

## The Interaction of Animacy and Morphosyntax in the Arabic DP

### Evidence from Event-Related Potentials

**INTRODUCTION.** Animacy hierarchies, like that in (1), influence a range of grammatical properties across languages, including agreement, word order, and marking of case and number (Corbett 2000).

(1) Speaker > Addressee > 3<sup>rd</sup> Person > Kinship terms > Other Humans > Higher animals > Lower animals > Discrete inanimates > Nondiscrete inanimates [from Haspelmath (2013)]

In online language comprehension, animacy has long been important in behavioral/eyetracking work on sentence level processing (Ferreira & Clifton 1986; Trueswell, Tanenhaus, & Garnsey 1994), and has recently attracted considerable attention in ERP research (see Brouwer & Hoeks 2012 for review).

**PRESENT STUDY.** Here we present preliminary results (n=10) from a study using Event-Related Potentials (ERPs) to investigate animacy and the morpho-syntax of nominals in Modern Standard Arabic (MSA). In MSA, demonstratives (DEM) agree in gender/number with singulars, regardless of animacy, and with animate plurals, but must be singular feminine with inanimate plurals:

- |        |                         |             |    |                         |                  |
|--------|-------------------------|-------------|----|-------------------------|------------------|
| (2) a. | *haaḏihi/ haaʔulaaʔi    | ʔal-ʔwlaadu | b. | *haaḏihi/ haaʔulaaʔi    | ʔal-banaatu      |
|        | *this.F.S/ this.Anim.Pl | the-boys.M  |    | *this.F.S/ this.Anim.Pl | the-girls.F      |
|        | ‘These boys’            |             |    | ‘These girls’           |                  |
| c.     | *haaʔulaaʔi/ haaḏihi    | ʔal-kutubu  | d. | *haaʔulaaʔi/ haaḏihi    | ʔal-tʔaawil-aatu |
|        | *this.Anim.Pl/ this.F.S | the-books.M |    | *this.Anim.Pl/ this.F.S | the-tables-F     |
|        | ‘These books’           |             |    | ‘These tables’          |                  |

How does the language processing system handle cases where the matching or mismatching of (here: DEM+NOUN) agreement features turns on the (in)animacy of the noun?

**METHODS.** We tested both singular and plural nouns in two word DEM+NOUN phrases, manipulating animacy, gender, number, and correctness (DEM+NOUN feature (dis)agreement). Singular nouns were either animate or inanimate, and were preceded by demonstratives that either matched or mismatched in gender. We expected these singular mismatches to elicit a uniform response profile, both behaviorally and in terms of ERPs (e.g., negative going deflections of the sort reported in Barber & Carreiras 2005 for Spanish). However, we also tested animate and inanimate plurals: animate nouns either followed matching plural demonstratives or mismatching singular feminine forms. Thus, masculine animate plural nouns constituted a "double" number/gender violation, whereas feminine animate plurals realized only gender violations (like the singulars). However, for the inanimate plurals, the same demonstratives flip their agreement matching status – here it is the singular feminine that constitutes the match, whereas the plural demonstrative is the mismatch. Items were drawn from a masterlist of 128 nouns (64 animate/64 inanimate) and were rotated through all sub-conditions (512 pairs total). Ten Saudi Arabic speakers performed acceptability judgments after each pair, and EEG was recorded throughout. ERPs were analyzed for successive 150 ms windows after noun onset; mean amplitude was the dependent measure.

**RESULTS & DISCUSSION.** As expected, singulars revealed only violation main effects: a negative going deflection with an anterior maximum throughout the 400-1000 ms interval post target noun onset (similar to Barber & Carreiras 2005 for Spanish). The plural cases, in contrast, yielded interactions in both the behavioral and ERP data. Though the ERP patterns for the feminine cases were fairly diffuse (there is some indication of individual differences for these conditions – not discussed here), a strikingly clear pattern already evident in this initial sample is a polarity reversal for the animate versus the inanimate masculine plural violations. There the animates ("double" violations) demonstrated a robust negative-going deflection similar to what we found for the singular NPs. In contrast the masculine inanimate plurals drove a relative *positivity* over the same latency ranges. One could interpret this pattern as a uniform agreement mismatch profile (i.e., relative positivity for the inanimates is actually a relative negativity for the match > mismatch, reflecting automatic feature mismatch detection independent of the animacy of the noun, thus resembling our other violation conditions). Alternatively, the positivity for the masculine plural inanimates could be diagnosed as a species of previously reported ("semantic") P600 type effect. However, we argue the full pattern of results (including the behavioral data) is more consistent with the latter interpretation, which we argue bears on our understanding of the relative time-course of the access/retrieval of morpho-syntactic phi-features relative to lexical-semantic features such as animacy.