = .22, t = 1.18, p = .08$) lost its significance in the second model. However, when the same analysis was conducted with the 2nd and 5th stories removed-variable, both models yielded non-significant results.

Upon analyzing the utterances in the language complexity task, the variability in utterances indicated that participants were reluctant to give verbal responses. Six children did not provide any verbal response during the task. Therefore; their score was coded as missing since the lack of response could be meaningfully different than children who provided some amount of verbal response but did not use any complex clauses. Looking at the variability in the remaining dataset children in the 25th percentile uttered 29 words, the 50th percentile uttered 44,50 words, and the 75th percentile uttered 79 words. Correlation analysis addressing the language complexity hypothesis ($r(54) = .09, p = .52$) was repeated with participants above the 50th percentile to observe the trend with children who provided a meaningful amount of verbal response to interpret. However, the results remained non-significant.

Similarly, while analyzing the patterns in free-play sessions, it was seen that children were more inclined to engage in pretend play. The percentage of engaging in pretend play during the 5-minute free play time was 40% in the 25th percentile, 66.67% in the 50th percentile, and 93.33% in the 75th percentile suggesting a ceiling effect, limiting the interpretability.

Then, to see the interplay between all cognitive factors, a hierarchical regression was conducted where age, EF, language complexity and pretend play variables were added in four steps. In the fifth stage the interaction variables of EF & language complexity, and EF & pretend play were added. Centered variables were used for the analyses. As seen in Table 5, only the significance of EF was marginal across models and the other variables were not significant predictors.

Table 5. Hierarchical Regression Analysis with Cognitive Variables and Their Interactions as Predictors of Metaphor Comprehension.

Variables	R^2_{adj}	F	F_{change}	$B(SE)$	β	p
Model 1	.02	1.99	-			
(Constant)				31.89 (22.63)		.17
Age (months)				.51 (.36)	.19	.16
Model 2	.06	2.60	3.13			
Age				.44 (.36)	.17	.22
EF				.88 (.50)	.24	.08
Model 3	.05	1.91	.57			
Age (months)				.40 (.36)	.15	.27
EF				.94 (.51)	.25	.07
Language Complexity				.10 (.13)	.10	.45
Model 4	.03	1.43	.10			
Age (months)				.39 (.37)	.15	.29
EF				.95 (.51)	.26	.07
Language Complexity				.11 (.14)	.11	.43
Pretend Play				-.19 (.61)	.04	.76
Model 5	.01	1.05	.36			
Age (months)				.39 (.38)	.15	.30
EF				.95 (.52)	.26	.08
Language Complexity				.10 (.15)	.10	.50
Pretend Play				-.16 (.63)	.04	.80
EF*Language Complexity				.01 (.04)	.06	.69
EF*Pretend Play				-.08 (.11)	-.11	.46

Note. Centered variables for the sum score of EF, and percentages of language complexity and pretend play were used.

Finally, the relationship between the secondary measures in the language complexity task (e.g., number of utterances, predicatives) or secondary measures in the pretend play measure (e.g., organization, elaboration/complexity) and metaphor comprehension was explored. None of the relationships were significant (all $ps > .05$).

3.2.4 Metaphor-related factors

To test the next hypothesis, whether the context affects metaphor comprehension, a within-subject t-test was conducted to check if performance on the intended easy context (1st, 2nd, and 3rd stories) and intended hard context (4th, 5th, and 6th) stories differ significantly. Although results were in the expected direction, the difference between easy context stories ($M = 64.78$, $SD = 23.78$) and hard context stories ($M = 61.56$, $SD = 26.24$) was not significant, $t(61) = .83$, $p = .41$. When the same analyses were repeated without the 2nd and 5th stories, performance on the stories with an easier context ($M = 79.03$, $SD = 26.47$) was significantly higher than the stories with a harder context ($M = 55.65$, $SD = 35.76$; $t(61) = 4.73$, $p < .001$).

As previously noted, a disparity existed between the conventionality ratings provided by college students and the familiarity ratings provided by parents. Consequently, the familiarity ratings of parents were utilized to examine the hypothesis proposing a positive correlation between the familiarity levels of metaphors within a story and the performance of that story. Specifically, 1st and 5th stories were used as more familiar, and 2nd, 3rd, 4th, and 6th stories were used as less familiar metaphors. This decision was made under the assumption that parent reports more accurately reflected children's familiarity with the phrases. A within-subject t-test results showed that the performance on more familiar metaphors ($M = 76.21$, $SD = 24.97$) was higher than the performance on the less familiar metaphors ($M = 56.65$, $SD = 24.76$). However, correlation analyses that look at the relationships between performance and familiarity ratings of each story were not significant ($r_s < .15$).

3.2.5 Exploratory analyses

Several exploratory analyses were conducted looking at the demographics. Since the preliminary analyses showed a correlation between the mother's education, income, perceived SES, and metaphor comprehension; a hierarchical regression analysis was conducted with the given variables. Mother's education was entered in the first step since it had a stronger correlation with metaphor comprehension while perceived SES and income were entered in the next step. The first model was significant ($F(1, 54) = 7.51, p = .01, R^2 = .12$), which shows mother's education was a significant predictor ($\beta = .35, t = 2.74, p = .01$) in metaphor comprehension. The second model was also significant ($F(3, 52) = 3.93, p = .01, R^2 = .19$) but did not show significant improvement from the first model ($F\text{Change}(2, 52) = 2.01, p = .15, R^2\text{Change} = .06$). Results revealed that mother's education ($\beta = .28, t = 2.11, p = .04$) remain as a significant predictor, while perceived SES ($\beta = -.16, t = -1.15, p = .25$) and income ($\beta = .16, t = 1.19, p = .24$) did not significantly predict metaphor comprehension.

Then, analyses aimed to examine whether different levels of EF interact with the levels of complexity like context, and familiarity were conducted. Before getting into analyses, for easier interpretation, a median cut categorical EF variable is computed in which scores smaller than or equal to 18 were labeled as low EF performance ($N = 49$) while scores higher than 18 were labeled as high EF ($N = 13$) performance.

First, to see if the effect of EF on metaphors presented in a harder context was more emphasized than metaphors in an easier context, two mixed design ANOVAs are performed 2 (low-high EF) $\times 2$ (easy-hard context) using metaphor comprehension as the DV (with and without 2nd, 5th stories). Interactions in both analyses were non-significant; however, the main effect of the context was

significant in the analysis without the 2nd and 5th stories; thus, that version was reported. In line with previous analyses, results showed a main effect of context type ($F(1,60) = 8.67, p = .005, \eta^2 = .13$) with performance in the easy context stories ($M = 79.03, SD = 26.47$) being higher than the hard context stories ($M = 55.65, SD = 35.76$). However, although the scores in low EF ($M = 65.81, SD = 24.04$) and high EF ($M = 73.08, SD = 27.41$) groups were in the expected direction, their difference was not significant ($F(1, 60) = 1.90, p = .17, \eta^2 = .03$). Finally, the interaction between EF and context was not significant ($F(1,60) = 2.75, p = .10, \eta^2 = .04$, Figure 2).

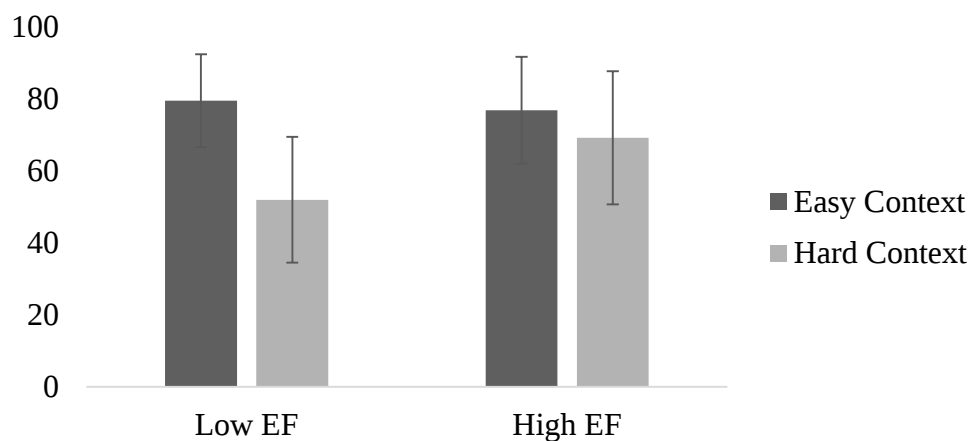


Figure 2. Metaphor Comprehension Performance Concerning Context Difficulty and EF Levels.

Then, the interaction between EF and familiarity ratings on metaphor comprehension was explored. A mixed subject ANOVA 2 (low-high EF) x 2 (more familiar-less familiar metaphors) was conducted to address the hypothesis. The main effect of familiarity was found to be significant with the performance on more familiar metaphors ($M = 76.20, SD = 24.97$) being better than less familiar metaphors ($M = 56.65, SD = 24.77; F(1,60) = 8.61, p = .005, \eta^2 = .13$). However, the main effect of EF was not significant ($F(1,60) = .80, p = .38, \eta^2 = .01$). Finally, the

interaction between EF and familiarity levels was marginally significant ($F(1,60) = 3.75, p = .06, \eta^2 = .06$). Bonferroni corrected pairwise comparisons showed that in the low EF group the performance on more familiar metaphors ($M = 77.04, SD = 26.44$) was significantly higher than the less familiar metaphors ($M = 53.57, SD = 24.34$; 95% CI [14.64, 32.30], $p < .001$), whereas the difference between more ($M = 73.08, SD = 18.99$) and less familiar metaphors ($M = 68.27, SD = 23.72$) did not significantly differ in the high EF group (95% CI [-12.33, 21.94], $p = .58$, Figure 3).

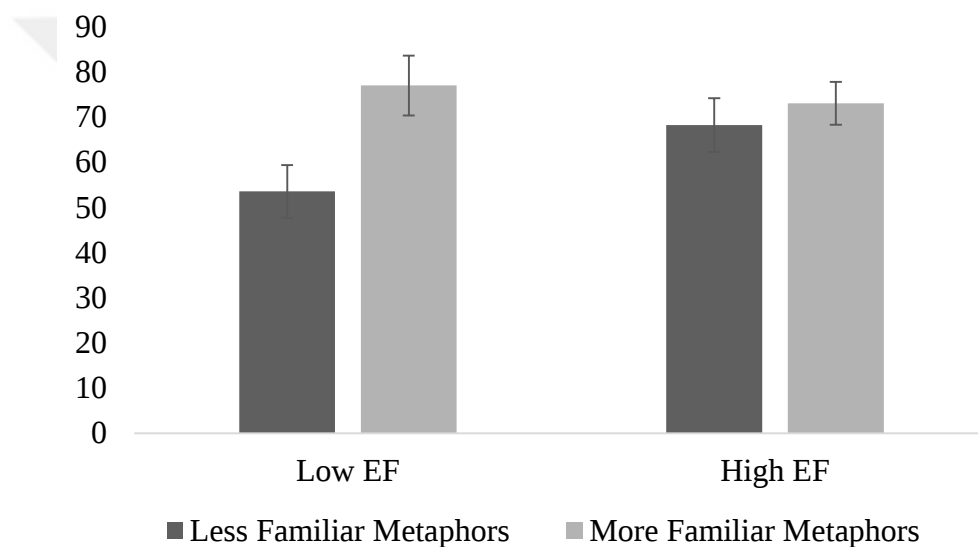


Figure 3. Metaphor Comprehension Performance Concerning Familiarity and EF Levels.

CHAPTER 4

DISCUSSION

In the current study, I aimed to investigate the relationship between cognitive and metaphor-related factors in the metaphor comprehension of preschool children.

Analyses revealed partial support for the hypotheses of the study. As opposed to the former theories (e.g., Asch & Nerlove, 1960; Piaget, 1926) and in line with the recent research conducted with preschool children (e.g. Deamer, 2013; Özçalışkan, 2005; Pouscoulous & Tomasello, 2020; Rubio-Fernandez & Grassmann, 2016; Zhu & Gopnik, 2023); current results support the hypothesis that even preschool children can comprehend metaphors when the meta-linguistic demands are diminished.

Although the abovementioned recent research shows that children as young as three years old can comprehend physical metaphors, and several studies indicate that elementary school children can comprehend psychological metaphors above chance level (e.g. Lecce et al., 2019; Nippold et al., 1984), to my knowledge, the present study is crucial as it demonstrates that even children aged 4 to 6 can understand psychological metaphors, when an appropriate methodology is used. Furthermore, I found that children not only comprehend the emotion's valence (positive or negative), but they also can accurately comprehend the specific emotion (e.g., happiness, surprise) that the metaphors convey.

A positive relationship between age and metaphor comprehension, consistent with the former studies, was found (e.g., Di Paola et al., 2020; Rubio-Fernandez & Grassmann, 2016). The current data is also in accordance with the recent research in terms of the lack of gender difference (e.g., Pouscoulous & Perovic, 2023).

The second hypothesis of the study proposing a relationship between EF and metaphor comprehension was also partially supported by the data. Both correlation and regression analyses suggested a positive relationship between EF skills and the metaphor comprehension ability of preschool children. To my knowledge, there are only a few studies examining the role of executive functioning in metaphor comprehension with children. As mentioned before, Carriedo et al. (2016) conducted a study with middle school children and young adults to investigate the relationship between metaphor comprehension and EF skills. Their results lack the support for a main effect of EF on metaphor comprehension. However, understanding the significance of the current findings is crucial in grasping the role of EF within a younger sample, as it is likely to diverge from the mechanisms observed in older children and adults. The initial five years of life are crucial in forming and advancing executive functioning (EF), as indicated by former research (Garon et al., 2008), with some studies even suggesting a growth spurt for EF between 3 to 6 years of age (Diamond, 2001). Given this developmental trajectory, it is plausible that EF could have a greater influence on metaphor comprehension in preschool children compared to older children. This aligns with the current findings, which demonstrate a positive relationship between EF and metaphor comprehension in preschool children.

Furthermore, although Carriedo et al. (2016) did not report a main effect of EF, their findings suggest that “EF plays a supplementary role when metaphor comprehension is highly demanding” (p.14). To elaborate, they propose that EF’s contribution to metaphor comprehension is more emphasized when metaphors are more complex to understand (e.g. novel metaphors, absence of a context) or when the individuals have a special processing difficulty (e.g. low semantic knowledge). Interaction analyses in the current data provide partial support for this hypothesis. As

anticipated, EF exerted a greater impact on understanding of less familiar metaphors compared to more familiar phrases, however; the same effect was not observed for the levels of context (easy and hard). Overall, the parallels and variations observed between the current study and previous research suggest that while EF plays a role in metaphor comprehension, its impact may vary depending on age and the level of difficulty of the phrase. Hence, it is crucial to investigate the interaction between executive functioning and metaphor-related factors when analyzing the variables that contribute to the acquisition of metaphor comprehension.

The data did not support the hypothesis, which proposed a positive correlation between children's pretend play tendencies and their metaphor comprehension. As opposed to former accounts (e.g. Billow, 1981) that treated instances of pretend as metaphor production, the current study shows that pretend production and metaphor comprehension are not closely related to each other. Clearly, the absence of a relationship between these variables could stem from several factors. The tendency to engage in pretend play was believed to indicate children's proficiency in pretense representations (Dansky, 1980), hence in the current study, the factor was tested using a task developed to examine a child's inclination for pretend play during a 5-minute free play session. However, the metaphoric stories task evaluated the comprehension abilities rather than the spontaneous metaphor production of children, therefore; the disparity in the tasks could potentially explain the absence of impact. In other words, although metaphor comprehension and pretend play are believed to share a common underlying mechanism, namely dual representation ability (Vosniadou, 1987), this relationship might become apparent if both are assessed through tasks that directly measure ability.

Taking this into account, exploring the relationship between pretend play and metaphor comprehension via their shared mechanism of dual representation might be an alternative method to address the interplay between the aforementioned variables in the development of metaphor comprehension. For example, tasks that assess the competency in pretending (e.g., action pantomime task, see Mottweiler & Taylor, 2014), competence in dual representation (e.g. scale model task, see DeLoache, 2000), and metaphor comprehension can be used to examine if the relationship between metaphor and pretend play is stronger with these kinds of tasks. Additionally, if there is an effect, whether it is mediated by the dual representation ability can be determined.

The sample characteristics may also contribute to the lack of evidence for a link between pretend play and metaphor comprehension. The sample's likelihood to engage in pretend play was strong, leaving little room for variation. A more diverse sample (i.e., with a wider range of ages or diverse socio-economic backgrounds) could be more suited to observing the hypothesized effects.

The results contradicted the hypothesis that proposed a connection between the children's complex language use and their understanding of metaphors. This finding is not in line with the claims made in the existing literature, which characterizes metaphor understanding as a linguistic skill (Özçalışkan, 2005; Vosniadou, 1987). According to these accounts, it is expected that metaphor comprehension will be influenced by various linguistic abilities. For example, Carriedo et al. (2016) found a positive correlation between verbal reasoning and metaphor comprehension, while Pouscoulous and Perovic (2023) observed a similar positive association between vocabulary skills and metaphor comprehension. The lack of a relationship in the current study can be due to the task characteristics. Just

like the pretend play task, the language task measured the preferred language of the participant since it was thought to reflect the linguistic competence of a child (Kidd, 2012) and have more ecologically valid observations. However, it might be more likely that a stronger association will be detected between a task that directly measures language proficiency and the comprehension of metaphors. Furthermore, similar to previous studies (e.g., Lecce et al., 2019) children in the current study were hesitant to provide verbal responses – thus, making it difficult to gather meaningful language samples. On top of that, the language complexity task was the first task that was administered to children, which might have contributed to their reluctance to narrate the movie clip they were shown. Also, children's preferred language was typically simple, leaving little room for variance to be interpreted.

In addition to investigating the effect of individual differences in cognitive factors, the current study aimed to examine the effect of metaphor-related factors on metaphor comprehension. As there is no consensus in the literature on the definition of simple and complex metaphors (Johnson & Pascual-Leone, 1989; Vosniadou et al., 1984; Waggoner & Palermo, 1989; Winner, et al., 1976), several factors that might contribute to the complexity level of a metaphor were studied.

The first hypothesis about metaphor-related factors proposed that the more complex the context (presenting a situation instead of facial expressions) metaphor is presented in, the less comprehension children will demonstrate. While the evidence provides some support for this hypothesis, it is essential to interpret the results with caution since this evidence in favor is only evident when two of the stories were excluded from the overall score. Nevertheless, the evidence is in line with former research in terms of suggesting that the complexity of the context plays a role in children's metaphor comprehension. For example, in a similar design, Vosniadou et

al. (1984) showed that when the presented story endings are more predictable, children's comprehension performance is better compared to seeing less predictable story endings.

The hypothesis suggesting the effects of familiarity was partially supported by the data. It was predicted that children would exhibit better comprehension performance with metaphors that are more familiar to them compared to less familiar ones. Recent research has primarily focused on children's comprehension of novel metaphors (e.g. Deamer, 2013; Pouscoulous and Tomasello, 2020; Waggoner and Palermo; 1989), therefore; the current study was significant in terms of demonstrating that children are better at comprehending familiar metaphors compared to the novel ones. Moreover, analyses revealed that what the young adult sample (in the pilot study) identified as conventional did not fully correspond to what parents reported as a familiar metaphor to their children. These findings highlight the need to distinguish between what adults define as conventional and how familiar the conceptualization is to children when studying the effect of conventionality.

Finally, the relationship between demographic factors and metaphor comprehension was explored in the scope of this study. Literature shows a positive relationship between SES and general cognitive abilities (e.g. Duncan & Magnuson, 2012) and linguistic development (Fish & Pinkermann, 2003). Although a similar interplay of the mechanisms can be expected between metaphor comprehension and SES as well, there are only a few studies examining the indicated relationship. For example, Pouscoulous and Perovic (2023) observed that children who scored poorly in their metaphor comprehension task were generally the ones coming from low SES families, the definition of which was based on the classification concerning income, employment, and living environment in the UK (Smith et al., 2015). Therefore, the

observation of a positive relationship between income, maternal education, and metaphor comprehension in the current study can be interpreted as a replication of literature in terms of suggesting the higher economic status a family has, the more chance they can provide for the children's cognitive development (Anger & Heineck, 2009; Duncan & Magnuson, 2012; Schady, 2011) and in turn metaphor comprehension abilities. For example, families with higher SES can provide better educational opportunities which can contribute to children's cognitive and language development. Moreover, former studies reported a relationship between a mother's education level and language development through maternal language input (Hoff-Ginsburg, 1998; Pancsofar & Vernon-Feagans, 2006). A comparable mediation of maternal linguistic input could be the underlying cause of the association in the context of metaphor comprehension as well, which further research can address.

In addition to the abovementioned objective measures of SES, a perceived SES measure was employed in the current study. In contrast to objective measures, perceived SES had a negative relationship with metaphor comprehension. Several studies reported that perceived SES measures have a unique variance in predicting factors like physical (Wen et al., 2006) and mental health (Hadley-Ives et al., 2000), where it even becomes a stronger predictor than aggregate measures of SES. A neuroimaging study even shows that the same perceived SES measures employed in this study, but not the objective SES measures were associated with the volume of a brain region that modulates the behavioral and physiological response to psychosocial stress (Gianaros et al., 2007). Therefore, using both objective (income and education) and subjective (perceived status) SES measures in the current study, enabled us to see the differing relationship between these measures and metaphor comprehension. However, further research is needed to understand the contradictory

findings in relation to the link between different measures of SES (i.e. income, parent education and perceived SES) and metaphor comprehension.

This research, like any other, has its limitations. As analyses revealed, not all of the metaphor comprehension stories worked in the intended direction.

Performance on different stories was expected to differ by their complexity levels, nevertheless; for instance, the poor performance in the second story seems to be due to the visual material used in the study. Looking at the second story in the story set A, the phrase “eli ayağına dolaştı” was used which has the literal translation of “her hands and feet are tangled” meaning “she got caught up in her feet” but the psychological meaning of the metaphor suggest that the person is anxious or worried. Participants tended to choose the incorrect picture, which is the only picture where the girl’s hands are in a different position. It is also possible that the correct picture does not accurately portray an anxious person (see Appendix C for pictures of stories). The same story ended with a metaphor defines a proud person (“göğsü kabarmış” meaning “her chest is puffed up”) in the story set B. However, participants in this condition were inclined to choose the anxious person picture, which was the incorrect response for the condition. The correct image in the condition may not successfully depict a proud person in this situation, as the girl in the picture has a rather neutral facial expression, rather than the one a proud person would typically have.

Another limitation of the study is the little variation observed in language complexity and pretend play tasks. As previously noted, children's tendency to use simpler language during the linguistic complexity task and high frequency of pretend play engagement during the free play session reduces the interpretability of the results. Additionally, children’s reluctance to verbally respond in the linguistic

complexity task narrows down the observations to be analyzed. A potential solution to the restricted variance reported with preference tasks might be to use an ability task (e.g., language competence or dual representation) to assess the mentioned factors. Especially a language task that focuses on abstract language usage rather than general language usage can be a better fit for investigating the relationship with metaphor comprehension. Choosing such an approach may also ensure that conceptually related mechanisms are addressed. Furthermore, given young children's reluctance to respond verbally in testing situations might be stemming from the unusual interaction with the experimenter, it is possible to provide different contexts where children can be more relaxed (e.g., talking with their parents or teachers). However, it is important to note that choosing methods that would require fewer verbal responses could undermine the ecological validity of the task.

Another issue to consider is that although I intended to set the conventionality levels of metaphors apriori with an adult pilot study, familiarity ratings in the main study showed that the ratings of college students did not match the ratings of parents. The ratings of college students provided insight into the general perception of phrases that were used in the study; however, the ratings of the parents were thought to be more suited for the purposes of the current study since they gave their answers not considering the general perception but their children's knowledge. Therefore, it is important to consider children's level of familiarity when designing or improving upon a metaphor comprehension task controlling for conventionality. Last but not least, the sample was mainly middle-class families with a limited variance. To improve the generalizability of the findings, a more diverse sample should be recruited.

Despite its limitations, the current study is significant and novel in several aspects. To my knowledge, the current study is the first to examine the psychological metaphor comprehension of preschoolers with a behavioral paradigm in a Turkish sample. The study also holds methodological importance for the Turkish-speaking science community since it offers a behavioral paradigm for further research, which contemporary accounts view as a better option to address metaphor comprehension, as opposed to tasks that require verbal responses. Although the performance of the two stories in the task was not in the intended direction, with improvements to the pictures and some of the metaphors; the paradigm can offer insight into preschool children's metaphor comprehension in further studies.

The findings are also essential in indicating that preschool children have at least some level of understanding of psychological metaphors. As discussed before, metaphors hold a meaning-making function (Lakoff & Johnson, 1980) which in turn can facilitate emotional understanding and emotion regulation of adults (Fetterman et al., 2016). Assuming this function holds for children as well, metaphors can be utilized to facilitate children's emotion regulation and meaning-making. It is thus crucial to initially determine the extent to which children grasp psychological metaphors before exploring whether they can employ these metaphors for emotion regulation in subsequent studies. Put simply, the current study is important in showing the factors affecting children's psychological metaphor comprehension, which can be used to design studies investigating the potential meaning-making function of metaphors for children.

Another highlight of the study is that it investigates both cognitive and metaphor-related variables, which is critical for understanding the elements that contribute to metaphor comprehension acquisition in depth. By examining a diverse

range of factors, including children's executive functioning skills, the tendency to engage in pretend play, and the complexity of language, alongside contextual variables such as the context metaphors presented in and familiarity ratings of phrases, the study offers a comprehensive analysis of the multifaceted nature of metaphor comprehension in preschool children. Additionally, observing the interaction between these factors (e.g., familiarity and EF) ensures a better understanding of the underlying mechanisms that contribute to the metaphor comprehension development.

While recent research has begun to address the potential factors influencing metaphor comprehension, there are still aspects that warrant further investigation. Factors like analogical reasoning (Di Paola et al. 2019; Rubio-Fernandez and Grassmann, 2016), conceptual knowledge (Pouscoulous and Tomasello, 2020), Theory of Mind (ToM; Lecce et al., 2019; Tonini et al., 2023), EF (Carriedo et al., 2016) and SES (Pouscoulous and Perovic, 2023) were addressed in the metaphor comprehension literature with varying age groups. For example, both Lecce et al. (2019) and Tonini et al. (2023) observed the positive effect of higher ToM skills on psychological metaphor comprehension in early middle school children, yet the same effect was not observed with physical metaphors. Moreover, this effect was only significant for younger children (9-year-olds), losing its significance for older middle school children (10-12-year-olds). These results indicate that the effect of ToM skills may be particularly important in early development and when employing psychological metaphors, which can be addressed in further research in relation to other cognitive and metaphor-related factors. More specifically, the enhanced effect of better ToM skills might contribute to better metaphor comprehension skills, especially with preschool children.

Another area of investigation that can be prioritized is the impact of different linguistic elements. Although metaphor comprehension is considered to be a cognitive and linguistic ability (Vosniadou, 1987), the latter is generally overlooked in the latest studies (Pouscoulous & Perovic, 2023). In addition to analyzing children's language ability, understanding the variables related to metaphorical phrases, such as their complexity levels, is critical in shaping children's content (e.g., books, cartoons). As discussed, children are exposed to metaphorical language through various forms of media (e.g., Tehseem & Khan, 2015). Although the literature shows even preschool children have some level of metaphor comprehension (e.g. Pouscoulous & Tomasello) it is also established that metaphor-related factors also play a significant role in the metaphor comprehension process of children (e.g. Vosniadou et al., 1984). Therefore, by understanding the effects of metaphor-related factors on the comprehension process, age-appropriate metaphors can be utilized in content children are exposed to.

Finally, future research can examine the effect of dual representation ability on metaphor comprehension in younger children, whose abilities are still developing. As former research shows, dual representation ability is considered to be related with several factors such as ToM (Leslie, 1987) and EF (Carlson, et al., 2014) which are already thought to be related to metaphor comprehension. Understanding the role of dual representation ability in metaphor comprehension can be promising to unpack potential cognitive processes involved in this skill and may help identify key developmental milestones.

Overall, understanding the interplay of various variables, especially for the comprehension of psychological metaphors, can be an important first step in gaining more knowledge about how children might utilize the “meaning-making” function of

metaphors in the context of regulating their own emotions. Having a better understanding of these processes not only provides knowledge about children's cognitive and linguistic capacities but also may provide insight into applied psychology. For instance, metaphorical communication and play are positively related to understanding one's own feelings (Faranda, 2014; Karairmak, 2015; Lapsekili & Yelboğa, 2014) and growing out of adverse childhood experiences (Pliske, et al., 2021). Therefore, understanding the conditions of metaphor comprehension can give an insight into how to benefit from metaphors as tools in the applied field.

APPENDIX A

ETHICS APPROVAL



T.C.
BOĞAZİÇİ ÜNİVERSİTESİ REKTÖRLÜĞÜ
Sosyal ve Beşeri Bilimler İnsan Araştırmaları Etik Kurulu (Sbinarek)



Sayı : E-84391427-050.01.04-159275
Konu : 2023-38T Kayıt Numaralı Başvurunuz
Hakkında

25.12.2023

Sayın Doç. Dr. Deniz TAHİROĞLU

Tez danışmanlığımı yürüttüğünüz öğrenciniz Pelin Kütükerdoğan'ın "Okul Öncesi Dönemde Çocukların Metafor Kavrayışı" başlıklı projesi ile Boğaziçi Üniversitesi Sosyal ve Beşeri Bilimler İnsan Araştırmaları Etik Kurulu (SBİNAREK)'e yaptığımız 2023-38T kayıt numaralı başvuru 22.12.2023 tarih ve 2023/10 sayılı kurul toplantısında incelenmiş ve projeye etik onay verilmesi uygun bulunmuştur.

Bu karar tüm üyelerin toplantıya on-line olarak katılımıyla ve oybirliği ile alınmıştır. Onay mektubu tüm üyeler adına Komisyon Başkanı tarafından e-imzalanmıştır. Bilgilerinizi rica ederiz.

Saygılarımızla,

Dr. Öğr. Üyesi Işıl ERDUYAN
Kurul Başkanı

Bu belge, güvenli elektronik imza ile imzalanmıştır.

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APPENDIX B

ADULT PILOT QUESTIONS

1. What do you think the metaphor in this story means? (e.g., 'her world is collapsed')
2. Example: What might Ece have seen when she entered her room? Please explain briefly.
3. Please briefly describe the child's emotional state in the story in your own words.

Please indicate your level of agreement with the following statements using a scale from 1 "Strongly Disagree" to 5 "Strongly Agree."

4. The metaphor in this story is a traditional one, meaning you are likely to hear or use it in daily life.
5. A person your age is likely to hear or use the metaphor in this story in their daily life.
6. It was easy to understand what the metaphor in this story was trying to convey.
7. A preschool-aged child (5 years old) would find it easy to understand this metaphor.

APPENDIX C

METAPHOR STORIES AND PICTURES

Familiarization Stories

1. EN: A new pool had been built where Ahmet lives. Ahmet went to the pool with his family. However, when Ahmet entered the pool, he noticed that the water was like ice.



TR: Ahmet'in yaşadığı yere yeni bir havuz yapmışlar. Ahmet ailesiyle birlikte havuza girmeye gitmiş. Ancak Ahmet havuza girince fark etmiş ki havuz buz gibiymiş.

Correct



Incorrect



Distracter



2. EN: Mert's mother was going to make cookies for Mert's birthday. Mert was very excited because he loved cookies. When the cookies were ready, Mert immediately took a slice and noticed that the cookie was like cotton.



TR: Mert'in annesi Mert'in doğum günü için ona portakallı kurabiye yapacaktı. Mert çok heyecanlanmış çünkü portakallı kurabiye çok severmiş. Kurabiye hazır olduğunda Mert hemen bir dilim almış ve fark etmiş ki kurabiye pamuk gibi olmuş.

Correct



Incorrect



Distracter



Test Stories

1. Easy Context-Conventional Metaphors

EN: One day, Ayşe was playing games with her brother Ali. Suddenly, Ayşe noticed a spider in their room and got very scared. She asked Ali to remove the spider. In this



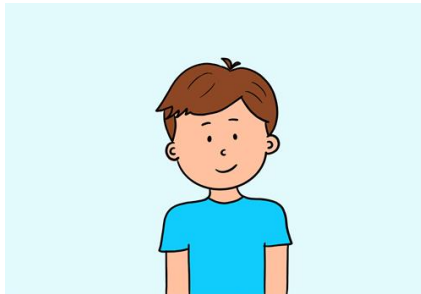
situation, A: Ali was a lion, B: Ali got terrified.

TR: Bir gün Ayşe, abisi Ali ile oyun oynuyormuş. Birden Ayşe odalarında bir örümcek olduğunu fark etmiş ve çok korkmuş. Ali'den örümceği dışarı çıkarmasını istemiş. Bu durum karşısında A: Ali aslan yürekli davranmış, B: Ali'nin ödü patlamış.

Correct for A:



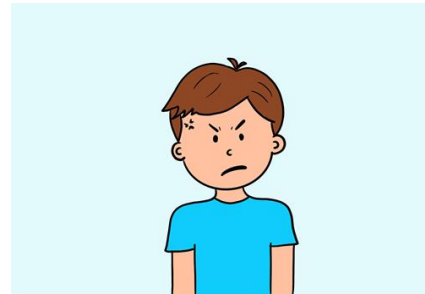
Distracter for A:



Correct for B:



Distracter for B:



2. Easy Context - Conventional Metaphors

EN: Beyza had been dancing since she was a child. One day, her teacher assigned her to dance in the school show. On the big day, Beyza went on stage. When she saw all her friends watching her, A: she got caught up in her feet, B: her chest was puffed up.



TR: 2. Beyza küçüklüğünden beri dans ediyormuş. Bir gün öğretmeni onu okul gösterisinde dans etmesi için görevlendirmiş. Büyük gün geldiğinde Beyza sahneye çıkmış. Tüm arkadaşlarının onu izlediğini görünce A: eli ayağına dolaşmış, B: göğsü kabarmış.

Correct for A:



Distracter for A:



Correct for B:



Distracter for B:



3. Easy Context - Novel Metaphors

EN: One day, Kerem took a math exam at school. Kerem was good at math, but the exam was still very difficult. Two days later, when Kerem saw his exam result, A: he shined, B: he faded.



TR: 3. Kerem bir gün okulda matematik sınavına girmiş. Kerem matematikte iyiymiş ama sınav yine de çok zormuş. İki gün sonra Kerem sınav sonucunu gördüğünde A: güneş olup açmış, B: çiçek olup solmuş.

Correct for A:



Correct for B:



Distracter for A:



Distracter for B:



4. Hard Context - Novel Metaphors

EN: Can loved playing with toy cars. One day, his friends came to visit and they wanted to play with Can's cars too. His mother told him that he had to share the cars



with his friends. In this situation, A: Can was a cotton, B: Can was a goat.

TR: 4. Can oyuncak arabalarıyla oynamayı çok seviyormuş. Bir gün arkadaşları misafirlğe gelmiş ve onlar da Can'ın arabalarıyla oynamak istemiş. Annesi arabaları arkadaşlarıyla paylaşması gerektiğini söylemiş. Can bu durum karşısında A: keçilik etmiş, B: pamuk olmuş.

Correct for A:



Distracter for A:



Correct for B:



Distracter for B:



5. Hard Context - Conventional Metaphors

EN: Ece was growing beautiful flowers in her room. When summer came, Ece couldn't water the flowers because she went on vacation for a week. She was very afraid that the flowers



would wither. When she entered her room and see the flowers, A: she was flying, B: her world collapsed.

TR: Ece odasında çok güzel çiçekler yetiştiriyormuş. Yaz geldiğinde Ece 1 hafta tatile gittiği için çiçekleri sulayamamış. Eve döndüğünde çiçeklerin solmuş olacağından çok korkmuş. Odasına girdiğinde gördüğü şey karşısında A: havalara uçmuş, B: dünyası başına yıkılmış.

Correct for A:



Distracter for A:



Correct for B:



Distracter for B:



6. Hard Context - Novel Metaphors

EN: One weekend, Lale invited her friend

Deren to her house to play together.

However, it snowed heavily on the day of the meeting and the roads were closed. While

Lale was waiting for Deren with hope, she

thought she heard a sound at the door. When she opened the door, A: her hopes faded away, B: she was overjoyed.



TR: Lale bir hafta sonu beraber oyun oynamak için arkadaşı Deren'i evine çağırmış.

Ancak buluşma günü çok fazla kar yağmış ve yollar kapanmış. Lale umutla Deren'i beklerken kapıda bir ses duyduğunu sanmış. Kapıyı açınca gördüğü şey karşısında A: umutları suya düşmüş, B: ağzı kulaklarına varmış.

Correct for A:



Distracter for A:



Correct for B:



Distracter for B:



APPENDIX D
DEMOGRAPHIC FORM

- 1) Please write your child's date of birth in day/month/year format.
- 2) Please indicate your child's gender.
- 3) Is your child currently attending preschool? Yes / No
 - a. If your answer to the previous question is yes, please write how many months your child has been attending preschool / how many months your child attended preschool.
- 4) Does your child have siblings? Yes / No
 - a. If yes, how many siblings does your child have (excluding themselves)?
 - b. If yes, please write their ages.
- 5) How often does your child read books alone, with friends, or with an adult?
 - 1- Less than 1 hour per week
 - 2- 1-2 hours per week
 - 3- 2-3 hours per week
 - 4- 3-4 hours per week
 - 5- More than 4 hours per week
- 6) Does your child have any diagnosed developmental disorders (e.g., autism, Down syndrome, attention deficit, learning difficulties, hyperactivity)? Yes / No
 - a. If yes, please explain.
- 7) Your relationship to the child: Mother / Father

8) Your Education Level:

0 = Cannot Read or Write

1 = Elementary school dropout or
literate

2 = Elementary school graduate

3 = Middle school dropout

4 = Middle school graduate

5 = High school dropout

6 = High school graduate

7 = College graduate (2-year degree)

8 = College dropout

9 = College graduate (4-year degree)

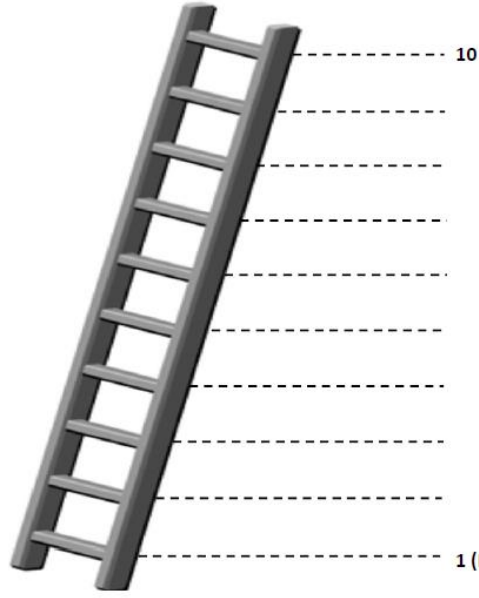
10 = Advanced degree (master's,
doctorate, or specialization in medicine)

14) Is there another parent who takes care of the child? Yes / No

a. If yes, please explain the relationship of the second parent: Mother / Father
/Other

15) Education level of the second parent (*same scale in question 13 is used*)

16) Please imagine that the staircase you see reflects the socio-economic level of people living in your city. Assume that at the top step are the richest, most educated, and most prestigious people, and at the bottom are the people with the least money, least education, and least prestigious jobs. Imagine that as you go up, you get closer to the people at the top, and as you go down, you get closer to the people at the bottom. Considering this, where do you think you are on this staircase in your current stage of life compared to other people in your city? Please put an "X" mark next to the step (with "10" being the highest) that shows where you are.



17) Household total income level (total earnings of all permanent residents of the household):

- 1- Below 11000 TL per month
- 2- 11001 - 22000 TL per month
- 3- 22001 - 33000 TL per month
- 4- 33001 - 44000 TL per month
- 5- 44001 - 55000 TL per month
- 6- 55001 - 66000 TL per month
- 7- Above 66000 TL per month

18) Please indicate how familiar you think your child is with the following metaphorical phrases using the scale from 1 "Not familiar at all" to 5 "Very familiar."

1. she was flying - havalara uçtu
2. her world collapsed - dünyası başına yıkıldı
3. she was a goat (implying stubborn like a goat) - keçilik etmek

4. she was a cotton (implying she was well-behaved) - pamuk olmak (uslu)
5. she was lion hearted - aslan yürekli
6. she was terrified - ödü patlamak
7. she got caught up in her feet - eli ayağına dolaşmak
8. her chest is puffed - göğsü kabarmak
9. she shined - güneş olup açmak
10. she faded - çiçek olup solmak
11. her hopes are faded - umutları suya düşmek
12. she was overjoyed - ağzı kulaklarına varmak
13. it was like a giant - dev kadar
14. it was like an ant - karınca kadar
15. it was like an ice - buz gibi
16. it was like a Turkish bath - hamam gibi
17. she was a turtle - kamplumbağa gibi
18. she was a cheetah - çita gibi
19. it was a cotton (implying soft like a cotton) - pamuk gibi (yumuşak)
20. it was a rock - taş gibi
21. writing was pearl-like - inci gibi yazı
22. writing was chaotic - karman çorman yazı

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