Derivation of VOS in Tongan: An Experimental Investigation

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Purpose: The Austronesian language Tongan has a basic VSO word order, but VOS is also grammatically possible (Churchward, 1953; Custis, 2004; Dixon, 1979, 1994; Otsuka, 2000, 2005). There are two competing syntactic analyses of how to derive the VOS order. One is a leftward scrambling analysis, according to which the object moves leftward across the subject, as in [V O_i S t_i] (Otsuka, 2000). The second is a coordination plus ellipsis analysis, which claims that the VOS order results from the coordination of two clauses in which the subject of the first clause is a null pronoun *pro*, and the second clause is elided except for the fronted overt subject, which is cataphorically associated with the null pronoun in the first clause, as in [[V *pro* O] [S_i ~~[V t_i O]~~]] (Polinsky & Potsdam, 2021). The leftward scrambling analysis and the coordination plus ellipsis analysis agree with the assumption that VOS sentences (e.g., (2b)) are syntactically more complex and hence are more difficult to process than corresponding VSO sentences (e.g., (2a)). However, the two analyses diverge with respect to the relative structural complexity of VOS and OVS (e.g., (2c)). Assuming that in OVS, the sentence's initial object is associated with the gap in the object position across the verb and subject, as in [O_i [V S *gap*$_i$]], the leftward scrambling analysis predicts that OVS is syntactically more complex and more difficult to process than VOS. In contrast, the coordination plus ellipsis analysis dictates that VOS is structurally more complex and more difficult to process than OVS.

Experiments: To test these processing predictions, we conducted two experiments in Tonga, in which 48 native Tongan speakers participated (*M* = 22 years 9 months). **Experiment 1** aimed to verify whether the VSO order is canonical in sentence processing by native Tongan speakers (see stimulus sentences 1a and 1b). Using the maze task (Figure 1), Experiment 1 indicated that the subject (NP-ERGative) of V<u>S</u>O was processed faster than the object (NP-ABSolutive) of V<u>O</u>S (Figure 2), and that the object of VS<u>O</u> was processed faster than the subject of VO<u>S</u>. This result supports VSO as the canonical order in Tongan. **Experiment 2** investigated the accuracies and reaction times for Tongan sentences with three different word orders: VSO, VOS, and OVS (2a, 2b, and 2c). Using the sentence correctness decision task, Experiment 2 showed the direction of accuracy as VSO > OVS > VOS (Figure 3), and the direction of reaction times as VSO < OVS < VOS (Figure 4).

Discussion: Experiments 1 and 2 indicated that VSO was processed more quickly than VOS and OVS, confirming the grammatical analysis that VSO is canonical in Tongan. Experiment 2 further showed VSO < OVS < VOS in processing speed, which is consistent with the prediction of the coordination plus ellipsis analysis but not that of the leftward scrambling analysis. Therefore, these experimental results support the coordination and ellipsis analyses.

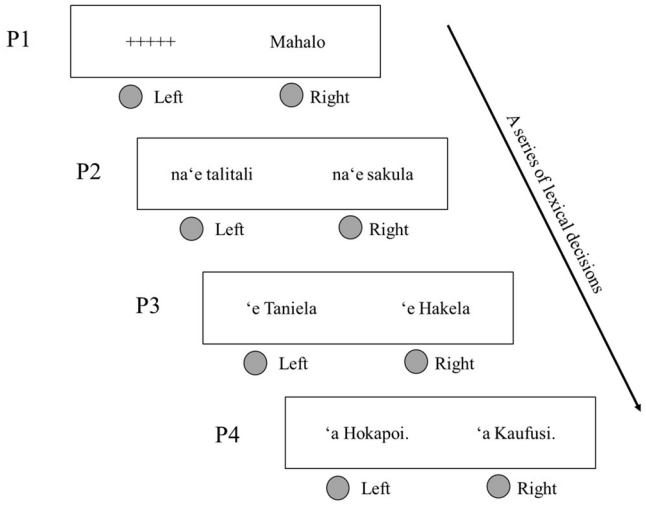

Figure 1. A series of lexical decisions in the lexical maze task

Note: P1 to P4 refer to phrase 1 to phrase 4 of a sentence.

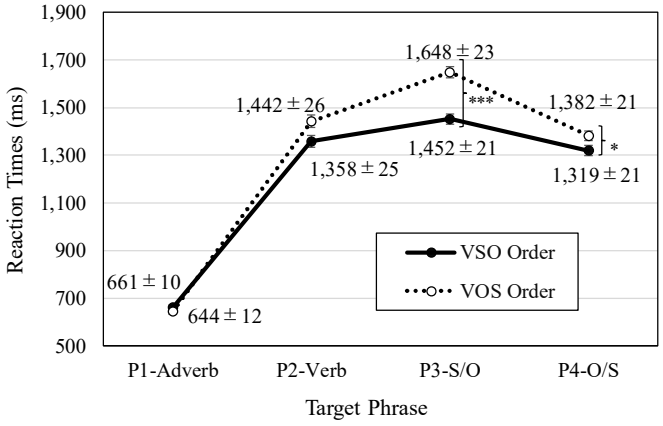

Figure 2. Reaction times for processing first phrase (P1) to fourth phrase (P4)

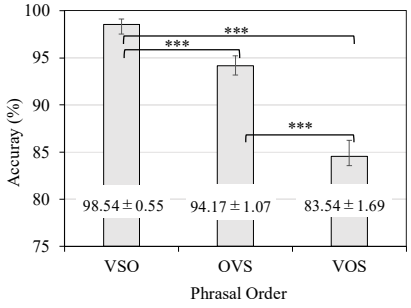

Figure 3. Mean accuracies (%) of the processing of VSO, OVS and VOS sentence

Note: *** p<.001 based on the LME results. Bars and ± indicate standard errors.

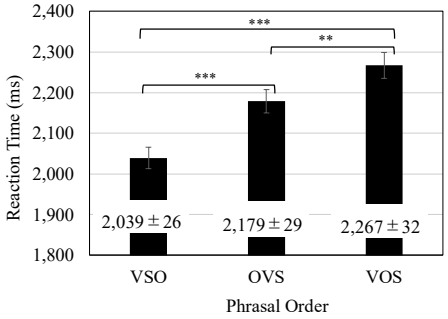

Figure 4. Mean reaction times for the processing of VSO, OVS and VOS sentences

Note: ** p<.01. *** p<.001 based on the LME results. Bars and ± are standard errors.

References: Otsuka, Y. (2005) in *Verb First*. John Benjamins. Polinsky & Potsdam (2021) in *The Proceedings of AFLA27*.

Tongan Stimulus Sentences used for Experiments 1 and 2

Stimulus sentences for the maze task in Experiment 1: All 30 pairs of correct sentences (YES responses) containing four phrases, including an initially presented adverb (*Adv*) *mahalo* 'yesterday,' are listed in (1a) *Adv*VSO order and (1b) *Adv*VOS order.

(1a) AdvVSO order

Phrase 1	Phrase 2	Phrase 3	Phrase 4
Mahalo	*naʻe talitali*	*ʻe Taniela*	*ʻa Kaufusi.*
Adv(yesterday)	PST V(welcome)	NP-ERG (Taniela)	NP-ABS (Kaufusi)

'Yesterday Taniela welcomed Kaufusi.'

(1b) AdvVOS order

Phrase 1	Phrase 2	Phrase 3	Phrase 4
Mahalo	*naʻe talitali*	*ʻa Taniela*	*ʻe Kaufusi.*
Adv(yesterday)	PST V(welcome)	NP-ABS (Taniela)	NP-ERG (Kaufusi)

'Yesterday Kaufusi welcomed Taniela.'

Stimulus sentences for the sentence correctness decision task in Experiment 2: All 30 pairs of correct sentences (YES responses) containing three phrases are listed in (1a) VSO order, (1b) VOS order, and (1c) OVS order.

(2a) VSO order

Phrase 1	Phrase 2	Phrase 3
Naʻe kai	*ʻe he fefine*	*ʻa e ika.*
PAST V(ate)	NP-ERG (woman)	NP-ABS (fish)

'The woman ate the fish.'

(2b) VOS order

Phrase 1	Phrase 2	Phrase 3
Naʻe kai	*ʻa e ika.*	*ʻe he fefine*
PAST V(ate)	NP-ABS (fish)	NP-ERG (woman)

(2c) OVS order

Phrase 1	Phrase 2	Phrase 3
Ko e ika	*naʻe kai*	*ʻe he fefine*
PRED(*ko*) NP(the fish)	PAST V(ate)	NP-ERG (the woman)