AMPLIFYING THE BIAS TO ORDER NOUNS BEFORE ADJECTIVES: STUDIES OF SILENT GESTURE AND EMERGING SIGN LANGUAGE

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Cross-linguistically, roughly 64% of the world's languages order Nouns before Adjectives, compared to the roughly 27% with the reverse order (Dryer, 2013). Yet, the factors driving this cross-linguistic tendency towards the NounAdj (i.e., post-nominal) order remains largely unknown. To investigate this asymmetry, we analyze production corpora elicited from three cohorts of Nicaraguan Sign Language (NSL1, NSL2, NSL3; Exp1a) and Silent Gesturers (Exp1b). Exp2 then examined the contribution of learning biases such as the bias towards regularization (Hudson Kam & Newport, 2005, 2009; Singleton & Newport, 2004) to the prominence of the NounAdj order cross-linguistically.

In Exp1a (NSL 1-3), we extracted 223 manual utterances containing a Noun and at least one Adjective and coded for order (NounAdj or AdjNoun) within each Noun Phrase; utterances where order was ambiguous (e.g., AdjNounAdj/NounAdjNoun) were excluded. Binomial tests showed a reliable preference for the NounAdj order for each NSL cohort (Table 1). Linear mixed models using forward difference contrasts revealed no difference between cohorts (p's > .3), suggesting that the bias towards NounAdj did not strengthen over consecutive generations.[1] In Exp1b, we analyzed 276 Noun Phrases from a production corpus of English-speakers asked to gesture without talking (Silent Gesturers). Although NounAdj preference was weaker for Gesturers compared to NSL cohorts (p < .01), we nonetheless found a preference for NounAdj among Gesturers (Table 1). Thus, manual productions from signers of an emerging

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[1] In Exp1, we also collected utterances from Nicaraguan and Guatemalan Homesigners. However, data from these groups were too sparse to submit for analysis.

language and from native speakers of an AdjNoun language both point to a "natural" (Goldin-Meadow et al., 2008) way of ordering Nouns versus Adjs.

Table 1: Proportion of NounAdj versus AdjNoun utterances for each participant group. Raw counts are given in parentheses.

Language Group	NounAdj	AdjNoun	SD	p	95% CI
NSL1 (n=8)	.84 (62)	.16 (12)	.37	< .001	(.73, .91)
NSL2 (n=6)	.89 (62)	.11 (8)	.32	< .001	(.79, .94)
NSL3 (n=8)	.87 (69)	.13 (10)	.33	< .001	(.78, .94)
Silent Gesturers (n=20)	.61 (168)	.39 (108)	.49	< .001	(.55, .67)

In addition to the cognitive bias towards NounAdj, we also wanted to see how other biases in language – such as the well-known bias toward regularizing variation in an input language (e.g., Hudson Kam & Newport, 2005, 2009; Singleton & Newport, 2004) – might simultaneously contribute to the prevalence of the NounAdj order cross-linguistically. Exp2, therefore, recruited 160 English-speakers to a web-based silent gesture regularization study. Comprehenders saw an event (e.g., someone waving a spotted spoon) and then were trained on two gesture vignettes describing that event. Vignettes differed only in the order of the Noun versus Adj gestures. Critically, the frequency that participants saw NounAdj versus AdjNoun vignettes varied by condition. In Majority NounAdj Conditions, they saw NounAdj and AdjNoun orders in 75% versus 25% of trials, respectively. Frequencies were reversed in the Majority AdjNoun Conditions.

We analyzed Entropy Change scores (Ferdinand et al., 2019; Shannon, 1948) and proportion of Majority Order selections using mixed models. In line with predictions, Entropy Change scores showed evidence of regularization in Majority NounAdj (p's < .01) but not Majority AdjNoun conditions. Participants also selected Majority Order vignettes more frequently when vignettes were in the NounAdj configuration (p < .01). Thus, participants were more willing to regularize towards the NounAdj order than to the AdjNoun order.

Our results point to two factors driving the cross-linguistic prominence of NounAdj word orders. The first is a cognitive bias for NounAdj orders stemming from a "natural" way of representing objects and their attributes. The second factor is a regularization bias amplifying those underlying preferences. Ongoing work investigates the NounAdj order in silent gesture communication and in iterated learning paradigms.

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