Discourse management

Reference tracking in speech and gesture in Turkish narratives

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Speakers achieve coherence in discourse by alternating between differential lexical forms e.g. noun phrase, pronoun, and null form in accordance with the accessibility of the entities they refer to, i.e. whether they introduce an entity into discourse for the first time or continue referring to an entity they already mentioned before. Moreover, tracking of entities in discourse is a multimodal phenomenon. Studies show that speakers are sensitive to the informational structure of discourse and use fuller forms (e.g. full noun phrases) in speech and gesture more when re-introducing an entity while they use attenuated forms (e.g. pronouns) in speech and gesture less when maintaining a referent. However, those studies focus mainly on non-pro-drop languages (e.g. English, German and French). The present study investigates whether the same pattern holds for pro-drop languages. It draws data from adult native speakers of Turkish using elicited narratives. We find that Turkish speakers mostly use fuller forms to code subject referents in re-introduction context and the null form in maintenance context and they point to gesture space for referents more in re-introduction context compared maintained context. Hence we provide supportive evidence for the reverse correlation between the accessibility of a discourse referent and its coding in speech and gesture. We also find that, as a novel contribution, third person pronoun is used in re-introduction context only when the referent was previously mentioned as the object argument of the immediately preceding clause.

Keywords: Discourse, reference tracking, gesture, pro-drop languages, Turkish

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1. Introduction

In order to produce coherent discourse, speakers need to refer to people, objects or places and link those referents in a meaningful way. "If language is to function effectively, a speaker is obliged to categorize a shared referent in a way that allows the listener to identify it" (Chafe, 1994, p. 97). That is, speakers need to mark the information status of their referents; whether they are newly introduced into discourse or referring back to already given information. Languages vary in the particular optional and obligatory markings they provide for marking the information status. For example, pronoun is the default form to mark reference to maintained referents in non-pro-drop languages, while null form is suggested to be the default form having the same function in pro-drop languages (Carminati, 2002). Nonetheless, studies focusing on a range of spoken languages, both pro-drop and non-pro-drop languages, have shown that speakers vary the quantity of marking material in referring expressions — choosing between noun phrase (e.g. a woman), pronoun (e.g. she), and null form (Ø) — in accordance with the accessibility of the referent (Chafe, 1994; Givón, 1983) independent from the typology of the language they speak.

Recent research has shown that speakers use co-speech gestures, i.e, pointing to referents in gesture space in narratives to introduce and track references in systematic ways. That is they use the visual modality to maintain discourse cohesion, i.e., to mark the accessibility of the referents in discourse (Debreslioska, Özyürek, Gullberg, & Perniss, 2013; Gullberg, 2006; Perniss & Özyürek, 2015; Yoshioko, 2008). Studies suggest that similar to speech, co-speech gestures, the meaningful movements of the hands that accompany speech, are sensitive to referential context in terms of the quantity of marking material (Gullberg, 2003, 2006; Levy & Fowler 2000; McNeill & Levy, 1993). Speakers use more marking material in speech (e.g. noun phrase) and gesture more with less accessible referents while they use less marking material (e.g. pronoun) and gesture less with more accessible referents. The majority of these studies, however, draw their data from non-pro-drop languages such as German, English, French and Dutch. More research is needed to see whether findings of those studies can be generalized to pro-drop languages. This is an interesting research question because contexts where a pronoun vs null argument is used in pro-drop languages differ from that in non-pro-drop languages in general. For example in pro-drop languages (e.g., Spanish, Chinese, Turkish etc.) omission of the highly accessible argument will be the default form (Carminati, 2002) while referents that are accessible are likely to be expressed using pronouns in non-pro-drop languages (Chafe, 1976; Levinson, 1987). The context where pronoun is used in pro-drop languages is determined to a large extent by pragmatic

and discourse related factors such as emphasis, corroboration, contrastive focus or old vs. new information (Erguvanlı, 1984; Davidson, 1996).

Starting from the viewpoint that speech and co-speech gestures go hand-in-hand in the information they express (Kita & Özyürek, 2003; So, Kita, & Goldin-Meadow, 2009), the present study investigates how referential context interacts with the linguistic and gestural forms during reference tracking in pro-drop Turkish. More specifically, our study investigates how local co-reference influences speakers' choice among nominal, pronominal and null linguistics forms and the presence/absence of gestures co-occurring with those forms in discourse narratives. The present study is set out to be the first study to investigate reference tracking in Turkish narratives as a multimodal phenomenon. Moreover, literature on reference tracking in Turkish so far focuses on the distinction between null form and pronoun in general in terms of discourse organization (Enç, 1986; Kerslake, 1987) and to our knowledge there is no systematic research on whether the use of different types of pronouns, personal vs. demonstrative, shows variation according to the referential context. We try to explore this question in our paper. We aim to generate results that will provide insights into reference tracking in Turkish and in pro-drop languages in general. Before describing our study in detail, we first provide additional background, summarizing previous research on reference tracking in speech and co-speech gesture.

2. Background

2.1 Reference tracking in speech

Theories on factors affecting how speakers code referents suggest a reverse correlation between accessibility of an intended referent and its lexical coding in speech. That is, less accessible referents are coded with more specific descriptions in speech (e.g. noun phrase) and more accessible ones with less specific descriptions (e.g. pronouns or null forms) (Ariel, 1990; Chafe, 1994; Givon, 1983; Levinson, 1987). Empirical studies on reference tacking in various languages seem to support this account. For example, Debreslioska et al. (2013) found that German adult native speakers use mainly nominal forms with less accessible referents while they prefer attenuated form with more accessible referents. In the following section we provide a short overview of linguistic forms available in Turkish and previous literature on reference tracking in speech in Turkish.

2.1.1 *Characteristics of Turkish as a pro-drop language and reference tracking in Turkish*

Traditionally, a pro-drop language is defined as a language which may have clauses without overt arguments (Kerslake, 1987). Turkish permits both subject and object arguments to be dropped in finite clauses and in possessive noun phrases. Turkish marks subject arguments by means of morphological inflection on the predicate (see example 1). Because subject referents are inferable from the morphological inflection, the use of a pronoun is optional unless the subject has an emphatic or contrastive function (see example 2). In that case the use of a pronoun becomes obligatory.

(1) a. *Ben iş-e gecik-ti-m.*
I work-DAT be late PAST 1SG
'I'm late to work.'
b. *Ø İş-e gecik-ti-m.*
work-DAT be late PAST 1SG
'I'm late to work.'

(2) a. *Ben iş-e gecik-ti-m ama sen henüz gecik-me-di-n.*
I work-DAT be late PAST 1SG but you yet be late NEG PAST 2SG
'I'm late to work but you're not late to work yet.'
b. * *Ø İş-e gecik-ti-m ama henüz Ø gecik-me-di-n.*
'I'm late to work but you're not late to work yet.'

(Erguvanlı-Taylan, 1986, p. 210)

There are some spontaneous discourse production studies on reference tracking (e.g. Doğruöz, 2007; Haznedar, 2010) that support the pragmatic function account of pronouns in Turkish. However, these studies were carried out with either children or bilingual adults. Children have been reported to drop arguments more frequently than adults both in pro-drop languages (e.g. Serratrice, Sorace, & Paoli, 2004) and in non-pro-drop languages (e.g. Pierce, 1992). Thus, child production data are not representative of adult production patterns. Bilingual studies, on the other hand, did not have monolingual Turkish control data and thus are not representative of native speaker patterns. Bilingual speakers have been repeatedly reported to differ from monolingual speakers in their choice of overt and null forms in their production (Polinksy, 1995; Hulk & Müller, 2000; Montrul, 2004). Finally, literature on reference tracking in Turkish does not provide a complete description of the distribution of different types of pronouns (i.e., personal pronoun vs. demonstrative pronoun) in discourse.

Turkish does not have an article system and authentic third person pronouns. The third person pronoun (i.e. 'o' for singular and 'onlar' for plural) in Turkish does not code gender and animacy unlike English third person pronouns, for example.

Furthermore, the third person pronoun 'o' has the same form as the distal demonstrative pronoun. The simple personal pronouns and demonstrative pronouns of Turkish are listed below (see 3 and 4):

(3) *ben* 'I' *biz* 'we'
sen 'you' (familiar) *siz* 'you' (plural), (formal singular)
o 'he', 'she', 'it' *onlar* 'they'

(4) *bu,* 'this (one)' *bunlar* 'these'
[1]*şu* 'this (one)', 'that (one)' *şunlar* 'these', 'those'
o, 'that (one)' *onlar* 'those'

2.2 Reference tracking in gesture

Studies that have incorporated gestural aspect of language into reference tracking in discourse have shown that gestures are sensitive to the informational structure of discourse (e.g. Gullberg, 2006; Perniss & Özyürek, 2015; Yoshioko, 2008). Referents that are coded with fuller forms in speech, e.g. with a noun phrase, are more likely to be accompanied by co-speech gestures, for example points to places associated with those referents. Contrastively, referents that are coded with attenuated forms, e.g. pronoun, are less likely to be accompanied by such co-speech gestures (So et al., 2009). One interesting question is then whether findings of those studies which so far focused on pro-drop languages can be generalized to non-pro-drop languages, where pronouns have different contextual distribution. We address this question by studying narratives from Turkish native speakers in a controlled discourse elicitation task.

3. The present study

The current study investigates reference tracking in both modalities of language, speech and co-speech gesture, during discourse narration by adult native speakers of Turkish. We aim to contribute to the existing literature on reference tracking by providing data from a pro-drop language. We aim to complement other types of participants studied so far in this domain in Turkish with a focus on adult native speakers. Furthermore, we tap onto the distribution of different types of pronouns (personal vs. demonstrative) in different referential contexts.

1. In their analysis of Turkish demonstratives, Küntay and Özyürek (2002) found that *şu* encodes spatial distance less compared to other two demonstratives but it mainly encodes the lack of addressee's visual attention on the referent.

Studies that have investigated speech-gesture interaction in Turkish are very limited, and most of them focus on motion event constructions (e.g. Furman, Kuntay, & Özyürek, 2014; Kita & Özyürek, 2003; Özyürek, 2002). The only study with a focus on co-speech gestures co-occuring with referring expressions to our knowledge has been conducted by Demir, So, Özyürek and Goldin-Meadow (2012). They found that in an animation narration task, young Turkish children use gesture to disambiguate and clarify their underspecified pronouns and omitted arguments. Yet, it should be noted that the participants had the stimuli available in their physical surrounding during data collection, which might have driven the high pointing gesture rate. Our study, on the other hand, focuses on references to protagonists which are not present in the physical surrounding during narrations and it is set out to be the first to study how adult Turkish speakers maintain references to speech and gestures the during a discourse elicitation task.

4. Method

4.1 Participants

Participants were 13 pairs of native speakers of Turkish; one speaker and one addressee per pair. Participants were first-year university students at Koç University in Istanbul, Turkey. Data collection sessions took place at the university, and were conducted by a Turkish research assistant. Participants were given course credits in return for their participation.

4.2 Stimulus materials

A short movie that was shown to participants in two parts was used to elicit narratives (Perniss & Özyürek, 2015). In the movie three female protagonists were silently engaged in a cooking activity in a kitchen. They performed individual actions (e.g. cutting, twisting a jar, cooking) and collaborative actions (giving, taking). The three women had their own fixed spatial locations throughout the movie (see appendix for the full description of events taking place in the stimuli).

4.3 Procedure

Participants entered in the experiment room in pairs. Participants were assigned the role of speaker or addressee randomly. A different addressee was present in each session and s/he was naïve to the stimulus materials. Speakers had to watch the stimuli on a laptop screen and then narrate it to their addressee. Speakers

watched the clips one by one, and before they continued with the second video they needed to narrate the first one. The stimuli were not visible to the speakers during the narrations. Each speaker narrated each stimulus video once and therefore each addressee listened to the each stimulus only once. Addressees were instructed not to interrupt the narration and they were asked to re-tell the story once the speaker finished their narration. The aim of the re-telling was to assure that the speaker provides a detailed narration and has the motive to be understandable.

4.4 Annotation and coding

We only focus on the data from each speaker in each pair, hence 13 participants in total. Both speech and gesture data from the participants who were assigned the role of the speaker were annotated and coded with the frame-by-frame video annotation software ELAN[2].

4.4.1 *Speech*

26 video narratives (2 subparts by each speaker) were transcribed using standard orthography of Turkish and divided into clauses. Following Berman and Slobin (1994), a clause was defined as any unit containing a predicate (e.g. a verb) that expresses a single activity, event, or state. For each clause, the referring expression (RE) identifying the subject and the predicate (Pred) were coded as separate constituents. For each constituent, the referential context was coded as *Introduction (I)*, *Maintenance (M)*, *Re-Introduction (RI)* or *Switch (SW)*. Coding of referential context was based on the notion of local co-reference (Hickmann & Hendricks, 1999). A *Maintenance* context implies that the subject referent of the clause is the same as that of the immediately preceding clause. A *Re-introduction*[3] context instead implies that the subject referent of the clause is different from that of the immediately preceding clause, but that the referent has been previously mentioned in the discourse. A *Switch* context implies that the subject referent of the clause was introduced in the object role in the immediately preceding clause (see example 5 below). The first mention of a subject referent, which was coded as *Introduction* context, was excluded from analyses. We included only subject-to-subject

2. ELAN is an annotation tool developed at the Max Planck Institute for Psycholinguistics, Nijmegen at The Language Archive department. It is an open source that can be reached at http://tla.mpi.nl/tools/tla-tools/elan/ (cf. Lausberg & Sloetjes, 2009).

3. Change from a singular to plural (e.g. one woman to both women), or from a plural to singular (e.g. both women to one of the women) referring expression signalled a Re-Introduction context (cf. Debrelioska et al., 2013). Thus, Maintenance contexts required full identity with the subject referent in the preceding clause.

co-reference, hence subject arguments in our coding to avoid that the variation in the lexical forms used, especially the choice between a null and overt form, is driven by the grammatical role rather than the referential context.

For each RE constituent, the linguistic type was coded as nominal (Nom), pronoun (Pron), other (Oth) or null (Ø). *Nominal* forms included referring expressions with noun as grammatical head (e.g. *kadın* 'woman'), but also relative constructions without noun head (e.g. domates kesen 'the tomato chopping (one)'. *Pronouns* included demonstrative and personal pronouns. Note that video narrations elicited only third person referents in our data. The only personal pronoun we observed in the data was the 3rd person pronoun 'o' and the only demonstrative pronoun was the proximal demonstrative 'bu'. The category *other* included forms which were more informative than pronouns and less informative than nouns in terms of how specifically they code the referent (e.g. *ikisi* 'the two'). Example (5), which contains five successive clauses extracted from a single discourse narration in our dataset provides an example of these coding categories. See Figure 1 for the stimulus video still corresponding to the narration provided in the example. Letters placed by each subject argument notates co-indexicality.

Figure 1. Still image from the stimulus video which corresponds to the discourse narration provided in example 5 in the text.

(5) *Type RE Ref. Context*

a.	*[Bayanlardan bir tanesi]$_k$ buzdolabının yanında.*	nominal	(*introduction)*
b.	*Ø$_k$ ocakta yemek yapıyor.*	null	(*maintenance*)
c.	*[Gözlüklü kız]$_j$ kavanozu alıyor.*	nominal	(re-*introduction*)
d.	*Ø$_j$ diğer kardeşine$_i$ Ø veriyor.*	Null	(*maintenance*)
e.	*O$_i$ Ø alıyor.*	pronoun	(*switch*)

a. '[One of the women]$_k$ is next to the fridge.'
b. 'Ø (she)$_k$ is cooking at the stove.'
c. '[The girl with the glasses]$_j$ takes the jar.'
d. 'Ø (She)$_j$ gives (it) to [her other sister]$_i$.'
e. 'She$_i$ takes (it).'

4.4.2 *Gesture annotation and coding*

We coded all gesture strokes that could possibly refer to animate subject referents in the clauses we included in our analyses. Gesture strokes are the meaningful segments of the stream of manual production (Kita, Van der Hulst, & Van Gijn, 1998). We coded gestures according to the following categories:

Finger points (the location of an entity is represented by either an index-finger or thumb pointing to a location in space associated with that entity, see Figure 2).

Hand points (the location of an entity is represented by a loose drop of the hand at the location, palm is down and fingers are spread, see Figure 3). We collapsed these two pointing categories into one category, i.e., points. There were no points with null subject arguments, all points co-occurred with either nominal forms or pronouns. The examples for points in figures were extracted from video recordings of participants. Each example consists of two stills: the first one illustrates the preparation for the gesture stroke and the second one the stroke itself. The clause during which the illustrated gesture was produced is also provided in

preparation stroke

O da açamıyor.
'**She** cannot open it (the jar)'.

Speech RE type: pronoun
Ref. Context: switch

Figure 2. Index-finger pointing gesture

Preparation stroke

Bunlardaniki tanesi masada oturuyor.
'**Two of these** are sitting on the table'.

Speech RE type: *other*
Ref. Context: *re-introduction*

Figure 3. Hand pointing gesture

each example. Bolded elements represent the speech segment the stroke co-occurred with. Co-occurrence was determined by whether the gesture stroke coincided with the articulation of referential expressions.

5. Analyses and results

5.1 Reference tracking in speech

In our analyses we focused on the tracking of references after they were introduced into discourse, hence re-introduction, switch and maintenance contexts. The narratives contained a total of 251 relevant clauses of which 133 (53%) contained an overt referring expression. Distribution (in percentages) of specific linguistic types (i.e., nominal, pronoun, other forms and null form) that are used to code subject referents in overall narratives has been provided in Table 1.

Table 1. Distribution (in percentages) of specific linguistic types across all contexts

Linguistic Type	Subject referents (N = 251)	Proportion linguistic types
nominal	58	23%
pronoun	34	14%
other	41	16%
null	118	47%

We performed repeated ANOVA on the mean proportion of use of specific linguistic types in overall discourse. The Greenhouse-Geisser correction was applied in all analyses. Results showed a significant effect of linguistic type ($F(3, 12) = 17.653$, $p < .001$, partial $\eta^2 = .595$). Turkish speakers used significantly more null forms compared to all other categories (all comparisons $p < .05$) (see Figure 4).

Next, we analyzed how this distribution looked in co-referential contexts (i.e., re-introduction, switch and maintenance) separately (see Figure 5). That is, we calculated the proportion of clauses with each specific linguistic type within each referential context. Repeated measures ANOVA showed a significant effect for the linguistic type in re-introduction context ($F(1.581, 12) = 17.279$, $p < .001$, partial $\eta^2 = .936$). Speakers used mainly nominal and other forms when they re-introduced subject referents and they used both forms more often than pronouns and null forms (all comparisons $p < .005$). Turkish speakers preferred more detailed forms to re-introduce subjects. In maintenance context, speakers used null forms more often than the other three linguistic types (all comparisons $p < .001$). This finding is in line with Turkish being a pro-drop language and with previous research suggesting null form is the default form in pro-drop languages to

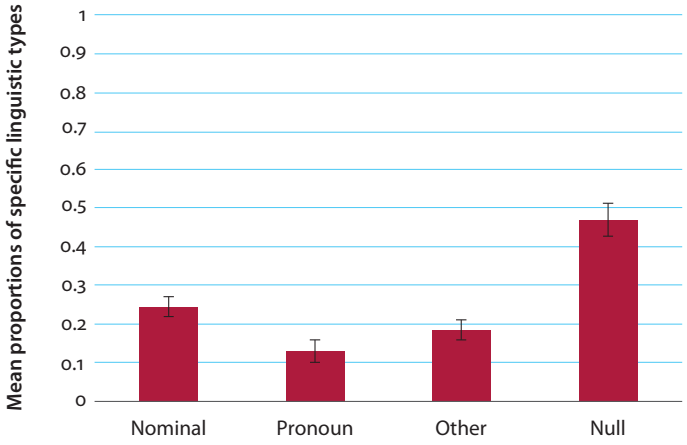

Figure 4. Mean proportions of subject referents coded with specific linguistic types in overall (Error bars represent SEs.)

maintain reference (e.g. Carminati, 2002). The analyses also showed a significant effect for the linguistic type in switch context (F (1.322, 12) = 10.127, p = .004, partial η^2 = 3.941). Turkish speakers used more pronouns compared to both other and null forms (both comparisons p < .005) in this context.

Next we looked at the distribution of different pronoun types, i.e., personal pronoun 'o' and the proximal demonstrative pronoun 'bu' (remember those were the only pronoun types observed in our data) in different contexts (see Table 2 for the percentages of each type of pronouns across contexts). We observed a difference between re-introduction, switch and maintenance contexts in terms of the

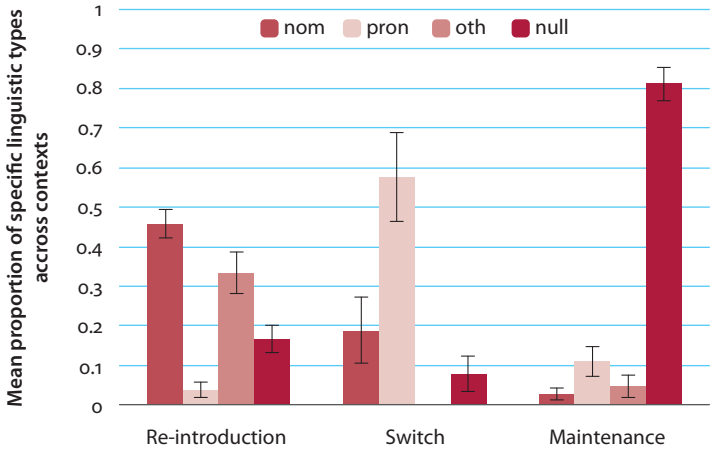

Figure 5. Mean proportions of subject referents coded with specific linguistic types in overall (Error bars represent SEs.)

type of pronoun the speakers used. In re-introduction context they used only the demonstrative pronoun 'bu' and in switch and maintenance contexts they used only the third person pronoun 'o'. The total number of pronouns used in our data is very low. Therefore any result should be interpreted with caution. However, we suggest that Turkish speakers use the third person pronoun 'o' only for the subject referent which has an antecedent in the immediately preceding clause as it is the case in switch and maintenance contexts. We suggest that third person pronoun 'o' functions as the marker of switch contexts where the subject argument was introduced as the object argument in the immediately preceding clause. We tentatively argue that Turkish speakers do differentiate between different types of pronouns, i.e. demonstrative pronoun vs. personal pronoun to systematically mark differential contexts, i.e., re-introduction vs. switch contexts.

Table 2. Percentages of each pronoun type produced in each referential context in overall narrations

	Re-introduction (N = 5)	**Switch (N = 15)**	**Maintenance (N = 14)**
3rd person pronoun 'o'	0%	100%	100%
Demonstrative pronoun 'bu'	100%	0%	0%

Speakers only occasionally used third person pronoun to maintain subjects in our data, but overall pattern shows that pronoun was used in this context to mark emphasis (see example 6) or contrast (see example 7) which in line with what the previous literature has suggested. For example, if the protagonist the speaker was talking about was, just like the previous subject referent they had mentioned, not successful in carrying out a specific task (e.g. 'opening the jar'), speakers used a pronoun to refer to her.

(6) a. *Kardeşi$_i$ de alıyor (kavanozu).*
b. *O$_i$ deniyor.* (*maintenance*)
c. *O$_i$ açamıyor.* (*maintenance*)
a. [Her sister]$_i$ is taking the jar.
b. She$_i$ is giving a try.
c. She$_i$ cannot open it.

(7) a. *Bu sefer [ocak başında olan kadın]$_i$ dönüyor.*
b. *O$_i$ alıyor ellerinden.* (*maintenance*)
c. *O$_i$ bir kerede açıyor.* (*maintenance*)
a. This time [the woman at the stove] is turning back.
b. She$_i$ is taking the jar
c. She$_i$ is opening it in one go.

5.2 Reference tracking in gesture

We did not perform any statistical analyses on the gesture data because the number of co-speech gestures, i.e., points per participant, was limited. Therefore we only provide descriptives for co-speech gestures and discuss them later in Section 6.

First we calculated the proportions of overt arguments accompanied by gestures.

Since we did not see points co-occurring with null arguments, we included only the overt arguments and accompanying gestures. Table 3 provides those proportions (point/speech) and also raw numbers of each linguistic type and pointing gestures accompanying them for a clearer picture of the data. Patterns in our data suggest that Turkish speakers used pointing gesture equally often with nominal and other forms. They gestured far less with pronouns. This confirms findings from previous research on multimodal reference tracking in non-pro-drop languages suggesting that speakers use more marking material both in speech (e.g. noun phrase) and gesture more with less accessible referents while they use less marking material (e.g. pronouns) and gesture less with more accessibly referents (Gullberg, 2006; Yoshioko, 2008)

Table 3. Raw numbers of speech and points and (gesture- speech ratios) in overall narrations

	Speech (N = 133)	**Points (N = 53)**	**Points/ Sp (= .40)**
Nominal	58	27	(0.46)
Pronoun	34	7	(0.20)
Other	41	19	(0.46)

Next we looked at how pointing gesture was distributed in different referential contexts overall and also per linguistic type (see Table 4). Overall, we see that speakers marked subject referents with a pointing gesture in switch and maintenance contexts to the same extend. Note that switch context could be considered as reference maintenance 'from object to subject position' in two successive clauses, which suggests that subject referents in switch context are also highly accessible. This might explain why Turkish speakers did not differentiate between the two contexts in their gesturing behavior. Contrastively, speakers gestured more in re-introduction contexts in comparison to switch and maintenance contexts. This trend is independent of the specific lexical type (null form or pronoun) used to code subjects. When we look at the frequency of gestures co-occuring with pronouns in each context, for example, we see that speakers still gesture more with pronouns in re-introduction context compared to pronouns in switch or maintenance context. This indicates that Turkish adult speakers do indeed take referential context into

account when they mark subject referents with a pointing gesture, in addition to its lexical status.

Table 4. Raw numbers of speech and points and (gesture- speech ratios) across referential contexts

Re-introduction	**Speech (N = 90)**	**Points (N = 44)**	**Points/Sp (= .49)**
Nominal	47	25	(0.53)
Pronoun	5	2	(0.40)
Other	38	17	(0.45)
Switch	Speech (N = 23)	Points (N = 5)	Points/Sp (= .22)
Nominal	8	2	(0.25)
Pronoun	15	3	(0.20)
Other	-	-	-
Maintenance	Speech (N = 20)	Points (N = 4)	Points/Sp (= .20)
Nominal	3	-	-
Pronoun	14	2	(0.14)
Other	3	2	(0.67)

Overall findings for points suggest that gestures are sensitive to the linguistic type with which a referent is encoded in speech (i.e., nominal vs. pronoun) and to the referential context of that referent at the same time.

6. Summary and discussion

In this study, we investigated how subject references are tracked in discourse in pro-drop Turkish, as conveyed through speakers' choices among a number of linguistic forms, including nominal, pronoun and null forms, in different referential contexts. We also presented a description of how co-speech gestures, i.e. pointing gestures, have been employed during reference tracking in discourse narrations.

6.1 Reference tracking in speech

First, we found that Turkish speakers show sensitivity to referential context in a discourse narration task and they alternate between different linguistic forms to mark different referential contexts. Speakers mainly use nominal and other forms to code re-introduction context and use the null form to code maintenance context. Thus, they code less accessible referents with fuller forms, nominal and other forms, while they code more accessible referents with more attenuated forms, pronouns and null form. Our data support generalizability of the reverse correlation

between accessibility of referents and the coding material speakers use for those referents by providing systematic data from a pro-drop language.

Next, we focused on contexts where pronouns are used. We confirmed that speakers use third person pronoun to maintain when they want to mark emphasis or contrast. Additionally, as a novel contribution to the existing literature on the function of pronouns in Turkish we found that Turkish speakers use only third person pronoun 'o' in switch context while they use only the proximal demonstrative pronoun 'bu' in re-introduction context. This might suggest that Turkish speakers do differentiate between different types of pronouns, i.e. personal vs. demonstrative pronoun to systematically mark differential contexts, i.e., switch context (see example 8) vs. re-introduction context (see example 9). Considering speakers use only the third person pronoun 'o' in switch context, we argue that 'o' has a function of marking switch contexts where the subject argument was introduced as the object argument in the immediately preceding clause.

(8) a. *Ø$_k$ Bu sefer [masada oturan diğer kişiye]$_i$ veriyor.*
b. *O$_i$ da baya uğraşıyor.* (*switch*)
a. This time she$_k$ is giving it to [the other person sitting at the table]$_i$
b. She$_i$ is trying hard, too.

(9) a. *Ø$_k$ açamıyor.*
b. Sonra bunlar$_i$ paslaşmaya başlıyorlar kavanozu açmak için
(*re-introduction*)
a. She$_k$ cannot open the jar.
b. Then these$_i$ start to pass each other to open the jar.

6.2 Reference tracking in gesture

In our data Turkish speakers use pointing gesture equally often with nominal and other forms, they gesture far less with pronouns. We suggest that Turkish speakers follow the Grice's maxim of quantity when they mark subject referents with a pointing gesture. Furthermore, speakers gesture more in re-introduction contexts in comparison to switch or maintenance context. This finding is independent of the specific lexical type used to code subjects. For example speakers gesture more with pronouns in re-introduction contexts compared to pronouns in switch or maintenance context. This indicates that speakers do indeed take referential context into account when they mark subject referents with a pointing gesture. We therefore support that speech and gesture go hand in hand in reference tracking in discourse (So et al., 2009) by providing additional evidence from a pro-drop language.

7. Conclusion

We provide supportive evidence for the reverse correlation between the accessibility of a discourse referent and its lexical coding in speech and gesture by studying a pro-drop language, Turkish, using a controlled discourse elicitation task. We go beyond the existing literature by showing more specifically the contexts in which pronouns might be preferred in such a language and that different subcategories of the same linguistic type, i.e. personal pronoun and demonstrative pronoun, may be used by speakers in a systematic way to mark different referential contexts. This proposes a different function of the use of pronouns in discourse in pro-drop languages that have focused mostly on their emphasizing role. Furthermore, we take into account both modalities of language, speech and co-speech gestures, to be able to draw a clearer and more complete picture of reference tracking in Turkish. We are aware that our gesture data are very limited; nonetheless our study provides a fine first step in describing how co-speech gestures are employed during discourse narration in an understudied language and therefore generates implications for language production in general.

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Appendix. Description of the stimulus videos

First (30 sn.) and the second part (38 sn.) of the movie clip

There are three women in a kitchen.
Two women are sitting at the table; one is facing the camera while the other is seated in front of the camera.
The woman who is facing the camera is slicing some green vegetable and the other is slicing tomatoes.
The third woman is standing in front of a stove and cooking.
The woman who is slicing vegetables finishes slicing and transfers the vegetables in a bowl.
Then she starts slicing mushrooms.
The woman who is slicing tomatoes is finished and transfers sliced tomatoes in a bowl as well.
Then she starts slicing a squash.
The third woman who has been cooking turns around and asks for the sliced green vegetables.
The girl who is facing the camera is passing her the bowl and continues slicing mushrooms.
The woman turns back to cooking.

The three women continue their cooking activity.
The woman who is facing the camera is still chopping mushrooms.
The woman who has been cooking is still in front of the stove and continues cooking.
The other woman who is sitting at the table is now trying to open a jar.
She tries hard but cannot open the jar. Then she passes it to the woman who is chopping mushrooms.
She cannot open the jar, either and passes it back to the other woman.
She tries to open it for the second time but fails again.
She passes it to the woman who has been chopping mushrooms, again.
While that woman is trying to open the jar, the third woman turns around and grabs it.
She opens the jar easily at first try and passes it back to the woman who is seated in front of the camera.