Indonesian Phonetics

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LIGN 110

1 Bahasa Indonesia

Indonesian, known as Bahasa Indonesia to its speakers, is the official language of Indonesia today, with approximately 43 million native speakers, and about 156 million more who speak it as a second language (Indonesia Census 2010). It is a very close relative to Malay within the Austronesian language family. Outside of Indonesia, Indonesian is spoken abroad by people of Indonesian background in countries such as the United States, the Netherlands, and Singapore.

My consultant for this project is Guido Sie, a native Indonesian speaker who grew up in Surabaya, Indonesia. In addition to Indonesian, he also speaks English, and is familiar with Dutch and Javanese from his experiences growing up in Surabaya. He has been living in the United States for over 35 years now, though still uses Indonesian to converse with friends and family periodically. Indonesian orthography uses the roman alphabet like English, and Guido is able to read Indonesian clearly.

The primary source of outside knowledge used to supplement this report is the journal article *Indonesian* by Craig Soderberg and Kenneth Olson. This article covers the phonetics of Indonesian, and was published in *Journal of the International Phonetic Association: Illustrations of the IPA* in 2008. I used both examples from this article, as well as other words that Guido and I agreed on.

2 Consonants

There are a total of 22 consonant phonemes in Indonesian, shown below.

	Bilabial	Labio-dental	Dental	Alveolar	Post-Alveolar	Palatal	Velar	Glottal
Stop	p b		t̪	d			k g	ʔ
Affricate					tʃ dʒ			
Fricative		f		s z	ʃ			h
Nasal	m			n		ɲ	ŋ	
Flap/Trill				r				
Approximant	w					j		
Lateral Approximant				l				

It is interesting to note that every consonant in Indonesian appears as a separate phoneme. While there are an abundance of consonant allophones, each one also appears in other

contexts as their own phonemes. As we will discuss later however, this is not the case with vowels.

Below is a list of Indonesian words demonstrating these different phonemes. The examples are provided in the same order as in the given recording. Each word is given via IPA transcription (broad form is included if different than narrow form), Indonesian orthography, and an English translation. Most consonants are demonstrated word-initially preceding the vowel /a/.

The first group shows the bilabial and labio-dental sounds: /p/, /b/, /m/, /w/, /f/:

1. [ˈpalɪŋ] /paliŋ/   *paling*   'most'
2. [ˈbali]   *Bali*   (name of an island)
3. [ˈmalu]   *malu*   'ashamed'
4. [ˈwali]   *wali*   'guardian'
5. [ˈfak̚t̪a]   *fakta*   'fact'

The next group illustrates the alveolar and post-alveolar fricatives /z/, /s/, /ʃ/, as well as the two alveolar liquids /r/, and /l/:

6. [ˈzat̚]   *zat*   'substance'
7. [saˈbʊʔ] /sabuk/   *sabuk*   'belt, sash'
8. [ˈʃaban]   *syaban*   'Sha'ban, 8th month of the Islamic calendar'
9. [raˈbu]   *rabu*   'Wednesday'
10. [ˈlabu]   *labu*   'squash, gourd'

The next group of words demonstrates the post-alveolar affricates /ʧ/ and /ʤ/, as well as the denti-alveolar/alveolar stops /t̪/ and /d/.

11. [ˈʧari]   *cari*   'find'
12. [ˈʤari]   *jari*   'finger'
13. [ˈt̪ari]   *tari*   'dance'
14. [ˈdari]   *dari*   'from'

The following words consist of the remaining nasal phonemes /n/, /ɲ/, and /ŋ/:

15. [naˈrasi]   *narasi*   'narrative'
16. [ˈɲarɪs] /ɲaris/   *nyaris*   'almost'
17. [ŋanˈt̪ʊʔ] /ŋant̪uʔ/   *ngantuk*   'sleepy'

The next group shows the palatal approximant /j/, and the velar stops /k/ and /g/:

18. [ˈjaŋ]   *yang*   'that, which'
19. [ˈkant̪ɔŋ] /kant̪oŋ/   *kantong*   'bag'
20. [ˈgant̪ɔŋ] /gant̪uŋ/   *gantung*   'hanging'

Lastly we compare the two glottal consonants /ʔ/ and /h/. Because /ʔ/ does not appear word initially as a phoneme, we frame both consonants between two /a/ vowels:

21. [ˈmaʔaf]   *ma'af*   'sorry'
22. [ˈpaha]   *paha*   'thigh'

According to Soderberg and Olson, /ʔ/ appears as a phoneme exclusively between two vowels in three situations. It may appear in words like in (21), found most often in words of Arabic origin. It may also appear between a affixes and stems which meet at vowel boundaries.

3   Vowels

There are a total of 6 vowel phonemes in Indonesian, shown below, with 4 additional vowel allophones shown in parentheses.

	Front	Central	Back
High	i		u
High-mid	(ɪ)		(ʊ)
	e		o
Mid		ə	
Low-mid	(ɛ)		(ɔ)
Low		a	

Below are words illustrating the six separate vowel phonemes. The first four show contrasts between /i/, /a/, /u/, and /o/. Each vowel in this group is framed between /b/ and /r/.

23. [ˈbiru]   *biru*   'blue'
24. [ˈbaru]   *baru*   'new'
25. [buˈruʔ]   *buruk*   'bad, poor'
26. [ˌboroˈbudur] *Borobudur* (name of a temple in Central Java)

The next pair compares the remaining two vowel phonemes /e/ and /ə/, using the frame /bʔb/:

27. [ˈbebas]   *bebas*   'free'
28. [bəˈbrapa]   *beberapa*   'several'

4   Allophones

As mentioned previously, the various consonant allophones in Indonesian all appear as separate phonemes themselves. However, some consonants have features still worth discussing, which have already appeared in the words above. For instance, the voiceless stops /p/, /t̪/, and /k/ are all produced unaspirated. In addition, all are unreleased in syllable final position, as seen in (5) - *fakta* - [ˈfak̚t̪a] and (6) - *zat* - [ˈzat̪̚]. In fact, in some words, syllable final /k/ was realized as [ʔ]. This behavior can be seen above in the words (7) - *sabuk* - [saˈbuʔ] and (17) - *ngantuk* - [ŋanˈt̪uʔ]. According to Soderberg and Olson, this behavior occurs only in non-loanwords, which explains why the change

was not present in [ˈfakˈ̚ta]. There are many other interesting consonant allophones, but the rest of the section will be devoted to discussing vowels, which consist of entirely new sounds.

The 4 vowels [ɪ], [ɛ], [ʊ], and [ɔ] appear as allophones in Indonesian of /i/, /e/, /u/, and /o/, respectively. They are typically lowered in a final closed syllable, or in a penultimate syllable which is followed by a final closed syllable whose vowel agrees in height (Soderberg and Olson, 2008). Guido seemed to closely follow this pattern throughout the recording.

To demonstrate, here is a pair of words demonstrating [ɛ] as an allophone of /e/:

| 29. | /sepele/ | [səˈpele] | *sepele* | 'not important' |
| 30. | /oleh/ | [oˈlɛh] | *oleh* | 'by' |

In [səˈpele], the open final syllable /le/ is produced with an unchanged [e]. In [oˈlɛh] however, the presence of the /h/ in the closed final syllable /leh/ results in /e/ being lowered to [ɛ]. In addition, although /e/ matches /o/ in height, we see that the initial /o/ is *not* lowered to [ɔ].

Similarly, the next pair illustrates [ɔ] as an allophone of /o/:

| 31. | /t̪oko/ | [ˈt̪oko] | *toko* | 'store' |
| 32. | /t̪okoh/ | [t̪ɔˈkɔh] | *tokoh* | 'figure, character' |

As before, the open final syllable /ko/ in [ˈt̪oko] is produced with an unchanged [o] vowel. On the other hand, the closed final syllable /koh/ in [t̪ɔˈkɔh] is produced with the lowered [ɔ]. In addition, this time we also see that in the penultimate syllable /t̪o/ in [t̪ɔˈkɔh], the /o/ is also lowered to [ɔ], since /o/ agrees in height with itself. Meanwhile the /o/ in the penultimate syllable /t̪o/ of [ˈt̪oko] remains unchanged, since the following /ko/ is not closed.

The fact that the first pair of words spoken by Guido did not follow the penultimate vowel-height rule suggests that this specific rule may be less prominent in his dialect. More discussion of this appears later on in final section of this report - Section 6, the sentence.

An example of [ɪ] as an allophone of /i/ can be seen in (1) - *paling* - [ˈpalɪŋ] and (16) - *nyaris* - [ɲarɪs]. Similarly, evidence of [ʊ] as an allophone of /u/ is present in (7) - *sabuk* - [saˈbʊʔ] and (17) - *ngantuk* - [ŋanˈt̪ʊʔ].

One behavior displayed that is worth noting is that /u/ was not always realized as [ʊ] in a final closed syllable. For example, in (25) - *buruk* - [buˈruʔ], and (26) - *borobudur* - [ˌboroˈbudur], the /u/ in the final closed syllable remained unchanged. On another note, it appeared that in some contexts, /u/ in a final closed syllable was lowered to /o/. For instance, in (20) - *gantung* - /gant̪uŋ/ - [ˈgant̪oŋ], /u/ is realized as [o]. Now one might argue that perhaps /o/ is the actually phoneme present for this specific word. However, if this were the case, we would have expected it to lower to [ɔ], since it appears in a final closed syllable. In fact, in the preceding word (19) - *kantong* - /kant̪oŋ/ - [ˈkant̪ɔŋ], the final syllable /t̪oŋ/ is realized as [t̪ɔŋ]. So if the vowel phoneme

in the final syllable of [ˈɡanton̪] was really /o/, we would expect its behavior to mirror the /t̪oŋ/ to [t̪ɔŋ] change. Since it does not, then it seems more likely that we are actually seeing the phoneme /u/ being lowered to [o]. This behavior is again seen in words (34) and (35) in the next section.

Similarly, Guido sometimes produced /a/ with a different vowel quality for certain words. After checking the formant listings of a sample of 7 words containing /a/, here is what I found:
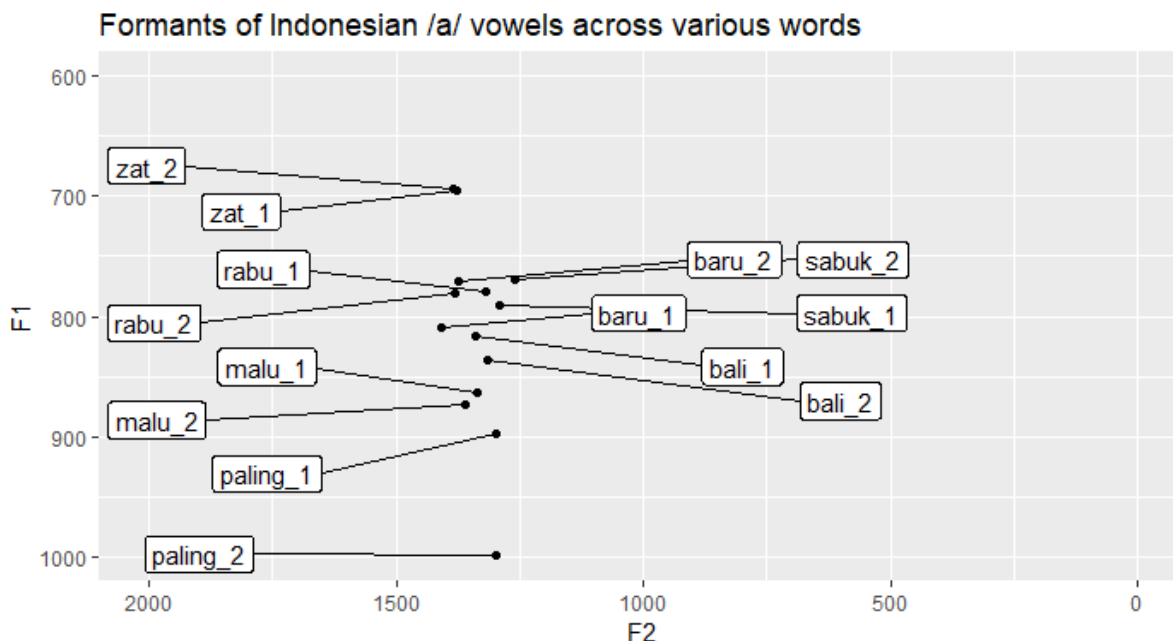

Figure 1: F1 and F2 listings of /a/ vowels across various words

Figure 1 shows that /a/ is most often produced with F1 around 800 and F2 around 1300. However, in some contexts, the F1 seems to differ significantly. In particular, (6) - *zat* - [ˈzat̪˺] - 'substance', seems to show a lower than typical F1, being produced with a higher /a/. On the other hand, (1) - *paling* - [ˈpalɪŋ] - 'most', seems to have a higher F1 than usual, being produced with a lower /a/. One theory I had initially was perhaps it had something to do with the fact that [ˈzat̪˺] is a word of Arabic origin. However, checking the formants for another word of Arabic origin, (22) - [ˈmaʔaf] showed F1 - 860, F2 - 1250, which is around the average. Thus, there does not seem to be any obvious systematic pattern to why these /a/ formants differ.

5   Stress

According to Soderberg and Olson, the primary stress in unaffixed Indonesian words typically appears on the penultimate syllable. The primary exception to this rule is if the penultimate syllable contains /ə/. In this case, the stress will most often move to the final syllable, though some dialects may move it to the previous syllable in certain contexts. In addition, stress does not display any phonemic contrast in Indonesian.

Below are a few examples demonstrating how Guido applied stress in the absence and presence of a /ə/ in the penultimate syllable.

<div>

33. /pint̪u/   [ˈpint̪u]   *pintu*   'door'
34. /pərut̪/   [pəˈrot̪˺]   *perut*   'stomach
35. /səbəlum/   [ˌsəbəˈlom]   *sebelum*   'before'

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While he did demonstrate the penultimate to ultimate stress change with the presence of /ə/in the penultimate syllable, he also applied the change in other contexts where the vowel in the penultimate syllable differed.

For instance, in the some of the preceding words he moved the stress to the final syllable, though the vowel in the penultimate syllable was /a/: (7) - *sabuk* - [saˈbʊʔ] - 'belt, sash'; (9) *rabu* - [raˈbu] - 'Wednesday'; and (17) - *ngantuk* - [ŋanˈt̪ʊʔ] - 'sleepy';

Similarly, in (25) - *buruk* - [buˈruʔ] - 'bad, poor', stress changes to the ultimate syllable following /u/, and in (30) - *oleh* - [oˈlɛh] - 'by' and (32) - *tokoh* - [t̪ɔˈkɔh] - 'figure, character', stress changes to the ultimate syllable following /o/.

Upon asking him about this behavior, he said that it was just the natural way he has always said those words. As a result, the most likely explanation is that it is simply a feature of the dialect of Indonesian he grew up speaking in Surabaya. In particular, perhaps it has something to do with the coda of the final syllable. One pattern I noticed among the words discussed above is that 5 out of the 6 ended in one of the two glottal consonants - /ʔ/ or /h/. However, more data and research would be needed to test the hypothesis.

6   Sentence

Below is a short sentence in Indonesian demonstrating a couple of the words above in a single utterance. It is provided in broad and narrow IPA, as well as a gloss and in Indonesian orthography.

/toloŋ	buku	jaŋ	biru	dibuŋkus/
[ˈt̪olɔŋ	ˈbuku	ˈjaŋ	ˈbiru	diˈbuŋkʊs]
please	book	that (is)	blue	passive-wrap
Tolong	buku	yang	biru	dibungkus.

"Please wrap the blue book".

Again we see the allophones [ɔ] and [ʊ] in the final closed syllables of [ˈt̪olɔŋ] and [diˈbuŋkʊs], respectively. Note that the /o/ in the penultimate syllable /to/ remains unchanged in [ˈt̪olɔŋ]. Similarly, the /u/ of the penultimate syllable /buŋ/ in [diˈbuŋkʊs] remains unchanged, even though /u/ agrees with itself in height. This acts as more evidence that the penultimate vowel-height allophone rule change is not as prominent in the dialect of Indonesian Guido speaks.

7   References

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