

Comparative Study of The Phonetic Systems of Indonesian and Thai Patani Malay

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ABSTRACT

This research is motivated by the differences and similarities in the phonetic systems of Indonesian and Thai Patani Malay. While both are Austronesian languages that have a close kinship correlation. The research aimed at analyzing the differences and similarities in the phonetic systems of Indonesian and Thai Patani Malay. The main method used in this comparative research was a contrastive analysis between the phonetics of Indonesian and Thai Patani Malay. The research object was the phonetic system of the two languages. Research data were obtained from audio recordings, interviews, and spoken texts from native speakers of both languages. Data analysis techniques were through segmental analysis, suprasegmental analysis, analysis of sound characteristics, and phoneme analysis. The study population consisted of native speakers of both languages and the Patani Malay community. The sample was selected supportively by considering variations in age, gender, education, socio-cultural background, dialect and sub-dialect. The research results show that there are significant differences in the phonetic systems of Indonesian and Thai Patani Malay. The Indonesian phonetic system is simpler and more stable than Thai Patani Malay. Indonesian has fewer phonemes; 20 phonemes, compared to Thai Patani Malay which has 28 phonemes, with a variety of different sounds and vowel patterns. Indonesian has a simpler vowel pattern, with only 3 short vowels and 3 long vowels. That Patani Malay has more complex vowel pattern, with 6 short vowels and 5 long vowels. These differences in the phonemic systems of Indonesian and Thai Patani Malay can cause phonemic interference in speakers of both languages. Phonemic interference can occur in the form of errors in pronunciation, comprehension, and writing.

Keywords: Phonetic System, Indonesian, Thai Patani Malay

1. INTRODUCTION

Indonesian and Thai Patani Malay are two Austronesian languages that have a close relationship. These two languages originate from Proto Malay, which is the ancestor of Malay and other Austronesian languages. However, along with their development, these two languages experienced various changes, both in the phonology, morphology, syntax and semantic systems. The differences and similarities in the phonetic systems of Indonesian and Thai Patani Malay can be a source of phonemic interference. Phonemic interference is a process that occurs when speakers of one language use sounds from another language in the language they are using.

The term interference was first used by Weinreich in Ohoiwutun (1996:72) who stated that interference, a change in the system of a language, occurs when there is contact between a language and elements of another language carried out by bilingualism. Bilingualism is the process of using two languages alternately (Adisumarto, 1993). Interference is considered a symptom of deviation from linguistic norms that occurs in a speaker's language user as a result of mother tongue contact. As stated by Mustikawati (2013), interference occurs due to the influence of the mother tongue system during the second language learning process. So the difference causes interference. Furthermore, the cause of interference is that speakers find new vocabulary that is difficult to pronounce, speakers hesitate to pronounce new vocabulary, speakers try to imitate old vocabulary in

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pronouncing new vocabulary (Swan, 2014; Julaika, 2022). Interference can occur at all linguistic levels, namely phonology, morphology, syntax, lexicon and semantics (Kridalaksana, 1982). Phonological interference is a deviation in pronunciation. Meanwhile, morphological interference occurs in deviations from the word formation process. Next, there is a deviation in the use of language structures called syntactic interference, and a deviation in language at the level of meaning is called semantic interference (Suwito, 1983).

Interference is different from code mixing, which occurs intentionally mixing elements of another language with a specific purpose, while interference occurs when the use of elements of another language is considered an error or deviation from linguistic rules (Chaer, 1995). Furthermore, Nurhayati (2022), states that phonemic interference can occurs in the form of errors in pronunciation, understanding and writing. Pronunciation errors can occur when Indonesian speakers pronounce [n] sound as $[\eta]$ or vice versa. For example, the pronunciation of the word "nyamuk" is pronounced as a "nanguk". Misunderstandings can occur when Indonesian speakers hear [ə] sound as [1] or vice versa. For example, the word "makan" is heard as mikin. Writing errors can occur when Indonesian speakers write [n] sound as "ny" or vice versa. For example, the word "nyamuk" is written as "nyakus". Inference also occurs when Indonesian speakers have difficulty distinguishing the [p^h] sound and [p] as in word /p^ha:/ and [pa:]. Meanwhile, Thai Patani Malay speakers who are studying Indonesian will have difficulty pronouncing in final position as in words /bubur/ menjadi /bubu/ even though these two words have different meanings (Sarim, 2005).

Thus, the differences and similarities in the phonetic systems of Indonesian and Thai Patani Malay are interesting to study, because they can provide a better understanding of the two languages. Thus, the research problem is formulated as follows: first, what are the differences and similarities in the phonetic systems of Indonesian and Thai Patani Malay? Second, how do these differences and similarities influence phonemic interference in speakers of both languages? This research focuses more on analyzing the differences and similarities in the phonetic systems of Indonesian and Thai Patani Malay, while Senyadi's research (2023) focuses more on differences in the use of vowel, consonant and diphthong phonemes. Apart from that, the difference in Kuwing's (2017) and Anindtya's (2018) research focuses more on analyzing the influence of phonemic interference on communication between speakers of the two languages. Long's toric research (2015) uses the same method as this research, namely contrastive analysis. However, Torik Long's research only analyzes the differences in the phonetic systems of the two languages, whereas this **novelty** research also analyzes their impact on phoneme interference.

2. RESEARCH METHODOLOGY

The main method used in this comparative research was contrastive analysis between the phonetics of Indonesian and Thai Patani Malay. The research object was the phonetic system of the two languages. Research data was obtained from audio recordings, interviews, and spoken texts from native speakers of both languages. Data analysis techniques include segmental analysis, suprasegmental analysis, sound characteristic analysis, and phoneme analysis. The research population consisted of native speakers of both languages and the Patani Malay community. The sample was selected supportively by considering variations in age, gender, education, socio-cultural background, dialect and sub-dialect.

3. RESULTS AND DISCUSSION

The results of the research state that Indonesian and Thai Patani Malay are two languages that are closely related, but have several differences, one of which is in terms of phonetics. The most striking phonetic difference between these two languages is the number of phonemes. Indonesian has 20 phonemes, while Thai Patani Malay has 28 phonemes. This difference causes differences in the sounds produced by the two languages. Another important difference is in the vowel patterns used by the two languages. Indonesian has a simpler vowel pattern, with only 3 short and 3 long vowels. Meanwhile, Thai Patani Malay has a more complex vowel pattern, with 6 short vowels and 5 long vowels.

These differences in the phonological systems of Indonesian and Thai Patani Malay can cause phonemic interference in speakers of both languages. Phonemic interference is errors in pronunciation, understanding and writing caused by differences in phonological systems between languages. Phonemic interference can occur in forms, including: pronunciation various errors, understanding errors, and writing errors. Phonemic interference can be reduced by studying the phonological systems of both languages well and in depth. Apart from that, speakers of both languages also need to practice frequently to improve their pronunciation and comprehension skillsa.

The research discussion of phonetic differences and similarities between the two languages focuses on phonemes, namely the smallest sound units in a language that can differentiate meaning. Indonesian has 20 phonemes, namely 5 vowel phonemes and 15 consonant phonemes. Meanwhile, Thai Patani Malay has 28 phonemes, namely 7 vowel phonemes and 21 consonant phonemes. The following is a table that compares Indonesian phonemes with Thai Patani Malay phonemes.

Phoneme	Indonesian	Thai Patani Malay
Vowel	/a/, /i/, /u/, /e/, /ə/, and /o/.	/a/, /i/, /u/, /e/, /o/, /ə/,/E/, /ɔ/dan /∞/.
Consonant	/b/, /c/, /d/, /f/, /g/, /h/, /j/, /k/, /l/, /m/, /n/, /p/, /q/, /r/, /s/, /t/, /v/, /w/, /x/, dan /y/.	/b/, /c/, /d/, /f/, /g/, /h/, /j/, /k/, /l/, /m/, /n/, /p/, /q/, /r/, /s/, /t/, /v/, /w/, /y/, /x/, /?/, dan /ŋ/.

The difference in vowels between Indonesian and Thai Patani Malay can be seen in the phoneme $/\Box$ / found in Thai Patani Malay, but not in Indonesian. Next, the phoneme \mathfrak{s} is found in Thai Patani Malay, pronounced with the mouth opened slightly more narrowly. For example, the phoneme $/\mathfrak{s}/$ in Thai Patani Malay which is a change to the Indonesian $/\mathfrak{a}/$ phoneme in the word "/rumah/" is pronounced in Thai Patani Malay with the vowel sound $/\mathfrak{s}/$.

The differences in vowel patterns used by the two languages, Indonesian and Thai Patani Malay, can be seen from the number of short and long vowels they have. Indonesian has 3 short vowels, they are /i/, /e/, and /a/. Meanwhile, there are also 3 long vowels, they are /i:/, /e:/, and /a:/. Meanwhile, Thai Patani Malay has 6 short vowels, they are /i/, / ϵ /, /a/, / σ /, / μ /, and / μ /. Meanwhile, there are 5 long vowels, they are /i:/, / ϵ :/, / α :/, / σ :/, and / μ :/.

These differences in vocal patterns can also influence the way speakers of the two languages pronounce words. For example, the vowel [a] is pronounced short and long, in Indonesian is pronounced with short vowels [a], in Thai Patani Malay is pronounced with a long vowel [a:] [ka]ta]. The word "sama" in Indonesian is pronounced with a short vowel [a], swhile the word "sama" in Thai Patani Malay is pronounced with a long vowel [a:] [sa]m \Box].

Furthermore, for example the **vowel [a] changes pronunciation**, the word "air" in Indonesian is pronounced with a short vowel [a], while the word "air" in Thai Patani Malay is pronounced with a short vowel $[\varepsilon]$. Changes in the vowel [a], for example in the word "apa" in Indonesian it is pronounced with a short vowel [a], while the word "apa" in Thai Patani Malay is pronounced with a short vowel $[\Box]$. The word "jalan" in Indonesian is pronounced with a short vowel [a], while the word "jalan" in Thai Patani Malay is pronounced with a short vowel [E].

Furthermore, the **vowel pattern [e]**, in general, Indonesian and Thai Patani Malay have similar vowel patterns /e/. Both languages use the short vowel [e]. Differences in [e] vowel patterns can influence the way speakers of the two languages pronounce words. For example, the word "merah" in Indonesian is pronounced with a short vowel [e], while the word "merah" in Thai Patani Malay is pronounced with a long vowel [e:].

Furthermore, Indonesian does not have **vowel** $[\varepsilon]$, while Thai Patani Malay has these vowels. The word "kacang" in Indonesian is pronounced with a short vowel [E] [kat Σ E]. Meanwhile, the word "kacang" in Thai Patani Malay is pronounced with a short vowel [ε]. The word "orang" in Indonesian is pronounced with a short vowel [E] [$\Box \otimes E$].

Furthermore, in some words, Thai Patani Malay uses **short vowels [ə]** which is lower than the short vowel [e] in Indonesian. For example, the word "emak" in Indonesian is pronounced with a short vowel [e], while the word "emak" in Thai Patani Malay is pronounced with a short vowel [ə]. The word "ember" in Indonesian is pronounced with a short vowel [e], while the word "ember" in Thai Patani Malay is pronounced with a short vowel [ə].

Furthermore, the **vowel pattern [i]**, for example in the word "api" in Indonesian is pronounced with a short vowel [i], while the word "api" in Thai Patani Malay is pronounced with a long vowel [i:]. The word "kita" in Indonesian is pronounced with a short vowel [i], while the word "kita" in Thai Patani Malay is pronounced with a short vowel [ε].

Differences in **vowel patterns [u]** can also influence the way speakers of the two languages pronounce words. For example, the word "buku" in Indonesian is pronounced with a short vowel [u], while the word "buku" in Thai Patani Malay is pronounced with a long vowel [u:] [buku]]. The word "sungai" in Indonesian is pronounced with a short vowel [u], while the word "sungai" in Thai Patani Malay is pronounced with a short vowel [u] [suNa]. The word "mulut" in Indonesian is pronounced with a short vowel [u], while the word "mulut" in Thai Patani Malay is pronounced with a short vowel [u] [suNa]. The word "mulut" in Indonesian is pronounced with a short vowel [u], while the word "mulut" in Thai Patani Malay is pronounced with a short vowel [u] [mulo?].

The vowel [o] changes pronunciation, for example the word "botol" in Indonesian is pronounced with the short vowel [o], while the word $[b\Box t\Box]$ in Thai Patani Malay is pronounced with a short vowel [o]. The word "udara" in Indonesian is pronounced with a short vowel [u] $[ud\otimes\Box]$ in the first syllable and long vowel [a:] in the second syllable, while the word "udara" in Thai Patani Malay is pronounced with a short vowel [u] in the first syllable and a long vowel [5:] in the third syllable.

The difference in consonants between Indonesian and Thai Patani Malay can be seen in the phonemes ? and η . The phoneme ? is a glottal consonant that is not found in Indonesian. The phoneme η s a velar consonant that is pronounced with the tongue against the back of the roof of the mouth. In Indonesian, the phoneme η is only found in loan words, such as "angin" and "bangun".

The phoneme /k/ in Indonesian can be pronounced both hard and soft, whereas in Thai Patani Malay it is always pronounced hard. in Indonesian it is pronounced using the consonant /k/, while in Thai Patani Malay it is pronounced with a consonant /x/. Another example, the word "makan" in Indonesian is pronounced with the sound ma.kan, while the word "makan" in Thai Patani Malay is pronounced with sounds ma./?/.kan. The difference in the/?/ sound in these two words can cause Indonesian speakers to misunderstand the word "makan" in Thai Patani Malay as "makanan".

Furthermore, differences in the pronunciation of the consonant /p/ in Indonesian can result in differences in pronunciation with Thai Patani Malay which is pronounced as /b/. For example, in the word "ta/p/i", in Indonesian it is pronounced with the consonant sound /p/, whereas in Thai Patani Malay it is pronounced with the consonant sound /b/ so "ta/b/i".

Apart from differences in the number of phonemes, differences in phoneme distribution can also cause differences in the sounds produced by the two languages. Phoneme distribution is the rule that determines how a phoneme can appear in a word. For example, the phoneme v cannot appear at the beginning of a word in Indonesian, but it can appear at the beginning of a word in Thai Patani Malay.

Furthermore, differences in phoneme distribution are also found in the phoneme /x/. In Indonesian, the phoneme /x/ is only found in loan words from foreign languages, such as "expression" and "experiment". Meanwhile, in Thai Patani Malay, the phoneme /x/ has a wider distribution, and can be found in native Thai Patani Malay words, such as $[x\leftrightarrow le?]$ (pulang) and $[xi\otimes \Box]$ (mengira).

The differences between Indonesian phonemes and Thai Patani Malay in vowels and consonants, if made in examples of several sentences from basic words written in bold (glossary), will appear in the following table.

Ref Indonesiar	n Thai Patani Malay
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1	Kenapa air meng alir sangat deras	[wa?p□ ai Nale d↔⊗ah saNa?]
2	Kita harus minta ampun kepada Tuhan	[kit□ k ^h ↔n□ mi□? apoN d↔Na tuhE]
3	Mayat ter apung di sungai kelmarin	[maja? do? napoN dalE suNa ma⊗EN]
4	Bagaimana bisa ditemukan mayat kemarin	[lagu man □ dZup□? maja? ma⊗EN]
5	Banyak abu di jalan raya hari ini	[d↔bu ba)□? di δZalE ha⊗i niN]
6	Dalam hutan banyak akar kayu	[dalE hutE ba∕⊡? aka kayu]
7	Orang zaman sekarang banyak mempunyai uang	[□⊗E dZamE l□niN ba/□? duit]
8	Anda membeli mobil berapa harganya?	[wap□ h↔g□ k↔⊗Et□ dem□ b↔li]
9	Abdullah itu orang baik	[pa? l□h tu □⊗E m□lE?]
10	Kaki Ayah bengkak digigit ular	[kaki aj□h b↔k□? k↔te? ula]
11	Di dalam sungai ada buaya	[dalE suNa niN ada b⊡j□]
12	Bilakah dia mau pergi sekolah	[mas□ man□ dij□ n□? gi k□l□h]
13	Dia mau pergi ke sekolah dengan apa?	[j□ n□? gi k□l□h d↔Na p□]
14	Kalau begitu, kita pergi dulu	[kalu gitu wi kit□ gi dulu]

The next discussion is phonemic interference, which is a form of language interference that occurs due to differences in sound systems (phonemics) between two languages. Phonemic interference can occur in the form of pronunciation errors, understanding errors, and writing errors. Phonemic interference in the form of pronunciation errors can occur due to replacement, addition or subtraction of sounds. Below are some examples of pronunciation errors caused by phonemic differences between the two languages:

1. Sound replacement:

- a) The letter /h/ in Indonesian is dropped from /O/ "aghi" in Thai Patani Malay. For example, the Indonesian word "hari" is pronounced as "kari" in Thai Patani Malay.
- b) The letter "k" in Indonesian is pronounced as /?/ in Thai Patani Malay. For example, the word "katak" in Indonesian is pronounced as "[kat□?]" in Thai Patani Malay.
- c) The letter /r/ in Indonesian is pronounced as /⊗/ in Thai Patani Malay. For example, the word "rajin" in Indonesian is pronounced as "ghajin [⊗adZeN]" in Thai Patani Malay.

2. Added sound:

- a) The letter /h/ is often added at the beginning of words in Thai Patani Malay. For example, the word "mata" in Indonesian is pronounced as "matah" in Thai Patani Malay.
- b) The letter /□/ is often added at the end of words in Thai Patani Malay. For example, the word "batin" in Indonesian is pronounced as "bating" in Thai Patani Malay.

3. Noise reduction:

- a) The letter /e/ is often omitted in Thai Patani Malay. For example, the word "terima" in Indonesian is pronounced as "trima" in Thai Patani Malay.
- b) The letter /r/ is often omitted in Thai Patani Malay. For example, the word "besar" in Indonesian is pronounced as "besa" in Thai Patani Malay.

Phonemic interference can occur in the form of comprehension errors caused by phonemic differences between two languages. Misunderstandings can be caused by several aspects: number of phonemes, sound variants, and diphthong sounds. The following are some examples of misunderstandings caused by phonemic differences between the two languages:

1. Number of phonemes

Previously we discussed the differences and similarities between the phonemes of Indonesian and Thai Patani Malay. This difference results in phonemic interference in the form of errors in understanding. Difference between phonemes /b/ and /p/. In Indonesian, the phonemes /b/ and /p/ have clear differences. However, in Thai Patani Malay, these two phonemes are sometimes pronounced the same. For example, the word "buku" (Indonesian) can be pronounced as "puku" (Thai Patani Malay). Next, the difference between the phonemes /t/ and /d/. In Indonesian, the phonemes /t/ and /d/ also have clear differences. However, in Thai Patani Malay, these two phonemes /t/ and /d/ also have clear differences.

the same. For example, the word "tapi" (Indonesian) can be pronounced as "dape" (Thai Patani Malay).

2. Sound variants

Indonesian Malay has fewer sound variants compared to Thai Patani Malay. For example, the phoneme /a/ in Indonesian only has one sound variant, namely /a/. However, the phoneme /a/ in Thai Patani has two sound variants, namely /a/ and /E/. This difference can cause errors in understanding, for example: the difference between the sounds /a/ and /E/. The word "makan" (Indonesian) can be pronounced as "makE" (Thai Patani Malay).

3. Diphthong sounds

Indonesian has three diphthong sounds, namely /ai/, /au/ and /oi/, while Thai Patani Malay does not have diphthong sounds. This difference can cause misunderstandings. For example: the difference between the sounds /ai/ and /ei/. The word "baik" (Indonesian) can be pronounced as "beik" (Thai Patani Malay)

This research is motivated by the differences and similarities in the phonetic systems of Indonesian and Thai Patani Malay, as well as the potential for phonemic interference in speakers of both languages. This research has resulted that there are significant differences in the phonetic systems of Indonesian and Thai Patani Malay. Indonesian has fewer phonemes, 20 phonemes, compared to Thai Patani Malay which has 28 phonemes, with a variety of different sounds and vowel patterns. Indonesian has a simpler vowel pattern, with only 3 short and 3 long vowels. Meanwhile, Thai Patani Malav has a more complex vowel pattern, with 6 short vowels and 5 long vowels. These differences in the phonemic systems of Indonesian and Thai Patani Malay can cause phonemic interference in speakers of both languages. Phonemic interference can occur in the form of errors in pronunciation, understanding and writing.

4. Conclusion

Based on the research results and discussion, it can be concluded that Indonesian and Thai Patani Malay have significant differences in phonetic systems, especially in terms of the number of phonemes and vowel patterns. Indonesian has a simpler and more stable phonetic system compared to Thai Patani Malay. Differences in the phonemic systems of the two languages can cause phonemic interference in speakers of the two languages. Phonemic interference can occur in the form of errors in pronunciation, understanding and writing. Therefore, it is important for speakers of both languages to study the phonological systems of both languages well and in depth improve and practice to pronunciation and comprehension skills. This research can provide a better understanding of the differences and similarities in the phonetic systems of Indonesian and Thai Patani Malay. as well as their impact on phonemic interference in speakers of both languages. This research can also be a basis for further research on phonemic interference in other languages that are closely related.

REFERENCES

- 176 M. Mamah et al.
- Adisumarto, M. Pengantar Dasar-Dasar Sosiolinguistik.Yogyakarta: Lembaga Pendidikan Ahmad Dahlan (1993).
- [2] Aksan, S. (2016). "Interferensi Fonemik Bahasa Indonesia dan Bahasa Inggris pada Mahasiswa Program Studi Bahasa Inggris Universitas Negeri Makassar." Jurnal Pendidikan Bahasa. 2(1), 21-28 (2016).
- [3] Chaer, L. A. *Sosiolinguistik Perkenalan Awal*. Jakarta: PT. Rineka Cipta (1995).
- [4] Julaika, Siti dan Edi Syaputra. "Interferensi Bahasa Indonesia ke Dalam Bahasa Inggris pada Abstrak Jurnal Ilmiah." Jurnal Multidisiplin Dehasen (MUDE). Universitas Bengkulu. Vol. 1 No. 3 Juli 2022 page: 113–118 (2022).
- [5] Kridalaksana, H. *Fungsi dan SIkap Bahasa.Ende*. Flores: Nusa Indah (1982).
- [6] Kuwing, Aseeyah. (2017). "Interferensi Fonologis Bahasa Melayu Pattani dalam Berbahasa Indonesia Mahasiswa Thailand di Universitas Muhammadiyah Surakarta." *Artikel Publikasi*. Surakarta: Universitas Muhammadiyah Surakarta (2017).
- [7] Long, Torik. Analisis Kontrastif Fonologi Bahasa Thailand dan Bahasa Indonesia. Skripsi Universitas Muhammadiyah Makasar (2015).
- [8] Nugraheni, Aninditya Sri dan Nisa Syuhda. "Interferensi Bahasa Melayu terhadap Bahasa Indonesia (Analisis Fonologi, Morfologi, Sintaksis pada Pola Komunikasi Mahasiswa di UIN Sultan Syarif Kasim Riau." *Jurnal Lingua Didaktika*. Fakultas Bahasa dan Seni, Universitas Negeri Padang. Vol. 13, No. 1. Halaman 011-025 (2019).
- [9] Nurhayati, L. "Interferensi Fonemik dalam Bahasa Indonesia dan Bahasa Melayu Patani Thailand." Jurnal Ilmiah Pendidikan Bahasa." 1(1), 1-12 (2022).
- [10] Ohoiwutun, Paul. *Sosiolinguistik.* Jakarta: Kesaint Blance (1996).
- [11] Sarim, p. Perbandingan Sistem Fonologis Bahasa Thai dan Bahasa Indonesia. Tesis. Yogyakarta: Universitas Gadjah Mada (2005).
- [12] Seniyadi. "Perbandingan Fonemik Bahasa Indonesia dengan Bahasa Melayu Patani Thailand." Jurnal Lingkar Pendidikan. Universitas Lancang Kuning. Vol 2(2), 61-66 (2023).
- [13] Suwito. Pengantar Awal Linguistik. Solo: Henari Ofset (1983).

[14] Swan, M. The Influence of the Mother Tongue on Second Language Vocabulary Acquisition. Diambil kembali dari www.mikeswan.co.uk: http://www.mikeswan.co.uk (2014). **Open Access** This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (http://creativecommons.org/licenses/by-nc/4.0/), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

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