How animacy and literacy affect picture naming

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Experiments on sentence processing reliably show effects of animacy on grammatical function assignment and word order. Whether animacy also effects language production at the phrase level is, however, less clear. Whereas a recent study [1] found that adults' and children's productions of N+N conjuncts were modulated by animacy, other studies have found no or no consistent effects of animacy on conjunct ordering [2, 3]. In the current study, we investigate whether the principle "the most animated NP precedes all other NPs" [4] also applies to coordinated NPs and how the effect might be influenced by speakers' reading/writing habits. Based on prior studies on spatial biases in scene perception and description [5, 6], we expect that the ability to read and write in the script of the spoken language influences picture naming and that in literate individuals the preferred sequence of naming may depend more on the directionality of the script than on animacy. We compared picture naming in 24 literate adult speakers of German (left-to-right script) (mean age 29 years), in 25 literate speakers of Arabic (right-to-left script) (mean age 33 years) and in 23 preliterate German-speaking children (mean age 59 months). All participants were presented with 30 picture sets of animate-inanimate entities depicted in grey shades (see Fig.1) and were asked to name the presented pictures. The position of the animate entity varied systematically between the right and the left side of the screen. Nouns depicted in the picture pairs were matched in terms of grammatical gender, syllable length and frequency in German. All participants were tested via a shared screen presentation in Zoom.

Figure 2, shows the mean proportion of responses per group where the animate item was named first in the N+N conjunct (e.g. *fish and shoe*): Proportions are plotted for each of the two positions (i.e., animate entity located on the left vs. the right). To examine whether reading and writing habits affected the order of mention during picture naming, we computed a mixed effects logistic regression model with language (German vs. Arabic) and position (animate left vs. animate right) as independent variables and order of mention (animate first – yes vs. no) as dependent variable. The model revealed a significant effect of position (Est. = 6.53, SE = 1.46, $z = 4.47$, $p = < 0.001$) but no effect of animacy (Est. = -0.49, SE = 0.38, $z = -1.31$, $p = .19$), suggesting that for literate adults the position of an item is more important than its animacy status. Furthermore, the model revealed a significant interaction between language group and position (Est. = -16.96, SE = 3.03, $z = -5.60$, $p < 0.001$), demonstrating that German and Arabic speaking cohorts solved the task in different ways. Whereas German speakers mentioned the animate entity first when it was located on the left but not when it was located on the right, a reverse tendency was observed for speakers of Arabic (also see Figure 2). In contrast to literate adult speakers, for preliterate German children a mixed effect logistic regression model revealed a significant influence of animacy (Est. = 0.44, SE = 0.17, $z = 2.60$, $p = 0.01$) but no significant influence of position (Est. = 0.26, SE = 0.50, $z = 0.53$, $p = 0.60$). These findings suggest that for children who do not yet know how to read and write, the animacy status of an entity is (still) important and not yet affected by effects of literacy.

Taken together, our findings show that experience with a writing system has important consequences for the ordering of N&N conjuncts. In literate adult individuals, the order of picture naming is strongly influenced by reading/writing habits but not by the animacy of an entity. By contrast, our data on preliterate children indicates that this preference develops and that effects of animacy in adults possibly have been overwritten by effects of literacy.

References

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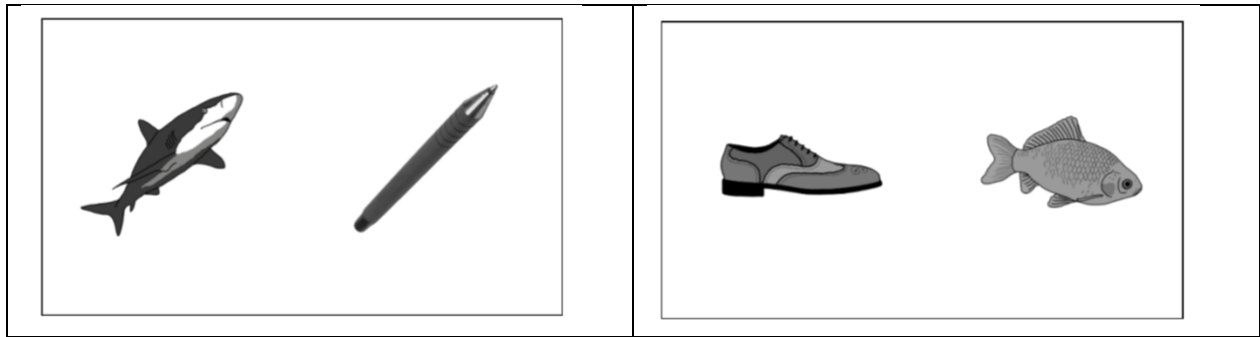
Figure 1: Examples of picture pairs presenting animate and inanimate entities
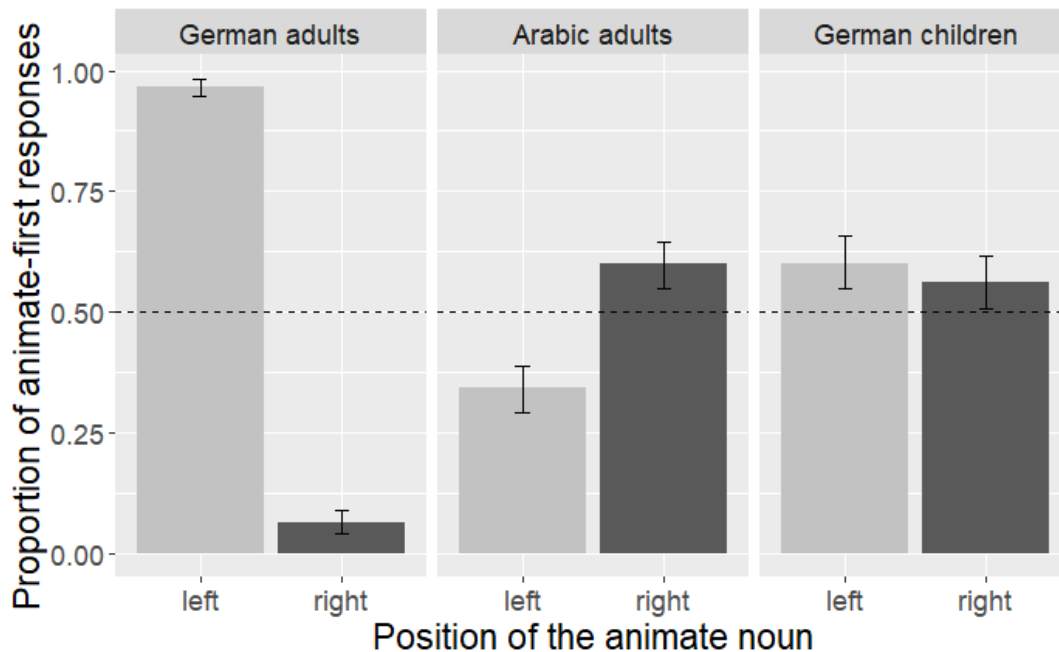

Figure 2: Proportion of animate-first responses for animate nouns in left vs. right position plotted for German adults, Arabic adults, and German children.