

DANGEROUS, HAZARDOUS, OR RISKY: A CORPUS BASED STUDY OF ENGLISH SYNONYMS

 \mathbf{BY}

MISS JUTHAPORN THUMMASOONTHORN

AN INDEPENDENT STUDY PAPER SUBMITTED IN PARTIAL
FULFILLMENT OF
THE REQUIREMENTS FOR THE DEGREE OF
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ENTITLED

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ABSTRACT

The study investigates a set of three synonyms, namely dangerous, hazardous, and risky, based on three criteria: senses of meaning, degrees of formality, and collocations. The data of the three synonyms was derived from Longman Dictionary of Contemporary English (LDOCE), Merriam-Webster Dictionary, along with the Corpus of Contemporary American English (COCA). The results indicate that these synonyms differ with respect to the three criteria mentioned above. With regard to the senses of meaning, dangerous implies danger in general, while hazardous and risky may be more specific in meaning; hazardous is connected with people's health relating to scientific facts, and risky relates to a known and accepted danger, especially in terms of the economy. In terms of their genres, hazardous seems to be the most formal word, as it tends to appear with the highest frequency in academic texts, while dangerous seems to be the least formal word since its frequencies are highest in informal genres, i.e., spoken and TV/movie subtitles. Based on COCA frequency and the MI value (\geq 3), the majority of noun collocates of dangerous are associated with broader and more general themes, whereas most of the noun collocates of hazardous and risky are related to a narrower sense. For this reason, these synonyms are regarded as loose synonyms, as they cannot substitute for each other in all contexts. This corpus-based study not only provides lexical knowledge about the synonyms but also has pedagogical implications. Since a corpus

can provide much more insightful lexical knowledge about synonyms than dictionaries, this may encourage English teachers to use corpora as a complementary source, in addition to dictionaries.

Keywords: Synonym, Corpora, Corpus-Based Study, Genre, Collocation



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CHAPTER 1

INTRODUCTION

1.1 Rationale and background of the study

Vocabulary is perhaps the most important component of English language learning, as according to David Wilkins (1972, p. 111), "without grammar very little can be conveyed, without vocabulary nothing can be conveyed." It is assumed that vocabulary is vital to communication. Without it, it is almost impossible to communicate successfully.

Nevertheless, to master English vocabulary may not be easy as English has such a large number of words, many of which have been borrowed from different languages such as German, French, Latin and Greek. As a result, English language has a huge number of synonyms. Unfortunately, synonyms cannot be used interchangeably in every context. That is the reason for which synonymy is one of the difficulties that learners frequently encounter in vocabulary learning (Laufer, 1990). Some criteria used to distinguish synonyms are dialects, styles or degrees of formality, connotations, and grammatical patterns (Jackson & Amvela, 2000).

Out of countless groups of synonyms, *dangerous*, *hazardous*, and *risky* appealed to the researcher's interest, and all of them are listed in the top 9000 most frequent words (Longman Dictionary of Contemporary English, 2014). Since their meanings are very close, they can pose a challenge to learners as well as teachers. Learners with limited English exposure may use them interchangeably in different contexts, causing less natural use (Szudarski, 2018). In addition, based on the researcher's teaching experience, *dangerous*, *hazardous*, *and risky* are common synonyms in many lessons at a military school where the researcher works. When being asked what the differences between them are or which contexts to use them in, the answers are merely based on intuition without concrete academic evidence to support. Besides, despite a number of previous studies having been conducted to identify synonyms, none have sought to distinguish *dangerous*, *hazardous*, and *risky*. Thus, it should be worth investigating the similarities and differences between

dangerous, hazardous, and risky in terms of the senses of meaning, genres, and collocations by systematically using dictionaries and corpus data.

1.2 Objectives of study

- 1.2.1 To compare the senses of meaning of the synonyms *dangerous*, *hazardous*, and *risky*.
- 1.2.2 To examine the distribution of the synonyms *dangerous*, *hazardous*, and *risky* across different genres.
- 1.2.3 To investigate the possible collocations of the synonyms *dangerous*, *hazardous*, and *risky*.

1.3 Research questions

- 1.3.1 What are the senses of meaning of the synonyms *dangerous*, *hazardous*, and *risky*?
- 1.3.2 How are the synonyms *dangerous*, *hazardous*, and *risky* distributed across different genres?
- 1.3.3 What are the common collocations of the synonyms *dangerous*, *hazardous*, and *risky*?

1.4 Scope of study

This study was limited to a corpus-based analysis of English synonyms and focused only on three synonymous adjectives, namely, *dangerous*, *hazardous*, and *risky*, in terms of the senses of meaning, genres, and collocations. The analyses will be derived from Longman Dictionary of Contemporary English (online version) and Merriam-Webster Dictionary (online version), together with the Corpus of Contemporary American English (COCA).

1.5 Significance of the study

This research of the three English synonymous adjectives is significant in two major aspects.

- 1.5.1 The study will raise awareness among English teachers and L2 learners of the differences of the three synonyms *dangerous*, *hazardous*, and *risky* in terms of senses of meaning, genres, and collocations.
- 1.5.2 The study demonstrates the importance of corpora as an additional tool for teaching and learning English vocabulary apart from dictionaries.

1.6 Organization of the study

This study is divided into five chapters as follows:

Chapter One contains the introduction that describes rationale and background of the study, objectives of the study, research questions, scope of the study and significance of the study.

Chapter Two consists of the literature review, which includes the concept of synonyms, corpus linguistics and the study of synonyms, and previous related studies

Chapter Three describes the research methodology used in this research.

Chapter Four contains an analysis of the research findings and discussion.

Chapter Five provides a summary of the research.

CHAPTER 2

REVIEW OF LITERATURE

This chapter reviews the related literature followed by a summary of previous related studies: (1) the concept of synonyms, (2) corpus linguistics and the study of synonyms, and (3) a summary of previous related studies.

2.1 The concept of synonyms

In English language, there are a number of words, known as synonyms, which share similar senses of meaning, such as *big* and *large*. The concept of synonyms plays an important role in English. To enable readers to have a better understanding of what the concept of synonym entails, the section that follows will firstly provide the definitions of 'synonyms', the differences between loose and strict synonyms, and criteria used in differentiating synonyms.

2.1.1 Definition

According to Jackson & Amvela (2000, p. 92), the term *synonymy* originates from the Greek word *sunonumon*, which means 'having the same name'. It is the term used by semanticists to refer to a relationship of similarity or sameness of meaning between two or more words.

Longman Dictionary of Contemporary English or LDOCE (Online version) defines *synonym* as "a word with the same meaning as another word in the same language", such as *big* and *large*. Based on the definition, if words share similar meanings, they may be considered synonyms. English language contains a great number of synonyms as, historically speaking, its words originated from many other languages, resulting in pairs of native and foreign words which refer to the same things (Palmer, 1997).

2.1.2 Strict and loose synonymy

Synonyms can be classified into two main types: strict (absolute) and loose synonyms.

Strict synonyms mean words that can substitute one another interchangeably in all contexts and do not cause any changes in meaning, style, or connotation of the

message (Jackson & Amvela, 2000). Nonetheless, it is almost impossible to find strict or real synonyms. Palmer (1997) points out that real synonyms do not exist since words which share the same meaning are not likely to be in use. Similarly, Kreidler (1998) suggests that no two words share the exact linguistic features, and it would be useless to have two words which can freely substitute for each other in all contexts.

In contrast, **loose synonyms** refer to words that have similar meanings; still, they cannot substitute one another in all contexts (Murphy, 2003). Likewise, Jackson and Amvela (2000) state that their overlapping meaning does not enable the words to be used interchangeably in all contexts. To clarify this, although *quick* and *fast* are similar in core meaning, they cannot substitute for each other in all contexts. For example, it sounds natural to say *quick comment* and *fast car*, not **quick car* and **fast comment*. The difference in the detailed meaning shows that *quick* refers to the action having been done in a short time while *fast* indicates the manner of movement rather than a short period of time (Aroonmanakun, 2015).

2.1.3 Criteria for distinguishing synonyms

Now that the definition of the terms has been provided in section 2.1.1 and the differences between loose and strict synonyms have been discussed in section 2.1.2, this section will explain the criteria used in distinguishing synonyms.

2.1.3.1 Degree of formality

Even though words in a set of synonyms share similar meanings, they differ in terms of formality degree. That is, some words are likely to occur in formal contexts, in contrast to others that tend to be used in informal contexts. Some words are used as slang words and are common in colloquial English, whereas others are standard terms (Jackson & Amvela, 2000). Some examples of synonyms distinguished by degree of formality are as follows:

Formal	Informal
commence	start
terminate	end
endeavor	try
	LDOCE (Online version)

Standard English

English slang words

crash prank destroy zap

drunk sloshed

(Jackson & Amvela, 2000)

2.1.3.2 Collocations

LDOCE (online version) defines *collocation* as "the way in which some words are often used together, or a particular combination of words used in this way." For instance, the verb *pay* has a strong tendency to co-occur with the noun *respect*, and the verb *commit* has a tendency to do so with *suicide*.

Words in a pair of synonyms may frequently co-occur with different collocates. According to Palmer (1997), some synonyms differ due to their collocational restrictions. That is to say, they are strongly attracted to some particular words. For example, *rancid* usually collocates with *butter*, while its synonym, *sour*, is found to commonly occur with *milk* (not **rancid milk* and **sour butter*). This indeed illustrates the case that words tend to co-occur in what may appear to arbitrary ways (O'Keeffe et al., 2007).

The phenomenon of collocation is relatively closely tied to semantic preference. Stubbs (2001, p. 65) defines semantic preference as "the relation, not between individual words, but between a lemma or word form and a set of semantically related words". Partington (2004) also points out that semantic preference can be considered as a feature of the collocates. In his work, Partington analyzed the item *sheer* in the newspaper and academic corpora. His findings revealed that *sheer* collocated with a number of items from specific semantic sets: (1) 'magnitude', 'weight' or 'volume', (2) items expressing 'force', 'strength' or 'energy', and (3) words expressing 'persistence'. Then Partington compared the occurrences of *sheer* with its synonyms i.e., *complete*, *pure* and *absolute*, and discovered that none of them shared semantic preferences with sheer.

2.1.3.3 Grammatical patterns

Based on this criterion, words in a set of synonyms do not always have the same grammatical patterns. For example, the synonymous adjectives *able* and *capable* both mean clever or good at doing something. Nevertheless, these two words have different grammatical patterns. The word *able* takes an infinitival phrase, as Phoocharoensil (2010, p. 231) points out in, "Jonathan is able to fly Concorde". On the other hand, the word *capable* requires a prepositional phrase beginning with *of*, as in "Jonathan is capable of flying Concorde."

Despite their equivalence in meaning, the grammatical patterns of the two words cannot be alternated, otherwise ungrammaticality in English may occur, as in "*Jonathan is able of flying Concorde." and "*Jonathan is capable to fly Concorde." (Phoocharoensil, 2010, p. 231).

2.2 Corpus linguistics and the study of synonyms

To enable readers to have a better understanding of corpus linguistics and the study of synonyms, this section will explain corpus linguistics, the definitions of corpus, and the use of corpora to study synonyms.

2.2.1 Corpus linguistics

According to Nesselhauf (2011), corpus linguistics involves the analysis of naturally occurring language based on computerized corpora. The analysis is commonly performed with the use of the computer, i.e., with specialized software, considering the frequency of the phenomena investigated. Corpus linguistics has played an important role in the empirical study of language, contributing to the thorough understanding of grammar and lexis and the development of certain 15 areas, such as dictionary making, language teaching, and discourse analysis (O'Keeffe & McCarthy, 2010). Due to its potential to be used for the investigation of many types of linguistic questions which yield interesting and surprising new insights about language, it has become one of the most common methods of linguistic investigation, including the study of synonyms.

In terms of pedagogy, corpora are beneficial to language learning in many ways. It is clear that corpora have now become the major source of knowledge, and the linguistic innovation has brought about the development of corpus-based language

teaching materials (O'Keeffe & McCarthy, 2010). The development of dictionaries, which are the central sources of lexical references, mainly relies on corpus data for accurate information regarding how lexis is used. Not to mention that collocations and authentic examples of words in contexts also came from corpora. Now it is easier for English teachers and learners to gain information about target words (Thornbury, 2002).

2.2.2 Corpus and its meanings

Longman Dictionary of Contemporary English or LDOCE (2014, p. 399) describes corpus as

- (1) "A collection of all the writing of a particular kind or by a particular person: the entire corpus of Shakespeare's works" and
- (2) "A large collection of written or spoken language that is used for studying the language: a corpus of spoken English."

According to O'Keeffe et al. (2007, p. 1), corpus is "a collection of texts, written or spoken, which is stored on a computer." These texts can be analyzed by using analytical software. O'Keeffe et al. (2007) also proposed that there are three main features of a corpus:

- (1) A corpus is a representative collection of texts. A corpus is judged on how representative it is. For example, if a corpus is designed to represent classroom discourse in the context of English Language Teaching (ELT), effort and great care must be put into the design stage of the corpus to ensure its representativeness, for example, a design matrix that captures all the important variables of age, gender, location, type of school, class size, etc. The design criteria of a corpus enable users to assess its representativeness.
- (2) A corpus is a collection of electronic texts stored on a computer. The texts, composed of written or spoken texts or a mix of both, may be entered into a computer by typing, scanning or downloading from electronic media. These large amounts of texts can be analyzed by specifically designed software.
- (3) A corpus allows for both qualitative and quantitative analysis. Language features can be examined both qualitatively by using frequency, or numbers of occurrences and quantitatively by exploring how a word or phrase is used in context across a corpus.

In a nutshell, a corpus is a principled collection of texts stored electronically and available for both qualitative and quantitative analysis.

2.2.3 Corpus and the study of synonyms

The use of corpora to study synonyms is the main concern of the current study. As Moon (2010) points out, corpora can be used to differentiate synonyms by investigating the linguistic features of synonyms i.e., genres, word frequency, phrases, and collocations. For example, corpus data show that the nouns *result* and *outcome* share the same core meaning, which is a thing that is caused or produced because of something else. However, the data reveals that these two synonyms do not have the same distribution pattern of collocation. Although both *result* and *outcome* collocate with *achieve* and *yield*, only *result* tends to occur with *generalize*, while *outcome* does not (Phoocharoensil, 2020).

2.3 Previous related studies

2.3.1 Corpus-based study of English synonyms

A number of studies have been conducted to investigate synonyms, focusing on their similarities and differences by employing widely used corpora, e.g., the Corpus of Contemporary American English (COCA) or the British National Corpus (BNC). This results in a much more reliable insight than that of the traditional descriptive research (Chung, 2011).

Phoocharoensil (2010) investigated five synonyms, i.e., ask, beg, plead, request and appeal. The data was collected from three learners' dictionaries and a corpus of Time in 1995, using Wordsmith Tools (version 3.0). The findings showed that despite their same core meaning, ask, beg, plead, request and appeal differ in several aspects, such as connotations, styles, dialects, grammatical patterns, and collocations, which are nonexistent in the dictionaries. For example, plead, request, and appeal are used in more formal contexts than ask and beg. Besides, the five synonyms have both similar and different collocations and grammatical patterns.

Chung (2011) studied two synonyms, namely *create* and *produce*, using the Brown Corpus and the Frown Corpus. From both corpora, 466 instances of 'create' and 481 instances of 'produce' were found. The findings revealed that not only do *create* and *produce* mostly occur as a bare infinitive and in the -ed forms, but their

meanings also overlap. However, they take different noun collocates as their objects. That is, *create* has a tendency to be followed by abstract objects in fewer quantity and with a higher possibility of creativity, whereas *produce* tends to precede objects produced in greater quantity with a low level of creativity.

Petcharat (2017) explored the similarities and differences of the synonymous adjectives *appropriate*, *proper*, and *suitable* by comparing the information from three learner dictionaries and 300 concordance lines for each word from COCA. It was found that even though they share the same core meaning, they differ in terms of detailed meanings, degrees of formality, collocations, and grammatical patterns. For example, *appropriate* is more likely to occur frequently in formal contexts than *proper* and *suitable*. By contrast, *proper* seems to be used less in formal contexts.

Likewise, Lapangdee (2017) investigated the collocations of the English synonyms *student* and *learner* using 300 concordance lines of each word in COCA. In terms of word frequency, the possible noun collocates of *learner* are outnumbered by those of *student*. Hence, the results showed that *student* and *learner* share a similar meaning, but differ in terms of collocations. Furthermore, the corpus data revealed that *student* seems to possess more possible collocates than *learners*. The researcher finally added that corpora have significant advantages in terms of vocabulary study as they provide many authentic examples of a large proportion of the vocabulary for language learning.

In a corpus-based study by Aroonmanakun (2015), two synonyms, *quick* and *fast*, were examined to find their similarities and differences. The data from COCA, which is the list of top 100 collocates of quick and fast with MI scores of at least 3, was compared with that from three learner dictionaries. The findings revealed that the two synonyms have different noun collocates. For example, *quick* usually collocates with *answer*, *breakfast*, and *comment*, which mostly involve the action having been done or responded to in a short time. In contrast, *fast* usually co-occurs with nouns that indicate the manner of movement rather than a short period of time, such as *acceleration*, *attack*, and *boat*. Although *quick* and *fast* sometimes share the same noun collocates, e.g. *learner*, the meaning derived from each adjective is different. For instance, a *quick learner* means someone who is able to learn something very easily, while a *fast learner* refers to someone who learns something in a short time.

Another insightful study by Phoocharoensil (2020) analyzed corpus-based data of the synonyms *consequence*, *result*, and *outcome* in COCA with the focus on genres and collocation patterns. In terms of genre, the study showed that the three synonyms occur with the highest frequency in academic texts, and the lowest frequency in TV and movie subtitles and fiction, thus signifying their high degree of formality. The findings of analyzing the top-20 frequency list of verb collocates and the top-30 frequency list of adjective collocates also revealed that *consequence* is often found with verbs and adjectives conveying negative senses, and the collocates of *result* tend to be research-oriented contexts. The collocates of *outcome* vary considerably in semantic properties but are not directly related to any specific contexts.

2.3.2 Corpus-based study of semantic preferences

Unlike the study mentioned above which focused on different aspects of synonyms, such as detailed meanings, degrees of formality, collocations, and grammatical patterns, the following two studies (Partington, 2004 and Selmistraitis, 2020) specifically searched towards the semantic preferences of particular sets of synonyms.

Partington (2004) examined the collocational patterns of absolutely, perfectly, entirely, completely, thoroughly, totally and utterly, utilizing data obtained from the Cobuild Corpus. His analysis shows that absolutely demonstrates semantic preference for adjectives which have a superlative sense such as delighted, enchanting, splendid, preposterous, appalling, intolerable. As for *perfectly*, it tends to occur with pleasant things (capable, correct, fit, good, happy, harmless, healthy, lovely, marvelous, and natural). Moreover, his findings revealed that completely, entirely, totally and utterly share a great number of collocates. Utterly expresses semantic preference for 'absence' (collocates are: helpless, useless, unable, forgotten, failed, ruined, destroyed) and 'change' (changed, different, failed, ruined, destroyed). Totally does not only show semantic preference for 'absence' or 'lack of' collocating with bald, exempt, incapable, irrelevant, lost, oblivious, uneducated, unemployed, etc. but also for 'change of state' and 'transformation' words, such as destroyed, different, transformed, absorbed, failed. When it comes to completely, the semantic preference is 'absence' (devoid, disappeared, empty, forgotten, hopeless, ignored, lost, oblivious, vanished, etc.) and 'change' (alerted, changed, destroyed, different). Entirely expresses semantic preference for 'absence' and 'change' as well. Finally, Partington found that *thoroughly* tends to occur with words relating to 'emotions' and 'states of mind', such as annoyed, approved, enjoyed, confused, happy, sure, and disgruntled.

Selmistraitis (2020) also studied three pairs of near synonyms, *succinct* – *concise*, *coherent* – *cohesive*, *and precise* – *accurate*, using 100 concordance lines with the 20 most frequent collocates of each synonym in COCA. She found that although they share similar meaning, their semantic preferences are different. The noun collocates of *succinct* and *concise* often denote a definite or clear expression, review or account of the situation in speech or writing. Only *concise* collocates with the types of books, such as dictionary and encyclopedia. The word *cohesive* most frequently collocates with collective nouns denoting a number of people, while the synonym *coherent* usually occurs with words expressing a plan of action, a set of ideas or a description. The word *precise* usually appears with words related to expressions of temporality and locality while *accurate* shows preference for abstract nouns denoting 'proving', 'identification', and 'discovering'. The researcher concluded that these synonyms cannot be used interchangeably in all contexts.

The eight previous studies reinforce the fact that corpora are highly useful in indicating the similarities and differences between synonyms, and the information drawn from corpora outweighs that obtained from learner dictionaries. Of all these studies, the research conducted by Phoocharoensil (2020) is the most comprehensive and up-to-date because his study is the latest corpus-based analysis on synonyms available since the update of COCA in March 2020 with three new genres, i.e., TV and movie subtitles, blogs, and webpages. Thus, his framework was adopted and applied in the present study.

CHAPTER 3

RESEARCH METHODOLOGY

This chapter illustrates the methodology used in data collection for this study. It includes (1) target words (2) data collection, and (3) data analysis.

3.1 Target words

The target words in this study were three English synonymous adjectives: dangerous, hazardous, and risky. The words were chosen due to their frequent usage in communication, supported by their presence in the list of the Longman Communication 9000, which highlights the 9000 most frequent words in both spoken and written English. There are not only a number of questions posted online regarding the differences among the three synonyms, but also based on the researcher's teaching experience, dangerous, hazardous, and risky are common synonyms in many lessons. When being asked how to distinguish these three words or which context to use them, the answers are merely based on intuition without concrete academic evidence to support.

Thus, it is worth analyzing the similarities and differences between *dangerous*, *hazardous*, and *risky* in terms of the senses of meaning, genres, and collocation by systematically using dictionaries and corpus data to gain more insightful information.

3.2 Data collection

3.2.1 Research instruments

The research instruments in the study are:

3.2.1.1 Longman Dictionary of Contemporary English or LDOCE

(online version): This dictionary is a well-known American learner dictionary. It contains 300,000 words, phrases and meanings, 88,000 examples of pronunciation and one million additional corpus examples. There are more than 147,000 collocations, 48,000 synonyms, antonyms, and related words. This version also contains the Longman Communication 9000, which is a list of updated core vocabulary.

3.2.1.2 Merriam-Webster Dictionary (online version): This is America's award-winning Merriam-Webster.com dictionary site which contains the meanings, pronunciations, and grammar advice of a dictionary with the synonyms and antonyms of a thesaurus (nearly 60,000 alphabetical dictionary entries and more than 13,000 thesaurus entries).

3.2.1.3 Corpus of Contemporary American English (COCA): COCA is a very large, genre-balanced corpus of American English, and is probably the most widely used corpus of English for ELT. It contains more than one billion words of text, approximately 25 million words being included each year from 1990-2019 from eight genres: spoken, fiction, popular magazines, newspapers, academic texts, TV and movie subtitles, blogs, and other web pages. It is also regarded as a counterpart to the British National Corpus (BNC), which was originally created by Oxford University Press in 1991 and was completed in 1994. It contains 100 million words of both spoken and written texts designed to represent a wide cross-section of British English. However, the reasons why COCA was chosen are due to (1) its enormous size, being larger than any other American English corpus, (2) its equal proportion of texts added to eight different genres, and (3) its nature of being a 'monitor' corpus, meaning that new texts are continuously added to the corpus, thus increasing its size each year (Davies, 2020).

3.3 Data analysis

3.3.1 Senses of meaning

To answer the first research question regarding the meaning of *dangerous*, *hazardous*, and *risky*, the data was obtained from LDOCE (online version) and Merriam-Webster Dictionary (online version). The use of these dictionaries is to present the meanings from both well-known American-based dictionaries. The senses of meaning, particularly of native speakers of American English, were examined from the definitions in the dictionaries to find the similarities and differences of the three synonyms. The examples of each sense of meaning are drawn from the first three hundred concordance lines of the COCA database. The senses of meaning of each adjective were then analyzed to determine whether they shared the same core meaning, and whether they are strict or loose synonyms.

3.3.2 Genres

In terms of their genres, the Corpus of Contemporary American English (COCA) was consulted to answer the second research question. COCA was used to investigate the frequencies and distribution of the target synonyms in the eight different genres: spoken, fiction, popular magazines, newspapers, academic texts, TV and movie subtitles, blogs, and other web pages. The data was then analyzed to find out their similarities and differences in the degree of formality.

3.3.3 Collocations

In responding to the third research question regarding collocation, COCA was also the major source used to search for noun collocates and adverb collocates frequently occurring with *dangerous*, *hazardous*, and *risky*. The collocates were then selected based on the statistical corpus-based methods, the Mutual Information (MI) value or score (Phoocharoensil, 2020). To determine whether two words co-occur by chance or have a strong association in terms of collocation, the MI value was chosen since it is the only statistical measure provided in COCA. However, the MI value alone is not sufficient; some collocations with high MI scores may not be the most representative examples since the number of occurrences in a corpus can be low in frequency (Szudarski, 2018). It has been suggested that the MI score be used with a frequency level (Schmitt, 2010). Thus, the noun collocates and adverb collocates in the top-20 frequency list in COCA whose MI score is ≥ 3, which is the significance value for collocational association, were chosen (Cheng, 2012).

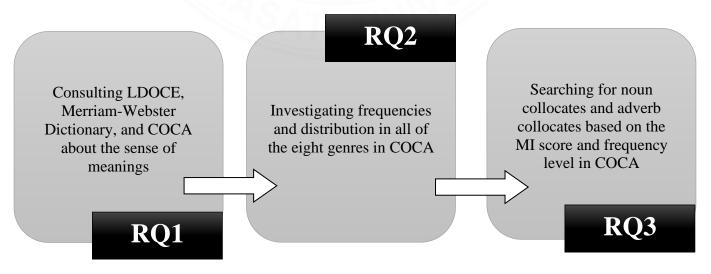


Figure 1. Conceptual diagram explaining the data analysis.

3.3.4 Inter-rater reliability

To minimize errors that may stem from inadequate coder expertise and coder bias, an inter-rater is needed to ensure the trustworthiness of the coding.

Inter-rater reliability (IRR) refers to the degree to which two or more coders agree with the same categorizations after analyzing the same data with the same coding scheme and procedure (Loewen & Plonsky, 2015). Some common measures are Cohen's Kappa (1960), Scott's Pi (1955), and Krippendorff's Alpha (1980), all of which consider how two coders agree in the same passage of text and then compare it to an expected percentage of agreement (Lovejoy et al., 2016). In addition to the aforementioned method, there is also an inter-rater measurement formulated by Miles and Huberman (1994), who propose that an IRR of 80% inter-coder agreement on 95% of codes is sufficient inter-coder agreement. The formula is shown below.

Some studies that employed this method have been carried out by McAlister et al. (2017) and Kusumah (2020), which seemed to yield reliable results. Thus, the percentage calculated from the above formula proposed by Miles and Huberman was used in the present study as well. The other coder was Patchakarn Pan-Akart, a master's degree student in English Language Teaching (ELT) at the Language Institute, Thammasat University. She is currently an English instructor at the Royal Thai Armed Forces Language Institute. Her research interests include phonology, phonetics, second language acquisition (L2) and corpus linguistics, thus making her suitable to be the other coder in this study.

In this process, the other coder was provided thirty concordance lines (ten percent of three hundred concordance lines) of each vocabulary that were chosen at random and classified based on their senses of meaning together with the definitions and explanations of each sense of meaning. Apart from that, the semantic preference of noun and adverb collocates of the target synonyms was also presented, followed by the discussion of agreements or disagreements. Finally, additional modifications were made to the findings based on discussions about disagreements. The percentage of inter-rater reliability (IRR) for the coded categories agreement was 97%, which is considered sufficient for the study according to Miles and Huberman.

CHAPTER 4 RESULTS AND DISCUSSION

In response to the three research questions in terms of senses of meaning, genres, and collocations, the findings as regards the senses of meaning of *dangerous*, *hazardous*, and *risky* are presented first, followed by their overall frequency in the eight different genres, and then the collocations in which the synonyms are commonly used.

4.1 Senses of meaning

To answer what the senses of meaning of the target synonyms are, Longman Dictionary of Contemporary English (online version), Merriam-Webster Dictionary (online version), and the Corpus of Contemporary American English (COCA) were used as the main source of the study in this respect. It was clear that *dangerous*, *hazardous*, and *risky* share the same core meaning, i.e., *involving risk or danger* but differ in detailed meanings.

Table 1

Meanings of dangerous, hazardous, and risky from Longman Dictionary of Contemporary English (LDOCE) and Merriam-Webster Dictionary

	Senses of meaning				
Synonyms	LDOCE	Merriam-Webster Dictionary			
	1. able or likely to harm or kill you e.g.:	1. involving possible injury, pain, harm, or			
	- It was a highly dangerous	loss; characterized by danger e.g.:			
	situation.	- a dangerous job			
Dangerous					
	2. involving a lot of risk, or likely to cause	2. able or likely to inflict injury or harm			
	problems e.g.:	e.g.:			
	- The business is in a dangerous	- a dangerous man			
	financial position.				

	Senses of meaning				
Synonyms	LDOCE	Merriam-Webster Dictionary			
	3. a situation or subject that could make				
	someone very angry or upset →				
	dangerous ground/territory e.g.:				
	- Teachers can be on dangerous				
	ground if they discuss religion.				
	1. dangerous, especially to people's health	1. involving or exposing one to risk (as of			
	or safety e.g.:	loss or harm) e.g.:			
Hazardous	- The chemicals in paint can be	- disposing of hazardous waste			
	hazardous to health.	-(1213 N			
	1. involving a risk that something bad will	1. attended with risk or danger			
Dislay	happen	- Her plan is too risky.			
Risky	- Buying a secondhand car is a risky				
	business.	43/A//			

4.1.1 Dangerous

With regard to the senses of meaning from both dictionaries, it can be seen that the meanings from LDOCE are somewhat similar to the meanings from Merriam-Webster Dictionary except the third sense of meaning—a situation or subject that could make someone very angry or upset—which does not appear in Merriam-Webster Dictionary. However, considering the samples taken from the first three hundred concordance lines of COCA, it seems that the word *dangerous* contains three senses of meaning, as evidenced below¹:

_

¹ Sample concordance lines in complete sentences of are shown in Appendix A.

- 1. able or likely to harm or kill you, as in (1-5).
- (1) ...food allergies can be *dangerous*, even life threatening, Halloween is a time...
- (2) ... near the edge of a cliff is *dangerous* work so make sure you have a life line...
- (3) ... supposition that it is injurious, *dangerous*, or fatal to be deceived.
- (4) ...the most deadly, *dangerous*, unhealthy and risky work is carried out...
- (5) Flu can be very *dangerous*, people die from flu and the vaccines...
 - 2. involving a lot of risk, or likely to cause problems, as in (6-10).
- (6) This can be *dangerous* to the person's belief system ...
- (7) ... that Superman's influence is so *dangerous* that the character encourages children to...
- (8) Nothing in all the world is more *dangerous* than sincere ignorance and...
- (9) Far more *dangerous*, politically speaking, is the delusion that ...
- (10) ...they should be treated like the *dangerous* children they are.
 - 3. a situation or subject that could make someone very angry or upset.

Surprisingly, this meaning was not found in the first three hundred concordance lines of COCA database despite the fact that territory is a strong collocation of dangerous according to COCA. Further discussion will follow at the end of this section below.

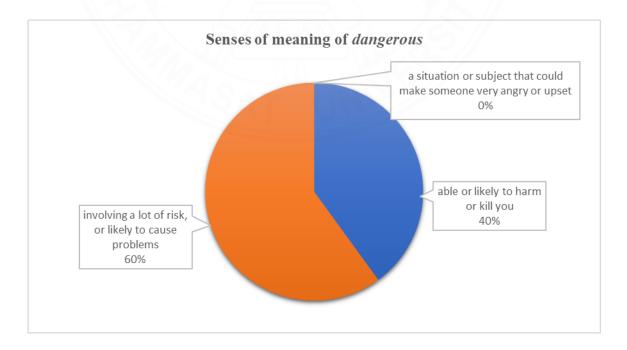


Figure 2 The frequency of meanings of the word dangerous

Figure 2 illustrates that the first sense of meaning, i.e., able or likely to harm or kill you, was shown in 120 concordance lines (40%). The second sense of meaning, i.e., involving a lot of risk, or likely to cause problems, was shown in 180 concordance lines (60%), and the third sense of meaning, i.e., a situation or subject that could make someone very angry or upset, was not found in the first three hundred concordance line.

4.1.2 Hazardous

According to both dictionaries, the word *hazardous* could have one sense of meaning with LDOCE focusing on people's health or safety, while Merriam-Webster Dictionary focuses on risks in general as shown below.

- 1. dangerous, especially to people's health or safety, as in (11-15).
- (11) ... unhealthy, very unhealthy or *hazardous*.
- (12) ... produces tons of gases that are *hazardous* to human health and the environment.
- (13) ... transport the gas may be more *hazardous* to your health than the tear gas itself.
- (14) ... all that you should avoid *hazardous* and dangerous remedies, medicines,...
- (15) ... in conditions that were clearly *hazardous* to the health of the dogs.
 - 2. involving or exposing one to risk (as of loss or harm), as in (16-20).
- (16) ... is not for all, and is spiritually *hazardous*.
- (17) Wearing our nation's uniform is *hazardous* combatting an enemy among the dangers.
- (18) ... in cardboard boxes may be *hazardous* to your comic collection.
- (19) ... Murdoch news reporting can be *hazardous* to your understanding and knowledge...
- (20) Overall, the operation was *hazardous*. Tactical Air Command " asked...

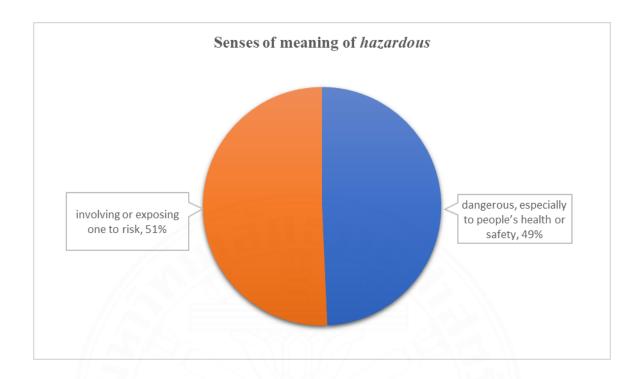


Figure 3 The frequency of meanings of the word hazardous

Figure 3 illustrates that the first sense of meaning—dangerous, especially to people's health or safety—as shown in 148 concordance lines (49%). The second sense of meaning—involving or exposing one to risk (as of loss or harm)—was shown in 152 concordance lines (51%).

4.1.3 Risky

With regard to the meanings from both dictionaries, it can be seen that the meanings from LDOCE are similar to the meanings from Merriam-Webster Dictionary. Thus, the word *risky* contains one sense of meanings as supported by the corpus data below:

1. involving a risk that something bad will happen, as in (21-25).

(21)	variable and that is extremely	risky	for folks trying to obtain retirement income.
(22)	is participating in dangerous or	risky	behavior that will inevitably harm her
(23)	It was a	risky	play that ended with a devastating result.
(24)	at which they deemed it too	risky	to send out rescuers.
(25)	In fact, nuclear is so	risky,	not one nuclear plant in the world is even

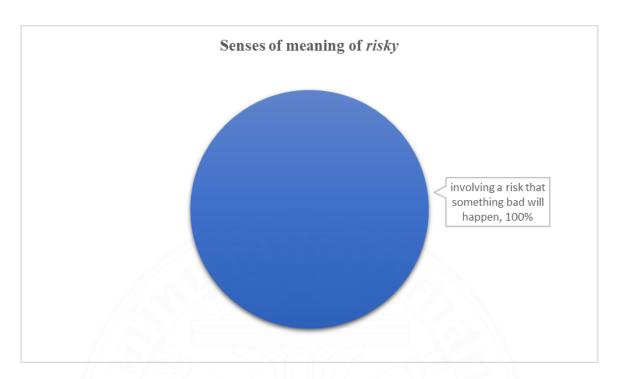


Figure 4 The frequency of meanings of the word risky

Figure 4 illustrates that only one sense of meaning, i.e., involving a risk that something bad will happen, was shown in 300 concordance lines (100%).

According to the information from both dictionaries and COCA, even though dangerous, hazardous and risky seem to have a similar core meaning, i.e., involving risk or danger, differences can be identified. As the data reveal, dangerous covers a wider range of meanings than hazardous and risky since dangerous contains additional meanings which relate to problems or bad results such as making people angry as in dangerous ground/territory. However, the examples of this sense of meaning were not found in the first three hundred concordance lines of COCA, which may imply that this sense of meaning is not used very frequently, despite the fact that territory is a strong collocation of dangerous according to COCA². Besides, the order of the concordance lines that present the most frequently used collocates first may account for the reason why dangerous ground/territory was not found in the first three hundred concordance lines.

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² The MI score of *territory* and *ground* is 6.60 and 3.41, respectively.

When, however, the investigation was extended to cover the first one thousand concordance lines in order to find an example of this sense of meaning, one example was found, as in:

(26) ...in serious trouble.. treading on *dangerous* ground.

Moreover, investigating the first three hundred concordance lines of each synonym reveals that their senses of meaning are also different. *Dangerous* implies something that is likely to harm or kill someone or likely to cause problems in general, as in

(5) Flu can be very *dangerous*, people die from flu and the vaccines...

Hazardous applies to great and continuous risk of harm or failure, especially to people's health relating to scientific facts, as in

(12) ... produces tons of gases that are *hazardous* to human health and the environment.

Risky is often used with a known and accepted danger, especially in term of economy, as in

(21) ... variable and that is extremely *risky* for folks trying to obtain retirement income.

As the data illustrate, *dangerous*, *hazardous*, and *risky* do not share the same detailed meanings and senses of meaning; they are not freely interchangeable in usage. Thus, they can be classified as loose synonyms in terms of meanings, as proposed by Jackson and Amvela (2000).

4.2 Genres

In response to the second research question of how the three synonyms are distributed across different genres, the degree of formality of the target synonyms was investigated. This is one of the criteria for distinguishing synonyms since one word in a synonymous set can be used in formal contexts, while the others cannot (Jackson & Amvela, 2000).

In terms of genres, the results show that COCA provides some information which does not appear in LDOCE and Merriam-Webster Dictionary. The results are illustrated in Table 2.

Table 2Distribution of *dangerous*, *hazardous*, and *risky* across eight genres according to frequency.

Dangerous		Hazardous			Risky			
Genre	Frequency	Per million	Genre	Frequency	Per million	Genre	Frequency	Per million
Academic*	4,969	41.48	Academic**	3,068	25.61	Academic	1560	13.02
Newspaper	7,343	60.32	Newspaper	1,034	8.49	Newspaper	1699	13.96
Magazine	8,253	65.45	Magazine	1,042	8.26	Magazine**	1970	15.62
Fiction	7,141	60.35	Fiction	189	1.60	Fiction*	606	5.12
Webpages	7,637	61.46	Webpages	673	5.42	Webpages	1215	9.78
Blogs	7,923	61.60	Blogs	510	3.97	Blogs	1289	10.02
TV/movie subtitles	10,200	79.64	TV/movie subtitles*	189	1.48	TV/movie subtitles	1047	8.17
Spoken**	10,663	84.54	Spoken*	417	3.31	Spoken	1472	11.67
Total	64,12	29	Total	7,12	2	Total	10,8	58

Notes:

As can be seen in Table 2, the number of occurrences of *dangerous* (64,129 tokens) is over nine times higher than that of *hazardous* (7,122 tokens), and over six times higher than that of *risky* (10,858 tokens). The obvious differences in degree of formality between them are also shown as the occurrences of *dangerous* are highest in number in the spoken genre (10,665 tokens), which is considered to be informal contexts. However, the lowest frequency (4,970 tokens) is found in the academic genre. On the other hand, the frequency of *hazardous* is highest in formal context, namely the academic genre (3,068 tokens), with the lowest frequency in the fiction

^{**} refers to the genre with the highest frequency.

^{*} refers to the genre with the lowest frequency.

genre (189 tokens) and TV and movie subtitles genre (189 tokens), which are representative of informal or colloquial English. Compared with *dangerous* and *hazardous*, *risky* has the highest frequency in the magazine genre (1970 tokens), and occurs with the lowest frequency in the fiction genre (606 tokens), all of which belong to informal text types.

Based on the findings, it is obvious that *dangerous*, *hazardous*, and *risky* are different in terms of degrees of formality. To clarify this, *hazardous* seems to be the most formal word, as it tends to be used more often in formal contexts and less often in informal contexts than *dangerous* and *risky*, while *dangerous* seems to be the least formal word, as it tends to be used less often in formal contexts and more often in informal contexts than *hazardous* and *risky*. Thus, it can be concluded that *dangerous*, *hazardous*, and *risky* share the same core meaning, but they are not the same in terms of degrees of formality. This is consistent with the studies by Petcharat (2017) and Phoocharoensil (2020) in that words in a set of synonyms are distributed across different text genres, and some of the words occur more frequently in particular genres than the others despite their similar meanings.

4.3 Collocations

Even though words in a set of synonyms may share similar core meaning, they may have different collocations. In this study, the collocations of *dangerous*, *hazardous*, and *risky* were investigated in order to find out the answer to the third research question regarding their similarities and differences in collocates. Since these synonyms are adjectives, the study was aimed at examining noun collocations and adverb collocations. The data, which was collected from COCA, is shown as follows:

Table 3Noun collocates of *dangerous*, *hazardous*, and *risky* in COCA

	Dangerous				Hazardous					Risky		
Rank	Noun Collocate	Frequency	MI Value	Rank	Noun Collocate	Frequency	MI Value	Rank	Noun Collocate	Frequency	MI Value	
1	place	823	4.75	1	waste	1727	12.22	1	business	478	7.10	
1	places	255	5.36	1	wastes	414	13.86	2	behavior	292	8.02	
2	situation****	728	6.36	2	materials	579	10.59		behaviors	186	9.34	
2	situations	312	7.14	2	material	139	8.00	3	move	163	6.03	
3	thing**	671	4.18	3	substances	412	12.72	4	investments	107	9.01	
4	man	450	3.23	3	substance	173	9.87		investment	66	6.66	
5	world	397	3.10	4	chemicals***	199	10.80	5	proposition	97	9.53	
6	game**	360	4.16	4	chemical	24	6.71	6	loans	97	8.39	
7	precedent	285	9.19	5	air	95	5.99	7	strategy	96	7.06	
8	weapon	199	6.58	6	conditions***	74	6.91	8	sex	78	5.94	
8	weapons	136	4.98	7	duty	45	7.41	9	thing**	70	3.51	
9	levels***	194	4.90	8	drinking	35	6.76	10	venture	66	8.48	
10	job***	189	3.23	9	levels***	27	5.22	11	choice	60	5.56	
10	jobs	141	4.20	10	situations****	26	6.73	12	assets	55	7.53	
11	territory	165	6.60	10	situation	23	4.55	13	situation****	47	4.99	
10	drug***	156	4.59	11	products	25	5.38		situations	43	6.87	
12	drugs	146	4.95	11	product	16	4.84	14	bet	45	6.38	
13	conditions***	141	4.67	12	areas	23	4.75		bets	42	9.54	
14	chemicals***	138	7.10	13	drinkers	21	10.71	15	mortgages	37	9.16	
15	mission	127	4.82	14	drug***	19	4.73	16	decision	37	4.72	
16	criminals	125	7.13	15	cargo	18	7.91		decisions	31	5.44	
17	road	115	3.59	16	foods	17	6.19	17	game**	35	3.38	
18	combination	113	5.61	17	weather	17	5.34	18	activities	31	5.13	
19	animals	111	4.69	18	pollutants	16	9.27	19	procedure	29	6.52	
20		110	<i>5.5</i>	19	jobs***	16	4.24	20		20	5.07	
	journey 110 5.5	5.5	20	asteroids	15	9.61		surgery 28	5.97			

Notes: **** refers to a collocate shared by the three synonyms.

*** refers to a collocate shared by dangerous and hazardous only.

** refers to a collocate shared by dangerous and risky only.

In this section, the noun collocates that usually occur with *dangerous*, hazardous, and risky are examined. The selected nouns have at least ≥ 3 of the MI value to confirm their statistical significance (Cheng, 2012; Schmitt, 2010).

The corpus data show that there exist more than 100 noun collocates of dangerous, hazardous, and risky based on frequency together with MI scores (\geq 3); however, only the top-20 noun collocates are demonstrated in Table 3. The adjective dangerous frequently precedes the nouns place(s), situation(s), thing, man, and world, as exemplified in (27-31) respectively.

- (27) The internet can also be a *dangerous place* particularly the world of blogs...
- (28) ... wander too close to a dangerous situation.
- (29) Ignorance is a *dangerous thing* in these complex times.
- (30) ... many things that made him a *dangerous man* to the movement.
- (31) Freedom in a *dangerous world* is far preferable to slavery in...

The noun collocates that usually follow hazardous are waste(s), material(s), substance(s), chemical(s), and air as in (32-36) respectively.

- (32) Pollution of waterbodies with even *hazardous waste* thrown in them is the key...
- (33) People working with *hazardous materials* could track exposure to...
- (34) ... and wastes and retain these *hazardous substances* until the fish die.
- (35) Dealing with the *hazardous chemicals* dumped years ago in Metro...
- (36) ... efforts to identify and address *hazardous air* pollutants.

The adjective *risky* often precedes the nouns *business*, *behavior*(s), *move*, *investment*(s), and *proposition* as exemplified in (37-41) respectively.

- (37) ... and end their support of this *risky business*.
- (38) ...half of college students exhibit *risky behavior* for HIV transmission...
- (39) ...to a joint session of Congress, a *risky move* in the eyes of many of his supporters.
- (40) Normally, returns on *risky investments* require discount rates that...
- (41) Extraction of oil from oil sands is a *risky proposition* and will likely in the long...

Out of the top-20 noun collocates, it is interesting to note that *situation(s)* is the only noun collocate shared by *dangerous*, *hazardous*, and *risky* in the top 20 collocates. Thus, it seems that these three synonyms are not likely to co-occur with

the same noun collocates. In terms of noun collocation, the findings imply that dangerous seems to be closer to hazardous than to risky since dangerous and hazardous share up to six common noun collocates. Dangerous and risky share three noun collocates, while hazardous and risky share only one noun collocate.

In the next step, to group their noun collocates on the basis of their similarities in meaning, the semantic preference of the synonyms was analyzed. Semantic preference refers to the relation between a word form and a set of semantically related words (Stubbs, 2001). To illustrate this, Stubbs examined the adjective *large* in a 200-million-word corpus and found that at least 25 percent of the 56,000 occurrences of *large* collocated with words conveying quantities and sizes, i.e., *numbers, scale, part, amounts,* and *quantities*. Thus, semantic preference can be determined by the semantic relations between words and their collocates.

Table 4Semantic preference of noun collocates of *dangerous*

1. Place	place(s), world, territory, road
2. Condition****	situation(s), precedent, journey, conditions, levels
3. Thing****	thing, game, weapon(s)
4. Creature***	man, criminals, animals
5. Substance***	drug(s), chemicals
6. Business****	job(s), mission
7. Others	combination

Notes: **** refers to a theme shared by the three synonyms.

*** refers to a theme shared by dangerous and hazardous only.

In Table 4, the top-20 noun collocates of *dangerous* were classified on the basis of their semantic preference, which can be grouped into seven themes, namely Place, Condition, Thing, Creature, Substance, Business, and Others. The second

theme, Condition, contains the highest number of collocates, i.e., *situation(s)*, *precedent, journey, conditions*, and *levels*.

Table 5Semantic preference of noun collocates of *hazardous*

1. Environment	air, areas, pollutants, weather
2. Substance	substance(s), chemical(s), drug, waste(s), material(s)
3. Thing****	products, cargo, foods, asteroids
4. Condition***	conditions, levels, situation(s)
5. Business****	duty, jobs
6. Creature***	drinkers
7. Action	drinking

Notes: **** refers to a theme shared by the three synonyms.

*** refers to a theme shared by dangerous and hazardous only.

As Table 5 illustrates, the collocates of *hazardous* are connected with seven themes, namely Environment, Substance, Thing, Condition, Business, Creature, and Action. The second theme, Substance, contains the highest number of collocates, i.e., *substance*(s), *chemical*(s), *drug*, *waste*(s), and *material*(s).

Table 6Semantic preference of noun collocates of *risky*

	business, investment(s), loans,				
1 Durding and	venture, assets, bet(s), mortgages,				
1. Business****	proposition, strategy, decision(s),				
	choice				
2 Activity	move, sex, game, activities,				
2. Activity	procedure				

3. Condition****	situation(s)
4. Behavior	behavior(s)
5. Thing****	thing
6. Medical	surgery

Notes: **** refers to a theme shared by the three synonyms.

Through a closer investigation into the semantic preferences of the noun collocates of *risky*, six major themes emerged. The majority of the discovered nouns fall into the first theme, Business, which are *business*, *investment(s)*, *loans*, *venture*, *assets*, *bet(s)*, *mortgages*, *proposition*, *strategy*, *decision(s)*, and *choice*.

All in all, a number of the nouns that frequently collocate with the three target synonyms share three common themes, namely Condition, Thing, and Business, which may partly be indicative of synonymy among the three words. In terms of their semantic preferences, the findings also imply that *dangerous* seems to be closer to *hazardous* than to *risky* since *dangerous* and *hazardous* share up to five common themes. *Dangerous* and *risky* share three themes, and *hazardous* and *risky* also do so. While the majority of noun collocates of *dangerous* are associated with broader and more general themes, such as Place and Condition, most of the noun collocates of *hazardous* and *risky* are related to a narrower sense. That is, *hazardous* conveys something that can have a direct effect on a person's health, which is evident from its themes, such as Environment and Substance, and the majority of noun collocates of *risky* are strongly associated with financial themes, i.e., Business and Activity.

Having analyzed the common noun collocates of *dangerous*, *hazardous*, and *risky* based on the corpus data from COCA, adverbs frequently co-occurring with the target synonyms were then searched as presented in Table 7.

Table 7Adverb collocates of *dangerous*, *hazardous*, and *risky* in COCA

	Dangerous				Hazardous				Risky		
Rank	Adverb Collocate	Frequency	MI Value	Rank	Adverb Collocate	Frequency	MI Value	Rank	Adverb Collocate	Frequency	MI Value
1	very**	3851	4.85	1	potentially**	199	8.82	1	too**	1057	5.99
2	most	3839	4.90	2	less****	69	3.83	2	very**	398	4.15
3	more	3838	3.70	3	extremely***	64	6.43	3	less****	354	5.60
4	too**	2557	4.68	4	particularly**	27	4.18	4	extremely**	92	6.37
5	potentially****	1113	8.14	5	environmenta lly	18	8.00	5	politically**	81	7.34
6	extremely****	807	6.92	6	highly****	12	3.61	6	highly****	71	5.59
7	less****	491	3.49	7	morally	10	6.38	7	potentially*	64	6.60
8	particularly****	242	4.17	8	increasingly* ***	7	3.44	8	pretty	53	3.47
9	inherently****	177	7.70	9	acutely	6	7.66	9	bit	50	3.44
10	incredibly	161	5.75	10	inherently***	6	5.99	10	inherently**	45	8.31
11	highly****	132	3.90	11	medically	5	6.98	11	particularly*	40	4.16
12	downright***	126	7.85	12	ultra	5	6.95	12	somewhat*	29	5.00
13	truly	104	3.57	13	horribly	5	6.61	13	increasingly ****	27	4.80
14	increasingly***	100	4.11	14	downright***	5	6.36	14	financially	24	6.74
15	possibly	85	3.50	15	politically***	5	3.91	15	incredibly	22	5.47
16	politically****	83	4.79	16	somewhat*	5	3.06	16	sexually	12	5.20
17	equally**	71	4.15	17	formerly	4	4.69	17	equally**	12	4.17
18	abnormally	54	8.82	18	imminently	3	9.81	18	enormously	10	6.77
19	terribly	41	4.81	19	intrinsically	3	6.70	19	legally	9	4.77
20	physically	31	3.43	20	moderately	3	5.73	20	systemically	8	10.03

Notes:

**** refers to a collocate shared by the three synonyms.

^{***} refers to a collocate shared by dangerous and hazardous only.

^{**} refers to a collocate shared by dangerous and risky only.

^{*} refers to a collocate shared by *hazardous* and *risky* only.

The data reveal that there exist more than 100 adverb collocates of *dangerous* and *risky*, whereas there are only 58 adverb collocates of *hazardous* based on frequency and MI scores (\geq 3). The first five most frequent adverb collocates of the word *dangerous* are *very*, *most*, *more*, *too* and *potentially*, as in (42-46) respectively.

- (42) ... is usually reserved for very dangerous students... often armed with guns...
 (43) Some of the most dangerous preservatives out there are sodium...
 (44) ... flame, are considerably more dangerous than their LED counterpart.
 (45) ... weather makes commuting too dangerous. -
- (46) It may also be *potentially dangerous* to humans due to a lack of thorough...

The first five adverb collocates that are frequently used with the adjective *hazardous* are *potentially, less, extremely, particularly*, and *environmentally* as in (47-51) respectively.

(47) ... admitted to using a potentially material to contaminate food in... hazardous (48)...were substituting *less* hazardous chemicals for harmful solvents in... ... required would be *extremely* (49)hazardous to any humans in the area. (50)Night driving is *particularly* hazardous on the old Panama City -- Colon highway. ...one of the most environmentally (51)hazardous consumer materials ever produced...

The adverb collocates that frequently occur with the adjective *risky* are *too*, *very*, *less*, *extremely*, and *politically* as exemplified in (52-56) respectively.

(52)	Voting via internet is <i>too</i>	risky	for having private information
(53)	usually do not make <i>very</i>	risky	and unsafe bets, and as insurance
(54)	plan would be " less	risky "	if the federal health care law was
(55)	This was an extremely	risky	operation since a storm could have
(56)	that it's too politically	risky	to help federal officials to fix the system

According to Table 7, it can be seen that the three synonyms share up to eight adverb collocates out of the twenty most frequently found adverbs, namely *less*, *extremely*, *politically*, *highly*, *potentially*, *inherently*, *particularly*, and *increasingly*. Nevertheless, in this study, *less* is considered a weak and insignificant adverb

collocate because it is a common modifier and can co-occur with almost all adjectives. In terms of adverb collocation, the findings imply that *dangerous* seems to be slightly closer to *risky* than to *hazardous* as *dangerous* and *risky* share up to eleven adverb collocates, while *dangerous* and *hazardous* share nine adverb collocates, similar to *hazardous* and *risky* that also share nine adverb collocates.

All the adverb collocates were then classified according to their semantic preference as follows.

Table 8Semantic preference of adverb collocates of *dangerous*

1 1	Manner***	abnormally, truly, inherently,				
1. 1	viamici	incredibly, politically, physically				
/ AS		terribly, very, most, more, too,				
2. I	Degree****	extremely, increasingly,				
		less, highly, equally, downright				
3. I	Emphasis***	particularly				
4. I	Probability****	potentially, possibly				

Notes: **** refers to a theme shared by the three synonyms.

In Table 8, the adverb collocates of *dangerous* were categorized into four themes, namely Manner, Degree, Emphasis and Probability. The majority of its adverb collocates are strongly associated with Degree, as demonstrated by the adverb *terribly, very, most, more, too, extremely, increasingly, less, highly, equally, downright,* and *particularly*.

Interestingly, *terribly* contains two senses of meaning, according to Merriam-Webster Dictionary, which are 1) to an extreme degree, and 2) in a terrible way, making it both adverb of degree and adverb of manner. However, investigating all forty-one concordance lines of dangerous modified by terribly tends to reveal only the first sense of meaning, i.e., to an extreme degree. The core meaning of dangerous is associated with 'involving risk or danger'; therefore, dangerous itself expresses a

negative sense, which seems to be modified by an adverb of degree, rather than an adverb of manner, *terribly*, as shown in (57).

(57) But the vaccine was obviously not *terribly dangerous*.

Table 9Semantic preference of adverb collocates of *hazardous*

1. Time	imminently, formerly
2. Manner***	environmentally, morally, inherently, medically, horribly, politically, intrinsically
3. Degree***	less, extremely, highly, ultra, moderately, acutely, somewhat increasingly, downright
4. Emphasis***	particularly
5. Probability****	potentially

Notes: **** refers to a theme shared by the three synonyms.

The adverb collocates of *hazardous* are connected with more themes than *dangerous* and *risky*. One theme that does not appear in adverb collocates of *dangerous* and *risky* is Time. Of all the five themes shown in Table 9, most of the cooccurring adverb are concerned with Degree, i.e., *less, extremely, highly, ultra, moderately, acutely, somewhat increasingly, particularly, and <i>downright*.

Table 10Semantic preference of adverb collocates of *risky*

	legally, systemically, sexually,
1. Manner****	financially, incredibly, inherently,
1. Wanner	politically

	too, very, less, extremely, highly,
2. Degree****	pretty, bit, enormously, equally,
	increasingly, somewhat
3. Emphasis****	particularly
4. Probability****	potentially, possibly

Notes: **** refers to a theme shared by the three synonyms.

Upon investigation of the semantic preference of *risky* through its adverb collocates, four main themes were determined. The second theme Degree contains the highest number of collocates, i.e., *too*, *very*, *less*, *extremely*, *highly*, *pretty*, *bit*, *enormously*, *equally*, *increasingly*, *somewhat*, and *particularly*.

All adverbs that frequently occur with these synonyms share four common themes. While the adverb collocates of *dangerous* and *risky* were categorized into four themes, namely Manner, Degree, Emphasis, and Probability, *hazardous* has one more additional theme, which is Time. The majority of adverb collocates of the three synonyms are strongly associated with Degree. However, the differences in themes of their adverb collocates are not as apparent as those of the noun collocates.

Overall, it can be concluded that *dangerous*, *hazardous*, and *risky* tend to cooccur with different noun and adverb collocates. Despite the fact that they share some collocates, those collocates are small in number compared to the total, especially noun collocates. This highlights the fact that these three synonyms cannot be used interchangeably in every context; they can be distinguished by the words they are likely to occur with. The findings are in line with a theoretical perspective stated by Palmer (1997) that some words are restricted by their collocations and only co-occur with particular words. Moreover, the results also support the previous studies by Chung (2011), Aroonmanakun (2015), Petcharat (2017), and Phoocharoensil (2020) in that words in a set of synonyms, despite sharing the same core meaning, cannot be used interchangeably in every context as they often co-occur with different words.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

This chapter presents the summary of the study and is divided into five parts: (1) a summary of the study, (2) a summary of the findings, (3) pedagogical implications, (4) recommendations for further research, and (5) the conclusion.

5.1 Summary of the study

5.1.1 Objectives of the study

The objectives of the study were 1) to compare the senses of meaning of the synonyms *dangerous*, *hazardous*, and *risky*, 2) to examine the distribution of the three synonyms across different genres, and 3) to investigate their possible collocations.

5.1.2 Target words and databases

The target words of the study were *dangerous*, *hazardous*, and *risky*. The data of the three synonyms were derived from Longman Dictionary of Contemporary English (LDOCE), Merriam-Webster Dictionary, together with the Corpus of Contemporary American English (COCA). The criteria for distinguishing these synonyms were senses of meaning, degrees of formality, and collocations. The senses of meaning, particularly of native speakers of American English, were examined from the definitions in the dictionaries, and the examples of each sense of meaning were drawn from the first three hundred concordance lines of COCA database. COCA was also used to investigate the frequencies and distribution of the target synonyms in eight different genres, and to examine noun collocates and adverb collocates frequently occurring with *dangerous*, *hazardous*, and *risky*.

5.2 Summary of the findings

The results of the study are summarized as follows:

5.2.1 Senses of meaning

As Petcharat (2017) concluded, the target synonyms contain both overlapping and non-overlapping senses of meaning. It is found that *dangerous*, *hazardous*, and *risky* share the same core meaning (involving risk or danger). However, *dangerous*

covers a wider range of meanings than *hazardous* and *risky* since *dangerous* contains additional meanings which relate to problems or bad results, such as making people angry as in *dangerous ground/territory*. In addition, the results suggest that *dangerous* implies something that is likely to harm or kill someone or likely to cause problems in general, while *hazardous* and *risky* may be more specific in meaning than *dangerous*. *Hazardous* applies to great and continuous risk of harm or failure, especially to people's health relating to scientific facts, and *risky* is often used with a known and accepted danger, especially in terms of the economy.

Overall, the results suggest that these synonyms are loose synonyms as they cannot substitute for each other in all contexts. There are still some contexts in which these words cannot be used interchangeably, despite their same core meaning (Jackson & Amvela, 2000).

5.2.2 Degrees of formality

Dangerous, hazardous, and risky occur in both formal and informal contexts. However, it was found that hazardous seems to be the most formal word, as it tends to be used more often in formal contexts and less often in informal contexts than dangerous and risky; meanwhile, dangerous seems to be the least formal word, as it tends to be used less often in formal contexts and more often in informal contexts than hazardous and risky. Thus, it can be concluded that dangerous, hazardous, and risky share the same core meaning, but they are not the same in terms of degrees of formality. This is in line with the studies by Petcharat (2017) and Phoocharoensil (2020) in that words in a set of synonyms are distributed across different text genres, and some of the words occur more frequently in particular genres than the others, despite their similar meanings.

5.2.3 Collocations

The main collocates of *dangerous*, *hazardous*, and *risky* are nouns and adverbs. In terms of noun collocation, the corpus data show that there exist more than 100 noun collocates of *dangerous*, *hazardous*, and *risky*, but out of the top-20 noun collocates, *dangerous*, *hazardous*, and *risky* share only one noun collocate. *Dangerous* seems to be closer to *hazardous* than to *risky* since *dangerous* shares more common noun collocates with *hazardous* than it does with *risky*. Moreover, when the top-20 noun collocates of each synonym were grouped together based on their

semantic preference, three common themes emerged among them. It can also be seen that while the majority of noun collocates of *dangerous* are associated with broader and more general themes, most of the noun collocates of *hazardous* and *risky* are related to a narrower sense. That is, *hazardous* conveys something that can have a direct effect on a person's health, and the majority of noun collocates of *risky* are strongly associated with financial themes. In terms of adverb collocations, the three synonyms share up to eight adverb collocates out of the twenty most frequently found adverbs, and the findings imply that *dangerous* seems to be slightly closer to *risky* than to *hazardous* as *dangerous* shares more adverb collocates with *risky* than it does with *hazardous*. When grouped based on their semantic preference, all adverbs that frequently occur with these synonyms share four common themes. The majority of adverb collocates of the three synonyms are strongly associated with Degree. However, the differences in themes of their adverb collocates are not as apparent as that of their noun collocates.

Overall, it can be concluded that *dangerous*, *hazardous*, and *risky* tend to cooccur with different noun and adverb collocates. This highlights the fact that these three synonyms cannot be used interchangeably in every context. The findings are in line with a theoretical perspective stated by Palmer (1997) that some words are restricted by their collocations and only co-occur with particular words. Moreover, the results are also consistent with the findings from the previous studies by Chung (2011), Aroonmanakun (2015), Petcharat (2017), and Phoocharoensil (2020).

5.3 Pedagogical implications

The current study investigated a set of three synonyms, namely *dangerous*, *hazardous*, and *risky*, using the three criteria: meanings, degrees of formality, and collocations. The findings suggest that these synonyms are different in terms of the three criteria mentioned above. Not only does this corpus-based study provide lexical knowledge of the synonyms, but it also makes a pedagogical contribution. The findings of the study can be adapted to teaching as follows:

The core meaning that the three synonyms share, i.e., *involving risk or danger*, should be taught to students in the first step, and the specific additional meanings and contexts in which each sense of meaning is used should be thoroughly presented later.

Dangerous, among these three synonyms, should be highlighted as it has more senses of meaning and implies something that is likely to cause problems in general, which seems to be suitable in more contexts than the other two synonyms. Apart from the senses of meaning, it is also important to raise awareness of degrees of formality when choosing the word in this set of synonyms. The fact that hazardous is the most formal word, followed by risky and dangerous respectively, should be highlighted. Moreover, noun and adverb collocates of the three synonyms should also be taken into consideration. This can be done by directing students' attention to high-frequency collocates of each synonym, followed by the shared collocates. Some sample sentences of these synonyms with their frequently occurring collocates from the corpus data may be shown to students to help them gain a thorough understanding. This is a particularly important lesson in a military school since the military contains many dangerous jobs and students need to know the similarities and differences of the synonyms in order to be able to use them correctly.

In addition to the three synonyms, the adverb collocates revealed by the corpus data, when categorized into themes based on their semantic preference, show one type of adverb which is usually ignored in many basic adverb lessons. For example, Swick (2009) classifies adverbs according to their functions into six categories, namely adverbs of manner, adverbs of time, adverbs of degree, adverbs of place, adverbs of frequency, and adverbs that make a comment, without mentioning adverbs of probability. Adverbs of probability are used to show how certain a speaker is about a situation or event. The most common adverbials of this type are *definitely*, certainly, clearly, obviously, possibly, perhaps, probably, and maybe, which make conversations sound interesting and engaging. They are also convenient to use and can substitute for modal verbs when expressing possibility. COCA shows that American native speakers tend to use adverbs of probability to modify the target synonymous adjectives, for instance, a potentially hazardous material, in both written and spoken text. Therefore, adverb lessons that do not incorporate adverbs of probability can possibly result in difficulties in speaking English naturally and fluently among learners. The importance of adverbs of probability shown in the corpus data illustrates why it is worth teaching and highlighting them from the beginning.

Considerable insight into the three synonyms would not have been gained without the corpora. According to O'Keeffe and McCarthy (2010), corpora are beneficial to language learning in many ways, and it is clear that corpora have now become a major source of knowledge. Their view is also supported by the fact that most of the data in the current study was derived from COCA as the corpus provides much more insightful information than dictionaries do. As a result, it is suggested that, instead of depending on only dictionaries or intuition when teaching vocabulary, corpora should be consulted as a reliable source of reference, and there are currently many corpora which are totally free to research and easily available on the internet, for example, COCA. As Thornbury (2002) points out, now it is easier for English teachers and learners to gain information about the target words from corpora in which collocations and authentic examples of words in contexts can be found.

5.4 Recommendations for further research

In light of the findings of this study, the following recommendations are made for future research.

- 5.4.1 As discussed earlier, grammatical patterns are also one of the criteria for distinguishing synonyms (Jackson & Amvela, 2000). Due to time constraints, however, this corpus-based study examined the three synonyms only in terms of meanings, degrees of formality, and collocations. It is recommended that grammatical patterns be included in the criteria of future studies to gain a more thorough understanding of the synonyms.
- 5.4.2 The current study focused only on the American English dictionaries and American English corpus. Thus, the findings may not be generalized to include other varieties of English, e.g., British English. In order to fill in the research gap, data should be collected from dictionaries and corpora based on different dialects, such as British English or Australian English in further research.
- 5.4.3 As mentioned earlier, *dangerous* contains additional meanings which relate to problems or bad results as in *dangerous ground/territory*. Although *territory* is a strong collocation of *dangerous*, the examples of this sense of meaning were not found in the first three hundred concordance lines but in the first one thousand lines of COCA. Rather than investigating the first three hundred concordance lines, a random

sample of three hundred concordance lines should be taken into consideration in a future corpus-based study.

5.4.4 The number of noun and adverb collocates of the three synonyms were limited to those in the top-20 lists. An extension of the investigation to include collocates with comparatively lower frequency will provide more accurate collocational patterns of the target synonyms in a further study.

5.5 Conclusion

Based on the findings of this study, it can be concluded that:

- 5.5.1 Although *dangerous*, *hazardous*, and *risky* share the same core meanings, the detailed meanings and senses of meaning are different. The three synonyms are also different in terms of degrees of formality, and tend to co-occur with different noun and adverb collocates. As a result, *dangerous*, *hazardous*, and *risky* are loose synonyms rather than strict synonyms as they are not freely interchangeable in usage.
- 5.5.2 The study also demonstrated how corpora can contribute to teaching vocabulary, which has pedagogical implications. It is obvious that a corpus provides much more insightful lexical knowledge of the synonyms than a dictionary, which may encourage English teachers to use corpora as a reliable source apart from dictionaries. Meanwhile, the corpus-linguistic method of this study can be adopted to study synonyms in order to gain a thorough understanding of the target synonyms.

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APPENDIX A

CONCORDANCE LINES IN COMPLETE SENTENCES

(1)	Since symptoms of food allergies can be <i>dangerous</i> , and even life threatening,
	Halloween is a time to be well-prepared to treat food allergies.
(2)	Working that near the edge of a cliff is <i>dangerous</i> work so make sure you have
	a life line tied off somewhere safe!
(3)	One does not want to be deceived, under the supposition that it is injurious,
	dangerous, or fatal to be deceived.
(4)	In Australia however, the most deadly, <i>dangerous</i> , unhealthy and risky work
	is carried out overwhelmingly by males.
(5)	Flu can be very <i>dangerous</i> , people die from flu and the vaccines generally
	help, " Bloomberg said.
(6)	This can be <i>dangerous</i> to the person's belief system when the supernatural
	is contradicted (e.g. by science).
(7)	Wertham even goes so far as to argue that Superman's influence is so
	dangerous that the character encourages children to create accidents and
	problems in order to be seen solving them.
(8)	Nothing in all the world is more <i>dangerous</i> than sincere ignorance and
	conscientious stupidity. "M. L. King
(9)	Far more <i>dangerous</i> , politically speaking, is the delusion that the sum of
	their individual lifestyle choices will have a significant impact on society.
(10)	As such, they should be treated like the <i>dangerous</i> children they are.
(11)	The Missoula County's website also lists the air quality as good, moderate,
	unhealthy for sensitive groups, unhealthy, very unhealthy or <i>hazardous</i> .
(12)	Incineration of biomass produces tons of gases that are <i>hazardous</i> to
	human health and the environment.
(13)	In some cases, the solvents used to transport the gas may be more
	hazardous to your health than the tear gas itself.

(14)	You may discover all that you should avoid hazardous and dangerous
	remedies, medicines, and therapies, from the tips further down.
(15)	There were 364 dogs in the kennel at the time and inspectors (called "dog
	wardens") left almost 400 dogs behind that day in conditions that were
	clearly <i>hazardous</i> to the health of the dogs.
(16)	Perhaps, as you say, there is still Orthodox monasticism - but that is not for
	all, and is spiritually <i>hazardous</i> .
(17)	Wearing our nation's uniform is <i>hazardous</i> - combatting an enemy among
	the dangers.
(18)	Ordinary cardboard is acidic, so storage in cardboard boxes may be
	hazardous to your comic collection.
(19)	In short, frequent exposure to Murdoch news reporting can be <i>hazardous</i>
	to your understanding and knowledge of the real world.
(20)	Overall, the operation was <i>hazardous</i> . Tactical Air Command " asked us
	for our accident rate.
(21)	The stock market is hugely variable and that is extremely <i>risky</i> for folks
	trying to obtain retirement income
(22)	It's simply not true that women who drink a glass or two a week is
	participating in dangerous or <i>risky</i> behavior that will inevitably harm her
	baby.
(23)	It was a <i>risky</i> play that ended with a devastating result.
(24)	However, city officials said winds were approaching speeds at which they
	deemed it too <i>risky</i> to send out rescuers.
(25)	In fact, nuclear is so <i>risky</i> , not one nuclear plant in the world is even
	insured.
(26)	I knew then that we were in serious trouble treading on <i>dangerous</i> ground.
(27)	The internet can also be a <i>dangerous place</i> - particularly the world of blogs and
	blogging - if used unwisely.

 situation. (29) Ignorance is a dangerous thing in these complex times. (30) Malcolm said that he knew many things that made him a dangerous in the movement. (31) Freedom in a dangerous world is far preferable to slavery in a safe or (32) Pollution of waterbodies with even hazardous waste thrown in them in factor helping this classifier absorbance. 	ne. is the key
 (30) Malcolm said that he knew many things that made him a <i>dangerous</i> in the movement. (31) Freedom in a <i>dangerous world</i> is far preferable to slavery in a safe or (32) Pollution of waterbodies with even <i>hazardous waste</i> thrown in them in the context of the cont	ne. is the key
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(32) Pollution of waterbodies with even <i>hazardous waste</i> thrown in them is	is the key
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factor behind this alarming phenomenon.	emicals
(33) People working with <i>hazardous materials</i> could track exposure to che	cimeats
or radiation over several weeks.	
(34) They take in chemicals and wastes and retain these <i>hazardous substa</i>	ances until
the fish die.	
(35) Dealing with the <i>hazardous chemicals</i> dumped years ago in M	Metro East
landfills could end up costing nearly 250 businesses, government ag	encies and
nonprofit groups in the region.	
(36) Therefore, in 2003, the Oregon Environmental Quality Commission	on adopted
new rules that put Oregon at the forefront of state efforts to identify a	nd address
hazardous air pollutants.	
(37) Investors nationwide should take note and end their support of this <i>ris</i>	sky
business.	
(38) At a time when more than half of college students exhibit <i>risky be</i>	havior for
HIV transmission, identifying and addressing those factors that pro-	omote risk
reduction is imperative.	
(39) Nancy Pelosi invited Vargas as her guest to President Trump's first ac	ddress to a
joint session of Congress, a <i>risky move</i> in the eyes of many of his sup	porters.
(40) Normally, returns on <i>risky investments</i> require discount rates that	are higher
than would be required for less risky investments.	
(41) Extraction of oil from oil sands is a <i>risky proposition</i> and will likely i	in the long
term be a disaster for both investors and inhabitants of an increasingly	y
warming planet.	

(42)	This kind of suspension is usually reserved for <i>very dangerous</i> students often
	armed with guns, knives, etc., and a danger to the society and themselves.
(43)	Some of the <i>most dangerous</i> preservatives out there are sodium benzoate,
	sodium nitrate, propyl gallate, thimerosal, and potassium bromate.
(43)	Some of the <i>most dangerous</i> preservatives out there are sodium benzoate,
	sodium nitrate, propyl gallate, thimerosal, and potassium bromate.
(44)	Of course, candles are an option, however, they don't put off very much light,
	and, with an open flame, are considerably more dangerous than their LED
	counterpart.
(45)	We encourage employees to work from home when weather makes commuting
	too dangerous.
(46)	It may also be <i>potentially dangerous</i> to humans due to a lack of thorough
	studies performed on the additional pesticide's effects on the body.
(47)	The suspect has admitted to using a potentially hazardous material to
	contaminate food in several Ann Arbor-area grocery stores, " Gelios said.
(48)	In particular, 70% of manufacturers were substituting <i>less hazardous</i> chemicals
	for harmful solvents in their manufacturing processes.
(49)	Unfortunately, the amount of radiation required would be extremely hazardous
	to any humans in the area.
(50)	Night driving is <i>particularly hazardous</i> on the old Panama City – Colon
	highway.
(51)	PVC is " one of the most environmentally hazardous consumer materials ever
	produced, " writes Joe Thornton, a biology professor at the University of
	Oregon in a briefing paper for the Healthy Building Network, an advocacy
	group.
(52)	Voting via internet is too risky for having private information revealed plus
	letting voter fraud reach an all time high!
(53)	This means that the investment is considered fairly safe and reasonable, as large
	institutions usually do not make very risky and unsafe bets, and as insurance
	companies are usually considered rather conservative investments.

(54)	Overall, the authors said that Ryan's premium-support plan would be " less
	risky " if the federal health care law was successful in lowering costs.
(55)	This was an extremely risky operation since a storm could have completely
	wrecked the fleet of ships tied together by the cables and by a causeway.
(56)	Wavering state officials might come to the conclusion that it's too politically
	risky to help federal officials to fix the system and instead let the problems pile
	up.



BIOGRAPHY

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