



HAL
open science

Eyes do not lie but words do: Evidence from eye-movement monitoring during reading that misuse of evidentiality marking in Turkish is interpreted as deceptive

Seçkin Arslan, Elif Tutku Tunalı, Yağmur Çetin, Özgür Aydın

► To cite this version:

Seçkin Arslan, Elif Tutku Tunalı, Yağmur Çetin, Özgür Aydın. Eyes do not lie but words do: Evidence from eye-movement monitoring during reading that misuse of evidentiality marking in Turkish is interpreted as deceptive. *Functions of Language*, In press, 10.1075/fol.22061.ars . hal-04644339

HAL Id: hal-04644339

<https://hal.science/hal-04644339>

Submitted on 11 Jul 2024

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

This is an author copy of Arslan, S., Tunalı, E. T., Çetin, Y., & Aydın, Ö. (2024). Eyes do not lie but words do: Evidence from eye-movement monitoring during reading that misuse of evidentiality marking in Turkish is interpreted as deceptive. *Functions of Language*.
<https://doi.org/https://doi.org/10.1075/fo1.22061.ars>

Eyes do not lie but words do: Evidence from eye-movement monitoring during reading that misuse of evidentiality marking in Turkish is interpreted as deceptive

Seçkin Arslan

Université Côte d'Azur & CNRS, Nice, France

Elif Tutku Tunalı

Sabancı Üniversitesi, Faculty of Arts and Social Sciences, Istanbul, Turkey

Yağmur Çetin & Özgür Aydın

Ankara Üniversitesi, Department of Linguistics, Ankara, Turkey

*** Correspondence:**

Corresponding Author: Seçkin Arslan

Laboratoire BCL : Bases, Corpus, Langage - UMR 7320

CNRS - Université Côte d'Azur

Campus Saint Jean d'Angely - SJA3 / MSHS-SE

25 avenue François Mitterrand

06300 Nice CEDEX 4

Seckin.ARSLAN@univ-cotedazur.fr

**Eyes do not lie but words do:
Evidence from eye-movement monitoring during reading that
misuse of evidentiality marking in Turkish is interpreted as
deceptive**

Abstract

Evidentiality encodes how a speaker knows about the information contained in his/her proposition. It has been shown that some ‘evidential language’ speakers make a deliberate choice of evidentials while telling lies (Aikhenvald 2004). In this study, we recruited 40 native speakers of Turkish, an ‘evidential language’, to judge statements with evidentials using an eye-movement-monitoring-during-reading study with an end-of-sentence deception detection task. The participants read sentences with four conditions, containing a direct or indirect evidential form either compatible or incompatible with the given information source. Our results show that the indirect evidential condition was detected as a lie more often than the direct evidential condition. Readers had the tendency to judge stimulus material with source-evidentiality mismatch to be untruthful. These findings were mirrored in the eye-movement data, as we found gaze duration to be longer at the critical verb region for indirect evidential and mismatch conditions.

1. Introduction

Evidentiality is referred to as a grammatical category that codifies how a speaker knows about the information contained in his/her proposition, such as through direct witnessing, inference, or a report (e.g., Aikhenvald 2004; Chafe & Nichols 1986; Willett 1988). A main FUNCTION of evidentiality is to refer to information sources, and this grammatical category is obligatory in a number of the world's languages. Speakers of 'evidential languages' typically need to state their information sources through certain inflections, affixes, clitics, and/or particles. In many 'evidential languages', evidentials are expected to be used felicitously regarding the information source, or the speaker might be accused of lying (Aikhenvald 2004: 98). This important observation suggests that one FUNCTION of evidentiality might be deliberately deceiving. It might be possible to argue that a deliberate choice of an evidential can be used for telling a lie. Notably, it should be noted that we do not refer to a modal approach towards the truth value of a statement. In this study, we explore whether speakers of Turkish, a language with obligatory evidential encoding, interpret a mismatch between information sources and evidential choices as being lied to.

As human beings, we tend to be bad lie detectors since we are biased towards accepting statements to be truthful (Grice 1975; Levine et al. 1999). However, previous research on non-evidential languages has shown that certain grammar structures used in deceptive contexts are obvious indicators of detecting deception. Some studies showed that when speakers tell lies, they produce inflated rates of negation words (Hauch et al. 2015), conditional forms (Meibauer 2018), inconsistent person referents/pronouns, missing past tense markers, and tense hopping such as "*She was amazing. She is amazing...*" (Porter & ten Brinke 2010: 68). The available experimental research, nonetheless, concentrated only on non-evidential languages leaving gaps in our understanding of whether evidential forms, making clear reference to how the speaker knows his/her statement, could be a transpicuous indicator of deception.

Some typological studies offered insights into how evidentials are deliberately used to tell lies. For instance, Aikhenvald (2004: 98) suggests that in evidential languages, one can tell lies by misusing evidential forms. Her data on Tariana, a language spoken in the Amazonian basin, has shown that when individuals tell lies, evidential marking can be different depending on whether the statement has false

information or not. For instance, true information about an event can be expressed incorrectly with a reported evidential, or false information can be expressed with direct/visual evidentials to tell a lie. Evidential marking in certain languages may often be associated with attitudes towards truth and other epistemic connotations (Cornillie 2009; Nuyts 2001). It is thus conceivable that the epistemic content might play a role in how the listener or reader comes to perceive an evidential statement as deceitful.

Turkish is an ‘evidential language’, in which evidentiality is encoded through its tense/aspect/mood inflections on the predicate (see also Aksu-Koç & Slobin 1986; Johanson 2000; Slobin & Aksu 1982). Turkish entails a choice of whether the information is known through direct witnessing (1) or indirect sources of report and/or inference (2).¹

- (1) *Didem bir şarkı söyle-di*
 Didem one song say.DIR
 ‘Didem sang a song’ [witnessed]
- (2) *Didem bir şarkı söyle-miş*
 Didem one song say.INDIR
 ‘Didem sang a song’ [reported/inferred]

Within the evidential paradigm, indirect evidential is the marked and direct evidential is the default form (Johanson 2003). Note that Johanson (2003) advocated that Turkish has an indirect (-miş) versus evidentiality-neutral past (-DI) distinction suggesting that the morpheme -DI does not consistently make reference to direct information source. Here, we adopt that Turkish has a two-way distinction between indirect – direct forms which is well grounded by descriptive and experimental work on Turkish (Aksu-Koç 2000; Aksu-Koç & Slobin 1986; Kornfilt 1997; Lewis 1967).

Turkish evidentials have the FUNCTION of expressing epistemic connotations relating to the speaker's evaluation of the likelihood that an event in the proposition is true (Aksu-Koç 2016; Arslan 2020). That is, information owned by the speaker conveyed through the direct evidential form is perceived as more

¹ Abbreviations in glosses: DIR = Direct Evidential, INDIR = Indirect Evidential, PRES.PROG = Present Progressive, ACC = Accusative, 1SG = First person singular

reliable than when the speaker's indirect information is based on reports of others. Arslan (2020) showed that uncertainty adverbs in Turkish (e.g. *belki* 'perhaps') blend well with indirect evidential but are strongly counter-intuitive with direct evidential in Turkish. Detecting a statement to be deceptive might require picking up such epistemic and evidential cues during language comprehension. Findings from studies on young children's acquisition have suggested that Turkish children, as early as four years old, make clear use of information sources in the linguistic input to identify misleading information (Aydin & Ceci 2009). Another developmental study showed that children between the ages of 5—7 years old find direct evidential form in Turkish to be more reliable than its indirect evidential counterpart (Ozturk & Papafragou 2016). A similar outcome has also been found in adult Turkish speakers who have a greater tendency to judge statements marked with the direct evidential as more convincing than those with the indirect evidential (Karaslaan et al. 2018).

In this study, we look from another angle at deception and grammar by combining the perspectives from studies that showed that certain grammatical markers act as indicators of deception (Meibauer 2018) and those showing when misused, indirect evidential may be perceived as less reliable over direct evidential (Arslan 2020). The aim of this study is to explore whether adult Turkish readers judge evidential forms mismatching with their respective information sources to be truthful or deceptive. To reach our aim, we utilised an empirical approach by using an eye-tracking-during-reading experiment in order to record a group of native Turkish speakers' eye movements. We used statements marked by direct/indirect evidentials either matching or mismatching to their appropriate information source context. We critically explored effects of the type of evidential (direct vs. indirect) and mismatch between evidential and information source and controlled for particular effects for event witnessability (i.e., likelihood of an event being witnessed; see Section 2. Methods). The rationale here was that if Turkish readers were to judge indirect information as less reliable, they would have a greater tendency to consider statements with direct evidentiality more truthful compared to statements marked by indirect evidentiality. Similarly, we expect Turkish readers to interpret the misuse of evidentials in inappropriate information source contexts as lie-telling.

2. Methods

2.1 Participants.

A total of 40 native Turkish speakers (22 females and 18 males; mean age = 23.7, SD = 2.91) participated in this study. We administered a detailed standard demographic questionnaire prior to the experiments. All participants reported to have acquired Turkish as their native language in natural settings and had (corrected to) normal vision. All the participants reported to have been raised monolingually and having no extensive abroad stays leading to a potential impact of bilingual immersion. Individuals with non-native knowledge of Turkish were not admitted. The participants reported no difficulty or neurological and/or psychiatric condition that might affect their language processing ability. The experiments took around 45 minutes. Participation was voluntary upon an informed consent. They received no monetary compensation.

2.2 Materials and norming.

The materials included 30 sentences with four conditions (120 sentences in total). Two conditions contained a direct witnessing context where the speaker attests having witnessed the information followed by a clause marked for either direct evidential, making it compatible with the information source, or indirect evidential, incompatible with the given information source (3). Two other conditions, by contrast, contained a non-witnessed information source context, followed by either an indirect evidential which is rather compatible with the given information source, or direct evidential, which is incompatible (4). We manipulated the type of evidential (Direct \times Indirect) and contextual appropriateness of evidential form used (Match \times Mismatch).

(3) *Ben gördüğüme eminim, Seda kendi işyerini soydu / soymuş*
I see certain.1SG Seda own workplace.ACC rob.DIR/ rob.INDIR
'I certainly saw, Seda robbed her own workplace'

(4) *Başkaları gördüğünü söylüyor, Seda kendi işyerini soymuş/ soydu*
Others see say.PRES.PROG Seda own workplace.ACC rob.INDIR/ rob. DIR
'Others say they have seen, Seda robbed her own workplace'

An additional factor we controlled for was event witnessability (Low witnessable \times High witnessable). We normed witnessability of events, used in the linguistic stimuli, that is, how possible it is for participants to witness such events in life, with a total of 60 native speakers of Turkish through an offline questionnaire. Participants rated these events on a 7-point scale based on how likely it is that they may witness such an event in their life (see Arslan et al. 2021). In each condition, half of the items were more likely to be witnessed ($n = 15$) and the other half were less likely to be witnessed ($n = 15$). We, thus, divided stimulus into highly witnessable (e.g., *gemiden denize atlamak* ‘jumping into the sea from a ship’, rated as 6.32 out of 7-point scale) and low witnessable events (e.g., *kendi işyerini soymak* ‘robbing one’s own workplace’, rated 3.37 out of 7). Furthermore, critical verbs on which evidential forms are inflected were controlled for their letter length and for their surface frequency in a written corpus (Sezer & Sezer 2013), see Appendix 1 for norming measures on our materials.

2.3 Procedures.

The experiments were programmed using the SMI Experiment Building software tool in a way that the participants saw one question-answer pair in a single trial. Eye-tracking experiments took place in Ankara, Turkey. The participants were admitted to a dimly lit room and seated within a comfortable reading distance from a 1680 x 1050 pixels 22-inch high-quality LCD desktop monitor equipped with an SMI RED-500 IView-X (SensoMotoric Instruments GmbH) eye-tracking unit positioned underneath the monitor. The participants' heads were stabilized by a chinrest to minimize head movements. We used a fully crossed design where all participants saw all trials. Stimulus materials were divided in four blocks with an equal number of items from each condition counterbalanced across blocks so that the same sentence would not appear with different condition manipulations in the same block. The participants saw all four blocks and read 30 sentences in each block. The trial item sequences were presented randomly. The sentence stimuli were presented in Courier font with size 36 in black colour on light grey background presented as whole centred to the middle of the screen. Before each trial, there was a calibration with 9-point fixation, after each break, the calibration process was repeated. Before each trial, a fixation cross appeared at the upper left-hand corner of the screen for 500ms so as to be able

to attract participants' gaze to the beginning of the sentence (i.e., Turkish reading direction is left to right). When participants finished reading each sentence, they were asked to look for 500ms at the <continue> sign placed at the bottom of the screen to continue to the end-of-sentence deception detection task. This task asked whether the statement the participants had read was 'truth or lie' and the participants were instructed to indicate their judgments with a key press (i.e., left arrow key for truth, and right arrow key for lie).

We recorded three eye-movement measures: First Pass Reading Time (FPRT), Regression Path Duration (RPD), and Total Fixation Time (TFT) all in milliseconds. FPRT is the sum of first-time fixations in a given region until the fixation exits the region to either the left or the right. RPD is the duration of all fixations in a region of interest from the first fixation to when gaze is directed away to the right. TFT represents the total duration of fixations while reading a region of interest. The analyses were conducted on data from the critical verb and the spillover regions, as shown bolded within brackets in (5).

(5) *Ben gördüğüme eminim Seda kendi işyerini [soydu] [bunun için] ...*

The fixation data were processed using the *em2* package (Logačev & Vasishth 2013) in R (R Core Team 2018) for computing reading time measures from the eye movement record. In our analyses, following (Baayen et al. 2008), we utilized mixed effects regression models using the eye-movement measures as the dependent variable and the following predictors: Evidentiality (direct \times indirect), Matching (match \times mismatch), Witnessability (witnessable \times less witnessable) and interaction between these fixed-effects. The independent variables were sum coded as +0.5, -0.5. The models were computed in R using the *lme4* package (Bates et al. 2015). We evaluated the use of information criteria (IC), specifically the Akaike information criterion (AIC) and the Bayesian information criterion (BIC), to select the best-fitting model. Participants and items were added as random intercepts. In eye-movement data, we included word length as a fixed effect to account for varying lengths of regions across items.

3. Results

Behavioural results from the deception detection task are presented in Table 1. The behavioural data are coded in a binary fashion indicating whether the participants judged statements as truth (1) or as a lie (0).

Table 1. Mean behavioural responses from the end-of-sentence deception detection task. Mean values closer to 1 indicate a greater likelihood of being accepted as truth, and values closer to 0 bear a greater likelihood of being judged as lies/deceptive.

	Direct				Indirect			
	Witnessable		Less Witnessable		Witnessable		Less Witnessable	
	Match	Mismatch	Match	Mismatch	Match	Mismatch	Match	Mismatch
Mean	0.87	0.62	0.78	0.47	0.78	0.53	0.65	0.44
SE	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02
CIs-95%	0.85;0.90	0.58;0.66	0.74;0.81	0.43;0.66	0.75;0.82	0.49;0.57	0.62;0.69	0.4;0.02

Outputs from a generalized mixed-effects regression model computed with our end-of-sentence judgement task are shown in Table 2. The results have shown a significant fixed effect of Evidentiality, Mismatch, and Witnessability without any significant interaction effects. A fixed effect of Evidentiality indicates that the participants were more likely to judge sentences with direct evidential to be truthful as opposed to the indirect evidential condition. The overall mean judgement proportion for the direct conditions was 0.69 while for the indirect condition it was 0.60. A lower judgement proportion indicates fewer judgments as ‘truthful’. In other words, sentences with indirect evidential were detected as a lie more often than direct evidential. Further, a significant fixed effect of Mismatch indicates that sentences in which the evidential marker and source information did not match were judged to be less truthful than sentences with matching evidential marker and source information. Our participants’ overall judgments showed that they accepted statements as truthful with a proportion of 0.77 in the match conditions, where evidentials are used appropriately, whereas the proportion of truthful judgments dropped to 0.51 in the

mismatch conditions. However, since there were no significant interaction effects between Mismatch and Evidentiality, it is conceivable that the responses were not influenced by our subtle condition differences. That is, our Turkish readers interpreted both the mismatching direct and the mismatching indirect evidential conditions to be less truthful reading than the matching evidential conditions. In other words, regardless of evidential marker (i.e., direct or indirect), participants considered mismatch conditions less truthful than match conditions. Finally, we found the fixed effect of Witnessability to be significant, indicating that the sentences containing events that are less witnessable are more likely to be conceived as lies than more witnessable events.

Table 2. Statistical outputs from a generalized linear mixed effects regression model computed with our end-of-sentence judgement task.

	β	SE	z	p
(Intercept)	1.50	0.22	6.89	<.001
Evidentiality	-0.66	0.26	-2.57	<.05
Mismatch	-1.61	0.22	-7.35	<.001
Witnessability	0.77	0.24	3.26	<.01
Evidentiality \times Mismatch	0.48	0.31	1.57	0.12
Evidentiality \times Witnessability	0.03	0.33	0.09	0.93
Mismatch \times Witnessability	-0.03	0.32	-0.10	0.92
Evidentiality \times Mismatch \times Witnessability	-0.33	0.44	-0.75	0.46

Outcomes from eye-movement monitoring task, including First Pass Reading Time (FPRT), Regression Path Duration (RPD), and Total Fixation Time (TFT) are given in Table 3, and the mean values in milliseconds of these outcomes are visualized in Figure 1. The outputs have revealed no critical effects for the spillover region, and hence, here we focused on the outcomes from the critical region. The mean eye-movement measures and statistical outputs for the spillover region are given in Appendix 2 and Appendix 3, respectively.

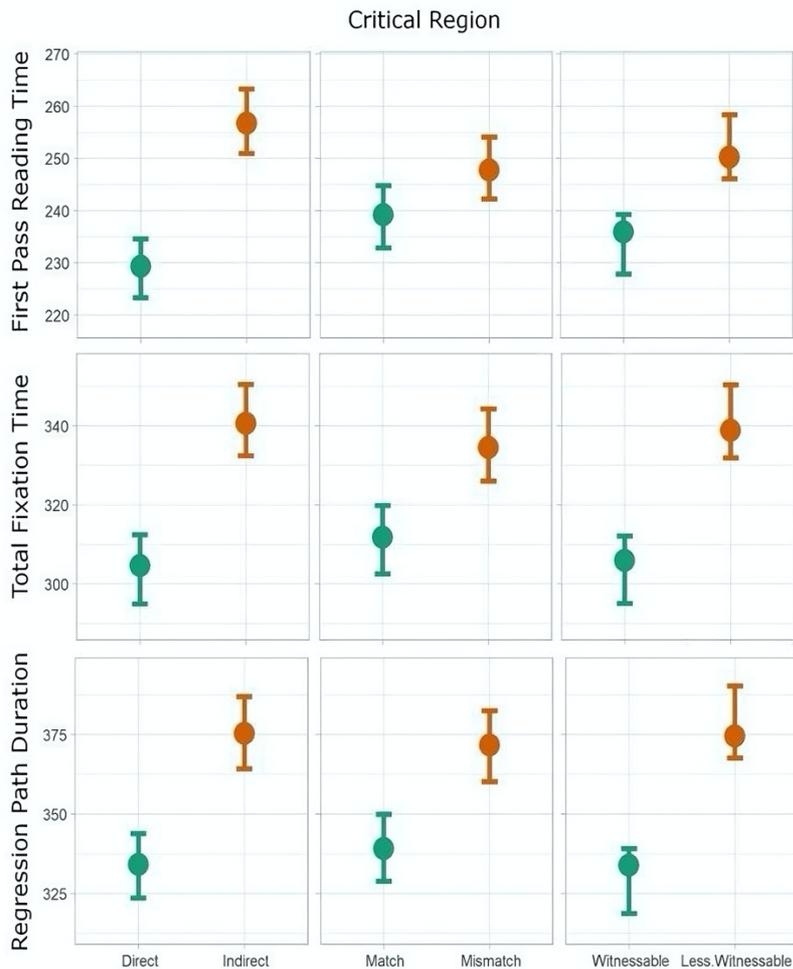


Figure 1. Mean outcomes from eye-movement monitoring task showing First Pass Reading Time (ms), Regression Path Duration (ms), and Total Fixation Time (ms). Error bars indicate 95% confidence intervals.

The analysis for the First Pass Reading Time (FPRT), has shown a significant fixed effect of evidentiality without any further interaction in the critical verb region; however, no significant effect was observed in the spillover region. The first pass data shows how long it took participants to fixate when they first gazed on these two regions. Therefore, the data showed that the participants significantly took longer to read indirect evidential verb forms than direct evidential verb forms notwithstanding whether or not the information source context matched or mismatched the evidential form.

Table 3. Mean outcomes from eye movement monitoring tasks. FPRT= First Pass Reading Time (Gaze Duration, ms), RPD= Regression Path Duration (ms); TFT= Total Fixation Time (ms). The standard error of each mean value is given in parentheses.

	Direct				Indirect			
	Withessable		Less Witnessable		Withessable		Less Witnessable	
	Match	Mismatch	Match	Mismatch	Match	Mismatch	Match	Mismatch
FPRT	205 (4.92)	226 (5.84)	238 (5.61)	245 (6.42)	248 (6.10)	253 (6.08)	263 (7.22)	263 (5.68)
RPD	285 (8.70)	311 (9.35)	347 (10.36)	385 (12.03)	342 (10.75)	371 (11.75)	380 (12.41)	404 (11.18)
TFT	268 (7.71)	283 (7.97)	313 (8.41)	348 (10.77)	318 (9.11)	341 (9.33)	345 (9.68)	358 (8.65)

Table 4. Statistical outputs from linear mixed effects regression models computed with the eye-movement measures (FPRT= First Pass Reading Time [Gaze Duration, ms], RPD= Regression Path Duration [ms]; TFT= Total Fixation Time [ms])

	Critical Region			
	β	SE	t	p
<i>FPRT</i>				
(Intercept)	5.272	0.05	104.86	<.001
Evidentiality	-0.051	0.02	-2.33	<.05
Mismatch	-0.020	0.02	-0.99	0.33
Witnessability	-0.001	0.02	-0.05	0.96
Word Length	0.091	0.01	7.31	<.001
Evidentiality \times Mismatch	-0.001	0.04	-0.01	0.99
Evidentiality \times Witnessability	-0.034	0.04	-0.83	0.41
Mismatch \times Witnessability	-0.007	0.04	-0.18	0.86
Evidentiality \times Mismatch \times Witnessability	-0.105	0.08	-1.28	0.20
<i>RPD</i>				
(Intercept)	5.540	0.06	86.75	<.001
Evidentiality	-0.060	0.03	-2.17	<.05
Mismatch	-0.064	0.03	-2.46	<.05
Witnessability	-0.079	0.03	-2.68	<.01
Word Length	0.081	0.02	5.16	<.001
Evidentiality \times Mismatch	0.004	0.05	0.07	0.94
Evidentiality \times Witnessability	-0.057	0.05	-1.09	0.28
Mismatch \times Witnessability	0.014	0.05	0.28	0.78
Evidentiality \times Mismatch \times Witnessability	-0.043	0.1	-0.42	0.68
<i>TFT</i>				
(Intercept)	5.475	0.06	90.00	<.001
Evidentiality	-0.052	0.02	-2.11	<.05
Matching	-0.048	0.02	-2.11	<.05
Witnessability	-0.035	0.03	-1.36	0.18
Word Length	0.105	0.01	7.57	<.001
Evidentiality \times Mismatch	0.014	0.05	0.30	0.76
Evidentiality \times Witnessability	-0.060	0.05	-1.30	0.20
Mismatch \times Witnessability	0.006	0.05	0.14	0.89
Evidentiality \times Mismatch \times Witnessability	0.001	0.09	0.01	0.99

Regarding the Regression Path Duration (RPD) data, which shows duration of regressions back into the critical region, we have found significant fixed effects of Evidentiality and Mismatch. This indicated that our participants fixated in this region longer for the indirect evidential conditions than direct evidential ones, and that they fixated longer for mismatch conditions than the match conditions. As there was no significant interaction between the two factors, it is conceivable that there was no modulation of mismatch on processing evidential forms. Furthermore, we found a significant fixed effect of Witnessability, indicating that the participants regressed back into this region longer to fixate in the critical region containing verbs that are less witnessable over those that are more witnessable.

Finally, regarding the Total Fixation Time (TFT) data, showing all fixation durations in regions of interests including first pass and regression durations, we have found significant fixed effects of Evidentiality and Mismatch, mirroring the earlier eye-movement measures. This suggests that again in the total fixation time, the participants took longer to fixate on the critical region for the indirect evidential conditions and for the mismatch conditions without the two factors modulating each other.

4. Discussion

This study investigated the relationship between evidentiality marking and deception detection experimentally. We are building upon observations from evidential languages suggesting that deliberate choices of evidentials might be employed in telling lies (e.g. Aikhenvald 2004: 89 data on Tariana), and those that showed that certain grammatical markers are clear indicators of deception (e.g. Meibauer 2018). The main aim of this study was to investigate how adult Turkish readers process evidential forms within a deception detection task. We utilized an eye-tracking-during-reading experiment to record a group of native Turkish readers' eye-movements while they read sentences marked by direct/indirect evidentiality either matching or mismatching with their appropriate information source context.

We expected that Turkish readers would judge (i) sentences with indirect evidentials to be less reliable, and thus more likely to be deceptive, than sentences with direct evidentials, and that they would judge (ii) sentences with evidentiality - information source mismatches to be untruthful than sentences without a mismatch. Our expectations were met by our results. Our behavioural results showed that the

Turkish readers judged the indirect evidential condition to be more deceptive than the direct evidential condition, and that they found the mismatch conditions to be possibly more deceptive than the match conditions. Nevertheless, these effects seem not to be modulating one another as we found no interaction effects here, suggesting that these factors are independent from each other. These findings were mirrored in the eye-movement data. In all the three measures (first pass gaze duration, regression path duration, and total fixation time) recorded at the critical verb region, we consistently found significant fixed effects of Evidentiality and Mismatch, indicating that the indirect evidential conditions and the mismatch conditions received longer fixation durations, but no interaction between these fixed effects. Furthermore, less witnessable events were found to be judged as deceptive more often, and during the eye-movement monitoring task, this critical region received longer regression path duration. This suggests that Turkish readers returned their gaze to the critical region much longer for a second reading in less witnessable events than in more witnessable ones. We should note that in this study we utilized a deception detection task asking the participant to respond whether or not what they read was truth or a lie. This is different from judging the reliability of the information in the statement (e.g., Tosun and Vaid 2018). Although the link between deception and reliability is yet unrefined, it is conceivable that less reliable information may have led the participants to interpret statements with indirect evidentials to be lies, and this interpretation is in line with the lack of interaction between mismatch and evidentials, indicating that Turkish readers found indirect evidentials to be more deceptive irrespective of whether there was a mismatch or not.

We hypothesized that the indirect evidential condition is judged as more untruthful or deceptive than the direct evidential conditions because indirect evidentials are cross-linguistically strongly linked with less reliable information (e.g. Plungian 2001). The data on Turkish confirms this tendency, as indirect evidential has been shown to be associated with less reliable information in studies on both children (Ozturk & Papafragou 2016) and adults (Karaslaan et al. 2018). Arslan (2020) further showed that uncertain information belonging to others blends well with indirect evidential over its direct counterpart. Therefore, our data corroborate the idea that indirect evidential conveys less reliable information, which could be conceived as more deceptive as compared to statements marked with direct evidential.

An outcome of this study is that when the information source and the choice of evidential do not match, we observed a disruption in processing. This is entirely in line with previous psycholinguistic studies showing that information source - evidentiality mismatches would be rather unfavourable in Turkish (Arslan 2020; Arslan et al. 2017; Karaca 2018). However, the question was whether the use of evidentials in inappropriate contexts in Turkish would be construed as deceptive, as Aikhenvald argued in her 2004 book for evidential languages. The data presented here fully converge with this idea: when evidentials are not used appropriately with their information source context, Turkish readers judge them as less truthful.

The third point of discussion regards witnessability, which we measured with an offline questionnaire as to how likely it is that native Turkish speakers would witness such an event in life. This is part of an ongoing study (see Arslan et al. 2021 for an overview). According to the outcomes from witnessability scale, Turkish speakers think certain events are more likely to be witnessed. In this regard, data presented in this study showed that statements with less witnessable events are more likely to be judged as ‘lies’ than those with more witnessable events. This is logical as the readers might be following a strategy to believe in events that they might witness in real life, as non-witnessable events might seem rather ‘made up’ or exaggerated. We believe that the participants’ responses are largely guided by world knowledge here, because eye-movement monitoring data showed that for less witnessable events regression path duration was longer in the critical verb region than for more witnessable events. This suggests that, for less witnessable events, our participants’ gaze returned to this region to stay relatively longer as the participants needed to re-read the evidential form for less witnessable events.

Our study was a preliminary investigation into how particular choices of evidentials interact in deception detection during naturalistic reading. It has led to three crucial outcomes: (i) Turkish readers anticipate evidential forms in a given statement to be appropriately justified with source information content and judge it to be truthful. When this anticipation is not met and there is a mismatch between an evidential form and its source, greater reading disruptions occur at the verb region in a deception detection task; (ii) Turkish readers consider direct evidential marked statements rather truthful over indirect evidential marked statements; (iii) Turkish readers find events that are less likely to be witnessed to be potentially more deceitful.

References

- Aikhenvald, Alexandra Y. 2004. *Evidentiality*. Oxford University Press.
- Aksu-Koç, Ayhan. 2000. Some aspects of the acquisition of evidential in Turkish. In L. Johanson & B. Utas (Eds.), *Evidentials: Turkic, Iranian and neighbouring languages*. 15-28. Walter de Gruyter.
- Aksu-Koç, Ayhan. 2016. The interface of evidentials and epistemics in Turkish. *Exploring the Turkish Linguistic Landscape: Essays in honor of Eser Erguvanlı-Taylan*, 175, 143.
- Aksu-Koç, Ayhan. & Slobin, Dan I. 1986. A psychological account of the development and use of evidentials in Turkish. In C. Wallace & J. Nichols (Eds.), *Evidentiality. The linguistic coding of epistemology*. 159-167. Ablex Publishing Corporation.
- Arslan, Seçkin. 2020. When the owner of information is unsure: Epistemic uncertainty influences evidentiality processing in Turkish. *Lingua*, 247, 102989.
- Arslan, Seçkin, de Kok, Dörte & Bastiaanse, Roelien. 2017. Processing grammatical evidentiality and time reference in Turkish heritage and monolingual speakers. *Bilingualism: Language and Cognition*, 20(3), 457-472.
- Arslan, Seçkin, Selvi-Balo, Selma, Maviş, İlknur & Meunier, Fanny. 2021. Event witnessability and evidentiality: A preliminary study on healthy aging Turkish adults. *L'évidentialité et la modalité : Au croisement de la grammaire et du lexique*, Montpellier (France).
- Aydin, Çağla, & Ceci, Stephen J. 2009. Evidentiality and suggestibility: A new research venue. *New directions for child and adolescent development*, 2009(125), 79-93.
- Baayen, R. Harald, Davidson, Douglas J. & Bates, Douglas. 2008. Mixed-effects modeling with crossed random effects for subjects and items. *Journal of memory and language*, 59(4), 390-412.
- Bates, Douglas, Mächler, Martin, Bolker, Benjamin M. & Walker, Steven C. 2015. Fitting Linear Mixed-Effects Models Using lme4. *Journal of Statistical Software*, 67(1), 1-48.
- Chafe, Wallace L. & Nichols, Johanna. 1986. *Evidentiality: The linguistic coding of epistemology*. Ablex Publishing.

- Cornillie, Bert. 2009. Evidentiality and epistemic modality: On the close relationship between two different categories. *Functions of language*, 16(1), 44-62.
- Grice, Herbert P. 1975. Logic and conversation. In P. Cole & J. L. Morgan (Eds.), *Speech Acts*. 41-58. Brill.
- Hauch, Valerie, Blandón-Gitlin, Iris, Masip, Jaume, & Sporer, Siegfried L. 2015. Are computers effective lie detectors? A meta-analysis of linguistic cues to deception. *Personality and social psychology Review*, 19(4), 307-342.
- Johanson, Lars. 2000. Turkic indirectives. In L. Johanson & B. Utas (Eds.), *Evidentials: Turkic, Iranian and Neighbouring Languages*. 61-88. Mouton.
- Johanson, Lars. 2003. Evidentiality in Turkic. In A. Y. Aikhenvald & R. M. W. Dixon (Eds.), *Studies in Evidentiality*. 273-290. Benjamins.
- Karaca, Figen. 2018. *Comprehension of Evidentiality in Spoken Turkish: Comparing Monolingual and Bilingual Speakers*. University of Alberta MS Thesis.
- Karaslaan, Hatice, Hohenberger, Annette, Demir, Hilmi, Hall, Simon & Oaksford, Mike. 2018. Cross-cultural differences in informal argumentation: norms, inductive biases and evidentiality. *Journal of Cognition and Culture*, 18(3-4), 358-389.
- Kornfilt, Jaklin. 1997. *Turkish*. Routledge.
- Levine, Timothy R., Park, Hee S., & McCornack, Steven A. 1999. Accuracy in detecting truths and lies: Documenting the “veracity effect”. *Communications Monographs*, 66(2), 125-144.
- Lewis, Geoffrey L. 1967. *Turkish grammar*. Clarendon Press.
- Logačev, Pavel & Vasishth, Sharavan. 2013. em2: A package for computing reading time measures for psycholinguistics [Computer software manual] (R package version 0.9). <https://CRAN.R-project.org/package=em2>. CRAN-R.
- Meibauer, Jörg. 2018. The linguistics of lying. *Annual Review of Linguistics*, 4, 357-375.
- Nuyts, Jan. 2001. Subjectivity as an evidential dimension in epistemic modal expressions. *Journal of pragmatics*, 33(3), 383-400.
- Ozturk, Ozge & Papafragou, Anna. 2016. The acquisition of evidentiality and source monitoring. *Language Learning and Development*, 12(2), 199-230.

- Plungian, Vladimir A. 2001. The place of evidentiality within the universal grammatical space. *Journal of Pragmatics*, 33(3), 349-357.
- Porter, Stephen & ten Brinke, Leanne. 2010. The truth about lies: What works in detecting high-stakes deception? *Legal and criminological Psychology*, 15(1), 57-75.
- R Core Team (2018) R: A Language and Environment for Statistical Computing. R Foundation for Statistical Computing, Vienna. <https://www.R-project.org>
- Sezer, Taner & Sezer Sever. 2013. *TS Corpus: Herkes için Türkçe Derlem* (<http://tscorpus.com>) Proceedings of the 27th National Linguistics Conference, Antalya.
- Slobin, Dan I. & Aksu, Ayhan A. 1982. Tense, aspect and modality in the use of the Turkish evidential. In P. J. Hopper (Ed.), *Tense-aspect: Between semantics and pragmatics*. 185-200. Benjamins.
- Tosun, Sümeyra. and Vaid, Jyotsna. 2018. Source vs. stance: on the relationship between evidential and modal expressions. *Dialogue & Discourse*, 9(1).128-162.
- Willett, Thomas. 1988. A cross-linguistic survey of the grammaticization of evidentiality. *Studies in language*, 12(1), 51-97.

Appendix 1. Stimulus characteristics: mean, SDs, and 95% CIs for surface frequency (per mil), word length, and witnessability.

Evidentiality	Matching	Witnessability	N	M	SD	SE	CI-95%
<i>Surface frequency (per mil)</i>							
Direct	Match	Less.Witnessable	15	27.83	37.91	9.79	[8.65;47.02]
Direct	Match	Witnessable	15	76.10	87.35	22.55	[31.89;120.31]
Direct	Mismatch	Less.Witnessable	15	27.51	38.14	9.85	[8.21;46.82]
Direct	Mismatch	Witnessable	15	76.11	87.34	22.55	[31.91;120.31]
Indirect	Match	Less.Witnessable	15	5.79	5.04	1.30	[3.24;8.34]
Indirect	Match	Witnessable	15	14.29	22.10	5.70	[3.10;25.47]
Indirect	Mismatch	Less.Witnessable	15	5.47	5.29	1.37	[2.79;8.15]

Indirect	Mismatch	Witnessable	15	14.30	22.09	5.70	[3.12;25.48]
----------	----------	-------------	----	-------	-------	------	--------------

Word length

Direct	Match	Less.Witnessable	15	6.60	1.18	0.31	[6.00;7.20]
--------	-------	------------------	----	------	------	------	-------------

Direct	Match	Witnessable	15	5.33	1.23	0.32	[4.71;5.96]
--------	-------	-------------	----	------	------	------	-------------

Direct	Mismatch	Less.Witnessable	15	6.73	1.44	0.37	[6.01;7.46]
--------	----------	------------------	----	------	------	------	-------------

Direct	Mismatch	Witnessable	15	5.40	1.24	0.32	[4.77;6.03]
--------	----------	-------------	----	------	------	------	-------------

Indirect	Match	Less.Witnessable	15	7.47	0.99	0.26	[6.97;7.97]
----------	-------	------------------	----	------	------	------	-------------

Indirect	Match	Witnessable	15	6.27	1.28	0.33	[5.62;6.91]
----------	-------	-------------	----	------	------	------	-------------

Indirect	Mismatch	Less.Witnessable	15	7.60	1.18	0.31	[7.00;8.20]
----------	----------	------------------	----	------	------	------	-------------

Indirect	Mismatch	Witnessable	15	6.33	1.23	0.32	[5.71;6.96]
----------	----------	-------------	----	------	------	------	-------------

Witnessability (m/7)

Direct	Match	Less.Witnessable	15	4.17	0.39	0.10	[3.97;4.37]
--------	-------	------------------	----	------	------	------	-------------

Direct	Match	Witnessable	15	6.13	0.14	0.03	[6.06;6.20]
--------	-------	-------------	----	------	------	------	-------------

Direct	Mismatch	Less.Witnessable	15	4.17	0.39	0.10	[3.97;4.37]
--------	----------	------------------	----	------	------	------	-------------

Direct	Mismatch	Witnessable	15	6.13	0.14	0.03	[6.06;6.20]
--------	----------	-------------	----	------	------	------	-------------

Indirect	Match	Less.Witnessable	15	4.17	0.39	0.10	[3.97;4.37]
----------	-------	------------------	----	------	------	------	-------------

Indirect	Match	Witnessable	15	6.13	0.14	0.03	[6.06;6.20]
----------	-------	-------------	----	------	------	------	-------------

Indirect	Mismatch	Less.Witnessable	15	4.17	0.39	0.10	[3.97;4.37]
----------	----------	------------------	----	------	------	------	-------------

Indirect	Mismatch	Witnessable	15	6.13	0.14	0.03	[6.06;6.20]
----------	----------	-------------	----	------	------	------	-------------

Appendix 2. Mean outcomes from eye movement monitoring tasks for the spillover region. FPRT= First Pass Reading Time (Gaze Duration, ms), RPD= Regression Path Duration (ms); TFT= Total Fixation Time (ms). The standard error of each mean value is given in parentheses.

	Direct				Indirect			
	Withessable		Less Witnessable		Withessable		Less Witnessable	
	Match	Mismatch	Match	Mismatch	Match	Mismatch	Match	Mismatch
<i>Spillover Region</i>								
FPRT	259 (5.13)	272 (5.93)	262 (4.91)	259 (4.96)	277 (5.47)	277 (5.47)	252 (5.36)	276 (5.35)
RPD	334 (10.12)	328 (9.32)	294 (7.14)	323 (9.65)	303 (7.06)	330 (8.58)	289 (7.83)	322 (8.13)
TFT	334 (8.47)	346 (9.42)	322 (7.64)	336 (8.77)	337 (8.42)	342 (8.07)	313 (8.47)	349 (8.71)

Appendix 3. Statistical outputs from linear mixed effects regression models computed with the eye-movement measures for the spillover region (FPRT= First Pass Reading Time [Gaze Duration, ms], RPD= Regression Path Duration [ms]; TFT= Total Fixation Time [ms])

	Spillover Region			
	β	SE	t	p
<i>FPRT</i>				
(Intercept)	5.445	0.03	205.6	<.001
Evidentiality	-0.015	0.03	-0.53	0.60
Mismatch	-0.024	0.03	-0.95	0.35
Witnessability	0.033	0.03	1.14	0.26
Word Length	0.022	0.02	1.45	0.15
Evidentiality \times Mismatch	0.048	0.05	0.94	0.35
Evidentiality \times Witnessability	-0.046	0.05	-0.90	0.37
Mismatch \times Witnessability	0.032	0.05	0.63	0.53
Evidentiality \times Mismatch \times Witnessability	-0.127	0.10	-1.26	0.21
<i>RPD</i>				
(Intercept)	5.565	0.03	176.56	<.001
Evidentiality	0.023	0.04	0.63	0.53
Mismatch	-0.050	0.03	-1.52	0.13
Witnessability	0.055	0.04	1.44	0.15
Word Length	0.024	0.02	1.17	0.25
Evidentiality \times Mismatch	0.085	0.07	1.28	0.20
Evidentiality \times Witnessability	0.008	0.07	0.12	0.91
Mismatch \times Witnessability	0.066	0.07	0.99	0.32
Evidentiality \times Mismatch \times Witnessability	0.020	0.13	0.15	0.88
<i>TFT</i>				
(Intercept)	5.619	0.03	168.12	<.001
Evidentiality	0.011	0.03	0.32	0.75
Matching	-0.035	0.03	-1.14	0.25
Witnessability	0.052	0.04	1.46	0.15
Word Length	0.032	0.02	1.70	0.09
Evidentiality \times Mismatch	0.058	0.06	0.95	0.35
Evidentiality \times Witnessability	-0.024	0.06	-0.39	0.70
Mismatch \times Witnessability	0.046	0.06	0.75	0.46
Evidentiality \times Mismatch \times Witnessability	-0.084	0.12	-0.68	0.50