Analyzing the Complex Word-form in the Indonesian language: A Morphological Approach

ABSTRACT

This study utilized a Morphological perspective to explore the complex structure of the Indonesian language's word forms. Indonesian was widely known for its agglutinative nature, which provided a rich area for linguistic analysis. The research took a comprehensive approach to examine and clarify the intricate mechanisms that governed word formation in Indonesian by utilizing empirical data and linguistic frameworks.The objective was to unravel the diverse patterns and mechanisms that underlay the construction of complex words in Indonesian. ADD The results showed that (1) the Indonesian language relied heavily on affixation as the primary means of creating complex word forms; hence, another standard morphological process was reduplication, which occurred in specific lexical and grammatical contexts; (2) these complex word forms shaped sentence structures and contributed significantly to the richness and flexibility of the larger grammatical unit; and (3) the effectiveness of computational methods in identifying intricate morphological patterns, discovering concealed regularities, and supplementing traditional linguistic analyses in unraveling the complexities of Indonesian word forms. The research results enhanced our understanding of Indonesian morphology and contributed significant insights to the broader field of linguistic studies.

Keywords: Indonesian language, morphology, complex word-form, agglutination, word formation.

1. INTRODUCTION

The Indonesian language is a complex tapestry of linguistic intricacies, particularly within Morphology[1], [2]. It is renowned for its agglutinative nature[3], [4], which means that words are formed by adding morphemes to a base word[5], [6]. This gives rise to a rich ground for exploring the construction and understanding of complex word forms. Indonesian morphology is a fascinating subject of study because of its intricate mechanisms governing word formation[7], [8]. It involves the analysis of prefixes, suffixes, infixes, and circumfixes, which are added to the base words to create new words with different meanings. Therefore, this research aims to delve into the depths of Indonesian morphology, exploring its complexities and underlying principles to provide a comprehensive understanding of the language.

Morphology is an essential aspect of linguistics, as it delves into studying the structure and formation of words in a language[9], [10]. When applied to Indonesian, a language known for its diversity and complexity, morphology can provide a comprehensive understanding of its linguistic patterns and mechanisms. By thoroughly exploring the language's morphological features[11], [12], linguists can gain invaluable insights into how words are formed, related, and convey meanings[13], [14]. This knowledge can be used to enhance our understanding of the language's rich cultural heritage and facilitate effective communication between speakers of different dialects and regions within the Indonesian archipelago.

This research seeks to enhance our understanding of complex word formation in the Indonesian language by utilizing empirical data and established linguistic frameworks. The study aims to explore the intricate processes and diverse patterns underlying the formation of complex words in Indonesian. The objective of this investigation is not only to contribute to a deeper comprehension of Indonesian morphology but also to provide a nuanced perspective that can enrich the broader landscape of linguistic studies. By analyzing and interpreting the empirical data, this research aims to generate insights to help us better understand how complex words are formed in Indonesian and the underlying linguistic mechanisms that govern this process.

2. LITERATURE REVIEW

2.1 Theoretical Framework

The Indonesian language is an exciting subject of study due to its unique agglutinative nature. This characteristic means that the language tends to add affixes and particles to root words to convey various grammatical and semantic nuances[15], [16]. This trait has been a topic of extensive research, emphasizing its implications for understanding word formation in language. Their assumptions highlighted the importance of understanding how affixes and particles are used to gain a deeper understanding of the language's grammar and meaning[17], [18].

First, Morphological Processes.Understanding Indonesian's complicated morphological processes entails investigating phenomena such as affixation[19], [20], reduplication[21], [22], and compounding[23], [24]. This foundationpointed out important considerations on these processes and their significance in the generation of complex word-forms[25], [26].*Second,* Linguistic Frameworks and Analyses.Approaches based on linguistic theories, such as Distributed Morphology[27], [28] or Construction Morphology [29], [30], give frameworks for analyzing Indonesian morphology's structural intricacies.

Third, Semantic and Syntactic Considerations.The theorieshighlighted the relationship between form and meaning, as well as the impact of complicated word-forms on sentence structure and grammar[31]–[36]. These foundations highlight the importance of morphology in Indonesian language understanding.*Fourth,* Computational Approaches to Morphological Analysis.Recent advances in computational linguistics and natural language processing, based on certain corpus of language, have also helped to analyze complicated word-forms[37]–[42].This foundation demonstrates the use of computational approaches to decode specific units of morphology, providing fresh viewpoints and analysis tools.

Using these theoretical underpinnings, this research seeks to synthesize and contribute to the current body of information surrounding the analysis of complicated word-forms in Indonesian, thereby increasing our grasp of the language's morphological complexities.

2.2.Previous Research

The Indonesian language is known for its complex morphology, which involves a variety of mechanisms such as agglutination, reduplication, syntax, and computational methods. Earlier research has delved into these mechanisms to shed light on how they work and contribute to the formation of complex word forms in the language. As part of this ongoing effort to better understand the intricate workings of Indonesian morphology, this research seeks to build upon and synthesize the existing contributions in the field. Doing so will provide a more comprehensive view of this fascinating aspect of the language.

Sneddon et al.'s (2010) work titled "Indonesian: A Comprehensive Grammar" is a crucial cornerstone in understanding the grammatical intricacies of the Indonesian language. The book provides an in-depth exploration of the language's agglutinative nature and offers

foundational insights into the morphological structure of Indonesia. Similarly, I. W. Arka's (2006) exploration of the Balinese language, "The Balinese Language," not only focuses on the Balinese language but also illuminates the shared agglutinative features and morphological intricacies of the Austronesian language family, which includes Indonesian. Furthermore, Ansaldo's (2009) book "Contact Languages: Ecology and Evolution in Asia" examines how contact languages in Asia have influenced the evolution of Indonesian's morphological processes through interactions, highlighting aspects of creolization and linguistic borrowing in the language.

The following texts provide valuable insights into the intricacies of the Indonesian language and its morphology. Nugraha&Baryadi's study, published in 2019, thoroughly examines the phenomenon of derivation in Indonesian and its role in shaping the complexity of word forms. By defining the functions and contributions of derivation, theyhighlight the unique features of Indonesian and enriches our understanding of its linguistic structure. In 2020, Pasaribu&Nugraha delved into the interface between morphology and syntax in Indonesian, demonstrating how complex word forms affect sentence structures and grammatical relationships[43]. Their work is precious for those interested in the interplay between different linguistic components and the rich diversity of the Indonesian language.

Finally, Nugraha's research, published in 2023, employs computational methods to analyze Indonesian morphology[44]–[46].Nugraha's work showcases the application of technology in unraveling the complexities of word formation and highlights the growing importance of computational linguistics in modern linguistics research. Together, these studies offer a fascinating glimpse into the intricate workings of the Indonesian language and provide valuable insights for linguists, language learners, and anyone interested in the complexities of language.

2.3 Research Gap

While the extant literature on Indonesian morphology provides useful insights into many features of complex word-forms, there is a significant vacuum in combining varied perspectives and applying them to a comprehensive analysis. Existing research has generally concentrated on discrete components of complicated word-forms, such as reduplication, affixation, or syntactic consequences.

A holistic and integrated approach that analyzes the interplay of these features within Indonesian morphology, on the other hand, is lacking. This study tries to fill that gap by combining fragmented ideas from prior studies and providing a coherent framework for studying the multifarious nature of complex word-forms in Indonesian. Furthermore, the use of contemporary computational tools to decipher morphological patterns provides a fresh approach that has not been fully investigated in the context of Indonesian morphology.

Through the integration of diverse perspectives, linguistic theories, and computational techniques, this study aims to provide a more comprehensive understanding of Indonesian morphology. Specifically, it seeks to elucidate the complex mechanisms that underlie the formation of complex word-forms. Admittedly, the research questions are as follows: (1) what role do various morphological operations like compounding, reduplication, and affixation play in the development of intricate word forms in the Indonesian language; (2) what effects do complicated word forms have on the syntactic and semantic structure of Indonesian phrases, and how do these forms affect the meanings and structures of sentences; and (3) how much can computational techniques help with the analysis and comprehension of Indonesian morphology, specifically with deciphering the complex word-forms' intricate patterns?

2. METHODOLOGY

This research employed a specific methodology that combined traditional linguistic analysis with computational approaches to delve deep into the complexities of Indonesian complex word forms within Morphology. The study aimed to provide a comprehensive understanding of the intricate structures and patterns of word formation in Indonesian, with a particular focus on the morphological processes involved. By leveraging the function of computational methods, the research aimed to shed new light on the mechanisms underlying the formation, derivation, and inflection of complex words in Indonesian and uncover the various factors that shaped the phonological, morphological, and semantic properties.

First, Corpus'sdatacompilation was conducted. In order to gain a thorough understanding of the Indonesian language, it was essential to gather data from a diverse corpus of Indonesian texts, namely the*Indonesian – Leipzig Corpora Collection (ILCC)* (https://corpora.unileipzig.de/en?corpusId=ind_mixed_2013). This corpus included a variety of genres, registers, and styles, reflecting the wide range of linguistic usage and word formations found in Indonesian.*Second*, Data Extraction was done. Once this corpus's data had been compiled, it was essential to utilize linguistic tools to extract and compile a comprehensive dataset of complex word forms from the text, namely *UDPipe*(https://lindat.mff.cuni.cz/services/udpipe/). The focus was on instances of affixation, reduplication, and compounding, as these were critical morphological processes in the Indonesian language.

Third, Linguistic analysis was conducted. After the data had been extracted, it was necessary to use qualitative and quantitative methods to analyze it. This step investigated the patterns and distribution of complex word forms in different linguistic contexts, using linguistic frameworks to categorize and understand the morphological processes at play. By doing so, we could gain a deeper insight into the structure and usage of Indonesian and improve our ability to use the language effectively.*Fourth*, Syntactic and Semantic Examination assisted by computational analysis was performed. The task required thoroughly examining complex word forms and their functions within sentences. This required exploring their syntactic structures and semantic nuances while analyzing their impact on sentence formation and meaning. To assist in this endeavor, computational linguistic tools and algorithms were employed to identify and categorize complex word forms, validate findings, and potentially discover hidden patterns or relationships.

Lastly, Validation and expert review were conducted. To ensure the accuracy and reliability of the analysis, the identified patterns and interpretations were subjected to expert review by anonymous linguists who were well-versed in Indonesian morphology. This procedure helped validate the findings and ensure they were consistent with established linguistic theories and prior research. Also, the goal was to contextualize the results within the broader framework of Indonesian morphology and contribute novel insights to the field. By comparing the findings with existing linguistic theories and prior research, we could better understand the complex word forms and their impact on sentence formation and meaning in the Indonesian language.

3. RESULTS AND DISCUSSION

3.1 Morphological Mechanisms Exceeding the Complex Word-Forms

The results presented in this study provide an in-depth understanding of the morphological processes in the Indonesian's complex word form. The study examines the various mechanisms that contribute to the formation of words and analyzes their frequencies, productivity, and the underlying grammatical alterations that make them more complex. By delving deep into the intricacies of the language, this study offers a nuanced and insightful perspective on the nature of Indonesian word forms that will be of immense value to

linguists. The elaborate findings presented here offer a thorough comprehension of the morphological mechanisms, their occurrences, effectiveness, and the intrinsic modifications that collectively contribute to the intricacy of Indonesian vocabulary.

On the one hand, the Indonesian language relies heavily on affixation as the primary means of creating complex word forms. This process involves the attachment of prefixes and suffixes to root words, resulting in a wide range of new words with unique meanings. On the other hand, another standard morphological process in Indonesian is reduplication, which occurs in specific lexical and grammatical contexts. Through reduplication, words can express nuances of plurality, intensity, or emphasis within themselves. Also, compounding is another necessary morphological process in Indonesian that involves the fusion of multiple morphemes to create new and complex lexical items. This process can result in a diverse range of formations, each with its unique meanings and applications.

Moreover, on the morphological processes within the complex word-forms, there are a few noteworthy discoveries. First, concerning the patterns of affixation. The results of the analysis showed complicated affixation patterns, which demonstrated how prefixes and suffixes are added to root words to construct complex word forms. Prefixes like {ber-}, {me(N)-}, and {di-} and suffixes like {-kan} and {-i} had a variety of uses, such as denoting verbal aspects, creating causatives, or signifying transitivity.*Second,* concerningthe reduplication patterns.Reduplication showed a variety of occurrences, including iterative reduplication, partial reduplication, and full reduplication in various language settings. Reduplication was observed in nouns, verbs, and adjectives, where it indicated multiplicity, amplification, or recurrent behavior.*Third,* concerning the compounding structures.A vast variety of structures were demonstrated by compounding in Indonesian, which combined words, roots, or stems to produce intricate lexical objects. The compounds that were found to be endocentric and exocentric each contributed to distinct lexical categories and semantic nuances.

Certain affixes and compounding strategies exhibited higher productivity, generating a greater number of complex word-forms. The analysis uncovered tendencies of productive affixes and compounds used in contemporary Indonesian.A few compounding techniques and affixes were more productive than others, producing a bigger quantity of intricate word forms. The investigation revealed patterns in the productive compounds and affixes utilized in modern Indonesian. Investigation into morphophonological alterations accompanyingaffixation revealed instances of vowel changes, consonant modifications, or elision, indicating the intricate nature of morphological processes in Indonesian word formation. These thorough findings offer a thorough grasp of the various morphological processes, their productivity, frequency, and underlying phonological changes that add to the complexity of Indonesian word formations.

(1) Example 1
Aspect: Affixation Patterns:
Root word: {tulis} (to write)
Affixed forms:{menulis} (writing);{ditulis} (was written);{penulisan} (writing activity)
Analysis:
The root word {tulis} is one such example, and it can be modified in various ways using different prefixes to create new meanings. For instance, when the prefix {me(N)-} is added to {tulis}, it changes the verb aspect and creates words like {menulis} which means "to write". Similarly, the prefix {di-} can be used to express the passive voice, as in {ditulis} which means "written". Additionally, the afffix{pe(N)-an} is used to nominalize the word and create nouns such as {penulisan} which means "writing activity". These affixes allow for a wide range of possibilities

regarding word formation in Indonesian, making it a versatile and productive language. The use of affixation in Indonesian can also help to create new words that do not exist in other languages, highlighting the unique nature of this language.

(2) Example 2
Aspect: Reduplication Patterns:
Root word: {makan} (to eat)
Reduplicated forms:{makan-makan} (eating);{makanan} (food)
Analysis:
The Indonesian language features a unique and extensive system of reduplication, which involves repeating all or part of a word to convey different meanings. One of the common forms of reduplication is iterative reduplication, which is demonstrated by the word {makan-makan}. This form indicates a continuous or repetitive action, such as eating repeatedly. On the other hand, partial reduplication, as seen in the word {makanan}, is used to create derivative nouns that refer to a particular category or type of something. In this case, {makanan} means food, demonstrating how reduplication can be used to create new words and expand the language's vocabulary. Overall, Indonesia's multifaceted reduplication system adds depth and nuance to the language, making it an exciting and unique linguistic phenomenon.

(3) Example 3
Compounding Structures:
Words combined: {rumah} (house) + {makan} (eat)
Compound form: {rumahmakan} (restaurant)
Analysis:
In Indonesian, the compound word {rumahmakan} is commonly used to refer to a restaurant or place to eat. This compound word is an excellent example of an exocentric compound, where the first element, {rumah}, meaning house, modifies the second element, {makan}, meaning eat, to create a new compound noun with a specific meaning. The Indonesian language is highly productive in forming compound words, and this example showcases the versatility of compounding in Indonesian to create new lexical items with precise semantic nuances. Using compounds in Indonesian provides an efficient way to express complex ideas using fewer words.

These examples reinforce the more general conclusions about the first study question by providing particular examples of affixation, reduplication, and compounding, demonstrating their unique patterns and functions within Indonesian morphology.

Furthermore, the investigation showed how frequently and productively affixation occurs in Indonesian word construction, which greatly aids in the development of complex word forms. Prefixes and suffixes' adaptability show how they can change the meaning of words and the way grammar is used[47], [48]. Additionally, reduplication revealed a variety of events and purposes, ranging from signifying multiplicity to escalating, underscoring its complex character in Indonesian morphology. Also, Compounding revealed a wide range of structures that support lexical growth and shed light on how various components might be combined to produce new vocabulary words.

In Indonesian word creation, morphological changes that coincided with affixation demonstrated the complex character of morphological processes. Some morphological processes were more productive than others, producing a wide variety of intricate word formations. Affixation has become the most common procedure, providing a productive and adaptable way to create complex word forms. The affixes demonstrated their adaptability by

serving a variety of purposes, such as changing verb aspects, signaling passive voice, or nominalizing nouns[49], [50].

The productivity of affixes varied, according to analysis, with some prefixes and suffixes being more frequently utilized and effective in creating new words than others. Prefixes like {ber-} were commonly used to denote states or activities, and suffixes like {-kan} and {-i} were often used to produce transitive verbs and causative verbs.Despite being less common than affixation, reduplication shows a variety of uses, including conveying plurality, intensity, or repetitive movements. This process demonstrated its adaptability within the Indonesian linguistic system by functioning across several word classes and contributing to both nouns and verbs[51].By combining words, roots, or stems to produce new lexical items[52], compounding played a crucial role in the expansion of the Indonesian language. The structures varied in that they contributed to distinct lexical categories and semantic nuances, ranging from endocentric to exocentric compounds.

A closer look revealed examples of levels of production were shown by compounding, reduplication, and affixation, which enhanced the lexical originality and productivity of Indonesian. These processes function as flexible instruments that enable speakers to generate and modify language to convey complex ideas and meanings[53]–[55].In summary, this in-depth analysis emphasizes the diverse functions of affixation, reduplication, and compounding within Indonesian morphology, as well as their productivity, usefulness, and contributions to the language's lexical diversity and artistic expression.

3.2 Syntactic and Semantic Implications of the Complex Word-Forms

Our study's results highlight the complex and intricate interplay between the various elements that constitute the Indonesian language. These elements include complex word forms, syntactic structures, semantic subtleties, and communicative implications. Our findings demonstrate how these multifaceted forms shape sentence structures and contribute significantly to the richness and flexibility of Indonesian discourse. This intricate interplay among the various language elements underscores the complexity of the Indonesian language, making it a fascinating and challenging subject for linguistic research.

On the one hand, the usage of complex word forms significantly impacts the structure of sentences in the Indonesian language. It has been observed that the presence of complex words often leads to a change in the syntactic relationships between various words and phrases within the sentence. On the other hand, the word forms in question could convey highly nuanced meanings, ranging from the subtlest alterations in word intensity to more profound and far-reaching shifts in lexical semantics. What is especially notable about these word forms is that they enriched the language's already impressive, expressive capabilities, rendering it even more versatile and adaptable to various communicative contexts. All in all, it is clear that these word forms played a crucial role in shaping the language's evolution over time and continue to be an essential part of its ongoing development and growth.

Moreover, we also found some note concerning the syntactic and semantic Implications. *First,* in term of the syntactic structures ofcomplex word-forms, complex word-forms were discovered to have a substantial impact on the syntactic structures of Indonesian sentences based on their modification and dependency. They frequently acted as modifiers or were dependent on other sentence components, which affected the phrase's overall structure. These forms showed some syntactic flexibility; they could be used as distinct parts of speech and hence adjust to varied syntactic settings without losing their morphological complexity.Additionally, based on its grammatical functions,the examination revealed situations in which intricate word-forms served as predicates, complements, or modifiers in sentences, demonstrating their versatility and range of grammatical functions.

Second, in term of the semantic nuances of complex word-forms, sentences that went beyond the literal meanings of words were expressed using complex word forms, which included minute changes in word semantics such as emphasis, specificity, or intensity. By providing a wide variety of terms with unique semantic nuances arising from their intricate structures, these word-forms helped Indonesian expand its vocabulary. Complex word forms had extremely context-dependent semantics, making it frequently necessary to comprehend the surrounding language context in order to properly appreciate their intended meanings and consequences. Also, by enabling accurate and effective communication, their use promoted discourse cohesiveness, especially in situations requiring concise expression or nuanced meanings.

(4) Example 4
Aspect: Syntactic Structures and Complex Word-Forms:
Complex word-form: {berlari-lari} (running around)
Syntactic function: Predicate (verb) in a sentence
Sentence: "*Anak-anakberlari-lari di halamansekolah.*" (The children are running around in the schoolyard.)
Analysis:
Within the sentence, the word {berlari-lari} serves the purpose of an act that describes how the children are engaged in the action. This particular word is a complex word form that significantly impacts the sentence's overall structure and how the reader perceives it. Its placement within the sentence is particularly noteworthy, as it influences how the main action is modified and how the sentence is structured as a whole. This illustrates the complexity of the Indonesian language and the importance of understanding the role that different word forms play in shaping its structure and meaning.

(5) Example 5
Aspect: Semantic Nuances and Complex Word-Forms:
Complex word-form: {kecil-kecilan} (in a small scale)
Sentence context: "*Usaha ituberjalankecil-kecilan, tapistabil.*" (The business is operating in a small scale, but steadily.)
Analysis:
The {kecil-kecilan} is a compound word in Indonesian that conveys a nuanced meaning of operating on a small scale but with stability. This form is an example of how complex word forms encapsulate specific semantic nuances that might not be expressible through individual words alone. Using {kecil-kecilan} within a sentence showcases how language can be intricate and nuanced and how a single word can carry a wealth of meaning and succinctly convey a complex idea. In essence, {kecil-kecilan} is a prime example of how language can be rich and diverse, and how its complexities can help us express ourselves and communicate our ideas precisely and clearly.

(6) Example 6
Aspect: Functions of Complex Word-Forms:
Complex word-form: {tidakada} (non-existent)
Pragmatic usage: Discourse marker for emphasis
Sentence context: "*Tidakada yang lebihpentingdarikejujuran.*" (There's nothing more important than honesty.)
Analysis:
The term {tidakada} is utilized as a discourse marker commonly employed to emphasize the non-existence or absence of something within a given context. This specific term can strengthen the speaker's assertion and highlight the importance of

specific points within the discourse. The pragmatic contribution of complex word forms to discourse is evident in this context, as it emphasizes the crucial elements and adds weight to the speaker's argument. This instance showcases how language can be crucial in conveying meaning and effectively communicating one's ideas.

These illustrations show how complex word forms in Indonesian have a significant impact on pragmatics in speech and communication, as well as on syntax and semantics within sentences. They also play important roles in expressing nuances and changing meanings.

Furthermore, the discussion that follows demonstrates the profound impact of intricate word forms on Indonesian discourse, semantics, and syntax by highlighting their pragmatic roles, syntactic flexibility, and semantic subtleties. Comprehending these consequences is essential to appreciating the depth and complexity of expression made possible by Indonesian language's complex word formations.

First, in terms of the syntactic influence,complex word forms have a significant impact on sentence patterns. They exhibit some syntactic flexibility and can function as modifiers or dependents in sentences. Complex word forms are remarkably flexible in terms of syntax; they can serve as dependent components or modifiers in sentences[56], [57]. Their versatility to different syntactic situations is demonstrated by their ability to change verbs, nouns, or adjectives, which has an impact on Indonesian sentence patterns. The results of the analysis showed that these forms had a variety of grammatical roles in sentences, including predicates, modifiers, and complements. Furthermore, these intricate word structures frequently expressed subtle semantic changes, offering levels of meaning that went beyond their component elements[58], [59].

Second, in terms of nuanced semantics,these forms contributed to the richness of Indonesian language by serving as contextual indicators of intricacies beyond the meanings of individual words and by conveying subtle meanings. Complex word-form semantics were extremely context-dependent, necessitating a sophisticated comprehension of the surrounding language contexts in order to accurately interpret them[60], [61]. These forms also served important pragmatic functions in conversation, highlighting certain ideas, fostering unity, or conveying communication goals[62], [63]. These forms added to Indonesian's lexical richness beyond their syntactic functions by providing precise, complex meanings that might not be conveyed by a single word. The expressiveness and communication range of the language are enhanced by this process of vocabulary expansion through complex word-forms[64], [65].

Third, in terms of functions,in addition to syntax and semantics, complex word-forms have real-world implications for communicative objectives, cohesion, and discourse emphasis. Complex word-form semantics were extremely context-dependent, necessitating a sophisticated comprehension of the surrounding language contexts in order to accurately interpret them[66], [67]. These forms also served important pragmatic functions in conversation, highlighting certain ideas, fostering unity, or conveying communication goals[68], [69].Sentence structures are influenced by their grammatical dependency and function as dependent or modifier elements within sentences, which changes the relationships between words and phrases[70], [71]. This phenomenon demonstrates how these forms influence how Indonesian sentences are syntactically organized overall.

These forms added to Indonesian's lexical richness beyond their syntactic functions by providing precise, complex meanings that might not be conveyed by a single word. The expressiveness and communication range of the language are enhanced by this process of vocabulary expansion through complex word-forms[72].By facilitating accurate and succinct

communication, these forms support discourse cohesiveness, especially in situations where nuanced meanings or succinct expression are crucial[73]. They make effective communication easier by condensing difficult ideas into manageable chunks.

3.3 Computational Analysis and Morphological Patterns

The detailed results presented in this context demonstrate the impressive effectiveness of computational methods in identifying intricate morphological patterns, discovering concealed regularities, and supplementing traditional linguistic analyses in unraveling the complexities of Indonesian Morphology. These findings support the notion that computational approaches can be a valuable tool for advancing our understanding of morphological processes. However, it is essential to note that while computational methods can provide significant assistance, they also highlight the significance of context and linguistic expertise in achieving comprehensive morphological understanding. Therefore, these results emphasize the need for a balanced approach that integrates computational and traditional linguistic methods for a more thorough examination and interpretation of morphological phenomena.

On the one hand, computational methods have proven highly effective in assisting linguists with identifying and categorizing complex word forms. By analyzing large amounts of linguistic data, these methods can reveal recurring patterns and structures that align with established linguistic frameworks. This enables researchers to understand language's underlying principles better and make more accurate predictions about how languages evolve and change over time. Overall, the use of computational methods has revolutionized the field of linguistics and opened up new avenues of previously inaccessible research. On the other hand, the process of analyzing data has brought forth some exciting discoveries, particularly in terms of correlations and patterns that were previously unknown. These insights have contributed to a more profound comprehension of Indonesian word formation's morphological regularities and exceptions. Identifying these hidden relationships has been a significant milestone in studying the language, and it is expected to facilitate further advancements in this field.

Moreover, the analysis of morphological patternsprovides several notes as follows. the Indonesian corpus demonstrated the efficacy of computational approaches in precisely recognizing and classifying complicated word-forms, demonstrating its promise for automating morphological research. The research showed that it could identify and classify the many morphological patterns seen in Indonesian by correctly classifying affixed, reduplicated, and compounded forms. Research revealed statistical tendencies and frequencies that complimented linguistic research by illuminating latent regularities and distributional patterns among complicated word-forms.

(7) Example 7
Aspect: Identification and Categorization:
Input: Text corpus containing various Indonesian sentences
Computational Analysis: Utilizing part-of-speech tagging and morphological analysis algorithms
Output:
(a) Precise recognition and classification of attached forms such as {diperhatikannya} (has been observing by her/him) in the sentence "*In addition, more attention needs to be paid to the cultural factors of the research sample"* (Besides, it is necessary to pay more attention to the cultural factors that the samples of research have). The automated version of the sentence is shown in the model below.

Chart 1 :automated version of the sentence

```
# generator = UDPipe 2, https://lindat.mff.cuni.cz/services/udpipe
# udpipe_model = indonesian-gsd-ud-2.12-230717
# udpipe_model_licence = CC BY-NC-SA
# newdoc
# newpar
# sent_id = 1
# text = Di samping itu, perlu lebih diperhatikannya faktor budaya yang dimiliki oleh sampel penelitian.
1    Di    di    ADP R--  _    2    case    _    TokenRange=0:2
2    samping    samping    NOUN    NSD Number=Sing 7    obl    _    TokenRange=3:10
3    itu    itu    DET B--  PronType=Dem    2    det    _    SpaceAfter=No|TokenRange=11:14
4    ,    ,    PUNCT    Z--  _    2    punct    _    TokenRange=14:15
5    perlu    perlu    ADV VSA _    7    advmod    _    TokenRange=16:21
6    lebih    lebih    ADV D--  _    7    advmod    _    TokenRange=22:27
7-8  diperhatikannya    _    _    _    _    _    _    TokenRange=28:43
7    diperhatikan    perhatikan    VERB    VSP Mood=Ind|Voice=Pass    0    root _    _
8    nya dia PRON    PS3 Number=Sing|Person=3|PronType=Prs 7    obl:agent _    _
9    faktor    faktor    NOUN    NSD Number=Sing 7    obj    _    TokenRange=44:50
10    budaya    budaya    NOUN    NSD Number=Sing 9    compound    _    TokenRange=51:57
11    yang    yang    PRON    S--  PronType=Rel 12    nsubj:pass    _    TokenRange=58:62
12    dimiliki    milik VERB    VSP Mood=Ind|Voice=Pass    9    acl:relcl    _    TokenRange=63:71
13    oleh oleh ADP R--  _    14    case    _    TokenRange=72:76
14    sampel    sampel    NOUN    NSD Number=Sing 12    obl    _    TokenRange=77:83
15    penelitian teliti NOUN    NSD Number=Sing 14    compound    _    SpaceAfter=No|TokenRange=84:94
16    .    .    PUNCT    Z--  _    7    punct    _    SpaceAfter=No|TokenRange=94:95
```

(b) Reduplicated forms, as {berlari-lari} (running around) can be recognized, such as in the sentence "*But not long after, Dito ran into the house"* (But not long after, Dito ran into the house.). The following model shows how the sentence has been automated.

Chart 2 :Sentence automation

```
# generator = UDPipe 2, https://lindat.mff.cuni.cz/services/udpipe
# udpipe_model = indonesian-gsd-ud-2.12-230717
# udpipe_model_licence = CC BY-NC-SA
# newdoc
# newpar
# sent_id = 1
# text = Tapi tak lama kemudian, Dito berlari-lari masuk ke rumah.
1    Tapi tetapi    ADV S--  _    3    advmod    _    TokenRange=0:4
2    tak    tak    PART    G--  Polarity=Neg 3    advmod    _    TokenRange=5:8
3    lama    lama    ADJ ASP _    7    advmod    _    TokenRange=9:13
4    kemudian    kemudian    ADV S--  _    3    advmod    _    SpaceAfter=No|TokenRange=14:22
5    ,    ,    PUNCT    Z--  _    3    punct    _    TokenRange=22:23
6    Dito dito PROPN    F--  _    7    nsubj    _    TokenRange=24:28
7    berlari-lari    berlari    VERB    VSA Mood=Ind|Voice=Act    0    root _    TokenRange=29:41
8    masuk    masuk    VERB    VSA Mood=Ind|Voice=Act    7    xcomp    _    TokenRange=42:47
9    ke    ke    ADP R--  _    10    case    _    TokenRange=48:50
10    rumah    rumah    NOUN    NSD Number=Sing 8    obl    _    SpaceAfter=No|TokenRange=51:56
11    .    .    PUNCT    Z--  _    7    punct    _    TokenRange=56:57
```

(c) Recognizing compound forms such as {rumahtangga} (family), as in the sentence "*Adib sudahmendirikanrumahtangga"* (Adib has established a household or family). The computerized version of the sentence is shown in the following model.

Chart 3 :computerized version of the sentence

```
# generator = UDPipe 2, https://lindat.mff.cuni.cz/services/udpipe
# udpipe_model = indonesian-gsd-ud-2.12-230717
# udpipe_model_licence = CC BY-NC-SA
# newdoc
# newpar
# sent_id = 1
# text = Adib sudah mendirikan rumah tangga.
1   Adib    adib    PROPN   X--  _   3   nsubj   _   TokenRange=0:4
2   sudah   sudah   AUX VSA _   3   aux _   TokenRange=5:10
3   mendirikan  diri    VERB    VSA Mood=Ind|Voice=Act  0   root _   TokenRange=11:21
4   rumah   rumah   NOUN    NSD Number=Sing 3   obj _   TokenRange=22:27
5   tangga  tangga  NOUN    NSD Number=Sing 4   compound    _   SpaceAfter=No|TokenRange=28:34
6   .   .   PUNCT   Z--  _   3   punct   _   SpaceAfter=No|TokenRange=34:35
```

Analysis: Recent results samples (7.a; 7.b; 7.c) have demonstrated the effectiveness of computational methods in dealing with the complex morphological structures in the Indonesian language. The study successfully classified and identified various types of intricate word forms, showcasing the potential of computational techniques in managing the diverse and rich morphology of the Indonesian language. The results of this study could pave the way for further advancements in natural language processing and machine learning applications for the Indonesian language and other languages with similar complex morphological structures.

(8) Example 8
Aspect: Statistical Analysis: Analyzing frequency distributions of affixes in the corpus
Finding:
Prefix {ber-} appears frequently in verbs that indicate states or activities; as visualized in the word graph bellow. The {-kan} suffix is commonly employed in causal constructions. patterns showing how particular affixes are associated with particular word groups or semantic categories; as modelized in the three-graph of the sentence "*Berikutsayatuliskanbeberapa source dan fungsinya"* (Here I write down some sources and functions).

Fig 1 : Word graph

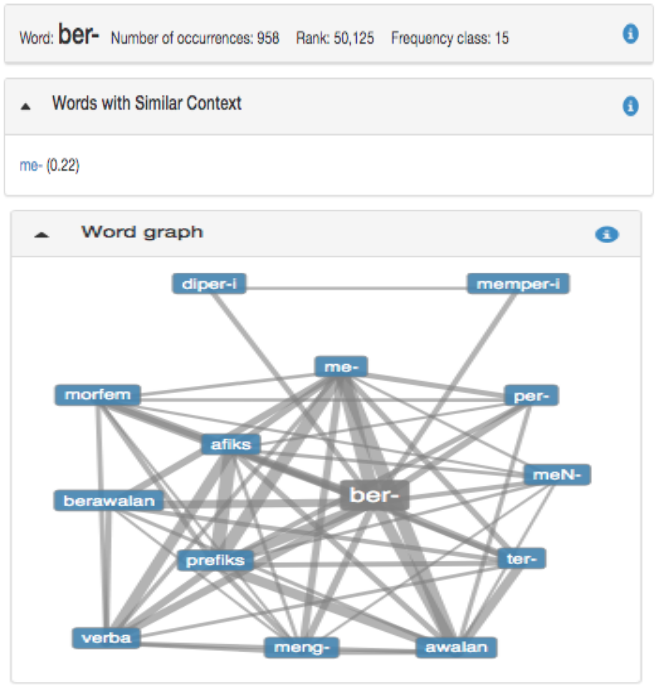

Fig 2 :Semantic categories 1

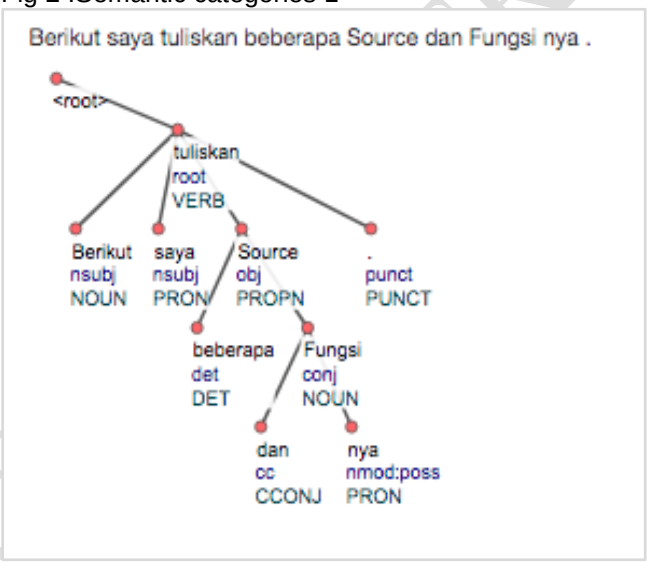

Fig 3 :Semantic categories 2

Analysis:
By leveraging computational methods and techniques, researchers were able to uncover latent patterns and tendencies in the process of word formation in the Indonesian language. These methods helped to identify statistically significant correlations between specific affixes and their respective semantic or syntactic roles in the language. This research sheds light on the inner workings of Indonesian word

creation and has the potential to inform further studies in computational linguistics and natural language processing.

These examples show how computational techniques can be used to efficiently detect, classify, reveal patterns, and support linguistic analysis in understanding the nuances of Indonesian Morphology. They also emphasize the importance of context and linguistic expertise in order to resolve the ambiguities and irregularities that naturally occur in language.

Furthermore, the following discussion delves into the specific ways computational methods can be effectively employed to identify patterns, uncover statistical tendencies, and provide a broader understanding of morphological structures within the Indonesian language. Using these tools offers a range of benefits, such as efficiency and breadth. However, it is essential to note that their integration with linguistic expertise is critical for accurate interpretation and contextual understanding of complex word forms in the language[74], [75]. By combining the strengths of computational methods and linguistic expertise, we can achieve a more comprehensive understanding of the nuances and intricacies of the Indonesian language[76].

Within the Indonesian corpus, computational approaches showed effectiveness in recognizing and classifying complicated word-forms. Machine learning methods, morphological analysis, and part-of-speech tagging enabled precise recognition and categorization of attached, reduplicated, and compounded forms[77]. Algorithms have revealed statistical tendencies and hidden patterns within complex word formations[78]. They disclosed relationships between particular word classes or semantic categories and morphemes, offering insights on Indonesian morphological distributions and recurrent morphological structures.

By processing massive datasets and automating preliminary categorizations, computational techniques proved to be useful adjuncts to traditional language investigations. The morphological patterns found in the language were largely outlined by their effective identification of statistical tendencies and general patterns[79].Although computer techniques were good at identifying patterns, linguistic knowledge was essential for confirming and comprehending these results[80]. The manual analysis of linguists resolved possible errors or anomalies found by computational methods, clarified semantics, and handled contextual nuances.

In summary, the findings from the three research questions conducted on Indonesian Morphology revealed the language's complex and intricate nature. The research highlights that affixation is the most dominant morphological process in Indonesian Morphology, while reduplication serves varied functions, and compounding structures exhibit diversity. These morphological processes significantly impact the language's structural aspects, altering its semantics and pragmatic functions. It is worth noting that computational methods have been effective in identifying patterns; however, they cannot replace the need for linguistic expertise to understand the nuances of complex word forms within Indonesian Morphology. Therefore, the study emphasizes the complementary role of computational methods and linguistic expertise in understanding the complex morphological processes underlying Indonesian Morphology.

4. CONCLUSION

In the end, this research goes into the complex landscape of Indonesian Morphology, focusing on the evaluation of complex word-forms via affixation, reduplication, and compounding. The findings shed light on the significance of affixation in word building, the

numerous functions of reduplication, and the wide range of compounding structures seen in the language. Furthermore, the research highlighted the syntactic, semantic, and pragmatic implications of these complex word-forms, emphasizing their impact on Indonesian sentence structures, meanings, and language.

Furthermore, the incorporation of computational tools was useful in discovering morphological patterns, revealing hidden regularities, and providing a broader knowledge of the morphological structures found in Indonesian. However, it is critical to recognize the limits observed throughout this inquiry. While computational methods were efficient, they faced difficulties in disambiguating context-dependent meanings and correcting irregularities inherent in natural language. This highlights the importance of combining computer studies with linguistic skills to achieve accurate interpretations and contextual comprehension.

The study's research scope was limited by the intricate and multifaceted nature of the Indonesian language, which presented several challenges during the research process. Despite these limitations, the study successfully identified and analyzed several key factors related to the Indonesian language. However, the study also revealed several potential avenues for future research, including exploring the nuances and variations of the Indonesian language in different regions, examining the impact of cultural and historical factors on the language, and investigating the potential for linguistic evolution and change over time.

In-depth research on the morphology of the Indonesian language can delve into various aspects, such as specific morphological processes, sociolinguistic factors, and ethical considerations. Computational algorithms can be improved to ensure precision and reliability, and a comprehensive comparative analysis with other languages can provide valuable cross-linguistic insights. Such studies can contribute to a better understanding of the language's structure and usage, enabling effective communication and language learning.

This study is an extensive exploration of the complexities of Indonesian morphology. It aims to provide a deep understanding of the structure of the language by analyzing complex word forms. The research delves into the intricacies of the language, examining the relationships between constituent parts of words, such as roots, affixes, and other morphemes. The study serves as a foundation for future research endeavors, laying out a roadmap for scholars to explore the nuances of Indonesian Morphology in more detail. The findings of this research can be used to develop more effective language-learning tools and methodologies that can help individuals learn the language more efficiently. Through this study, scholars hope to gain insights into the underlying principles governing the morphology of the Indonesian language. This, in turn, can help researchers better understand the language's evolution and its relationship to other languages in the region. Overall, this research is a significant contribution to linguistics and language studies, and it paves the way for further exploration of the complexities of Indonesian Morphology.

REFERENCES

[1] D. S. Nugraha, "Expanding the Meaning of Children's Lexemes in Indonesian," Sirok Bastra, vol. 4, no. 1, pp. 7–16, Apr. 2018, doi: 10.37671/sb.v4i1.70.

[2] D. S. Nugraha, "The Transitivity of Denominative Verbs in Indonesian Sentence Construction," SINTESIS, vol. 11, no. 02, pp. 78–86, 2017, doi: https://doi.org/10.24071/sin.v11i2.1735.

[3] D. S. Nugraha, "Theme-Rheme Structure in Abstract Texts in Indonesian," Sirok Bastra, vol. 5, no. 1, pp. 15–28, May 2018, doi: 10.37671/sb.v5i1.91.
[4] D. S. Nugraha, "The Syntactic Role of the Subject in the Construction of Basic Indonesian Sentences," Sirok Bastra, vol. 3, no. 2, pp. 105–115, Apr. 2018, doi: 10.37671/sb.v3i2.59.
[5] L. Bauer, Rethinking morphology. Edinburgh. Edinburgh: Edinburgh University Prrss, 2019.
[6] G. Booij, “Construction Morphology,” in The Cambridge Handbook of Morphology, Cambridge University Press, 2016, pp. 424–448. doi: 10.1017/9781139814720.016.
[7] D. S. Nugraha, "Theme-Rheme Structure in Indonesian Abstract Texts," Sirok Bastra, vol. 5, no. 1, pp. 15–28, May 2018, doi: 10.37671/sb.v5i1.91.
[8] D. S. Nugraha, "The Idiomatic Constructions of "Bapak" in Indonesian," RHETORIKA: Journal of Language, Literature and Teaching, vol. 13, no. 2, pp. 268–277, Aug. 2020, doi: 10.26858/retorika.v13i2.13099.
[9] M. Haspelmath and A. Sims, Understanding Morphology, 2nd ed. Routledge, 2010.
[10] J. D. Bobaljik, “Universals in Comparative Morphology,” Universals in Comparative Morphology, Jan. 2019, doi: 10.7551/MITPRESS/9069.001.0001.
[11] J. P. Blevins, Word and Paradigm Morphology. Oxford University Press, 2016. doi: 10.1093/acprof:oso/9780199593545.001.0001.
[12] O. Bonami and J. Strnadová, “Paradigm structure and predictability in derivational morphology,” Morphology, vol. 29, no. 2, pp. 167–197, May 2019, doi: 10.1007/S11525-018-9322-6.
[13] R. Lieber, “Morphology and Lexical Semantics,” Morphology and Lexical Semantics, Jan. 2001, doi: 10.1017/CBO9780511486296.
[14] F. Rainer, F. Gardani, H. C. Luschützky, and W. U. Dressler, Morphology and Meaning, vol. 327. Amsterdam: John Benjamins Publishing Company, 2014. doi: 10.1075/cilt.327.
[15] D. Embick, “Morphemes and morphophonological loci,” Distributed Morphology Today: Morphemes for Morris Halle, pp. 151–166, Jan. 2013, doi: 10.7551/MITPRESS/9780262019675.003.0009.
[16] I. Plag, “Morphological Productivity,” Morphological Productivity, Dec. 2020, doi: 10.1515/9783110802863.
[17] W. Motsch, “Word-formation in structuralism,” Word-Formation: An International Handbook of the Languages of Europe, vol. 1, pp. 52–66, March. 2015, doi: 10.1515/9783110246254-006/HTML.
[18] R. Lieber, “Word-formation in generative grammar,” Word-Formation: An International Handbook of the Languages of Europe, vol. 1, pp. 94–112, March. 2015, doi: 10.1515/9783110246254-009/HTML.
[19] S. Manova, “Understanding Morphological Rules,” Understanding Morphological Rules, 2011, doi: 10.1007/978-90-481-9547-3.
[20] G. Stump and R. A. Finkel, Morphological Typology. Cambridge University Press, 2013. doi: 10.1017/CBO9781139248860.
[21] M. , Assmann, D. , Büring, I. , Jordanoska, and M. Prüller, “Towards a theory of morphosyntactic focus marking,” Nat Lang Linguist Theory, 2023, doi: https://doi.org/10.1007/s11049-023-09567-4.
[22] D. Sanacore, N. Hathout, and F. Namer, “Frame-like structure for morphosemantic description,” Jan. 2021.
[23] I. Plag and H. Baayen, “Suffix Ordering and Morphological Processing,” Language (Baltim), vol. 85, no. 1, pp. 109–152, 2009, [Online]. Available: http://www.jstor.org/stable/40492847
[24] F. Masini and J. Audring, “Construction Morphology,” in The Oxford Handbook of Morphological Theory, J. Audring and F. Masini, Eds., Oxford University Press, 2018, pp. 364–389. doi: 10.1093/oxfordhb/9780199668984.013.25.

[25] U. Wandruszka, “Word-formation in categorial grammar,” Word-Formation: An International Handbook of the Languages of Europe, vol. 1, pp. 112–123, March. 2015, doi: 10.1515/9783110246254-010/HTML.
[26] J. Mugdan, “Units of word-formation,” Word-Formation: An International Handbook of the Languages of Europe, vol. 1, pp. 235–301, March. 2015, doi: 10.1515/9783110246254-017/HTML.
[27] R. Lieber, “Derivational Morphology,” in Oxford Research Encyclopedia of Linguistics, Oxford University Press, 2017. doi: 10.1093/acrefore/9780199384655.013.248.
[28] A. M. Di Sciullo, “Asymmetry in Morphology,” Asymmetry in Morphology, Dec. 2018, doi: 10.7551/MITPRESS/1465.001.0001.
[29] H. C. Luschützky, “Word-formation in natural morphology,” Word-Formation: An International Handbook of the Languages of Europe, vol. 1, pp. 123–144, March. 2015, doi: 10.1515/9783110246254-011/HTML.
[30] G. Booij, “Word-formation in construction grammar,” Word-Formation: An International Handbook of the Languages of Europe, vol. 1, pp. 188–202, March. 2015, doi: 10.1515/9783110246254-014/HTML.
[31] R. Lieber, “Syntax of Words,” in Encyclopedia of Language & Linguistics, Elsevier, 2006, pp. 405–408. doi: 10.1016/B0-08-044854-2/00144-9.
[32] C. Collins and E. Stabler, “A Formalization of Minimalist Syntax,” Syntax, vol. 19, no. 1, pp. 43–78, Mar. 2016, doi: 10.1111/SYNT.12117.
[33] C. Blom, “The Demarcation of Morphology and Syntax,” 2005, pp. 53–66. doi: 10.1075/cilt.264.04blo.
[34] E. Anagnostopoulou and Y. Samioti, “Domains within words and their meanings,” in The Syntax of Roots and the Roots of Syntax, Oxford University PressOxford, 2014, pp. 81–111. doi: 10.1093/acprof:oso/9780199665266.003.0005.
[35] K. von Heusinger, C. Maienborn, and P. Portner, “Semantics,” Semantics, vol. 2, pp. 1–1078, Dec. 2011, doi: 10.1515/9783110255072/HTML.
[36] S. Kotowski and I. Plag, The Semantics of Derivational Morphology. De Gruyter, 2023. doi: 10.1515/9783111074917.
[37] C. O. Alm, “Linguistic data resources for computational emotion sensing and modeling,” in Handbücher zur Sprach- und Kommunikationswissenschaft / Handbooks of Linguistics and Communication Science [HSK] 46/1, De Gruyter, 2022, pp. 226–250. doi: 10.1515/9783110347524-011.
[38] D. S. Nugraha, “Identifying Indonesian Light Verb Constructions: a Computational Linguistics Approach ,” in XVI. Alkalmazott nyelvészett doktoranduszkonferencia, Krisztina K. and G. T. Etelka, Eds., Budapest, Hungary: Az MTA Alkalmazott Nyelészeti Munkabizottága és a Nyelvtudományi Kutatóközpont szervezésében, 2022.
[39] S. Th. Gries and M. Paquot, “Writing up a Corpus-Linguistic Paper,” in A Practical Handbook of Corpus Linguistics, Cham: Springer International Publishing, 2020, pp. 647–659. doi: 10.1007/978-3-030-46216-1_26.
[40] T. McEnery and A. Hardie, Corpus Linguistics. Cambridge University Press, 2011. doi: 10.1017/CBO9780511981395.
[41] A. Mizumoto, L. Plonsky, and J. Egbert, “Meta-analyzing Corpus Linguistic Research,” in A Practical Handbook of Corpus Linguistics, Cham: Springer International Publishing, 2020, pp. 663–688. doi: 10.1007/978-3-030-46216-1_27.
[42] A. O’Keeffe and M. J. McCarthy, The Routledge Handbook of Corpus Linguistics. London: Routledge, 2022. doi: 10.4324/9780367076399.
[43] T. A. Pasaribu and D. S. Nugraha, “The Use of Lexeme HEAD in English and Indonesian Compound Words: A Contrastive Analysis,” Eralingua: Jurnal Pendidikan Bahasa Asing dan Sastra, vol. 4, no. 2, pp. 133–144, Jul. 2020, doi: 10.26858/eralingua.v4i2.13073.

[44] D. S. Nugraha, “Morphosemantic Features of Membuat ‘Make’ in The Light Verb Constructions of Indonesian,” LiNGUA: Jurnal Ilmu Bahasa dan Sastra, vol. 17, no. 2, pp. 131–142, Jan. 2023, doi: 10.18860/ling.v17i2.17757.
[45] D. S. Nugraha, “Morphosyntactic Features of Membuat ‘Make’ in the Light Verb Constructions of Indonesian,” European Journal of Language and Culture Studies, vol. 2, no. 2, pp. 33–43, Mar. 2023, doi: 10.24018/ejlang.2023.2.2.80.
[46] D. S. Nugraha, “Morphosemantic Features of Mengambil ‘Take’ in the Light Verb Constructions of Indonesian,” International Journal of Linguistics and Translation Studies, vol. 4, no. 3, pp. 120–138, Jul. 2023, doi: 10.36892/ijlts.v4i3.327.
[47] P. Kiparsky, “Grammaticalization as optimization,” Grammatical Change: Origins, Nature, Outcomes, Jan. 2012, doi: 10.1093/ACPROF:OSO/9780199582624.003.0002.
[48] H. Borer, “The Generative Word,” The Cambridge Companion to Chomsky, pp. 110–133, Jul. 2017, doi: 10.1017/9781316716694.006.
[49] M. C. Baker, “Lexical Categories,” Lexical Categories, Mar. 2003, doi: 10.1017/CBO9780511615047.
[50] E. Ronneberger-Sibold, “Word-creation,” Word-Formation: An International Handbook of the Languages of Europe, vol. 1, pp. 485–500, Mar. 2015, doi: 10.1515/9783110246254-028/HTML.
[51] T. Schwaiger, “Reduplication,” Word-Formation: An International Handbook of the Languages of Europe, vol. 1, pp. 467–484, Mar. 2015, doi: 10.1515/9783110246254-027/HTML.
[52] S. Olsen, “Composition,” Word-Formation: An International Handbook of the Languages of Europe, vol. 1, pp. 364–386, Mar. 2015, doi: 10.1515/9783110246254-022/HTML.
[53] A. Spencer, “Derivation,” Word-Formation: An International Handbook of the Languages of Europe, vol. 1, pp. 301–321, Mar. 2015, doi: 10.1515/9783110246254-018/HTML.
[54] J. R. Taylor, “Word-formation in cognitive grammar,” Word-Formation: An International Handbook of the Languages of Europe, vol. 1, pp. 145–158, Mar. 2015, doi: 10.1515/9783110246254-012/HTML.
[55] J. Grzega, “Word-formation in onomasiology,” Word-Formation: An International Handbook of the Languages of Europe, vol. 1, pp. 79–93, Mar. 2015, doi: 10.1515/9783110246254-008/HTML.
[56] P. Štekauer, “The delimitation of derivation and inflection,” Word-Formation: An International Handbook of the Languages of Europe, vol. 1, pp. 230–235, Mar. 2015, doi: 10.1515/9783110246254-016/HTML.
[57] S. Valera, “Conversion,” Word-Formation: An International Handbook of the Languages of Europe, vol. 1, pp. 322–339, Mar. 2015, doi: 10.1515/9783110246254-019/HTML.
[58] H. Harley, “On the Identity of Roots,” Theor Linguist, vol. 40, no. 3–4, pp. 225–276, Oct. 2014, doi: 10.1515/tl-2014-0010.
[59] J. Pustejovsky, “Type Theory and Lexical Decomposition,” pp. 9–38, 2013, doi: 10.1007/978-94-007-5189-7_2.
[60] R. Lieber, P. Štekauer, and S. Valera, “Conversion,” The Oxford Handbook of Derivational Morphology, Jan. 2014, doi: 10.1093/OXFORDHB/9780199641642.013.0010.
[61] P. Stekauer, S. Valera, and L. Körtvélyessy, “Word-Formation in the world’s languages: A typological survey,” Word-Formation In The World’s Languages A Typological Survey, pp. 1–366, Jan. 2012, doi: 10.1017/CBO9780511895005.
[62] R. Lieber, “The category of roots and the roots of categories: What we learn from selection in derivation,” Morphology, vol. 16, no. 2, pp. 247–272, Dec. 2006, doi: 10.1007/S11525-006-9106-2.

[63] L. Bauer, “Notions of paradigm and their value in word-formation,” Word Structure, vol. 12, no. 2, pp. 153–175, 2019, doi: 10.3366/WORD.2019.0144.
[64] J. Pustejovsky, “The Generative Lexicon,” The Generative Lexicon, May 2020, doi: 10.7551/MITPRESS/3225.001.0001.
[65] I. Plag, “Morphological Productivity,” Morphological Productivity, Dec. 2020, doi: 10.1515/9783110802863.
[66] J. Bohnemeyer, “Sebastian Löbner: Understanding Semantics.,” Linguistics, vol. 43, no. 2, Jan. 2005, doi: 10.1515/ling.2005.43.2.443.
[67] M. Cançado and A. Gonçalves, “Lexical Semantics: Verb Classes and Alternations,” The Handbook of Portuguese Linguistics, pp. 374–391, Apr. 2016, doi: 10.1002/9781118791844.CH20.
[68] B. Wälchli and M. Cysouw, “Lexical typology through similarity semantics: Toward a semantic map of motion verbs,” Linguistics, vol. 50, no. 3, Jan. 2012, doi: 10.1515/ling-2012-0021.
[69] R. Lieber, “The semantics of transposition,” Morphology, vol. 25, no. 4, pp. 353–369, Nov. 2015, doi: 10.1007/s11525-015-9261-4.
[70] I. Stupak, “Positional verbs: derivation semantics and functioning,” Pragmalinguistica, no. 28, pp. 128–146, 2020, doi: 10.25267/Pragmalinguistica.2020.i28.07.
[71] R. Lieber, “On the lexical semantics of compounds,” 2010, pp. 127–144. doi: 10.1075/cilt.311.11lie.
[72] A. Aikhenvald and R. M. W. Dixon, Language at Large: Essays on Syntax and Semantics. Leiden, The Netherlands: Brill, 2011. doi: https://doi.org/10.1163/ej.9789004206076.i-606.
[73] J. Bańczerowski, “Some contrastive considerations about semantics in the communication process,” in Theoretical Issues in Contrastive Linguistics, J. Fisiak, Ed., Amsterdam: John Benjamins Publishing Company, 1981, p. 325. doi: 10.1075/cilt.12.27ban.
[74] J. Newman and C. Cox, “Corpus Annotation,” in A Practical Handbook of Corpus Linguistics, Cham: Springer International Publishing, 2020, pp. 25–48. doi: 10.1007/978-3-030-46216-1_2.
[75] A. Zeldes, “Corpus Architecture,” in A Practical Handbook of Corpus Linguistics, Cham: Springer International Publishing, 2020, pp. 49–73. doi: 10.1007/978-3-030-46216-1_3.
[76] T. McEnery, “A new agenda for corpus linguistics - working with all of the world’s languages,” Literary and Linguistic Computing, vol. 15, no. 4, pp. 403–420, Dec. 2000, doi: 10.1093/llc/15.4.403.
[77] A. Rosenbach, “Exploring constructions on the web: a case study,” in Corpus Linguistics and the Web, BRILL, 2007, pp. 167–190. doi: 10.1163/9789401203791_011.
[78] A. Kilgarriff, “Language is never, ever, ever, random,” Corpus Linguistics and Linguistic Theory, vol. 1, no. 2, pp. 263–276, 2005, doi: 10.1515/cllt.2005.1.2.263.
[79] H. Moisl, “Cluster Analysis,” in A Practical Handbook of Corpus Linguistics, Cham: Springer International Publishing, 2020, pp. 401–434. doi: 10.1007/978-3-030-46216-1_18.
[80] M. Paquot and T. Larsson, “Descriptive Statistics and Visualization with R,” in A Practical Handbook of Corpus Linguistics, Cham: Springer International Publishing, 2020, pp. 375–399. doi: 10.1007/978-3-030-46216-1_17.