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An Analysis on Newly Introduced English Verb in Oxford English Dictionary in 2016-2018: Levin's Taxonomy of Verb Classification and Verbnet

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Abstract

Levin (1993) argues that the behaviour of verbs is determined by word meaning which is directly linked to the expression and interpretation of its argument. Based on this statement, Levin classified verbs into 48 classes and VerbNet, an English verb lexicon was created based on the extension of Levin's taxonomy of verb classification (VC). Therefore, this study presents the classification of the updated English verbs of 2016 to 2018 in the online version of the Oxford English Dictionary (OED) to examine the relevance of Levin's VC and VerbNet in the recently added repertoire of verbs. In Addition, the study seeks to find out the new verb classes introduced in this study. This study uses a mixed method to identify and classify the verbs. To conclude, this study found that both classifications were applicable and relevant in 14 new main verb classes introduced to classify the verbs that did not belong to Levin's VC and VerbNet. Hence, this contributes to the body of knowledge as the newly introduced verb classes could be used based on the given semantic and syntactic conditions.

Keywords: *Levin's taxonomy of verb classification; VerbNet; Verb classification*

1.0 Introduction

One of the elements of English language grammar is parts of speech (POS). POS is also known as word classes (McIntyre, 2007). In English, there are four main POS that can receive new words which include the noun, verb, adjective and adverb. This study focuses specifically on verbs. One characteristic of the verb is that it is classifiable. Verbs are classified to show the micro-differences among other verbs with similar or clustered meaning (Korhonen, 2004). Also, a verb's syntactic structure carries its semantic information. This is because verbs are affirmative which means that their condition should always agree with the syntax structure (Seifi, 2012). Hence, the semantic element (meaning) will reflect the syntactic element of the verb. In classifying verbs, the semantic and syntactic elements are gathered and analysed using alternations (Levin, 1993).

Based on the reading, it could be concluded that these newly added verbs could be updated as a new word or entity (the new form of a word) and word sense (an existing form of the word that acquires new meaning) (Haspelmath & Sims, 2010). Oxford University Press (n.d.) mentioned that new words or word senses are identified and compiled from the speech habits of a community. They are later reviewed and edited by dictionary authors (Berg, n.d., as cited in Zgusta, 1971). Following this, the words and word senses have to undergo an additional process into the OED which is automated by a generator. As this study focused on

classifying verbs, only the newly updated verbs in the OED are selected to be classified. They are classified using two main verb classifications in this field: Levin's taxonomy of verb classification (VC) and VerbNet. This is to investigate the applicability of the classifications and to introduce new verb classes. The latter was done to classify the verbs that do not belong in Levin's VC and VerbNet. Also, only the verbs ranging from 2016 to 2018 are referred to in this study because the verbs are the most recently included in the OED.

Several scholars have worked on verb classifications. Among them are Levin, Jackendoff, Dorr, Korhonen, Briscoe, Ryant, Kipper, Dang, Schuler and Palmer (Levin, 1993; Dorr & Olsen, 2018; Dorr, 1997; Korhonen and Briscoe, 2004; Kipper, Korhonen, Ryant, & Palmer, 2006; Kipper, Dang, Schuler, and Palmer, 2000; and Kipper, 2005). Nonetheless, most of these scholars focused on the verbs involved in the natural language process. Natural language processing (NLP) is a system for computers to comprehend human language instead of coding (Khurana, Koli, Khatter, & Singh, 2017). As not all, the newly added verbs from OED are not applied in the NLP task (verbs were extracted from the dictionary which does not specify for NLP), this study aims to investigate the applicability of Levin's VC and VerbNet. Hence, this study was done by classifying the newly updated verbs of 2016 to 2018 in OED using Levin's VC and VerbNet.This study helps to determine the new classes involved to classify the newly updated verbs that do not belong to Levin's VC and VerbNet. The new classes could serve as a guide for future reference to classify novel verbs that will be updated in OED. This contributes to the field of verb classification by extending the current list on Levin's VC and VerbNet.

1.1 Research Questions

There are two research objectives in this study which are:

1. What is the applicability of Levin's taxonomy of verb classification (VC) and VerbNet to newly-introduced English verbs in 2016-2018 in the Oxford English Dictionary (OED)?
2. What are the new verb classes for a newly introduced word in OED that cannot be classified using Levin's taxonomy of verb classification (VC) and VerbNet?

2.0 Literature Review

Word classes or parts of speech are very important in the English language because of their grammatical functions. According to Jurafsky and Martin (2018), there are eight major word classes which are noun (e.g., generalisation), verb (e.g., put), adjective (e.g., beautiful), pronoun (e.g., he), preposition (e.g., against), adverb (e.g., slowly), conjunction (e.g., if), and article (e.g., the). Nonetheless, (Haspelmath, 2001) added two classes to the list; numerals (e.g., thrice) and interjection (e.g., um). Word classification is an innate or mental ability of the human to classify words based on established criteria. For example, "a word that denotes a

person, place or thing is a noun" (Aarts & Haegeman, 2008, pg. 118). However, if a word takes after the properties of another word class, it shall be assigned to another class (Smith, 2015).

In this study, the content word that was focused on is the verb which plays a significant role in a sentence. A verb determines the role of a subject. It also acts as the main predicate for a sentence that dictates the syntactic structure (see Sun, Korhonen, & Krymolowski, 2008; Hwang & Kaiser, 2014; Khurana et al., 2017). Furthermore, verbs are very flexible in terms of changing their form. For example, affixes could be attached to a verb to change its tense, mood, aspect, polarity, valence-changing operation, and subject/object arguments (Haspelmath, 2001). In addition, Moro, Raganato, and Navigli (2014) reported that verbs are troponymy. Troponymy is a hierarchical semantic relationship that connects verbs that are from one source (Bailey, 2008). This relationship among verbs resulted in verb classification (Mill, 1846 as cited in Fillmore, 1985). For example, take as a verb is a troponym of getting as the former brings more specific meaning. Thus, in a verb class, the take verb is located under the get verb. Navarretta (1999) asserted that a group of verbs that are semantically related is considered as a group. Based on the reading, many previous works focus on verb classification because of the verb's properties. Hence, it can be concluded that verbs can be classified based on their semantic and syntactic properties.

There are several purposes for verb classification. Firstly, verbs' behaviours among the members of a verb class could be compared (Fillmore, 1970 as cited in Jurafsky, 2014). Thus, the ambiguity between verbs could be lessened (Kipper, 2005). Secondly, the semantic or syntactic descriptions of verbs can distinguish them from other members of the class (J. Li & Brew, 2008). This would complement the information and behaviours for their operational context (Kipper et al., 2006). Furthermore, verb classification is important as it could enhance NLP tasks and applications (Korhonen & Briscoe, 2004). Examples of NLP tasks and application are (i) semantic role labelling (Swier & Stevenson, 2004; Giuglea & Moschitti, 2006 as cited in Vulić, Mrkšić, & Korhonen, 2017), (ii) semantic parsing (Shi & Mihalcea, 2005), (iii) word sense disambiguation (Brown, Dligach, & Palmer, 2011). The last two NLP applications studies were cited in Abend, Reichart, and Rappoport (2008) which are (iv) Machine Translation (Dorr, 1997) and (v) Document Classification (Klavans & Kan, 1998).

The first element in classifying a verb is semantic behaviour. Semantic behaviour is "meaning components or elements of words" (Vulic et al., 2017, p.3). This element emphasises verb definition, thematic roles, and restrictions (Klebanov et al., 2016). Braasch (2008) listed three basic steps in grouping the verbs using semantic components.

The second element of classifying a verb is syntactic alternation. Kilgarriff (n.d., p. 213) explained that syntactic alternation is the shared pattern by a group of words that share a similar relationship of senses. The term syntactic alternation is also referred to as morpho-syntactic behaviour (Pinker, 1989; Jackendoff, 1990; Levin, 1993, as cited in Kipper et al., 2006). This element covers two types of alternations; (i) transitivity and

(ii) diathesis (Klebanov et al., 2016). However, an analysis by Boas (2011) on Levin's VC build verb found that several members of the verb class possessed irregular behaviour and one of them does not occur in one alternation suggested by Levin. This has conflicted with White et al.'s view (2012.) where they suggested that syntactic structure can inform the semantic behaviour of a verb. Thus, the inability to perform certain syntactic alternations by several members of the build verb has reduced the predictive power of classification.

An additional element in verb classification relates to computational technology. Computer technology has resulted in the automatic classification of verbs which became an extensively studied area (see for instance Navaretta, 1999, Joanis & Stevenson, 2003, Swift, 2005, Li and Brew, 2008, Abend et al., 2008, Sun, Korhonen, & Krymolowski, 2008; Klebanov 2016, and Vulic et al., 2017) These studies demonstrated how verbs could be generated automatically from a given corpus while investigating the accuracy of auto-generated software in classifying verbs. On the other hand, scholars such as Hatzivassiloglou and McKeown (1993 as cited in Navarrette, 1999), Levin (1993 as cited in Korhonen and Briscoe, 2004), Oishi and Matsumoto (1997 as cited in Joanis and Stevenson, 2003), Kipper (2005), Loper, Yi, and Palmer (2007), Das, Chen, Martins, Schneider, and Smith (2014) etc. have classified verbs semi-automatically. Computational technology has facilitated linguists in exploring data as compared to manual classification with fewer problems, particularly in the case of verb classification. Korhonen (2002) asserted that accurate results from manual methods could be achieved but it is time-consuming because of the process of classifying the verbs one by one instead of generating them automatically. To conclude, there are many existing verb classifications and different methods available for use in classifying verbs. However, a few classifications will be referred to serve as the main reference in the verb classification field.

Theories and Frameworks of Verb Classification

There are many theories and frameworks in classifying verbs, especially in the English language. These classifications are the main references in the field of verb classification.

i) Vendler's Verb Classification

The earliest work on verb classification is the Vendler's verb class. Vendler adopted Aristotle's verb class and created two new classes (Verkuyl, 2002). It is a taxonomical-based classification where Vendler divided verbs into four aspectual-property class which include, For example, the usage of 'I am running' is relevant while 'I am knowing' is irrelevant. Hence, run verb and know verb were divided into different class (Kawamura, 1994). Vendler (1967) asserted that the verbs were classified based on time schemata. Time schemata refer to the performance (with or without endpoint) and the duration of the verb is performed. Based on the reading, the relationship of Vendler's verb classes is summarised in Table 1 below.

Table 1: Relationship between aspectual properties of verbs

Scalar		**Non-Scalar**
Continuous	Accomplishment	Activity
Punctual	Achievement	Stative

The performance of verbs with an endpoint is known as scalar (Tamm, 2012). Examples of scalar verbs include read, kill, find, and build while the non-scalar verbs include words like love, trust, and see. Table 1 shows the accomplishment and achievement words are scalar verbs while activity and stative words are non-scalar verbs. Kawamura (1994) reported another relationship between these properties which are continuity and punctuality. Continuity refers to the ability of verbs to occur progressively while punctuality is the ability of verbs to be used with a specific time.

i. Continuous:

They are pushing a cart. (activity) vs He is painting a house. (accomplishment)

ii. Punctual

I knew about her at noon sharp. (stative) vs I found her at 3 a.m.(achievement).

Nevertheless, Vendler (1957) noted differences betweencontinuity and punctuality members that occur in question form. The differences are shown as follows:

i. Activity:

For how long did they take to push the cart? versus *How long did they take to push the cart?

ii. Accomplishment:

*For how long did he take to paint a house? versus How long did he take to paint a house?

ii. Achievement:

At what time/ moment did you know about her? versus *For how long did you know about her?

v. Stative:

*At what time/moment did you love her? versus For how long did you love her?

*= Inappropriate version of the question.

Therefore, the verbs need to be identified into the four main classes. This is because the differences in semantic and syntax among the verbs could be further distinguished.

ii) Levin's Taxonomy of Verb Classification

Levin's VC is the largest of the verb classes in English. Levin (1993) mentioned that verbs are classified because more than one sense share the same meaning components. Both the semantic components and syntactical structure are considered under this classification (Kipper et al., 2006). Li and Brew (2008) stated that Levin classified verbs according to their related meaning and similar alternation ability within a given syntactic frame. This is because the syntactic alternations can reflect the semantic components which allow one verb to be distinguished from other verbs. For example, comparing bring and take a verb and get verb, only the former can perform dative alternation. This is because the preposition to does not involve getting the verb (Levin, 1993). Examples are as follows:

1. Dative alternation
   a. Bring and take verb

      Laila brought the key to Om vs Laila brought Om the key.

   b. Get verb

      *Mail bought a shirt for Pamela. vs. Mail brought Pamela a shirt.

Moreover, Joanis and Stevenson (2003) reported that Levin mapped the semantic arguments into syntactic positions which created a hierarchical pattern. Therefore, according to Levin (1993), this taxonomy has eight main syntactic alternations and 48 main verb classes. Table 2 presents a summary of Levin's theory based on discussions by Baker and Ruppenhofer (2002).

Table 2: Levin's theory summary
(Source: Baker and Ruppenhofer (2002)

Grouping	193 verb classes
Basis	Argument syntax
Data Source	Linguistics literature
Coverage	3100 verbs
Results	Verb classes and Alternation

Referring to Table 2, it is important to note that Baker and Ruppenhofer (2002) later concluded that Levin's VC was narrower and based on the semantic function of verbs. However, there is a discrepancy in the reporting of data for Levin's VC. For instance, Kipper and Boas (2011) report that Levin covered 3024 verbs instead of 3100 verbs while Dorr and Olsen (2018) report that Levin's VC consists of 192 verb classes instead of 193. As Levin's VC proved that semantics and syntax affect each other and are inter-related (Rosen, 1996), scholars adopt this verb classification as the main

reference for related studies (Schulte im Walde, 2000). This is because Levin's VC managed to reduce the redundancy of meaning across similar verbs and helped to generalise the methods of verb classification (Li & Brew, 2008). Levin had also motivated the automatic discovery of verb classes which contributed to the field of computational linguistics (Abend et al., 2008).

Examples of studies extended from Levin include (i) Dorr (1997) who classified 4432 verbs with approximately 11000 senses, (ii) Dang, Kipper, Palmer, and Rosenzweig (1998) who classified carry verb in Portuguese to be mapped in VerbNet (refer to Section 2.1.1.4.3), (iii) Dang, Kipper, and Palmer (2000) who reported explicit semantic and syntactic classification using Lexicalized Tree Adjoining Grammars which contributed towards the establishment of Natural Language Processing (NLP), (iv) Kipper et al. (2000) who managed to classify 5257 senses into 274 classes, and (v) Korhonen and Briscoe (2004) who added 57 novel verb classes and 106 diathesis alternations using verbs related to NLP. Following this study, (vi) Korhonen and Ryant (2005 added 53 novel classes (see discussions in Kipper et al., 2006). Also, Levin guided (vii) Rudenko (1996 as cited in Korhonen & Briscoe, 2004), sentential complement. Other examples include (viii) Lexical Conceptual Structure (LSC) (1997) database implementation and (ix) Sager's (1981) study on syntactic alternation. To conclude, Levin's VC is constantly extended indicating that it is still relevant to be used in classifying verbs in the present context.

iii) VerbNet

VerbNet is the largest computational verb lexicon with comprehensive semantic-syntactic properties (Kipper et al., 2006). It adapts Levin's hierarchical method to classify verbs by sorting them alphabetically and numerically (refer to VerbNet index website-https://verbs.colorado.edu/verb-index/). This is because the independent verb lexicon is an extended version of Levin with novel verbs, classes, descriptions, and information such as verb arguments and restrictions (Abend et al., 2008). In VerbNet, more than 5200 verbs are classified into 237 classes (Kipper, 2005; Pazienza, Pennacchiotti, & Zanzotta, 2006). Although VerbNet is highly associated with Levin's VC, the verbs are arranged according to their frame participation (Kipper, 2005). Verb frame or also known as verb subcategorisation frame (SCF) provides detailed information on verb syntactic preference (Lippincott, Ó Séaghdha, & Korhonen, 2012). For example, according to Schulte im Walde (2009), the verb bake could be followed by (i) direct object (e.g.: Elsa bakes a cake) and also (ii) indirect object (e.g.: Elsa bakes Tim a cake). However, it is not relevant to be followed by that clause (e.g.: Elsa bakes that she likes cake). Therefore, these thematic roles and restrictions are emphasised in VerbNet (Klebanov et al., 2016).

Kipper (2005) managed to merge two studies into VerbNet. The first study was Korhonen and Briscoe's (2004) 57 novel verb classes. The 55 novel classes managed to be fused into VerbNet with

slight alteration, nevertheless, 2 classes were rejected because of their homogeneity. Pazienza et al. (2006) elaborated that each verb in VerbNet is unambiguous. Thus, homogeneous verb classes should not be included in VerbNet. The second study merged into VerbNet was LSC. Kipper managed to incorporate only 426 entities out of 1266. This happened because of unmatched criteria of classes in VerbNet and LSC.

The development of VN cross-linguistic studies has been ongoing. Studies in languages other than English such as Spanish and Catalan (Aparicio, Taulé, & Martí, 2008), Mandarin (Liu & Chiang, 2008), French (Pradet, 2014 as cited in Vulić et al.,2017), and Polish (Majewska et al., 2017) were conducted to classify and map out the relevant verbs. The parallel behaviour patterns of morphosyntax (grammar) among the languages resulted in these cross-linguistic studies (Levin, 2013). Hence, the VerbNet framework is duplicated widely to be adapted as the linguistic criteria matched. To conclude, presently, Levin's VC and VerbNet are the main verb classifications in the English language. Therefore, these classifications could be used to classify new verbs.

Word (Verb) and Dictionary

Boas and Dux (2017) mentioned that all word class members are lexical units. This implies that a verb is a lexical unit of a word. Hence, this section discusses word and word meaning using verbs as examples further explaining their relationship within the dictionary.

Word and Word Sense

Online English Oxford Living Dictionaries defines word or entity as a "single distinct meaningful element of speech or writing used with others (sometimes alone) to form a sentence and typically shown with space on either side when written or printed". On the other hand, word sense is a different representation of one aspect of the definition of an entity (Jurafsky & Martin, 2018). For example, the verb give could carry the word senses of (i) free transfer of the possession of (something) to (someone) and also, (ii) cause or allow (someone or something) to have or experience (something). Thus, this shows that a word could have more than one word sense. According to Onion (1966 as cited in Kristó, 2004), Mattiello (2005) and (Lindén, 2004), existed word or entity could gain a new sense through extension and shift in the meaning of an existing form of a word. This could result in the extinction of the usage of former sense (Labov, 2001). However, Shahid (2002 as cited in Khan, Ayaz, & Faheem, 2016) asserted that there are no true synonyms. Additionally, Kilgariff (2003 as cited in Lindén, 2004) mentioned that thesaurus is a cluster of words with coherent meanings. For example, the verbs pull, drag, and rip are different even though the verbs can be used interchangeably in a suitable context.

This phenomenon (synonym) happened because of usage preference by people in a language where it resulted in lexicalisation that is usually caused by a semantic need (Lindén, 2004).

Factors of the Emergence of Novel Word and Word Sense

There are many reasons which contribute towards the addition of word and word sense in a language. Firstly, in the early 1980s, computational technology has contributed many novel senses to the existing entities. For instance, mouse, icon, virus, window, computer, cloud, and tablet were given new senses in this field. Secondly, Cooper (2005) listed a few factors that caused many words to receive new senses which are metaphors, metonyms, and figurative language. Additionally, slang and euphemism have also caused the addition of word and word sense (Cooper, 2005). An example of the latter can be seen through the use of 'to end his life instead of 'to kill'. Lastly, words and word senses are added in a time-saving manner can be seen in the use of shortened words and abbreviations. Next, Ayto (2006 as cited in Cook, Lau, Rundell, & Baldwin, 2013) and Labov (2001) stated that a word that adapted new sense mirrors the cultural changes in a particular society. In addition, Cook et. al. (2013) reported that the media is one of the biggest contributors to novel words and novel senses.

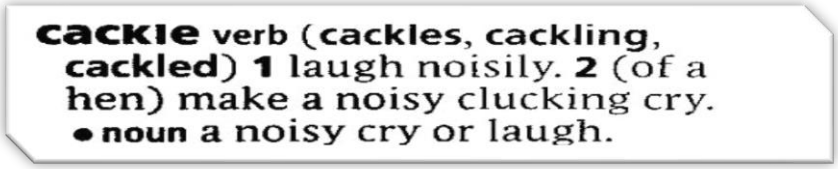
Lastly, Sim Monica and Pop Anamaria (2014) added short messages used on social media (Twitter) to the list. This new acquisition of a sense of words is known as a neologism. Neologism is defined as "a word, a term, or a phrase that has been recently created (or coined) often to apply to new concepts, to synthesize pre-existing concepts, or to make older terminology sound more contemporary" (Usevičs, 2013, p.1). There are three types of neologism: (i) the word or word sense is created by no previous etymon, (i) it is borrowed from another language and (iii) it is extracted from existed etyma (Cooper, 2005). For example, lol verb. Presently, the acronym lol for laughing out loud is used as a verb. It could also be used in sentences such as 'I lolled' or 'I was lolling'. This addition takes place because there is a need to fill in the gap or create a new item (word or word sense).

Ambiguity in Novel Word and Word Sense

One of the major problems in the emergence of new words is ambiguity. Apresjan (n.d.) stated that semantic structure is one of the factors for ambiguity. Meanwhile, Mattiello (2005) added obscurity and indeterminacy to the list. Obscurity is the difficulty of understanding the intended meaning while indeterminacy is the lack of sources in identifying the origin for word pronunciations. As a result, scholars such as Lakoff, Levin, And Pustejovsky face major difficulties in dividing and arranging senses (Kilgarrif, 1997). Despite the claim, classification of words conducted by Fillmore (1977), Levin, (1993), Korhonen and Briscoe (2004), and Kipper (2005) has helped in reducing the ambiguity among verbs with similar meaning. This eases the process of adding the words into the dictionary.

New word and Dictionary

Dictionary is an inventory for words that provides information such as definition and origin and contain words that are organised based on their word classes (see for instance Podhajecka, 2009; Hanks, 2013; and Dash, 2015). A detailed layout in the dictionary on the word cackle is provided below as an example:



(Extracted from Oxford English Dictionary Ninth Edition, 2014)

Zgusta (1971 as cited in Bergenholtz & Gouws, 2012) discussed the functions of the dictionary. They stated that the dictionary could help in preserving a language. For example, Estienne, a linguist in the 14th century managed to retain the origin of English words when compiling a dictionary (Hanks, 2013). Therefore, dictionary (i) functions as 19 a storehouse where it deposits information on different types of lexical items and (ii) acts as a courthouse that assists people to find words and meanings (Dash, 2015).

Development of Lexicography Practice

The earliest practise started in India by collecting unfamiliar words during the first millennium BC. While in West Asia, experts found word lists in cuneiform (Dash, 2015). China followed the practice of lexicography by producing one of the earliest thesauri and organised lexicons. Arya was compiled during the second to the third century (Karen Chung as cited in Apresjan, n.d.). Next, during the medieval period, in Persia, words were organised by syllable to ease poets (Hanks, 2013). However, later, in medieval Europe, words were sorted alphabetically (Murray, 1900; Castro (1991) & Hanks (2006) as cited in Hanks, 2013; Kramer, 2006; and Dash, 2015). This practice is widely used in the present context. For example, the senses of cackle (refer to the example in 2.2.2) are organised based on entity instead of separating the senses according to their word classes.

Contemporarily, computational technology has a big influence on lexicography. It is the birth of an online dictionary. Before the online dictionary claimed, printed dictionary compilation is a labour intensive field. Contrarily, as online dictionaries began using software, dictionaries could be updated regularly to include new materials (Rundell, 2016). For example, the OED website updates new words, senses, and sub-entries while Merriam-Webster Dictionary reviews words from various publications before updating their online dictionary. Li (2005) reported that in 1997, there were no less than 400 online dictionaries.

The online dictionary could be classified into two types; (i) traditional and (ii) modern. The former is managed by professional lexicographers and established companies. In contrast, the latter is a crowd-source website handled by non-professionals with examples Often collected via the internet (Nguyen, Mcgillivray, & Yasseri, 2018). Fišer and Čibej (2017) reported that crowd-sourced dictionaries require less effort and time because of task division. For example, the Urban Dictionary generated unfamiliar words and information automatically from the internet (Ni & Wang, 2017).

This is one of the significant differences between the usage of printed and online versions of dictionaries. Thus, words in printed dictionaries are limited compared to online dictionaries (Gouws, 2014). This might be the reason that motivates users to shift from conventional to computed dictionaries.

Novel Words and Senses in Dictionary

Computational lexicography improved the process of adding novel words and senses into the dictionary. Firstly, words and words senses could be generated from the internet. The existence of generators and software automatically select relevant data (word or word sense) to be included (Cook et al., 2013). For example, the ver decolonize was updated as a new verb into the OED watchlist before being revised and updated in June 2016. Sinclair (1985) and Lau et al. (2012) mentioned that the new method has been functioning to gather all citational evidence of words. For instance, OED traditional reading program (software) gathers evidence of the use of novel words or senses from the corpus and collects them (Hanks, 2013). Next, frequency from the database helps to identify which novel words or senses are used in the real context and determine the words to be included in dictionaries (Summers, 2005). Nevertheless, many modern lexicographers adapt Barnhart's computational technique to create a dictionary. For words, the database automatically sorted them in a logical order. While for senses, regardless of the frequency in corpora, the literal senses of a word are placed first followed by its metaphorical sense. Hence, it could be summarised from the readings that Oxford English Dictionary (OED) is one of the main dictionaries referred to as it regularly updates both; printed and online sources.

Dictionary for Specific Purposes

Novel words are words reviewed to be included in a suitable dictionary. This is because a dictionary may be designed for specific needs and users (Householder, 1967 as cited in Bergenholtz & Gouws, 2012). Thus, the words that fit the dictionary purpose would be added to the lexicon. For example, verbs related to legal jargon will not be included in a dictionary for school students.

Therefore, the dictionary would be comprehensive (Lew,2013) and user-friendly too since the content is more purposeful and user-specific (Hanks, 2013).

Current Study

Based on the readings above, verbs are classified to identify the micro-differences between them using theories and frameworks on verb classification. Also, the literature highlights that the main elements of verb classification are semantic and syntax. Therefore, semantic and syntactic elements of the verbs would be emphasised in classifying the verbs in this study. On the other hand, novel words that are updated in dictionaries have undergone many procedures (please refer to Oxford Dictionaries (2019) for details on these procedures). These words will be classified into dictionary according to their specific purpose. In this study, verbs were used as examples of novel words because this study relates to verb classification. The present study seeks to further investigate the applicability of Levin's VC to the newly introduced verbs in 2016 until 2018 that were updated quarterly in OED. Also, the study investigates the classes that are involved in classifying the verbs that do not belong in Levin's VC and VerbNet. It is important to study the relevance of Levin's taxonomy of verb classification and VerbNet on the newest verbs of English as both classifications are main references in verb classification studies.

3.0 Methodology

3.1 Research Design

This study follows a series of steps for data collection and data analysis. Firstly, newly updated verbs of 2016 to 2018 are extracted from OED official website (http://www.oed.com/). Secondly, the verbs were classified according to years. Next, the verbs were then classified according to Levin's VC. The verbs that do not belong to Levin's VC were classified according to VerbNet. Following this, the verbs that cannot be classified in both Levin's VC and VerbNet are assigned to new classes. Lastly, the data were tabulated.

The data for this study were the newly updated verbs of 2016 to 2018 on the OED official website. The website is updated quarterly on new words, new sub-entries and new senses. In this study, only new words verbs are used. The total of new verbs found is 185 entries in 2016, 2017 and 2018. The detailed number of verbs extracted in descending order are tabulated in Table 3.

Table 3: Number of newly updated verbs in 2016-2018 extracted from OED in descending order

Year	Month	Number of Verbs
2018	December	21
	September	26
	June	21
	January	24
2017	September	14
	June	9
	March	9
2016	December	20
	September	15
	June	19
	March	7
	Total	**185**

3.2 Data Collection

The official online website of OED (https://www.oed.com/) was visited to extract the verbs. Next, 'Updates to the OED' is searched to view the list of updates on a new word, sub-entries and senses for each year. Lastly, the verbs were extracted manually by establishing a set of criteria in this study which is as follows:

Criterion 1: The extracted verbs should be taken from 'new words'. This is because both the online and printed versions of OED do not explain the difference between senses and words, therefore, 'new word' is preferred to avoid inaccurate result from this study.

Figure 4: Categories of the new word list in OED

Based on Figure 4, the 'new word' category is selected to view all the newly updated verb in the category.

Criterion 2: The extracted verbs should be newly updated from 2016 to 2018. As this study is a small-scale investigation conducted manually, the verbs can be analysed thoroughly. These two years were selected as they were the most recent updates in OED at the time of the study.

Criterion 3: The examples of verbs used in context should be available online. This is to show the actual usage of context by the verb. Diagram 3.2 summarises the steps taken for data collection in this study.

- Visit the official website of OED (http://www.oed.com/)
- Search for 'Updates to OED'
- Extracted newly updated verbs
- Verbs from 'new word'
- Verbs of 2016 to 2018
- Examples of context used by the verb

3.3 Data Analysis

Step 1: Identifying verbs and their sentence

In this study, 185 verbs were identified, classified into a table, and attached with their definition and context. Both definition and context are important because the context shows the real usage of a word. For example, the word hammer can be both noun and verb. Only through its context of use, one may decide whether the hammer is a verb or a noun. This context is important to identify the verb's syntactic alternation ability. This was done to distinguish the verbs from the other verbs with similar semantic behaviour. Since the dictionary does not provide the context for all newly updated verbs, authentic contexts were searched for. In doing so, selected homepages such as Brigham Young University (BYU) corpus, social media and web pages were visited. The preference would be BYU corpus, followed by social media and lastly the internet for reliability purpose. Sentences containing such verbs were selected if only they met these criteria;

Criterion 1: The context should be used in a real situation. As it is evidence of the usage of novel verbs, the sentence should be genuine and used in the real context. Hence, scripts and subtitles were not used in this study.

Criterion 2: The meaning of context should not be ambiguous. This might cause problems in analysing the data. Hence, simple sentence structure is prioritised in choosing the sentence. Table 5 shows an example of the verb decolonize verb attached with its definition and context. This verb is accepted as it fits the selected criteria of this study.

Table 5: Classification of *decolonize* verb and its context

Coding	Word of Verb	Definition	Sentence	Status
1	Decolonize	To free or release a land	Spain seemed in no hurry to decolonize those lands. Source: English Oxford Living Dictionaries	Accepted

In this step, 19 verbs were dismissed from this study because they did not fit the selection criteria. The verbs were *downwrap, interparle, belve, afound, twine v.3, inthirl, scrip, sunket, teet, blonks, Mon, through-geng, wantrow, yo-heave-ho, laird, long, through-smite, screenge,* and *screeve*. For example, *blonks* verb is dismissed because it is widely used as a noun to be referred to K-pop fans that do not stan Blackpink, South Korean idol group as a whole. However, the usage of *blonks* as a verb is not available online. Hence, *blonks* verb was dismissed from this study. Table 6 shows *teet* verb and *blonks* verb and some of the relevant semantic and syntactic details. In the case of these two verbs, the classification was found to be incomplete as shown below:

Table 6: Incomplete classification of *teet* verb and *blonks* verb

Coding	Word Verb (Dictionary)	Definition	Sentence	Status
90	Teet	(The verb is used as a noun and adjective)	(i)Do it you're teets source: Urban Dictionary (ii) teet boy of the vale getting his nutrients like Tormund source: Twitter	Not Accepted
96	Blonks	To not stan Blackpink, South Korean idol group as a whole.	(Not found)	Not Accepted

The condition of *teet* verb is unacceptable in this study because in all the contexts gathered online, the word teet was only used as nouns and adjectives (please refer to Table 6 for examples of contexts). The word class of teet in the examples were determined through Tallerman's (2011) '*gap test'*. English speakers can conduct a gap test to know in which class a word belongs to by replacing the word in question with another word. In this test, only a word of a similar word class can be used to replace the word in question, i.e only a noun can replace a noun. Hence, if the word is not fit to fill in the gap, it does not belong in the same word class. In the sentence '*Do it you're teets'*, the word teets can be replaced with the word '*loser*'. The loser is a noun, therefore, teets in this context is also a noun. As there is not a single context of the word teet has been used as a verb can be found online or in the BYU corpus, this study dismissed teet verb.

Step 2: Classifying of verbs into Levin's VC and VerbNet

The verbs are later classified manually using Levin's VC and VerbNet. In this study, the verbs were classified based on their semantic and syntactic properties. The former was determined by the definitions and extracted sentences (meaning component based on real usage) and the latter was determined by the alternation ability of the verbs. In this study, Levin's VC was prioritised. Hence, all the verbs were classified using Levin's VC before using VerbNet. Table 7 tabulates downconvert verb classified using Levin's VC.

Table 7: Classification of *downconvert* verb using Levin's VC

Coding	Word Verb	Definition	Sentence	Levin's VC
4	Down convert	To convert (audio or video) form a higher quality or resolution to a lower one.	..the ability to downconvert the HD footage they shoot to SD	45.6 verbs of calibratable changes of state.

Secondly, the verbs that managed to be classified using Levin's VC, undergoes the alternation process according to the classification. For the alternation that is based on Levin's VC (1993), the extracted contexts were paraphrased to fit in Levin's sentence sample. Table 8 lists the top three alternations performed by Levin's Verbs of Calibratable Changes of State and its explanation. The examples are extracted from Levin's Verb Classification (1993, pg. 247). The asterisk symbol (*) shows that the verb is unable to perform the alternation.

Table 8: The top three alternations performed by Levin's Verbs of Calibratable Changes of State and its explanation:

No	Alternation	Explanation	Example
1	Possessor Subject Possessor-Attribute Factoring Alternation (intransitive)	The possessor might be expressed as the subject while the attribute is expressed using preposition (e.g.: in).	a. The price of oil soared. b. Oil soared in price.
2	Causative Alternations	The sentence of transitive verb can be changed to {cause to V-intransitive}.	a.The temperature soared. b.The heat soared the temperature

3	There-Insertion	to add 'there' at the beginning of a sentence.	* There-Insertion: a. Oil soared in price. b. * There soared oil in price.

Step 3: Identifying the remaining verbs

After classifying 142 verbs using Levin's VC and VerbNet, there remained 23 verbs that did not belong to both classifications. The verbs were later listed in a table. Table 9 shows examples of four verbs that could not be classified using Levin's VC and VerbNet.

Table 9: Example of verbs that cannot be classified using Levin's VC and VerbNet

Downcycle	Toyi-toyi
Bum-suck	Vox-pop

Step 4: Classifying of verbs that cannot be classified using Levin's VC and VerbNet

The identified verbs that could not be classified using Levin's VC and VerbNet were later tabulated. Next, the verbs were analysed and classified based on VerbNet semantic roles and alternation. If the verbs carried certain similar semantic elements of VerbNet, they were placed under VerbNet classes. However, if they were found not suitable, new classes were introduced based on VerbNet's semantic roles which create the syntax frames or alternation.

Step 5: Performing intercoder reliability test

After the data has been collected, a total of 166 verbs were classified into their respective classes and the intercoder reliability test was conducted. This step is conducted in three stages; pre-deliberation, during deliberation, and post-deliberation. In the first stage (pre-deliberation), two intercoder were briefly introduced to Levin's VC and VerbNet. They were provided with the verb classifications and verb lists. They later coded individually the verbs that fit into all the classifications given.

3.4 Reliability and Validity

Reliability and validity are important aspects of research. According to Altheide & Johnson (1994 as cited in Mohajan, 2017), "reliability is the stability of findings, while validity represents the truthfulness of findings" (pg. 1). In this study, reliability is achieved through an intercoder reliability procedure. It is a method where several diverse people within a similar field of expertise perform the similarities and differences check-in readings, interpretation, responses to, or uses of given text or data (Krippendorff, 2004). This is to ensure the quality of content analysis of a study and to avoid subjective bias that could be performed by the researcher (Burla et al., 2008). Such a procedure is important especially when there is a degree of subjectivity in the evaluation, coding or interpretation of data (Krippendorff, 2004).

Hence, this study involves five coders with a linguistics background which include the areas of morphology, semantics, and syntax. Therefore, any values of deliberation under 80% will be considered as unreliable.

4.0 Findings and Discussion

4.1 Levin's Taxonomy of Verb Classification and VerbNet applicability to newly introduced Eng- lish verbs in 2016 to 2018 of Oxford English Dictionary (OED).

Research Question 1 sought to investigate the applicability of Levin's VC in the newly updated English verbs in 2016 to 2018 in OED. In this study, out of 166 verbs investigated, 109 verbs are classified using Levin's VC, 34 verbs are classified using VerbNet and the remaining 23 verbs were classified into newly introduced verb classes. The percentage distribution of 166 verbs in their respective classes was calculated. It was found that 66% of the new verbs (N=109) managed to be classified under Levin's VC while 20% of them (N=34) were classified under VerbNet. Hence, the remaining verbs' percentage is 14% (N=23). Table 4.1 shows the percentage distribution of the newly updated verbs' verb classifications.

Table 4.1 Percentage distribution of the newly updated verbs' verb classifications

Verb Classification	Total Number of Verbs Involved (%)
Levin's taxonomy of verb classification	109 (66%)
VerbNet	34 (20%)
New verb classes	23 (14%)
Total	**166 (100%)**

4.2 Verbs classified using Levin's taxonomy of verb classification

Levin's VC managed to classify 109 newly updated verbs in 2016 to 2018 of OED. Based on this result, a few examples of verbs classified under Levin's VC were discussed. The first example is the verb *downconvert*. The verb was alternated using three alternations of Levin's Verbs of Calibratable Changes of States (Verb Class of 45.6). The three alternations include (i) Possessor Subject Possessor-Attribute Factoring alternation (intransitive), (ii) Causative alternation, and (iii) There insertion. *Downconvert* verb can perform all three alternations listed under Levin's VC of 45.6 and its semantic element relates to changes that could be gauged accurately. Therefore, the verb is classified in Levin's

VC of 45.6. This is because Li and Brew (2008) mentioned that verbs that are related semantically and possessed similar alternation ability could be classified under the same class of Levin's VC.

The second example is *bareback v*erb. This verb is classified under Levin's Verbs That Are Not Vehicle Names (51.4.2). In this verb class, Levin (1993) has noted that some members across the class cannot perform two of the alternations listed. Bareback verb is one of the members that cannot perform (i) Induced Action alternation and (ii) Locative Preposition Drop alternation. Although it cannot perform the alternation, *bareback* verb can still be classified under Levin's Class of 51.4.2. This is because if a member cannot perform an alternation and noted by Levin, it shall pass as a member of the verb class. In this study. This might be the reason for Levin's VC relevance as the main reference in the verb classification field even after more than two decades of implementation.

4.3 Verbs classified using VerbNet

After classifying 109 verbs, the remaining 58 verbs will be classified using VerbNet. However, out of 54 verbs, only 34 verbs manage to be classified using VerbNet. Verbs that were classified using VerbNet could also have more than one alternation. For example, *caw* verb under VerbNet's Manner of speaking (Verb Class of 37.3). This verb could be alternated using three syntax frames in the verb class which are: (i){Agent V {{+dest_dir}} Recipient}, (ii) {Agent V {about} Topic} and lastly, (iii) {Agent V Topic:}. This verb used the semantic role of 'Agent' as its subject because the subject – 'The boys' performed the action which affected another party. In addition, it includes the semantic role of 'Topic' as caw verb relates to the semantic element of the manner of speaking. Hence, it was classified in a sub-category of VerbNet's Communication (Verb class of 37) which is VerbNet's Verb Class of 37.3. This shows that the ability of a verb to perform the alternation depends on deep semantic similarities among the verbs (Li & Brew, 2008).

Thus, out of 166, 34 verbs were classified using VerbNet. All of these verbs were classified using the same method as presented and discussed above. Hence, for the first research question, it was concluded that Levin's VC and VerbNet are applicable to classify newly introduced English verbs in 2016 to 2018 of Oxford English Dictionary (OED). However, Levin's VC was able to classify the majority of Based on this result, a few examples of verbs classified under Levin's VC were discussed. The first example is the verb downconvert. The verb was alternated using three alternations of Levin's Verbs of Calibratable Changes of States (Verb Class of 45.6). The three alternations include (i) Possessor Subject Possessor-Attribute Factoring alternation (intransitive), (ii) Causative alternation, and (iii) There insertion. *Downconvert* verb can perform all three alternations listed under Levin's VC of 45.6 and its semantic element relates to changes that could be gauged accurately. Therefore, the verb is classified in Levin's VC of 45.6. This is because Li and Brew (2008) mentioned that verbs that are

related semantically and possessed similar alternation ability could be classified under the same class of Levin's VC.

The second example is *bareback* verb. This verb is classified under Levin's Verbs That Are Not Vehicle Names (51.4.2). In this verb class, Levin (1993) has noted that some members across the class cannot perform two of the alternations listed. Bareback verb is one of the members that cannot perform (i) Induced Action alternation and (ii) Locative Preposition Drop alternation. Although it cannot perform the alternation, *bareback* verb can still be classified under Levin's Class of 51.4.2. This is because if a member cannot perform an alternation and noted by Levin, it shall pass as a member of the verb class. In this study. This might be the reason for Levin's VC relevance as the main reference in the verb classification field even after more than two decades of implementation. This was supported by Levin and Rappaport (2013 in an interview as cited in Levin, 2013) that the best method to classify verbs would be Levin's taxonomy of verb classification. Also, this study summarises those verb alternations depending on the syntactic guidelines provided by the classifications. This was seen through the use of Levin's alternation and VerbNet syntax frame demonstrated in this study.

4.4 The new verb classes introduced to classify verbs that do not belong to Levin's taxonomy of verb classification and VerbNet.

According to Abend et al. (2008), VerbNet includes more descriptions and information on verb's arguments and restrictions in their syntax frame compared to Levin's VC. Therefore, it could be concluded that the syntax frame of VerbNet was relevant to classify new and additional verbs. To classify the remaining verbs, two important aspects from VerbNet were used. The aspects were semantic role and syntax frame. Hence, all the verbs were classified using these aspects. The first example could be observed through downcycle verb. It was found that the verb had similar semantic elements with VerbNet's Class of Other_cos-45.4. Hence,VerbNet's Verb Class of 45.4's semantic roles acted as a guideline for the new class and thus, created a new syntax frame for downcycle verb. The first syntax frame was {Agent V Patient}which was adopted from VerbNet's Verb Class of 45.4. This is because *downcycled* verb was able to perform the alternation. Kilgariff (n.d.) asserted that a verb is taxonomical, therefore, it shows how some similarities might exist between semantically clustered verbs.

On the other hand, 17 remaining verbs were not semantically related to any verb class in VerbNet. Thus, a new syntax frame was created based on the VerbNet Guidelines provided by the University of Colorado. The syntax frame is used in this study to show micro-differences between the verbs in the same class to lessen the ambiguity among verbs (Kipper, 2005). This was because verbs that could not perform similar alternations cannot be classified under the same class. Examples can be seen

from several verbs such as *self-combust*, *self-fund*, and *self-regulate* which are related semantically but not syntactically. It was found that the verbs self-fund verb and self-regulate verb cannot use the syntax frame of {Agent V Attribute Result}. However, this syntax frame could be used in the case of the self-combust verb. This was because the semantic role of 'Goal' was more suitable for the self-fund verb and self-regulate verb instead of 'Result'. Hence, this alternation differentiates and separates the self-combust verb from the other two verbs. This is similar to Schulte im Walde's method (2000) of classifying the verbs where she clustered NLP verbs semantically by using the verb's behaviours (syntax alternation ability).

Thus, all the 23 remaining verbs are classified into 14 new verb classes which are introduced in this study. Out of 14 new classes, three of the verb classes were able to classify more than one verb. The three verb classes were further classified into sub-categories because they have similar semantic elements, although the verbs could not perform similar alternations. Vulić et al. (2017) emphasised that members of a verb class should be able to perform similar alternations, thus, the verbs that cannot perform the alternation should be further differentiated from one another verb classes introduced for the remaining 23 verbs that could not be classified using Levin's VC and VerbNet. Therefore, the second research question has been answered as 14 new verb classes were introduced to classify 23 remaining verbs that did not belong to Levin's VC and VerbNet. Also, this study found that some of the newly updated verbs in 2016 to 2018 in OED were semantically clustered although their syntactic alternation ability might differ from each other.

5.0 Recommendation

The limitation of this study was the inaccessibility to an automatic verb generator. An automatic verb generator could classify the verbs based on certain equations without consuming much time. Therefore, the inaccessibility has led to the manual classification of verbs. Even though the result of the manual classification may be more accurate than auto-generated, this study takes more time in the data analysis stage. As this study introduces 14 new verb classes, this finding has contributed new or additional knowledge of verb classification to the field. For future studies, the study could consider an extended list of Levin's taxonomy of verb classification and VerbNet. This is because the newly extended list covers the newly updated semantic and syntactic elements of the most recent verbs of OED added to the English language. Hence, the novel verb classes introduced in this study can be used to be developed further while classifying the novel verbs in the English language. This will show that the verb classification ability to expand according to language development.

6.0 Conclusion

This study answers both research questions. The first research question seeks to find out the applicability of Levin's taxonomy of verb classification and VerbNet to newly introduced English verbs in the 2016 to 2018 Oxford English Dictionary (OED). It was found that Levin's VC and VerbNet were indeed applicable for classification of the newly updated verbs. However, the study also found that Levin's VC was able to classify more verbs than VerbNet.

For the second research question, the study identified verb classes that were introduced to classify verbs that do not belong to Levin's classification of verb and VerbNet. It was concluded that 14 new verb classes were introduced to classify the remaining 23 verbs. This shows that verb classes could develop from time to time though the existing classifications were not able to classify newly updated verbs.

To conclude, this study found that existing verb classifications were applicable for newly updated verb. However, new classes may emerge as there might be new semantic and syntactic elements as English language continue to evolve.

The limitation of this study was the inaccessibility to an automatic verb generator. An automatic verb generator could classify the verbs based on certain equations without consuming much time. Therefore, the inaccessibility has led to manual classification of verbs. Even though the result of the manual classification may be more accurate than auto-generated, this study takes more time in the data analysis stage.As this study introduces 14 new verb classes, this finding has contributed new or additional knowledge of verb classification to the field. For future studies, the study could consider an extended list of Levin's taxonomy of verb classification and VerbNet. This is because the newly extended list covers on the newly updated semantic and syntactic elements of the most recent verbs of OED added to English language. Hence, the novel verb classes introduced in this study can be used to be developed further while classifying the novel verbs in English language. This will show that the verb classification ability to expand according to the language development.

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