Inflection and derivation in proficient L2 Arabic sentence processing

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While L2 learners are less sensitive than native speakers to morphological structure in general (e.g., Jiang, 2007; Neubauer & Clahsen, 2009) researchers disagree about the roles different features of morphological systems play in determining the time course and accuracy of their acquisition by L2 learners. Some studies suggest that L2 learners process derivational morphemes in a more native-like manner than inflectional ones (Silva & Clahsen, 2008; Kirkici & Clahsen, 2013). Other research demonstrates accurate acquisition of L2 inflectional morphology as well (Gor & Jackson, 2013; Hopp, 2010). To date, few studies have directly compared L2 acquisition of inflectional and derivational morphology. Arabic verbs exhibit a system of derivational morphology whose function in constraining event structures allows for relatively direct comparison with inflectional morphemes at the sentence level. Further, Arabic derivational morphemes are discontinuous; a triliteral root interleaves with one of ten verbal templates to form every Arabic verb, as Figure 1 illustrates.

The current study brings evidence of sensitivity to both inflectional and derivational sublexical structure during sentence reading in proficient L2 Arabic learners (N = 44) to bear on the controversy surrounding the source(s) of the observed differences between L1 and L2 morphological behavior. A self-paced reading task used anomalies in verbal inflection (number agreement), verbal derivation (template morpheme), and verbal semantics to test whether learners automatically access these features while reading.

Table 3 shows mean reading times (RTs) by language group, condition and region. We analyzed these results using 4 ANOVAs, one for each sentence region, with Condition as a within-subjects factor and Language Group as a between-subjects factor, revealing significant main effects of Language Group ($p < .001$) in all sentence regions, of Condition ($p < .001$) in the critical region and both spillover regions, and of the interaction between them in the critical region only ($p < .001$). For ease of reference, Table 4 shows the results of simple comparisons by language group, condition and region. In brief, all three anomaly types slowed L2 participants' reading times significantly in the critical region. L1 participants responded to inflectional anomalies in the critical region, but derivational and semantic anomalies in the spillover region.

This pattern of results accords with previous studies that found sensitivity to inflectional morphology (Gor & Jackson, 2013; Hopp, 2010) during sentence processing in proficient L2 learners. Further, it adds evidence of L2 learners' sensitivity to derivational morphology during sentence processing, despite numerous typological differences between the target language and the L1, specifically the Arabic verbal templates' discontinuous forms and abstract meanings.

Table 1. Discontinuous root and pattern morphemes in Arabic verbs

Table 1 Discontinuous morphemes in Arabic verbal derivation

	X F Y	root related to concealment
+	ʔa_ _a_a	pattern IV - causative
=	**ʔaxfa:**	**to hide (sth.)**
	X F Y	root related to concealment
+	i_ ta_a_a	pattern VIII - anticausative
=	**ixtafa:**	**to disappear**

Table 2. Experiment conditions and example stimuli

Conditions			
Baseline (No Anomaly)	**Derivational Anomaly**	**Inflectional Anomaly**	**Semantic Anomaly**
اختف	أخف	اختفوا	فسر
ixtafa:	ʔaxfa:	ixtafu:	fasara
disappeared	hid (sth.)	disappeared (pl)	explained

Example sentence

بعد أن سقط من على الطاولة، القلم اختف في العشب الطويل.

baʕda an saqatˁa min ʕala atˁa:wila, alqalam ixtafa fi: alʕuʃb atˁawi:l

after that fell from on the.table the.pencil disappeared in the.grass tall

After it fell from the table, the pencil disappeared in the tall grass.

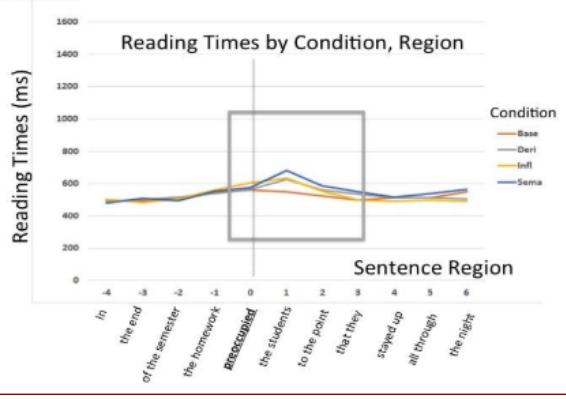
Table 3. Mean reading times by sentence region and condition

		sentence region							
		precritical (-1)		critical (0)		spillover 1		spillover 2	
L Group	Condition	Mean	St Dev	Mean	St Dev	Mean	St Dev	Mean	St Dev
L1	Base	548.5	173.8	561.9	174.9	549.6	146.5	522.9	158.7
	Deriv	544.6	152.3	572	200.3	628.3	198.1	558.6	148
	Infl	559.8	163.7	615.4	246.7	632.7	190.3	551.9	184.1
	Sem	560.9	182.5	591.3	197	684.8	262.7	588.5	189.6
L2	Base	1095.1	490.7	1155.4	508.2	983	333.5	848.2	369.2
	Deriv	1081.3	460.5	1250.8	567.5	980.4	342.7	842.3	264.2
	Infl	1084.9	427.1	1404.3	580.7	1058.7	380.3	917.1	393.7
	Sem	1069.4	469.5	1242.6	505.6	1072.9	365	834.8	243.7

Table 4

			sentence region							
			precritical (-1)		critical (0)		spillover 1		spillover 2	
L Group	Condition	df	t	p	t	p	t	p	t	p
L1	Deriv	28	0.255	0.801	0.859	0.397	**-4.235**	**< 0.001**	**-3.639**	**0.001**
	Infl	28	-0.912	0.37	**2.72**	**0.011**	**-4.541**	**< 0.001**	-1.453	0.157
	Sem	28	0.884	0.384	1.755	0.09	**-5.032**	**< 0.001**	**-4.813**	**< 0.001**
L2	Deriv	38	0.4	0.691	**-3.198**	**0.003**	0.104	0.918	0.14	0.889
	Infl	38	0.332	0.742	**-6.401**	**< 0.001**	**-2.714**	**0.01**	**-2.342**	**0.025**
	Sem	38	0.684	0.493	**-2.408**	**0.021**	**-2.216**	**0.033**	0.358	0.722

L1 Results



L2 Results