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ABSTRACT

Background: Agrammatic speech is characterized by reduced speech rate, reduced utterance length and lack of grammatical complexity, with grammatical morphemes often omitted or substituted. At the word level, verbs have been argued to be particularly vulnerable: agrammatic speakers produce fewer verbs or use a less diverse range of verbs than unimpaired speakers and the use of finite verbs is compromised. However, this description is based on agrammatic narrative speech from languages that express Tense, Aspect and Agreement through verb inflection. To date, a few studies have described narrative speech in a language without verb inflection (e.g., Standard Indonesian). Thai is another language that does not use verb inflection but uses constructions with serial verbs. Another typical feature of Thai, which has not been investigated in agrammatic speakers, is the use of particles to express politeness, although agrammatic speakers of Standard Indonesian have an impaired use of (different) particles but produce the passive construction (which is a way to express politeness) to a normal extent.

Aim: The current study aimed to characterize Thai agrammatic speech and to analyse the use of verbs and polite particles.

Methods: Nine Thai agrammatic and nine non-brain-damaged (NBD) speakers participated in the study. Narrative speech was elicited in a semi-standardized interview and by picture description. First, the presence of general features of agrammatic speech were investigated in Thai: reduced speech rate and utterance length, and lack of grammatical complexity. This was followed by an in-depth analysis of verb and particle production.

Results: As in other languages, Thai agrammatic speakers talked slowly and with short utterances. However, the use of embedded sentences was normal. They produced fewer verbs, more specifically, their production of the serial verb construction was seriously impaired. Remarkably, the use of polite particles was spared, in fact, the agrammatic speakers produced more of these particles than the NBD speakers, although this may have been influenced by the context.

Conclusions: Thai agrammatic speech resembles that of other languages in terms of speech rate and utterance length. Interestingly, the specific features of Thai that were investigated, serial verbs and polite particles, both showed different patterns to normal, and merit further investigation in the future.
**Introduction**

Agrammatic speech is typical in people with Broca’s aphasia and is traditionally characterized by nonfluent speech output, with relatively well-preserved comprehension of single words. Research has shown that, relative to non-brain-damaged (NBD) speakers, individuals with agrammatic aphasia produce slow, effortful speech, with simplified grammar. In other words, there is a reduction in the number of words uttered per minute, and complex sentences, such as embeddings and passives are rarely used (e.g., Saffran et al., 1989; Thompson et al., 2010 for English; Bastiaanse & Jonkers, 1998 for Dutch; Arslan et al., 2016 for Turkish; Abuom & Bastiaanse, 2012 for Swahili-English; but see Anjarningsih et al., 2012 for passives in agrammatic speakers of Standard Indonesian). The spontaneous speech of agrammatic speakers with aphasia consists mainly of content words such as nouns, verbs, and adjectives, whereas function words and grammatical morphemes are often omitted and/or substituted (Goodglass & Kaplan, 1972).

As noted by Arslan et al. (2016), the narrative and spontaneous speech of individuals with agrammatic aphasia has been examined across languages for several decades. Menn and Obler (1990) published a cross-linguistic source book of agrammatic speech in many different languages, including English, German, French, Italian, Finnish, and Hebrew. In depth investigations of agrammatic speech in a variety of languages have also been performed (e.g., Italian: Miceli et al., 1989; Dutch: Bastiaanse & Jonkers, 1998; English: Saffran et al., 1989; Thompson et al., 2010; Turkish: Arslan et al., 2016; Swahili-English bilinguals: Abuom & Bastiaanse, 2012).

However, whilst this previous research has contributed substantially to our understanding of how agrammatic speech manifests itself across a variety of languages, the focus was predominantly on Indo-European languages, with a relative lack of characterization of languages that have different grammatical features; in particular, Asian languages (but see, Packard, 1993 for Chinese; Anjarningsih et al., 2012 for Standard Indonesian). The current study explored the characteristics of narrative speech of Thai speakers with agrammatic aphasia.

**Some relevant characteristics of Thai**

In this paper, “Thai” refers to Standard Thai, the official language and language of instruction in government schools and official locations in Thailand. Thai is a language with a fixed Subject-Verb-Object (SVO) word order (Sudmuk, 2003). It is an isolating or an “analytical” language, a language that primarily uses specific words (i.e., free-standing morphemes) rather than inflections, to convey grammatical relations in sentences (Thiengburanatham, 2013). Unlike English or other Indo-European languages that have a combination of grammatical morphemes that can stand alone (such as articles) and those that are bound (inflectional affixes), Thai uses only free-standing morphemes.¹ For example, while in English plurality on nouns is indicated by the use of affixes -s/(e.g., cat – cats), – /z/(e.g., dog – dogs) or -/iz/(e.g., bus – buses), Thai uses additional words yer: “lot”, as illustrated in (1–2).

(1) chan sue nungsue
    I        buy  book
    “I buy a book.”
(2) chan sue nungsue yer
   I      buy  book  lot
   “I buy (a lot of) books.”

**Serial verb constructions**

As illustrated by the underlined words in (3), in Thai, a sequence of verbs can be produced consecutively.

(3) Suda dern pai ha mhor lung lerk ngan
   Suda  walk  go  see  doctor  after  finish  work
   “Suda walks to go and see the doctor after finishing work.”

This linguistic feature is known as “serial verb construction” where more than one verb can be juxtaposed in a single clause with no overt conjunction between the verbs (Chuwicha, 1993; Muansuwan, 2002). Many studies have proposed that when there is more than one verb in a clause, then that clause is verb-serialized (Chuwicha, 1993; Muansuwan, 2002; Sudmuk, 2005; Takahashi, 2009; Thepkanjana, 1986; Wilawan, 1993). For example, as illustrated in (3), the underlined words “dern pai ha” refer to three individual free-standing lexical verbs (“to walk”, “to go”, “to see”) that can be independently used in a sentence. Nonetheless, in the example given, they are concatenated in a single clause. This phenomenon occurs in many languages, but the number of verbs expressed by serial verb constructions differs from language to language (Foley, 2008). No studies have examined the mean/range of the number of verbs per clause/sentence for serial verb constructions in Thai.

Further, although verb serializations have been widely discussed in the Thai linguistic literature, there is no consensus as to how many types of serial verb constructions there are. While Thepkanjana (1986) classified serial verbs in Thai into seven categories according to the functions of serial verbs, Wilawan (1993) grouped them into two major groups based on the syntactic properties of the first verb in the series. Sudmuk (2005), however, divided the serial verb constructions into eight types “with respect to the restriction of the limited set of verbs that occur in the series.” (p. 9). Although the classification of verb series is controversial, these serialized verbs have common features: according to Takahashi (2009), they “designate a certain substantial event or situation (action, process, change, state, and so on) and share at least one nominal argument, which may or may not be explicitly expressed.” (p. 215)

**Time reference**

Since Thai does not have inflected verbs, time reference to completed, ongoing and future events is achieved through so-called “aspectual adverbs” (see 4–6). Aspect can be classified as imperfective and perfective. Imperfective aspect indicates that an event is ongoing, and perfective aspect denotes that an event has been finished and is completed. In (4–6), underlined words are aspectual adverbs; italicized words are temporal lexical adverbs.

(4) meuxwan ter du teevee leaw
    yesterday she watch television PERF
   “Yesterday, she watched television.”
(5) tonnee ter kamlang du teevee
    now she IMPERF/PROG watch television
    “Now, she is watching television.”

(6) prungnee ter jaa du teevee
    tomorrow she IMPERF watch television
    “Tomorrow, she will watch television.”

Aspectual adverbs are optional and can be omitted when the time frame of the event is clear from the context. In the above examples, the time frame is set by the temporal lexical adverb, so leaw, kamlang and jaa can be left out; however, when they are realized, the sentence is equally grammatical and pragmatically acceptable. The same applies for temporal lexical adverbs. Hence, (ter) du teevee: “(she) watch television” can be used in response to any of these questions: “What is she doing now?”, “What did she do yesterday?”, and “What will she do tomorrow?” as the time frame can be referred from the leading questions.

**Polite particles**

Particles are lexical meaningful free morphemes added to the end of a clause or a sentence. While English and other Indo-European languages use intonation and prosody to express the meaning of a sentence (e.g., by varying on the tone of the voice, the meaning of “Come here” can be changed from a mild entreaty to an authoritative command), Thai uses particles to change the mood of a clause or a sentence: making it softer, more polite, more commanding, or more sarcastic. Here the focus is on particles to express politeness. These particles are the most common particles and the ones most relevant for the current study. Khrap is used by male speakers as in (7), and kha is used by female speakers, as in (8).

(7) Nguang mhai khrap?
    sleepy right PART
    “Are you sleepy? (uttered politely by a male speaker)”

(8) Nguang mak kha
    sleepy very PART
    “Very sleepy (uttered politely by a female speaker)”

According to Prasithrathsint (2001), polite particles are discourse markers that operate at a pragmatic level where they are used to mark politeness in interpersonal communication. They also connote the social status and the gender of the speaker (Prasithrathsint, 2001) and indicate turn-taking (Prasithrathsint, 2001). Bhamoruput (1972) noted that these polite particles are most likely to be used when the social status of the speaker is lower than that of the addressee (i.e., by those who are inferior, junior, or non-intimate equal), to indicate deference and respect that the speaker wants to show to the addressee.
Aphasiological background

Verbs, verb inflection and time reference in Agrammatic speech

Although agrammatic speech is generally characterized by its impoverished grammar, the idea that it consists mainly of content words (see, e.g., Goodglass & Kaplan, 1972) has lately been shown to be only partially correct. For instance, verbs (which are content words) and verb inflections have been reported to be particularly vulnerable (Bastiaanse et al., 2002; Bastiaanse & Jonkers, 1998; Kolk & Heeschen, 1992; Miceli et al., 1983; 1989; Saffran et al., 1989; Thompson et al., 2010): in languages that use grammatical morphemes for verb inflections, such as in English (and other Indo-European languages), grammatical morphemes such as the third person singular and past tense endings of verbs are less frequently observed in agrammatic speech than in speech of NBDs.

Many researchers have noted that production of lexical verbs in agrammatic speech is more affected than the production of nouns (Bastiaanse & Jonkers, 1998; Saffran et al., 1989; Thompson et al., 1995). According to Thompson et al. (1995), agrammatic speakers tend to produce verbs that do not have an internal argument (e.g., to sleep), or have just one (e.g., to like [something or someone]): the more complex the argument structure of the verb, the harder it is for the agrammatic individuals to produce that verb. This has been confirmed for Dutch (Bastiaanse & Jonkers, 1998).

However, some researchers have related the poor production of lexical verbs to the requirement to inflect verbs for tense and agreement. Bastiaanse and Jonkers (1998) investigated a group of Dutch agrammatic speakers and found that verb retrieval and verb inflection had an inverse relationship in this population. In other words, agrammatic speakers who had relatively high verb diversity (i.e., verb retrieval) had poor verb inflection, and those with relatively good verb inflection had reduced verb diversity. This tradeoff was confirmed for Italian (Rossi & Bastiaanse, 2008), and partially confirmed for Turkish (only for direct evidentials; see Arslan et al., 2016) and Swahili-English bilingual agrammatic speakers (Abuom & Bastiaanse, 2012). The overall conclusion from these studies is that it is difficult for agrammatic speakers to both retrieve the name of an event (e.g., verb) and inflect it for tense and agreement. The question is what happens in languages that have no verb inflection but use aspectual adverbs – grammatical morphemes that are free-standing and optional rather than bound and obligatory. According to Packard (1993), free-standing grammatical morphemes are vulnerable in Mandarin agrammatic speech: they tend to be omitted. This was also shown for Standard Indonesian (Anjarningsih & Bastiaanse, 2011).

Building on this, the linguistic feature Tense, which is used to express event time (past – an event that has taken place; present – an event that is taking place; and future – an event that will take place) seems to be particularly susceptible to impairment. In other words, the semantic notion of time reference, which has to be expressed by grammatical morphology (i.e., the operation that inflects verbs for tense), is affected in agrammatic aphasia (Bastiaanse, 2008; Bastiaanse et al., 2011; Burchert et al., 2005; Clahsen & Ali, 2009; Faroqi–Shah & Dickey, 2009; Lee et al., 2008; Wenzlaff & Clahsen, 2004). Stavrakaki and Kouvava (2003), however, found that, aside from tense, aspect was also vulnerable in agrammatism (see also, Nanousi et al. (2006) for Greek). Aspect is different from tense. Tense provides information regarding when a situation occurs: it sets the time frame of an event (past, present, future), and refers to the location of an event in time (Comrie, 1985).
Aspect concerns “the internal structure of events, relating a current state with the onset or the end of the state” (Lee, 2008, p. 340). It is used to describe how an event is viewed: whether the event is finished (perfect) or still ongoing (imperfect).

Hence, broadly speaking, aspectual adverbs – which are also used to specify the time frame of an event in some languages and are comparable to tense inflection – may also be affected in agrammatic aphasia. In other words, the tradeoff between verb retrieval and inflecting the verb for different time frames, reported by Bastiaanse and Jonkers (1998), is expected for languages that use aspect for time reference. Anjarningsih and Bastiaanse (2011) investigated this in Standard Indonesian, a language that uses aspectual adverbs to situate an event in time. As predicted, an inverse relationship was found between verb retrieval and aspectual adverbs: agrammatic speakers who produced a relatively high diversity of lexical verbs used relatively few aspectual adverbs and vice versa.

**Serial verb constructions**

While the number of verbs per utterance has been investigated previously (e.g., in Turkish by Arslan et al., 2016; in English and Korean by Sung et al., 2016), serial verb constructions have not been studied before in agrammatic aphasia.

**Particles**

Anjarningsih et al. (2012) is the only study that, to our knowledge, has investigated particle production in agrammatic narrative speech. They reported that Standard Indonesian agrammatic speakers produced a low proportion of particles. However, Standard Indonesian particles are different from those in Thai: Standard Indonesian particles function like prepositions and are grammatical words (Anjarningsih et al., 2012). In Thai, particles are used to express politeness, mood, enforcement and are, thus, lexical and pragmatic in nature (McCready, 2014).

Boye and Harder (2012) argued that words and word classes are not necessarily either grammatical or lexical. For example, in English the verb to have can have a grammatical function as an auxiliary (John has written a book), or a lexical function (John has a book). Boye and Bastiaanse (2018) showed that in agrammatic spontaneous speech, the auxiliary to have is used less than in typical narrative speech, whereas to have with a lexical function is used to a normal extent. A similar difference seems to exist for Standard Indonesian and Thai particles: those in Standard Indonesian have a grammatical function, whereas Thai particles have a lexical function.

**The current study**

The current study aimed to identify the characteristics of Thai agrammatic speech and how they relate to those of other languages. First, we examined whether a group of Thai speakers with aphasia showed the general features of agrammatic speech. We predicted reduced speech rate and utterance length, fewer grammatical sentences that are less complex (i.e., fewer embedded sentences), as has been observed in a wide range of languages. In combination with relatively good comprehension of single words, this confirms a diagnosis of Broca’s aphasia/agrammatism.

Second, we focused on some typical grammatical characteristics of Thai. As noted above, verb production in agrammatic aphasia is impaired and this has been related to
the need to inflect verbs for agreement and tense (Bastiaanse & Jonkers, 1998 among others). This is interesting in relation to Thai, because of the lack of inflectional morphology for verbs. Therefore, we also explored the relation between verb production and the production of time reference morphology. Previous research has shown that agrammatic speakers have difficulty in retrieving the name of an event (the verb) and indicating the time frame in which the event happened (inflection for tense and aspect or the use of aspectual adverbs; Anjarningsih & Bastiaanse, 2011; Bastiaanse & Jonkers, 1998; Rossi & Bastiaanse, 2008). Therefore, we expect a tradeoff between verb retrieval and aspectual adverb production in Thai, that is, agrammatic speakers who have relatively good verb production will have relatively poor production of aspectual adverbs and vice versa. Serial verb constructions are also typical for Thai. Given the findings in Turkish (see above; Arslan et al., 2016), the number of verbs per utterance is expected to be decreased in Thai agrammatic speech.

As mentioned above, the production of particles in Standard Indonesian agrammatic speakers was reduced (Anjarningsih et al., 2012). It was argued that particles in Standard Indonesian have a grammatical function. In Thai, however, politeness particles, the most frequently used type of particle, have a lexical/pragmatic function. Therefore, we predict that the production of polite particle in Thai will be spared in agrammatic speakers.

**Methods**

**Participants**

Nine individuals with non-fluent aphasia (5 males, aged 26–83 years, mean 53.89 years) and nine NBD speakers (5 males, aged 23–78 years, mean 52.67 years) matched for age, gender, handedness, and education participated in the study. All participants were native speakers of Thai and right-handed. The agrammatic speakers were recruited from the Department of Communication Sciences and Disorders, Faculty of Medicine, Ramathibodi Hospital, Bangkok, Thailand following classification as “R470: Dysphasia and Aphasia” according to the International Statistical Classification of Diseases and Related Health Problems (ICD-10-TM). They all had aphasia following a single left hemisphere stroke, except one participant (A2) who had suffered traumatic brain injury (his performance pattern did not deviate from that of the stroke patients). No further details of the lesion localization were available for the agrammatic speakers, as it was not possible to obtain the scans from the previous hospital from which the participants were transferred.

Selection of agrammatic speakers followed the methodology of other investigations in languages where there is limited aphasia testing (Abuom & Bastiaanse, 2012; Larney, N. Tsiwah et al., 2020; F. Tsiwah et al., 2020). The participants with aphasia were all identified as having a profile consistent with agrammatic aphasia by a speech therapist at Ramathibodi Hospital and a neurolinguist. Their speech was non-fluent and effortful; articulation was relatively spared: all aphasic speakers were intelligible. Further, the auditory word comprehension subtest of the Boston Diagnostic Aphasia Examination (BDAE; Goodglass & Kaplan, 1972) adapted to Thai was administered and revealed that their comprehension of single words (nouns, verbs, colors, shapes, letters, and numbers) was relatively spared, thus their language characteristics matched the profile of Broca’s aphasia. The was also administered to the NBD speakers (see Table 1). Vision and hearing
were (corrected to) normal in all participants. The demographic details of the participants and their BDAE scores are displayed in Table 1.

The non-brain-damaged speakers were selected to match the agrammatic speakers in age and education. They all had (corrected to) normal vision and hearing, no history of neurological diseases, nor of alcohol or drug abuse.

Each participant gave informed consent following the Declaration of Helsinki under the procedure approved by the Committee of Human Rights Related to Research Involving Human Subjects, Faculty of Medicine, Ramathibodi Hospital, Mahidol University (MURA2018/34). They were financially compensated the equivalent of 15 Euro for their participation. All data are available and are provided in Tables 1,2,3,4,5.

**Materials & Procedure**

We explored speech production elicited by means of picture description and a spontaneous speech interview. Following Olness (2006) method for elicitation of narrative speech, participants were instructed to describe a black and white picture of a Thai rural scene provided and used standardly by the Ramathibodi Hospital. The commonly-used “cookie theft” picture (Goodglass & Kaplan, 1972) was not culturally or linguistically appropriate for Thai individuals. For spontaneous speech, a semi-standardized interview was conducted asking for information about the past (illness), present (hobby/family), and future (plans). There were two questions in each category. Question (i) was always raised first. If further prompting was required, the participants were asked question (ii). The questions were;

<table>
<thead>
<tr>
<th>Table 1. Demographic data for the agrammatic (A1-A9) and non-brain-damaged (N1-N9) speakers.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
</tr>
<tr>
<td>--------------</td>
</tr>
<tr>
<td>A1</td>
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<tr>
<td>A2</td>
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<td>A3</td>
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<tr>
<td>A4</td>
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<tr>
<td>A5</td>
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<tr>
<td>A6</td>
</tr>
<tr>
<td>A7</td>
</tr>
<tr>
<td>A8</td>
</tr>
<tr>
<td>A9</td>
</tr>
</tbody>
</table>

Note: A = Individuals with aphasia; N = Non-brain damaged speaker; m = male; f = female.
**Picture description**

(i) Can you tell me what is happening in this picture?/Can you create a story with a beginning, a middle and an end about what happened in the picture?

**Reference to the past**

(i) Can you tell me about how your speech problems started (agrammatic speakers)/about your last illness (for NBD speakers)?

(ii) Can you tell me about what happened when you had your stroke (agrammatic speakers)/about your last illness (for NBD speakers)?

**Reference to the present**

(i) Can you tell me how you spend your free time?

(ii) Can you tell me something about your family?

**Reference to the future**

(i) Can you tell me what will you do next?

(ii) Can you tell me what is your plan after this hospital visit?

There was no time limit for the interview and picture description. For participants with aphasia, the samples were obtained in a quiet room at the Department of Communication Sciences and Disorders, Faculty of Medicine, Ramathibodi Hospital, Mahidol University. The first author administered the experiment in presence of a speech therapist. Unfortunately, due to constraints on the time that the first author could stay in Thailand, the interviews with the NBD participants occurred by phone. The picture for the picture description was emailed to participants beforehand. For both groups, the entire session was audio-recorded using an iPhone, with their permission. The samples were orthographically transcribed by the first author.

**Data Analysis**

Although a sample size of 300 words is generally considered to be reliable for spontaneous speech analysis for languages such as English, Italian, and Dutch (Brookshire & Nicholas, 1994), for a language such as Thai that does not have articles and drops many elements, such as subject and object pronouns and aspectual adverbs, a sample size of 200 words is comparable and appropriate (Abuom & Bastiaanse, 2012; Arslan et al., 2016). The 200-word samples were extracted with an equal balance of the picture description and three questions (i.e., roughly 50 words each from picture description; reference to the past, present, and future).

The first author segmented the speech samples into utterances, using the methodology developed by Vermeulen et al. (1989). Another Thai native speaker with a background in Thai linguistics checked the transcription and the segmentation into utterances for accuracy. An utterance was defined as a unit that expresses a proposition, and/or includes a predicate and an explicit or implied subject. Disagreements between the two judges on the transcription or the analysis of an utterance were discussed and resolved by consensus.
To answer our first research question, we first analyzed *general characteristics* of agrammatic speech that have been found to be reduced in studies to other languages, to ensure that the non-fluent speech was truly agrammatic. This, in combination with the high scores on the BDAE test for auditory word comprehension (see Table 1), supported the diagnosis of agrammatic Broca’s aphasia. For this, we analyzed the following grammatical variables:

- *Mean length of utterances (MLU)*: the number of words per utterance
- *Speech rate*: words per minute
- *Grammaticality*: percentage of grammatical sentences
- *Embedded sentences*: percentage of utterances that include at least one embedding

The second research question addressed the *production of lexical verbs* and *time reference* elements. The following variables were used:

- *Number and diversity of verbs*: the number of lexical verbs and the number of different verbs. Thai does not distinguish between non-finite and finite verbs as all verbs are free-standing morphemes.
- *Serial Verbs*: the mean number of verbs per utterance for every utterance that contained at least one verb (Mean number of Verbs per Utterance: MVU).
- *Number of aspectual adverbs*: aspectual adverbs referring to the past, present, and future were counted.

The final research question was related to the production of particles. For this, we used the following variable:

- *Polite particles*: percentage of utterances with a polite particle.

**Statistical Analysis**

For comparison between the agrammatic and NBD speakers, we examined performance both at the group and at the individual level. Since the groups were small, for the between-group comparisons, we used the non-parametric Mann-Whitney U (MWU) test, with a significance level set at $p = .05$. The individual scores of the agrammatic speakers were compared to the range of the NBDs for each variable. If all agrammatic speakers fell outside the normal range, there was considered to be strong evidence that a variable was affected by agrammatism.

**Results**

**General Characteristics of Agrammatic Features**

In Table 2, the results of the grammatical analysis are given. The MLU of the agrammatic speakers was lower than that of NBDs (MWU: $z = −3.510$, $p < 0.001$). All agrammatic speakers scored outside the range of the NBDs. In addition, the agrammatic speakers produced significantly fewer words per minute than the NBD
speakers (MWU: \( z = -3.582, p < 0.001 \)). Again, all agrammatic speakers scored outside the normal range. In sum, the agrammatic speakers produced utterances that were half as long and took double the time to produce compared to the NBD individuals.

The percentage of grammatical sentences produced by the agrammatic speakers was also lower than that of the NBD (MWU: \( z = -3.136, p < .0001 \)) and all agrammatic speakers were outside the range of the NBDs, except A2. There was no difference in the percentage of embedded sentences between the two groups (MWU; \( z = -1.572, p = 0.136 \)), with many of the NBD and agrammatic speakers not producing any embedded sentences at all.

### Verb Production

The production of verbs, and variables for serial verbs for both groups of participants are shown in Table 3.

The analysis of verb production showed that, as a group, agrammatic speakers produced significantly fewer verbs than NBD speakers\(^4\) (Verb tokens: MWU: \( z = -2.474, p = 0.011 \)). All but A1 and A6 scored inside the normal range. In regards to verb diversity, there was no difference between the agrammatic and the NBD speakers (Verb types: MWU: \( z = -1.197, p = 0.258 \)). Most of the agrammatic speakers scored inside the normal range.

<table>
<thead>
<tr>
<th>MLU</th>
<th>speech rate (wpm)</th>
<th>% grammatical sentences</th>
<th>% embedded sentences</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>3.39</td>
<td>38</td>
<td>66.67</td>
</tr>
<tr>
<td>A2</td>
<td>4.49</td>
<td>47</td>
<td>92.31</td>
</tr>
<tr>
<td>A3</td>
<td>5.06</td>
<td>47</td>
<td>71.88</td>
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<tr>
<td>A4</td>
<td>5.18</td>
<td>61</td>
<td>39.39</td>
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<tr>
<td>A5</td>
<td>4.74</td>
<td>39</td>
<td>47.06</td>
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<tr>
<td>A6</td>
<td>3.78</td>
<td>44</td>
<td>55.56</td>
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<td>A7</td>
<td>4.62</td>
<td>32</td>
<td>69.23</td>
</tr>
<tr>
<td>A8</td>
<td>5.34</td>
<td>62</td>
<td>68.42</td>
</tr>
<tr>
<td>A9</td>
<td>4.37</td>
<td>44</td>
<td>55.26</td>
</tr>
<tr>
<td>mean</td>
<td>4.55</td>
<td>46</td>
<td>62.86</td>
</tr>
<tr>
<td>range</td>
<td>3.39–5.34</td>
<td>38–62</td>
<td>66.67–92.31</td>
</tr>
</tbody>
</table>

Note: Bold highlighting indicates scores for people with aphasia outside the range of the non-brain-damaged speakers.
MLU = Mean Length of Utterances; wpm = word per minute
### Table 3. Individual and group results for the agrammatic (A1-A9) and non-brain-damaged (N1-N9) speakers for the production of verb types, verb token and the mean number of verbs per utterance that contain a verb.

<table>
<thead>
<tr>
<th></th>
<th>verb tokens</th>
<th>verb type</th>
<th>mean number of verbs per utterance</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>22</td>
<td>14</td>
<td>1.38</td>
</tr>
<tr>
<td>A2</td>
<td>47</td>
<td>27</td>
<td>1.57</td>
</tr>
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</tr>
<tr>
<td>median</td>
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<td>21</td>
<td>1.48</td>
</tr>
<tr>
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<tr>
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<td>21</td>
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<tr>
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<td>20–35</td>
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</tr>
<tr>
<td>median</td>
<td>56</td>
<td>25</td>
<td>2.5</td>
</tr>
</tbody>
</table>

Note: **Bold** highlighting for aphasic participants indicates a score outside the range of the non-brain-damaged speakers.

**Aspectual adverbs**

Table 4 shows the production of aspectual adverbs by both groups. The number of aspectual adverbs produced by the NBD speakers was unexpectedly low; the same was true for the agrammatic speakers. Given the number of NBD speakers (and agrammatic speakers) who did not produce any aspectual adverbs, we did not perform statistics.

**Serial verbs**

Table 3, above, gives the data for the serial verbs. The agrammatic speakers produced significantly fewer verbs per utterance compared to the NBD speakers (MWU: \( z = -3.532, \ p < 0.001 \)). All agrammatic speakers scored outside the normal range.

**Particles**

The production of polite particles is given in Table 5.

Interestingly, the agrammatic speakers produced more significantly polite particles than the NBDs, (MWU: \( z = -2.870, \ p = 0.004 \)), and also have a higher percentage of utterances with polite particles (MWU: \( z = 1.98, \ p = 0.047 \)). Numerically, all but two (A3; A4) agrammatic speakers produced more polite particles than any of the NBDs, and two (A2; A6) produced a higher proportion of utterances with polite particles.
Discussion

The current study aimed to identify the features of narrative and spontaneous speech in Thai agrammatic speakers by addressing three points: the general characteristics of Thai agrammatism; the use of verbs and aspectual adverbs for time reference; and the use of particles. The three topics will be discussed below.

General Characteristics of Thai Agrammatism

Our data show that the basic characteristics of Thai agrammatic speech do indeed resemble the general features of agrammatic profiles in other languages, including, for example, English (Saffran et al., 1989; Thompson et al., 2010); Dutch (Bastiaanse & Jonkers, 1998); Turkish (Arslan et al., 2016); and Standard Indonesian (Anjarningsih et al., 2012). As in these languages, the Thai agrammatic speakers studied here produced shorter utterances than the NBD speakers. Their speech was also slow compared to the NBD speakers. Most of their utterances described a simple event with, for instance, an agent performing a single action (e.g., haa mhor. lit. “(I) see doctor’), or a feeling that was experienced (e.g., mun jeb. lit. “it hurt”). While, overall, the ability to produce grammatical sentences was impaired in the agrammatic speakers, the percentage of grammatical sentences in one participant (A2) was very high. However, many of the sentences A2 produced were short and simple; her relatively long MLU was due to the fact that she added a polite particle to almost every utterance (in more than 90% of the cases).

### Table 4. The individual and group results of the numbers of aspectual adverbs used by the agrammatic speakers (A1–A9) and the non-brain-damaged (N1–N9) speakers.

<table>
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<th>future</th>
<th>total</th>
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<tbody>
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<td>0</td>
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<td>A2</td>
<td>4</td>
<td>3</td>
<td>0</td>
<td>7</td>
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<td>A3</td>
<td>1</td>
<td>7</td>
<td>0</td>
<td>8</td>
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<tr>
<td>A4</td>
<td>2</td>
<td>4</td>
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<td>6</td>
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<td>A5</td>
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<td>5</td>
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<td>A6</td>
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<td>A7</td>
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<td>4</td>
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<tr>
<td>A8</td>
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<td>1</td>
<td>2</td>
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<tr>
<td>A9</td>
<td>0</td>
<td>3</td>
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<td>3</td>
</tr>
<tr>
<td>mean</td>
<td>1.11</td>
<td>1.56</td>
<td>0.56</td>
<td>3.22</td>
</tr>
<tr>
<td>range</td>
<td>0–3</td>
<td>0–6</td>
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<tr>
<td>median</td>
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<tr>
<th></th>
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<tbody>
<tr>
<td>N1</td>
<td>0</td>
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<tr>
<td>N2</td>
<td>1</td>
<td>6</td>
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<td>7</td>
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<tr>
<td>N3</td>
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<td>N5</td>
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<td>N6</td>
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<td>N8</td>
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<td>5</td>
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<tr>
<td>N9</td>
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<td>4</td>
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<td>mean</td>
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<td>median</td>
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<td>0</td>
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In terms of sentence complexity, again, we saw evidence of grammatical impairment in the group of agrammatic speakers. Five of the nine did not produce one single embedding. However, some of the NBDs also failed to produce embedded sentences. It is well-known that in some languages, embedded sentences are used less frequently than in others. For example, in the cross-linguistic study of Bastiaanse et al. (1996), English and Hungarian NBDs used a large number of embedded sentences in conversation, whereas some of the Dutch NBDs did not produce any at all, even though the same elicitation methods as in the current study was used. It may be the case that Thai is like Dutch in this respect: not every healthy speaker uses many embedded sentences. Another explanation is that the nature of the elicitation task did not encourage production of embedded sentences. Recently, Stark (2019) tested three different elicitation paradigms – picture description, procedural discourse and story retelling – and found different results in agrammatic narrative and spontaneous speech when these different methodologies were used (see also, Olness, 2006). Even though we used two different methods – picture description and semi-standardized interview – to elicit narrative speech, the observed lack of sentence complexity may be due to our choice of elicitation method, although a cross-linguistic cause cannot be excluded.

**Production of verbs and time reference**

The number of verbs in the agrammatic speakers was lower than that of the NBD speakers. This has been reported for other languages previously (e.g., Saffran et al., 1989;
Thompson et al., 1995 for English; Miceli et al., 1989 for Italian). In other languages, such a difference is not found (Bastiaanse & Jonkers, 1998 for Dutch; Abuom & Bastiaanse, 2012 for Swahili and English; Anjarningsih et al., 2012 for Indonesian). When we look at the current data for Thai, we see that only two agrammatic speakers fall outside the normal range, showing that no decisive conclusion on the production of verb tokens can be drawn. However, when the production of serial verbs is considered, the difference in verb use becomes clear: NBD speakers produce more serial verbs than agrammatic speakers. Clearly, there is simplified use of verbs by these Thai agrammatic speakers (we return to this below).

In both groups, the production of aspectual adverbs was very low. It seems that the way the narrative speech was elicited did not evoke explicit use of aspectual adverbs. This may, again, be a result of the methods of elicitation (spontaneous speech and picture description; Stark, 2019). However, the results diverge from the findings in Standard Indonesian agrammatic speech (Anjarningsih & Bastiaanse, 2011) who, when the same questions were used for eliciting spontaneous speech, found a trade-off between the diversity of verbs and aspectual adverbs, which was interpreted as a problem in expressing the name of the event and the time frame in which the event happened (Bastiaanse, 2013). This pattern was not observed in the current Thai data.

However, there is an interesting phenomenon with respect to verb retrieval: the number of verbs was low, not because there are many utterances without a verb (this number was similar in both groups), but rather because for the Thai agrammatic speakers appeared to find it hard to express complex events using serial verb constructions. This supports the findings of Arslan et al. (2016) who reported a reduced number of verbs per utterance in Turkish agrammatic speech. Critically, however, unlike in Turkish, verbs in Thai are complex in that more than one verb can be combined in a single clause. This can be seen in the NBD speakers who produce sentences with as many as three verbs (e.g., klub pai haa mhor: lit. “return go see doctor” for “I went back there to see a doctor”). In contrast, the agrammatic speakers usually used only one single verb (e.g., ha mhor: lit. “see doctor”).

Serial verb constructions can be subcategorized into many types (Sudmuk, 2005; Thepkanjana, 1986; Wilawan, 1993), for example, to describe that the events occur simultaneously (e.g., khao nung kin kao: lit. “he sit eat rice”); to describe the order of an event (e.g., khao reep dern ma ha chan: lit. “he hurry walk come find me”; or to show how an event is a consequence of the previous action (e.g., khao leun lom pen prae: lit “he slip fall become wounded”). These constructions are grammatically complex, that is, the verbs have to be used in the right order to express which verb modifies the other. Even though agrammatic speakers seem to be relatively unimpaired in their use of verbs, combining the verbs into a meaningful concatenation is apparently too complex. However, when they use them, the order is correct.

Particles
Surprisingly, the agrammatic speakers produced more particles than NBDs. This finding diverges from that of Anjarningsih et al. (2012) who reported an impairment in the production of particles in Standard Indonesian agrammatic speech, while using the same questions in their interviews. However, the Indonesian particles, as argued above, have a grammatical function, whereas Thai particles have a lexical function. According to
Boye and Harder (2012), and supported by Boye and Bastiaanse (2018), the same word class can have different functions across languages (e.g., Standard Indonesian and Thai particles) and within languages (as shown by the data from Boye and Bastiaanse (2018) on the grammatical and lexical function of to have in Dutch).

Critically, however, the relative increase in polite particles in Thai agrammatic speakers may have been because of social hierarchy. The experimental setting for the agrammatic speakers was at the hospital as part of their follow-up medical appointments. Prior to testing, we asked if they were willing to participate in the semi-standard interview as part of a research project, and that this interview would be conducted by the first author but under the supervision of the participant’s speech therapist. Hierarchy in Thai is important; educated people and clinicians are highly-respected. In this context, the social status of the agrammatic speakers (i.e., patients) is lower than that of the interviewers (i.e., a neurolinguist and a speech therapist), hence, pragmatically, their use of polite particles not only signifies politeness, but also implies that they should converse in a way that is appropriate to their status (Bhamoraput, 1972; Prasithrathsint, 2001). In contrast, the NBD speakers were of equal (or possibly higher) status than the conversational partner: the first author acted as an interviewer, and the NBD speakers were participating as a favour, and the interviewer was younger than the majority of the NBD speakers. It is also possible that the fact the interview took place by telephone rather than in a more formal hospital setting could have contributed to the low number of polite particles produced by the NBD speakers. As noted by Bhamoraput (1972), polite particles are less likely used if the speakers are superior to or more senior than the addressee. Interestingly the fact that pragmatic constraints may interfere with grammatical complexity has been reported before: Anjarningsih et al. (2012) and Jap et al. (2016) reported that the passive construction in Standard Indonesian is relatively spared, even though the passive in Standard Indonesian is as complex as that of English. In Standard Indonesian, the passive is a polite form and, production of these constructions is not affected, just like particles in Thai. It is possible that politeness may protect grammar, or at least, agrammatic speakers prefer to obey the politeness rules.

Summary & conclusions

Overall, like agrammatic speakers of other languages, the Thai agrammatic speakers studied here produced slow speech, and used short utterances that were often ungrammatical. In terms of verb production, the number of verbs the agrammatic speakers produced was lower than that of the NBD speakers, confirming the results of previous studies that verb production is an affected element in agrammatism, although no trade-off between verb retrieval and aspectual adverb use was found. However, critically, Thai agrammatic speakers’ production of verbs was low, not because they produced utterances without a verb, but because they produced fewer serial verbs, suggesting that it was the grammatical complexity of serial verbs that was problematic. This was the first study to examine serial verbs in agrammatic speech and hence adds important new findings to the body of literature on verbs: agrammatic speakers’ use of verbs is simplified, both in languages that use verb inflections, which are bound morphemes, and in languages with serial verbs, which are free morphemes.

We also examined particles. Surprisingly, the number of polite particles produced by the agrammatic speakers was different from that of the NBDs, but in the opposite direction to
that which would be expected. On the basis of the results from Standard Indonesian agrammatic speakers (Anjarningsih et al., 2012), we expected the production of particles to be impaired. However, the Thai agrammatic speakers produced more particles than the NBD speakers. Further research is required with greater control of the relative social status of participants with and without aphasia and the experimenters, to enable us to confidently interpret these findings. However, should our results be replicated, coupled with the findings from Standard Indonesian, the Thai data will enhance our understanding of the interplay between pragmatics and syntax such that, in agrammatism, pragmatic constraints may interact with effects of grammatical complexity. These results may serve as a basis for future studies on the interaction between pragmatics and syntax.

The current study also has implications for clinical practice, suggesting that, in addition to evaluation of the standard features of spontaneous speech, Thai speakers with aphasia should be assessed on their ability to use serial verbs. Given these constructions are very typical in Thai and often used by NBD speakers particularly when describing complex events, any impairment would restrict the ability of Thai speakers with aphasia to participate successfully in daily conversation. Consequently, should an individual show an impairment, it may be useful to focus on these constructions during therapy, and further research regarding how best to achieve this is required. In contrast, it seems that the use of polite particles may be a relative strength in Thai speakers with aphasia and, therefore, may not need to be a focus of intervention.

Of course, our findings are limited given that we only examined spontaneous speech in a small sample of one type of aphasia, but we hope that this is the beginning of a serious search for the features of language impairment in Thai people with aphasia which in turn will lead to the development of improved diagnostic assessment and directions for treatment. Finally, it must be acknowledged that different procedures in obtaining the narrative and spontaneous speech may yield different results, and therefore, exploration of the effects of using different paradigms is encouraged (Stark, 2019).

Notes

1. This excludes loan words.
2. The picture illustrates children playing in a field, and adults doing agricultural work.
3. Note that all utterances that contained more than one verb were serial verb constructions.
4. Since the total number of verbs is different between the groups, calculation of the Type Token Ratio is not justified, unlike our practice in other studies (see, e.g., Abouom & Bastiaanse, 2012; Bastiaanse & Jonkers, 1998).
5. Recall that Thai is a pro-drop language; in this case, the personal subject pronoun chan: “I” was dropped, which is entirely acceptable.

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Disclosure statement

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References


