Word Order Rules: Parsing Sentences in a “Free” Word Order Language

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Abstract

In fixed word order languages like English, word order is highly predictive of a noun's thematic and grammatical role, and a large body of research has shown that speakers of fixed word order languages tend to rely on word order when they parse and interpret sentences. In flexible word order languages like Turkish, word order is less predictive of nouns' thematic and grammatical roles, and less is known about the types of cues adult speakers use to determine the meaning of sentences. How do speakers of free word order languages determine the grammatical role of nouns? To answer this question, we presented 28 adult speakers of Turkish 48 stimuli sentences where the word order was varied between SOV and OVS. The cues to aid the grammatical roles were word order, casemarking on the object noun, and when a casemarker was not present an indefinite determiner. The results suggest that, of the three morphosyntactic cues (word order, overt-casemarking, and determiner), word order is the primary cue that Turkish speakers use to assign grammatical and thematic roles, overt object casemarking is a strong secondary cue, and the indefinite determiner is a weaker tertiary cue.

Word order rules: Parsing sentences in a "free" word order language

Natalie Batmanian[1] and Karin Stromswold

1 Introduction

In fixed word order languages like English, word order is highly predictive of a noun's thematic and grammatical role, and a large body of research has shown that speakers of fixed word order languages often use word order when they parse and interpret sentences (e.g., Townsend & Bever 2001; Ferreira, 2001). In flexible word order languages like Turkish, however, word order is less predictive of a noun's thematic and grammatical roles, and less is known about the types of cues adult speakers use to determine the meaning of sentences. This paper investigates the cues that native adult Turkish speakers use to interpret sentences with different word orders.

Turkish is traditionally described as a free word order language. All six of the word orders are grammatical when objects are overtly casemarked (Göksel & Kerslake, 2005). However, linguists characterize Turkish as being configurational (Kornfilt, 1994, 1997; Kural 1997), with topicalized constituents moving to sentence-initial position and focused elements being preverbal (Kornfilt 1994). In (1) a through f, sandwich '*sandviç*' (sandwich) is marked with accusative case '*–i*' to indicate it is the direct object, and, while the pragmatic force of (1a) is neutral, (1b) conveys that '*the man* ate the sandwich' and (1c) conveys that 'the man ate *the sandwich*'.

(1) a. S O$_{-ACC}$ V
Adam sandviç-i yedi.
'The man ate the sandwich.'
b. S V O$_{-ACC}$
Adam yedi sandviç-i.
'The man ate the sandwich.'
O$_{-ACC}$ V S
Sandviç-i yedi adam.
'The man ate the sandwich.'
c. O$_{-ACC}$ S V
Sandviç-i adam yedi.
'The man ate the sandwich.'
d. V O$_{-ACC}$ S
Yedi sandviç-i adam.
'The man ate the sandwich'
e. V S O$_{-ACC}$
Yedi adam sandviç-i.
'The man ate the sandwich.'

In Turkish, the nominative case is never overtly marked, whereas whether the accusative case can be overtly marked depends on the word order and pragmatic force of the sentence. Only SOV and OVS word orders are grammatical when the overt accusative casemarker is dropped and, when this occurs, direct objects are indefinite. Non-overtly casemarked objects must be adjacent to the verb to receive structural case (Erguvanlı, 1984; Kornfilt, 1994, 1997, Kural, 1992). When an object is not overtly casemarked, Kornfilt (1997) argues the object receives case by incorporating into the verb and the resulting verb phrase has a different meaning than in an NP-VP construction. Specifically, in the non-casemarked sentences (2) a and b, the incorporation of the noun into the verb results in the sentences conveying the meaning 'the man engaged in sandwich-eating.'

(2) a. S O V
Adam sandviç yedi.
'The man ate a sandwich/sandwiches.'

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b. O V S
Sandviç ye-di adam.
'The man eat-Past a sandwich/sandwiches.'

Subject and object NPs are often dropped in spoken Turkish. For example, analyses of child-directed speech revealed that less than 8% of Turkish adults' sentences contained a subject, an object, and a verb (Batman-Ratyosyan, 2003). As shown in Figure 1, in sentences that contained all three constituents, 67% were subject-initial, 27% were object-initial and 6% were verb-initial, with SOV being the most frequent word order (Batman-Ratyosyan, 2003).

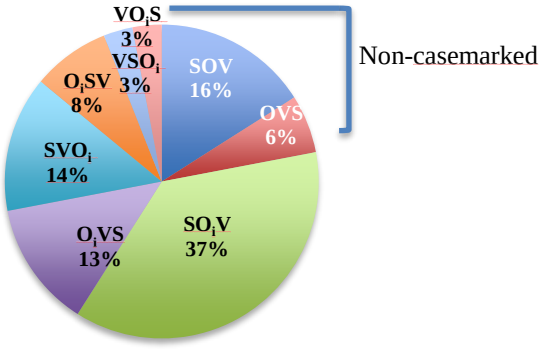

Figure 1. Results of analyses of 5190 utterances said by native Turkish-speaking adults to children. Eleven transcripts were collected by Aksu-Koç (1985) and are part of the CHILDES corpora (MacWhinney & Snow, 1985) and 9 transcripts were collected by Batman-Ratyosyan (2003).

Words are revealed one by one in spoken language. In fixed word order languages, research suggests that listeners rely heavily on word order when they assign grammatical and thematic roles to nouns. For example, when English speakers hear a noun-verb-noun sequence, they tend to assume the first noun is the subject and agent of a sentence, and the second noun is its object and patient. Occasionally in English, overt casemarking signals the grammatical role of a noun. For example, in (3a) the noun *boy* could be the object of the verb *believe* or the subject of a subsequent verb. This ambiguity disappears when the noun *boy* is replaced with the third person masculine pronoun which has a different form in accusative (3b) and nominative case (3c). The result is that English speakers are faced with greater processing costs in (3a) than (3b) or (3c) where casemarking disambiguates the second noun's grammatical role.

(3) a. Mary believed the boy.
- Mary believed the boy.
- Mary believed the boy was innocent.
b. Mary believed him.
c. Mary believed he was innocent.

In some Turkish sentences, overt casemarking also disambiguates whether a noun is the subject or the object of a sentence. Recall that all six word orders are possible in Turkish when there is an overt accusative casemarker, but only SOV and OVS word orders are grammatical when the accusative casemarker is absent (see Table 1). Thus, in a noun-noun-verb sequence, if a bare noun is followed by a noun, the grammatical roles of these nouns must be subject and object respectively, whereas if a casemarked noun is followed by another noun, the grammatical roles of the nouns must be object and subject, respectively. In the first case, the ambiguity is resolved at the second noun, and, in the second case, the ambiguity is resolved at the first noun. In a noun-verb-noun sequence, the subject-object ambiguity is resolved at the first noun if this noun is casemarked. However, if the first noun is <u>not</u> overtly casemarked, the grammatical roles of the two nouns cannot be determined until the end of the sentence because the first noun could be the subject of an SVO_{ACC}

sentence or it could be the object of an $O_{ø}VS$ sentence.

Thus, the grammatical roles of Turkish nouns become unambiguous at different points depending on whether the object is overtly casemarked or not: these roles are resolved at the first constituent in $O_{ACC}VS$ sentences, at the second constituent in $SO_{ACC}V$ and $SO_{ø}V$ sentences, and at the third constituent in $O_{ø}VS$ sentences. Given that the underlying word order of Turkish is SOV and subject-initial sentences are considerably more frequent than object-initial sentences in spoken Turkish (Aksu-Koç & Slobin, 1985; Batman-Ratyosyan, 2003), when Turkish speakers parse sentences, it would be reasonable for them to assume that if the first noun of a sentence is not overtly casemarked, it is the subject of the sentence (Batman-Ratyosyan, & Stromswold, 1999). However, if they make this assumption, they will garden-path on $O_{ø}VS$ sentences and misinterpret the meaning of $O_{ø}VS$ sentences when they fail to reanalyze them.

	Subject Initial		Object Initial	
	- Overt Case	+ Overt Case	- Overt Case	+ Overt Case
NNV	$SO_{ø}V$	$S\ O_{ACC}V$	$*O_{ø}SV$	$O_{ACC}S\ V$
NVN	$*SVO_{ø}$	SVO_{ACC}	$O_{ø}VS$	$O_{ACC}VS$

Table 1. The grammaticality of Turkish word order types as a function of the grammatical role of the first noun and the presence of accusative casemarking.

2 Method

To investigate how Turkish speakers use word order and casemarking to assign grammatical and thematic roles to nouns in online sentence processing, we had 28 Turkish-speaking adults listen to spoken SOV and OVS sentences in which the object was or was not overtly casemarked. All of the participants were native speakers of Turkish who were tested in Turkey and were attending college in Turkey.

Participants listened to 48 Turkish sentences and indicated the subject/agent of each sentence and rated the acceptability of each sentence on a 1 to 5 scale (with 5 being most acceptable). All sentences were semantically reversible with eight actional Turkish verbs (*çek* 'pull', *döv* 'beat', *ısır* 'bite', *it* 'push', *kokla* 'sniff', *okşa* 'caress', *öp* 'kiss' and *sev* 'pet') and three animate nouns (*ayı* 'bear', *at* 'horse' and *fil* 'elephant'). Because each noun could plausibly be either the agent or patient of the verb, participants could not use semantics to guide their parsing of stimuli sentences.

There were eight different trial types, with half having the SOV word order and half having the OVS word order. A third of the sentences had objects that were overtly casemarked ($SO_{ACC}V$, $O_{ACC}VS$, e.g., 4), a third had objects that were proceeded by an indefinite determiner ($SdetO_{ø}V$, $detO_{ø}VS$, e.g., 5), and a third had objects that were neither overtly casemarked nor had the indefinite determiner *bir* 'a/one' ($SO_{ø}V$, $O_{ø}VS$, e.g., 6). Half of the sentences were presented with a context sentence to provide felicity for the topicalized constituents (see example 7).

(4) a. $SO_{ACC}V$ At fil-i it-sin.
Horse elephant-ACC push-3.SG.OPTATIVE
'Let the horse push the elephant'

b. $O_{ACC}VS$ Fil-i it-sin at.
Elephant- ACC push-3.SG.OPT horse
'Let the horse push the elephant'

(5) a. $S\ detO_{ø}V$ At bir fil it-sin.
Horse DET elephant push-3.SG.OPT
'Let the horse push an elephant'

b. $detO_{ø}VS$ Bir fil it-sin at.
DET elephant push-3.SG.OPT horse
'Let the horse push an elephant '

(6) a. $SO_{ø}V$ At fil it-sin.
Horse elephant push-3.SG.OPT
'Let the horse push an elephant/elephants'

b. $O_{ø}VS$ Fil it-sin at.
Elephant push-3.SG.OPT horse
'Let the horse push an elephant/elephants'

(7) a. Context Bu oyun-da at-lar oyna-sın.
This game-LOC horse-PL play-3.SG.OPT
'Let the horses play in this game.'

$SO_{ACC}V$ At fil-i it-sin.
Horse elephant- ACC push-3.SG.OPT
'Let the horse push the elephant'

b. Context Bu oyunda fil-ler oynasın.
This game-LOC elephants-PL play-3.SG.OPT
'Let the elephants play in this game.'

$O_{ACC}VS$ Fil-i it-sin at.
Elephant- ACC push-3.SG.OPT horse
'Let the horse push the elephant'

3 Analyses

For inferential analysis of the results of this experiment, we used the package *lme4* with the R software (version 3.5.1) to model the binary choice target structure (subject=1 versus object=0) where respondents identified the subject noun (as the agent) in the stimuli sentences. We applied the *glmer* function for Generalised Linear Mixed models specifying the binomial option.

The experiment had a 2x2x2 factorial design with Word Order (SOV versus OVS), Accusative Case (No Overt Case versus Overt Case), and Context (Context versus No Context). A model with Word Order, Case, and Context as fixed effects and Participant, and Verb as random effects failed to converge. Because we were primarily interested in the effect of Case and Word Order, we analyzed Context and No Context sentences separately. These analyses revealed the same interaction between Word Order, and Case, in both Context, and No Context sentences (see Table 2), and for that reason, we eliminated Context from our analyses.

	NO CONTEXT		**CONTEXT**	
	No Case	Case	No Case	Case
SOV	93%	95%	97%	95%
OVS	59%	98%	48%	96%

Table 2. Comprehension Accuracy for No Context and Context trials.

4 Results

Overall, as shown in Figure 2, participants correctly understood 95% of $SO_{ACC}V$, 95% of $SO_{ø}V$, and 97% of $O_{ACC}VS$ sentences. In striking contrast, they understood only 54% of $O_{ø}VS$ sentences. A Generalized Mixed Effect model with Word Order and Case as fixed effects and Participant and Verb as random effects revealed a significant interaction between Word Order and Case (see Table 3), due to participants' poor comprehension of OVS sentences that were not casemarked (see Figure 2). There were no significant effects of either Participant or Verb.

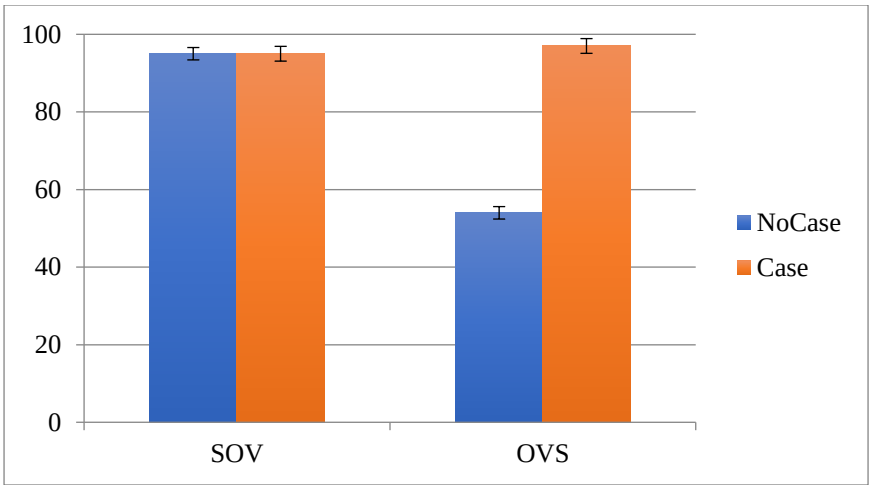

Figure 2. Percent accuracy in the comprehension task as a function of Case (Case and NoCase) and Word Order (SOV and OVS). (Error bars are standard errors.)

Fixed effects:				
	Coefficient	SE	z -value	P
(Intercept)	3.8026	0.7254	5.242	0.0000000159***
Word Order (ovs)	2.3548	1.7137	1.374	0.169399
Case (nocase)	-0.1574	0.9611	-0.164	0.869880
Case x Word Order	-5.7691	1.7324	-3.330	0.000868***

Table 3. Fixed effects parameter estimates (in log odds) for the full model without random correlations, and results of the model comparisons. Fixed factors Word Order (SOV and OVS), and Case (NoCase and Case). Number of observations: 1324, participants: 28, verbs: 8.

Analyses of individual participants' accuracy data for the four sentence types revealed that, of the 28 adults, 21 (75%) did considerably worse on $O_{ø}VS$ sentences than the other 3 types of sentences, and 4 did worse on non-casemarked sentences ($SO_{ø}V = O_{ø}VS$) than overtly casemarked sentences. Of the remaining 3 participants, one correctly understood all 48 sentences, one made only one mistake (on an $SO_{ø}V$ sentence), and one made 3 mistakes (one each for $SO_{ø}V$, $O_{ø}VS$ and $O_{ACC}VS$). In summary, although there was some variability among participants, most found $O_{ø}VS$ sentences more difficult than the other 3 sentence types.

We next analyzed individual participants' comprehension accuracy for just those sentences that lacked overt accusative casemarking (i.e., $O_{ø}VS$ and $SO_{ø}V$ sentences). These analyses revealed that 25 of the 28 participants were more accurate on $SO_{ø}V$ sentences than $O_{ø}VS$ sentences, and three were equally accurate on the two types of sentences (see Figure 3), a pattern that was highly significant ($p < .000005$ by cumulative binomial sign test). For the $SO_{ø}V$ sentences, 27 participants performed at better than chance level ($p < .05$ by one tail test) and 1 participant performed at chance level. For the $O_{ø}VS$ sentences, 10 participants performed at better than chance level, 12 performed at chance level, and 6 performed at below chance level.

Of the 28 participants, 10 performed at above chance level on both $SO_{ø}V$ and $O_{ø}VS$ sentences, 11 performed at above chance level on $SO_{ø}V$ sentences and at chance level on $O_{ø}VS$ sentences, 1 performed at chance level on both $SO_{ø}V$ and $O_{ø}VS$ sentences, and 6 performed at above chance level on $SO_{ø}V$ sentences and at below level on $O_{ø}VS$ sentences. Note that these last 6 participants basically treated all sentences that lacked overt casemarking as if they were SOV.

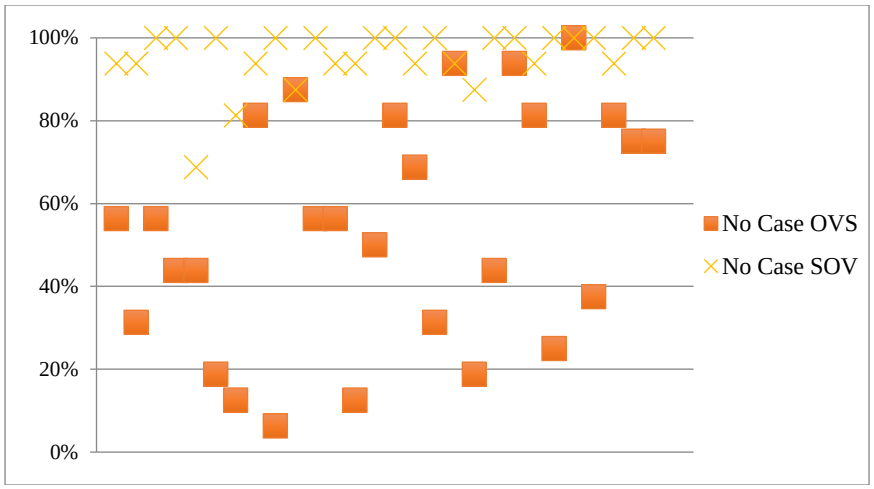

Figure 3. Scatterplot of individual participants' comprehension accuracy of SOV and OVS non-casemarked sentences.

The presence of an indefinite determiner had a differential effect on participants' comprehension of $SO_{ø}V$ and $O_{ø}VS$ sentences. As shown in Figure 4, participants correctly interpreted $O_{ø}VS$ sentences in which the indefinite determiner preceded the object noun ($detO_{ø}VS$) more often than $O_{ø}VS$ sentences that lacked a determiner (71% versus 37%, respectively). In contrast, participants were equally accurate for $SO_{ø}V$ sentences that did and did not have an indefinite determiner (95% for both).

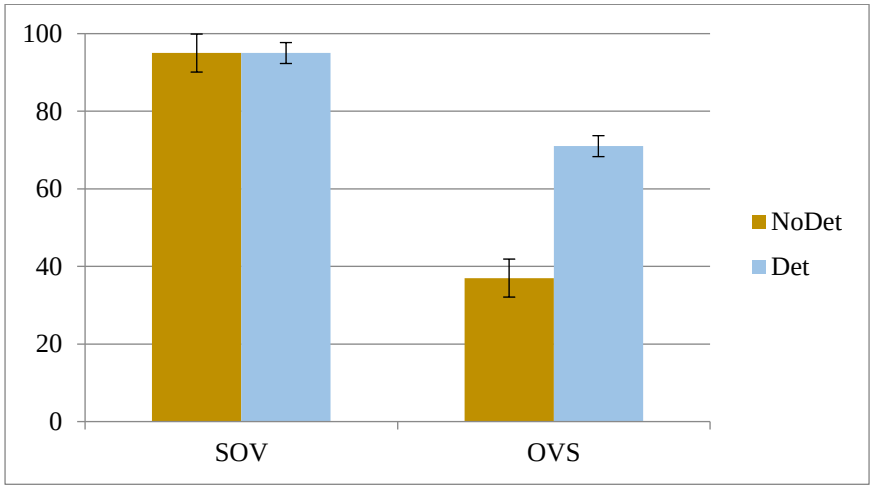

Figure 4. Percent accuracy in a comprehension task for sentences that lacked overt casemarking as a function of Word Order (SOV and OVS) and the presence of the indefinite determiner (Det and NoDet) preceding the object. (Error bars are standard errors.)

Of the 28 participants, 24 were more accurate on $O_{ø}VS$ that had the indefinite determiner than those that lacked determiners, 2 were equally accurate on the two types of $O_{ø}VS$ sentences, and 2 were more accurate on $O_{ø}VS$ sentences that lacked determiners ($p < .000005$ by cumulative binomial sign test). As shown in Figure 5, for the $O_{ø}VS$ sentences that had the indefinite determiner, 13 participants performed at above-chance level ($p < .05$ by one tail test), 13 performed at-chance level, and two performed at below-chance level. For the $O_{ø}VS$ that lacked determiners, three participants performed at above-chance level, 15 performed at-chance level, and 10 performed at below-chance level.

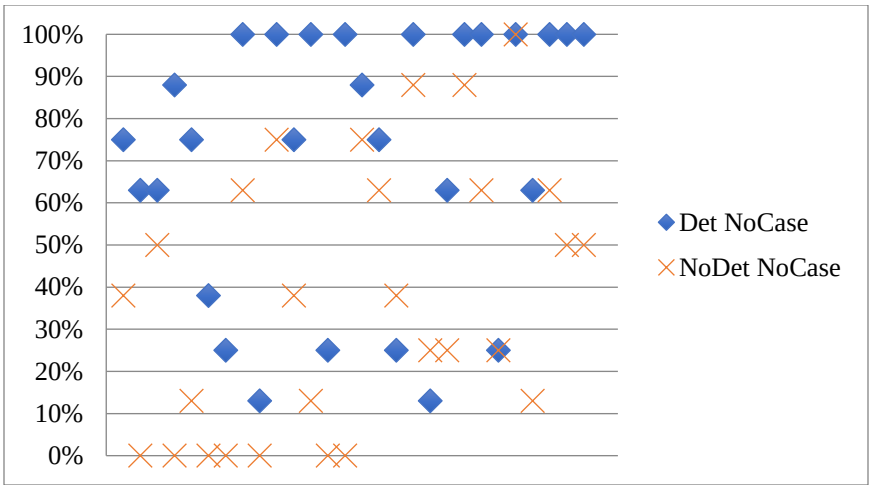

Figure 5. Scatterplot of individual participants' comprehension accuracy for non-casemarked OVS sentences with and without a determiner (Det and NoDet).

In addition to the comprehension task, we asked participants to rate the acceptability of the stimuli sentences on a 1 (not at all acceptable) to 5 (most acceptable) scale. As shown in Figure 6, participants rated $SO_{ACC}V$ sentences more acceptable (4.21 out of 5) than $O_{ACC}VS$ sentences (3.92 out of 5), which were in turn rated more acceptable than $SO_{ø}V$ sentences (3.51 out of 5), which were in turn rated more acceptable than $O_{ø}VS$ sentences (2.88, all *p*'s < .001). Thus, the pattern of participants' acceptability ratings for the 4 sentence types was strikingly different from their comprehension of the 4 sentence types where participants were equally good at comprehending $SO_{ACC}V$, $O_{ACC}VS$, and $SO_{ø}V$ sentences (>95% correct) and had very poor comprehension of $O_{ø}VS$ sentences (54% correct, see Figure 2).

As shown in Figure 7, for sentences that lacked overt accusative casemarking, participants rated Det $SO_{ø}V$ sentences as being the most acceptable (3.7), followed by NoDet $SO_{ø}V$ sentences (3.3), which were in turn rated as more acceptable than Det $SO_{ø}V$ sentences (3.1), with NoDet $SO_{ø}V$ sentences receiving the lowest acceptability ratings (2.6, all *p*s <.05). Recall that participants had no difficulty understanding $SO_{ø}V$ sentences regardless of whether they contained the indefinite determiner (95% correct for both types of sentences), whereas participants had much less difficulty understanding $O_{ø}VS$ that contained the indefinite determiner than those that lacked one (71% and 37%, respectively, see Figure 4). Thus, the presence of the indefinite determiner preceding a noncasemarked object affected participants' acceptibility ratings differently than it affected their comprehension: participants rated both SOV and OVS sentences to be more acceptable when they contained an indefinite determiner, whereas presence of an indefinite determiner improved participants' comprehension of OVS sentences but not SOV sentences.

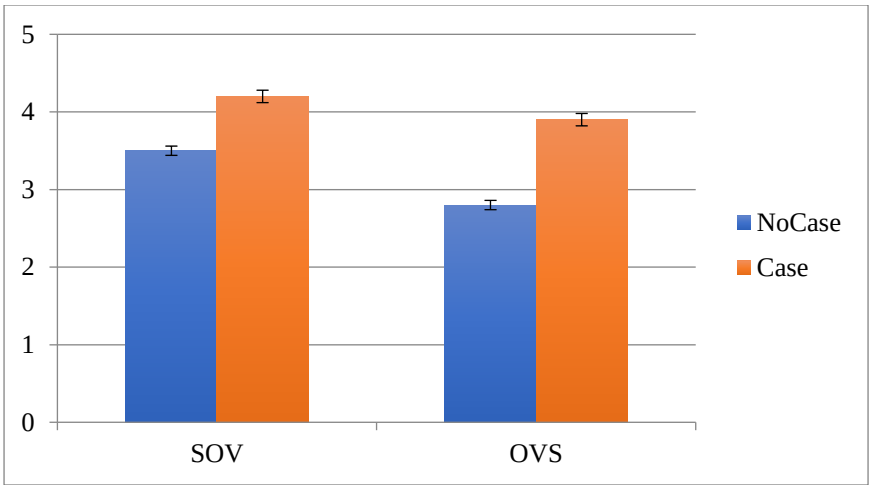

Figure 6. Acceptability ratings of SOV and OVS sentences with and without accusative case (Case and NoCase). Ratings were on a scale of 1 to 5, with 5 being most acceptable. (Error bars are standard errors.)

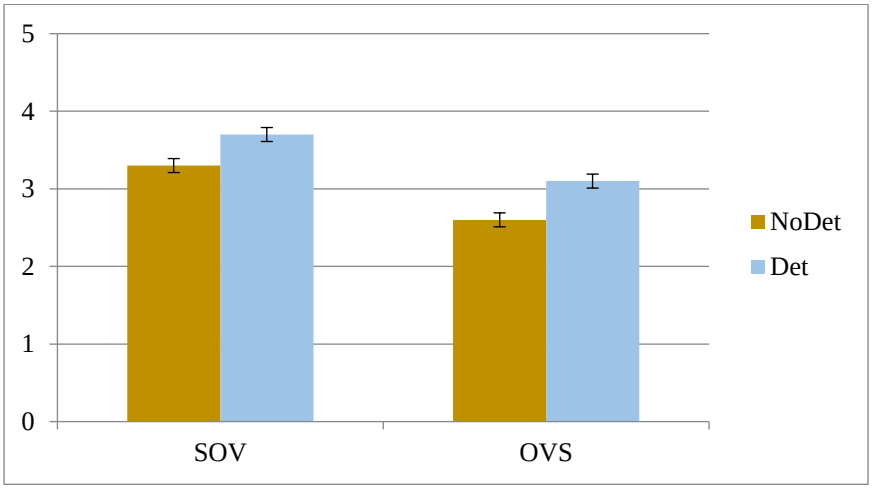

Figure 7. Acceptability ratings of non-casemarked SOV and OVS with and without the indefinite determiner (Det and NoDet). Ratings were on a scale of 1 to 5, with 5 being most acceptable. (Error bars are standard errors.)

5 Discussion

The purpose of this study was to investigate what morphosyntactic cues speakers of free word order languages use to parse and interpret spoken sentences. Because the focus of the study was on how morphosyntax affects processing, we used semantically reversible sentences, thereby preventing our participants from using semantic plausibility to interpret sentences. We found that our participants correctly interpreted the SOV sentences regardless of whether the object of the sentences was or was not overtly casemarked or preceded by the indefinite determiner *bir* 'a/one'. In striking contrast, the presence of the accusative case or the indefinite determiner had a profound effect on participants' ability to understand the OVS sentences: When the object of an OVS sentence was overtly casemarked, participants had no difficulty interpreting the sentences, whereas participants correctly understood only half of OVS sentences that lacked overt accusative casemarking. The presence of the indefinite determiner doubled the chances that participants correctly intepreted OøVS sentences (from 37% to 71%) but did not fully compensate for the lack of accusative casemarking. These

results suggest that, of the three morphosyntactic cues (word order, overt casemarking, and determiner), word order is the primary cue that Turkish speakers use to assign grammatical and thematic roles, overt object casemarking is a strong secondary cue, and the indefinite determiner is a weaker tertiary cue.

Taken as a whole, our results indicate that, just as speakers of fixed word order languages often use word order heuristics to interpret sentences, speakers of 'free' word-order language like Turkish often rely on word order heuristics when they parse and interpret sentences. Although Turkish does allow subjects, verbs and objects to occur in any order, in online processing tasks, it is reasonable for Turkish speakers to assume that the first noun of a Turkish sentence is the subject because, as shown in Figure 1, among three-constituent-long sentences, subject-initial sentences are more than three times as common as object-initial sentences in spoken Turkish (Batman-Ratyosyan, 2003). This "1st Noun = Subject" assumption is even more felicitous when the first noun is not casemarked because 10 times more sentences begin with a subject than begin with a non-casemarked object (see Figure 1).

Our participants' near-perfect comprehension of $SO_{ACC}V$, $SO_{ø}V$, $O_{ACC}VS$ sentences and their poor comprehension of $O_{ø}VS$ sentences is consistent with Turkish speakers using a "1st Noun = Subject" heuristic to process sentences. Because both $SO_{ACC}V$ and $SO_{ø}V$ begin with a subject Turkish speaker who use a "1st Noun = Subject" heuristic should have no difficulty understanding SOV sentences regardless of whether the object has the accusative casemarker or the indefinite determiner. If Turkish speakers initially assume the first noun of an $O_{ACC}VS$ sentence is the subject, they will realize that this assumption is incorrect by the end of the first constituent when they process the overt accusative casemarker. Thus, even if Turkish speakers do initially garden-path on $O_{ACC}VS$ sentence, they should have no difficult recovering.

What happens if Turkish speakers use a "1st Noun = Subject" heuristic to process $O_{ø}VS$ sentences? Given that SVO_{ACC} sentences are more than twice as common as $O_{ø}VS$ sentences (Batman-Ratyosyan, 2003), they probably would not recognize their error and would continue to garden path until the end of the sentence when they learned that the last noun did not have accusative casemarking (and thus could not be an SVO_{ACC} sentence, but must instead be an $O_{ø}VS$ sentence). If, by the end of an $O_{ø}VS$ sentence, they lack the processing resources required to recognize they have garden-pathed and/or to reparse the sentences, this would explain why our participants misinterpreted half of the $O_{ø}VS$ sentences as being subject-initial (Ferreira, Bailey, & Ferraro, 2002). We should caution that, although our comprehension results are consistent with Turkish speakers using a "1st Noun = Subject" heuristic that sometimes leads to fatal gardenpaths, studies that collect more fine-grained, real-time data (e.g., eye gaze studies, ERP studies) are needed to investigate whether this is, indeed, the case.

It is not readily clear why the presence of the indefinite determiner improved our participants' comprehension of $O_{ø}VS$ sentences because in Turkish, the indefinite determiner can precede a subject noun as it does an object noun (e.g., *Bir adam bir çocuğ-u boğul-mak-tan kurtar-dı*. A man a child-Dat drown-Inf.Loc save-Past.3Sg. 'A man saved a child from drowning.'). Eye gaze studies could clarify whether the presence of the indefinite determiner helps Turkish speakers to avoid garden pathing on $O_{ø}VS$ sentences or to recover from the garden-pathing on these sentences.

Recall that our participants were equally accurate at understanding $SO_{acc}V$, $O_{acc}VS$, and $SO_{ø}V$ (>95% correct for all), yet they gave significantly different acceptability ratings to the three types of sentences ($SO_{acc}V$ > $O_{acc}VS$ > $SO_{ø}V$). There are several possible explanations for this discrepancy. One possibility is that interpreting the meaning of a sentence is an online, automatic process and people are only subject to fatal garden-pathing on $O_{ø}VS$ sentences. Rating the acceptability of sentences, on the other hand, is a metalinguistic task, and thus is likely an off-line task in which participants mull over the sentences, perhaps trying to imagine specific situations in which a sentence might be said. If one imagines specific scenarios with specific agents and patients, this would make sentences with overtly casemarked objects (which are definite) better than sentences without overtly casemarked objects (which are indefinite). It would also make SOV sentences better than OVS sentences because SOV sentences are pragmatically neutral whereas OVS sentences are pragmatically marked. Taken together, this would result in $SO_{ACC}V > O_{ACC}VS > SO_{ø}V > O_{ø}VS$ acceptability ratings. A second possibility is that, rather than giving acceptability ratings, participants unconsciously rated how difficult they found the sentences to process. If this is the explanation, comprehension reaction times should mirror acceptability ratings more closely than

comprehension accuracy rates do. A final possibility is that the comprehension accuracy-acceptability differences merely reflect the granularity of the measurements in the two tasks: in the comprehension task, participants had only two choices (which of two nouns was the subject), whereas participants rated the acceptability of sentences on a 1 – 5 scale.

Future eye gaze studies, ERP studies, reaction time studies, acoustic studies and analyses of social media may help further clarify how Turkish speakers signal and understand who did what to whom in spoken and written Turkish.

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