

# A Paradigmatic Lexical Relation Study of Analysing Entailment in Identity and Inclusion Relations

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## ABSTRACT

While paradigmatic lexical/sense relations are traditionally used to analyse the relations between lexical items, the present article adopts a descriptive qualitative method, based on Cruse's (2000) classification of lexical/sense relations, to find the identity and inclusion relations of two lexical items in two different texts by using the logical entailment relation. The article aims at finding out whether or not lexical items can be substituted by another without changing their meaning; the meaning of one lexical item is included in the meaning of the other; and the validity of these relations in one context can be tested as entailment relations. The study concludes that entailment has a context-bound relation with regard to identity and inclusion relations. Entailment occurs freely with propositional synonymy. Although the two lexical items in near synonymy are close in meanings or related, entailment relation cannot be attained. Entailment in hyponymy is a unilateral relation. i.e., the meaning of one hyponym entails the meaning of the superordinate, but the meaning of the superordinate does not entail the meaning of each hyponym. Entailment in meronymy relation stands if the relation is between patronym to holonym, i.e., the entailment relation does not stand under holonym to partonym.

**KEY WORDS:** Entailment, Hyponymy, Lexical/Sense Relation, Meronymy, Synonymy

## 1. INTRODUCTION:

Identity and inclusion relations are studied within paradigmatic lexical/sense relations. The terms 'semantic relations', 'meaning relations', and 'lexical relations', as well as 'paradigmatic/syntagmatic relations' all are related to the concept of sense relations. The traditional field of sense relations is concerned with paradigmatic relations such as synonymy, antonymy, hyponymy, meronymy, etc. (Storjohann, 2016). One possible definition of sense relations is: "Any relation between lexical units within the semantic system of a language", (Matthews 1997:337). This implies that the meaning of lexical elements in a language must be related. It makes no difference whether this relationship expresses identity or non-identity. One could also define sense relations as "a paradigmatic relation

between words or predicates". "Paradigmatic relations are those into which a linguistic unit enters through being contrasted or substitutable, in particular environment, with other similar units", (Palmer 1997:67). To put it another way, a paradigmatic relation is one in which one lexical unit may be substituted by another (Geisler, 2011).

Lexical / sense relations have been studied by different semanticists, but Cruse's (2000) is the most comprehensive of these accounts. Paradigmatic sense relations are divided into two broad categories: those that indicate identity and inclusion between word meanings, and those that express opposition and exclusion between word meanings. The class of identity and inclusion includes hyponymy, meronymy, and synonymy, whereas the class of opposition and exclusion consists of incompatibility and antonymy. Similarly, Lyons (1995) establishes the structure of lexical sense relation as follows: Synonymy, Hyponymy, Incompatibility, and Antonymy. However, Palmer, (1997) studies the paradigmatic lexical sense relations in accordance to 'structural' framework, and he classifies this class into the following relations: Synonymy, Polysemy, Homonymy, Incompatibility, Hyponymy, Antonymy, and Relational Opposites.

Koya University Journal of Humanities and Social Sciences (KUJHSS), Volume 5, Issue 1, 2022.

Received 22 Aug 2022; Accepted 16 Nov 2022,

Regular research paper: Published 18 Feb 2023

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Entailment is addressed logically since it is the foundation for all other logical relationships. These relationships consist of both “equivalence and contradiction”. Therefore, the premise underlying “Molly is a cat” implies the premise underlying “Molly is an animal.” As a consequence, one cannot simultaneously assert that “Molly is a cat and deny that it is an animal”; doing so would constitute a contradiction. Therefore, entailments are a crucial component of what is spoken, and they cannot be cancelled or separated (Bertuccelli Papi, 1997:141).

## 2. PREVIOUS STUDIES

Different researchers have studied the paradigmatic lexical-sense relations, and each researcher has focused on an aspect of the lexical-sense relations. Some previous studies were conducted to investigate either entailment or lexical relations. However, entailment has not been studied directly to investigate identity and inclusion relations. The first study was conducted by Khalil (2002) in an article entitled ‘Entailment in Meaning.’ This article studied entailment as the most central truth relation in semantics, as it is a type of semantic dependence that holds between one sentence and another. However, this study did not study the application of entailment in identity and inclusion relations in general, and it did not present the cases where entailment can hold in these relations.

Another study by Yousif (2008) tackled the lexical relations in the semantic field theory to establish sense as an important category within the domain of conceptual or cognitive meaning. Various sense-relationships that hold between lexical items were linguistically explored, but the attempt was to analyse them in terms of conceptual structure to find out how senses (concepts) are cognitively interrelated.

Likewise Mehdi (2008) studied the linguistic aspects of communicative competence and lexical competence as they are used in communicative and learning strategies. Lexical/sense relations as one aspect of lexical competence were studied to find out its influence on communication problems caused by the limited resources of an imperfect interlanguage system. Therefore, this study leaves no space for entailment relations in lexical/sense relation study.

Nekah et al. (2013) investigated lexical sense relations through the application of linguistic knowledge, cognitive processes in colloquial speech and word association tests. Thus, entailment relation is not used to find the cognitive processes in colloquial speech.

Hobi (2014) studied the paradigmatic sense relations of identity and inclusion with the focus on the notion of sense relation in general, and some properties and types of lexical/ sense relations were explained. It is true that

the researcher dealt with synonymy, meronymy, and hyponymy, but the researcher did not show the logical relations that hold between entailment and the three mentioned relations.

Another work that tackled lexical/sense relations was conducted by Carbone (2018). The study addressed lexical/sense relations to investigate some meaning issues like vagueness and indeterminacy. Thus, the study examined lexical/sense relations in context, i.e., as part of discourse.

Equally, Miao (2020) presented the importance of lexical/sense relations in learning vocabulary. The researcher deduced that meanings of vocabulary are largely determined by the lexical sense relations, which makes the understanding and analysis of lexical sense relations helpful in the mastery of meanings of words.

The present article adopts a descriptive qualitative method in analyzing some sentences to find the identity and inclusion relations of two lexical items in two different sentences by using the logical entailment relation. Therefore, this study aims at identifying how one lexical item can be substituted by the other without changing its meaning, and how the meaning of one lexical item is included in the meaning of the other. This study hypothesizes that the validity of these relations in one context can be tested by a logical relation as entailment relations.

## 3. ENTAILMENT

Entailment is a relation between two propositions where the truth of the second statement is necessarily entailed by the truth of the first. This term is taken from logic and now it can be considered as a part of semantics (Crystal, 2008). For example:

1. A. *I can see a cat.*
- B. *I can see an animal.*

In contemporary semantic discussion, entailment is dealt with different rules under negation. Entailment fails whenever the entailed sentence is negated. For instance: ‘*She cannot see a dog*’ does not entail that ‘*She can see an animal*’. Thus, the latter may be true or false (Ibid).

Bertuccelli Papi (1997: 141) asserts that entailment is “a relation between semantic units, which is propositions, and it is drawn from classical logic. As such it is defined regarding valid inferences, or, alternatively, in terms of truth values: A entails B if B is true whenever A is true (or, in all worlds where A is true, B is true”.

Widdowson and Yule (1996) state that entailment is a purely logical concept, symbolized by (II), they reject it to be a pragmatic notion (i.e. having to do with speaker meaning). Besides, they have classified entailment into two types: background entailment and foreground

entailment. In uttering the below example (2); the speaker, necessarily, is committed to the truth of an enormous number of background entailments.

2. *Bob chased three rabbits.*

The above example offers some examples of entailments, such as:

3. A. *Someone chased three rabbits.*

B. *Bob did something to three rabbits.*

C. *Bob chased three of something.*

D. *Something happened.*

Cruse (2000: 28) states that linguistic semanticists separate entailment from what logicians refer to as material implication. "A proposition P materially implies another proposition Q iff it is never the case that P is true and Q false". This material implication appears to be virtually identical to entailment. To demonstrate this concept, think about the following statements: "It is a dog, and All bachelors are unmarried". A case of material implication is existed between these two sentences because the first sentence cannot be correct while the other one is false. However, the truth-value relationship persists due to the semantic link between "dog" and "animal," such that even though "It's a dog literally requires It's an animal" (as the former cannot be true if the latter is false), the latter also implies the former.

#### 4. IDENTITY RELATION

Identity relation is considered as an axis of the paradigmatic lexical-sense relations. According to Cruse (2000), this relation involves the study of synonymy, i.e., the sameness of meaning. Identity relation investigates whether two or more lexical items are close in meaning, i.e., whether they are synonyms or not. The subsequent section studies synonymy as the only involved lexical-sense relation in identity relation.

##### 4.1 Synonymy

The concept of synonymy is well-known and intuitively obvious; it denotes sameness in meaning, or sense. Synonymy is context-dependent. Two words may have the same meaning in a particular context, but not necessarily in all contexts, as in the case of *pale/light* or *peel/skin* (Brinton and Brinton, 2010). The lexical items (*pale/light*) and (*peel, skin*) in examples (4) and (5) are synonymous, but the lexical items (*light, pale*) and (*skin, peel*) in examples (6) and (7) are not synonymous.

(4) *The shirt is (pale/light) in color.*

(5) *The (peel, skin) of the orange is thick.*

(6) *The book is (light, \*pale) in weight.*

(7) *The girl's (skin, \*peel) is sunburned.*

Palmer (1997) identifies synonymy as a term that refers to the 'sameness of meaning', but this sameness of meaning makes tautology, as stated by Kreidler (1998), if

two synonymous words are joined with (and), but if two of them are combined but differ in polarity, the result is a contradiction, as in the below example:

8a. *The rock is large and (it is) big.*

8b. *The train traveled fast but (it did) not (travel) rapidly.*

##### 4.2 Types Of Synonymy

If synonymy is simply defined as similarity in meaning, it appears to be a very uninteresting relationship; but, if synonymy is defined as words with more semantic similarities than differences, a new area of research becomes clear. Although Lyons (1995) and Murphy (2003) identify synonymy in some dichotomies, this paper adopts Cruse's (2000: 156-159) classification of synonymy. Thus, the subsequent sections identify three types of synonymy: "absolute synonymy", "prepositional synonymy", and "near-synonymy".

###### Absolute Synonymy

This type of synonymy addresses a total closeness of the meaning of words. Absolute synonyms are items that are equinormal in all cases: "for two lexical items X and Y, if they are to be recognized as absolute synonyms, in any context in which X is fully normal, Y is, too; in any context in which X is slightly odd, Y is also slightly odd, and in any context in which X is totally anomalous, the same is true of Y". The examples below demonstrate how difficult it is to find absolute synonyms ("relatively more normal pairs" is denoted by "+", and "relatively less normal pairs" is denoted by "-").

(i) *brave: courageous*

9a. *Little Billy was so brave at the dentist's this morning. (+)*

9b. *Little Billy was so courageous at the dentist's this morning. (-)*

(ii) *calm: placid*

10a. *She was quite calm just a few minutes ago. (+)*

10b. *She was quite placid just a few minutes ago. (-)*

(iii) *big: large*

11a. *He's a big baby, isn't he? (+)*

11b. *He's a large baby, isn't he? (-)*

(iv) *almost: nearly*

12a. *She looks almost Chinese. (+)*

12b. *She looks nearly Chinese. (-)*

(v) *die: kick the bucket*

13a. *Apparently he died in considerable pain. (+)*

13b. *Apparently he kicked the bucket in considerable pain. (-)*

According to the preceding description, just one distinct context is required to reject a pair of terms as "absolute synonyms". Therefore, simply a context is considered doubtful: until there was at least one category of such contexts, one may fairly wonder that the impact was semantic in nature.

###### Propositional Synonymy

Propositional synonyms have different meanings if they involve different aspects of non-propositional meaning. These aspects involve differences in the expressive meaning, the stylistic level, and the presupposed area of discourse. As an example, consider *violin* and *fiddle*. Certain features of the speakers should be identified to state the difference between them. The term 'fiddle' is more often used when the speaker is an 'outsider' to the violinistic community. The term 'fiddle' is neutral if the two expert violinists speak to each other, whereas the term '*violin*' is used mainly for non-professional violinists. This issue is more addressed in the following instances:

14a. *This was the first time they had had intercourse.*

14b. *This was the first time they had made love.*

14c. *This was the first time they had fucked.*

The example (14.a) is more likely to be used in a court of law than the others, while the example (14b) is neutral and the example (14c) is more likely to be used in a book sold at an airport bookstore.

### Near-Synonymy

This type of synonymy is not quite clear, so it is considered a non-synonymy. However, there are two points that show the difference between near-synonymy and non-synonymy is considerably less clear. The first point is that language speakers do have a proper sense of which pairs of words are synonyms. The second issue is that it is inadequate to just assert that there is a range of semantic relativity and that synonyms are words with closely related meanings. Since there is no clear correlation between semantic similarity and synonymy, this is insufficient. The meanings of the following pairs of terms are similar, but they cannot be considered synonymous: "entity: process, living thing: object, animal: plant, animal: bird, dog: cat, spaniel: poodle."

These pairs may theoretically go on without making synonyms. The main concern is that these words are used mainly as a counterpoint to other words on the same field. However, a primary function of the 'dog' is to signal "not cat/mouse/camel/ (etc.)", that is, to convey a contrast. Thus, synonyms do not use simply to contrast with one another. They may, of course, contrast in some contexts, most notably with near-synonyms: '*He was killed, but I can assure you he was not murdered, madam.*' It is not easy to characterise the types of difference that do not undermine synonymy. As a general guideline, although not particularly clear, acceptable difference between pairs near-synonyms must be backgrounded, minor or both.

## 5. INCLUSION RELATIONS

Inclusion relations are another alignment of paradigmatic lexical-sense relations. Two different lexical-sense relations, hyponymy and meronymy, are

included in the classifications of inclusion relations. Cruse (2000) categorises hyponymy and metonymy as inclusion relations, as the meaning of one lexical item is included in the meaning of the other. The two subsequent sections study these two relations with enough examples.

### 5.1 Hyponymy

Richards and Schmidt (2002: 243) define hyponymy as "a relationship between two words, in which the meaning of one of the words includes the meaning of the other word." It can be seen in the relation between '*cat* and *animal*', '*pigeon* and *bird*', '*orchid* and *flower*'. In the study of hyponymy, two relations are identified; hyponymy and superordinate. The word '*animal*' is the superordinate of '*cat*'. Conversely, '*cat*' is the hyponymy of '*animal*'. Similarly, '*bird*' is the superordinate of '*pigeon*', whereas '*pigeon*' is the hyponym of '*bird*'. Also, the same process applies to '*orchid* and *flower*' (Brinton and Brinton, 2010).

However, Cann (2019: 175) claims that hyponymy involves "a specific instantiations of a more general concept". In each situation, one word conveys a more precise meaning than the other words. The specific term is called "hyponym" while the general term is "superordinate", which may also be referred to as a "hyperonym or hypernym", although the latter term is avoided in certain dialects of English since it sounds identical to "hyponym". Conversely, Lyons (1995) describes hyponymy in terms of unilateral implication. (For instance, *X is scarlet* will be taken to imply *X is red*; but the converse implication does not generally hold). For instance, *I bought some flowers*. This sentence might indicate the disjunction of *I bought some tulips*, *I bought some roses*, *I bought some violets*, and so on. (In this case, 'disjunction' refers to the selection of one of many alternatives: if *p* implies the disjunction of *q*, *r*, and *s*, then *p* implies either *q* or *r* or *s*).

Cruse (2000: 150) mentions that this relation is frequently represented as an *inclusion* relationship. What is included depends on whether meanings are viewed "extensionally or intensionally". The class defined by the superordinate word contains the class signified by the hyponym as a subclass from an extensional perspective; as a result, "the class of fruit includes the class of apples as one of its subclasses". If verbs are being discussed, it should be noted that the "class of acts of slapping" is a subclass of the "class of acts of hitting". Dealing with meanings intensionally, it might be concluded that the meaning (sense) of '*apple*' is richer than that of '*fruit*', as it includes the meaning of *fruit*. For example, if *murder* is defined as "kill with intent and illegally". Thus, it is obvious that '*murder*' has more meaning than '*kill*' and includes the meaning of '*kill*'.

Cann (2019: 175) offers a test to the class of nouns involved in this relation by “replacing X and Y in the frame X is a kind of Y and seeing if the result makes sense.” Thus, it is understood that “(A) horse is a kind of animal” but not “(An) animal is a kind of horse” and so on. A specific description of this relation, on the other hand, is not fully easy.

## 5.2 Meronymy

Meronymy (it is taken from the Greek word *meros*, ‘part’) is the relationship between words that is “part to whole relation”: “hand is a meronym of arm”, “seed is a meronym of fruit”, and “blade is a meronym of knife” (conversely, “arm is the holonym of hand”, “fruit is the holonym of seed”, etc.) (Riemer, 2010: 140). Similarly Cann (2019) views this relationship “part-of” or “meronymous relations.” According to Cruse (2000: 153) meronymy is another type of inclusion relation; “it is the lexical reflex of the part-whole relation”. Meronyms include the following: “hand: finger, teapot: spout, wheel: spoke, car: engine, telescope: lens, and tree: branch.” In the instance of “car: engine”, engine is referred to as the meronym (it is occasionally referred to as *partonym* as well), while car is referred to as the holonym. Meronymy is also defined in terms of “normality in diagnostic frames” for example, “an X is a part of a Y, a Y has X/Xes,” as shown in the following examples:

- 15a. A *finger* is a part of a *hand*.
- 15b. A *hand* has *fingers*.
- 15c. ?A *hand* is part of a *finger*.
- 15d. ?A *finger* has *palms/wheels*.

A *finger* is an integral part of a *hand*, but a *lake* can be imposed as a part of a *park* but is not a necessary part of it. Cruse (1986) and Croft and Cruse (2004) have outlined the category PART, which includes classes such as *part*, *portion*, *piece*, *segment*, and *element*, all of which might be interpreted differently by speakers as parts of a whole. Croft and Cruse (2004: 155–156) demonstrate how speakers' judgments differ about whether a *battery* and a *bulb* are equally part of a *flashlight*, despite the fact that both are contained within its body. Traditionally, the *bulb* is included, but the *battery* is not, as it is expected to be bought separately. A clear definition of meronymy is difficult, as it remains open where the boundaries of a whole entity are (Storjohann, 2016).

In the English language, Iris, Litowitz, and Evens (1988) (as cited in Riemer, 2010) present four distinct relations of meronymy. The first relation tackles “the functional component to its whole,” for example, the relation between “heart and body” or “engine and car.” The second relation is between “a segment to a preexisting whole (*slice-cake*).” The third type of meronymy relation is between “a member to a collection or an element to a set (*sheep-flock*).” Finally, the fourth

relation is between a ‘subset’ and a ‘set’ that is considered an instance of the hyponymy relation between “fruit-food.”

Winston, Chaffin, and Herrmann (1987) (as cited in Riemer, 2010) suggest “a six-way typology in which *part of* has six distinct meanings: component-integral object meronymy (*pedal-bike*), member-collection (*ship-fleet*), portion-mass (*slice-pie*), stuff-object (*steel-car*), feature-activity (*paying-shopping*) and place-area (*Everglades-Florida*).” When the same kind of meronymic relationship is present across the whole chain, as is the case in (16), which includes the component-object kind of meronymy, they assert that meronymy is transitive:

- 16a. The *car's door handle* is part of the *car door*.
- 16b. A *car's door* is part of the *car*.
- 16c. The *car's door handle* is part of the *car*.

## 6. DISCUSSION

In this section, entailment is investigated in accordance with Cruse's (2000) classification of identity and inclusion relations. Synonymy is the first relation to start with. As stated previously, absolute synonymy requires complete similarity between the two entities in terms of context. Thus, two lexical items are considered to have absolute synonymy if they both have the same value and meaning in both contexts of the sentences. For example, the words “big” and “large” are synonyms, but they can't replace each other in all situations. Consequently, they can't bear the entailment relation as shown in the below example.

- 17. Ali has a *big* baby.

To entail the above example, it should be said that ‘Ali has a *large* baby.’ However, the entailment relation fails in this sentence due to the difference in the animate that attributes largeness and bigness. To dig deeper in this issue, two more synonyms are discussed: *hard* and *difficult*. These two lexical items are synonyms, and they hold entailment relation in some contexts, as shown in the below example:

- 18. The exam was *hard*.

The above example accepts the entailment relation due to the validity of using both lexical items in the given context. Thus, it is possible to say, ‘The exam was *difficult*.’ However, the lexical item ‘hard’ does not stand in other contexts, as shown in the below example.

- 19. Sara uses a *hard* desk for her studies.

The abovementioned example does not bear the entailment relation, as it is not possible to say ‘Sara uses a *difficult* desk for her studies.’ Thus, the lexical items ‘hard’ and ‘difficult’ are synonyms and hold the entailment relation in some contexts, and these two relations, synonymy and entailment, also fail under other situations.

Propositional synonymy, as the name implies, can be investigated in terms of entailment. When two lexical items are propositional synonyms, they can be exchanged without affecting the truth-conditional properties of the statement (Cruse, 2000). In other words, two statements are different in the case that one of them has one of a pair of propositional synonymy, whereas the other statement has counterpart pair that include mutual entailment: "John bought a *violin*" entails that "John bought a *fiddle*"; "I heard him tuning his *fiddle*" entails that "I heard him tuning his *violin*"; "She is going to play a *violin* concerto" as well entails that "She is going to play a *fiddle* concerto."

Propositional synonymy occurs between two lexical items that have the same referent or the same quality Kreidler (1998). Thus, the below example refers to the same referent, so the lexical items can be exchanged. Therefore, the entailment relation happens without affecting the validity of the statement.

20. Jason is a *seaman*.

21. Jason is a *sailor*.

Each of the above sentences can entail the other. Assuming that Jason refers to the same person in the two sentences, then if 3a is true, 3b is true; if 3b is true, 3a is true; and if either is false, the other is false. This establishes that *seaman* and *sailor* are synonyms; when they are used in predications with the same reference phrase, the predications have the same truth value. As discussed previously, propositional synonymy occurs due to differences in expressive meaning, stylistic differences, or presupposed field of discourse differences. In propositional synonymy, the entailment relationship can also happen between an adjective, an adverb, and a verb.

22.A: John is a *clever*

22.B: John is an *intelligent*

23.A: George drove the car *fast*.

23.B: George drove the car *rapidly*.

24.A: The bus *left* at 10:00.

24.B: The bus *departed* at 10:00.

The entailment relations between each pair of the above propositional synonymy can be expressed in this way: the truth of A entails the truth of B, and vice versa. The falsity of A entails the falsity of B, and vice versa.

As discussed previously, near synonymy occurs between lexical items that are semantically close and related. To discuss this type of synonymy, the verbs 'kill' and 'murder' in the below example are considered.

25. The man was *killed* in the car accident.

The entailment relation is hard to achieve in this type of synonymy. Although the verbs 'kill' and 'murder' are quite related and close in meaning, the above sentence does not entail that 'The man was *murdered* in the car accident.' Other near synonyms are 'dog' and 'cat', 'spaniel' and 'poodle', and 'pilfer' and 'robber'.

The most common way to describe hyponymy is in terms of entailment between statements that only vary in terms of the lexical elements being tested. For example, "It's an *apple*" entails that "It's a *fruit*," and "Mary *slapped* John" entails that "Mary *hit* John." There are two issues with this hyponymy definition. The first issue is that a hyponymous sentence does not necessarily have a superordinate sentence to correlate with it (Cruse, 2000). For example, "It's a *tulip*" entails "It's a *flower*," but "It's *not a tulip*" does not entail "It's a *flower*," and "The fact that it was a *tulip* surprised Mary" entails "The fact that it was a *flower* surprised Mary." Identifying the kind of sentences in which entailment is true would be ideal, but accomplishing this task is challenging. As a result, the entailment relation in hyponymy is an example of a unilateral relation, for example.

26.A. Allan saw a *monkey*.

26.B. Allan saw an *animal*.

27.A. She likes *carrots*.

27.B. She likes *vegetable*.

The meanings of the above pairs of sentences are close in terms of inclusion relations. The meaning of 'monkey' is included in the meaning of 'animal', and the meaning of 'carrot' is included in the meaning of 'vegetable'. Consequently, the sentence 'Allan saw a *monkey*' entails that 'Allan saw an *animal*', and the sentence 'She likes *carrot*' entails that 'she likes *vegetables*'. The entailment relation exists between hyponym and superordinate, as 'monkey' and 'carrot' are hyponyms of superordinate 'animal' and 'vegetable'. Two other pairs of examples are investigated below to check whether entailment is valid between superordinate and hyponym relations or not.

28.A. She planted a *tree*.

28.B. She planted an *oak*.

29.A. She dusted the *furniture*.

29.B. She dusted the *chairs*.

The above two pairs of sentences are close in meaning, and the meanings of (B) sentences are included in the (A) sentences. Thus, the sentence 'She planted a *tree*' does not entail that 'She planted an *oak*'; she might have planted a pine, or a banyan, etc. Similarly, the sentence 'She dusted the *furniture*' does not entail that 'She dusted the *chairs*'. Instead, she might have dusted the sofa, table, or desk. Thus, hyponymy is called inclusion relation because, as clarified in these two sentences, the meanings of 'an *oak*' and 'chairs' are included in the meanings of a 'tree' and 'furniture'.

The second difficulty is that the entailment relation does not work when the relation between hyponym and superordinate is excessively restrictive. Thus, the issue is that entailment must be context-independent, but hyponymy judgments are context-dependent. For example, many sources consider "dog: pet and knife:

cutlery” to be strong instances of hyponymy, for example:

30. John raises a *pet*.

31. Sara bought a set of golden *cutlery*.

The lexical item “*pet*” is very related and included in the meaning of “*dog*”, and “*cutlery*” is related and included in the meaning of “*knife*”. Although the mentioned pairs are close in meaning, and the meaning of one is included in the meaning of the other, an item in a pair cannot entail or replace the other. In other words, it is a fact that not all kinds of dogs are considered pets. For most people, dogs are considered pets in the main context of urban life, and possibly the default context invoked by the lexical item “*knife*” out of context is the mealtime context. For example, in most of the middle-eastern countries, “*dogs*” are not considered as “*pets*”, or “*knives*” are considered as “*cutlery*”. Thus, entailment relation does not exist in the hyponymy relation as it is context-bound.

Meronymy does not have a straightforward logical definition in terms of sentence entailment, as hyponymy does. The relation does, however, have logical characteristics, which become especially apparent when locative predicates are involved. For instance, if X and Y are meronyms, the statement that entity A is in X entails that entity A is in Y. As shown by the following examples, ‘*a cockpit is a component of an aeroplane*’, and ‘*an elbow is a component of an arm*’.

32.A. John is in the *cockpit*.

32.B. John is in the *aeroplane*.

33.A. John has a boil on his *elbow*.

33.B. John has a boil on his *arm*.

The entailment relation exists in the above two pairs of sentences. The sentence “*John is in the cockpit*” entails that “*John is in the aeroplane*.” Likewise, the sentence “*John has a boil on his elbow*” entails that “*John has a boil on his arm*.” The same entailment relation does not exist if the sentences are reversed, i.e. the entailment relation does not stand under holonym to partonym. For example, the sentence “*John is in the aeroplane*” does not entail that “*John is in the cockpit*”, and the same process applies to the other pair.

In fact, it is not easy to specify the right entailment connections between statements containing meronyms and their corresponding holonyms. Cann (2019) makes an effort to limit the meronymy relation to those word pairings that support both the “X is a part of” and “Y has” paraphrases. He draws attention to the fact that, at least between the two terms, the “has a” connection does not necessarily entail a “part of” one, as shown in the below examples:

34. A *wife* has a *husband*.

35. The *job* has *stress*.

The entailment relation in the above two sentences does not hold. For example, the sentence “*A wife has a*

*husband*” does not entail that “*A husband is part of a wife*.” Similarly, the sentence “*The job has stress*” does not entail that “*stress is part of the job*.” Even if one admits that both paraphrases must be true for a meronymic pair, several issues remain. For instance, while the pair of sentences “*husband is a part of a marriage*” and “*marriage has a husband*” appears to be quite acceptable, it is not immediately clear that “*marriage*” is a precise holonym of “*husband*.” Thus, it may be necessary to limit the relation to words that signify the same basic category of thing: concrete or abstract, which will result in distinct “part of” relations depending on how a term is construed.

## 7. CONCLUSIONS

Based on the above investigation and analysis of entailment as a logical relation of meaning regarding both inclusion and identity, the following points have been concluded:

- Entailment has a context-bound relation with identity and inclusion relations. Thus, absolute synonymy exists only when the two lexical items occur in the same context.

- Entailment occurs freely with propositional synonymy, as its name implies the two lexical items can be substituted without affecting the truth-conditional properties of the two sentences.

- Although the two lexical items in near synonymy are close in meanings or related, the entailment relation can’t be attained.

- Entailment in hyponymy is a unilateral relation. In other words, the meaning of one hyponym entails the meaning of the superordinate, but the meaning of the superordinate does not entail the meaning of each hyponym.

- Entailment in a hyponymy relation can’t be achieved when the relation between hyponym and superordinate is excessively restrictive. Thus, entailment relation is not existed in the hyponymy relation as it’s context bound.

- Entailment in meronymy relation stands if the relation is between partonym to holonym. In other words, the entailment relation does not stand under holonym to partonym.

- The “has a” relation in meronymy does not necessarily entail a “part of” relation. As a consequence, it could be required to restrict the relation to terms that describe the same fundamental kind of item, whether they are concrete or abstract. This will lead to different “part of” relations depending on how a term is interpreted.

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