The Role of Tagalog Voice Information on Sentential Argument Order in Production and Gaze Patterns in Comprehension

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This study examined whether the verbal affixation of voice morphology is utilized to order (in production) and anticipate (in comprehension) upcoming elements in a verb-initial and flexible word order language, Tagalog. Unlike more familiar active/passive voice systems, Tagalog sentences allow multiple transitive patterns for the same set of nominal arguments. Verbs contain a voice-marking affix that identifies one of the arguments as syntactically prominent (the pivot, further indicated by the nominal marker ang); see examples (1)-(4) [1,2,3]. Sentential word order has been claimed to depend on voice morphology [4], suggesting voice could strongly constrain predictions for word order in online comprehension. While earlier psycholinguistic work has provided important evidence for predictive processing [5,6,7,8,9], questions remain about how routinely predictions are made [10]. This study aimed to contribute to this line of investigation by testing an understudied type of linguistic information: voice morphology.

**Experiment 1: Production.** Tagalog permits multiple orders for nominal arguments, but there is controversy regarding word order preference and canonicity. We tested the effect of voice on word order using a sentence continuation task. 30 native Tagalog adults viewed a visual scene containing 4 prototypical arguments (agent, patient, benefactive, and instrument) (Fig1). They then completed a sentence fragment containing a verb in one of the 4 possible voice alternations (Agent Voice [AV], Patient Voice [PV], etc), using all 4 depicted elements. 36 verbs were crossed with 4 voice conditions and 2 scene arrangements in a counterbalanced design. Extending previous studies [10,11] to tests of more voices and arguments, we observed a strong and significant preference for ...Agent-Pivot-... word order in all voices except AV, and two highly frequent word orders in AV (Fig2, confirmed via maximal mixed-effects logistic regression models; critical fs >3.07). These results help clarify proposals in the theoretical literature [4,12], especially for sentences that include understudied benefactive or instrument arguments, and support a cognitive preference for word order patterns that allow high accessibility to elements relevant to syntactic computations (here, agent and pivot arguments) [13,14,15]. Importantly, the results verified a strong effect of voice morphology on word order when all other factors were controlled, and thus voice can be anticipated to be a strong predictor of word order.

**Experiment 2: Visual-world comprehension.** We next tested whether speakers use voice morphology upon hearing the verb (and a following adverb) to anticipate upcoming sentential arguments in real-time comprehension. Recent work has suggested that Tagalog speakers use only verbal semantics and not morphosyntactic information from voice morphology when anticipating arguments [16], but did not control for argument animacy. Given the agent/pivot saliency in Tagalog in Exp1, we predicted increased looks to both agents and pivots at the verb region, with higher looks to the agent/pivot in AV. 34 native Tagalog adults participated in a visual-world experiment. Visual scenes (Fig1) received 1500ms of preview, and remained during sentence presentation (1.5-8s). 36 critical verbs, counterbalanced across 4 voices and 2 visual scene arrangements were interspersed with 72 fillers. Argument animacy was controlled (agents/benefactives were animate; patients/instruments were not). The results of mixed-effects linear regression models revealed no significant effect of voice on looks to agent or pivot AOIs in the critical verb+adverb region (all fs <0.93). Instead, a strong animacy effect was observed (Fig3). In contrast to the findings in Experiment 1, the results suggested an absence of a voice effect on anticipation of upcoming arguments, converging with findings from previous research [16]. These findings suggest the possibility that non-syntactic information (event representations) dominates the processor’s capacity to use syntactic information to predict upcoming input.
Agent Voice (AV)

(1) Nag-luto kani-kanina lang ang nanay ng spaghetti para sa anak gamit ang kawali.

"The mother cooked spaghetti for the child with the pan."

Patient Voice (PV)

(2) Lin>luto kani-kanina lang ng nanay ang spaghetti para sa anak gamit ang kawali.

"The mother cooked spaghetti for the child with the pan."

Benefactive Voice (BV)

(3) Ipinag-luto kani-kanina lang ng nanay ang anak ng spaghetti gamit ang kawali.

"The mother cooked spaghetti for the child with the pan."

Instrumental Voice (IV)

(4) Ipinan-luto kani-kanina lang ng nanay ang kawali ng spaghetti para sa anak.

"The mother cooked spaghetti for the child with the pan."

GLOSS: AG(agent), AV(agent voice), BEN(benefactive), BV(benefactive voice), INS(instrument), IV(instrument voice), NPVT(non-pivot), PAT(patient), PV(patient voice), PVT(pivot)

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