



Investigating the Unproductive Morphological Forms in Indonesian Language

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Author's contribution

The sole author designed, analyzed, interpreted and prepared the manuscript.

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ABSTRACT

This study entailed an investigation into the unproductive morphological forms in the Indonesian language. This study analyzed these forms' nature, patterns, and potential linguistic implications to uncover the reasons behind their existence and persistence. The study employed descriptive approached and data-based methodologies, utilizing the SEAlang Library Indonesian Corpus (SLIC) as the primary data source. The results revealed unique features of unproductive morphological forms in Indonesian, characterized by specific affixational patterns, including the morphologically marked infixes {-em-}, {-er-}, {-el-}, and {-in-}. These forms also exhibited semantic limitations limited to particular word classes or semantic domains. Additionally, a confluence of cognitive and linguistic influences contributed to the phenomenon of unproductive word forms. The study also identified boundaries and constraints within morphological productivity, exploring unproductive morphological forms to provide insights into the micro-change of the language. This study's findings could advance broader aspects of morphological theory and language description.

Keywords: *Unproductive morphological forms; Indonesian language; linguistic structure; morphological patterns.*

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1. INTRODUCTION

Studying language morphology is an essential aspect of comprehending the complex structures embedded within a linguistic system [1,2]. With its diverse and intricate system [3,4], the Indonesian language provides a unique opportunity to explore the nuances of morphological forms. Amongst these forms are the intriguing aspects of unproductive morphemes in the language. These elements are present but do not contribute to generating new words, making them a fascinating subject of study [5,6]. In this regard, this study aims to explore unproductive morphological forms in the Indonesian language and unravel their essence, patterns, and underlying significance within the framework of Morphology. The study will delve into the intricacies of the language and provide valuable insights into the nature of morphological forms, contributing to the existing knowledge of language morphology.

This study of unproductive morphemes in the Indonesian language, furthermore, presents a fascinating opportunity to explore the intricacies and structural soundness of this language. With the aid of empirical analyses and linguistic methodologies [7–9], this study aims to uncover the enigmatic aspects of their existence, distribution, and plausible implications within the broader framework of morphological theory. Through an examination of these forms, this study intends to shed light on the underlying mechanisms that govern the formation and application of morphemes in the Indonesian language.

The persistence of unproductive morphological elements in Indonesian presents an intriguing phenomenon that warrants further investigation. By delving into the underlying reasons behind this phenomenon [10,11], we have the potential to uncover valuable insights into the mechanisms that shape linguistic systems. As such, this investigation holds the promise of contributing to our understanding of Indonesian linguistics and the broader discourse on morphological structures and language change. In light of the potential significance of this inquiry [12–14], this study aims to delve into the intricate details of the Indonesian language's morphological forms that do not contribute to its productivity.

Through this investigation, the study provides a stepping stone toward a more profound comprehension of language structure and the

inherent intricacies of linguistic systems. Therefore, the research questions are as follows: (1) what distinguishing traits do unproductive morphological forms in the Indonesian language have from productive morphemes?; (2) in spite of their lack of productivity now, what structural, or cognitive factors support the existence and of unproductive morphological forms in Indonesian; and (3) what does the study of Indonesian unproductive morphological forms teach us about morphological theory and the mental processes involved in processing language?

2. LITERATURE REVIEW

2.1 Theoretical Framework

This study delves into the issue of unproductive morphological forms in the Indonesian language and aims to provide a comprehensive understanding of their nature and importance. Drawing from well-established linguistic frameworks [15–18], the study explores the theoretical foundations of morphology to shed light on the underlying factors contributing to the presence of these forms (Figure 1).

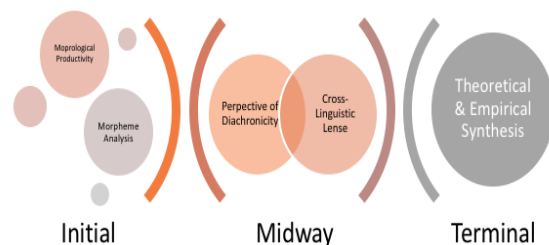


Fig. 1 Analysis Framework for the Unproductive Morphological Forms

First, Morphological Productivity. A fundamental idea in morphological theory [19,20], morphological productivity is at the center of this study. Productivity in morphology is the ability of morphological rules or processes to produce new, legitimate forms in a language [21]. This study attempts to identify the limits and mechanisms governing morphological productivity in Indonesian by contrasting productive and unproductive morphological components.

Second, Morpheme Analysis and Distribution. Through the use of a morpheme-based methodology [22–24], this study analyzes the distribution, affixational patterns, and relationship between unproductive and productive morphemes [25]. The purpose of this study is to clarify the linguistic variables and limitations

influencing the occurrence and application of ineffective morphological features in Indonesian.

Third, Micro-diachronic Perspective. By utilizing diachronic linguistics [26,27], the study broadens its scope to include historical dimensions. It aims to uncover possible insights into the development of language and the reasons underlying the persistence of some unproductive morphemes despite their lack of productivity in the present by following the historical trajectories of these morphological forms [28,29].

Fourth, Cross-Linguistic Comparison. This study might include a comparison analysis with other languages that have comparable morphological traits [30,31]. The study intends to contextualize and maybe generalize findings by contrasting Indonesian with languages that have similar characteristics, adding to a wider understanding of morphological structures outside of the field of Indonesian linguistics.

This theoretical framework employs trusted linguistic theories and methodologies to provide a comprehensive perspective for examining ineffective morphological forms present in the Indonesian language. The framework delves deep into the complexities of language morphology and investigates pseudo-evolution, offering valuable insights into the intricacies of the language.

2.2 Previous Studies

Previous research on the morphology of the Indonesian language has played a crucial role in establishing a solid foundation for comprehending the intricacies and subtleties of its morphological structure. Through a thorough analysis of productive and non-productive morphological elements, scholars have significantly contributed to understanding the Indonesian language's linguistic patterns and change. These studies have explored how morphemes, affixes, and other grammatical structures function within the language, providing valuable insights into the mechanisms underlying its complex system of inflection and derivation. By examining the morphological structure of Indonesian, researchers have shed light on essential aspects of its grammar, syntax, and semantics, paving the way for further inquiry into this fascinating and diverse language.

First, research on Indonesian morphological productivity. Key studies on productivity in

Indonesian morphology were carried out by Sneddon (1996), who focused on the generative processes that underlie the affixation process that creates new words [32]. In order to evaluate the nature of ineffective morphological forms in Indonesian, the study established the foundation for comprehending productive morphological patterns and their contribution to the lexicon.

Additionally, there was research on the examination of unproductive morphemes. Chaer (2008) and Kridalaksana (2009) conducted a thorough examination of non-productive affixes in Indonesian, delving into the domain of unproductive morphological features [33,34]. The study shed light on the presence of morphemes in the language that appear to be non-functional by examining the distribution and semantic limitations of these forms.

Second, research on the limited historical views of the Indonesian morphology. Poedjosoedarmo (2006) examined the historical trends of Indonesian morphological patterns, moving the focus to historical linguistics [35]. The research provided insight into the development of the language's morphological structure, even though it was not directly focused on unproductive morphemes. This could provide hints about the persistence of some unproductive features across time.

Third, within the terms of morphosemantics and morphosyntax, Nugraha in 2017 and 2021 investigated the structural processes that underlie the understanding of Indonesian words with complicated morphology [36–39]. The study shed important light on the cognitive load associated with processing morphologically complex verbal structures, even if it did not specifically address unproductive forms.

Lastly, in respect to the cross-linguistic comparisons, Nugraha & Baryadi (2019) and Pasaribu & Nugraha (2020) conducted cross-linguistic analyses that compared the morphology of English with Indonesian, emphasizing both similarities and differences in morphological systems [40,41]. These comparative investigations established the foundation for a comprehensive contextualization and possible generalizations about morphological structures, even though they did not specifically focus on unproductive forms.

Indonesian morphology has been the subject of numerous researches or studies exploring

various aspects of the language. Although Indonesian morphology has been greatly enhanced by these earlier studies, there has not been much research done on the subject of thorough investigations that focus on unproductive morphological forms. By offering a thorough assessment and analysis of these forms and attempting to understand their nature, distribution, and possible linguistic implications within the Indonesian morphological landscape, the current study seeks to close this gap in knowledge.

This study's unique addition is that it focuses exclusively on Indonesian morphological variants that are unproductive. The existence and persistence of unproductive morphemes have mainly stayed on the periphery of scholarly investigation, despite the fact that earlier research have offered insightful information about productive morphological patterns and historical change.

This study aims to close this gap by carefully examining and analyzing these ineffective morphological forms. The study intends to reveal the nature, distribution, and possible linguistic implications of these features within the Indonesian morphological system by concentrating on them explicitly. Additionally, this thorough study of Indonesian morphemes that are ineffective not only closes a large gap in the literature but also offers a chance to discover new details about the complex structure of language morphology.

3. METHODOLOGY

The descriptive approach employed a combination of linguistic disciplines such as morphology, semantics, and corpus linguistics to analyze unproductive morphological forms in Indonesian morphology extensively. This comprehensive investigation aimed to gain a deeper understanding of the nature and characteristics of these morphological forms. By examining the interplay between these linguistic disciplines, this methodology offered a unique and holistic approach to studying the intricacies of Indonesian morphology.

First, a corpus of written Indonesian texts, namely the SEALang Library Indonesian Corpus (hereafter: SLIC) (website: <http://sealang.net/indonesia/corpus.htm>) was chosen to represent the variety and breadth of linguistic phrases containing the unproductive

forms, such as {-em-}, {-er-}, {-el-}, and {-in-}. In order to guarantee a representative sample that reflected the language's usage, selection criteria prioritized various grammatical contexts. Once acquired, the corpus-data was carefully annotated, emphasizing morphological features, productive and unproductive morphemes, and distributional pattern classification. The systematic identification and tagging of morphological structures within the corpus-data were made more accessible by annotation tools and linguistic software, namely UDPipe (website: <https://lindat.mff.cuni.cz/services/udpipe/>).

Third, the annotated data was subjected to qualitative studies to identify the traits and distribution of unproductive morphological forms. The frequency, incidence, and distribution of ineffective morphemes in various lexical categories were evaluated. To carry out the semantic and contextual analysis a thorough semantic analysis was carried out to identify the unique interpretations and semantic limitations guiding ineffective morphological features. Contextual analysis investigated the language settings in which these morphemes were found and examined their syntactic and semantic functions in sentences and discourse.

After gathering and analyzing the data related to unproductive morphological forms in Indonesia, the final step involved interpreting and synthesizing the information to understand various aspects comprehensively. This stage included examining the different traits and characteristics associated with these forms, studying their distribution patterns, exploring their evolutionary history, investigating their cognitive implications, and analyzing their societal influences. Combining all these factors gave the researchers an understanding of the phenomenon of unproductive morphological forms in the Indonesian language.

4. RESULTS AND DISCUSSION

4.1 Characteristics of the Unproductive Morphological Forms

The investigation uncovered unique features of unproductive morphological forms in Indonesian. This analysis identified particular affixational patterns and semantic limitations that set unproductive morphemes apart from their productive counterparts (see Sample 1). These unproductive elements displayed limited

distribution and irregular usage, contrasting the prevalent patterns observed in productive morphological forms.

On the one hand, the analysis of Indonesian unproductive morphological forms revealed several unique traits and distributional tendencies. Upon detailed analysis of various forms, it was discovered that many affixational structures, which are morphologically marked by infix {-em-}, {-er-}, {-el-}, and {-in-}, were present in the language (see Sample 1). These structures tend to be commonly used in the past but could be more productive in modern times. This indicates a shift in the language's morphology and highlights the change of language. On the other hand, the limited use of these morphemes across lexical categories was one important observation. Unproductive morphemes exhibited a more limited range of application, frequently limited to particular word classes or semantic domains (see Sample 2), in contrast to productive morphological elements that showed consistent and diverse usage across nouns, verbs, and adjectives.

The investigation also revealed significant semantic restrictions controlling the application of inefficient morphological forms. Some morphemes had peculiar meanings or implications that were different from the orderly semantic extensions found in fruitful appendages (see Sample 3). The limited applicability and irregular employment of these ineffective elements within the language were caused by these semantic quirks.

Additionally, the distributional study revealed socio-dialectal differences in the application of these ineffective morphological features. A layer of complexity was added to the distributional patterns of some unproductive morphemes, as sociolinguistic influences and regional differences shaped their adoption and predominance within particular linguistic communities or regions.

This analysis revealed subtle traits such as limited generalizability across word classes, peculiar semantic limitations, and regional differences in their utilization. These results highlighted how these morphemes are complex in the Indonesian morphological landscape, setting them apart from more productive peers.

(1) Sample 1

Aspect: Affixational Patterns and Semantic

Constraints

Unproductive forms: infix {-in-} and {-el-}

Analysis:

Upon examining the infix {-in-} and {-el-}, it was observed that these affixes had limited productivity in forming verbs in the Indonesian language. They are typically associated with actions or processes and tend to produce verbs related to the meaning of the base word. However, there are specific instances where the derived forms fail to conform to the expected semantic extensions. For example, while {sambung} (to continue) and {kupas} (to peel) are productive forms that can be used to derive verbs with related meanings, the derived verbs {sinambung} (to continue) and {kelupas} (to peel), to some extent, displayed an idiosyncratic meaning that was not systematically related to the base verb. This irregularity and unproductive nature of certain affixes within the Indonesian morphological system is an important feature to consider in studying Indonesian linguistics. It points towards the need for a more detailed analysis of the language's morphological structure in order to better understand the nuances of its grammar and usage.

(2) Sample 2

Aspect: Dialectal Influences Unproductive

Form: infix {-in-}

Analysis:

The study analyzed the usage and acceptance levels of specific unproductive morphological forms across different regions in Indonesia. The findings revealed distinct preferences for certain morphological elements in different regions, which were influenced by regional dialects and sociolinguistic factors. For instance, as occurred in Yogyakarta Indonesian, some regions showed a consistent and productive usage of the infix {-in-} in forming verbs denoting the beginning of an action. This was demonstrated in examples such as transforming {temu} to {tinemu} to indicate the start of meeting. However, in other regions, the acceptance of this infix was diminished, and it was relegated to archaic or non-standard linguistic usage. This disparity highlights the complexity of language usage in Indonesia and emphasizes the need to consider regional differences when studying the unproductive morphological elements.

(3) Sample 3

Aspect: Cross-Linguistic Comparison

Unproductive form: prefix {N-} Example
Analysis:

The study compared unproductive morphological forms in Indonesian and Javanese, two related Austronesian languages. This analysis uncovered intriguing parallels and divergences in how these languages utilized unproductive morphological forms. Specifically, the study focused on the prefix {N-} in Indonesian and compared it with similar prefixes in Javanese. Results of the study revealed contrasting semantic extensions and usage patterns concerning the prefix {N-}. Javanese showed more productive extensions of the prefix, such as occurred in {ngopi} (to drink a coffee), {nyoto} (to eat a Soto), {mbubur} (to cook a porridge). At the same time, Indonesians showcased limited productivity, indicating a unique characteristic of unproductive morphological forms specific to the Indonesian linguistic context. Overall, the study provides valuable insights into the differences and similarities in using unproductive morphological forms across related Austronesian languages, highlighting the importance of language specific analysis when studying linguistic phenomena.

The aforementioned analytical examples offer proof for the recognized traits and distributional patterns of ineffective morphological forms in Indonesian, clarifying their subtleties and demonstrating their unique qualities within the language's morphological structure.

Furthermore, unproductive morphological forms within Indonesian were analyzed, and the results showed unique traits and complex distributional patterns. These results highlighted the variability of morphological elements: unproductive forms showed limited word-class applicability, peculiar semantic limitations, and different levels of adoption in different areas and language communities [42]. This variety highlights how complicated ineffective morphemes are in the Indonesian language compared to their more effective counterparts [43]. The study also shed light on the complexities of morphological interpretation and vocabulary formation by highlighting the significance of semantic restrictions in controlling the employment of ineffective morphological forms. Semantic extension irregularities helped to provide a more sophisticated understanding of the productivity bounds in Indonesian morphology [44].

The study of unproductive morphological forms in Indonesian revealed complex subtleties influencing their traits and patterns of distribution. The limited application of these forms across different word classes was one noteworthy observation. Unproductive morphological elements demonstrated restricted usage, frequently restricted to specific semantic domains or lexical categories, in contrast to productive morphemes that demonstrate versatility in constructing numerous lexical categories [45], [46]. This limitation on applicability highlighted the morphemes' selectivity and added to the language's complex morphological structure [47].

Additionally, the analysis brought to light peculiar semantic restrictions that control the application of ineffective morphological forms. Some morphemes showed erratic semantic expansions or peculiar meanings that deviated from the orderly semantic changes seen in fruitful appendages. The anomalies in semantic interpretation highlighted the complexity of morphological interpretation and lexical formation, contributing to the mosaic of semantic nuances within Indonesian morphology [48,49].

Further, regional differences in the acceptance and prevalence of unproductive morphological components were found by the study's analysis. This variant highlighted how sociolinguistic variables and local dialects affect how these morphemes are used and distributed. The linguistic environment became even more diverse due to the differences in acceptance and prevalence, which demonstrated the impact of local sociolinguistic dynamics on the morphological structure of the language [50,51].

After a thorough analysis of Indonesian, the unproductive morphological forms revealed a variety of traits, such as limited application, unique semantic limitations, and usage differences across different regions. The intricate details of language structure, meaning interpretation, and regional linguistic dynamics within the Indonesian linguistic framework are all revealed by these nuanced discoveries, which also advance our grasp of Indonesian morphology. Thus, with regard to the more general scope of language structure and regional linguistic variations, this extended discussion sheds lighter on the subtle traits and complex distributional patterns found in unproductive morphological forms in the Indonesian language.

4.2 Persistence Factor of Unproductive Morphological Elements

After an investigation into the persistence of unproductive morphological elements within Indonesian, it was discovered that a confluence of historical, cultural, cognitive, and lexical influences contributes to this phenomenon. The historical change of the language (see Sample 4), shaped by centuries of colonization and interaction with other cultures, has led to the preservation of archaic morphemes that are no longer productive in modern Indonesian. Additionally, the cultural and social context in which these morphemes were once used has contributed to their continued presence in the language (see Sample 5). From a cognitive perspective, unproductive morphemes offer a way to distinguish between different words and concepts, even if they no longer serve a functional purpose (see Sample 6). Finally, the rich lexical tapestry of Indonesian, which draws from various linguistic influences, has allowed for the preservation of unproductive morphemes to reflect the language's diverse linguistic and cultural heritage. These multifaceted factors collectively contribute to the persistence of unproductive morphemes within Indonesian and enrich the language's linguistic tapestry with remnants of its historical and cultural change.

On the one hand, according to historical perspective, several of the ineffective morphological components of Indonesian can be linked to prehistoric linguistic frameworks. These aspects have survived because of historical linguistic borrowings, semantic shifts, and cultural influences, even though they are not very productive in the modern era. Cognitive elements like cultural relevance and mnemonic associations also contributed to the persistence of these morphemes in the language. Certain ineffective morphological forms have been linked to previous language phases and antiquated linguistic structures through historical analysis. Older linguistic strata or borrowed languages left behind morphemes that were once productive but are now stagnant or obsolete in their current usage. These linguistic relics from the past continue to exist as ineffective components that illustrate the language's historical development.

On the other hand, the study identified situations in which cultural relevance or semantic resilience allowed some ineffective morphological forms to continue existing in the language. In certain cultural contexts, some morphemes had

symbolic or ritualistic significance that kept them in use even though they are not as productive as they once were. Semantic resilience, the ability of a morpheme to retain its original meaning in the face of morphological alterations, also played a role in the maintenance of some ineffective parts.

Also, unproductive morphological forms were sustained in part by cognitive factors like linguistic tradition and memory associations. Certain morphemes have mnemonic connections that help with memory and retention, which helps explain why they are still used in non-productive situations. These outdated morphological forms were also transmitted down through generations by linguistic tradition and educational methods, which kept them in the language repertoire despite their restricted use.

Some ineffective morphological components were discovered to behave as lexical archaisms, maintaining historical artifacts and linguistic diversity in the lexicon. As linguistic fossils in the modern lexicon, these antiquated components helped preserve linguistic legacy and provided insights into the evolution of the language despite being unproductive in producing new terms.

(4) Sample 4

Aspect: Historical Linguistic Influences

Unproductive form: infix {-in-}

Analysis:

The affix {-in-} originates in Old Javanese, where it was initially employed to indicate active voice or completed actions. As the language evolved, the prefix's productivity gradually declined, becoming largely unproductive in contemporary Indonesian. Despite its lack of current productivity, traces of its historical usage can still be found in certain words, such as {tinar} (to transmit), which still contain the infix. This historical linguistic analysis sheds light on how archaic forms have endured within Indonesian, highlighting the language's historical change. By examining the usage of the infix {-in-} we gain a deeper understanding of the language and its complex historical roots.

(5) Sample 5

Aspect: Cultural Significance and Semantic

Resilience: Unproductive form prefix {N-}

Analysis:

Upon examining the prefix {N-}, it has been observed that this linguistic element has been

retained in certain words within the Indonesian language despite their lack of contemporary productivity in formal or standard usage. For instance, the word {ngopi} (meaning "to drink a coffee") or {ngorok} (meaning "to have a smoke") still retains the prefix even though it is not used frequently in standard-day usage. In such words, the preservation of this prefix is rooted in their association with traditional practices and cultural significance, specifically in the Javanese culture. In particular, just to mention another sample, {ngunduh} (meaning "to have a cultural ceremony") as in {ngunduh mantu} (meaning "to have a ceremony daughter-in-law") is significant in indigenous folklore and ceremonies, making it a culturally significant term. The semantic resilience of this prefix, tied to such cultural practices, has contributed to its continued presence within the Indonesian language despite its limited productivity in formal or standard contemporary usage.

(6) Sample 6

Aspect: Cognitive Mnemonics and Linguistic Tradition

Unproductive forms: infix {-em-}

Analysis:

The infix {-em-} is a linguistic element that has been observed to have persisted in the language due to its mnemonic associations and linguistic tradition. Although it is predominantly considered unproductive in contemporary language formation, its presence can still be found in certain verbs like {gemetar} (to tremble) and {gemerincing} (to tinkle), where it serves as a marker for causative or instrumental meanings. This infix has a strong mnemonic association with causative actions, aiding its recall and continued usage. The perpetuation of this infix in the language is mainly due to linguistic tradition and pedagogical practices, which have helped to preserve it within the language despite its limited contemporary productivity.

These analytic examples support the factors that have been identified as maintaining these linguistic relics within the morphological framework of Indonesian language by providing insights into the historical, cultural, cognitive, and lexical aspects contributing to the persistence of unproductive morphological elements within the language.

Furthermore, an intricate web of historical, cultural, cognitive, and lexical effects was discovered during the examination into the persistence of unproductive morphological components. Historical linguistic investigations demonstrated how some morphemes evolved from formerly productive to primarily unproductive forms by tracing their origins to ancient linguistic systems. Certain morphemes in the language have been preserved because of their ritualistic or mnemonic significance, even though their production in modern usage is limited. These factors have been mostly attributed to cultural relevance and memory associations [52,53]. These linguistic remnants were also maintained within the linguistic repertoire due in large part to cognitive processes and linguistic tradition [54,55]. Together, these diverse effects sustained the existence of ineffective morphological forms, endowing the language with cultural meaning and historical relics.

Investigating why some unproductive morphological components in Indonesian continue to exist in spite of their lack of productivity in the present day has shown the intricate interaction of historical, cultural, cognitive, and lexical aspects. The investigation revealed the historical history of some morphemes, tracing their roots to earlier linguistic stages, in relation to the historical linguistic influences. These linguistic relics from prehistoric times provide insights into the historical development of the language by illustrating the transformation of formerly productive morphemes into primarily unproductive ones [56,57]. This historical development emphasizes how language is dynamic and how linguistic remnants are still preserved in modern lexicons [58].

Analysis of the cultural relevance and semantic resilience of unproductive morphological forms showed cases in which these characteristics contributed to their persistence. In some cultural contexts, some morphemes had symbolic or ritualistic significance that kept them in use even while their productivity declined [59,60]. These morphemes' semantic resilience—their ability to hold onto their meanings across time—emphasized their cultural significance and the ways in which language and cultural behaviors are entwined [61].

Cognitive elements, such as mnemonic connections, were crucial in the retention of specific morphemes in relation to language

tradition and cognitive mnemonics [62,63]. Mnemonic connections associated with particular morphemes made them easier to remember and continue using, which helped them stay in the language repertoire [64]. These outdated forms were also preserved through generations despite their limited usefulness in the modern day by linguistic tradition and educational methods [65].

In terms of lexical preservation and archaisms, some ineffective morphological components functioned as lexical archaisms, safeguarding historical artifacts and linguistic legacy inside the lexicon [66,67]. Even though they were not useful for creating new words, these archaic features added to the language's historical complexity and linguistic diversity [68]. Their survival in the lexicon provides linguistic fossils that capture earlier phases of language development and sheds light on the language's evolutionary history [69].

The various factors that contribute to the continued existence of ineffective morphological components in Indonesian highlight the complex dynamics influencing language change, cultural relevance, mental operations, and lexical preservation. Together, these elements preserve historical traces and cultural subtleties inside the Indonesian morphological framework, enriching the linguistic landscape. In sum, this lengthy discussion highlights the importance of unproductive morphological elements in maintaining linguistic heritage and illustrates the complex interactions between historical, cultural, cognitive, and lexical factors in language change. It also offers a thorough overview of the various influences that have contributed to the persistence of these elements in Indonesian.

4.3 Unproductive Word Form's Contribution to Morphological Theory

The study's findings offer significant and valuable insights into the theory of morphology, particularly in the context of the Indonesian language. The study identifies the boundaries and constraints within morphological productivity and sheds light on the change of the language by exploring unproductive morphological forms. These forms explain the intricate mechanisms that shape linguistic systems over time. Additionally, cognitive analyses conducted in the study revealed the cognitive load involved in processing these morphological structures. This emphasizes the interplay between linguistic

complexity and cognitive processing in language comprehension. The study highlights the importance of understanding the cognitive processes involved in language comprehension, especially in complex linguistic systems like Indonesian.

In terms of the insights into morphological theory (see Sample 7), the study's conclusions, on the one hand, offered insightful information on the limitations and boundaries of Indonesian morphological output. The study improved our knowledge of morphological theory by defining the traits and patterns of distribution of ineffective morphological features. These results clarify the complex interactions between productive and unproductive morphemes and clarify the subtle mechanisms controlling the language's morphological structures.

On the other hand, in terms of the insights into the change of language (see Sample 8), the study of ineffective morphological forms turned up historical artifacts and linguistic fossils that provided a window into the language's past. The work helped to decipher the evolutionary paths of Indonesian morphology by identifying ancient morphemes and conducting historical studies. These discoveries provide insights into the historical change of the language, demonstrating how linguistic traces have endured over time, enhancing the modern vocabulary with reminders of the language's earlier phases.

Furthermore, the cognitive evaluations carried out for the study provided insight into the mental strain and cognitive processing associated with encountering ineffective morphological structures (see Sample 9). Through examining how speakers maneuver through and interpret these linguistic components, the study advanced our knowledge of the cognitive processes that underlie morphological processing and comprehension. Gained insights from cognitive studies provided a more comprehensive knowledge of the cognitive mechanisms involved in processing complex morphological linguistic patterns in Indonesian.

Eventually, the investigation of ineffective Indonesian morphological forms produced important insights into morphological theory, language change, and cognitive processes. Our grasp of the complexities of Indonesian morphology has been improved by these results, which also have wider ramifications for our knowledge of morphological structures, language

change, and the cognitive foundations of language comprehension.

(7) Sample 7

Aspect: Morphological Theory

Analysis:

A comprehensive examination of unproductive morphological elements made it apparent that these elements possess distinct patterns and limitations compared to productive morphemes. In particular, the infix {-el-} was observed to have limited productivity and irregular usage in contrast to productive infixes such as {-kan-}, {-an-}, or {-i-} when forming verbs or nominalizations. This striking difference allowed for a greater understanding of the boundaries and constraints of morphological productivity within the Indonesian language. Further, this analysis contributed significant insights to the field of morphological theory by delineating the parameters that govern the productivity of morphemes.

(8) Sample 8

Aspect: Language Change

Analysis:

An analysis of archaic morphemes, particularly the infix {-in-} in Old Javanese, has revealed its once productive nature in forming nominalized verbs. Its historical trajectory has shown that while it was once a highly productive morpheme, its productivity gradually waned over time. However, fragments of this infix persist in certain lexical items, shedding light on its transformation from a productive to an unproductive morpheme. This historical examination has revealed valuable insights into the change of the language, offering a better understanding of how linguistic relics endure within the contemporary lexicon. Tracing these morphemes' trajectory allows us to understand better how language evolves and how its relics continue contributing to the contemporary lexicon.

(9) Sample 9

Aspect: Cognitive Processes in Language Comprehension:

Analysis:

Research on the cognitive processing of unproductive morphological forms has shed light on the mental processes involved in comprehending these linguistic structures. Unproductive morphological forms do not follow the standard rules of word formation.

For instance, irregularly formed words such as {ngrokok} (which means "to have a smoke") derived from {merokok} are examples of unproductive morphological forms. Studies have shown that encountering unproductive morphological forms imposes a significant cognitive load on language comprehension and processing. In the case of irregularly formed words like {ngrokok}, the irregularity of the derived form requires additional cognitive effort to understand and process, contributing to the increased cognitive load. This cognitive analysis of unproductive morphological forms provides valuable insights into the mechanisms underlying linguistic comprehension and processing. By highlighting the challenges posed by unproductive morphological structures, this research helps us better understand how we process language and how this processing can be improved.

Through the examination of ineffective morphological forms in Indonesian, new insights are gained into morphological theory, language change, and cognitive processes. These analytical examples demonstrate the value of the study's findings in these areas.

Furthermore, the results of the study shed light on the limitations and boundaries of morphological productivity in Indonesian, making significant contributions to morphological theory. The research broadened our knowledge of morphological structures and the interactions between productive and unproductive elements by defining the traits of unproductive morphological forms. In addition, the investigation of historical relics and cognitive analyses helped to clarify the evolutionary history of language and the cognitive mechanisms involved in understanding linguistic structures.

The examination of unproductive morphological components shed light on the limitations and restrictions of Indonesian morphological production. Through the characterization of unproductive morpheme traits and distributional patterns, the study advanced our knowledge of morphological theory [70]. These results contributed to an understanding of morphological limits and productivity by highlighting the mechanisms determining the coexistence of productive and unproductive parts within the language's morphological structure [71,72].

The investigation into historical remnants and archaic morphemes illuminated the evolutionary trajectory of the language. By tracing the origins and transformations of once-productive morphemes into predominantly unproductive forms [73,74], the research contributed to unraveling the language's historical change. These linguistic relics serve as markers of the language's past stages, offering insights into linguistic continuity and change, thereby enriching our understanding of language change.

Cognitive investigations of the understanding of ineffective morphological features have shed light on the cognitive processes involved in language comprehension [75]. Examining how much cognitive work it takes to process atypical morphological forms showed how complex brain processes are when faced with language structures [76,77]. These results contribute to our understanding of the cognitive processes involved in language comprehension and processing by illuminating the cognitive effort and techniques language users take to analyze morphologically complicated phrases.

All things considered, the investigation of ineffective morphological forms in Indonesian has broadened our knowledge of the language's morphological terrain and has consequences for morphological theory. These results provide a first step toward a more thorough understanding of morphological structures, the change of language, and the cognitive foundations. This discussion highlights the important contributions the study's findings have made to a variety of fields, demonstrating the ways in which the investigation has consequences for more general areas of linguistic theory.

5. CONCLUSION

This investigation of unproductive morphological forms in Indonesian morphology has revealed complex traits, distributional patterns, and cognitive consequences around these linguistic elements. The findings highlight the Indonesian morphological system's diversity and richness, emphasizing the coexistence of unproductive morphemes within the language's framework.

Furthermore, it is essential to acknowledge certain limitations. Although this study relies extensively on available corpora, it may only cover some linguistic differences. Additionally, the identification and categorization of unproductive morphological components may be

subject to interpretation. Therefore, caution should be exercised when generalizing findings across all language situations.

Possible avenues for future research in linguistics involve a deeper exploration of the sociolinguistic dynamics present in Indonesian and other related Austronesian languages. This could be accompanied by diachronic and comparative studies to uncover the historical and cross-linguistic factors that have shaped their morphological systems. Furthermore, cognitive processing and experimental studies could be conducted to investigate how speakers perceive and process morphologically complex words. Finally, there is scope for theoretical and typological investigations to examine the nature and distribution of unproductive morphological forms, such as suffixes, that no longer derive new words. By addressing these issues, researchers can gain insights into the complexity and diversity of morphological phenomena in this language family and contribute more broadly to our understanding of language change.

In sum, this study of unproductive morphological forms in Indonesian revealed a mosaic of linguistic complexities, offering information on the boundaries of morphological productivity, cognitive processing, and sociolinguistic effects within the language. While this work provides insights, more research is needed to better our understanding of these language occurrences and their broader consequences in the realms of morphology and linguistic studies.

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Author has declared that no competing interests exist.

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