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Measuring complexity of the objects of the verb *give* across English varieties: a study of constituent length and dependency distance

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Abstract: Drawing data from the International Corpus of English, this study investigates the complexity of direct objects (DOs) and indirect objects (IOs) of the verb *give* in Hong Kong English (HKE), Indian English (IndE) and British English (BrE) based on two metrics: length and dependency distance (DD). The findings are as follows: (1) DOs in HKE and IndE are shorter or structurally simpler than those in BrE, potentially due to second language acquisition simplification strategies, object pronominality and language contact effects. (2) The lack of a significant difference in IO length across the three English varieties may be attributed to the pronominality of IOs. However, IndE exhibits a significantly greater DD of IOs compared to HKE and BrE, likely due to differences in complementation pattern preferences. (3) The DD of DOs and IOs in the three English varieties remains within a certain range, which may reflect the "principle of least effort" in human language use. Moreover, DOs are longer and exhibit a greater DD than IOs, a difference that may be attributed to the pronominality of objects and the proportion of adjacent dependencies. This study introduces DD as a feasible metric for studying world Englishes.

Keywords: varieties of English; complexity; length; dependency distance; ditransitive verb

1 Introduction

With the global spread of English, stable and distinct varieties emerged. While initially developing through colonial expansion, these varieties gradually evolved unique linguistic forms and structures through language contact in diverse cultural and geographical contexts (Kachru 1985).

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Extensive studies have examined the lexical and syntactic features of specific words across various English varieties, revealing notable differences in the complementation patterns of different ditransitive verbs (Hundt and Gut 2012; Mukherjee and Schilk 2008; Schneider 2023). Among these studies, the verb *give* has been an essential focus. Previous studies have primarily investigated its frequency, collocation and complementation patterns (Ai and You 2015; Mukherjee and Hoffmann 2006; Schilk 2011). Meanwhile, many studies have explored various driving factors that may affect the dative alternation, such as definiteness, discourse accessibility, pronominality, animacy, length and semantic class (Bresnan et al. 2007; Callies and Szczesniak 2008; Collins 1995). The verb *give* typically occurs in four complementation patterns: ditransitive, *to*-dative, monotransitive and phrasal. Current studies reveal distinct preferences for these patterns. For example, in Indian English, monotransitive patterns occur more frequently than ditransitive and *to*-dative patterns. In contrast to Indian English, British English exhibits a greater preference for ditransitive patterns over both *to*-dative and monotransitive patterns. Moreover, *to*-dative patterns occur more frequently in Indian English than in British English (Mukherjee 2004; Mukherjee and Hoffmann 2006).

To some extent, the preferences for complementation patterns of the verb *give* in different English varieties reflect the ordering preference of the same structural constituent. Length is a key factor in constituent ordering in English, as shorter elements generally precede longer ones (Behaghel 1909). Studies have also found that length and complexity affect constituent ordering in the sentence. The longer and less complex constituents tend to appear at the end of the sentence, while relatively shorter and simpler components tend to be in the initial part of the sentence (Wang and Liu 2014). Studies have consistently shown that length significantly influences dative alternation (Röthlisberger 2023; Schilk et al. 2013; Szmrecsanyi et al. 2017). As a quantifiable metric, length is widely used to measure complexity (Arnold et al. 2000; Szmrecsanyi 2004). Xu (2016) investigated the length of objects in *give* ditransitive constructions among Chinese English learners and found that even advanced learners produced shorter direct objects than native English speakers, suggesting an incomplete convergence with native norms. However, few studies have further examined the complexity of each constituent of the *give* constructions across different English varieties. Therefore, the present study focuses on the complexity of the objects of the verb *give*.[1] In addition to length, this study introduces dependency distance (DD) as another complexity measure. While DD has been widely applied in linguistics studies (Liu et al. 2009; Sinnemäki and Haakana 2023), few studies have employed it to compare complexity across English varieties. Therefore, this study

1 In the following text, 'the objects of the verb *give*' will be referred to as '*give* objects' for brevity.

provides a novel methodological approach for analyzing the complexity of the *give* objects across English varieties through the integration of length and DD.

Based on the International Corpus of English (ICE), the present study investigates the complexity of *give* objects across Hong Kong English (HKE), Indian English (IndE) and British English (BrE). We focus on the verb *give* for two reasons: (1) it is a typical and frequently used ditransitive verb in English, and (2) studies have found varying preferences in its complementation patterns across different English varieties. However, comparative analyses of the complexity of *give* objects in HKE, IndE and BrE remain limited. This study thus examines similarities and differences in the complexity of direct objects (DOs) and indirect objects (IOs) across different English varieties.

Moreover, this study is grounded in the theoretical framework of World Englishes, specifically Kachru's (1985) "Three Circles of English" model, which categorizes English varieties into the Inner, Outer and Expanding Circles based on their historical, social, and functional contexts. In other words, English as a native language and second language has traditionally been categorized with the Inner and Outer Circles of English, respectively (Kachru 1992). Previous studies have examined the complexity of various linguistic structures across different English varieties (Brunner 2014; Collins 2023; Markus 2020), revealing similarities and differences among English varieties from the Inner, Outer and Expanding Circles. BrE is a typical Inner Circle English variety, serving as a foundational linguistic and cultural model of English. In contrast, HKE and IndE belong to the Outer Circle, where English was introduced through colonization and has since developed distinctive linguistic features influenced by local languages and cultures. Therefore, it is plausible that Inner and Outer Circle English varieties exhibit similarities and differences in the complexity of *give* objects. Based on this, this study compares the complexity of *give* objects across HKE, IndE and BrE.

The following section reviews existing studies on *give* constructions, followed by a description of the data, analytical methods, and metrics in Section 3. Section 4 presents the results and discussion. Section 5 concludes the study with directions for further research.

2 Previous research

Lexical and syntactic features have long been a focus in World Englishes research, with particular attention paid to ditransitive verbs, collocations and complementation patterns. In general, studies on *give* constructions in English varieties have mainly focused on two key aspects: (1) the investigation of complementation patterns across varieties, and (2) the exploration of factors influencing pattern selection.

Previous studies have examined the frequency and complementation patterns of the verb *give* across various English varieties. For instance, Mukherjee and Hoffmann (2006) compared IndE and BrE and found that IndE prefers the monotransitive pattern, whereas BrE favors the ditransitive pattern. In addition, comparative studies of *give* complementation patterns in South Asian varieties and BrE have revealed no significant effect of regional background on dative alternation (Bernaisch et al. 2014). Furthermore, Ai and You (2015) examined the complementation patterns of verb *give* in Chinese English and found significant differences between Chinese English and Indian English. These findings underscore varying degrees of preference for the complementation patterns of ditransitive verbs across English varieties, highlighting the distinctive characteristics of ditransitive constructions in World Englishes.

Moreover, studies have investigated the syntactic and semantic features of direct and indirect objects in *give* constructions, as well as how these features influence pattern selection (Röthlisberger et al. 2017; Röthlisberger 2018). Bresnan and Hay (2008) investigated the effect of animacy on the syntax of *give* in New Zealand and American English, finding that New Zealand English speakers appeared to be more sensitive to the role of animacy. Other studies have explored the effect of length and pronominality of objects on the pattern selection of *give* in British, Indian and Pakistani English (Schilk et al. 2013). Szmrecsanyi et al. (2017) further analyzed statistically significant differences in the effect size of length, recipient pronominality and semantics of the verb *give* in a spoken dataset. These findings suggest that the length of objects, as a metric of complexity, plays a crucial role in the pattern selection for the verb *give*. However, previous studies have also found that different English varieties exhibit distinct preferences for the complementation patterns of ditransitive constructions. Based on this, the present study hypothesizes that common and distinct features may exist in the complexity of the direct objects (DOs) and indirect objects (IOs) of the verb *give* in different complementation patterns across various English varieties.

Quantifying linguistic complexity requires reliable metrics. Length is a frequently employed measure of syntactic complexity, defined as the number of words in a given structure (Wasow 2002). In addition, this study introduces DD in *Dependency Grammar* as an alternative metric for capturing complexity. Psycholinguistics research suggests that human language processing is constrained by working memory capacity, which refers to the amount of stored information activated in the human brain when processing language (Baddeley 1992). Therefore, applying a scientifically valid and reliable metric to measure the difficulty of language processing and comprehension is essential. DD in *Dependency Grammar* is suitable for this purpose, as it reflects the processing difficulty in different syntactic

structures and can thus capture the complexity of *give* objects across English varieties.

Dependency Grammar is a grammatical framework that describes the structure of natural language. According to this theory, words are not of equal status in a sentence. Instead, words form governor-dependent relationships, where one word (the governor) governs the other (the dependent) (Liu 2008; Tesnière 1959). DD is a key metric in *Dependency Grammar*, which refers to the linear distance between a governor and its dependent (Liu 2008). In recent years, *Dependency Grammar and DD* have been widely applied in syntactic analysis, and studies have shown DD is effective in capturing linguistics complexity across languages (Agmon et al. 2024; Liu et al. 2017). The reasons for using DD as the complexity metric in this study are as follows. First, DD is grounded in linguistically interpreted syntactic analysis and thus serves as a reliable and precise metric of syntactic structure (Liu 2008). Second, DD correlates with the cognitive difficulty of syntactic processing, as it reflects the load imposed on working memory during language comprehension (Jiang and Liu 2015). Specifically, higher DD values indicate greater cognitive demands, as they require more working memory capacity and increasing the difficulty of syntactic processing (Lu et al. 2016). Thus, DD provides a practical and empirically validated measure for assessing syntactic processing difficulty across different English varieties.

This study aims to investigate the complexity of *give* objects across different English varieties through the analysis of length and DD, as these two metrics offer complementary insights into complexity from distinct perspectives. Length focuses on the inherent characteristics of sentence components, such as the number of words within a phrase, providing a direct measure of structural complexity. On the other hand, DD quantifies the syntactic dependency relations between words, reflecting the cognitive load involved in processing these dependencies.

To illustrate how these two metrics complement each other, consider the following pair of *give* constructions: *I give you a ring*/*I give a ring to you*. The DO *a ring* in both sentences consists of two words, indicating equivalent complexity based on length alone. However, when examined through the lens of DD, notable differences emerge. In the first example, the DD of the DO is 3, as the intervening pronoun *you* increases the linear distance between the verb *give* and its DO *ring*. In contrast, in the second example, the DD of the DO is 2, reflecting a more compact syntactic structure with a closer dependency between *give* and *ring*. After the verb *give* appears in the first example, two words need to be stored in the human brain before the DO *ring* can be recognized. Compared to the second example, the first example has a longer matching process, thus consuming more working memory capacity and increasing processing difficulty. These distinctions highlight that while length provides a straightforward measure of structural complexity, DD offers a deeper understanding of different constructions' complexity and cognitive processing demands. Therefore,

both metrics are incorporated in this study to provide a more comprehensive assessment of the complexity of *give* objects across English varieties.

The present study does not aim to investigate the predictability of the variables in dative alternation but to explore the complexity of the *give* objects across English varieties. To this end, length and DD are employed to examine the complexity of the *give* objects in HKE and IndE, with comparisons drawn to BrE. The present study aims to address the following research questions:

(1) What is the complexity of DOs of the verb *give* across HKE, IndE and BrE?
(2) What is the complexity of IOs of the verb *give* across HKE, IndE and BrE?
(3) What are the common and distinct features of objects' complexity of the verb *give* in HKE, IndE and BrE?

This study investigates the complexity of the *give* objects across different English varieties, aiming to contribute to a broader understanding of the similarities and differences in language structures across English varieties worldwide.

3 Methodology

This section provides information on the corpus data, the data processing procedures and the metrics employed in the present study.

3.1 Corpus data

This study draws on written text data from the Hong Kong, Indian and British components of the ICE. Initiated in 1990, the ICE project aims to collect materials on English varieties for comparative studies of English worldwide. Each ICE corpus comprises approximately one million words, with written texts accounting for 40 % of the total data. The construction of each sub-corpus adheres to a standardized design (Greenbaum 1996), ensuring comparability across different English varieties. Further details about the ICE project are available at www.ice-corpora.uzh.ch/en.html.

3.2 Data processing

AntConc 3.2.4 was employed to extract sentences containing the verb *give* and its inflected forms (e.g., *gave*, *given*, *giving*, *gives*) from each of the three corpora. Since this study focuses on the syntactic features of the verb *give*, sentences containing

phrasal structure with *give* (e.g., *give in*, *give up*, *give away*, *give out*, etc.) were manually excluded. In addition, sentences where *give* functions as a preposition, as illustrated in example (1), were also excluded. Four hundred sentences were randomly selected from each corpus to ensure a balanced comparison across the three English varieties, forming the HKE, IndE, and BrE datasets.

(1) *Given the fact that when applied appropriately, it does not pose toxiological hazards, is clean and less energy consuming than other preservation methods.* (ICE-IND:W2B-035#99:1)

Each sentence containing the verb *give* was manually analyzed and coded according to the classification framework of complementation patterns proposed by Mukherjee and Hoffmann (2006). Three argument roles (e.g., the "agent" = X, the "recipient" = Y, the "patient" = Z) are involved in a *give* construction with the "ditransitive meaning" of "X causes Y to receive Z" (Mukherjee and Hoffmann 2006). "Y" was labeled as an indirect object (IO) and "Z" was labeled as a direct object (DO). Ditransitive, to-dative and monotransitive patterns are the three main constructions of the verb *give*. The ditransitive pattern, which contains DO and IO, is considered the prototypical complementation pattern of *give*, as illustrated in example (2). In the *to*-dative pattern, the IO appears in the *to*-phrase structure and follows the DO, as shown in example (3). The monotransitive pattern lacks the IO, as exemplified in (4). These three patterns can occur in both active and passive voice structures.

(2) *Sir, I will give you*$_{\text{IO}}$ *money*$_{\text{DO}}$. (ICE-IND:W2F-018#64:1)

(3) *I gave my card*$_{\text{DO}}$ *to Aunt Ellen*$_{\text{IO}}$ *when she went back to hongkong*. (ICE-HK:W1B-012#212:6)

(4) *A few of such items*$_{\text{DO}}$ *are given below*. (ICE-IND:W2A-013#23:1)

Finally, the software SPSS 20 was employed to examine the differences in length and DD across the three English varieties. Given the non-normal distribution of the data, the Kruskal-Wallis and Mann-Whitney U tests were conducted. The Kruskal-Wallis test was used to compare differences among more than two data groups, while the Mann-Whitney U test was applied for pairwise comparison between two groups.

3.3 Metrics

This study adopts length and DD as metrics of complexity. Previous studies investigating the length of grammatical constituents have predominantly employed word

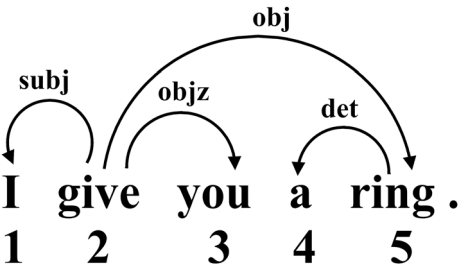

Figure 1: Dependency structure of *I give you a ring*.

count as a metric (Ai and You 2015; Brunner 2014; Xu 2016). Therefore, to ensure comparability with existing literature and methodological consistency, word count was used to measure the length of DOs and IOs.

In addition, this study adopts DD as a measure of complexity, focusing on the dependency relations between words within a sentence. Dependency relations are generally characterized as binary, asymmetrical and labeled (Hudson 2007; Liu 2008). Specifically, each governor and its dependent are connected by an arc that explicitly indicates the type of dependency relation (e.g., *obj* for the direct object, *objz* for the indirect object).

In this study, the syntactic dependency trees of sentences containing *give* are constructed based on the dependency relation attributes, and a directed acyclic graph is used to represent the syntactic dependency structure. Figure 1 illustrates the dependency structure of the sentence "*I give you a ring*".

Figure 1 shows the directed arc from the governor to the dependent. For instance, the verb *give* governs the noun *ring* with a direct object dependency relation (obj) and the pronoun *you* with an indirect object dependency relation (objz).

The calculation of DD is based on the linear distance between the governor and the dependent, computed as the absolute difference between the governor's and the dependent's numerical positions in a sentence (Heringer et al. 1980; Hudson 1995; Liu 2008). For example, in Figure 1, the verb *give* governs the noun *ring*, forming a direct object dependency relation (obj) with a DD value of |2–5|, which equals 3. The verb *give* also governs the pronoun *you* to form an indirect object dependency relation (objz) with a DD value of |2–3|, which equals 1. In addition, the DO in Figure 1 is *a ring*, with a length of 2, while the IO is *you*, with a length of 1.

Likewise, this calculation method can be applied to *to*-dative, monotransitive and passive structures. In example (3),[2] the verb *give* governs the noun *card*, forming a direct object dependency relation (obj) with a DD value of |2–4|, which equals 2. The

2 (3) I gave my card_{DO} to Aunt Ellen_{IO} when she went back to hongkong.

verb *give* also governs the pronoun *Ellen* to form an indirect object dependency relation (objz) with a DD value of |2–7|, which equals 5. Moreover, example (4) is a monotransitive pattern in the passive voice. In example (4),[3] the verb *give* governs the noun *items*, forming a direct object dependency relation (obj) with a DD value of |7–5|, which equals 2.

4 Results and discussion

Before conducting a detailed analysis of length and DD, we first investigate the complementation patterns of the verb *give* in HKE, IndE, and BrE, as presented in Table 1.

Table 1 indicates that monotransitive patterns are more frequently used in IndE, while ditransitive patterns are preferred in BrE and HKE. This finding is consistent with previous research results (Ai and You 2015; Mukherjee and Hoffmann 2006). However, it is worth noting that Ai and You (2015) found a much higher frequency of ditransitive patterns in Chinese English, accounting for 71 %. In contrast, the current study finds that the proportion of ditransitive patterns in HKE is less than 50 %. This discrepancy may be attributed to differences in corpus compositions. Ai and You's (2015) data were drawn from an online forum in China, with contributors from diverse regional backgrounds, whereas this study focuses exclusively on HKE. Our results show that HKE and BrE exhibit comparable preferences for the complementation patterns of *give*. In the following section, this study investigates the length and DD of the DOs and IOs across different complementation patterns of *give* in HKE, IndE and BrE.

Table 1: Distribution of complementation patterns of the verb *give* across HKE, IndE, and BrE.

Type	HKE		IndE		BrE	
	Freq	%	Freq	%	Freq	%
Ditransitive	192	48.00 %	128	32.00 %	180	45.00 %
To-dative	92	23.00 %	110	27.50 %	75	18.75 %
Monotransitive	111	27.75 %	159	39.75 %	138	34.50 %
Others	5	1.25 %	3	0.75 %	7	1.75 %
Total	400	100.00 %	400	100.00 %	400	100.00 %

3 (4) A few of such items_{DO} are given below.

4.1 The complexity of DO in *give* construction

This study employs length and DD as two metrics to examine the complexity of the *give* objects across English varieties. Next, we discuss the length and DD of the *give* objects in different complementation patterns, respectively.

4.1.1 The DO length in *give* construction

We calculated the average length of DOs[4] in different complementation patterns of the verb *give* in three English varieties. The results are shown in Table 2.

Table 2 reveals notable differences in DO length across the three English varieties and complementation patterns. In the ditransitive pattern, BrE exhibits the longest DO length, whereas in the *to*-dative and monotransitive patterns, IndE has the longest DO length. Additionally, across all three varieties, DOs in the ditransitive pattern tend to be longer than those in the *to*-dative pattern. Overall, BrE has the longest DO length. The Kruskal-Wallis test and the Mann-Whitney U test were conducted to examine whether there is a significant difference in DO length across the three English varieties, followed by Post hoc tests. *H* and *p*-values are presented for Kruskal-Wallis test reports, while *Z* and *p*-values are presented for Mann-Whitney U test reports. The results are as follows.

First, there is a significant difference in DO length in the ditransitive pattern across the three English varieties ($H = 21.141$, $p < 0.01$). Post hoc tests indicate that DO length in BrE is significantly greater than that in HKE (Adj.$p < 0.01$) and IndE (Adj.$p < 0.01$), while no significant difference is observed between HKE and IndE

Table 2: DO length in different *give* complementation patterns across HKE, IndE, and BrE.[a]

Type	HKE	IndE	BrE
Ditransitive	4.13	4.93	6.24
To-dative	1.95	2.16	1.8
Monotransitive	4.19	5.56	4.88
Total	3.64	4.42	4.91

[a]The total data is not the average of the sum of each complementation pattern data in Tables 2–5 but the average of all length and DD data.

4 In the following text, 'average length of DOs' or 'average length of IOs' is hereafter referred to as 'DO length' or 'IO length' for brevity.

(Adj.p = 1 > 0.05). These findings suggest that, in the ditransitive pattern, HKE and IndE speakers tend to use shorter and simpler DOs than BrE speakers.

Second, in the *to*-dative pattern, no significant difference in DO length was detected across the three English varieties (H = 4.086, p = 0.13 > 0.05), suggesting comparable lengths between HKE, IndE and BrE. Moreover, in the monotransitive pattern, a significant difference in DO length was observed across the three English varieties (H = 11.728, p = 0.03 < 0.05). Post hoc tests revealed that DO length in HKE is significantly shorter than in BrE (Adj.p = 0.028 < 0.05) and IndE (Adj.p = 0.003 < 0.01), while there is no significant difference in DO length between BrE and IndE (Adj.p = 1 > 0.05).

Overall, a statistically significant difference in DO length was observed among the three English varieties (H = 16.333, p < 0.01). Specifically, HKE exhibits significantly shorter DOs compared to BrE (Adj.p < 0.01), whereas no significant differences were found between BrE and IndE (Adj.p = 0.144 > 0.05) or between HKE and IndE (Adj.p = 0.115 > 0.05).[5] These results suggest that DOs in HKE are generally shorter and simpler than those in BrE, indicating a structural distinction in DO length between the two varieties. Previous studies have identified shorter DO lengths in Chinese English learners' ditransitive pattern of *give* compared to native English speakers (Xu 2016). The present findings align with previous studies, showing that the DO length of *give* in HKE is also significantly shorter than that in BrE, which may indicate that DO length in HKE has not yet reached native English proficiency levels. Finally, DOs in the ditransitive pattern are significantly longer than those in the *to*-dative pattern across the three English varieties (HKE: Z = −8.07, p < 0.01; IndE: Z = −7.289, p < 0.01; BrE: Z = −9.633, p < 0.01).

4.1.2 The DD of DO in *give* construction

We further calculated the average DD[6] of DOs in the *give* construction across the three English varieties. The results are shown in Table 3.

Table 3 shows that HKE exhibits the highest DD of DOs in the ditransitive pattern. In contrast, IndE shows the highest DD of DOs in the *to*-dative and monotransitive patterns. Meanwhile, across all three English varieties, the DD of DOs in the ditransitive pattern is greater than that in the *to*-dative pattern. Overall, HKE has the highest DD of DOs.

The statistical test results are as follows. First, there is a significant difference in the DD of DOs in the ditransitive pattern across the three English varieties (H = 8.459,

5 The observed results are not contradictory but reflect the interplay between effect sizes, variability, and statistical power.

6 In the following text, 'DD' refers to 'average DD' for brevity.

Table 3: DD of DOs in different *give* complementation patterns across HKE, IndE, and BrE.

Type	HKE	IndE	BrE
Ditransitive	3.59	3.15	3.5
To-dative	1.8	1.92	1.88
Monotransitive	3.1	3.31	2.86
Total	3.04	2.87	2.97

p = 0.015 < 0.05). Post hoc tests indicate that the DD of DOs in IndE is significantly lower than that in HKE (Adj.p = 0.02 < 0.05) and BrE (Adj.p = 0.043 < 0.05). No significant difference was observed in the DD of DOs between HKE and BrE (Adj.p = 1 > 0.05).

Second, no significant differences in the DD of the DOs were found in either the *to*-dative or monotransitive patterns across the three English varieties (*to*-dative patterns: H = 1.61, p = 0.447 > 0.05; monotransitive patterns: H = 0.991, p = 0.609 > 0.05). Overall, a significant difference in the DD of the DOs was observed across the three English varieties (H = 10.566, p = 0.005 < 0.01). Specifically, HKE and BrE exhibit significantly longer DD of DOs than IndE (HKE: Adj.p = 0.046 < 0.05; BrE: Adj.p = 0.006 < 0.05), with no significant difference between HKE and BrE (Adj.p = 1 > 0.05). Finally, the DD of DOs in the ditransitive pattern is significantly larger than that in the *to*-dative pattern across all three English varieties (HKE: Z = −9.518, p < 0.01; IndE: Z = −8.101, p < 0.01; BrE: Z = −8.732, p < 0.01).

4.1.3 Discussion

The following findings can be summarized based on the data presented in Tables 2 and 3. First, the DO length in the ditransitive pattern is shorter in HKE and IndE compared to BrE. Meanwhile, the DO length in the monotransitive pattern is shorter in HKE compared to BrE. These findings suggest that the DO length in the ditransitive pattern in HKE and IndE and the DO length in the monotransitive pattern in HKE have not reached the level of native English speakers, reflecting simplification features. This tendency toward simplification is often attributed to the "universal laws of ontogenetic second language acquisition" (Schneider 2007: 89). Both HKE and IndE are postcolonial English varieties, and it has been claimed that these varieties tend to use simpler structures compared to local varieties, such as simpler noun phrase structures (Brunner 2014). Consistently, our study also found that HKE and IndE tend to use simpler nouns or noun phrases than BrE because DOs are always nouns or noun phrases (as shown in Table 6). Moreover, in

speech communities such as those in India and Hong Kong, English functions as a second language alongside local languages and is typically acquired later in life. In these multilingual settings, simplicity plays a crucial role in selecting syntactic structure. This perspective aligns with Second Language Acquisition research findings, where measures of noun phrase complexity are widely acknowledged. For example, the frequency of 'complex nominals'[7] has been identified as a key metric of progress among Chinese learners of English as a foreign language (Lu 2010). Therefore, the preference for shorter DOs in different complementation patterns in HKE and IndE likely reflects a common simplification strategy in the second language acquisition process.

In addition, the DO length in HKE is significantly shorter than that in IndE and BrE, while there is no significant difference between IndE and BrE. Based on Schneider's (2007) Dynamic Model, we attempt to explain why DO length in HKE does not reach the native-speaker level, while that in IndE does. The Dynamic Model divides the development process of postcolonial English varieties into five stages. According to this model, HKE is in phase 3, referred to as the nativization phase (Schneider 2007: 135). During this phase, the English language undergoes significant changes in vocabulary, pronunciation and grammar, which reflect the transformation of the local society in politics, culture and identity. Eventually, the languages of the immigrant and local groups gradually converge to form a unique localized English variety (Schneider 2007: 40–48). In contrast, IndE appears to have entered the early stages of phase 4, known as the endonormative stabilization phase (Schneider 2007: 171). During this phase, the local English variety becomes increasingly standardized and forms stable language norms. English has become an important symbol of national or regional identity (Schneider 2007: 48–52). Compared to Hong Kong, English is more widely used in education, media and daily life in India, providing Indian English learners with greater English input and exposure. This high frequency of exposure may facilitate deeper acquisition and internalization of English structures, potentially explaining why the DO length in IndE has reached the level of native speakers.

Second, the DD of DOs in the ditransitive pattern in IndE is significantly smaller than that in HKE and BrE. This difference may be influenced by the pronominality of IOs in the ditransitive pattern. Therefore, we separately analyzed the pronominality of IOs in the ditransitive pattern across the three English varieties. The results revealed that the proportion of IOs being pronouns is higher in IndE (67.19 %) than that in HKE (55.21 %) and BrE (58.33 %). This tendency contributes to the smaller DD

7 Complex nominals are defined as NPs involving '(i) nouns plus adjective, possessive, prepositional phrase, relative clause, participle, or appositive, (ii) nominal clauses and (iii) gerunds and infinitives in subject position' (Lu 2010: 483).

of DOs in the ditransitive pattern in IndE. Since pronouns are typically single-word elements, their use as IOs reduces the DD between the verb *give* and the DO, resulting in a smaller DD of DOs in IndE. For instance, the DO length in examples (5), (6) and (7) is 2. However, in IndE, the IO is a pronoun with a length of only 1, whereas in BrE and HKE, the IOs are noun phrases with lengths of 2 and 3, respectively. Consequently, the longer IOs in BrE and HKE increase the distance between the verb *give* and the DO, leading to a longer DD of DOs compared to IndE. Based on this, the DD of DOs in ditransitive patterns is smaller in IndE than that in HKE and BrE because IndE prefers pronouns as IOs, which shortens the distance between the verb *give* and the DO. The bolded part in the examples represents DO, and the underlined part represents IO.

(5) *Mr Macleod said he would give the legislative council* ***specific proposals*** *after the summer recess.*
(ICE-HK:W2C-005#10:1)

(6) *Please give this matter* ***your attention***.
(ICE-GB:W1B-026)

(7) *Once you pay the amount, i will give you* ***the keys***.
(ICE-IND:W2F-015#176:1)

Finally, some consistent and divergent findings are observed through a comparison of the length and DD of DOs. Consistently, no significant differences are observed in either the length or DD of DOs in the *to*-dative pattern among HKE, IndE and BrE. Moreover, the length and DD of DOs in the *to*-dative pattern are shorter and smaller than those in the ditransitive pattern among the three English varieties. This finding supports the tendency for shorter and structurally simpler constituents to be at the front (Wang and Liu 2014). Inconsistently, Table 2 indicates that the DO length in HKE is significantly shorter than that in BrE, indicating a noticeable deviation from native English usage regarding DO length. However, the DD of DOs in HKE is significantly larger than that in IndE but does not differ significantly from BrE. This variation is influenced by the pronominality of IOs in the ditransitive pattern. Except for the ditransitive pattern, no significant differences are found in the DD of DOs in the monotransitive and *to*-dative patterns across three English varieties. As previously discussed, the proportion of IOs being pronouns is lower in HKE (55.21 %) and BrE (58.33 %) compared to IndE (67.19 %). Consequently, the verb *give* is positioned farther from its DO in HKE and BrE, increasing the DD of DO. Examples (5), (6), and (7) are typical manifestations of this phenomenon.

Moreover, in the monotransitive pattern, the DO length in HKE is shorter than that in IndE and BrE. However, no differences are found in the DD of DOs in the monotransitive pattern across the three English varieties. This finding may be

attributed to the nouns or noun phrases used in the monotransitive pattern. Noun phrases (NPs) can be classified into the following four types: none, prem, post, and prem + post (Haan 1993: 86). The most basic noun phrases consist solely of a head without any modifiers (type 'none', such as 'books'). NPs with one or several pre-modifiers are filed under 'prem' (such as 'a beautiful book'). NPs in the category 'post', have one or several postmodifiers (such as 'a book that I bought yesterday'). Finally, NPs that include both pre- and postmodified are categorized as 'prem + post' (such as 'some beautiful books that I bought yesterday'). We hypothesize that IndE and BrE speakers use NPs with postmodifiers more frequently in monotransitive patterns than HKE speakers. This preference may account for the longer DO length observed in IndE and BrE compared to HKE, despite no difference in the DD of DOs across the three English varieties. To test this hypothesis, we analyzed the types of NPs used as DOs within monotransitive patterns across the three English varieties. The results show that the frequency of NPs containing postmodifiers is higher in IndE (29.56 %) and BrE (28.99 %) than that in HKE (18.02 %). This finding suggests that the greater use of postmodified NPs in IndE and BrE contributes to the longer length of DOs in these varieties. For instance, the following sentences are typical examples. The bolded part is DO. In examples (8), (9) and (10), their DOs are *synopsis*, *outline,* and *guideline*, respectively, and their DDs are all 3. However, their DO lengths are different (6, 11, and 4, respectively). Although the DD of DOs in HKE is the same as in IndE and BrE (e.g., 3), the DO length in HKE is shorter than that in IndE and BrE. Therefore, we conclude that IndE and BrE speakers tend to use more postmidified NPs as DOs in monotransitive patterns than HKE speakers. This usage results in longer DO lengths in IndE and BrE, even though the DD of DOs remains comparable across all three varieties.

(8) *Please give **a brief synopsis of your work**.*
(ICE-IND:W1B-005#73:1)

(9) *It is necessary to give **a brief outline of how coastal sand dunes form and evolve**.*
(ICE-GB:W1B-026)

(10) *He never gave **a general guideline**.*
(ICE-HK:W2A-004#128:1)

In the next section, this study further explores the complexity of IOs across HKE, IndE and BrE, shedding light on how the complexity of objects varies in various complementation patterns across these varieties.

4.2 The complexity of IO in *give* construction

We analyzed the length and DD of IOs in the different complementation patterns of the verb *give* across three English varieties. Since the monotransitive pattern lacks an IO, this study only considered the length and DD of IOs in the ditransitive and *to*-dative patterns.

4.2.1 The IO length in *give* construction

The study calculated the IO length in different complementation patterns of the verb *give* across the three English varieties. The results are presented in Table 4.

Table 4: IO length in different *give* complementation patterns across HKE, IndE, and BrE.

Type	HKE	IndE	BrE
Ditransitive	1.57	1.48	1.53
To-dative	3.29	3.61	3.89
Total	2.13	2.46	2.22

Table 4 shows that the IO length in the ditransitive and *to*-dative patterns is around 1 and 3 for the three English varieties, respectively. Overall, the IO length across all patterns is around 2, with little difference in the values. However, it is noteworthy that the IO length in the *to*-dative pattern tends to be longer than that in the ditransitive pattern in all three English varieties.

Statistical test results indicate that there is no significant difference in the IO length among the three English varieties in either the ditransitive pattern ($H = 2.907$, $p = 0.234 > 0.05$) or the *to*-dative pattern ($H = 1.59$, $p = 0.451 > 0.05$). Xu (2016) also found no difference in the IO length of the verb *give* between Chinese English learners of varying second-language proficiency levels and native English speakers. Consistent with that, the findings of our study suggest that there is no difference in the IO length among the three English varieties ($H = 3.114$, $p = 0.211 > 0.05$), which shows that the IO length in HKE and IndE has reached the level of native English speakers. Moreover, it is worth mentioning that the IO length in the *to*-dative pattern is significantly greater than that in the ditransitive pattern across the three English varieties (HKE: $Z = -6.795$, $p < 0.01$; IndE: $Z = -9.054$, $p < 0.01$; BrE: $Z = -7.456$, $p < 0.01$).

4.2.2 The DD of IOs in *give* construction

Furthermore, we calculated the DD of IOs in different complementation patterns of the verb *give* across the three English varieties. The results are shown in Table 5.

Table 5: DD of IOs in different *give* complementation patterns across HKE, IndE, and BrE.

Type	HKE	IndE	BrE
Ditransitive	1.74	2.04	1.97
To-dative	4.47	5.18	4.64
Total	2.62	3.49	2.75

Table 5 indicates that, regardless of the ditransitive pattern, *to*-dative pattern or overall, the DD of IOs is highest in IndE. In addition, across all three English varieties, the DD of IOs in the *to*-dative pattern exceeds that observed in the ditransitive pattern.

Statistical test results reveal no significant difference in the DD of IOs for the ditransitive pattern among the three English varieties (H = 1.374, p = 0.503 > 0.05). However, there is a significant difference in the *to*-dative pattern among the three English varieties (H = 8.158, p = 0.017 < 0.05). The DD of IOs in BrE does not differ from that in HKE or IndE (HKE: Adj.p = 1 > 0.05; IndE: Adj.p = 0.064 > 0.05), but there is a significant difference in the DD of IOs between HKE and IndE (Adj.p = 0.036 < 0.05).

Overall, the DD of IOs significantly varies among the three English varieties (H = 13.018, p = 0.001 < 0.01). Post hoc tests show that the DD of IOs in IndE is significantly higher compared to both HKE (Adj.p = 0.003 < 0.01) and BrE (Adj.p = 0.007 < 0.01). At the same time, no significant difference is observed in the DD of IOs between HKE and BrE (Adj.p = 1 > 0.05). Consistent with observations regarding IO length, the DD of IOs in the *to*-dative pattern across the three English varieties is significantly greater than that in the ditransitive pattern (HKE: Z = –12.277, p < 0.01; IndE: Z = –11.831, p < 0.01; BrE: Z = –10.361, p < 0.01).

4.2.3 Discussion

Several conclusions can be drawn based on the results in Tables 4 and 5. Firstly, there is no significant difference in IO length among the three English varieties, which could be attributed to the pronominality of IOs. Therefore, we separately analyzed the pronominality of DOs and IOs in the three English varieties, and the results are shown in Table 6. As revealed in Table 6, the proportions of IOs being NPs and pronouns are comparable among the three English varieties, thus accounting for the observed similarities in IO length.

Second, the DD of IOs in IndE is significantly larger than that in HKE and BrE. According to Table 1, the *to*-dative pattern occurs more frequently in IndE (27.5 %) compared to HKE (23 %) and BrE (18.75 %). The preposition *to* increases the distance between the verb *give* and its IO, which may substantially contribute to the

Table 6: Pronominality of DOs and IOs across HKE, IndE, and BrE.

Object	Pronominality	HKE		IndE		BrE	
		Freq	%	Freq	%	Freq	%
DO	Pronoun	3	1.06 %	2	0.84 %	6	2.35 %
	NP	281	98.94 %	236	99.16 %	249	97.65 %
IO	Pronoun	123	43.31 %	96	40.34 %	113	44.31 %
	NP	161	56.69 %	142	59.66 %	142	55.69 %

significantly greater DD of IOs in IndE. Moreover, the length and DD of DOs in the *to*-dative pattern are greater than those in the ditransitive pattern among the three English varieties, indicating a tendency to place longer and more complex constituents at the final part of the sentence (Wang and Liu 2014).

Lastly, comparing the length and DD of IOs reveals consistent and inconsistent findings. Consistently, no significant differences are observed in the length and DD of IOs within the ditransitive pattern among HKE, IndE and BrE. Moreover, the length and DD of IOs in the ditransitive pattern are shorter and smaller than those in the *to*-dative pattern across the three English varieties, demonstrating that shorter and simpler constituents tend to precede longer and more complex ones (Wang and Liu 2014). Inconsistently, although IO length does not significantly differ across the three varieties, the DD of IOs in IndE is greater than that in HKE and BrE, which is influenced by the preference for using complementation patterns. There is no difference in DD in the ditransitive pattern among the three English varieties, but differences exist in the *to*-dative pattern. Table 1 shows that the frequency of the *to*-dative pattern in IndE (27.5 %) is higher than that in HKE (23 %) and BrE (18.75 %). Therefore, the preposition *to* increases the distance between the verb *give* and its IO, resulting in the longer DD of IOs in IndE.

In summary, the DOs and IOs of the verb *give* in the three English varieties demonstrate both shared and distinctive characteristics regarding length and DD. Therefore, the following section further examines the relationship between the length and DD of DOs and IOs in the *give* construction across the three English varieties.

4.3 Relationship between the complexity of DOs and IOs in the *give* construction

Length and DD measure the complexity of syntactic structures from different perspectives. Based on the above analysis, some similarities and differences can be

observed in the length and DD of DOs and IOs in the *give* construction across the three English varieties.

4.3.1 Common features in the complexity of DOs and IOs in the *give* construction

Regarding the similarities, first, Tables 5 and 6 show that the length and DD of DOs and IOs in the *give* construction across the three English varieties fall within a certain threshold, with the length constrained to a maximum of 7 and DD not exceeding 6. Prior research has shown that human cognitive processing capacity is limited to approximately 7 ± 2 units, mainly influenced by short-term memory constraints (Miller 1956). Therefore, this study demonstrates that the length and DD of DOs and IOs in the *give* construction across the three English varieties are restricted within a certain range due to the constraints imposed by language grammar and cognitive mechanisms.

Second, regardless of whether the construction follows a ditransitive, *to*-dative, or monotransitive pattern, the DD of DOs and IOs in the three English varieties conforms to the "principle of least effort" in language processing. DD is limited to this threshold under the constraints of grammar and working memory (Liu et al. 2017). Dependency distance minimization (DDM) is the specific manifestation of this cognitive mechanism. To further examine the tendency of DDM in the *give* construction, we analyzed the distribution of DD of DOs and IOs in HKE, IndE and BrE. The results are shown in Figure 2.

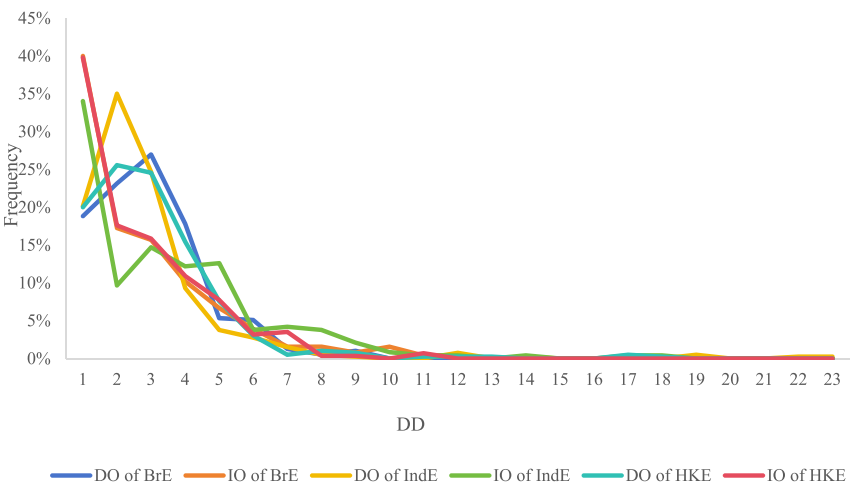

Figure 2: Distribution of DD of DOs and IOs across HKE, IndE, and BrE.

Figure 2 illustrates that the distribution of DD of DOs and IOs in the three English varieties all exhibits the characteristics of a "long tail", reflecting a tendency to minimize DD. This tendency is related to the human language processing mechanism and the "principle of least effort" in language processing (Zipf 1949). Based on an analysis of DD in 20 languages, Liu (2008) found that human language has a tendency of DDM limited by working memory capacity. The findings of the present study indicate that the internal structures of different language varieties also exhibit a tendency of DDM.

Furthermore, Figure 2 indicates that when the DD exceeds 10, the maximum proportion of the DD of DOs and IOs in the three English varieties remains only about 2 %. This finding suggests that humans tend to avoid long-distance dependency relations when using language. This result confirms that DDM manifests the influence of human cognitive mechanisms and the "principle of least effort" on the syntactic structure (Liu et al. 2017). Additionally, previous research has found that during sentence processing, words are continuously stored in the human brain's working memory (Gibson 2000). The retrieval and integration of two related words within a sentence impose a cognitive cost on working memory, with longer dependency distances requiring greater cognitive resources. For example, the DD of IOs in examples (2)[8] and (3)[9] are 1 and 4, respectively. After the verb *give* appears in example (3), three words need to be temporarily stored in the human brain before the IO is identified. Compared with example (2), example (3) involves a longer matching process, thus consuming more working memory capacity and increasing the difficulty of syntactic processing. Therefore, constrained by working memory capacity and cognitive load, humans tend to choose language structures that are easier to understand and process, specifically those with smaller DD. This cognitive mechanism shapes language production, promoting a general tendency of DDM and, over time, contributing to stable syntactic patterns. From a psychological and biological perspective, this study suggests that the tendency of DDM in languages serves as an adaptive strategy to ensure effective communication, highlighting the interaction between cognitive constraints and syntactic organization.

4.3.2 Distinct features in the complexity of DOs and IOs in the *give* construction

As for the differences, first, the length of IOs is shorter than that of DOs in the three English varieties (HKE: $Z = -9.542$, $p < 0.01$; IndE: $Z = -8.756$, $p < 0.01$; BrE: $Z = -11.215$, $p < 0.01$), which could be attributed to the pronominality of DOs and IOs. Table 6 shows that the proportion of pronouns functioning as IOs (HKE: 43.31 %, IndE:

8 Example (2): *Sir, i will give you*$_{IO}$ *money*$_{DO}$.

9 Example (3): *I gave my card*$_{DO}$ *to Aunt Ellen*$_{IO}$ *when she went back to hongkong*.

40.34 %, BrE: 44.31 %) is much higher than that of pronouns functioning as DOs (HKE: 1.06 %, IndE: 0.84 %, BrE: 2.35 %) across the three English varieties, with DOs mainly consisting of nouns or noun phrases. Since pronouns are typically single-word units, this study suggests that the pronominality of IOs contributes to their shorter length. Meanwhile, based on the data in Table 6, the proportion of nouns or noun phrases serving as DOs in HKE is roughly comparable to that in IndE and BrE. However, as shown in Table 2, the DO length in HKE is significantly shorter than that in IndE and BrE. This finding suggests that, compared with IndE and BrE, HKE exhibits a stronger tendency toward using shorter and structurally simpler nouns or noun phrases as DOs.

Second, within the ditransitive pattern, the DO length is significantly longer than that of IO across the three English varieties (HKE: $Z = -12.904$, $p < 0.01$; IndE: $Z = -11.289$, $p < 0.01$; BrE: $Z = -11.828$, $p < 0.01$). In contrast, in the *to*-dative pattern, DOs are significantly shorter than IOs (HKE: $Z = -3.172$, $p = 0.002 < 0.01$; IndE: $Z = -4.218$, $p < 0.01$; BrE: $Z = -3.559$, $p < 0.01$). This finding aligns with previous research results showing that the ditransitive pattern is more frequently used when the DO is longer than the IO, whereas the *to*-dative pattern is preferred when the DO is shorter than the IO (Bresnan et al. 2007; Kendall et al. 2011; Schilk et al. 2013). This phenomenon also follows the "principle of end-weight" in human language (Quirk et al. 1972: 943), which posits that longer constituents tend to appear after shorter constituents in a sentence (Arnold et al. 2000). Examples (11) and (12) are typical manifestations of this phenomenon. The bolded part indicates the DO and the underlined part indicates the IO.

(11) *I would like to give <u>you</u>* ***an idea about university of Calgary***. (ICE-HK:W1B-001#67:3)

(12) *He never wanted to give* ***pain*** *to <u>both the ladies</u>*. (ICE-IND:W1A-018#47:1)

Third, the DD of DOs across the three English varieties is significantly greater than that of IOs. This difference is likely influenced by the proportion of adjacent dependencies (DD = 1). As illustrated in Figure 2, the distribution of DD of 1 for IOs in the three English varieties is approximately twice that for DOs. The proportion of adjacent dependencies is negatively correlated with the mean DD of the entire sentence and even the entire language (Liu 2008). In other words, the higher the frequency of adjacent words, the smaller the mean DD. In addition, the DD of IOs in IndE is significantly greater than that in HKE and BrE because the proportion of DD greater than 3 for IOs in IndE is approximately more than twice that in HKE and BrE. The higher the proportion of longer DD, the greater the mean DD.

5 Conclusions

Drawing on the ICE, this study examines the complexity of DOs and IOs in the *give* construction through two key metrics: length and DD. While length directly reflects syntactic complexity, DD captures the complexity of syntactic relationships by measuring the difficulty of word matching within a sentence. Using these two metrics, this study comprehensively analyzes the complexity of DOs and IOs in *give* construction across different English varieties.

There are three key findings. First, the DO length in HKE is shorter than that in IndE and BrE, while the DD of DOs in IndE is shorter than that in HKE and BrE. This phenomenon may be influenced by simplification strategies in second language acquisition, language contact and the pronominality of DOs. Moreover, the results show no difference in IO length among the three English varieties, as pronouns predominantly represented IOs. This result further indicates that nouns and noun phrases used as IOs in the three English varieties tend to be shorter and simpler. However, the DD of IOs in IndE is greater than that in HKE and BrE, which can be attributed to the higher frequency of *to*-dative patterns used in IndE. Finally, some common and distinct features exist in the complexity of DOs and IOs. On the one hand, the DD of DOs and IOs across the three English varieties demonstrates a tendency of DDM, consistent with the "principle of least effort" in human language. As a metric for measuring syntactic complexity, DD reflects the constraints imposed by human cognitive mechanisms on syntactic structures (Ferrer-i-Cancho 2004, 2014), limiting DD within a certain threshold. On the other hand, both the length and DD of DOs are greater than those of IOs, which are influenced by the pronominality of objects and the proportion of adjacent dependencies.

In the field of World Englishes, this study provides a novel perspective on the complexity of different English varieties. Although this study only focuses on the verb *give*, the findings provide insights into the complexity of specific language structures across English varieties. The *give* construction is an important language structure in English, and the syntactic features of its objects warrant further investigation within the domain of World Englishes. Meanwhile, this study contributes to the research methodology by incorporating DD from *Dependency Grammar*, demonstrating its effectiveness as a metric for measuring syntactic complexity. This approach also highlights the relevance of psychological, cognitive and working memory factors in syntactic analysis (Heringer et al. 1980; Hudson 1995; Liu 2007). Finally, future research can further investigate the syntactic features of objects in ditransitive constructions, building upon the findings of this study to explore additional dimensions of linguistic complexity.

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