



Agrammatism in Tagalog: voice and relativisation

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ABSTRACT

Background: Virtually nothing is known about the ability of Tagalog speakers with agrammatic aphasia to cope with basic grammatical features of their language. Tagalog is unusual in exhibiting competing transitive patterns thanks to a system of voice that can make either of the verb's arguments syntactically prominent – a prerequisite for undergoing syntactic operations such as relativisation.

Aims: Our objective is to investigate the nature of the syntactic impairment associated with agrammatic aphasia in Tagalog, with special attention to voice patterns and relative clauses (RCs).

Methods and Procedures: Five native Tagalog-speaking patients diagnosed with agrammatism took part in (1) elicited-production and (2) comprehension tasks to assess their ability with respect to voice patterns and (3) elicited-production, (4) imitation, and (5) comprehension tasks to assess their performance on RCs.

Outcomes and Results: Although the participants did poorly on grammatical morphemes, the classic symptom of agrammatism, their impairment was somewhat less severe in patterns involving verb-agent-patient order, the patient-voice in declarative clauses, and the agent voice in RCs.

Conclusions: Our findings reveal a departure from a general cross-linguistic tendency to favour agent-prominent constructions (e.g., the active voice in languages like English), as shown by the participants' greater accuracy on patient voice declaratives than on their agent voice counterparts. Nonetheless, we found evidence of a subject preference in RCs, consistent with reports of a similar advantage in many other languages.

ARTICLE HISTORY

Received 26 February 2017

Accepted 31 July 2017

KEYWORDS

Nonfluent aphasia; Broca's aphasia; symmetrical voice; Philippine-type language; focus

Introduction

Voice and relativisation have long played an important role in the study of agrammatic aphasia, a disorder whose most obvious symptom is the production of telegraphic speech and the corresponding loss of major grammatical patterns (Bradley, Garrett, & Zurif, 1980). Two generalisations have emerged from this line of research:

- (1) All other things being equal, a morphologically complex pattern is more likely to be problematic than a less complex pattern. Thus, comprehension is less impaired

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in active-voice patterns (e.g., *the dog chased the cat*) than in passives (e.g., *the cat was chased by the dog*) since the latter is morphologically more complex than the former (Berndt, Mitchum, & Haendiges, 1996; Caplan & Hanna, 1998; Cho-Reyes and Thompson, 2012; Schwartz, Saffran, & Marin, 1980 for English; Hagiwara & Caplan, 1990 for Japanese; Yarbay Duman, Altinok, Ozgirgin, & Bastiaanse, 2011 for Turkish, among many others).

- (2) Subject relative clauses (SRCs) (e.g., *the dog that chased the cat*) generally show fewer effects of impairment than direct object relative clauses (ORCs) (e.g., *the cat that the dog chased*) (Caramazza & Zurif, 1976; Cho-Reyes & Thompson, 2012 for English; Friedmann, Reznick, Dolinski-Nuger, & Soboleva, 2010 for Russian; Yarbay Duman et al., 2011 for Turkish, among many others).

We focus here on the question of whether these generalisations hold for Tagalog, a major language of the Philippines, with intriguing structural properties that appear to be restricted to Western Austronesian languages (Himmelfmann, 2002). We provide a brief overview of those properties in the next section. We subsequently report on a series of experiments¹ that we conducted with a view to determining the possible effects of agrammatism on voice (two experiments) and relativisation (three experiments) in Tagalog.

Structural properties of Tagalog

Tagalog manifests a system of voice marking that indicates the syntactic prominence of one or the other of a transitive verb's two arguments – the agent in patterns such as (1a) and the patient in patterns such as (1b).² The terms “pivot” and “focus” are often used in the literature on Tagalog to refer to the prominent argument.

- (1) a. Agent Voice
 Humahabol **ang** **aso** ng pusa.
 chase.AV FOC dog NFOC cat
 “The dog is chasing a/the cat”.
- b. Patient Voice
 Hinahabol ng aso **ang** **pusa**.
 chase.PV NFOC dog FOC cat
 “The dog is chasing the cat”.

A defining feature of the Tagalog voice system is its symmetrical character (Foley, 1998; Himmelfmann, 2005), which is manifested in two distinct ways.

First, neither of the two principal voice forms (the agent voice and the patient voice) is morphologically derived from the other. Rather, each is marked by its own special affix (the infix *-um-* for the agent voice in the example above and *-in-* for the patient voice).³ Second, both arguments are marked in comparable ways by a case prefix – *ang* [aŋ] for the focused argument (the agent in the agent voice and the patient in the patient voice) and *ng* [naŋ] for the non-focused argument. Moreover, regardless of the voice pattern, neither argument can be freely deleted (unlike, say, the agent in an English passive). Thus, the agent–patient voice contrast in Tagalog differs significantly from the active–passive voice contrast in English in crucial ways. Of special importance here is the fact that the two Tagalog voice patterns are alike in

Table 1. Summary of verbal and nominal marking in Tagalog voice patterns.

	Agent voice	Patient voice
Verbal affix	-um-	-in-
Case marker for agent	<i>ang</i> [aŋ]	<i>ng</i> [naŋ]
Case marker for patient	<i>ng</i> [naŋ]	<i>ang</i> [aŋ]

their morphological complexity, whereas the more familiar active–passive patterns of English and similar languages are not (Table 1).

Voice plays a major role in the syntax of RCs in Tagalog. In agent voice patterns, relativisation of the agent (the subject)⁴ is acceptable, but relativisation of the patient (the direct object) is unacceptable.⁵

- (2) a. Subject relative clause with agent voice
 aso = ng [humahabol _ ng pusa]
 dog = L chase.AV NFOC cat
 “(the) dog [that _ is chasing a/the cat]”
- b. Direct object relative clause with agent voice
 *pusa = ng [humahabol ang aso _]
 cat = L chase.AV FOC dog
 “(the) cat [that the dog is chasing]”

In the patient voice, in contrast, relativisation of the patient is acceptable, whereas relativisation of the agent is considerably less so, although not completely unacceptable (Pizarro-Guevara & Wagers, 2016).

- (3) a. Direct object relative clause with patient voice
 pusa = ng [hinahabol ng aso _]
 cat = L chase.PV NFOC dog
 “(the) cat [that the dog is chasing _]”
- b. Subject relative clause with patient voice
 ?aso = ng [hinahabol _ ang pusa]
 dog = L chase.PV FOC cat
 “(the) dog [that _ is chasing the cat]”

As mentioned at the outset, voice and relativisation are two loci of impairment for agrammatic aphasia. Tagalog is of special interest for the study of aphasia because its voice system does not seem to treat the agent argument preferentially (as is the case of the English active voice, for example). This raises the possibility that Tagalog-speaking patients with agrammatic aphasia will not show the same differential impairment in voice patterns that is observed in languages like English. An additional issue arises as to how patients with aphasia will cope with the interaction between relativisation and voice, which makes one of the verb’s arguments more eligible to undergo this process than the other. We turn now to the question of how the unique features of voice and relativisation in Tagalog are impacted by agrammatic aphasia.

Study 1: Voice in declarative sentences

We conducted two experiments targeting declarative sentences, one to investigate production and the other to examine comprehension.

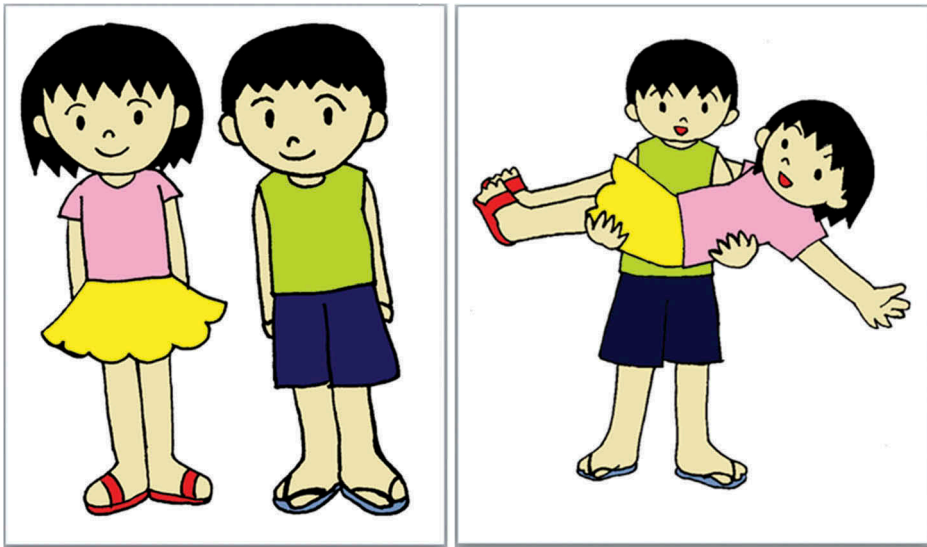


Figure 1. Sample test item for the production task.

Declarative sentences were normed by having 19 native Tagalog adults (age range: 20–58; mean 28.42) rank their naturalness as descriptions of a corresponding picture (see Figure 1) on a 6-point scale, ranging from 1 (unacceptable) to 6 (fully acceptable). The normed items included 10 agent-/patient-voice test items that matched the corresponding picture and 10 that indicated the reverse situation; an additional 72 declarative sentences and pictures were included as fillers. All items in the survey were randomised.

Participants' mean rating for sentences that accurately described the corresponding picture was 5.14 (SD = 1.29) for agent-voice patterns, and 5.67 (SD = 1.13) for patient-voice patterns. All sentences that described the picture inaccurately received low scores (erroneous agent-voice declaratives: mean = 1.28, SD = 0.88; erroneous patient-voice declaratives: mean = 1.38, SD = 1.18).

Using a linear mixed-effects model with voice as a fixed effect and participants and verbs as random effects, there was a significant difference by voice among correct sentences ($\beta = 0.54$, SD = 0.21, df = 17.62, $t = 2.60$, $p < 0.05$).⁶ Using another model with grammatical correctness as fixed effects and participants and verbs as random effects, there was a significant difference in acceptability when voice is constant ($\beta = -4.29$, SD = 0.27, df = 19.20, $t = -15.68$, $p < 0.001$). The survey results thus confirm the suitability of the target declarative sentences and the picture stimuli used in the experiment.

Production of declarative sentences

Participants

Five participants who had been diagnosed with agrammatic aphasia were recruited for our study: three males and two females, ranging in age from 38 to 76 (mean age 57.8). All had Tagalog as their first and dominant language, as is usually the case in the

Philippines, especially in urban areas, they all also had varying degrees of proficiency in English as a second language. The participants were confirmed to have preserved sensory functions by a health professional at the time of assessment. The presence of aphasia and agrammatic symptoms was also confirmed through a standardised assessment adapted from English and/or informal measures⁷ by a qualified and experienced speech-language pathologist. None of the participants had any dementia-related comorbidities (Table 2).

In addition, 16 healthy controls participated in our study – 5 males and 11 females, ranging in age from 50 to 79 (mean age 66.25). All had Tagalog as their first and dominant language, with varying degrees of fluency in English and other second languages. These participants had preserved sensory functions (normal or corrected-to-normal vision and normal hearing), and there were no reports of any medical condition (such as vascular strokes) that might have caused a language disorder.

Materials and procedure

The participants were shown a series of two-picture panels (Figure 1). The first picture introduced two animate characters, with the help of an accompanying sentence *May isang babae at isang lalaki* (“Here are a girl and a boy”). The second picture, which depicted a transitive action involving the two previously introduced characters, was accompanied by a question designed to elicit a transitive declarative sentence: *Ano’ng nangyayari dito?* (“What is happening here?”).

The task began with 3 practice items involving actions that could be described with a simple intransitive sentence. These were immediately followed by the 10 test items involving transitive actions. All responses were audio-recorded and were transcribed by a member of the research team. They were subsequently reviewed by a native Tagalog speech pathologist with experience transcribing aphasic speech. Disagreements (10.00%) from the transcription review were resolved by consensus.

Only a participant’s final response was counted for the purposes of analysis. Each utterance was classified in accordance with its semantic appropriateness and grammatical acceptability, including the presence of obligatory case markers and voice affixes. Phonemic paraphasias and other minor articulatory errors were disregarded.

Results

Performance by the control group on the production task was almost impeccable: lexical morphemes and voice affixes were all produced with 100.00% accuracy, while case marking was produced with 97.77% accuracy. Of the 160 responses, 114 (71.27%) were patient-voice patterns, and just 4 (2.51%) were in the agent voice,⁸ consistent with reports that the patient voice is preferred when the patient is specific and human (Tanaka, 2016). Of the 114 patient-voice patterns, almost all (109; 95.60%) manifested the verb–agent–patient (VAP) word order; 3 of the 4 agent-voice patterns also made use of this word order.

The participants who had been diagnosed with language impairment failed to produce a single grammatical sentence. Their errors reflected the classic profile of agrammatism: there was substantial success in the production of content words, which were produced 95.00% of the time, but severe impairment in grammatical morphemes, which were rarely used correctly. Table 3 summarises our results.

Table 2. Aphasic participants.

Code	Age/ Sex	Medical diagnosis	Localisation of damage	SLP diagnoses	Onset	Vision	Handed- ness	Motor limitations	Length of SLP intervention	Highest educational attainment
E001	76/F	CVA/stroke	Not available	Broca's aphasia	74	Corrected-to- normal	Right	Right hemiparesis	1 year 7 months	College degree
E002	59/M	CVA/stroke	(L) capsulo-ganglionic region extending to the (L) temporal lobe	Broca's aphasia	57	Corrected-to- normal	Right	Right hemiparesis	2 years and 2 months	MD
E007	38/M	CVA/stroke	(L) basal ganglia extending to the (L) centrum semiovale	Broca's aphasia	33	Normal	Right	Right hemiparesis	3 years (with the surveyed SLP)	College degree
E010	40/M	Incomplete CVA	Not available	Broca's aphasia	39	Normal	Right	None	1 year and 4 months	College degree
E017	76/F	CVA/stroke	(L) middle cerebral artery	Broca's aphasia	72	Corrected-to- normal	Right	None	4 years	Elementary

Table 3. Production of declarative clauses by aphasic participants ($n = 5$).

Type of morpheme	Number of contexts where required	Number produced	Number correct
Voice affixes	50	10 (20.00%)	2 (4.00%)
Case markers	70	36 (51.43%)	2 (2.86%)
Lexical morphemes (nouns and verbs)	120	120 (100.00%)	111 (92.50%)

Overall, the language-impaired participants produced voice affixes in only 10 of the 50 sentences where they were required. However, only 2 of these affixes (4.00% overall) were correct. Case marking was used in just 36 of the 70 patterns where it was called for. In those noun phrases where a case marker appeared, *ang* was slightly more common than *ng* (21 vs. 15). However, each of the two case markers was used correctly only once, yielding an overall success rate of just 2.86%.

Finally, it is worth noting that the aphasic participants showed a preference for agent–patient word order in utterances that contain at least two nominal arguments. As summarised in Table 4, the agent–patient order occurred 20 times, compared to just 11 instances of the reverse order.

Summary

The results of our production task appear to confirm the previous diagnosis of the language-impaired participants in our study. All five showed classic signs of agrammatic aphasia, as indicated by their inability to produce grammatical morphemes such as case markers and verbal affixes in both voice patterns, despite considerable success on the production of content words.

Comprehension of declarative sentences

Participants

The same two groups of participants took part in this study.

Materials and procedure

Comprehension was tested with a picture-selection task. Participants were shown a series of two-picture panels, each of which depicted a pair of individuals involved in an action such as chasing (Figure 2). The participants were asked to point to the picture described by an audio-recorded transitive sentence (in this case, the Tagalog equivalent of either “The girl is chasing the boy” or “The boy is chasing the girl”).

The stimuli were crossed in terms of voice (agent voice vs. patient voice) and word order (VAP vs. verb–patient–agent [VPA]), creating four conditions and a total of 20 test items: 5 agent-voice VAP order, 5 agent-voice VPA order, 5 patient-voice VAP order, and 5 patient-voice VPA order. Two sets of test items (varying in terms of item order) were

Table 4. Order of elements among utterances with two nominal arguments ($n = 5$).

Argument order	Number	Per cent (%)
Agent–patient	20	40.00
Patient–agent	11	22.00
<2 arguments	19	38.00

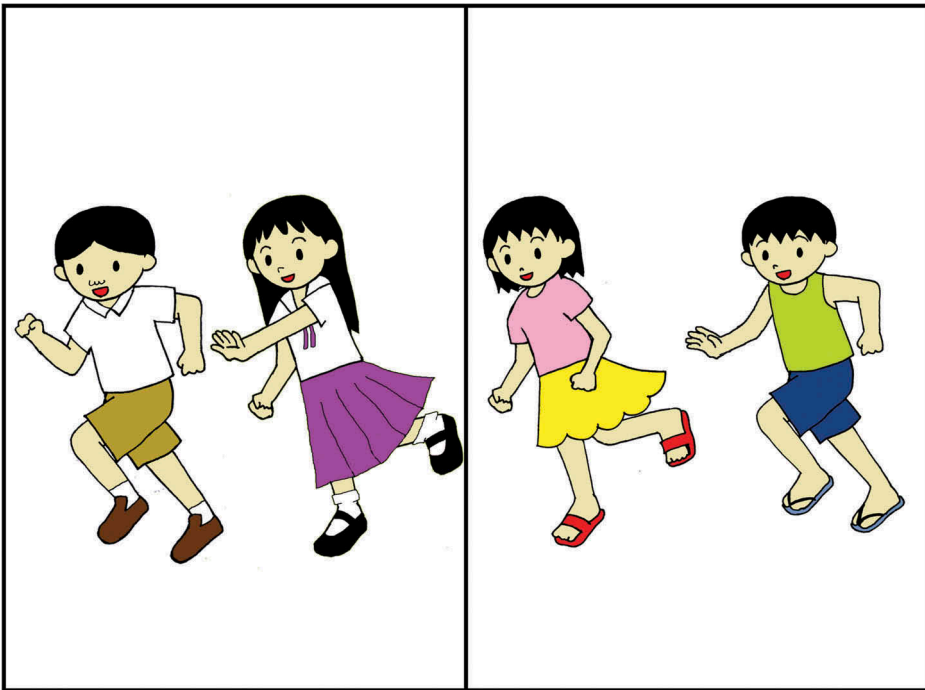


Figure 2. Sample test item for the comprehension task.

created and were administered to participants in a pseudo-randomised manner. All participant responses were recorded by hand.

Results

Performance by the participants in the control group revealed no sign of a voice preference in comprehension, with a success rate of 87.50% on the agent voice and 91.88% on the patient voice. However, there were strong indications of a word order preference. When the VAP order was employed in the test items, participants responded correctly 98.75% of the time in both voice patterns, compared to a success rate for the VPA order of just 76.25% in agent voice patterns and 85.00% in patient voice constructions.⁹ All errors involved “reversals” – interpreting a sentence such as “The girl is chasing the boy” as if it were “The boy is chasing the girl” (Table 5).

A mixed effects logistic regression model with word order and voice as fixed effects and participants as random effects reveals a significant effect of word order ($\beta = -3.94$, $SD = 1.15$, $z = -3.44$, $p < 0.001$). There was no significant effect of voice type ($p = 0.10$) nor was there a significant interaction effect between voice and order ($p = 0.62$).

Table 5. Comprehension of declarative sentences by controls (% correct; $n = 16$).

Word order	Agent voice	Patient voice
VAP order	79/80 (98.75%)	79/80 (98.75%)
VPA order	61/80 (76.25%)	68/80 (85.00%)
Total	140/160 (87.50%)	147/160 (91.88%)

VAP: Verb-agent-patient; VPA: verb-patient-agent.

Table 6. Comprehension of declarative sentences by agrammatic participants ($n = 5$).

	Agent voice	Patient voice
VAP order	15/25 (60.00%)	18/25 (72.00%)
VPA order	11/25 (44.00%)	15/25 (60.00%)
Total	26/50 (52.00%)	33/50 (66.00%)

VAP: Verb-agent-patient; VPA: verb-patient-agent.

The success rate for our aphasic participants was substantially lower, revealing an effect both of voice and of word order, as illustrated in Table 6.¹⁰

Overall, the participants with agrammatism performed better on the patient voice than the agent voice regardless of word order (66.00% vs. 52.00%); moreover, no individual participants performed better on agent-voice patterns than on the patient-voice constructions. As was the case with the control group, all errors involved reversals. Furthermore, like the control group, agrammatic participants were more successful on sentences with the VAP order than on those with the VPA order (60.00% vs. 44.00% in the agent voice, and 72.00% vs. 60.00% in the patient voice). No participant was more successful on the VPA order than on the VAP order.

Summary

Our results point to two conclusions. First, in contrast to the situation in other languages for which data are available, our agrammatic participants do not show a preference for the voice pattern in which the agent is syntactically prominent (e.g., the active voice in languages like English, with the agent in subject position). Rather, they are more successful on the patient voice pattern, which is known to occur more commonly than its agent-voice counterpart (Cooreman, Fox, & Givón, 1984). Similar findings have been reported for Standard Indonesian among individuals with Broca's aphasia (Jap, Martinez-Ferreiro, & Bastiaanse, 2016).

Second, we see the same preference for the agent-patient order observed in the production task, as well as in the performance of our control participants. It remains to be determined whether this preference reflects frequency of occurrence in the ambient language or a more general propensity to arrange a verb's arguments in an order that reflects the way events unfold in the real world, with the agent/instigator preceding the patient toward whom the action is directed (Croft, 1991, p. 262; Langacker, 1995, pp. 18–20; O'Grady & Lee, 2005; Goldin-Meadow, So, Ozyurek, & Mylander, 2008; among many others).¹¹

Study 2: RC patterns

We carried out three studies on relativisation – one on production, a second on comprehension and a third on imitation.

All target RCs and corresponding picture stimuli (see Figure 3) were normed with 20 native Tagalog adults (age range: 23–69; mean 29.8), with the help of an online six-point survey (with 1 corresponding to “unacceptable” and 6 to “completely acceptable”). The surveyed items included 15 SRCs and ORCs that correctly described a designated individual in the accompanying picture and 15 SRCs and ORCs that did not; an additional 108 RCs of other types, along with accompanying pictures, were included as fillers. All items in the survey were randomised.

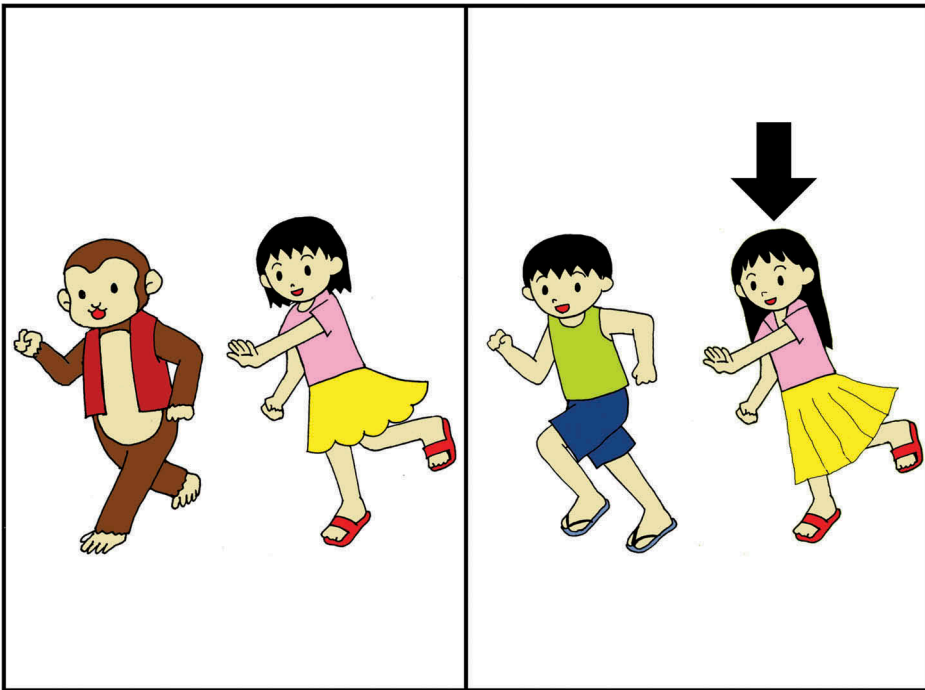


Figure 3. Sample test item for the production of relative clauses.

Participants gave SRCs¹² that accurately picked out the designated individual a mean rating of 5.62 (SD = 0.95), compared to of 5.82 (SD = 0.85) for appropriate ORCs. All SRCs and ORCs that failed to describe the designated individual received low ratings (mean for erroneous SRCs = 1.45, SD = 1.36; mean for erroneous ORCs = 1.28, SD = 0.67).

Using a mixed effects linear regression model with voice as fixed effects and participants and verbs as random effects, there was no significant difference by voice among correct RCs ($\beta = 0.20$, SD = 0.12, df = 280.00, $t = 1.69$, $p = 0.09$). Using another model with grammatical correctness as fixed effects and participants and verbs as random effects, there was a significant difference in grammatical correctness when voice is constant (for SRCs: $\beta = -4.17$, SD = 0.14, df = 274.72, $t = -30.30$, $p < 0.001$; for ORCs: $\beta = -4.54$, SD = 0.10, df = 280.00, $t = -45.82$, $p < 0.001$).

These results confirm the suitability of the target RCs and the picture stimuli used in our experiment.

Production of RCs

Participants

The same two groups of participants took part in this study.

Materials and procedure

Test materials consisted of a series of two-picture panels, each depicting a transitive action with two animate participants, as illustrated in Figure 3 (Tanaka et al., 2016a).

Each panel was accompanied by a two-sentence descriptive prompt, such as (in the case of Figure 3) *Humahabol ang isang babae ng unggoy. Humahabol ang isa pang babae ng lalaki.* (“A girl is chasing the monkey. Another girl is chasing the boy”). At this point, an arrow appeared over one of the figures, who the participant was asked to identify. As established in work by Hsu, Hermon, and Zukowski (2009), Kim (2013), and Tanaka (2016), this situation strongly favours the production of an RC – a pattern such as (4) in the case of the example illustrated in Figure 3.

- (4) babae = ng [humahabol ng lalaki]
 girl = L chase.AV NFOC boy
 “the girl who is chasing the boy”

The task began with 3 practice items that were designed to elicit simple adjectival RCs. These were followed by 10 actual test items involving transitive verbs (5 SRCs and 5 ORCs), arranged in random order.

Because of a concern that the voice pattern used in the prompt sentences might influence the participants’ choice of RC type, we prepared two lists of test items. One task had half of the sentence prompts in the agent voice, and half of the prompts in the patient voice. The other task had the prompts in the reverse voice.

The two versions of the test were administered to the participants in a pseudo-randomised order, with an interval of 1–4 weeks between the two versions of the test. (One agrammatic participant was unavailable to take the test a second time.) All responses were audio-recorded and transcribed for later analysis.

Results

The performance of the control group was unsurprising. Their overall response rate for targeted responses was in the 70–78% range (on par with other elicited production studies on native adults, including English, e.g., Hsu, Hermon & Zukowski, 2009, who found a targeted response rate of 82% and Kim and O’Grady, 2015 who report a success rate of just 75% for ORCs in English). Although participants sometimes avoided production of RCs or produced RCs of a different type than the one the experimenters had targeted (a common occurrence in elicited production experiments in general), comparatively few responses involved grammatical errors (Table 7).

A mixed effects logistic regression model with RC types and voice pattern in the prompt sentences as fixed effects and participants and verbs as random effects revealed no significant effect of RC type ($p = 0.45$) or prompt ($p = 0.17$) and no interaction effect between RC type and prompt ($p = 0.13$).

In contrast, the performance of the agrammatic participants was very poor: only one RC (see (5)) was produced and even it contained an error (the linker *-ng* on the head noun *babae* “girl” is missing).

Table 7. Production of relative clause by control group participants ($n = 16$).

Response categories	Subject relative clauses	Object relative clauses
Target responses	125/160 (78.13%)	112/160 (70.00%)
Other acceptable RCs	23/160 (14.38%)	18/160 (11.25%)
Errors	12/160 (7.5%)	30/160 (18.75%)

RC: Relative clause.

- (5) babae [nambabasa? ng lalaki]
 girl wet.AV NFOC boy
 "the girl who splashed the boy"

The two most common response types involved a bare verb accompanied by one or more caseless nominals (37.78% of all SRCs, 46.67% of all ORCs) and verbless patterns that consisted just of bare nominals (17.78% of all SRCs, 13.33% of all ORCs).

- (6) a. Pattern involving a bare verb:

Target: babae = ng [binubuhat ng lalaki _] (ORC)
 woman = L hug.PV NFOC man
 "the woman who the man carries"

Response: babae at lalaki... lalaki at babae... buhat... bubuhat [E002]
 "woman and man... man and woman... carry... carry"

- b. Verbless pattern:

Target: babae = ng [binubuhat ng unggoy _] (ORC)
 woman = L hug.PV NFOC monkey
 "the woman who the monkey carries"

Response: ito... ano... lalaki... (self-corrects) **babae... unggoy...** ganun
 "this... uhm... man... (self-corrects) woman... monkey... so-and-ganun... **babae** kaya... kaya ito ito... **babae** [E017]
 so... woman then... then this this... woman"

Summary

Our agrammatic participants were unable to produce RCs with any degree of success. The preponderance of bare nominals and bare verbs in the participants' responses is expected – it is, after all, the defining feature of agrammatism. However, in contrast to the results of our study of declarative clauses (where agrammatic patients exhibited a patient-voice advantage), neither voice pattern had a mitigating effect on the production of RCs. It seems plausible to attribute this result to the greater complexity of RCs, which (unlike declarative clauses) require an external head-noun and a corresponding clause-internal gap.

Comprehension of RCs

Participants

The same two groups of participants took part in this study.

Materials and procedure

Comprehension was tested with the help of a character-selection task. Participants were shown a series of two-picture panels, each of which depicted a pair of individuals involved in an action such as carrying, as illustrated in Figure 4 (Tanaka et al., 2016b).

- (7) Ituro mo ang babae = ng [binubuhat _ ng lalaki]
 point you FOC girl = L carry.PV NFOC boy
 "Point to the girl who the boy is carrying".

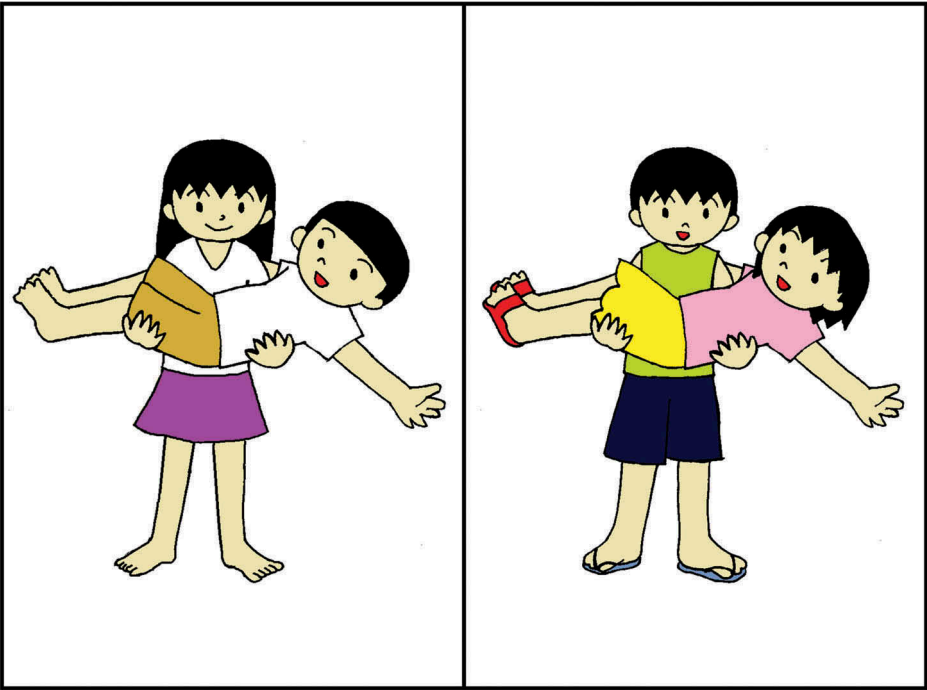


Figure 4. Sample test item for the comprehension of relative clauses.

The task began with 3 practice items involving simple intransitive RCs, such as (8), followed by 10 actual test items (5 SRCs and 5 ORCs) arranged in random order.

- (8) ang babae = ng [tumatalon]
FOC girl = L jump.AV
“the girl who is jumping”

Two sets of test items were created, each with a different item order. The sets were administered to the participants in a pseudo-randomised manner. All responses were recorded by hand for later analysis.

Results

The participants in our control group performed nearly flawlessly in their comprehension of SRCs, attaining a success rate of 98.75%. They did somewhat less well on ORCs, where they responded correctly just 85% of the time (Table 8). (A similar asymmetry for normal adults on this sort of task was reported by Tanaka (2016).)

A mixed effects logistic regression model with RC types as fixed effects and participants and verbs as random effects revealed a significant effect of RC type ($\beta = 1.55$,

Table 8. Comprehension of relative clauses by control group participants ($n = 16$).

Subject relative clause	Object relative clause
79/80 (98.75%)	68/80 (85.00%)

SD = 0.66, $z = 2.37$, $p < 0.05$). The most common error (11.25% of all responses) involved reversals – interpretation of ORCs as if they were SRCs.

- (9) *Test item:* babae = ng [humahabol _ ng lalaki]
 girl = L chase.AV NFOC boy
 “the girl who is chasing the boy”

Reversal Error: Test item is interpreted as if it were:

babae = ng [hinahabol ng lalaki _]
 girl = L chase.PV NFOC boy
 “the girl who the boy is chasing”

The agrammatic participants did much less well than the controls, with a success rate of just 56.00% on SRCs and 40.00% on ORCs.¹³ No participant did better on ORCs than on SRCs (Table 9).

The most common error on SRCs (40.00% of all responses) involved selection of the wrong head noun so that (for example) “the girl who is chasing the boy” is interpreted as “the boy who is chasing the girl”.

- (10) *Test item:* babae = ng [humahabol _ ng lalaki]
 girl = L chase.AV NFOC boy
 “the girl who is chasing the boy”

Head Error: Test item is interpreted as if it were:

lalaki = ng [humahabol _ ng babae]
 boy = L chase.AV NFOC girl
 “the boy who is chasing the girl”

Two error types were particularly common for ORCs – interpreting the clause as if it were an SRC (32.00% of all responses) and choosing the wrong head (20.00% of all responses).

- (11) a. *Test item:* babae = ng [hinahabol ng lalaki _]
 girl = L chase.PV NFOC boy
 “the girl who the boy is chasing”

Reversal Error: Test item is interpreted as if it were:

babae = ng [humahabol _ ng lalaki]
 girl = L chase.AV NFOC boy
 “the girl who is chasing the boy”

- b. *Test item:* babae = ng [hinahabol ng lalaki _]
 girl = L chase.PV NFOC boy
 “the girl who the boy is chasing”

Head Error: Test item is interpreted as if it were:

lalaki = ng [hinahabol ng babae _]
 boy = L chase.PV NFOC girl
 “the boy who the girl is chasing”

Table 9. Comprehension of relative clause by aphasic participants ($n = 5$).

Subject relative clause	Object relative clause
14/25 (56.00%)	10/25 (40.00%)

Summary

At first glance, it might seem surprising that agrammatic participants did as well as they did on SRCs (agent-voice) compared to ORCs (patient-voice). While comprehension was not significantly better on SRCs than on ORCs, it was numerically higher, and more importantly, it did not lag behind the success rate for patient relatives. This is surprising at first glance, given that the patient-voice pattern is the more frequent form in the language and that the participants prefer that voice pattern to the agent voice in simple declarative sentences (Study 1). However, a countervailing force may well be at work here.

There is independent reason to believe that there is a general preference across languages for SRCs, as manifested both in work on typology (Hawkins, 2004, p. 169) and on language acquisition (Kim & O'Grady, 2015). Consistent with this tendency, we see an interpretive advantage in favour of SRCs both in the performance of our control group, who do significantly better on patterns of that type than on ORCs, and in children learning Tagalog as a first language (Tanaka, 2016). It has been suggested that this preference is partially pragmatic in character: RCs have to be about their head noun and clauses are often most naturally construed as being about the referent of the subject/agent (e.g., Hsu et al., 2009, pp. 350–351; MacWhinney, 2005). If this idea is on the right track, it may help explain why the preference for SRCs survives the impairment associated with agrammatism.

Imitation of RCs

Participants

The same two groups of participants took part in this study.

Materials and procedure

Participants were asked to repeat a series of audio-recorded RCs. The task began with 3 practice items involving simple intransitive RCs, followed by 10 actual test items (5 SRCs and 5 ORCs) arranged in random order. Two sets of test items were created, each with a different item order. The sets were administered to the participants in a pseudo-randomised manner. All responses were audio-recorded and transcribed for subsequent analysis.

Results

Participants from our control group performed near ceiling on the imitation task, with 100% accuracy on SRCs and 98.70% accuracy on ORCs, where a single error was made.

The aphasic participants did much less well: there were just seven successful repetitions of SRCs, for an overall success rate of 28.00%; not a single ORC was imitated

Table 10. Imitation of relative clause by aphasic participants ($n = 5$).

Subject relative clause	Object relative clause
7/25 (28.00%)	0/25 (0.00%)

correctly (Table 10). (Of the seven correct responses, three came from a single participant; two other participants each correctly imitated two test items.)

Sixteen per cent of the SRC test items and 16.00% of the ORC items elicited no response at all. Common error types involved use of a bare verb along with one or more nominals (24.00% of all SRCs and 8.00% of all ORCs) and use of a verbless pattern (24.00% of all SRCs and 16.00% of all ORCs). Case was correctly used just 4.00% of the time in both voice patterns.

(12) a. Bare verb pattern

Test item: nanay na [hinihila ng bata _]
 mother L pull.PV NFOC child
 "the mother who the child is pulling"

Response: ano, ano ... nanay... bata... ganun, ganun... hila, hila...
 [E017]
 "hmm, hmm... mother... child... so-and-so... pull"

b. Verbless pattern

Test item: nanay na [naghihintay _ ng anak]
 mother L wait.for.AV NFOC child
 "the mother who waits for the child"

Response: nanay ang... ano. [E010]
 "mother the... what".

Summary

The results of the imitation task support two conclusions. First, they confirm that the production of RCs creates very substantial difficulties for agrammatic speakers. This difficulty is manifested either through the omission or the incorrect use of the verbal affixation and case inflection expected in RCs. Second, they provide independent evidence for the earlier finding that SRCs enjoy an advantage over their object counterparts.

General discussion and conclusion

We set out to determine the impact of agrammatism on voice patterns and RC types in Tagalog, a language in which both grammatical systems manifest typologically unusual properties. Despite the limited number of participants and of experimental items – a common feature of preliminary studies of agrammatism in new languages, our study supports five conclusions.

- (1) Our Tagalog-speaking agrammatic participants encounter major difficulty in the production of all clause types tested (declarative clauses and RCs, agent voice, and patient voice), due primarily to problems with voice affixes and case markers.
- (2) They are overall better at comprehending patient-voice declarative clauses than agent-voice declarative clauses. At an individual level, no agrammatic participant did better on agent-voice patterns than on patient-voice constructions.
- (3) They are overall better at comprehending VAP patterns than VPA patterns, regardless of voice. At an individual level, no agrammatic participant did better on VPA patterns than on VAP constructions.

- (4) They are overall better at comprehending SRCs (agent-voice) than ORCs (patient-voice). At an individual level, no agrammatic participant did better on patient-voice patterns than on agent-voice constructions.
- (5) They are overall better at imitating SRCs (agent-voice) than ORCs (patient-voice). At an individual level, no agrammatic participant did better on patient-voice patterns than on agent-voice constructions.

These findings have at least two general implications.

First, it is evident that there is no universal preference for syntactic constructions that treat the agent argument as syntactically prominent, as English active-voice sentences do. The Tagalog-speaking agrammatic participants were essentially unable to produce grammatical sentences in either voice and manifested a preference for *patient*-voice patterns in the comprehension of declarative clauses.

Second, despite an evident preference for the patient voice in declarative clauses, our Tagalog-speaking agrammatic participants manifested a preference for subject or *agent*-voice patterns in RCs, as indicated by their performance on both the comprehension task and the imitation task. This result seems to align with a cross-linguistic subject advantage in RCs that has been well documented in studies of typology, processing, and language acquisition.

One fact in particular seems to stand out, when we compare our results with the findings reported in the larger literature on agrammatism. As noted at the outset, it is generally reported that impairment correlates with morphological complexity – a paradigm example involves the relative difficulty of passive patterns compared to their morphologically simpler active counterparts. Crucially, however, the asymmetries in performance that we have observed cannot be attributed to the presence or absence of grammatical morphology per se. Both voice patterns that we studied require a voice affix on the verb and case marking on the verb's arguments; neither is morphologically more complex than the other, unlike the contrast between actives and passives in English. Yet, depending on the clause type (declarative vs. relative), certain patterns were more difficult than others for our agrammatic participants.

Interestingly, the patterns on which the impaired Tagalog-speaking participants did best in comprehension (patient voice and VAP word order in declarative clauses, and subject or agent-voice constructions in RC patterns) are also the patterns on which our control group did best; moreover, they are also the patterns preferred by child language learners (Tanaka, 2016).

A variety of overlapping factors could be responsible for these parallels. One involves grammatical markedness, as reflected in breadth of usage: whereas patient-voice patterns are common with both animate and inanimate patients, the agent-voice patterns occur predominantly when the patient argument is inanimate (Tanaka, 2015; Tanaka et al., 2014). Second, there is the possible effect of processing considerations, especially in RC patterns which are known to manifest a subject preference across a broad range of languages for reasons often attributed to processing cost (Hawkins, 2004; Kim & O'Grady, 2015). Third, it is essential to consider the role of frequency effects, which are common correlates both of grammatical markedness and of contrasts in processing difficulty (e.g., Hawkins, 2004). Further exploration of these issues should be a priority in the next stage of research on Tagalog agrammatism.

Notes

1. All experiments have met the ethical requirements for their implementation, as stipulated by the University of Hawai'i Human Studies Program, CHS#23949.
2. List of abbreviations: AV: Agent voice; PV: patient voice; FOC: focus; NFOC: non-focus; L: linker; RC: relative clause; SRC: subject relative clause; ORC: direct object relative clause; VAP: verb-agent-patient word order; VPA: verb-patient-agent word order.
3. The agent voice can also be expressed with *mag-* and *mang-*; patient voice can also be indicated by *i-*.
4. Because agents have key subject properties in Tagalog by the criteria outlined in Keenan (1976), we refer to agent relative clauses as subject relative clauses and patient relative clauses as direct object relative clauses in this study.
5. Tagalog allows scrambling of its arguments in both voice types, and there is still uncertainty as to the canonical word order of the language. The position of the gap in our examples assumes a verb-agent-patient word order, which is preferred by children (Garcia, Dery, Roeser, & Hoehle, 2016; Tanaka, 2016).
6. The significant difference between voice among correct sentences in the survey might be attributed to the strong preference among participants for patient voice when the patient is animate and specific (Tanaka, 2015; Tanaka et al., 2014), which was the case in our stimuli items. Regardless, the mean rankings of the correct AV and PV declaratives still entail a high grammatical acceptability for these sentences.
7. There are no standardised assessment tools for aphasia for any Philippine languages.
8. Of the remaining 42 responses, 37 were intransitive and stative patterns, 4 responses involved non-declaratives (inverted sentences and relative clauses), and 1 response involved a patient voice declarative with a case marking error.
9. A success rate of 70% by normal adults on certain sentence patterns has been observed in other studies as well. Ferreira (2003) reports a comprehension rate of 79–85% by native speakers of English (all college students) on passive sentences such as *The man was visited by the woman*, which also manifest a patient-agent order. Schumacher et al. (2015) reports a 63.2–72.8% range of accuracy in the German object-verb-subject topicalisation pattern among healthy adults.
10. Due to the small number of participants in the experimental group, we do not include tests of statistical significance.
11. Attention to word order may reflect that fact that neither case nor voice can identify the agent or the patient on its own: The *ang*-marked NP is the agent only in the agent voice, and the patient only in the patient voice. In contrast, word order offers a potentially simple single-clue strategy for sentence interpretation.
12. As mentioned earlier, we refer to agent relative clauses as subject relative clauses and patient relative clauses as direct object relative clauses in this study.
13. The performance of agrammatic aphasics on SRCs versus ORCs is not as close to chance as it might appear to be, as the character-selection task makes available four possible responses for each test item.

Acknowledgments

The authors thank the Filipino speech-language pathologists Arnold Barzaga, Valerie Bautista, Howell Bayona, Christine Medina-Chin, Carla Cuadro, Jessamae Fadri, Ferdiliza Garcia, Elea Gonzalez, Erlinda Lim, Jocelyn Marzan, and Sheryl Sibug-Wong for their assistance in recruiting participants for the study. We are grateful to the Memory Center at St. Luke's Medical Center (Quezon City) and Department of Rehabilitation Medicine, Veterans Memorial Medical Center for allowing us to conduct our research in their institutions. The authors are also indebted to the healthy participants and patients with agrammatic aphasia who devoted their time in participating in this study. Special thanks are also given to Tricia Olea-Santos for her

feedback on our research, and to Ma. Concepcion Segismundo for her assistance in reviewing our transcriptions.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

This research did not receive external funding.

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