Processing Metaphors: Models of Processing, Factors Influencing Processing Mechanisms, and Recent Studies in Turkish

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ABSTRACT: Humans have an innate capacity to comprehend the communicative intentions behind utterances as soon as they hear them. However, there are still many unresolved questions regarding which cognitive mechanisms help people to recognize metaphorical expressions and how these mechanisms develop from childhood to adulthood. This article aims to examine two models of metaphor processing, summarizes the factors affecting the process of metaphor comprehension, and presents a literature review on metaphor processing in Turkish. This systematic review demonstrates that Turkish literature is advancing with more experimental studies in the field of metaphor processing and calls on further psycholinguistic research to understand how individual differences influence the processing and acquisition of metaphors.

Keywords: symbolic language, metaphorical competence, factors affecting metaphor processing, psycholinguistics, pragmatic processing

Metafor Çözümleme Süreci: Çözümleme Modelleri, Çözümleme Sürecini Etkileyen Faktörler ve Türkçede Yapılan Son Çalışmalar

ÖZ: İnsan zihni, sembolik ifadeleri duyduğunda milisaniyeler içinde anlamlandırabilir. Ancak hangi bilişsel süreçlerin metaforların çözümlenmesinde rol aldığı ve bu mekanizmaların çocukluktan yetişkinliğe nasıl geliştiği konusunda henüz yanıtı bilinmeyen birçok soru bulunmaktadır. Bu makale, metafor çözümleme sürecini açıklayan iki temel modeli psikodilbilim çerçevesinde inceleyerek, metafor algılama yetisinin gelişimine etki eden unsurları ve bu alanda Türkçede yapılmış çalışmaları incelemektedir. Türkçede metafor çözümlenmesi üzerine yapılan deneysel çalışmaların gitgide artmasının literatüre hız kazandırdığı görülmüştür. Bu makale, bu konuda

Türkçede nörodilbilim ve psikodilbilim çerçevesinde daha çok çalışma yapılması gerektiğini göstererek, bilişsel bozukluğu olan yetişkinlerde ve atipik ve tipik gelişim gösteren çocuklarda metafor çözümleme süreçlerinin nasıl olduğu üzerine yapılacak yeni araştırmalara çağrı yapmaktadır.

Anahtar sözcükler: sembolik dil, metafor çözümleme yetisi, metafor çözümleme sürecini etkileyen faktörler, psikodilbilim, edimbilimsel çözümleme

1 Introduction

We encounter metaphorical expressions like *a night owl, a couch potato*, *to be over the moon* quite often in our daily life. For instance, in a fast google search we found *got the wind up* occurs much frequently than *was frightened* (1,380,000,000 to 225,000,000) or *gözden düşmek* (i.e., *having lost people's respect*) occurs much frequently than *değerini kaybetmek* (i.e., *to be disgraced*) (47,400,000 to 2,330,000) (2020, December). More elaborate corpus analyses have also shown that metaphors constitute the one-third of a typical corpus (Shutova, 2015). This illustrates how much human communication is based on symbolic meaning. The ability to interpret symbolic meaning such as metaphors, jokes, irony, or satire lies in the core of human socio-cognition.

Humans appear to process such symbolic meaning seemingly easily within milliseconds and they create an appropriate verbal or behavioral response; yet, we barely know the details about the mechanism with which human brain computes non-literal or symbolic meaning (Camp, 2006; Winner & Gardner, 1977). Understanding the cognitive mechanisms underlying literal versus symbolic interpretation is crucial in multiple respects. First, it is theoretically important to pinpoint whether or not these two sets of meaning components require different neural and cognitive mechanisms (Bambini, Bertini, Schaeken, Stella, & Di Russo, 2016). Second, it is clinically and pedagogically crucial to identify how metaphors are interpreted and learned. It is not difficult to imagine that someone who fails to understand and properly respond to symbolic meaning despite being a native speaker would encounter serious social, educational, or societal problems. This failure is often taken to reflect individual differences at cognitive or socio-cognitive levels such as autism spectrum condition, schizophrenia, Alzheimer's, Williams Syndrome, or aphasia (Dennis, Lazenby, & Lockyer, 2001; Kalandadze, Norbury, Nærland, & Næss, 2018; Mashal & Kasirer, 2011; for a review see, Siqueira, Marques, & Gibbs Jr, 2016). Third, understanding the human capacity to interpret and generate symbolic meaning would provide technological insights. For instance, experimental findings from human participants would provide insights about how non-literal meaning should be computationally modelled for natural language processing tasks such as machine translation or sentiment analysis tools (Mao, Lin, & Guerin, 2018).

Psycholinguistic studies, however, have devoted relatively limited attention to how symbolic meaning is processed. With the methodological advances in experimental semantics and pragmatics, the field has seen an increasing amount of attention in this area mostly in the last decade. In Turkish linguistics as well, the last decade has seen a growing interest in the area of symbolic meaning. The present study aims to present psycholinguistic models of metaphor processing with a literature review of the studies in support of these models, to outline the factors influencing metaphor processing, and to review the literature on metaphor processing in Turkish. We hope to provide an up-to-date analysis in the topic, which would provide a useful source for upcoming studies in the field. In what follows, we will focus on two main models of metaphor comprehension in Section 2, we will review linguistic factors and individual differences influencing metaphor processing in Section 3, then we will review studies from Turkish in Section 4, and we will conclude this paper with a critical analysis presenting a set of future directions in the field.

2   Major Theories of Metaphor Processing

In the course of language interpretation, comprehenders have to recognize the intent behind the speaker's utterances. The intended meaning depends on pragmatic factors such as context, world knowledge, and speaker meaning. Metaphorical utterances provide a great example of the gap between linguistic meaning and communicative intention. Investigating how people evaluate the possible meanings of metaphorical words and how they bridge the gap between literal meaning and what is actually being communicated is one of the main interests of experimental semantics and pragmatics (Gibbs Jr, 1994a; Giora, 2003; Grice, 1975; Martinich, 1984; Searle, 1979). In the process of metaphor comprehension, "positions are traditionally divided into two main models according to whether the access to figurative meaning is considered indirect… or direct" (Bambini et al., 2016, p. 182). While the traditional theories of language processing claim that people search for a nonliteral meaning in situations where the speaker's utterance is defective or does not make sense if taken literally (Grice, 1975; Searle, 1979), the direct-access model argues that humans have the capacity to automatically generate the meaning of metaphoric expressions in a supportive context (Gibbs Jr, 1994a; Ortony, Schallert, Reynolds, & Antons, 1978). In the following subsections, we will examine the indirect and direct access models of metaphoric processing.

2.1   Indirect Access Model to Metaphorical Meaning

The traditional view of metaphor comprehension is a pragmatic account that is pioneered by John. R. Searle (1979) and Paul Grice (1975). According to Searle,

refining John L. Austin's speech act theory, the meaning of a metaphor could be irrelevant to the actual meanings of the words. The speaker is assumed to use an indirect speech act in order to reveal a message which is different from the meaning of the linguistic items. In these expressions, the comprehenders cannot understand the intended meaning behind the utterance through the propositions contained in the sentence, that is, they additionally have to consider the utterance content, speaker's intentions, and situational context to correctly decode the speech acts. In the process of recognizing the speech act as indirect, the hearers follow Grice's cooperative principles in conversation with its four maxims, namely quantity, quality, relation, and manner (Finch, 2003). Assuming that the speakers obey the cooperative principle, Searle claims that people could make a distinction between primary and secondary illocutionary acts. Searle, in his account of speech acts, adopts a serial approach to metaphor comprehension, where an anomalous literal interpretation is necessary for listeners to attempt to seek an alternative figurative meaning.

This indirect-access model implies that the analysis of the literal meaning of an utterance is obligatory, and comprehenders need to realize a defective or implausible literal interpretation before an alternative and figurative meaning can be generated (Gentner & Bowdle, 2001; Gibbs Jr, 1999; Glucksberg, 2008). The major implication of this standard pragmatic view is that the processes used to construct the precise meaning in literal and figurative language are highly different and that a nonliteral interpretation is derived only if the literal meaning is found to be unsatisfactory or incoherent in a given context (Cieślicka, 2006). This was supported by a variety of studies that show longer reaction times for the comprehension of metaphorical expressions as compared to literal sentences (Clark & Lucy, 1975; Gerrig & Healy, 1983; Gibbs Jr, 1981). A study conducted by Janus & Bever (1985), for instance, asked the participants to read the passages including phrases that could be interpreted literally or metaphorically depending on the context and to answer the related comprehension questions, as in (1) (p. 481):

(1)   a. Lucy and Phil needed a marriage counselor. They had once been very happy, but after several years, of marriage, they had become discontented with one another. Little habits, which had at first endearing, were now irritating and caused many senseless and heated arguments.
        b. The old couch needed re-upholstering. After two generations of wear, the edges of the couch, were tattered and soiled. Several buttons were missing and the materials around the seams was beginning to unravel. The upholstery had become very shabby.

After reading these passages, the participants read the target sentences that could be interpreted literally or metaphorically (e.g., *the fabric had begun to fray*) and answered the comprehension questions. This study supported the indirect model of metaphor comprehension such that the paragraphs with metaphoric utterances required longer processing times than literal utterances (Janus & Bever, 1985).

As far as ERP studies are concerned, metaphors have been reported to elicit larger N400 amplitudes in contrast to literal meaning. In a study conducted by Weiland, Bambini, & Schumacher (2014), the participants were presented with metaphors (e.g., *these lawyers are hyenas*) in two groups: the target group saw a prime word semantically related to the literal meaning of the target word (i.e., *furry*) whereas the control group saw a semantically non-related word. The indirect access model predicted that the semantic priming would cause the reduced N400 effects, which would be supporting the facilitating effect of literal meaning in metaphor comprehension. As expected, the representation of metaphors with a prime of the literal meaning of the target word produced a lower N400-amplitude, which indicates a higher cognitive effort in the interpretations of figurative utterances as a result of the demanding nature of conflict resolution in the metaphorical environment (De Grauwe, Swain, Holcomb, Ditman, & Kuperberg, 2010). While these types of evidence suggest that the computation of nonliteral meaning depends on the realization of the defectiveness of literal meanings, research favoring the direct-access view has found little evidence of the sequence of stages in the process of literal and metaphor comprehension.

2.2   Direct Access Model to Metaphorical Meaning

In contrast to the standard pragmatic view, the direct access hypothesis claims that both literal and figurative meaning of the speaker's utterances are interpreted through the same processes. This assumption of a single mechanism implies that with sufficient context, comprehenders should not take more time to understand the metaphorical meaning than the literal meaning (Gibbs Jr, 1994a; Ortony et al., 1978; Shinjo & Mayors, 1987). According to this view, there is no need to suppress an incompatible, literal interpretation of an utterance before reaching the metaphorical meaning. This model thus assumes that humans could compute both interpretations simultaneously (Cacciari & Glucksberg, 1994). In a study conducted by McElree & Nordlie (1999), the participants read some utterances in which a common final word induced a metaphorical (e.g., *some hearts are stone*) or literal (e.g., *some temples are stone*) interpretation, and judged whether or not these utterances were meaningful. In this speed-accuracy tradeoff (SAT) study, there was no extra time lag for the figurative utterances compared to the literal ones. In another task, the participants read some figurative (e.g., *some hearts are ston*e) versus nonsense (e.g., *some clouds are stone*) strings and judged whether these utterances were literally true or not. According to the

results, it does not take more time to interpret the metaphorical strings than comparable nonsense strings. These results were not compatible with the indirect view of metaphor comprehension (Gildea & Glucksberg, 1983; McElree & Nordlie, 1999).

The findings of another study showed that noun-noun combinations (e.g., *shark lawyer, steel arms*) that are ambiguous between a literal (i.e., *a lawyer who is dedicated to protecting sharks*) or metaphorical (i.e., *a lawyer who is vicious and merciless*) interpretations were interpreted figuratively despite the fact that the literal alternatives were neither defective nor implausible, even in the absence of contextual supports (Glucksberg, 2008). Despite the implicit nature of the metaphorical expressions in these combinations, people still preferred to interpret them metaphorically, which is inconsistent with the indirect access model.

A neuropragmatics research, analyzing the effect of metaphorical expressions on the event-related brain potential responses, demonstrated that in the presence of a supportive and rich context, N400 amplitude is reduced as compared to the metaphors presented within a limited context (Bambini et al., 2016). Thus, Bambini et al.'s study showed that the contextual cues in the experimental stimuli facilitated the access and retrieval of information encoded and stored in memory. This supports that metaphorical assertions could be directly accessed as quickly as literal strings given in an appropriate context (Gibbs Jr, 1994b; Harris, 1976).

Based upon this literature, the dichotomy between indirect and direct models seems to be unsolved. Research has shown that this is an oversimplified version of what may actually be taking place during the processing of metaphorical statements. We know that various factors other than the existence or strength of the context might also influence how metaphors are processed. The next section will review these factors.

3   Factors Influencing Metaphor Processing

3.1   Linguistic Factors Influencing Metaphor Processing

Research on experimental pragmatics has assessed a variety of linguistic factors influencing the metaphor comprehension process. With regard to the effect of familiarity, based on Gentner & Bowdle's career-of-metaphor hypothesis, research suggests that the more conventional a metaphor becomes, the easier and faster people have an interpretation in mind. For example, a term that is frequently used in a particular language with its figurative meaning, such as *roller coaster* (e.g., *marriage is a roller coaster*), becomes conventionalized (Jones & Estes, 2006). In the process of decoding these familiar expressions, we are required to identify them as a component of our mental lexicon and interpret them at an automatic level. However, when interpreting a term which is less used with its figurative meaning, such as *rail* (e.g., *marriage is a rail*), we remember

the literal meanings of these two words (i.e., *marriage and rail*) in a separate manner and create a new connection between these terms by evaluating their semantic features. ERP studies of metaphor comprehension have also reported an increased activity in the N400 component when participants were presented with a novel metaphor, which indicated a higher cognitive load (Arzouan, Goldstein, & Faust, 2007; Lai & Curran, 2013).

Besides familiarity and conventionality of metaphors, the relative aptness of metaphors – that is, the extent to which the metaphor vehicle (i.e., the term used metaphorically) is compatible with the characteristics of the topic (i.e., the subject of the metaphor) – accounts for differences in comprehension difficulty of metaphorical expressions (Chiappe, Kennedy, & Chiappe, 2003; Gagné, 2002). The findings of the research conducted by Jones & Estes (2006) have provided evidence showing how aptness facilitates the processing of metaphors. In this study, the participants were asked to read a variety of statements and press the spacebar as soon as they interpreted their meanings, and then they rated how easy it was for them to have an interpretation. For instance, in a 7-point grading scale, while the aptness rating of *some lectures are sleeping pills* is 6.09, the aptness rating of *some comedians are sleeping pills* is 3.31. It was observed that aptness predicted the speed and ease of metaphor comprehension; the participants were faster and more successful in interpreting the highly apt statements.

3.2 Individual Differences Influencing Metaphor Comprehension

Studies have shown that participant variables, including intelligence, conceptual knowledge, vocabulary knowledge, linguistic ability, age, and other cognitive skills might explain the differences between the process involved in the comprehension of nonliteral statements (Cain, Oakhill, & Lemmon, 2005; Norbury, 2004; Stamenković & Holyoak, 2018). Kazmerski, Blasko, & Dessalegn (2003) found a linear relationship between the vocabulary size, language comprehension skill, and interpretations of metaphors by using the Multidimensional Aptitude Battery II Test. Other studies suggested that children can produce metaphors depending on the similar physical features between the objects (Elbers, 1988; Epstein & Gamlin, 1994). For instance, a 26-months old child pointed to a yellow baseball hat and said "*corn, corn*" or an 18-months old child calls a toy car as a snake while twisting it (Winner, McCarthy, Kleinman, & Gardner, 1979). Even though there are findings regarding children's use of some expressions which appear like metaphors (Piaget, 1962; Werner & Kaplan, 1967), there is not much information about how and at what age children develop the ability to comprehend and to produce metaphors.

However, there are many studies revealing that age is an essential factor in metaphor comprehension (Billow, 1975; Johnson & Pascual-Leona, 1989;

Özçalışkan, 2005). Carriedo, Corral, Montoro, Herrero, Ballestrino, & Sebastian (2016) observed an improvement in metaphor comprehension between the ages of 11 and 15 and between the ages of 15 and 21, which was linked to the development of executive functions around those ages. Lee & Kamhi (1990) conducted a study to examine the metaphoric competence of two groups of children at the age of 9 to 11. One group of children with learning disabilities had a history of language impairment as well. The results revealed that the children with learning disabilities and a language impairment performed more poorly in metaphorical tasks compared to those who only had learning disabilities but no language impairment. Moreover, both groups of children with learning disabilities showed less metaphoric competence when compared to typically-developing children. Also, Wiśniewska-Kin (2017) conducted a study to examine how 8-9- and 9-10-year-old children conceptualize emotions. The results showed that 9-10-year-old individuals performed better in expressing metaphors for emotions, which was linked to better language skills in 9-10-years-old children. Thus, age and language skills can be considered as crucial factors in the process of assessing children's ability to comprehend metaphors.

Besides language comprehension skills and age, executive functions, creativity, and theory of mind are among the participant-related factors that influence metaphor comprehension. In the following subsections, we will examine these cognitive factors.

3.2.1 *Relationship between executive functioning and metaphor*

Executive function is used as an umbrella term to refer to a set of cognitive processes, which include the ability to think before acting, to make decisions and to play with ideas, to face unexpected and novel circumstances, and to keep focused on a task (Diamond, 2013). The core elements of executive functions are working memory, inhibitory control, and cognitive flexibility (Diamond, 2013; Miyake et al., 2000). Working memory refers to storing, maintaining, and manipulating information while performing a cognitive task (Baddeley, 2002; Baddeley & Hitch, 1974). Inhibitory control refers to the mechanism that helps controlling one's attention, behavior, thoughts, and emotions so as to do what is required by suppressing the goal-irrelevant stimuli (Diamond, 2013). As for cognitive flexibility, it is the ability to think differently to adjust to new demands and rules, and to approach differently to a problem (Diamond, 2013; Miyake et al., 2000).

Considering that metaphor comprehension requires the skill of abstraction and attentional effort involving high levels of control and cognitive regulation, the executive functions can be considered as a good candidate to explain the developmental differences observed between individuals in metaphor comprehension (Carriedo et al., 2016). The relation between working memory

and metaphor comprehension was identified by Blasko (1999). In the study, the participants were grouped according to their performance on the Reading Span Task developed by Daneman & Carpenter (1980). Then, they were asked to interpret the metaphors (e.g., *a mosquito is a vampire*) chosen from the study of Katz, Pavio, Marschark, & Clark (1988). The interpretations focusing on a single surface feature were assessed as low quality while high-quality interpretations explained the depth of the metaphors fully. For example, for the interpretation of *thought is a snake sliding and coiling on warming stones*, a participant with a high span explained it as "the snakes move like the neural messages in the cortex during the thought process. The thought processes warm and activate the brain like the stones warm the snake." A participant with a low span, on the other hand, interpreted the same sentence as "thought is like a snake coiling around." The study revealed that individuals with high working memory performed better in producing deep and detailed metaphor interpretations.

Similarly, Carriedo et al. (2016) examined the effects of verbal reasoning and executive functions on metaphor comprehension across development. In the study, two verbal reasoning tests, which are analogical and class-inclusion reasoning tests, the Remote Association Task, metaphor comprehension task, and various tests evaluating cognitive flexibility, inhibition control, and working memory were used. The result of the study showed that the participants with high working memory span can create better and more qualified interpretations of metaphors (Carriedo et al., 2016; Chiappe & Chiappe, 2007; Gibbs Jr, 2008; Kazmerski et al., 2003; Pierce, MacLaren, & Chiappe, 2010).

Different from the studies conducted by Blasko (1999) and Kazmerski et al. (2003), Chiappe & Chiappe (2007) examined the predictive role of the inhibitory control abilities. To do this, participants were evaluated for their performance on the Stroop Test and Listening Span Task. Then, they were asked to interpret a set of metaphors. The latencies to arrive at the correct interpretation of metaphors were recorded as well. The results revealed that the participants with better inhibitory control abilities constructed metaphor interpretations with a greater speed regardless of the difficulty level of the metaphors. Therefore, this suggested a link between cognitive inhibition and metaphor comprehension (Carriedo et al., 2016; George & Wiley, 2016; Gernsbacher, Keysar, Robertson, & Werner, 2001; Rubio- Fernandez, 2007). In support of this, George & Wiley (2016) stated that inhibition mechanisms are activated when the irrelevant literal information needs to be suppressed, which is required mostly in the processing of unfamiliar metaphors.

There are also some studies focusing on how individuals with cognitive disorders and children with atypical development process metaphors. Mashal & Kasirer conducted a study to examine the improvement of the comprehension of metaphors in children with autism and learning disabilities with the help of an intervention program using "thinking map." The participants were tested to

assess their ability to shift between the different meanings of a homophone. Their executive functions and figurative language comprehension were also measured. The results suggested that both groups of children with the autism spectrum disorder (ASD) and learning disabilities had difficulty in interpreting non-literal expressions when compared to typically developing children. However, the thinking map strategy was effective only for the children with learning disabilities to improve their comprehension of novel metaphors but not for children with ASD. Mashal & Kasirer suggested that children with learning disabilities performed better in the mental flexibility task, which may be a factor explaining this developmental pattern. They suggested that the comprehension of unfamiliar metaphors can be possible by shifting between the literal and metaphorical meaning of words; therefore, mental flexibility can have a predictive role in this process. Additionally, Mossaheb, Aschauer, Stoettner, Schmoeger, Pils, Raab, & Willinger (2014) conducted a study on the patients diagnosed by schizophrenia. The participants were given the Trial Making Test to assess their cognitive flexibility and information processing speed, and the Metaphor Triad Test to assess their ability to comprehend metaphors. The results showed a positive correlation between cognitive flexibility and metaphor comprehension (Mashal & Kasirer, 2011; Mossaheb et al., 2014).

Accumulating evidence suggests that the performance of individuals in tasks which measure the capacity of working memory, inhibitory control, and cognitive flexibility may predict the performance of the individuals in metaphor comprehension tasks. In light of the previous findings, it can be concluded that the higher executive functioning capacity one has, the better one can perform in metaphor tasks.

3.2.2 Relationship between creativity and metaphor comprehension

Gerrig & Gibbs Jr (1988) indicated that people prefer to use figurative language in some instances even though there are possible ways to express the same idea by using the literal meaning of the words and figurative language requires creativity (Silvia & Beaty, 2012). Also, Billow (1977) considers metaphors as a process of creativity. However, there are not many studies conducted to examine the relationship between creativity and the use of figurative language. Kenett, Gold, & Faust (2018) used the Creativity Test and Remote Association Test developed by Wallach & Kogan (1965) to explore the relationship between creativity and comprehension of metaphorical expressions. The participants were grouped according to their semantic creativity and were given sets of words. They were asked to explain whether there was a link between these words in each set, which also required them to think beyond the literal meaning of the words. The results showed that the individuals who performed better in the creativity measure did not differ from individuals with lower levels of creativity with

respect to their accuracy in conventional metaphors (e.g., *lucid mind*). However, the former group showed better accuracy in novel metaphors (e.g., *conscience storm*) and exhibited faster processing speed both in conventional and novel metaphors. Furthermore, Malgady (1977) revealed that there is a positive correlation between verbal creativity and the use of figurative language among children aged between 5-12. Kogan, Conner, Gross, & Fava (1980) also found out that there is a link between the performance of the participants in the divergent-thinking task and the ability to interpret metaphors.

Although the link between creativity and metaphor comprehension is still not well understood, research suggests that creative cognition is associated with more flexible semantic memory structure, which facilitates the performance on metaphor-related language tasks (Kenett, Gold, & Faust, 2018). However, since previous findings have found that two groups differ in the accuracy ratings only for novel metaphors, not conventional metaphors, future research is needed to examine the mapping between creativity and processing of different types of metaphors.

3.2.3 Relationship between theory of mind and metaphor comprehension

The theory of mind, which is an ability to interpret others' mental states, beliefs, desires, emotions, and knowledge, is another ability correlated with pragmatic competence. Emphasizing the importance of understanding the intent behind the speaker's utterances in a given context, Happé (1993) argued that theory of mind is a major socio-cognitive skill that has a dramatic impact on figurative language comprehension. In relevance theory (Sperber & Wilson, 1986), recognizing intentions holds a prominent place in normal communication in the process of encoding and decoding of messages; and thus, people need to "interpret every utterance in terms of the speaker's thoughts" while comprehending metaphorical expressions (Happé, 1995, p. 282).

Although few studies showed that the theory of mind is not sufficient to explain the individual differences in metaphor comprehension (Leslie & Frith, 1988; Rinaldi 2000), the findings of a research report demonstrated that when children were required to consider mental aspects of metaphorical interpretation, their theory of mind abilities predicted their success in comprehending the figurative language (Lecce, Ronchi, Del Sette, Bischetti, & Bambini, 2018). In this study, the theory of mind skills was evaluated with Happé's Strange Stories task, which includes a variety of short stories related to social situations and questions asking participants to derive why the character in the story behaved in a particular way (Lecce et al., 2018). In order to assess their capacity to interpret physical and mental metaphors, the participants were asked to explain some metaphorical utterances in a verbal task. For example, in the interpretation of a physical metaphor, such as *dancers are butterflies*, the subjects were required to

focus on the colorful and energetic nature of a butterfly and make inferences on physical attributes. On the other hand, in the process of decoding the intent behind a mental metaphor, such as *daddy is a volcano*, it was essential for the participants to give attention to the mental state and psychological experiences of the daddy. In these two examples of metaphorical expressions, nine-year-olds performed lower than ten-year-olds, eleven-year-olds, and twelve-year-olds in the interpretation of mental metaphors, but not physical metaphors, which was attributed to the developmental changes in the theory of mind skills. Since it is difficult for younger children to make an inference about the psychological aspects of the metaphor's topics, the impact of theory of mind on metaphor comprehension is more obvious when the experimental items included mental metaphors (e.g., *soldiers are lions*), where the similarity is established on the basis of psychological characteristics of the individuals (Lecce et al., 2018).

Another study focusing on children with autism spectrum disorder (ASD) and atypical development found that poorer metaphor processing capacity is correlated with the poor theory of mind abilities even with good syntactic and vocabulary knowledge (de Villiers, 2011). People with schizophrenia also demonstrate poorer pragmatic skills and theory of mind abilities. Accordingly, a number of researchers have paid attention to the non-literal understanding in individuals with schizophrenia (Brüne & Bodenstein, 2005; Gavilán & García-Albea, 2011; Mo, Su, Chan, & Liu, 2008). The results of these studies were that patients who had difficulty in understanding their own and others' mental states demonstrated low performance in metaphor comprehension tasks (Gavilán & García-Albea, 2011).

As the metaphor processing system would require the ability to make pragmatic inferences depending on the type of communicative action, theory of mind is to some extent a prerequisite for understanding figurative language. The studies on both typical and atypical populations of children and adults suggest that theory of mind skills provide an explanation for the pattern of individual differences in the comprehension of metaphorical meaning. On the other hand, some authors reported that not all metaphors are equally related to the theory of mind skills; the interpretation of mental metaphors requires a greater degree of the theory of mind skills than physical metaphors. This shows that the interpretation of different types of metaphors might be related to different cognitive skills.

Overall, this section reviewed the linguistic factors and individual differences involved in metaphor processing. Research on the impact of linguistic factors on the individual's comprehension of non-literal language suggests that familiarity and aptness of metaphors facilitate metaphorical interpretation. Since novel metaphors are unknown to the hearer and require more cognitive effort than conventional metaphors, they require more time in processing and lead to more misinterpretations. The categorical similarity between topic and vehicle terms

also increases the relative comprehensibility of the metaphorical form. In terms of individual differences, research shows that intelligence, conceptual knowledge, vocabulary knowledge, linguistic ability, age, and other cognitive skills are correlated with the degree of efficiency in processing metaphorical expressions. While working memory, inhibitory control, and cognitive flexibility play an active role in the automatic activation of metaphorical meanings, creativity helps individuals to establish more complete and accurate interpretations of the novel metaphorical utterances. On the other hand, theory of mind becomes a stronger predictor of performance on the linguistic tasks in which participants are required to make inferences on the mental state of the speaker. This section indicates that the comprehension of metaphors involves an interaction between linguistic and domain-general cognitive abilities, which makes it a highly complex process. The next section will explore the content of the relevant studies conducted in Turkey.

4   Studies on Metaphor Comprehension in Turkish

Turkish studies on metaphors can be grouped into three: studies that focus on the theoretical aspects of the figurative language, those employing methods of corpus linguistics to analyze metaphors, and those employing psycholinguistic methods.[1]

Studies focusing on the theoretical aspects of the figurative language generally focused on the examination of the metaphors within the frame of linguistic theories and the comparison of metaphors in Turkish and their counterparts in English. For instance, Aksan (2006) examined the metaphors and cultural model of *anger* in American English in comparison to the metaphors conceptualizing *anger* in Turkish. The results revealed that there are similarities in the way these metaphors are conceptualized in Turkish and American English. For example, the human body is perceived as a container for the emotions as can be seen in the following sentences in American English and Turkish: *He was filled with anger* and *İçi öfke ile doluydu* (i.e., *he was full of anger*). In support of this, Arıca-Akkök (2017) analyzed metaphors of *anger* in Turkish with a culture-specific view in light of the conceptual metaphor theory. The metaphors were collected from national newspapers and the corpus analysis method was used to analyze them. The findings revealed that the most commonly used conceptual metaphor for *anger* was the container metaphor and the results supported the Aksan's claim (2006) that the cognitive model of Turkish and American English is very similar. Similarly, in another study Aksan & Aksan

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[1] See Arslan & Bayrakçı (2006), Demir & Melanlıoğlu (2011), Karatay (2016), Onan & Özçakmak (2014), and Onan & Tiryaki (2012), for the study of metaphor from a pedagogical perspective, which is beyond the scope of the present study.

(2012) conducted a corpus study in which they analyzed the collected data of conventionalized metaphorical expressions that employ two particular source domains, namely *sabır* (i.e., *patience*) and *çile* (i.e., *suffering*). It is claimed that these two source domains are culturally significant concepts that shed light on Turkish speakers' understanding of life, morality, and emotions. The authors stated that the word *çile*, which is a borrowed Persian word meaning a dervish's forty-day period of retirement and fasting, is preferred when the participants referred to a hardship or a pain in life instead of any other possible word that could convey a similar meaning. It suggests that Turkish speakers somehow create a link between their pain and a dervish's experience during seclusion. Thus, the study suggests that abstract concepts from spiritual domains have an impact on conceptual metaphors and the trace of the Anatolian Sufi tradition can be seen in the way Turkish speakers conceptualize life, morality, and emotion. Both Arıca-Akkök (2017) and Aksan & Aksan (2012) added support to the conceptual metaphor theory suggesting that metaphor is the reflection of how we conceptualize our world, and it is characteristic of thought but not language.

Aksan & Kantar (2008) analyzed love metaphors from a cross-cultural perspective. A corpus for the study was constructed from different types of dictionaries and internet resources, and the potential metaphors were analyzed on the bases of linguistics and cognitive criteria. The findings revealed that Turkish and English speakers generally use the same metaphorical source domain to conceptualize *love*. However, a difference between Turkish and English speakers conceptualizing *love* observed in the conceptual mapping of *love is a journey* metaphor because *journey* requires a predetermined goal and a union at the end of the journey which is led by a path. In Turkish, on the other hand, *journey* is not perceived as a purposeful act in love relationships.

There are also studies conducted within the frame of corpus linguistics. Efeoğlu & Işık-Güler (2017) investigated the body politic conceptualization of Turkey as a country and analyzed how it is conceived of as a biological body. This study was carried out on the Corpus of Political Discourse consisting of political news articles published in American, British and Turkish newspapers. In the study, the conceptual metaphors used for Turkey in British, American, and Turkish newspapers were examined and compared. The findings demonstrated that Turkey is depicted as an animate organism which struggles, lives, and which has a body. For example, the lexical unit *shouldering* is used as taking up a difficult responsibility in the following sentence: "Turkey, which hosts half of the 3.2 million refugees who have fled Syria, is shouldering the heaviest burden of what today's report calls the world's worst refugee crisis in a generation" (Efeoğlu & Işık-Güler, 2017, p. 62). The results suggested that the use of conceptual metaphors helps stirring emotions and conveying the sociopolitical issues to the audiences in a more familiar frame.

In addition to theoretical and corpus-based studies, there have been psycholinguistic studies investigating interpretation of metaphors. One of the earliest psycholinguistic studies in Turkish metaphors investigated the comprehension of metaphorical motion events in children from a cross-linguistic perspective (Özçalışkan, 2003). Lakoff & Johnson (1999) propose that we have many abstract domains with regards to motion events. Talmy (2000) demonstrates that languages differ systematically in how to lexicalize a motion event. Talmy's typological classification of motion verbs proposes that languages can be grouped in terms of how motion-events are constructed: satellite-framed languages and verb-framed languages. In the satellite-framed languages, such as English and German, the manner of motion is typically encoded in the main verb, and the path of motion is expressed as a separate particle associated with the main verb (e.g., *he crawls into the house*). In the verb-framed languages, such as Turkish and Spanish, the path of motion is expressed by the main verb and the manner of motion is mostly expressed by an additional component such as a particle or adverb (e.g., *odaya koşarak girdi*; i.e., *she/he entered the room running*).

Özçalışkan (2007) states that the language-general and language-specific samples of metaphorical motion events need to be examined to understand children's understanding of figurative meanings. The analysis of metaphorical motion events occupies a prominent place in the existing literature. Gibbs Jr (2006) proposes that adults understand metaphors mostly attending to an online recreation of actions in the metaphorical language in their mind. When adults were asked to interpret metaphorical motion events, they carried out bodily simulations, such as envisioning the idea of chewing food in their mouth while interpreting *chewing an idea*. Therefore, Gibbs Jr's study demonstrated that the imagination of physical action predicts the speed and ease of metaphor comprehension. Interpreting various metaphorical motion events, the participants were observed to firstly focus on the bodily movements, which were highly relevant to the literal meanings of the metaphoric phrases, and then a defective literal meaning triggered a search for an alternative, mostly figurative, meaning.

Based on this literature, Özçalışkan (2005) conducted a study in which children were told short stories with metaphorical motion events (e.g., *zaman çabucak uçup gidiyor*; i.e., *time flies and goes away quickly)*, and they were instructed to retell these stories while looking at a set of pictures. After the retelling task, the children were asked a question testing their comprehension of the metaphorical motion event in the given story. This study demonstrated that although four-year-olds were able to select the proper meaning of metaphorical motion events, children only started to provide rich explanations for these metaphors at the age of 5 years.

In another study, Özçalışkan (2007) compared Turkish- and English-speaking children in terms of their interpretation of metaphorical motion events. In addition to the research method used in Özçalışkan (2005), Özçalışkan (2007) presented children with various pictures each of which consisted of different motion events to introduce them to the source domain meaning of motion (i.e., literal meaning), assuming that younger children focus exclusively on the source domain in interpreting metaphors (e.g., *a turtle crossing a street*). Then, she told them to describe each picture in a verbal task. After this task, children were asked a few questions about the metaphorical extensions of the motion events in the depicted pictures (e.g., *can ideas crawl through your mind?*), and they were instructed to give explanations about these metaphorical motion events. The results demonstrated that four-year-olds interpreted metaphorical motion events as physical objects and responded with an expressive gesture of physical motions, which followed the same pattern in both languages. Five-year-old children's explanations revealed that children at this age could interpret these metaphors as abstract concepts, which shows a marked developmental change in the use of the gestural space in both English and Turkish. On the other hand, English-speaking children gave more attention to the manner of motion events by expressing it more extensively (e.g., *he walks, runs, crawls ... in/out*) compared to Turkish-speaking children. Özçalışkan (2007) claimed that the differences in the lexicalization of motion events in these languages might produce a significant effect on the expression of metaphorical motion events as well. This is in line with Slobin's (2004) account basing this difference on the availability of codable linguistic slots to encode the manner of motion events in one's language.

Winner, Rosenstiel, & Gardner (1976) demonstrated that children younger than age 4 could comprehend metaphorical motion events when these phrases are presented in a context of short stories. When children at this age were expected to interpret the metaphorical expressions in isolation, they were more likely to provide physical explanations for these motion events. These findings indicate the facilitating effect of the situational context on metaphor comprehension. This claim was supported by the study conducted by Özçalışkan (2007), which demonstrated that four- and five-year-old children could easily interpret metaphorical motion events if they were given in a short story. In the metaphorical expression in which time is identified as a moving entity, children at this age range could comprehend these metaphors by considering both source and target domains of ideas. As mentioned above, such a metaphorical mapping created an impact not only on children's speech but also on their gestures. These children mostly produced gestures aligned with the target domain of these metaphors by expressing them as abstract concepts.

Ibe-Akcan & Arıca-Akkök (2016) conducted a study on the comprehension of metaphoric, metonymic, and humorous expressions by Turkish adults. A

metaphor comprehension test was used to assess participants' metaphor comprehension. The results were analyzed according to Iskandar's (2014) measuring tool. Also, a written test which has sentences including an equal number of metaphorical, metonymic, and humorous expressions was used, and the participants were asked to explain these sentences. The answers were analyzed by a six-point measuring scale. The results suggested that age plays an essential role in the comprehension of figurative language. For example, when 20-29- and 30-39-years old adults were compared, the group of 30-39-years old performed better in interpreting non-literal expressions. The results also suggested that the participants did not have any difficulty in interpreting the metonymic and humorous expressions when compared to metaphorical expressions, and contextual clues were helpful in the interpretation of figurative language. Arıca-Akkök & Uzun (2018) conducted an eye-movement while-reading study focusing on the adults who read expressions with novel versus familiar metaphors. The study showed that the expressions constructed by novel metaphors required more time when compared to expressions with familiar metaphors.

Hülagü & Özge (2017) tested the direct versus indirect access models of metaphor processing models by examining how Turkish children and adults interpreted literal and metaphorical motion events (e.g., *run into a house*, *run into a frustration*). The participants were asked to act-out to describe motion events using silent gestures in order to avoid possible confounding effects of varying levels of linguistic abilities at younger ages. The findings of the study showed that children did not decompose the metaphorical motion events into its literal meaning components as long as the meaning of the metaphors was familiar to them, which supports the direct access model as well as underlining the effect of familiarity aligning with the career-of-metaphor hypothesis (Gentner & Bowdle, 2005). This study showed that children comprehend metaphors similarly to adults as young as four years of age.

Recently, Özkan, Aygüneş, & Dikmen (2020) investigated the comprehension of non-literal expressions in second language speakers compared to native speakers. Two groups of participants were included in the study employing a self-paced reading paradigm: native speakers of Turkish and Turkish-Arabic bilinguals. The results revealed that the unfamiliar metaphors took more time to process when compared to familiar ones. Moreover, there was not any difference in the processing pattern of native speakers and bilingual speakers. In this regard, the findings supported the claim that the literal and non-literal expressions were processed similarly.

5 Conclusion

This paper reviewed the models of metaphor processing with literature assessing these models, summarized the factors affecting the process of metaphor understanding and development, and then presented a literature review on metaphor processing in Turkish. What emerges from this study is that (i) the discussion as to whether or not we need an initial access to the literal meaning prior to an access to the metaphorical meaning is far from established, (ii) a variety of factors seem to guide these processes, and (iii) Turkish linguistics have recently gained a momentum thanks to more theoretical and experimental studies.

This systematic review showed that future studies should focus more on linguistic, participant-related, and cognitive factors as it becomes nearly impossible to select among these theoretical alternatives when experiments are confounded by these factors. Almost all studies to date have focused on single-factor analysis when investigating the influence of linguistic or non-linguistic elements on metaphorical processing. Furthermore, most of the processing studies have focused on healthy adult populations, so we have little information as to how symbolic meaning is processed in adults with cognitive disorders and in children showing typical or atypical development. With the advance of the field of experimental pragmatics, more online psycholinguistic techniques have been available to test the cognitive and neural underpinnings of metaphor processing in different populations. We have seen that Turkish metaphor literature is already expanding with more experimental studies (e.g., Arıca-Akkök & Uzun, 2018; Hülagü & Özge, 2017; Ibe-Akcan & Arıca-Akkök, 2016; Özçalışkan, 2003, 2005, 2007; Özkan, Aygüneş, & Dikmen, 2020). We call on further psycholinguistic research in Turkish to investigate how multiple factors interact during the course of metaphor interpretation in different populations to provide more experimental data that could inform the theory of metaphor processing.

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