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PARTIAL EXPERIMENTAL FINDINGS ON THE CONSTRUAL BASE VS. AFFIXED LEXICAL FORMS IN INDONESIAN MEASURED THROUGH DRAWING DURATION

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Abstract

Our study investigated whether Indonesian affixations affect speakers' construal of base lexical forms. The participants in this study completed a drawing task with duration serving as an indirect index of construal. We hypothesized that affixed forms would require longer drawing durations due to the schematic meaning embedded by grammatical morphemes. Experiment 1 tested noun-based form *batas*, Experiment 2 tested verb-based form *tumbuh*, and Experiment 3 tested adjective-based form *cepat*, each with their respective affixed forms. Experiment 1 yielded partial significant results: three affixed forms (*batasan, pembatasan,* and *membatas*) required significantly longer drawing durations than the base form. Experiment 2 showed no significant effects, while Experiment 3 suggested overall significance although post-hoc tests failed to validate specific pairwise differences. Despite mixed results, this study provides preliminary evidence that Indonesian derivational affixation influences construal, thus providing preliminary experimental evidence for construal effects of derivational morphology in Indonesian cognitive semantics.

Keywords: experiment, Indonesian grammar, construal, cognitive semantics

Abstrak

Penelitian kami menginvestigasi bagaimana afiksasi dalam bahasa Indonesia memengaruhi penafsiran penutur atas bentuk leksikal dasar. Para partisipan dalam penelitian ini menyelesaikan kegiatan menggambar dengan durasi sebagai indeks taklangsung terhadap penafsiran. Kami berhipotesis bahwa bentuk-bentuk terafiksasi akan membutuhkan durasi penggambaran lebih lama karena penambahan makna skematik oleh morfem gramatikal. Eksperimen 1 menguji nomina dasar 'batas', Eksperimen 2 menguji verba dasar 'tumbuh', dan Eksperimen 3 menguji adjektiva dasar 'cepat'; masing-masing dengan bentuk afiksasinya. Eksperimen 1 menunjukkan hasil signifikan yang parsial: tiga bentuk terafiksasi ('batasan', 'pembatasan', dan 'membatas') membutuhkan durasi penggambaran yang lebih signifikan ketimbang bentuk dasarnya. Eksperimen 2 menunjukkan efek non-signifikan, sementara Eksperimen 3 menunjukkan signifikansi menyeluruh walaupun tes lanjutan gagal memvalidasi perbedaan antar pasangan yang spesifik. Meskipun hasil yang diperoleh parsial, penelitian ini menyediakan bukti awal bahwa afiksasi derivasional dalam bahasa Indonesia memengaruhi penafsiran, dan dengan demikian menyediakan bukti eksperimental inisial untuk efek penafsiran dari morfologi derivasional dalam semantik kognitif bahasa Indonesia.

Kata kunci: eksperimen, tatabahasa Indonesia, penafsiran, semantik kognitif

INTRODUCTION

Numerous introductory texts of Cognitive Linguistics have pointed out that grammar involves conceptualization or meaning construction (Croft & Cruse, 2004; Evans & Green, 2006). That is to say that language represents the way bodily experience is mentally organized or conceptually structured in mind, and that language structures the way speakers perceive and communicate their experience. Cognitive Linguistics is also introduced as a study of language that commits itself to characterizing language universally, by taking insights about how the mind works into account. These commitments are the Generalization Commitment and the Cognitive Commitment.

Cognitive semantics is one of two major branches in Cognitive Linguistics along with the cognitive approach to grammar (Evans & Green, 2006). According to Talmy (2000, p.5), introspection is central to cognitive semantics because it provides an accessible point to conceptual content and structure in conscious experience of language. Cognitive semantics is not necessarily limited to introspection, as it is open to a wide range of methods that offer complementary and integrative means of studying language; this means that every approach (for example, experimental, corpus-based, developmental, and observational) covers certain dimensions of language and its meaning-making (Gonzales-Marques et al., 2007; Zlatev, 2018).

For Talmy (2000), his method pertains syntactic and cross-linguistic comparative analyses on extensive linguistic data. In his Conceptual Structuring System (CSS) framework, he proposes language comprises open-class lexical subsystem and closed-class grammatical subsystem. The former encodes conceptual content of language (for example, OBJECT and ACTION) and the latter schematic meaning of language (for example, PATH, GOAL, etc.). Both subsystems operate in a lexicon-grammar continuum, thus represent the speakers' mental view of a state of affair via their language expressions.

Cognitive Linguistics has been advancing ever since its foundational movement in 1980s. The use of experimental methods marks the advancement as exemplified by scholarly works of last two decades that further shed light on issues related to cognition and language. Kaschak et al. (2006) and Zwaan et al. (2004) orchestrated experiments on the relationship between perceptions of motion event with language comprehension, by assigning participants to judge their perception of stimuli against recorded expressions that encode direction of motion (for example, *away* and *towards*). Their findings corroborate the idea that perceptual simulation—the grounding of concepts in mind—entails language comprehension.

The use of progressive aspect is found to correlate with eye movement that directs one's attention in matching visually perceived event and its verbalization (Flecken, 2011). Flecken's experiment also tested the effect of bilingualism (namely, Dutch and German) in seeing how participants would use the progressive aspect to orally describe perceived events. The experiment found bilingualism interferes with language use.

Experimental studies have also tested the relationship of cross-language differences and language use, memory, eye movement patterns, and comprehension (Athanasopoulos & Bylund, 2012; Huette et al., 2014; Montero-Melis & Bylund, 2017; Papafragou et al., 2008). These studies point to a strong suggestion that there is language difference in encoding speakers' thoughts of caused-motion event, while their cognitive processing seems to operate without significant differences.

Despite the advancement, the exemplifying studies give the impression that Cognitive Linguistics paid little attention to Indonesian—needlessly, the pre-existing works are directed to

study the Western European language (typically English). Noguchi (2011) attempted a challenge to Talmy's lexicalization patterns of motion event in Japanese. This attempt has been extended to the Indonesian context.

In a somewhat similar aim, Muwaffaq et al. (2021) and Muwaffaq & Visiaty (2023) applied Talmy's Conceptual Structuring System (CSS) in Indonesian. Both studies demonstrated the way Indonesian grammar encode schematic meaning. Muwaffaq et al. (2021) examined Indonesian prepositions (e.g., *di, ke, dari, pada,* and *bagi*) and demonstrated semantic constraints in construal of events or states of affairs. Muwaffaq & Visiaty (2023) propose that conceptualization in Indonesian relies on what they call as pairing and combining morphemes or particles. Considering their scrutiny in Indonesian grammatical expression and meaning making, one can plausibly regard both studies as positioned within the subdomain of cognitive semantics and grammar.

Aligning with Talmy (2000), Muwaffaq et al. (2021) propose that prepositional elements of Indonesian grammar restrict the way one construes spatial relations. For instance, the prepositions *di X (at)* and *ke X (to)* specify different spatial relations. While the former expresses the location of an object, the latter specifies the endpoint of a motion-event. Importantly, both expressions restrict fine grained topological encoding of spatial relations. Muwaffaq & Visiaty (2023) propose a characterization of Indonesian as comprising of particle complexes that are paired to construct meaning. The logic underlying their dub of linguistic particle builds upon Talmy's (2000) closed-class grammar and open-class lexical subsystems of language. The term particle refers to given linguistic forms that may be a member of the open-class lexical subsystem or the closed-class grammatical subsystem, such as that in Talmy's framework.

To provide a concrete example, Muwaffaq & Visiaty (2023) demonstrate Indonesian grammatical meaning as arising from the pairing of independent and dependent particles. The former (e.g., *bank, insentif, terbit*) encode semantic concepts such as ENTITY, ACTION, or ATTRIBUTE. On the other hand, the latter (e.g., *bagi, pe-, -kan*) functions to organize schematic meaning that links these concepts in construal process. Their analysis of the headline *BI terbitkan insentif bagi bank penyedia pendanaan dampak COVID-19* illustrates that the omission of the dependent particle *-kan* would render the expression conceptually problematic. This suggests that *-kan*, as a dependent particle, establishes a semantic link between the agent (*BI*) and the object (*insentif*), designates the base lexical item as the intended actualized situation, and thus points to the particle's function as extending beyond that of a mere transitivizer.

Muwaffaq et al. (2021) and Muwaffaq and Visiaty (2023) aimed to characterize Indonesian grammar and meaning-making by employing what Tummers et al. (2005) refer to as corpus-illustrated linguistics. Similar approach is exemplified by some other studies in Indonesian Cognitive Linguistics studies (see Mardiah, 2021; Rajeg et al., 2022; and Zulkarnen & Muwaffaq, 2018). As characterized by Tummers et al. (2005), those studies grounded their theoretical propositions about Indonesian language system in the corpus without quantitative assessment. In the long run, studies that rely on introspection need to answer critical challenges that call for exploring methodological options in Cognitive Linguistics and pursuing wider dimension of the subject such as language and intersubjectivity (see Dabrowska, 2016; Divjak et al., 2016; Geeraerts, 2016; Schmid, 2016).

Rajeg et al. (2022) investigated whether voice alternations preserve meaning across active and passive forms. Although their work offers import to sense-voice association and meaning preservation, they focused on distributional patterns of sense-voice associations. Our study differs

from theirs in that it explicitly examines construal effects that questions whether derivational affixation affects the cognitive complexity during interpretive process, measured indirectly through drawing duration, within Talmy's (2000) framework.

The current study takes up the criticism of overusing introspection and the challenge to expand Cognitive Linguistics particularly in studying Indonesian. It engages the lack of experimental method in testing hypotheses about the nature of Indonesian grammar and meaning making in mind. In doing so, the current study aims to test the relation between grammatical expressions and construal by employing experimental approach. While this subject of grammatical expression and construal has been a part of the pre-existing studies mentioned earlier by some scholars (Mardiah, 2021; Muwaffaq et al., 2021; Muwaffaq & Visiaty, 2023; Nasrullah & Budiman, 2022), the use of experimental approach may be considered relatively limited in the study of Indonesian Cognitive Linguistics.

Indeed, there have been earlier attempts that employed an experimental approach to Indonesian. Casasanto et al. (2005) tested temporal metaphors by comparing conceptual mappings of TIME AS DISTANCE against TIME AS QUANTITY, while Aryawibawa & Ambridge (2018) examined semantic constraints in grammatical construction by requiring participants' acceptability judgements. The current study may be considered novel in addressing the extent to which affixation structures linguistic meaning-making—as indicated by drawing duration—by placing Indonesian as focal point.

The experiment measured drawing duration online or direct interpretation on lexical stimuli as an indirect index of construal complexity. If language consists of open-class lexical subsystem (the content meaning) and closed-class lexical subsystem (the schematic meaning) such as proposed by Talmy (2000), then the same lexical would be drawn differently when it is paired with grammatical elements so to express its varying construal. Given the differences, participants would require longer duration to draw more elaborate interpretation from construing grammatically affixed lexical stimuli. Similar logical consequences apply to noun-forming, verb-forming, and adjective-forming affixations—meaning that different constructions (i.e.,, object, action, vs attribute) affect participants drawing duration.

The current study rationalized the experimental task as it entails the bottom-up perceptual recognition and the top-down conceptual simulation, which aligns with Barsalou's (1999) Perceptual Symbol Systems. It is understood that drawing duration is an indirect index for construal. However, accessing construal directly and using neurocognitive or gaze-based alternatives posed certain challenges, given the limited resources of the current study. The current method offers an affordable and practical way out to such challenges, while it remains grounded in the framework of embodied cognition. The notion of embodied cognition proposes that conceptual thinking and linguistic meaning-making are grounded in bodily or sensorimotor experiences (see Lakoff and Johnson, 1980; Lakoff, 1999; Barsalou, 1999).

Pre-existing studies have tested the hypothesis that grammatical form encodes additional meaning into the lexical form. Janda & Lyashevskaya (2013) employed linguistic profiling on Russian to challenge the traditional assumption that prefixes are semantically empty, that is, they merely function as aspectual markers. Their findings support the view that Russian prefixes correspond with the semantic of their lexical bases. There have been similar attempts to test the question of how grammar structures meaning and event construal in other languages (see Zwaan et al., 2004; Kaschak et al., 2006; Papafragou et al., 2008; Flecken, 2011; Athanasopoulos & Bylund 2012; Montero-Melis & Bylund, 2017; Huette et al., 2014).

Drawing on Talmy's (2000) view that the closed-class grammatical subsystem adds schematic meaning to the readily provided conceptual content from the open-class lexical subsystem, and its consistent internalization Talmy's view into Indonesian by Muwaffaq & Visiaty (2023), the current study tests the hypothesis that Indonesian affixation affects construal. Particularly, this study predicts grammatically affixed forms will require longer durations when interpretively drawn in comparison to their base lexical forms. This prediction echoes the additional schematic structure that is contingent on affixation of base lexical items.

METHOD

Corpus-Based Stimuli Selection

The current study used a corpus that consists of fourteen online *Antara News* headlines published on the 1st of April 2020, following Muwaffaq et al. (2021) and Muwaffaq & Visiaty (2023) (see https://doi.org/10.6084/m9.figshare.30919859). Aligning with those studies, there was no particular rationale underlying the choice of publication. The idea was simply to collect natural written language samples from a national, state-owned news agency, with the assumption that the produced texts would adhere to standard Indonesian.

Each lexical form in the corpus was tagged for its co-occurrence with noun-forming affixations (e.g., *-an, pe-, pe-…-an,* and *per-…-an*) and verb-forming affixations (e.g., *ber-, me-, me-…-i, me-…-kan, di-, di-…-i ,* and *di-…-kan*). We extracted 190 types of base lexical forms after manually identified the forms from the corpus (mean type frequency = 3.04). We further grouped the lexical forms according to its class by referring to *Kamus Besar Bahasa Indonesia (KBBI)*: noun (227 tokens, 59 types, and mean type frequency 3.84), verb (303 tokens, 112 types, and 2.7 mean type frequency), adjective (45 tokens, 17 types, and 2.5 mean type frequency), and *prakategorial* (4 tokens, 2 types, and mean type frequency 2). The exclusion of *prakategorial* forms was self-evident from its criterial definition in KBBI (i.e., unused base-form). The selection proceeded by assuming the mean types as familiarity threshold. The latter favored >3 type-frequency nouns, >2 type-frequency verbs, and >1 type-frequency adjectives (see https://doi.org/10.6084/m9.figshare.30919859).

We introspected semantic and schematic content of the lexical forms to refine the selection. The introspection evaluatively excluded lexical forms that pose challenge to visualize (i.e., imageability), exemplify ambiguity (i.e., *jalan* may refer to object and action), and schematically inconsistent when co-occurring with the intended affixations (i.e., *memutus* 'to cut off' vs *memutuskan* 'to decide'). These criteria were intended to minimize random interpretive variation which might interfere with the drawing task in the experiment (see https://doi.org/10.6084/m9.figshare.30919859).

Leipzig Indonesian Corpora (ind_mixed_2013) was referred to in evaluating morphological productivity of the affixation types. The evaluation further excluded lexical forms with <10 frequency. Following that, the KBBI was referred to in verifying the base forms and the affixed forms. The interest of current study was to select recognizable lexical forms with their affixed forms. Under this consideration, we justified pragmatic and non-theoretical means of selection without account to corpus statistical criteria. In other words, the aim of referring to the Indonesian Leipzig Corpora was not to ensure whether the lexical forms were statistically represented. Rather, it was to see the productivity of the lexical forms.

The selection retained *batas* (noun), *tumbuh* (verb), and *cepat* (adjective). In conceptual terms, *batas* denotes a spatial boundary, *tumbuh* expresses a process, and *cepat* a scalar-temporal rate. These base lexical forms satisfied the frequency thresholds and introspectively preserved schematic consistency across affixations (see https://doi.org/10.6084/m9.figshare.30919859). Albeit Indonesian Leipzig Corpora recorded no occurrences of certain affixed form of *cepat.* However, the form was favored over its antonym *lambat* because the base form appeared more frequently in the corpus.

Design

Other than the varying stimuli and participants which are assigned respectively to the experiment (i.e., Experiment 1, Experiment 2, and Experiment 3), all experiments applied identical materials and procedures. Independent variables of Experiment 1 tested the noun-based lexical *batas* and its attested derivations (i.e., the noun-forming affixations and the verb-forming affixations). Respectively, independent variables of Experiment 2 and Experiment 3 respectively tested the verb-based *tumbuh* and the adjective-based *cepat*. These experiments ran on distinct and separate schedule. The current study also had no interest in testing the effects across these experiments. However, the experiments considered drawing duration as indirect index of construal, therefore the dependent variable. Applying Talmy (2000) and Muwaffaq & Visiaty (2023) that grammatical elements add schematic meaning to lexical elements, the current study formulated the hypotheses as follows:

H_0: There is no difference in drawing duration between base and affixed lexical forms.
H_1: Affixed lexical forms yield longer drawing durations than base forms.

Participants

We recruited 90 participants with IDR75,000 incentives around Universitas Al-azhar Indonesia. The participants were randomly and equally assigned into each of the experiment. All of the participants were Indonesian native speakers, but their second languages varied. In Experiment 1, there were 21 male and 9 female (mean age 24.5) participants. Their second language ranged from English (24), Arabic (2), English and Arabic (1), and English and Hokkien (1). Two participants reported not having a second language. The participants' educational backgrounds consisted of 20 undergraduate students, seven bachelor's degree holders, two master's degree holders, and one participant with a doctoral degree.

In Experiment 2, there were 11 male and 19 female participants (mean age 21.8). Participants' second language was English (18), Arab and English (3), English and Japanese (2), and English and Turkish (1). Five participants reported not having a second language. Their educational background was undergraduate students (20) and Bachelor graduate (10). In Experiment 3, there were 7 male and 23 female participants (mean age 19.6). Their second language was English (19), Arabic (4), and English and Arabic (3). Four participants reported that they did not have a second language. All of them were undergraduate students at the University of Al-azhar Indonesia.

Material

The experimenters designed a web-based system (xemcog.uai.ac.id) to present the stimuli for Experiment 1 (i.e., noun-base lexical stimuli), Experiment 2 (i.e., verb-base lexical stimuli), and Experiment 3 (adjective-base lexical stimuli). Only the experimenters had access to the system. The experimenters operated the system on Lenovo IdeaCentre AIO 3 27IAP7 desktop with keyboard and mouse equipment. The system can no longer be accessed because the server subscription has been expired. However, this section documents material description in detail, and the procedural details are provided in the subsequent section. The access differs respectively to the experiments.

All of the experiments consisted of 12 rounds of sequential tasks in consecutive order. Every round started with a priming page—a cross in the center—for 3000 milliseconds. The lexical stimuli followed for 5000 milliseconds, before automatically turned to the succeeding priming page for the same duration. Subsequently, the system presented a type-in response that required participants to type the presented stimulus on the previous page. This task aimed to control participants' attention to the stimulus; the correct typed lexical stimulus verified their attention of the stimulus. The system recorded response time starting from the first type until participants clicked the submit button.

The main experimental task was presented on the following page. Participants were instructed to draw their interpretation of the stimulus by using the provided mouse. The system started recording the time response once participants clicked the mouse until they submitted the drawing. Succeeding the drawing task was familiarity rating of the lexical stimulus by using Likert Scale-5. The final task in every round was producing a sentence by using the encountered lexical stimulus. The sentence was typed using the provided keyboard. Similarly, the response time recorded the duration starting from the first type to the submission.

Procedure

Experiment 1 (noun-base *batas*), Experiment 2 (verb-base *tumbuh*), and Experiment 3 (adjective-base *cepat*) applied an identical procedure. The experiments took place at the Centre for Computer and Language Laboratory, Universitas Al-azhar Indonesia. The participants' background information was collected via re-registration form before the experiment started. The form confirmed their consent in participating the experiment. The participants carried out the experimental task individually in accordance with their participation schedule. The schedule was set every Monday, Wednesday, and Friday (from 1 to 6 pm Indonesian Western Time).

The experimenters briefed the participants before commencing the task. The participants were informed about the number of rounds and the experimental tasks in every round. The stimuli were presented in a fixed order. They were also made aware that the instruction was also stated on the system. Importantly, the experimenters informed the participants that the experiment had no correct or incorrect answers and was not a psychological test, and that they could take their time in responding despite being timed. The participants were aware that the experiment recorded their time response. The experimental hypothesis was not revealed to participants.

The participants were given the chance to ask questions about the instruction. Given their understanding of the instruction, the experimenter logged into the Xemcog system: User Account 1 accessed Experiment 1, User Account 2 for Experiment 2, and User Account 3 for Experiment 3. The system home page presented participants with instruction to click the start button to begin

the experiment. After completing the experiment, we conducted an exit interview with the participants, during which the experimenters asked about their experience, particularly with the main task (i.e., drawing the stimuli). The participants' drawings from all experiments are archived on Figshare for transparency and responses documentation (see https://doi.org/10.6084/m9.figshare.c.8138147.v1). R codes for the statistical and graphical analyses are available at https://doi.org/10.6084/m9.figshare.30575303 while the raw data is available at https://doi.org/10.6084/m9.figshare.30575297.

RESULTS

Experiment 1: Noun-based form *batas*

The experiment excluded two data entries due to the system which failed to record the responses from one participant (n = 28). One-way Repeated Measures ANOVA was applied to test the effect of affixations of noun-based lexical form *batas* on participants' interpretation as indicated by their drawing duration $F (11, 297) = 11.78$, $p<001$. The result suggests a significant difference, although the effect size indicates a small-to-moderate impact (GES = 0.067).

Mauchly test examined the violation of equal variances or sphericity. Mauchly's test reveals (W: 0.0001, P<.001). The violation of equal variance assumption necessitated adjusted sphericity and correction tests Greenhouse-Geisser and Huynh-Feldt tests to control false-positive result. The test revealed Greenhouse-Geisser epsilon 0.171 (df 1.88, 50.63), p<.001 and Huynh-Feldt epsilon 0.183, (df 2.01, 54.34), p<.001. Both results suggest the significant results remain consistent despite the sphericity violation. Figure 1 illustrates the distribution of the participants' drawing duration that measured in seconds across lexical forms.

The significance indicates variation that is unlikely due to chance. The significance was examined further by applying pairwise comparison Holm correction for multiple testing. The result suggested significant differences in certain pairs of lexical forms (p<.001) such as *batas-batasan, batas-dibatas, batas-dibatasi, batas-membatas,* and *batas-pembatasan*. Supplementary Table 1 provides full account of the test result. It is important to note that certain affixed forms namely *dibatas* and *dibataskan* were drawn in shorter duration than the base form on average. This irregularity may reflect inconsistent participant engagement or uneven imageability across lexical forms instead of differences in construal.

On the other hand, we found partial significant result that *batasan, pembatasan,* and *membatas* required longer drawing duration than *batas*. Despite the partiality, this finding corroborates Talmy's (2000) view that grammatical closed-class element adds schematic meaning to the lexical open-class element, and Muwaffaq & Visiaty's (2023) argument that Indonesian dependent particles or morphemes in Indonesian organize meaning. Accordingly, the partially significant results lead to the rejection of the null hypothesis (H0) that affixation has no effect on drawing duration. The partially significant findings and irregularities in the data tentatively support the alternative hypothesis (H1) that grammatical affixation affects construal, although the direction and stability of the effect require further validation.

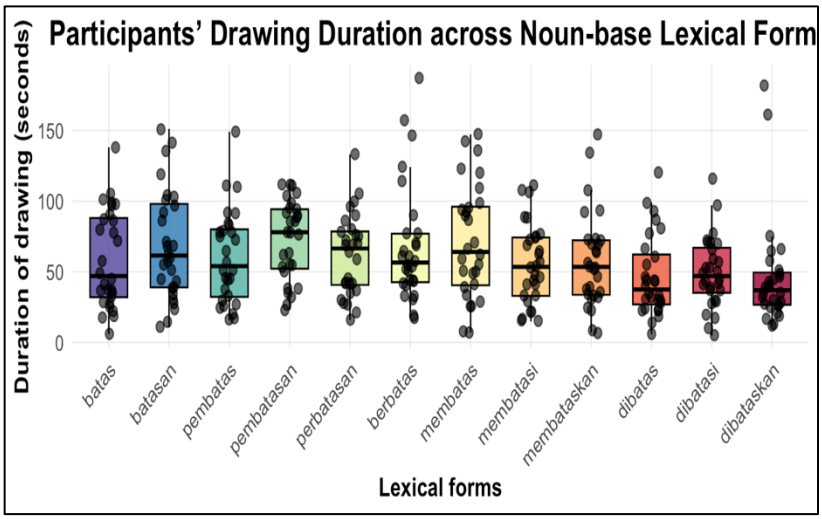

Figure 1. The figure illustrates the distribution of participants' drawing duration measured in seconds as to indicate interpretive response to noun-based lexical forms (*batas*). The experiment tested the effect of noun-based lexical grammatical pairings or affixations on drawing duration (n = 28) using within-participant design. The experiment observed certain pairs were demonstrating highly significant effect ($p<.001$).

Experiment 2: Verb-based form *tumbuh*

The experiment excluded two sets of participant responses because the system failed to record them (n=28). ANOVA Repeated Measures was applied to test the hypothesis that grammatical pairings or affixations on verb-based lexical forms affect construal as indicated by drawing duration. Interestingly, the test result suggested no significance F (11, 297), 1.83, $p>.05$, GES (0.041). The non-significant result provides basis to consider sphericity violation test unnecessary.

The result falls short to substantiate the prediction that grammatical closed-class elements adds schematic meaning into conceptual content evoked by the lexical open-class element (Talmy, 2000). It also fails to support the view that Indonesian dependent particle or morpheme structures meaning when paired with the independent particle or lexical item. Introspectively, this finding appears counterintuitive because the base form *tumbuh* conceptually differs from its noun-forming affixed forms *tumbuhan, penumbuh, penumbuhan,* and *pertumbuhan.* This may indicate the current experimental measurement (i.e., drawing duration) was less sensitive to capture conceptual differences. According to this result, the experiment confirmed the null hypothesis (H_0) that base form vs affixed forms yields no effect on participants construal as indicated by drawing duration. Further, the alternative hypothesis (H_1) is then improbable (see Figure 2).

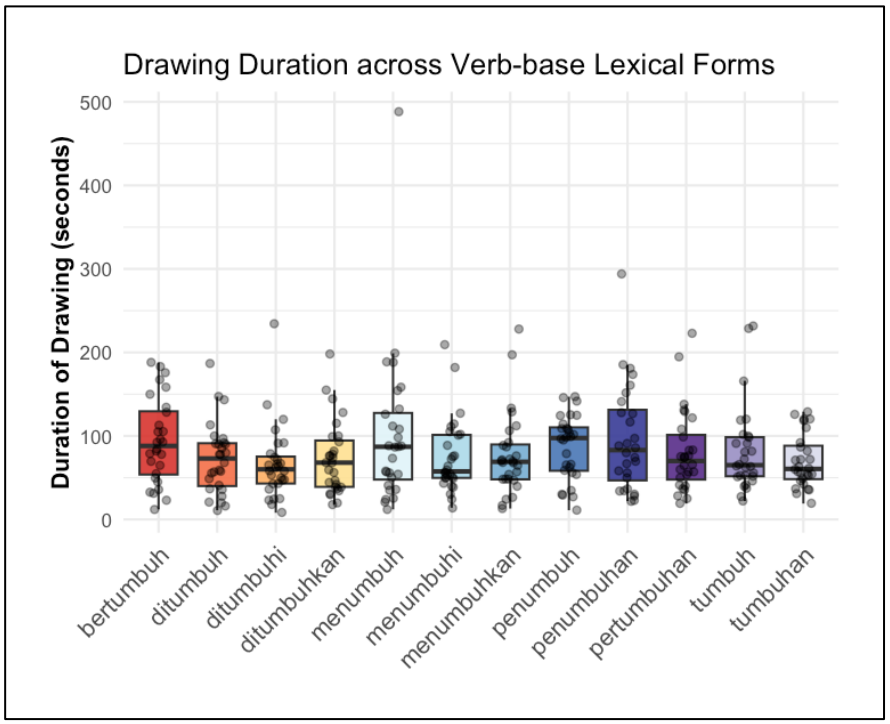

Figure 2. The figure illustrates the spread of participants' drawing duration measured in seconds as to indicating interpretive response to verb-based lexical forms (*tumbuh*) (n = 28). The experiment tested the same hypothesis as in Experiment 1, given the modification in the base lexical form. The experiment found there was no significant effect (p = .108).

Experiment 3: Adjective-based form *cepat*

ANOVA Repeated Measures F (10, 290) = 3.714, p<.0001 (GES = 0.065) indicates weak to moderate effect given the highly significant result (n = 30). The Mauchly result reveals sphericity violation in the data, meaning the data violated the equal variances assumption (W: 0.0001, P<.001). The violation of equal variance assumption necessitated adjusted sphericity and correction tests Greenhouse-Geisser and Huynh-Feldt tests to control false-positive result. The test revealed Greenhouse-Geisser epsilon 0.321, (df 3.21, 93.23), p<.05 and Huynh-Feldt epsilon 0.366, (df 3.66, 106.22), p<.05. In other words, the statistically significant result remains consistent despite the sphericity violation (see Figure 3).

A pairwise post-hoc analysis was applied to examine which lexical forms holds the differences in terms of drawing duration. The analysis included 55 pairwise comparisons (i.e., 30 observations per group). Holm's correction was used to adjust the p-value and the family-wise error rate. Although the ANOVA result shows null hypothesis (H0) is unlikely given the overall result, the lack of pairwise effects suggests the observed effect might be more likely caused by uncontrolled factors such as participants fatigue, task habituation, or the design rather than affixations. Therefore, the result provides inadequate basis to confidently affirm the alternate hypothesis (H1) in terms of lexical differences. This result offers a limited support to Talmy's (2000) view that grammatical closed-class elements add schematic meaning to open-class lexical content. The same holds to Muwaffaq & Visiaty (2023) who views that dependent particles structure meaning in Indonesian language system. The current data shows a weak empirical evidence.

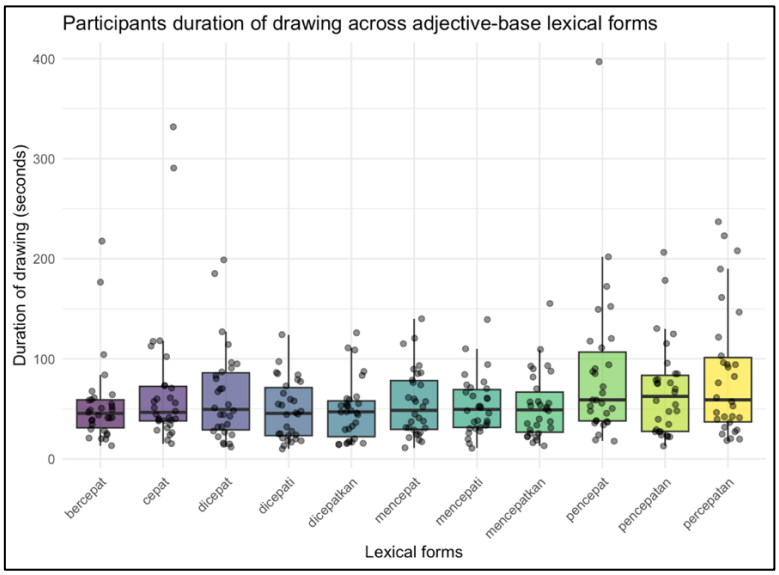

Figure 3. The figure illustrates the spread of participants' drawing duration across adjective-based lexical forms measured in second (*cepat*) (n = 30). The experiment tested the hypothesis that grammatical pairings or affixations affect semantic interpretation as indicated by drawing duration. Albeit the experiment found statistically significant result ANOVA Repeated-Measures ($p<.001$), pairwise analysis suggested there was no reliable effect across the pairs of lexical forms and drawing duration.

DISCUSSION

The findings of Experiment 1 yield partial and mixed statistically significant results. The participants spent longer duration to draw their interpretation on the affixed forms *batasan, pembatasan,* and *membatas*) in comparison to the base form *batas*. This partially supports the experimental hypothesis that grammatical elements may affect the way participants construe lexical form, therefore necessitated a longer duration to express construal in drawing. Furthermore, this finding supports Talmy's (2000) theoretical view that the closed-class grammatical subsystem supplements schematic meaning in the open-class lexical subsystem, as also proposed by Muwaffaq & Visiaty (2023) in their theorization of Indonesian grammar. Affixations may demand conceptual elaboration, thus requiring longer drawing duration.

On the other hand, the participants spent significantly shorter duration to draw the affixed forms *dibatas* and *dibatasi* than the base form *batas.* Rather than offering confirmation, despite the statistical significance, the finding otherwise contradicts the hypothesis that an affixed form necessarily requires longer duration to draw. The current study proposes the irregularity may be caused by confounding variables, such as fatigue and task habituation, which the experimental design failed to control. The participants might experience fatigue or habituation as they carried out 12 rounds of repetitive task. In consequence, the drawing task became less engaged or less cognitively demanding due to the increased familiarity and imageability. The mixed results call for a more meticulous experimental control and more direct evidence of grammatical influence.

Interestingly, the partial significant results in Experiment 1 showed that several affixed forms yielded no effect on drawing duration (e.g., *pembatas, perbatasan, berbatas, membatasi, membataskan,* and *dibataskan*). Individual variation in the way participants visualized their interpretation pertained the non-significant results in *pembatas, perbatasan,* and *berbatas*. For

membatasi, membataskan, and *dibataskan*, the participants might have defaulted to simpler or quicker sketch to express the different interpretation.

The Experiment 2 found overall non-significant result. This implies that the participants spent consistent duration in drawing their interpretation of the base form and the affixed forms. One could reflect that the consistency does not necessarily imply that the affixed forms were not construed differently. The lexical form *tumbuh* conceptually entails temporal aspect in growth process. On the other hand, the affixed form *tumbuhan* pertains conceptual reification that changes the latter with plant as an object. The affixed form *penumbuh* reconceptualizes the lexical form, adding agentive or instrumental sense. Intuitively, the conceptual reification pertains to the other affixed forms, which generally resonates with Talmy's (2000) account and, in the Indonesian context, aligns with the view of Muwaffaq & Visiaty (2023). Although the result of Experiment 2 cannot support the views, the partial significant result in Experiment 1 finds it unlikely that grammatical or morphological elements are meaningless—as other studies have come forth with evidence for those views (see Zwaan et al., 2004; Kaschak et al., 2006; Papafragou et al., 2008; Flecken, 2011; Athanasopoulos & Bylund 2012; Montero-Melis & Bylund, 2017; Huette et al., 2014).

In Experiment 3, our study found significant difference across adjectival forms such as suggested by the statistical test. However, the consistency of such effect cannot be confirmed due to the variability in response times. The latter is suggested by the result of sphericity violation test. The result of pairwise comparison test also failed to confirm the effect of affixations on drawing duration of adjective-based and affixed forms. In other words, the effect of affixation appears to bear little to no effect on drawing duration. The discrepancy between positive generic and pairwise results arguably exemplifies an effect of construal that is less salient at pairwise test. This might point to another weak spot to the experimental design.

The experimental method used in this study measured construal indirectly. Drawing duration indicates the length of time spent by the participants in completing the task, which is not straightforward in capturing the underlying cognitive process during construal. The partial significant result affirms a longer time spent by participants to draw grammatically derived lexical forms against the base lexical. Importantly, the non-significant results may imply unanticipated confounding variables in the experiment design, and a call for improvements in future studies.

The current experiment reinforces the thesis that grammar is conceptualization, in which grammatical elements are inherently meaningful in a schematic sense and correspond with lexical elements to construct meaning in the minds of language users. This taps into Talmy's (2000) framework of grammatical and lexical subsystems which constitute the lexicon-grammar continuum in language meaning-making. The shift in construal, particularly as revealed by the results of Experiment 1, illustrates the construction of meaning as shaped by affixation. In Muwaffaq & Visiaty's (2023) terms, affixations are the pairing of grammatical particles or morpheme with lexical particle (e.g., [*pem*-]batas[-an]).

Additionally, one can speculate that the frequency of the base form and the affixed forms plays interfering role to the way participants construe and draw their interpretation. Thus, the more frequent a given form is, the faster the drawing duration. In other words, participants draw faster because the lexical forms are well-recognized. Such hypothetical view is possible, although the current study cannot conclusively confirm it. However, this already hints a suggestion for future studies.

It should be emphasized that the indirect measure used is justified considering the limited resources in the current study. Regardless of the mixed results, the indirect measured allowed the current study to offer insights that are deriving from objective and empirical observation. Comparably, pre-existing studies about cognition and language structure of Indonesian are limited to corpus-illustrated approach (see (Mardiah, 2021; Muwaffaq et al., 2021; Muwaffaq & Visiaty, 2023; Nasrullah & Budiman, 2022; Zulkarnen & Muwaffaq, 2018). The current study can also be considered an attempt to introspection overuse criticism (Dabrowska, 2016; Divjak et al., 2016; Geeraerts, 2016; Schmid, 2016).

Given the circumstantial nature of drawing duration as a measure of construal, one may question whether participants' familiarity with the drawing equipment interfered with their drawing times. Some participants also reported that using a computer mouse for drawing posed a challenge. While this concern is valid, participants were not required to produce detailed drawings and were given the freedom to express their interpretations in any manner. Therefore, although technical constraints may have introduced some interference, they are unlikely to have substantially hindered participants' performance. In any case, future studies could address this issue by providing more user-friendly digital drawing tools and recruiting participants with greater drawing proficiency.

Another possibility is that participants may engage with aesthetic intent rather than conceptual processing, thus leading to a more aesthetically pleasing drawing than conceptual accuracy. This possibility cannot be ruled out despite participants were informed that the drawing task did not count for correctness nor aesthetic, nor there was any scoring for the images they produced. Given the possibility, the aesthetic intent is unlikely to cause bias in the data since it would affect the lexical forms randomly. Nevertheless, the current study acknowledges that the aesthetic drive cannot be ruled out completely. Future studies can anticipate this limitation by specifying the procedure into a speed-focus task.

Another critical point regards the experiment within-participant design and the fixed order of stimuli presentation. The design may have habituated or exhausted participants with the tasks. This might have interrupted participants response time. This issue can be anticipated by randomizing the order of stimuli presentation or applying between-participant design. Future studies can also refine the method by altering the measured variables that are more straightforward to construal (for example, the number of clicks or strokes, matching or judging the stimuli, or verbal description). The current study used lexical expression for experimental stimuli. A replication with sentential stimuli may also improve the experiment as it would stimulate participants into construing a complete scene. Provided with more resources, it is suggested to use instruments that can observe cognitive process directly (for example, EEG, fMRI, or eye-tracking device).

Another limitation needs evaluation, particularly regarding the technical issues with the audio recording of the exit interview. The recording quality hindered systematic analysis of participants' verbal report about the experience of doing interview and the interpretation of lexical stimuli. Consequently, the setback limits the discussion without account to participants report and rests solely on the measured data. Future studies should use proper equipment and device for recording structured interview, which would be useful for evidence triangulation.

Our study referred frequency as one of several criteria for selecting stimuli. While it might be tempting to explore the possible correspondences between frequency and construal, the design of current study would be limited to provide theoretically grounded analysis. Given that drawing

duration is an indirect index of construal that could be influenced by frequency, testing that relationship falls beyond the present scope. Future studies are suggested to anticipate the question more directly.

CONCLUSION

The current study is an initial attempt to experimentally investigate the relation between Indonesian grammatical elements and construal. It offers empirical support to pre-existing studies in similar vein. It also adds support to the framework of Cognitive Linguistics in general. Scholars who put their interest with language and meaning making can refer and replicate the current study to gain broader knowledge.

Grounded on the Cognitive Semantics framework, the current study offers initial partial experimental evidence that Indonesian grammatical affixation influences construal. The use of a drawing task to indirectly measure construal complexity reveals that a number of noun-based lexical forms partially produced longer drawing durations in comparison to the base form—therefore providing empirical support for the view that grammatical elements structure meaning. The verb-based stimuli yielded insignificant effect, whereas the adjective-based stimuli showed only a limited effect, suggesting unanticipated category-specific constraints in the way grammatical elements correspond with conceptual structure.

The partial significant findings in the current study provides preliminary support for the view that: grammatical elements are inherently meaningful, and they add schematic meaning which is readily combined with the content meaning of the lexical. However, as the design excluded semantically related or unrelated lexical forms, future studies are suggested to control semantically related and unrelated forms to isolate grammatical effects in the test. In that way, the measured effect can be attributed more confidently to the effect of affixation than semantic association. However, the current study underscores the relation between grammatical elements of Indonesian in structuring speakers' mental representations, rather than merely syntactic markers or rules. It also calls for future studies in the area with refined methods to shed more light on the nature of Indonesian grammar and meaning-making.

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