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Fictive Motion and Visualisation: Dynamic Spatial Perception in Turkish*

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ABSTRACT
This study investigates fictive motion (FM) expressions in Turkish, focusing on how static spatial relationships are described dynamically through language. FM, a linguistic phenomenon where static scenes are described with motion-related terms (e.g., "The road winds through the valley"), stimulates mental simulation and enhances spatial visualisation. Using a drawing experiment, sixty native Turkish speakers were presented with twelve pairs of fictive and non-fictive sentences to illustrate their interpretations. Statistical analysis confirmed significant differences in seven of the twelve pairs, highlighting the role of motion-implying verbs in expanding spatial perception. Results show that FM expressions lead to larger and more extended visual descriptions, supporting the idea that FM facilitates vivid mental simulations of motion, even when describing stationary scenes. These findings align with cognitive linguistic theories such as Langacker's virtuality (1999), Talmy's typology of FM (2000) and Matlock's mental simulation (2004) by contributing to the understanding of FM in a verb-framed language like Turkish. By examining FM through visual representation, this study adds to the cross-linguistic research on FM, highlighting the role of language in shaping spatial conceptualisation.
Keywords: Fictive motion, mental simulation, Turkish, spatial conceptualisation, cognitive linguistics

1. Introduction

Motion, a fundamental concept embedded in both physical experience and language, shapes how we describe movement and change. Ancient philosophers like Heraclitus and Aristotle recognised its significance, with Aristotle defining motion as the "actualisation of potential." In linguistics, this duality is reflected in Tesnière's (1959) distinction between "inner motion" (inherent activity) and "outer motion" (spatial change relative to a reference).

Actual motion, or physical motion, involves the change of an object's position over time, analysed in physics by parameters like distance, velocity, and acceleration within a reference frame. Kinematics studies such motion without considering its causes, while dynamics focuses on the forces affecting it. When an object remains unchanged relative to a frame, it is at rest. Motion applies across various domains, from particles to fields. Momentum, tied to velocity and mass, remains constant in isolated systems unless acted upon by a force. In language, motion is conveyed using verbs indicating movement through space. This separation of motion concepts forms the foundation for motion typology, explored by scholars like Talmy, who examine how languages describe both physical and non-physical movement. Motion verbs like "run" and "go" depict scenarios where a living being moves across physical space from one location to another, as shown in examples such as *Ali, Malibu Plajı'ndan kulübe doğru koşuyor* 'Ali runs/is running from Malibu Beach to the club' or *Murtaza tepeye çıktı* 'Murtaza went up the hill'. These literal applications of motion verbs inherently imply the passage of time, a state change, and a defined path that links an origin and destination (Miller & Johnson-Laird, 1976; Talmy, 1975).

Fictive motion (FM) is an extension of this concept, where language describes static or abstract entities with motion-related terms, as seen in expressions like "The road winds through the valley." Here, a stationary road is described as if it moves, allowing spatial relationships to be portrayed with imaginative detail. FM enables speakers to illustrate spatial configurations in ways that mentally simulate motion, aiding in conceptualising space and distance. The study of FM provides a window into the cognitive processes underlying language use, showing how dynamic verbs in static contexts shape perception. It is ubiquitous across languages, suggesting universal cognitive mechanisms. Furthermore, understanding FM can inform NLP, AI language models, and translation tasks by emphasising how figurative language is processed and represented.

George Lakoff and Mark Johnson's book *Metaphors We Live By* (1980) extended the FM model of Lakoff (1987), which is based principally on his Conceptual Metaphor Theory (CMT), particularly on the "FORM IS MOTION" mapping. This framework allows static shapes or forms to be understood using motion-based language. Lakoff discusses how spatial trajectories, such as in "The path stretches along the shore," are conceptualised by tracing a path mentally, mapping concrete experiences to abstract concepts. Lakoff (1987: 442) explained that when observing an object in constant motion, we can mentally map out the path it takes. He also highlighted that these image-schema transformations are rooted directly in our visual and physical (kinaesthetic) experiences.

Langacker (1990, 1999) refers to this phenomenon as "virtuality," where nouns and verbs evoke generalised types rather than specific instances, creating a blend of static and dynamic imagery. Through this mental simulation, listeners visualise motion that facilitates spatial understanding. He discusses *sequential* and *summary scanning*, where FM represents a static scene through dynamic linguistic means. Sentences like "The trail rises steeply" exemplify how static spatial configurations are processed as dynamic through mental scanning.

Talmy (2000) categorises FM expressions based on the ways in which static entities are imagined dynamically, such as *emanation* (shadows or sensory paths extending from a source), *frame-relative motion*, *pattern paths*, *advent paths*, *access paths*, and *coextension paths*. His work outlines the conceptualisation of motion verbs to describe static objects, exemplifying how the cognitive discrepancies between linguistic expressions and perceptual reality reveal deeper cognitive processing.

Fauconnier and Turner (2002) describe this blend of dynamic and static scenarios as a cognitive aid, mapping a "moving trajector" onto static objects to help conceptualise spatial relationships. Fauconnier and Turner explained FM on the basis of their Conceptual Blending and Integration Theory (henceforth: CBIT). Their theory focuses on conceptual integration where mental spaces blend to create new meanings. FM emerges when static scenes are dynamically re-conceptualised through such blending. The blending framework supports FM sentences that evoke metonymic thinking, where language links the trajectory of motion to the stationary subjects.

Matlock presented, in her dissertation, strong evidence demonstrating that the occurrence of fictive motion (FM) with motion verbs is not coincidental. She emphasised that understanding both the literal and metaphorical meanings of these verbs is essential for processes such as visual scanning or mentally simulating movement. Matlock (2004) argues that FM arises from the brain's ability to simulate movement, making FM essential for understanding how language activates cognitive simulations of motion. Her experimental studies showed that reading FM sentences activates the motion perception regions in the brain, highlighting the embodied nature of FM processing.

Research into FM has evolved with tools like eye-tracking, drawing tasks, and neuroimaging, which provide insights into the cognitive processing involved in FM expressions. Cross-linguistic studies reveal variations in how languages use FM. For instance, Matsumoto (1996) and Rojo & Valenzuela (2004) found that English favours path information, while Spanish emphasises path over manner. A study by Stosic and Sarda (2009) compared Serbian, a satellite-framed language, and French, a verb-framed language, noting that languages with high manner salience, like Serbian, use FM expressions less frequently than French, underscoring the impact of linguistic structure on FM usage. In their "Frame-Relative Constructions in the Description of Motion" paper, Egorova and Purves (2018) investigated frame-relative constructions—a type of fictive motion—in alpine narratives, exploring

their communicative motivations and linguistic encodings. Stosic *et al.* (2015) examined the cognitive motivations behind fictive motion expressions across multiple languages, providing insights into how different linguistic communities conceptualise motion. Matlock (2017) explored the interplay between metaphor, mental simulation, and fictive motion, emphasising their roles in cognitive processing. Duong (2021) reviewed various cognitive linguistic models explaining fictive motion, highlighting its significance in understanding figurative language use. However, to date, no research has specifically addressed FM in Turkish. Therefore, this study, as part of a larger work on motion events (Topraksoy 2022), represents the first attempt to analyse FM expressions in Turkish.

This study investigates FM in Turkish through a drawing experiment, where participants illustrate from fictive and non-fictive motion sentences. By analysing these visual representations, the study seeks to reveal how Turkish speakers conceptualise FM relative to static descriptions, contributing to the broader cross-linguistic study of FM. Through the term "fictive motion," this research aligns with cognitive linguistics approaches, exploring how different languages use FM to enhance spatial understanding and bridging insights from linguistic analysis with cognitive processing mechanisms.

2. Methodology

This study investigates fictive motion (FM) expressions through a drawing task adapted from Matlock's (2006) study, aiming to visualise how native Turkish speakers conceptualise FM versus non-fictive motion. Sixty native Turkish speakers, aged 18 to 30, voluntarily participated. All participants were current university students or recent graduates from Istanbul and Ankara, selected for their familiarity with Turkish spatial and motion-related expressions to authentically capture FM processing in their native language. This research was approved by the Ethics Committee of Hacettepe University, with approval number 35853172-300-E.00000422419.

2.1. Materials

The experiment used 12 pairs of sentences—each pair consisting of one fictive and one non-fictive sentence—to describe similar scenes with and without implied motion. For example, a fictive sentence like *Dövme çocuğun omzundan boynuna doğru uzanıyor* 'The tattoo extends from the boy's shoulder towards his neck' was paired with a non-fictive counterpart such as *Dövme çocuğun omzuyla boynunun arasında* 'The tattoo is between the boy's shoulder and neck' The sentences were translated and adapted from English FM studies, especially Talmy's (2000) sub-categorizations, to ensure cultural and linguistic appropriateness for Turkish. The purpose of using paired sentences was to control for content while isolating the effect of fictive language. The sentence pairs are given in the Appendix.

2.2. Procedure

Participants were presented with each sentence pair in a randomised order. They were instructed to read each sentence carefully and then draw what they envisioned based on the description. This method, inspired by Matlock (2006), captures how participants visually interpret spatial relations through implied motion. Participants created one drawing per sentence, which was coded anonymously to ensure unbiased analysis.

The primary elements in each drawing were measured in centimetres, focusing on length and width, to quantify how FM might influence the visual representations. The expectation was that fictive sentences would prompt larger or more spatially extended drawings compared to their non-fictive counterparts, indicating an impact of FM on spatial conceptualisation.

2.3. Data Analysis

The analysis involved comparing the dimensions of fictive and non-fictive drawings to determine if FM influenced participants' visual representations. A *paired t-test* was conducted on the mean lengths of the drawings, testing for significant differences between fictive and non-fictive sentences. Table 2 showing the t-test results for each pair of sentences is given in the Appendix.

This methodological approach, which combined visual interpretation with quantitative analysis, revealed the cognitive processing underlying FM in Turkish. By examining differences in spatial dimensions, the study seeks to understand how FM expressions influence Turkish speakers' spatial conceptualisation and contribute insights into the broader cross-linguistic study of fictive motion.

3. Results

The results of the drawing experiment reveal notable differences between fictive and non-fictive motion expressions in Turkish. Participants' drawings for fictive sentences consistently depicted larger or more extended figure elements compared to those associated with non-fictive sentences. This outcome suggests that fictive motion expressions stimulate a more dynamic spatial conceptualisation, aligning with findings from previous studies on FM in other languages.

3.1. Overall Comparison of Fictive and Non-Fictive Drawings

The mean lengths of the figure elements in the drawings were calculated for both fictive and non-fictive motion sentences. The average length[1] for fictive motion sentences was 96.53 cm, while for non-fictive sentences, it was 82.65 cm, indicating a statistically significant difference ($p < 0.05$) in favour of fictive descriptions. This pattern reflects a broader mental simulation effect, where fictive motion sentences led participants to conceptualise space more expansively, as if the static scenes held an element of movement.

1 Sum=Total calculation of Categories F and NF each/Participant total(n=60)

3.2. Pairwise Analysis of Fictive and Non-Fictive Sentences

Individual sentence pairs were analysed to explore whether specific FM expressions produced consistent differences in the drawing size. Table 1 below summarises the comparison of sentence pairs with M_{lenght}:

Table 1. Comparison of the pairs with and without any difference from the drawings

Sentence Pairs (NF/F2)	**M_{lenght} (=cm)**
1) Ev iki dağ arasında *24) Ev iki dağ arasında yer alıyor.*	5,36 5,91
8) Yapraklar ovanın her tarafındaydı. *2)Yapraklar ovanın her tarafına saçılmış*	15,8 16,29
3) Market otoparkın yanında. *11) Market otoparka bakıyor.*	10,05 9,92
17) Yılan yoldan uzakta. *6) Yılan yolun kenarında yatıyor.*	4,51 4,70
12) Kadın bahçe kapısından uzaktaydı. *20)Kadını bahçe kapısına doğru yönlendirdim.*	5,40 5,50
7) Yön tabelası kasabaya doğruydu. 4) *Yön tabelası kasabayı gösteriyor.*	5,09 5,66
22) Dövme çocuğun omzuyla boynunun arasında. *5) Dövme çocuğun omzundan boynuna doğru uzanıyor.*	1,76 3,42
9) Çocuğun doğum lekesi dizi ile ayak bileği arasındaydı. *14) Çocuğun doğum lekesi dizi ile ayak bileği arasına yayılmış*	0,93 1,90
10) Dere orman ile vadi arasında. *13) Dere kıvrıla kıvrıla vadiye doğru ilerliyor.*	10,45 11,43
16) Top kapının yanındaydı. *21) Yavaş yavaş topu kapıya yaklaştırdım.*	2,34 6,56
19) Göl orman ve tren yolu arasında. *18) Orman ile tren yolu arasında bir göl uzanıyor.*	9,9 12,41
15) Çocuklar futbol sahasında. *23) Çocuklar futbol sahasının etrafında toplanmış.*	11,01 12,77

The mean length comparisons for each pair were put into t-test analysis. The t-test results show that certain sentence pairs exhibited a more pronounced difference in the spatial representation of fictive and non-fictive elements, while others demonstrated negligible variation. Specifically, pairs with verbs that implied motion or direction, such as “uzanıyor” (extends) and “ilerliyor” (progresses), yielded larger drawings than pairs involving more neutral verbs.

For instance, the fictive sentence *Dere kıvrıla kıvrıla vadiye doğru ilerliyor* ‘The stream curls towards the valley’ produced significantly larger visual representations compared to its non-fictive counterpart. In contrast, sentence pairs with minimal motion cues, such as those

2 Fictive motion sentences in each pair are given in italics.

describing static proximity or location without directional movement, displayed little difference in the drawing dimensions. These findings indicate that the verb choice within fictive motion expressions plays a role in influencing spatial visualisation. These differences are visualised in the below Chart 1:

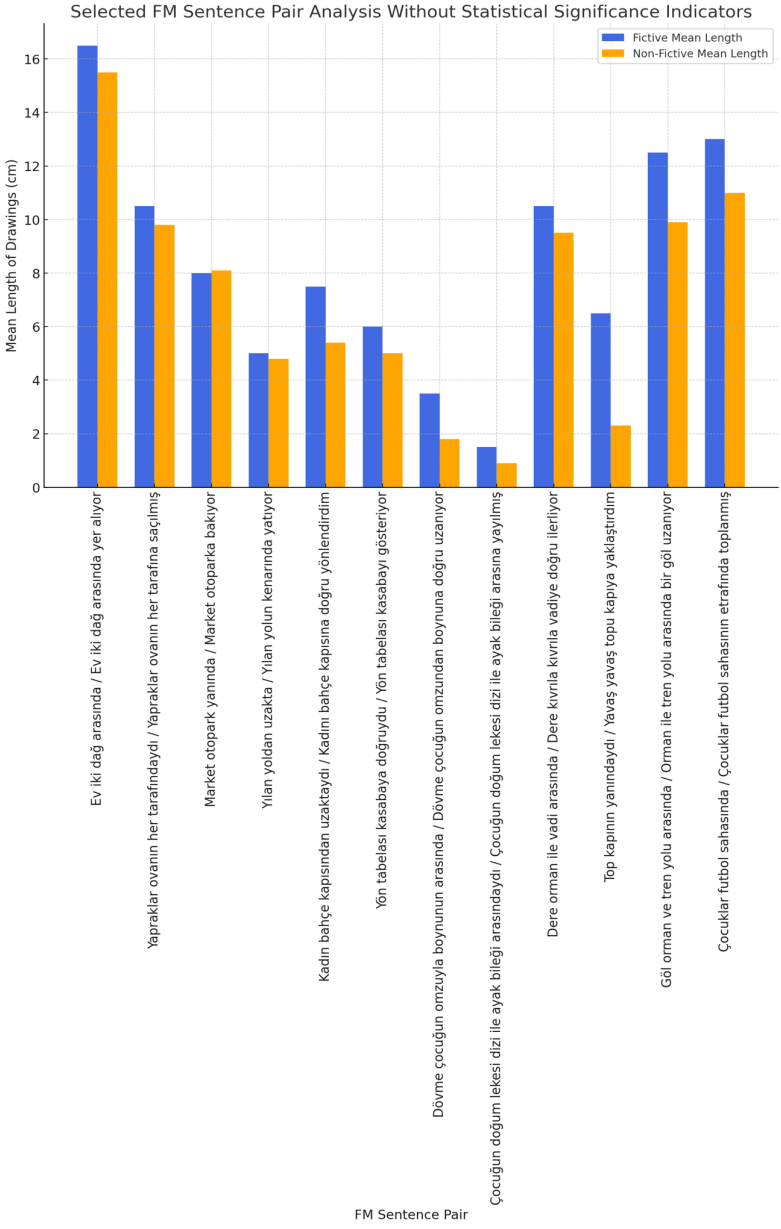

Chart 1. Mean length of drawings for each pair of sentences

3.3. Statistical Analysis

The statistical analysis, using paired t-tests for each sentence pair, confirmed that seven out of twelve pairs showed significant differences in drawing sizes between fictive and non-fictive sentences. These results validate the influence of FM in generating larger or more elaborate spatial representations, supporting the hypothesis that fictive expressions prompt a unique cognitive processing style that emphasises dynamic imagery.

Overall, the results of this study underscore the impact of fictive motion on spatial conceptualisation in Turkish. The significant differences between fictive and non-fictive drawings suggest that fictive motion expressions evoke a mental simulation of movement, shaping how speakers of Turkish visualise spatial relationships even in static contexts

4. Discussion

The findings of this study provide valuable insights into how fictive motion (FM) expressions influence spatial conceptualisation among Turkish speakers. The results demonstrate that FM expressions in Turkish prompt larger and more extended visual representations compared to their non-fictive counterparts, indicating that FM stimulates the mental simulation of motion, even in descriptions of static scenes. This aligns with Matlock's (2004) concept of mental simulation and Langacker's (1990) notion of virtuality, supporting the idea that FM facilitates a dynamic perspective on spatial relationships.

4.1. The Cognitive Basis of Fictive Motion in Turkish

The differences observed between fictive and non-fictive drawings suggest that Turkish speakers engage in mental imagery aligned with dynamic spatial configurations when processing FM expressions. This finding supports Fauconnier and Turner's (2002) theory that FM integrates dynamic motion with static spatial scenes, leading speakers to interpret FM sentences as if the entities have a trajectory or spatial extension, thereby enhancing the vividness of visual representations.

The influence of FM on spatial conceptualisation in Turkish also supports Talmy's (2000) typology, which includes various FM types such as co-extension paths and frame-relative motion. The study's findings, particularly the variation in drawing sizes between different sentence pairs, align with Talmy's claim that FM categories shape mental simulations of space. Notably, sentence pairs containing verbs that imply extension or directionality—like "uzanıyor" (extends) and "ilerliyor" (progresses)—generated the largest differences in drawing sizes. This suggests that FM verbs play a key role in expanding the perceived spatial scale and trajectory in participants' interpretations.

Further analysis in Table 1 highlighted that certain FM verbs, such as 'yaklaştır' (brings closer) and 'uzan' (extends), elicited significantly larger figure elements. This finding is consistent with Waliński's (2018:222) observation that some verbs evoke FM more systematically. However,

not all fictive sentence pairs yielded larger drawings, suggesting that both verb selection and mental scanning play roles in participants' interpretation (Matlock, 2004; Langacker, 1990). These findings reinforce the idea that verbs implying extension or movement foster a stronger mental simulation of space, as described in Talmy's (2000) FM categories.

4.2. Implications for Cross-Linguistic Research on Fictive Motion

While the study focused specifically on Turkish, these findings contribute to cross-linguistic FM research by showing how language typology may impact FM processing. Turkish, a verb-framed language, encodes spatial relations through verbs rather than auxiliary elements like prepositions, as seen in satellite-framed languages such as English. This reliance on motion verbs in Turkish FM expressions likely amplifies the mental simulation effect, as verbs inherently carry path or directional information.

These findings align with similar FM studies in other languages, where dynamic verbs consistently produce larger or more elaborate spatial representations (e.g., Matlock, 2006). The Turkish data further emphasise the role of motion verbs in shaping FM, suggesting that languages with distinct typological patterns may leverage FM in unique ways, affecting the vividness and extent of the spatial imagery produced by speakers. The study's findings support the hypothesis that FM acts as a cognitive tool that transcends literal motion, enabling speakers to convey complex spatial relations dynamically. The study concludes that FM expressions in Turkish promote dynamic spatial conceptualisation, consistent with Talmy's (2000) typological distinctions.

Overall, this study establishes a preliminary foundation for understanding FM in Turkish and its position within the broader cross-linguistic landscape. Future research, especially comparative studies across languages and contexts, could deepen our knowledge of FM's cognitive impacts, complementing recent findings by Tomczak & Evert (2015), Lewandowska-Tomaszczyk (2012), and Blomberg & Zlatev (2014) on factors that influence FM expression and simulation strength.

5. Limitations and Future Directions

This study highlights the influence of fictive motion (FM) on spatial conceptualisation in Turkish, but there are some limitations. The drawing task effectively captured participants' spatial interpretations but lacked the ability to measure the temporal and sequential dynamics central to FM processing. Future research could incorporate methods like eye-tracking or reaction-time studies to reveal the temporal aspects of FM and capture real-time cognitive processes, as suggested by neurocognitive studies (Cacciari *et al*., 2011; Romero Lauro *et al*., 2013), which link FM comprehension with motor cortex activation.

Additionally, examining FM processing among bilingual speakers or comparing Turkish with other verb-framed languages could uncover language-specific nuances in FM conceptualisation. Given that only certain FM sentence pairs showed significant differences

in spatial representations, further studies might explore the effects of verb types or syntactic structures within FM expressions. Expanding the range of FM sentence types could help clarify the relationship between FM and cognitive processes, such as sequential scanning (Langacker, 1990) and mental simulation.

6. Conclusion

This study explored fictive motion (FM) expressions in Turkish through a drawing experiment, revealing that Turkish speakers mentally simulate motion even in descriptions of static scenes. By comparing fictive and non-fictive sentence pairs, the findings show that FM expressions lead to larger, more spatially extended visual representations, underscoring the cognitive impact of FM in Turkish.

The results contribute to a broader understanding of FM as a cognitive tool that enables speakers to convey spatial relationships dynamically. In Turkish, FM expressions leverage motion verbs to imply trajectories and spatial extensions, aligning with cognitive frameworks suggesting that language facilitates the mental simulation of movement. These findings reinforce Talmy's (2000) typological distinctions in FM, highlighting how language-specific factors, such as verb-framed structure in Turkish, may enhance the mental imagery associated with FM.

While this study provides preliminary insights into FM processing in Turkish, further research could employ additional experimental methods, such as eye-tracking or reaction-time studies, to deepen the understanding of the temporal and attentional processes involved in FM. Additionally, comparing FM across different languages could offer more nuanced perspectives on how typological factors shape FM and the mental simulation of spatial relations. Such a study covering online observation of how FM is processed cross-linguistically will be carried out in cooperation with Robin Thompson at the University of Birmingham.

Overall, this study situates Turkish within the broader field of cross-linguistic research on fictive motion (FM), providing evidence that FM expressions expand both cognitive and linguistic boundaries by allowing speakers to conceptualise static scenes dynamically through language. By examining FM in Turkish, the study enhances typological and cognitive linguistic insights, illustrating how Turkish speakers use FM expressions to evoke vivid and detailed spatial imagery, thus broadening our understanding of the cognitive and linguistic processes involved in spatial thinking.

Data accessibility statement: The dataset can be accessed from: https://osf.io/jnh2d/?view_only=3da4e41e1a4747a683d7dc53328017cd
Ethics and Consent: This research was approved by the Ethics Committee of Hacettepe University, with approval number 35853172-300-E.00000422419.
Peer-review: Externally peer-reviewed.
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Appedix- 1 Sentence Pairs and Drawing Task

Aşağıda verilen cümleleri okuyunuz. Okuduktan sonra, her bir cümleden ne anladığınızı ana hatlarıyla çizim yaparak anlatınız.

1) Ev iki dağ arasında.
Çizim:

2) Yapraklar ovanın her tarafına saçılmış.
Çizim:

3) Market otoparkın yanında
Çizim:

4) Yön tabelası kasabayı gösteriyor.
Çizim:

5) Dövme çocuğun omzundan boynuna doğru uzanıyor.
Çizim:

6) Yılan yolun kenarında yatıyor.
Çizim:

7) Yön tabelası kasabaya doğruydu.
Çizim:

8) Yapraklar ovanın her tarafındaydı.
Çizim:

9) Çocuğun doğum lekesi dizi ile ayak bileği arasındaydı.
Çizim:

10) Dere orman ile vadi arasında.
Çizim:

11) Market otoparka bakıyor.
Çizim:

12) Kadın bahçe kapısından uzaktaydı.
Çizim:

13) Dere kıvrıla kıvrıla vadiye doğru ilerliyor.
Çizim:

14) Çocuğun doğum lekesi dizi ile ayak bileği arasına yayılmış.
Çizim:

15) Çocuklar futbol sahasında.
Çizim:

16) Top kapının yanındaydı.
Çizim:

17) Yılan yoldan uzakta.
Çizim:

18) Orman ile tren yolu arasında bir göl uzanıyor.
Çizim:

19) Göl orman ve tren yolu arasında.
Çizim:

20) Kadını bahçe kapısına doğru yönlendirdim.
Çizim:

21) Yavaş yavaş topu kapıya yaklaştırdım.
Çizim:

22) Dövme çocuğun omzuyla boynunun arasında.
Çizim:

23) Çocuklar futbol sahasının etrafında toplanmış.
Çizim:

24) Ev iki dağ arasında yer alıyor.
Çizim:

Teşekkürler

Appedix- 2 T-test results for all sentence pairs (Table 2)

Sentence Pair	Mean 1	Mean 2	Variance 1	Variance 2	Observations	Pearson Correlation	Hypothesized Mean Difference	df	t Stat	P(T<=t) one-tail	t Critical one-tail	P(T<=t) two-tail	t Critical two-tail
1-24	5.3695	5.9186	8.3866	7.9267	59	0.7182	0	58	-1.9665	0.02700000	1.6716	0.05400000	2.0017
8-2	15.8000	16.2983	40.4841	38.8912	59	0.8176	0	58	-1.0054	0.15950000	1.6716	0.31890000	2.0017
3-11	10.0593	9.9237	12.9976	14.1991	59	0.6385	0	58	0.3319	0.37060000	1.6716	0.74120000	2.0017
7-4	5.0915	5.6627	8.5732	7.4020	59	0.8372	0	58	-2.7018	0.00450000	1.6716	0.00900000	2.0017
22-5	1.7661	3.4254	3.0595	6.2826	59	0.6336	0	58	-6.5502	0.00000001	1.6716	0.00000002	2.0017
17-6	4.5119	4.7017	7.1597	4.6219	59	0.7401	0	58	-0.8067	0.21160000	1.6716	0.42310000	2.0017
9-14	0.9305	1.9000	0.4042	1.6755	59	0.4944	0	58	-6.6185	0.00000001	1.6716	0.00000001	2.0017
10-13	10.4559	11.4390	20.0222	21.7359	59	0.6186	0	58	-1.8908	0.03180000	1.6716	0.06360000	2.0017
12-20	5.4051	5.5017	9.4550	7.6822	59	0.3265	0	58	-0.2181	0.41400000	1.6716	0.82810000	2.0017
15-23	11.0153	12.7797	20.9720	47.6541	59	0.4259	0	58	-2.0988	0.02010000	1.6716	0.04020000	2.0017
16-21	2.3492	6.5661	1.6332	12.0785	59	0.3057	0	58	-9.7681	0.00000000	1.6716	0.00000000	2.0017
19-18	9.9034	12.4153	23.7131	19.6927	59	0.6696	0	58	-5.0727	0.00000200	1.6716	0.00000430	2.0017