

Abstract

We want to show how basic copula clauses in Indonesian can be dealt with within the framework of Head Driven Phrase Structure Grammar (HPSG) (Pollard & Sag, 1994). We analyzed three types of basic copula clauses in Indonesian: copula clauses with noun phrase complements (NP) expressing the notions of ‘proper inclusion’ and ‘equation’, adjective phrases (AP) expressing ‘attribution’, and prepositional phrases (PP) expressing relationships such as ‘location’. Our analysis is implemented in the Indonesian Resource Grammar (INDRA), a computational grammar for Indonesian (Moeljadi et al., 2015).

1 Introduction

Every language has a copula clause type, which may take a copula verb (Dryer, 2007). Some languages lack a copula verb; the copula slot is left blank and we have ‘verbless clauses’. In addition, some languages have more than one kind of copula verb. Most commonly, one will just refer to ‘a state’ and the other to ‘coming into a state’, similar to *be* and *become* in English (Dixon, 2009, p. 175). In this paper, we limit our discussion to the stative ‘be’ clause. Indonesian, a Western Malayo-Polynesian language of the Austronesian language family,¹ has multiple copula verbs, distributed over different semantic relations in addition to ‘verbless clauses’. We give an analysis that covers both multiple copula verbs and verbless clauses.

Analyses of Indonesian copulas can be found in reference grammars, such as Alwi et al. (2014), Mintz (2002), and Sneddon et al. (2010). A syntactic analysis in Lexical Functional Grammar (LFG) (Kaplan & Bresnan, 1982; Dalrymple, 2001) was done by Arka (2013). However, to the best of our knowledge, no work has been done on modeling Indonesian copula clauses in HPSG (Sag et al., 2003) and Minimal Recursion Semantics (MRS) (Copestake et al., 2005). This paper aims to fill in this gap, referring to existing HPSG literature on copulas, such as Bender (2001) and Van Eynde (2009). Our analysis is implemented in the Indonesian Resource Grammar (INDRA), a computational grammar for Indonesian (Moeljadi et al., 2015).²

Basic copula clauses in Indonesian can be divided roughly into three types, depending on the part-of-speech of the predicate: noun phrase (NP), adjective phrase (AP), or prepositional phrase (PP). Copula clauses taking an NP predicate typi-

¹Indonesian (ISO 639-3: ind) belongs to the Malayic branch with Standard Malay spoken in Malaysia, Brunei Malay in Brunei, Local Malay in Singapore and other Malay varieties spoken at various places in Indonesia (Lewis, 2009). The Indonesian language is spoken mainly in the Republic of Indonesia as the sole official and national language and as the common language for hundreds of ethnic groups living there (Alwi et al., 2014, p. 1-2). In Indonesia it is spoken by around 22.8 million people as their first language and by more than 140 million people as their second language. It is over 80% cognate with Standard Malay (Lewis, 2009).

²<http://moin.delph-in.net/IndraTop>

cally express the notions of ‘proper inclusion’ and ‘equation’,³ those taking an AP predicate express ‘attribution’, and the ones taking a PP predicate typically express ‘location’ (Payne, 2008, p. 111-123). Table 1 shows an outline of the three types of basic copula clauses in Indonesian.

Relation	Subject	Predicate
Proper inclusion, Equation	<i>Budi</i>	(<i>adalah</i>) <i>guru</i> (NP)
	Budi	is a teacher
Attribution	<i>Budi</i>	\emptyset <i>pandai</i> (AP)
	Budi	is clever
Location	<i>Budi</i>	(<i>ada</i>) <i>di rumah</i> (PP)
	Budi	is at home

Table 1: Three types of basic copula clauses in Indonesian

All three types of basic copula clauses in Table 1 can appear without a copula verb. In fact, ‘attribution’ is typically expressed without a copula verb. The copula verbs shown in Table 1 are *adalah*⁴ for ‘proper inclusion’ and ‘equation’, and *ada* for ‘location’. However, as mentioned before, there are more than one copula for some semantic relations. These other types will be discussed in the following section.

2 Basic Data

2.1 Copula clauses with Noun Phrase Predicates

Copula clauses with an NP as predicate may or may not have a copula verb *adalah*, *ialah*,⁵ or *merupakan*⁶ (Alwi et al., 2014, p. 358-359). These clauses express the notions of ‘proper inclusion’ and ‘equation’. Indonesian does not distinguish these notions syntactically, as shown in Example [1a] and [1b]. The three copula verbs behave the same way.

Since *ialah* is historically derived from 3SG *ia*, it only occurs with a third person subject (Sneddon et al., 2010; Mintz, 2002). Example [1c] shows that *saya* “1SG” cannot be the subject of a copula clause with *ialah*.

The copula verb *merupakan* is a verb which is in the process of becoming a copula (see Footnote 6). At its present stage it cannot appear if the NP predicate

³ ‘Proper inclusion’ is when a specific entity is asserted to be among the class of items specified in the nominal predicate, as in English sentence “He is a teacher”. Usually the subject is specific (“he”) and the nominal predicate is non-specific (“a teacher”). ‘Equation’ is when a particular entity is identical to the entity specified in the predicate nominal, e.g. “He is my father” (Payne, 2008, p. 114).

⁴ *adalah* is derived from the existential verb *ada* and a focus particle *-lah*.

⁵ *ialah* is derived from 3SG *ia* “s/he” and a focus particle *-lah*.

⁶ *merupakan* is derived from a noun *rupa* “form, figure, appearance, sort”, an agent-trigger prefix *me-*, and an applicative suffix *-kan*. The original meaning is “to form, to shape, to constitute”.

is a specific referent, such as a proper name, demonstrative, or pronoun, as shown in Example [1d]. However, it can precede a unique referent NP with a definite marker or a possessive marker as shown in Example [1b]. In addition, it can take an aspect or tense marker, while *adalah* and *ialah* cannot, as shown in Example [1e]. These have been confirmed in the Indonesian section of the Nanyang Technological University — Multilingual Corpus (NTU-MC) (Tan & Bond, 2012), a parallel corpus containing 2,975 sentences from three sources: Singapore Tourism Board website,⁷ a Sherlock Holmes short story *The Adventure of the Speckled Band*, and a Japanese short story written by Akutagawa Ryunosuke: *The Spider's Thread*.

To the best of our knowledge, there is no meaning difference among the three copula verbs. Sneddon et al. (2010), Alwi et al. (2014), Macdonald (1976), and Mintz (2002) note that *adalah* and *ialah* are interchangeable and most common in noun clauses where either the subject or predicate is long or structurally complex in formal, written language. Alwi et al. (2014) mention that *adalah* can also be changed with *merupakan*.

- (1) a. *Budi (adalah/ialah/merupakan) guru.*
 Budi COP teacher
 “Budi is a teacher.”
- b. *Budi (adalah/ialah/merupakan) guruku.*
 Budi COP teacher=1 SG
 “Budi is my teacher.”
- c. *Saya (adalah/*ialah/merupakan) guru*
 1 SG COP teacher
 “I am a teacher.”
- d. *Orang itu (adalah/ialah/*merupakan) Budi.*
 person that COP Budi
 “That person is Budi.”
- e. *Ini sudah/akan *adalah/*ialah/merupakan hal yang luar biasa.*
 this PERF/FUT COP case REL beyond
 ordinary
 “This has been/will be an extraordinary case.” (based on NTU-MC sentence ID 11938)

2.2 Copula clauses with Adjective Phrase Predicates

Copula clauses which express the notion of ‘attribution’ are the ones which have an AP as the main semantic content and are called ‘predicate adjectives’ (Payne, 2008, p. 120-121). A copula is usually absent in predicate adjectives, as shown in

⁷www.yoursingapore.com

Example [2a]. As Sneddon et al. (2010, p. 246-247) note, a copula *adalah* may be used by some speakers in adjective clauses, as illustrated in Example [2b]. According to the first author's intuition, a copula *ialah* may be less commonly used than *adalah*, but *merupakan* cannot occur with predicate adjectives. Not all speakers agree with the grammaticality of this and we did not find any occurrence of predicate adjectives with copulas in the NTU-MC; further Arka (2013, p. 31, 33) states that a copula cannot precede an adjective. Even so, we do provide an analysis for copula + AP in this paper (and INDRA).

- (2) a. *Budi pandai.*
 Budi clever
 "Budi is clever."
- b. *Pernyataan itu (?adalah/?ialah/*merupakan) benar.*
 statement that COP true
 "That statement is true." (based on Sneddon et al., 2010, p. 247)

2.3 Copula clauses with Prepositional Phrase Predicates

Copula clauses which express the notion of 'location' are the ones which have a PP as the main semantic content and are called 'predicate locatives' (Payne, 2008, p. 121-123). An existential verb *ada* or *berada* may be used optionally in predicate locatives, as illustrated in Example [3a]. The copulas *adalah* or *ialah* may appear, too, as shown in Example [3b]. Both in Example [3a] and [3b], the PP is a complement, not an adjunct.

- (3) a. *Budi (ada/berada) di rumah.*
 Budi EXIST at home
 "Budi is at home."
- b. *Satu-satunya air yang ada (adalah/ialah/*merupakan) dari*
 one-RED=DEF water REL EXIST COP from
 telaga.
 lake
 "The only water there is is from the lake." (based on Sneddon et al., 2010, p. 247)

There is another 'benefactive' clause in which the main semantic content of the predication is realized in a PP, marked by a preposition *untuk* "for", and its syntactic pattern usually follows the one of predicate locatives (Payne, 2008, p. 122). In Indonesian, an optional copula verb *adalah* or *ialah* may appear in this 'benefactive' clause, as shown in Example [4a].

Regarding *ialah*, for the same reason mentioned in Section 2.1, it can only appear with a third person subject. Example [4b] shows that *engkau* "2SG" cannot be the subject of *ialah*, while Example [4c] shows that 3SG subject *presiden* "the president" can be the subject.

- (4) a. *Ini (adalah/ialah/*merupakan) untuk Budi.*
 this COP for Budi
 ‘‘This is for Budi.’’
 b. **Engkau ialah untukku.*
 2SG COP for=1SG
 Intended meaning: You are for me.
 c. *Presiden ialah untuk rakyat.*
 president COP for people
 The president is for the people.

3 Analysis

3.1 Copula clauses with Noun Phrase Predicate

In order to model the shared meaning of the various copulas, we use a simple type hierarchy, as illustrated in Figure 1. The supertype of all the NP copulas *cop-verb-lex* inherits from *transitive-verb-lex* with an obligatory complement. This then has two children. The copula *adalah* is an instance of *v_np_cop_noasp_le* which inherits from *cop-verb-lex* with an additional constraint: it cannot occur with any aspect or tense marker (see Example [1e]). The copula *merupakan* also inherits from *cop-verb-lex*, but with a different constraint: the head of the complement should be a common noun, not a proper noun, pronoun, or a demonstrative. We divided *noun* into *commonnoun*, *propername*, and *pronoun*. The copula *ialah* (*v_np_cop_3_le*) inherits from *v_np_cop_noasp_le* with another constraint: the subject should be third person.

⁸In the simplified version of the graph shown in this paper, properties of the predicates such as semantic type, aspect, tense and number are not shown. If they are important to the analysis they will be discussed in the text. Referential individuals will be in the restriction of a quantifier (shown with the link RSTR/H). All other predicates are events.

lexical category (VP, NP, AP, and PP) can be a predicate XP; the NP subject takes this XP to make an Indonesian clause. Our analysis corresponds to ‘Constructional analysis II’ in Bender (2001, p. 101-118). There are three kinds of facts which make such an analysis unsuccessful to deal with African American Vernacular English (AAVE) copula absence: the possibility of copulaless existentials, a curious interaction of negation and ellipsis, and the possibility of complement extraction (Bender, 2001, p. 107). These three things do not exist in Indonesian: Indonesian has an obligatory existential verb *ada*, compared with AAVE which has *there* and a zero copula in existential sentences, as shown in Example [5a]; AAVE has the possibility of copula ellipsis in case it strands *not*, while Indonesian uses a negation marker *tidak* or *bukan*¹¹ which does not occur with any copula, as shown in Example [5b]; finally, AAVE has a long distance dependency in which the complement of the silent copula can be extracted, while in Indonesian in Wh-question the complement or the question word must appear without a copula, as shown in Example [5c] and [5d].¹² In short, because of differences in syntactic structure, the constructional analysis which does not work for AAVE can be implemented for Indonesian.

- (5) a. *Ada mobil yang menghalangi jalanku.*
 EXIST car REL block way=1SG
 “There a car blocking my way.” (based on Bender, 2001, p. 107)
- b. *Mereka berkata mereka sahabat, tetapi sebenarnya bukan.*
 3PL say 3PL best.friend but actually NEG
 “They say they’re best friends, but they not.” (based on Bender, 2001, p. 115)
- c. *Di mana (*adalah/*ialah/*merupakan) mobilmu (ada/berada)?*
 at where COP car=2SG EXIST
 “Where your car?” (based on Bender, 2001, p. 117)
- d. *Mobilmu (*adalah/*ialah/*merupakan/ada/berada) di mana?*
 “Where your car?” (based on Bender, 2001, p. 117)

3.2 Copula clauses with Adjective Phrase Predicate

As mentioned in Section 2.2, the predicate and the main semantic content of copula clauses with AP predicates is the AP. Predicative APs take one argument (NP as the subject), similar to intransitive predicates.¹³ Figure 5 shows the parse tree of Example [2a].

As mentioned in Section 2.2, a copula may or may not precede AP. In this paper, we provide an analysis for copula + AP, too. The copula *adalah* is treated as

¹¹ see Section 4 for negation.

¹² Sneddon et al. (2010, p. 324-328) note that question words may occur first in the clause, as in Example [5c], or in the normal position, as in Example [5d]. If the question word is predicate of a non-verbal clause, it often precedes the subject, as in Example [5c].

¹³ There is a lexical rule that converts these to attributive adjectives for the modifier use.

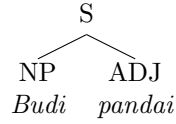


Figure 5: Parse tree of *Budi pandai*
“Budi is clever”

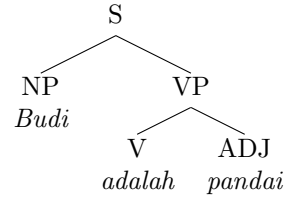


Figure 6: Parse tree of *Budi adalah pandai* “Budi is clever”

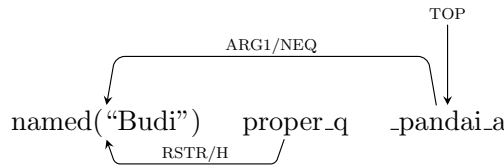


Figure 7: DMRS representation of *Budi (adalah) pandai* “Budi is clever”

a raising auxiliary which does not introduce a predicate and links its subject to the subject of its complement (the adjective). Figure 6 shows the parse tree of Example [2a] with *adalah*.

The MRS representation is the same as the one for intransitive sentences (see Figure 7 where we show the dependency MRS representation). The MRS of the clauses with and without *adalah* are the same. The event, *_pandai_a_rel* is the semantic head and hook for composition. Its ARG1 is linked to the subject: *named_rel*(“Budi”).

3.3 Copula clauses with Prepositional Phrase Predicate

Predicate locatives have a PP as the main semantic content and an optional verb *ada* or *berada*, or a copula *adalah* or *ialah*. Predicative prepositions, such as *di* “in/on/at”, take two arguments, similar to transitive predicates, as shown in Figure 8. When appearing with PPs, we also treat *ada*, *berada*, *adalah*, and *ialah* as auxiliaries which do not introduce a predicate of their own. The head of the subject is a noun and the head of the complement is a preposition. Figure 9 shows the parse tree of Example [3a] with an existential verb *ada*. The MRS of predicate locatives with *ada*, *berada*, *adalah*, and *ialah* is exactly the same as the one without, as shown in the dependency MRS representation in Figure 10.

In the MRS representation, the semantic head daughter and hook for composition is the event *_di_p_rel*. Its ARG1 and ARG2 are linked to *named_rel*(“Budi”) and *_rumah_n_rel* respectively.

Regarding ‘benefactive’ clauses, our analysis is the same as the one for predicate locatives. We treat *adalah* and *ialah* in these clauses as auxiliaries which do not introduce a predicate. The MRS (and DMRS) representation is similar to the one in Figure 10.

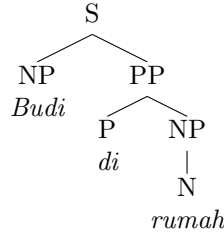


Figure 8: Parse tree of *Budi di rumah*
“Budi is at home”

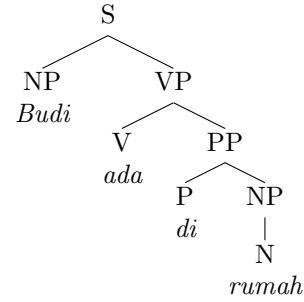


Figure 9: Parse tree of *Budi ada di rumah* “Budi is at home”

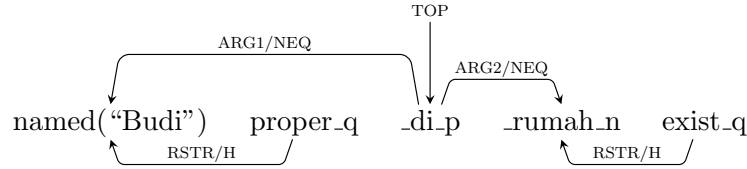


Figure 10: DMRS representation of *Budi (ada) di rumah* “Budi is at home”

4 Negation

Indonesian has two main negation markers for clauses, placed before the negated element. Examples 6, 7, and 8 summarize the interaction of negation with copula verbs in Indonesian, for NP, AP, and PP, respectively. The standard negation marker *tidak* is used when the predicate is verbal, including the copula verb *merupakan* and existential verbs *ada* and *berada*, as shown in Example [6b], [7a], and [8c], or adjectival, as in Example [7b], and with PP predicates, as shown in Example [8]. It cannot negate copula *adalah* or *ialah*, as illustrated in Example [6b], [6d], [7c], and [8b]. In Example [6d], *tidak* is not compatible with *adalah* and *ialah* and *merupakan* is ruled out because the NP predicate is a proper name (see also Example [1d]).

The special negation marker *bukan* “be not” is used when the predicate is nominal, as in Example [6] (Kroeger, 2014, p. 137),¹⁴ or prepositional,¹⁵ as shown in Example [8]. However, it cannot negate copula *adalah* or *ialah*, as illustrated in Example [8b], or existential verbs *ada* and *berada*, as in Example [8c].

- (6) a. *Budi bukan/*tidak guru.*
 Budi NEG teacher
 “Budi is not a teacher.”

¹⁴Kroeger (2014, p. 137) notes that in certain kinds of contexts, *bukan* can be used to negate verbal clauses and argues that it is a marker of ‘external’ (sentential) negation. We will not discuss it because this is beyond the scope of this paper.

¹⁵Sneddon et al. (2010, p. 202) mention that a number of prepositions can be negated by either *bukan* or *tidak*.

- b. *Budi tidak *adalah/*ialah/merupakan guru.*
 Budi NEG COP teacher
 “Budi is not a teacher.”
- c. *Guru itu bukan/*tidak Ali.*
 teacher that NEG Ali
 “That teacher is not Ali.” (Arka, 2011, p. 85)
- d. **Guru itu tidak adalah/ialah/merupakan Ali.*
 teacher that NEG COP Ali
 Intended meaning: That teacher is not Ali.
- (7) a. *Mereka tidak/*bukan menolong kami.*
 3PL NEG help 1PL.EXCL
 “They didn’t help us.” (Sneddon et al., 2010, p. 202)
- b. *Budi tidak/*bukan pandai.*
 Budi NEG clever
 “Budi is not clever.”
- c. **Budi tidak adalah/ialah/merupakan pandai.*
 Budi NEG COP clever
 Intended meaning: Budi is not clever.
- (8) a. *Tempatnya tidak/bukan di sini.*
 place=DEF NEG at here
 “The place is not here.”
- b. *Ini tidak/bukan *adalah/*ialah/*merupakan untuk Budi.*
 this NEG COP for Budi
 “This is not for Budi.”
- c. *Budi tidak/*bukan ada/berada di rumah.*
 Budi NEG EXIST at home
 “Budi is not at home.”

We treat *tidak* as an adverb modifying VP, AP, or PP, as shown in Figure 11. It is represented as *neg_rel* in the MRS. The value of its ARG1 is equated with the LBL of the VP, AP, or PP predicate, as illustrated in Figure 12. We treat *bukan* as a non-modifier verb, a combination of *copula_v_rel* as the head and *neg_rel* as the daughter, which takes an NP subject and an NP or PP complement, as shown in Figure 13 and 14.

In order to block *tidak adalah* and *tidak ialah* from parsing, we added a restriction in *tidak*: the value of the ASPECT of the VP which it modifies should be *perf-and-prog*, which means it modifies verbs that can take a perfect or progressive aspect marker. Because *adalah* and *ialah*’s ASPECT is *nonaspect*, which means they cannot take aspect markers, it is not compatible.

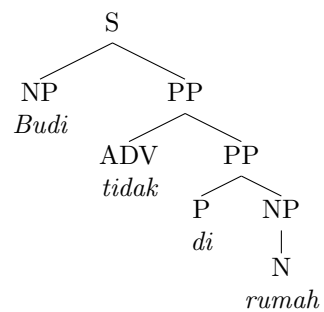


Figure 11: Parse tree of *Budi tidak di rumah* “Budi is not at home”

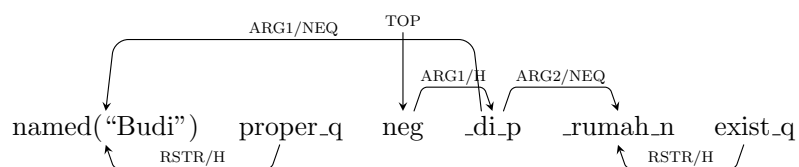


Figure 12: DMRS representation of *Budi tidak di rumah* “Budi is not at home”

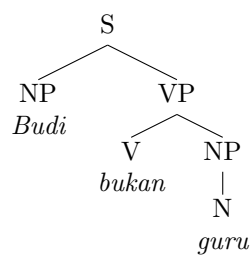


Figure 13: Parse tree of *Budi bukan guru* “Budi is not a teacher”

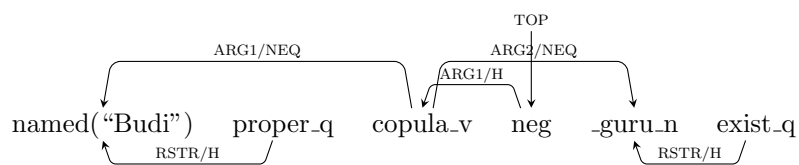


Figure 14: DMRS representation of *Budi bukan guru* “Budi is not a teacher”

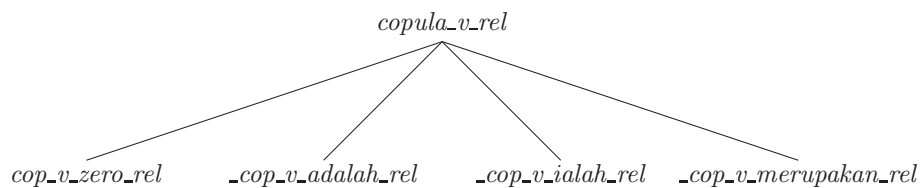


Figure 15: Semantic hierarchy of copulas

5 Generation

Again, we model similarities, in this case of meaning, using a type hierarchy, as illustrated in Figure 15. We can use this to underspecify the input to the generator. For example, for *copula_v_rel* it will then try to generate all predicates that are subsumed by it, i.e. all copula constructions, and only succeed for the grammatical ones.

Input:	Input:
Budi merupakan guru	Budi ada di rumah
Output:	Output:
Budi guru	Budi di rumah
Budi ialah guru	Budi ada di rumah
Budi adalah guru	Budi berada di rumah
Budi merupakan guru	Budi adalah di rumah
...	...

6 Conclusion

Our analyses of Indonesian copula clauses are similar to Arka (2013)’s LFG analysis but cover more copula verbs with a refined type hierarchy. Because of differences in syntactic structure between AAVE and Indonesian, the analysis that builds a VP out of a predicative NP, which does not work for AAVE, can be successfully implemented for Indonesian.

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