# Syntactic abilities in Malay adult speakers with aphasia: a study on passive sentences and argument structures

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ABSTRACT

**Background**: Within the last four decades, individuals with aphasia have been observed to face difficulties in understanding complex sentences despite having good understanding of single words. The difficulties observed have been proposed to follow a pattern predicted by the theory of grammar, making the deficit a special case of an underspecified language competence.

**Aims:** The purpose of this study is to examine sentence types – reversible actives and passives and argument complexity among Malay speakers with aphasia, looking at sources of difficulties with non-canonical sentences in a language with free word order.

**Methods & Procedures:** A group of five non-brain damaged (NBD) adults and five adults with aphasia matched with age, education and language were recruited. Subjects were tested in their sentence comprehension abilities via two picture matching tasks: a reversibility active/passive and an argument complexity task based on the number of arguments.

**Outcomes & Results:** Generally, the control adults had better sentence comprehension than the group of adults with aphasia, with significant differences in the mean scores of both active and passive reversible sentences. The analysis of the argument complexity task showed that the comprehension level in adults with aphasia was preserved although lower compared to their normal counterparts. Finally, an error analysis of the responses showed that individuals with aphasia had different sources of difficulties: with thematic roles in passive sentences based on syntactic similarities and with active sentences based on semantic similarities.

**Conclusions:** Individuals with aphasia, speakers of a free word order language demonstrated lower understanding of both reversible active and passive sentences with no apparent signs of canonicity patterns. A more detailed error analyses disentangled the source of difficulties with reversible errors for passives based on grammatical order and semantic-based errors for agent driven sentences based on semantic preferences.

**Keywords:** sentence comprehension, Malay, aphasia, Passive, Similarity based effects, Argument structure.

## Introduction

Sentence comprehension among adults with aphasia especially in individuals with agrammatism has been extensively studied in the literature. Comprehending a sentence requires parsing its syntactic structure, understand the meaning of the single lexical items and integrate this meaning within a coherent linguistic structure. In the absence of lexical comprehension deficits, semantically reversible sentences presented in non-canonical word order (OVS) compared to the canonical (SVO) word order have been found to be easily misunderstood by people with aphasia, as well as other groups with language disorders (Grodzinsky, 1990). When both determiner phrases are animate and are potential arguments for the verb as in reversible sentences such as *The woman is pushing the boy*, in languages such as English with non-free word order, the canonical SVO order is more easily understood compared to the non-canonical OVS order. The grammatical features involved in the syntactic relation contributes further to the impairment in sentence comprehension in adults with aphasia, with similar arguments (for example both subject and object being singular compared to one being singular and one plural) being more difficult to be integrated in the correct thematic role due to similarity effects between the two arguments (Garraffa & Grillo, 2008; Martini et al., 2019).

Few syntactic based hypotheses were proposed to deal with what is called the canonicity patterns, with people with aphasia performing at chance in sentences with non-canonical order. One of the first accounts proposed was the *Trace Deletion Hypothesis* (TDH) (Grodzinsky, 1986, 1995). TDH focused on a specific element, i.e. syntactic traces, arguing that individuals with aphasia cannot generate accurate representations of the sentences deleting all syntactic positions occupied by traces and use an agent-first processing strategy (NP1=Agent) which leads to at-chance performance. As a result, a patient with asyntactic comprehension when asked to

interpret "*Who is doing what to whom?"* in a passive sentence will be faced with two possible DPs acting as Agent and is forced to guess as shown in the Malay passive sentences in (2).

(1) Budak lelaki    sedang    **men**gejar      budak perempuan[1]
    Child man       Aspect    **ACT**-chase     Child woman
                        'The boy is chasing the girl'

(2) Budak perempuan$^i$    sedang    **di**kejar **t$^i$**    oleh    budak lelaki
    Child  woman           Aspect    **PASS**-chase    By     child man
                        'The girl is being chased by the boy'

This is in line with Ramli Salleh (1989) who proposed that passive verbs in Malay fail to assign accusative case and theta role to its noun phrase complement, therefore, forcing the noun phrase object to move in order to acquire case and theta role. It is interesting to note that both active and passive structures in Malay do require the interpretation of a voice Affix in the verb (prefix *meN-* vs *di-* respectively) to assign the correct thematic structure, making the morphosyntactic feature of the verb relevant for both structures. This point will be discussed in detail in the present study.

A more recent approach, *Generalised Minimality* (GM) (Grillo, 2008) proposed a limited grammatical capacity as a possible cause of aphasics' impaired sentence comprehension. For example, with passives, the inability to maintain the activation of the full array of features in the representation normally associated with syntactic nodes that are causing the subject to guess at the agent. More importantly, this feature underspecification is grammatically driven by the property of the language with more

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[1] I In Malay, the prefixes meN-, peN- has the archiphoneme N which will be realized into its various morphophonemic forms depending on the interaction of the N in meN- with the first phoneme of the base word.eg. *meN + kejar* (to chase) → *mengejar*, meN + *sapu* (to sweep) → *menyapu*.

formal features being more vulnerable compared to less active syntactic ones. This framework was proposed to better characterize the impairment often reported on some non-canonical sentences, in particular on sentences where both arguments (subject and object) share the full set of grammatical features. For example, in the case of Malay, to understand *Who is doing what to whom* in a reversible sentence, it is necessary to keep active the morphosyntactic representation of the voice affix on the verb. This feature is necessary to correctly parse the argument structure and license both internal and external arguments. An underspecification of the voice feature on the verb will result in some distortion in the comprehension of both active and passive sentences, (see examples in (3) and (4) below), making both subject and object similar arguments and disambiguated by their position in the structure but not by any verbal assigning morphosyntactic feature. Position is not a strong feature for Malay, a free word order language, making both active and passive sentences fragile in patients with weaker processing. According to GM, an underspecification of grammatical features in the verbal domain, an aspect often reported in agrammatic aphasia, will affect the comprehension of both active and passive sentences.

**ACTIVE REPRESENTATION IN EXPERT SPEAKERS**
(3a) Budak lelaki     sedang     **men**gejar     budak perempuan
    child  man        Aspect     **ACT**-chase     child woman
[N, +animate,φs, Nom, θ1]            [N, + animate, φs, Acc, θ]
       'The boy is chasing the girl'.

**ACTIVE REPRESENTATION IN SPEAKER WITH APHASIA**
(3b)  Budak lelaki     sedang     ~~men~~ kejar     budak perempuan
    child  man        Aspect     ~~ACT~~-chase     child woman
[N, +animate]                 [N, + animate]
       'The boy is chasing the girl'

**PASSIVE REPRESENTATION IN EXPERT SPEAKERS**
(4a)  Budak lelaki     sedang     **di**kejar     oleh budak perempuan
    child  man        Aspect     **PASS**-chase     by child woman

$[N, +animate, \varphi s, nom, \theta 2]$ $\qquad$ $[N, + animate, \varphi s, nom, \theta 1]$

'The boy is chased by the girl'


**PASSIVE REPRESENTATION IN SPEAKER WITH APHASIA**

(4b) Budak lelaki    sedang    ~~di~~kejar    oleh budak perempuan

       child man      Aspect    ~~PASS~~-chase     by child woman

       $[N, +animate]$                           $[N, + animate]$

'The boy is chased by the girl'


The two hypotheses (TDH and GM) make different predictions in terms of the canonicity effect in Malay with the TDH assuming passives to be impaired and GM making prediction for both passives and actives, based on an underspecification of grammatical features in the verbal domains with different sources of derived problems: passives due to crossing a potential argument (more reversible errors based on underspecification of grammatical features) and active sentences being weak due to lack of morphosyntactic specification of the Agent base feature but not for thematic assignment but more at lexical level.

Another notable aspect of the grammar investigated in people with aphasia is the impairment of the argument structure (AS) and its thematic assignment. Cho-Reyes & Thompson (2012) reported that people with agrammatic or anomic aphasia had difficulty in producing three-argument more than two- and one- argument verbs. In a related study, Meltzer-Asscher et al. (2015) investigated the behavioral and neural correlates of AS processing among 29 healthy adults using fMRI. The neurobiological findings from this study support the hypothesis that an increased number of arguments in a verb elicits greater activation in the left posterior perisylvian region with further costs predicted by an incremental argument complexity.

In this study we will present some preliminary findings on two sentence comprehension experiments testing comprehension of reversible sentences (active vs. passives) and argument structures (one-two-three-four arguments verbs) in a group of

adults with aphasia. Before presenting the data, some properties of Malay and previous studies on similar structures will be presented.

## 2. The morphosyntax of Malay

The Malay language, a member of the Malayic language group, belongs to the subfamily of the Western Malayo-Polynesian language of the Austronesian language family (Nothofer, 2006). It is spoken by 270 million people in different countries in the South East Asia region such as Singapore, Indonesia, Brunei, across the Straits of Malacca and South China seas (Yap et al., 2017, Teo (2005). According to Yoder (2010), Riau Indonesian/Malay has a somewhat free word order with simple morphological and syntactic structure in that the verbs are generally unmarked for tense and aspect and nouns unmarked for number and definiteness. Morphologically, Malay is an agglutinative type language and employs more of the derivational than the inflectional morphology. It employs the morphological processes of affixation, compounding and reduplication. Affixation plays a crucial role in constructing verb and sentence types in Malay: e.g. transitive verbs with active voice bear the prefix *meN-* (glossed as ACT for 'active'). When passivized, verbs bear the prefix form *di-* (glossed as PASS for 'passive'). Some of these affixes are ignored in colloquial speech.

Subjects in Malay are not marked by their position as in English. In verbs with two arguments, for example an agent and a theme, the verb sits in the middle position and carries voice information required to understand their grammatical roles (SVO or OVS), making it difficult to predict patterns of performance based on canonical direction of thematic role assignment.

## 2.1 Passives in Malay

Passivized sentences and in general object-preposed constructions are higly frequent in Malay, but there are no systematic observations specific for Malay (see Postman, 2004 for a study on object fronting). In Standard Indonesian (SI), a language that shares a grammatical system for passives similar to Malay, many observations of both spoken and written corpora found that between 30-40% of verbs were inflected with the passive voice marker, with a preference for 'Patient trigger' clauses (the sentences with the *di*-marker). We will not explore in this study the discourse related implications of this preference.

Sentence (**5**) is an active sentence containing a reversible verb and a preverbal prefix *meN-* attached to the verb. This prefix is interpreted as an Agent Focus, making the voice information crucial to assign thematic role and not positional order. Sentence (5a) shows a variant form of the verb i.e. bare verb. The bare verb in (5a) has the prefix deleted in surface structure but retains the active meaning in its base structure. In other words the prefix whether overt or covert still relays the same meaning. It is therefore possible for Malay to have verbs without affixation or called 'bare verbs'. We shall see later in *kena*/get passive and the passive with third or first person pronoun where bare verbs are utilized.

> (5)   Kawan-kawan Ali    **mem**buli     dia. (standard Malay)
>        Friend-REDUPLI    **ACT**-bully     Him
>        Ali
>                  'Ali's friends bullied him'

> (5a).   Kawan-kawan Ali ∅- **buli** dia. (standard spoken Malay)
>        Friend-REDUPLI Ali    bully him
>        'Ali's friends bullied him.

Nomoto and Kartini (2014) in their study on written texts in Standard Malay and Standard Colloquial Malay described passives in Malay as consisting of two types:

agentive passives (as in 6) and bare passives (agentless passives as in (7)). The *di-* form includes an agentive *di-* passive [ *di-* +V preposition *oleh*/by +N ] (6), *di-* + DP agent (eg. *Pakaian itu telah disidaikan emak / The clothes have been hung out to dry by mother* and the *pro* type where there is no overt agent but the agent meaning is entailed as in (7). More importantly, it is interesting to note that the prefix *di-* can be interpreted as a Patient Focus, in contrast with the *meN-* prefix mentioned above; making it plausible to interpret the DP as both the grammatical subject and topic of the sentence.

(6)     Ali       **di**buli       (oleh       kawannya)
        Ali       **PASS**-bully    (by         friend-his)
                'Ali was bullied (by his friend)'.

(7)     Pakaian   telah     **di**sidai
        clothes   have      **PASS**-hang out
        'The clothes have been hung out (to dry)'

In addition, there is another type of passive called the *kena*/get passive with bare verbs (8). *Kena*/get is a third type of Malay passive and is constrained by pragmatic specifications related to the context in which it appears. Siaw-Fong (2005) studied *kena*/get passives from 3 different sources: online newspaper corpora, classical Malay texts and internet sources. She concluded that *kena*/get passive from these three different sources reflected similar features of transivity and pragmatic use in discourse. Results showed that *kena*/get adversative passive was lower in frequency in written corpora (when compared to *di-* passives), higher in transitivity, less formal in register and has a negative connotation for the recipients of the action compared to *di-* passives.

(8)     Ali       **kena**      buli
        Ali       **get**       bully
                'Ali got bullied'

Bare passive verbs are also found in third person pronoun *mereka/they* (9). The pronominal passive involves a change in word order and the use of a pronominal with a bare verb.

(9)     Pakaian itu     telah     mereka     sidai
        clothes that     have     they     hang out
        'Those clothes (that) they have hung (out to dry).'

Finally, there are stative passives which occur with an absence of agentive meaning and have a circumfix *ke-…-an* or preverbal prefix *ber-*.

(10)     Ali     **ke**hujan**an** / **ber**hujan
         Ali     **PASS**-rain-aff / **PASS**-rain
         'Ali was drenched wet' / 'Ali was caught in the rain'

However, passives as in (9-10) and the *kena* form are not included in this pilot study.

In summary, passives in Malay involve a few mechanisms: the change in verbal prefixes (from *meN-* to *di-*) or the use of *kena*/get, and the optional use of the preposition *oleh*/by (this can be omitted when the agentive DP immediately follows the passive verb). The current study used the following types of sentences as stimuli: active sentences with reversible verbs and passives [*di-* +V   preposition *oleh*/by +N]. It is important to note that passivization in Malay is also used as a strategy for the relativisation of objects. In Malay, object extraction is disallowed and replaced by passive object relatives (Cole and Hermon, 2005) (instead of \**Budak lelaki yang emak cium*/ *The boy that the mum kisses*, the grammatical sentence will be the sentence *Budak lelaki yang dicium oleh emak / The boy that is kissed by the mum*). In this case the verb is first passivized with the *di-* affix before the object is extracted. In a case study of an Italian aphasic speaker, comprehension of passive object relative was reported as above chance compared to a selective impairment on object relative clause (Martini et al., 2019). This asymmetry reported for the Italian aphasic speaker is natural as in the

grammar of Malay with a preference for structures such as passive object relative and the ungrammaticality of the more complex object relative clauses. The absence of object relatives and the passivization strategy adopted for object relativisation in Malay are a clear sign that passive morphology is easy to access in Malay and has a clear grammatical function.

Gapped object relatives, such as *The boy that the mum kissed*, have been reported to have now a marginal role in Standard Indonesian, a language with free word order with similar affixation properties, due to its influence from English, as a second language syntactic transfer to cover instances where a passive marker will be infelicitous (Hassall, 2005). It is possible that Malay, a language with limited monolingual speakers and high rate of English users, might evolve toward a similar pattern allowing object extraction due to the high level of contact with English. More studies are required to investigate if Malay is moving in direction similar to SI.

## 2.2 Argument structure in Malay

Argument structures in Malay can be in the form of a one-place argument, two-place argument, 3 place-argument and 4 place argument structures (A Razak, 1997). The subcategorization and the argument structure of verbs in Malay can be represented as follows:

(11) *baca/read < **pem**baca/reader, **di**baca/ **PASS**-read >*

| Ali | **me**mbaca | buku |
|-----|-------------|------|
| Agent | | Theme |
| Ali | **ACT**-read | book |

    'Ali is reading the book'

(12a)

| Hartawan itu | menyumbang | kepada rumah anak yatim |
|--------------|------------|--------------------------|
| millionaire the | ACT-donate | to house child orphan |

    'The millionaire donated to the orphanage.'

(12b)

| Wang itu | disumbangkan | oleh hartawan itu | kepada | rumah | anak yatim |
|---|---|---|---|---|---|
| Money the | PASS-donate-aff | by millionaire the | to | home | child orphan |

'The money was donated by the millionaire to the orphanage.'

c. *sumbang/ donate* < ***peny**umbang/ person who donate,* ***disumbang*** */PASS-donate/ was donated* >

The transitive resultative expression is obtained by fusing individual verbs with the argument construction. Thus, the verb *baca/read* has a lexical entry involving two participant roles: *pembaca* (the person who reads) and *dibaca* (the entity that is being read).

## 3. Sentence comprehension in adults' speakers of Malay with aphasia

There are no studies exploring sentence comprehension in Malay aphasic speakers. Since Malay and Standard Indonesian (SI) share similar mechanisms of passivization (refer to (13-14)), we will therefore report in this section some studies on passives in SI. According to Paauw (2008), the standard languages in Indonesia and Malaysia are very similar and exhibit only minor lexical variation, although the colloquial varieties of the national languages in Indonesia and Malaysia are very different and are not immediately intelligible to one another. The differences between SI and Standard Malay are at the levels of vocabulary, pronunciation and slightly different word spelling due to the influence of different local languages and dialects. In addition, (Nomoto and Shoho (2007) confirmed that both languages are almost identical in terms of sentential syntactic and semantics.

| | Standard Indonesia (Active Sentence) (Chung, 2008) | | Malay Language (Active Sentence) |
|---|---|---|---|
| (13a) | Bapak saya mem-bayar | (14a) | Bapa saya membayar pemandu teksi |

tukang becak satu rupiah.

itu RM10.

father my Tr-pay worker pedicab one rupiah

Father I ACT-pay driver taxi Det RM10

My father paid the pedicab driver one rupiah. [transitive applicative]

My father paid the taxi driver RM10.

**Standard Indonesian (Passive di-) (Chung (2008)**

**Malay Language (Passive di-)**

(13b.) Kamar-nya di-sewa-nya tadi malam.

(14b.) Bilik itu disewanya malam tadi.

room-the P1-rent-by.him last night

Room DET PASS-rent-him night just

The room was rented by him last night.

The room was rented by him last night

A recent study looked at the comprehension of reversible sentences in Standard Indonesian (SI) by 11 patients with aphasia (PWAs) of both passive, active, subject and object cleft sentences (Jap, Martinez-Ferreiro, & Bastiaanse, 2016). Interestingly, the study reported low performance for object cleft and no difference for passives and other canonical sentences. The authors discussed this selective impairment for object cleft mentioning the functional use of passive in SI and its specific discourse functions preventing this structure to be underspecified in SI aphasia. Object clefts constructions as the one in (16) were selectively impaired compared to their subject counterpart (15). The structure in (16) are sometimes referred as bare passive, being this object fronting derived sentences with no morphosyntactic *di-* affix (Nomoto, 2010).

(15) Subject cleft (Agent-Theme)
Perempuan itulah yang memanggil laki-laki itu
Girl that is who **ACT-**call boy the
'That is the girl who is calling the boy'

(16) Object cleft (Theme –Agent)

Laki-laki itulah yang perempuan itu panggil

Boy     that is   who girl the ∅-call

'That is the boy who the girl is calling' (from Jap, Martinez, & Bastiaanse, 2016)

It is interesting to note that an explanation solely based on usage of the structure will not deal with the asymmetry in the cleft sentences reported, being both subject and object clefts are rare in SI (Engleberston, 2008; Ewing & Cumming, 1998). An explanation based on deletion of the traces or derived order will not cover the lack of deficit in passive SI reported in the study, being both traces and derivations applied in both structures. The approaches based on locality effects while crossing similar arguments will explain this asymmetry (see Martini et al., 2019), being in SI object cleft the only structure with a derived order structure with no active morphosyntactic features where an argument (the theme) is crossing over a similar argument position (the subject of the embedded clause) to reach the subject position. A qualitative analysis of errors for each structure are not reported in the study, making it difficult to understand if the mechanism beyond the processing of passives in SI was similar to non-derived sentences, such as actives.

A case study of an Indonesian-speaking non-fluent aphasia male, HS, on complex sentences with an act-out task was carried out by Postman (2004), comparing a series of bi-clausal sentences with active, passive and object fronting structures in VP-conjoined clauses and in center-embedded clauses. The case reported, HS, consistently predicated as subject of the second verb the NP with the role of agent in the first clause, which indicated that the thematic prominence of argument was more important for HS compared to arguments positions. This is a possible explanation for a free word order

and thematically oriented language such as SI; although this is possibly an extra linguistic strategy similar to a rational adaptation to a favored thematic mapping due to the lack of syntactic information. It is interesting to note that this adaptation was not driven by the statistical properties of the language (many themes in subject position will be the prediction based on usage and not agent) but it is more possible that this is the effect of an underspecified syntactic structure.

## 4. Methods

### 4.1 Participants

Five non-brain damaged (NBD) adults and five adults with aphasia were recruited. The mean age of the individuals with aphasia and the normal adults were 41 and 53 years old respectively. Both groups were matched for education (years of formal education) and native language (Malay as their mother tongue). The adults with aphasia were recruited from the Speech Therapy Unit, General Hospital Kuala Lumpur (HKL). All of them had chronic non-fluent speech reported by the attending speech-language therapists who assessed the patients with a translated version of the Boston Diagnostic Aphasia Examination (BDAE) (Goodglass, Kaplan & Barresi, 2001). All the participants were identified to have non-fluent aphasia based on performance on the Cookie Theft picture test. People with aphasia (PWA) included in this study fulfilled the following criteria: (1) a left hemisphere damage due to a lesion; (2) at least six months post-onset; (3) had non-fluent agrammatic speech; (4) had good comprehension of single words; and (5) having normal/corrected to normal auditory and visual acuity. Their speech productions were reported to be effortful (slower than normal), agrammatic, produced simple and short utterances with word finding difficulty. For the

non-brain damaged group, the participants and their family members reported there were no history of hearing, speech or language, cognitive and psychological problems.

--INSERT TABLE 1--

## 4.2 Design and materials

An auditory-sentence-to-picture-matching task was developed and involved two conditions, reversibility and complexity. In the first task, 20 active and passive reversible sentences were presented to the participants, and in task two, 26 sentences with varying argument structures were tested. The verbs selected in this study were based on familiarity and imageability (Mohd Azmarul, Shahidi & Hamid, 2017) from concrete to abstract type. A full list of sentences for both tasks are included in the Appendix. For each item, participants had to choose one out of four pictures. An example for task 1 is reported in Figure 1.

--- INSERT FIGURE 1 HERE----

## 5. RESULTS

### 5.1 Reversible active and passive sentences

The performance of sentence comprehension in active and passive forms was higher in the NBD group compared to the PWA (NBD Active mean=19.4, ± 0.89; Passive mean=19.0, ± 1.0; PWA Active mean=12.2, ±3.9; Passive mean=10, ±4.0).

---INSERT TABLE 2---

The analysis of a two-way mixed ANOVA between subjects revealed significant differences between the two groups, $F_{(1,8)}$ =22.62, $p < 0.05$ and strong effect size, $\eta =$ 0.73. The results of the error pattern analysis for reversible active and passive sentences

in PWA is shown in table 3, with similar amounts of error across all conditions (reversible, lexical and reversible lexical items) with the only exclusion of the Actives not having reversible errors compared to Passives.

--INSERT TABLE 3--

## 5.2 Sentence complexity

The performance of PWA and NBD across the four levels of argument complexity tests is shown in Table 4. The performance of PWA and NBD across the four levels of argument complexity tests is shown in Table 4. Overall, the PWA performed similarly compared to NBD.

--INSERT TABLE 4---

## 6. Discussion

The comprehension ability of reversible active and passive sentences among individuals with aphasia was found to be much lower than that of adults with no brain damage, with apparently no differences between active and passive sentences. This finding is consistent and similar to findings of other studies conducted previously in Standard Indonesian (Jap, Martinez-Ferreiro, & Bastiaanse, 2016), where passive sentences were proposed to be relatively easier to understand due to their high frequency in the language.

In terms of the two hypothesis presented in the introduction, TDH and GM, the results are not supporting the pattern predicted by the TDH. According to the Trace Deletion Hypothesis, movement should be the source of difficulty in aphasia, with a selective impairment of passives compared to active sentences. In our study, a clear asymmetry with a deficit of non-canonical sentence did not emerge. All patients had a

comparable diminishment in comprehension of both passives and active sentences, contrary to what was predicted by the TDH. According to the GM approach, the source of the damage for sentence comprehension in aphasia is a reduction of the morphosyntactic specification, visible in reversible sentences due to the similarity between arguments. The prediction for Malay will be a deficit in both sentences, actives and passives, due to the crucial role of the voice feature for both agent and theme driven sentences. The prediction of the GM account are met with all aphasic participants in this study reporting some sort of distortion for both active and passive sentences.

A more detailed look at the pattern of errors in the Malay language further supports the idea that the main problem is the underspecification of active grammatical features, adding an important dimension to distinguish the performance on Passive vs. Active sentences in Malay speakers with aphasia. Pure reversible errors were reported for passive sentences and not for active sentences. Actives were reported to have mainly lexical errors with a tendency to select the semantically related confound verb. These difference in the quality of the errors could explain the different sources of difficulties in sentence processing in aphasic speakers of Malay, the one for passives based on non-canonical order in line with other studies on passives as non-canonical derived structure and the one for actives more anchored on a more general weak competence in thematic assignment due to the underspecification of the morphosyntacitic features of the verb and a consequent interference of the semantic distractor of the task. Two sources for similarities are at play in underspecified verbs in Malay, one is more grammatical (reversible pattern of errors selectively for passives) and the other one more semantically driven (lexical errors selectively for active sentences). These results open new considerations for a more general mechanism at play during thematic assignment

and visible in languages such as Malay where free word order and strong thematic information are the two main ingredients for sentence comprehension.

The present study has to be considered as a pilot study, and a more systematic investigations is needed testing more structures in Malay speakers with aphasia. For example *kena* passives will be an ideal candidate, being this a grammatical marker interpreted at semantic level to test the hypothesis of semantically based route preserved in people with aphasia.

In addition, the verbal prefix *di-* of agentive passive is a pure grammatical form with no semantic content compared to the *kena*/get which is an overt passive marker with semantic content. This distinction for example could differentiate the performance in individuals with aphasia. Preliminary evidence have been reported in the acquisition of passives in Malay speaking children with developmental language disorder (DLD), with relatively easier comprehension of *kena* passives compared to *di-*passives (Norsofiah et al., *forthcoming* for a study on children with DLD).

The present study is offering a perspective for future work to better explain for the lack of asymmetry between active and passive sentences in languages such as Malay, where frequency of use and familiarity of passive *di-* is not considered to contribute to sentence comprehension but a double pressure for both semantic and syntactic similarities is at play with different source of vulnerabilities in both Actives and Passives. This relates well to the diglossic nature of the Malay language (Teo, 2005; Platt (1977)) i.e. specialization of functions where each H and L Malay serves its own purposes. It is not just the frequency of use and familiarity but more of frequency of use and familiarity in the respective High and Low varieties. The high *di-* passive variant functions robustly in formal language which includes printed materials such as newspaper reportings and official documents while the *kena*/get passive satisfies the

pragmatic function in the low Malay variant in everyday conversations; opening options for testing different passives in Malay to explore when formal grammatical features and their underspecification do play a role.

In terms of sentence comprehension based on argument complexity, the group of people with aphasia performed similarly to non-brain damaged adults. People with aphasia did not face much difficulties in retrieving verbs per se and had no problems accessing verbs with varying forms of argument structures. These problems with argument structures for the Malay adults with aphasia does not support for example Goldberg's (1995) view who stated that it is the argument construction that is responsible for the syntax and semantics of the resulting expression. Marantz (2013) in revisiting argument structures reiterated that current theories of argument structures place emphasis on events and the connection between arguments and events rather than on thematic roles. He echoed the importance of building on a foundation of understanding surrounding the role of syntax in structuring event meanings and the relatively independent and constrained role of the verbal root in contributing to argument structure meanings.

Types of verbs, based on grammatical features and possibly more plausible event structures for the active sentence in reversibility tasks will provide more insights into the difficulties adults with aphasia faced in comprehending sentences. It will be necessary to investigate event based distinctions in the active sentences (for example using markers that makes it more plausible to use an active sentence such as preverbal elements such as adverb *sering/ frequently* or in-situ modifiers of pronoun Agents, such as *sendiri* 'self'). This information on types of verbs that are more felicitous with active structures could be also useful to speech-language therapists in their treatment of Malay adults with aphasia.

## 7. Clinical Implications

This preliminary study is important from the clinical and theoretical aspects. From the clinical point of view, this study has been able to elaborate on important aspects of difficulties of sentence comprehension in Malay. This information combined with patterns of error analysis of the incorrect responses by the subjects with aphasia provide useful insights to speech-language therapists in managing their clients with aphasia. For example, Hillis (2002) delineated various types of therapies that are based on cognitive neuropsychological approaches that could address difficulties faced by Malay adults with aphasia in their mapping of the thematic links between the verbs and its arguments, accessing lexical verbs and so on. There are a few treatment methods which proposed to focus on deficits in sentence comprehension in people with aphasia. Mapping Therapy, for example, mainly focuses on sentence comprehension deficits (e.g., Schwartz et al., 1994; Fink, 2001; Mitchum, Greenwald, & Berndt, 2000). The Mapping Hypothesis (e.g., Schwartz et al., 1994; Schwartz, Saffran, & Marin, 1980), focuses on the mapping of grammatical roles of nouns onto their thematic grids and vice versa. The aim is to improve the ability to connect the syntactic to the semantic/thematic structures. Rochon and Reichman (2004) reported a study on treatment of sentence comprehension whereby the mapping therapy was combined with an additional acting-out task using figurines. This is supported by Kiran et al. (2012) who suggested that acting-out may enhance treatment-induced improvements, as it targets intermittent reductions in working memory capacities necessary for the interpretation of syntactic structures and assignment of thematic roles. Such reductions are assumed to be present in people with aphasia particularly with sentence processing deficits (Adelt, Hanne, & Stadie, 2016).

There are also other treatment studies that targeted deficits in both sentence comprehension and production with promising methodologies which added new dimensions to the discussion on single versus distinct syntactic processing systems (Nickels, Rapp, & Kohnen, 2015). The findings of the present study could be used as a basis in studying other complex syntactic structures in Malay that could influence the level of comprehension among Malay adults with aphasia, for example subject versus object relative clauses, *wh*-questions, etc.

## 8. Conclusion

The study on sentence comprehension among Malay adults with aphasia has demonstrated that a description based on the morphosyntax of Malay is crucial to understand the difficulties of sentence comprehension. Our findings highlighted aspects of morphosyntax that proved challenging particularly for the formal derivational affixes used in marking voice in both active and passive sentences. Characteristics of the Malay language which is diglossic, predominantly derivational and an interchangeable mix between lexical and grammatical elements set the landscape for sentence comprehension difficulties among Malay adults with aphasia.

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**Table 1.** Participants' demographic, linguistic, and clinical background information.

| Group | Participants | Gender/ Age (Years) | Language | Education (Years) | Medical Diagnosis | Aphasia Type |
|---|---|---|---|---|---|---|
| **Non-brain damaged** | SWI | F/50 | Ml | 9 | Healthy | - |
| | RN | F/53 | Ml | 9 | Healthy | - |
| | MN | M/63 | Ml | 10 | Healthy | - |
| | ROS | F/50 | Ml | 12 | Healthy | - |
| | ZH | M/58 | Ml | 10 | Healthy | - |
| **People with aphasia** | FH | F/37 | Ml | 15 | HS | NF |
| | AAA | M/32 | Ml | 9 | HS | NF |
| | MS | M/63 | Ml | 15 | TS | NF |
| | SM | M/64 | Ml | 8 | TS | NF |
| | MA | F/22 | Ml | 8 | Pre – eclampsia | NF |

*\* Gender: F (female), M (male); Language: Ml (Malay); Medical Diagnosis: (Haemorrhagic stroke HS; Thromboembolic stroke TS) Aphasia Type: NF (non-fluent).*

**Table 2.** Performance of active and passive sentences for NBD and PWA.

| GROUP | Subjects | ACTIVE | | PASSIVE | |
|---|---|---|---|---|---|
| | | Raw score ( n = 20) | Percentage ( % ) | Raw Score ( n = 20 ) | Percentage (%) |
| NBD | SWI | 20 | 100.00 | 19 | 95.00 |
| NBD | WRW | 19 | 95.00 | 20 | 100.00 |
| NBD | RN | 18 | 90.00 | 18 | 90.00 |
| NBD | MY | 20 | 100.00 | 18 | 90.00 |
| NBD | ROS | 20 | 100.00 | 20 | 100.00 |
| | **Mean** | **19.40** | **97.0** | **19.00** | **95.00** |
| | **S.D** | **0.89** | | **1.00** | |
| | **Min/Max** | **18/20** | | **18/20** | |
| PWA | FH | 7 | 35.00 | 8 | 40.00 |
| PWA | MS | 8 | 40.00 | 5 | 25.00 |
| PWA | SM | 16 | 70.00 | 13 | 65.00 |
| PWA | AAA | 16 | 80.00 | 15 | 75.00 |
| PWA | MA | 15 | 75.00 | 9 | 45.00 |
| | **Mean** | **12.2** | **61.00** | **10** | **50.00** |
| | **S.D.** | **3.96** | | **4** | |
| | **Min./Max** | **7/16** | | **5/15** | |

**Table 3**. Analysis of the error for reversible active and passive sentences in PWA.

| Subject | Reverse role (n=40) (%) | | Lexical (n= 40) (%) | | Reverse role/lexical (n = 40) (%) | | No Response (n = 40) (%) |
|---|---|---|---|---|---|---|---|
| | **Active** | **Passive** | **Active** | **Passive** | **Active** | **Passive** | |
| FH | 3 (7.5) | 4 (10) | 1 (2.5) | 3 (7.5) | 8 (20) | 4 (10) | 2 (5) |
| MS | 3 (7.5) | 7 (17.5) | 7 (17.5) | 1 (2.5) | 2 (5) | 7 (17.5) | 0 |
| SM | 1 (2.5) | 0 | 1 (2.5) | 3 (7.5) | 2 (5) | 2 (5.00) | 2 (5) |
| AAA | 0 | 2 (5) | 3 (7.5) | 1 (2.5) | 1 (2.5) | 2 (5) | 0 |
| MA | 0 | 6 (15) | 4 (10.5) | 2 (5) | 1 (2.5) | 2 (5) | 1 (2.5) |
| **TOTAL** | **7 (17.5)** | **19 (47.5)** | **16 (40)** | **10 (25)** | **14 (35)** | **17 (42.5)** | **5 (12.5)** |

**Table 4.** Performance on the argument structure task in NBD and PWA.

| GROUP | Subject | Arg 1 (n=7) | Arg 2 (n=10) | Arg 3 (n=7) | Arg 4 (n=2) | Total score (n=26) | % |
|---|---|---|---|---|---|---|---|
| Aphasia | FH | 5 | 8 | 4 | 1 | 18 | 69.23 |
| Aphasia | MS | 7 | 9 | 7 | 2 | 25 | 96.10 |
| Aphasia | SM | 6 | 10 | 7 | 2 | 25 | 96.10 |
| Aphasia | AAA | 6 | 9 | 6 | 1 | 22 | 84.61 |
| Aphasia | MA | 6 | 8 | 7 | 1 | 22 | 84.61 |
| NBD | SWI | 7 | 10 | 7 | 2 | 26 | 100 |
| NBD | WRW | 7 | 10 | 7 | 2 | 26 | 100 |
| NBD | RN | 7 | 10 | 7 | 2 | 26 | 100 |
| NBD | MY | 7 | 10 | 7 | 2 | 26 | 100 |
| NBD | ROS | 7 | 10 | 7 | 2 | 26 | 100 |

**Fig. 1** Pictures set for one item in reversibility task. **Bottom right**: *Wanita itu memberi hadiah kepada budak lelaki./*The woman gives the present to the boy. (Target). **Top right**: *Hadiah itu dijual oleh wanita itu kepada budak lelaki.* /The present was sold by the woman to the boy. (Verb distractor). **Top left**: *Hadiah diberikan oleh budak lelaki kepada wanita itu./*The present was given by the boy to the woman. (Reverse role distractor). **Bottom left**: *Budak lelaki menjual hadiah kepada wanita itu/*The boy sells the present to the woman. (Reverse role + verb distractor).

**Sentences used in the sentence comprehension task**

**TASK 1 Reversible Active vs. Passive:**
**Active**
1. Budak perempuan mengejar budak lelaki.
2. Perempuan sedang melukis gambar lelaki.
3. Budak lelaki sedang menarik baju wanita itu.
4. Wanita itu menangkap lelaki tersebut.
5. Lelaki sedang memukul wanita itu.
6. Wanita itu sedang mewarna gambar lelaki.
7. Budak lelaki menjual barang kepada wanita itu.
8. Lelaki itu sedang menampar wanita.
9. Wanita itu sedang membacakan buku kepada budak perempuan.
10. Wanita itu  sedang mentertawakan lelaki itu.
11. Wanita itu sedang mencium budak perempuan itu.
12. Budak lelaki itu menggigit tangan budak perempuan.
13. Lelaki sedang memarahi wanita itu.
14. Wanita itu sedang memeluk budak perempuan.
15. Budak perempuan itu menjilat tangan budak lelaki.
16. Wanita itu menyepak bola kepada budak lelaki.
17. Wanita itu sedang menolak budak lelaki.
18. Lelaki itu sedang membaling bola kepada budak perempuan.
19. Wanita itu memberi hadiah kepada budak lelaki.
20. Wanita itu sedang menunjukkan gambar kepada budak perempuan.

**Passive**
1. Hadiah diberikan oleh budak lelaki kepada  wanita itu.
2. Gambar itu ditunjukkan oleh budak perempuan kepada wanita itu.
3. Lelaki itu sedang dimarahi oleh wanita itu.
4. Wanita itu sedang dipeluk oleh budak perempuan.
5. Tangan budak perempuan dijilat oleh budak lelaki.
6. Wanita itu sedang diketawakan oleh lelaki itu.
7. Wanita itu sedang dicium oleh budak perempuan.
8. Tangan budak lelaki digigit oleh budak perempuan.
9. Buku sedang dibacakan oleh budak perempuan kepada wanita itu.
10. Budak perempuan sedang dikejar oleh budak lelaki.
11. Baju budak lelaki sedang ditarik oleh wanita itu.
12. Gambar seorang perempuan sedang diwarnakan oleh lelaki.
13. Wanita itu ditangkap oleh lelaki itu.
14. Lelaki itu dipukul oleh perempuan wanita.
15. Wanita itu  ditolak oleh budak lelaki itu.
16. Bola disepak oleh budak lelaki kepada wanita itu.
17. Barang itu dijual oleh wanita itu kepada budak lelaki.
18. Lelaki ditampar oleh perempuan itu.
19. Bola dibaling oleh budak perempuan kepada lelaki itu.
20. Gambar wanita sedang dilukis oleh lelaki.

**TASK 2 Argument complexity:**

**1 Arguments**
1. Lelaki itu sedang ketawa.
2. Pintu itu tertutup.

3. Lelaki itu sedang melompat – lompat.
4. Pintu itu terbuka.
5. Telur itu terpecah.
6. Budak lelaki itu sedang tidur.
7. Wanita itu tersenyum.

## 2 Arguments
1. Lelaki itu pecahkan telur.
2. Wanita itu sedang menjual air.
3. Wanita itu sedang membaca buku.
4. Wanita sedang menidurkan budak lelaki.
5. Wanita itu sedang tersenyum kepada budak perempuan.
6. Lelaki itu sedang  mentertawakan perempuan itu.
7. Lelaki sedang menutup pintu itu.
8. Lelaki itu sedang melompat longkang.
9. Lelaki sedang menyenduk nasi.
10. Lelaki membuka pintu itu.

## 3 Arguments
1. Lelaki itu sedang menyimbah air ke tanah.
2. Lelaki itu sedang mengeluarkan buku dari dalam beg.
3. Lelaki sedang menyendukkan nasi untuk budak lelaki.
4. Lelaki itu sedang menyimbah air ke badan wanita itu.
5. Wanita itu sedang menjual air kepada lelaki.
6. Lelaki itu sedang mengeluarkan buku untuk wanita.
7. Wanita sedang membaca buku kepada budak lelaki.

## 4 Arguments
1. Lelaki itu sedang mengeluarkan buku dari dalam beg untuk budak perempuan.
2. Lelaki itu sedang memasukkan buku ke dalam beg untuk budak perempuan.