Building a Cross-Linguistic Typology of Sentence Planning from Case Alignment

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What determines when there is variation in planning strategies across languages? We investigate this with case alignment, focused on ergative case: a special case for transitive agents (Fig 1) [1]. Ergative case is useful for the question of planning variation vs language variation because (i) many languages will have sentences of the basic form in (1) and (2). Yet, (ii) when languages use ergative case varies widely around the world: e.g., Hindi uses ergative only in the perfective aspect, while the consistently ergative Shipibo (ISO: shp; Peru) uses ergative in all contexts, save two optional exceptions (a DESIDerative and PROGressive)[2].

Hindi speakers co-plan parts of an ergative sentence, especially the verb, at the same time as the ergative noun [3,4], in contrast with speakers of nominative-case languages (e.g., Japanese[5]) who plan agents separately, with a 'just-in-time'/incremental strategy. Across 3 experiments (1 picture-description eyetracking and 2 picture-word interference [ePWI]), we show that Shipibo speakers plan more like Japanese speakers than Hindi speakers, despite the fact that Hindi and Shipibo sentences appear more similar on the surface.

First fixations in the visual world eyetracking picture description experiment (N=46) suggested that Shipibo speakers who initially looked to non-agents were more likely to produce a non-ergative sentence in optionally ergative constructions, based on a Bayesian Bernoulli model (Table 1; e.g., FirstFixAOI x PROG: *p(posterior)*>0=0.95; FirstFixAOI X DESID *p(posterior)*>0=0.91). This pattern is more similar to [6]'s finding that prominence in early visual attention drives later grammatical decisions than [4]'s picture description findings for Hindi, which found distributed attention only for ergative sentences for a much longer stretch of visual attention. Since [4] interpret their Hindi results as evidence of some form of co-planning, Exp 1 is preliminary evidence for a difference in planning strategies between the two languages.

The two ePWI studies (identical except for distractors) investigated evidence for co-planning of the verb (Exp 2) and patient (Exp 3) alongside the ergative noun. Participants described an image while listening to a distractor word (SOA = 0ms). Distractors that are semantically-related to a word being planned during the initial phase of sentence cause interference, and a delay in speech onset. Both studies suggested that Shipibo ergative NPs are planned independent of the rest of the sentence. In the verb experiment (N=48), a semantic interference effect was present in the marginal effects of the μ parameter of a distributed ExGaussian Bayesian model ($ERG_{Interference}$ - $ERG_{Baseline}$ = 0.0712, 95% CI: 0.013 to 0.132) but not when the distractor was related to the verb ($V_{Interference}$ - $V_{Baseline}$ = -0.022, 95% CI: -0.084 to 0.039). The patient study (N=27) found the same overall pattern although it manifested in the β parameter ($ERG_{Interference}$ - $ERG_{Baseline}$ = 0.059, 95% CI: 0.014 to 0.115; $Patient_{Inteference}$ - $Patient_{Baseline}$ = -0.014, 95% CI: -0.029 to 0.059), (see [7] for the roles of μ and β in picture-word interference).

The comparison of the Shipibo results to Hindi [3,4] shows that sentence planning strategy cannot be deduced from sentence form alone. Instead, planning strategy must understood in the context of language-specifics --- e.g., Hindi ERG is dependent on certain marking on the verb and therefore co-plans the verb with the ERG noun [4] while Shipibo uses ERG on (nearly) any transitive [2] and therefore only needs to verify transitivity. These differences are only apparent when looking at use of case across an entire language. Our results expand the cross-linguistic typology of planning strategies based on case alignment and case variability.

(1) E-a-ra isin-ai
1-ABS-EV be.sick-IMPF
I am sick.

(2) Ja-n-ra e-a jamá-ke.
3-ERG-EV 1-ABS kick-PERF
(S)he kicked me.

Examples 1&2: Demonstration of ergative case in Shipibo (adapted from [2])

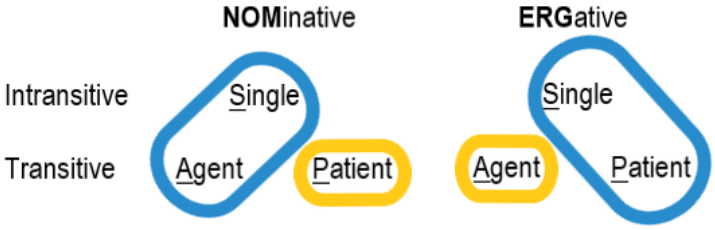

Figure 1: Schematic of the difference between nominative and ergative alignment. Ovals indicate the arguments that use the same morphology

Experiment 1: Visual World Picture Description

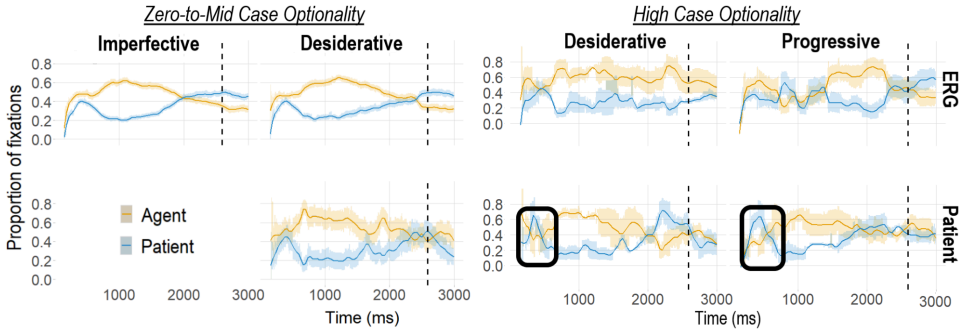

Figure 2: Looks to AOIs across sentence type, divided by the speaker's optionality between cases (low optionality = always ERG*).*

Table 1: Bayesian posterior probability (ERG[0,1] ~ TAM * FirstFix; p(Posterior>0) is prob. mass above 0)

	95% CI	*p(Posterior>0)*		95% CI	*p(Posterior>0)*
DESID	[1.2, 2.4]	1	FirstAOI x DESID	[-0.3, 2.0]	0.91
PROG	[3.4, 4.7]	1	FirstAOI x PROG	[-0.2, 2.2]	0.95

Experiments 2 & 3: Picture-Word Interference

Experiments 2 & 3: the critical statistic is the marginal effect of the *I*nterference condition minus the *B*aseline condition for each of the three targeted constituents (ergative, patient, verb). Analyzed with distributed Bayesian Exgaussian models (parameters: μ,σ,β; μ & β most relevant [7]).

Experiment 2: Verb-Interference PWI

		95% CI	
		2.5%	97.5%
μ	ERG_I - ERG_B	0.013	0.132
	$Verb_I$ - $Verb_B$	-0.084	0.039
β	ERG_I - ERG_B	-0.031	0.064
	$Verb_I$ - $Verb_B$	-0.076	0.018

Experiment 3: Patient-Interference PWI

		95% CI	
		2.5%	97.5%
μ	ERG_I - ERG_B	-0.002	0.130
	$Patient_I$ - $Patient_B$	-0.032	0.097
β	ERG_I - ERG_B	0.014	0.115
	$Patient_I$ - $Patient_B$	-0.029	0.058

[1] Dixon. 1994. *Cambridge Univ. Press*; [2] Valenzuela, 2003. Dissertation.; [3] Zafar & Husain. 2022. *AMLaP*. [4] Sauppe et al. 2021. *PLoS Biology*; [5] Momma et al. 2016. *JEP:LMC*; [6] Gleitman et al. 2007. *JML*. [7] Roelofs & Piai. 2017. *QJEP*. [8] Sauppe et al. *manuscript for submission*.