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Do University Students Need to Master the GSL and AWL Words? A Psychology Word List

Mahmood Safari[1*]

[1*]Assistant Professor at Hazrat-e Masoumeh University, Qom, Iran;
mahmood.safari@gmail.com

Abstract

University students are mainly advised to master the words in West's General Service List (GSL) and Coxhead's Academic Word List (AWL) in order to be able to read their academic texts easily and effectively. However, there are too many words in the two lists and a large number of them seem to be of less frequency in many academic disciplines; moreover, there are many important general and academic words which are missing in the two lists. The present study explored a corpus of psychology texts containing 3.4 million running words to work out the most frequent words used in psychology, a less investigated discipline. The corpus was analyzed by some text analysis software (TextStat and TextAnalys) and a list of 1587 most frequent word families was developed for psychology. The list included general English and academic words and no technical words of psychology. The frequency of GSL and AWL word families was investigated in the corpus to find out the GSL and AWL words highly frequent in psychology texts and also other high frequency words of psychology which are absent in the two lists. The results revealed that 1077 GSL and 95 AWL word families were of low frequency in psychology texts and there were 189 high frequency general and academic words which are absent in the GSL and AWL. The coverage of the developed psychology word list over the corpus was shown to be 2.2% higher than that of GSL plus AWL, although it contained 983 fewer words.

Keywords: Academic Vocabulary, AWL, Coverage, Frequency, GSL

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1. Introduction

Vocabulary is very important for language use and language learning; without vocabulary communication is almost impossible. Rivers (1968) asserted that "It would be impossible to learn a language without vocabulary-without words" (p. 462). Learners need to learn a large number of words to acquire a foreign language at every level. Allen (1983) states that "Experienced teachers of English as a Second Language know very well how important vocabulary is. They know students must learn thousands of words that speakers and writers of English use" (p. 1). However, the number of words in every language is enormous and beyond learning capacity of anyone. No one can acquire all the words in a language, even the words in their mother tongue. According to research (Goulden, Nation & Read, 1990; D'Anna, Zechmeister & Hall, 1991), educated native speakers of English know only around one third of the 54000 word families in English (i.e., 17 to 20 thousand words). Even this number of words is very large for teaching to second language learners (Richards, 2001). On the other hand, many researchers have commented that 2000 to 3000 word families are sufficient for second language learners to perform well in the second language and continue language learning on themselves. According to Howatt (1984) "3000 common words would probably suffice for all except specialist purposes" (p. 187). Some scholars have referred to the first 2000 words as the point where words stop being frequent and become rare. Nation and Waring (1997) showed that knowing about 2000 word families gives near to 80% coverage of written texts.

The main question regarding vocabulary instruction is "what words should we teach to language learners?" Words must be selected to be taught to language learners and this has been recognized by language teaching scholars for a long time. In the early 20th century, vocabulary control movement proposed that the words to be taught to language learners should be limited and these words must be selected carefully. There were many studies to figure out the most important words and several lists were developed. The most important was West's (1953) General Service List (GSL), which included 2000 English word families claimed to be the most frequent and, hence, the most important words in English. The word list has been widely used as a basis for language teaching and research since then.

However, West's GSL was criticized for its age (Engels, 1968), size (Richards, 1974) and coverage (Nelson, 2000). The study was done in 1930s and the corpus mainly consisted of very old texts. The second thousand GSL words were shown to cover a very low percentage (4.7%) of the running words in non-fiction texts (Engels, 1968). Therefore, there have been some recent attempts to develop newer general service lists of words (Brezina & Gablasova, 2013; Browne, 2104). Researchers used larger and modern

corpora to develop their lists but there are some criticisms against them too (Laufer, 2014). The new lists included too many words amounting to around 2500 to over 2800 words, many of which are not commonly used in academic texts.

With the emergence of English for Specific Purposes (ESP) in 1970s, there were further studies to develop lists of words for academic purposes (Campion & Elley, 1971; Ghadessy, 1979; Lynn, 1973; Parninskas, 1972; Xue & Nation, 1984). These studies culminated in Coxhead's Academic Word List (AWL), which was based on the analysis of a 3.5-million-word academic corpus. These researchers took West's (1953) GSL as the basis and developed their academic word lists on top of the GSL assuming that university students know GSL words and only need to master academic words. They only figured out non-GSL words which occurred most frequently across different academic disciplines, ignoring the fact that many GSL words are not commonly used in academic texts. Recently there have been some more specific studies which developed word lists for single academic disciples (e.g., Chung, 2009; Lei & Liu, 2016; Martinez, Beck & Panza, 2009; Moini & Islamizadeh, 2016; Mudraya, 2006; Munzo, 2015; Ward, 2009; Wang, Liang, & Ge, 2008). The researchers criticized a monolithic academic word list, claiming that many words have different meanings and functions in different disciplines and every academic discipline has its own vocabulary list which includes much fewer words than the combination of GSL and AWL.

Research has shown that around half of the GSL words are not commonly used in academic texts (e.g., Moini & Islamizadeh, 2016) and it seems inefficient to ask university students to learn such a large number of words many of which students will rarely meet in their academic texts. Also, many AWL words are less frequent in many academic disciplines and seem to be technical words of the academic disciplines which were overrepresented in the AWL corpus (e.g., *levy*, *subsidy*). Moreover, there are many highly frequent general and academic words which are absent in the GSL and AWL due to the inadequacy of the employed corpora (e.g., Chen & Ge, 2007; Khani & Tazik, 2013; Vongpumivitch, Huang & Chang, 2008; Yang, 2015). West's (1953) corpus was old and loaded with fiction texts and Coxhead's (2000) corpus underrepresented some academic disciplines such as biology and medicine. Hirish and Nation (1992) indicated that the GSL list covered 90-92% of a corpus of fiction texts while it has a much lower coverage in other areas of language use, for instance 76% in academic texts. Also, studies have shown that Coxheads' AWL has varying coverage in different disciplines. It covered 11% of social sciences texts and only around 6 % of the agriculture, biology and medicine corpora (Cobb & Horst, 2004; Hyland & Tse, 2007; Munoz, 2015).

2. Literature Review

Since early times vocabulary has been recognized as one of the main aspects of language instruction. The vocabulary control movement in early 20th century attempted to find out the most important words to be taught in language courses. The movement "culminated in the appearance of Michel West's A General Service List in 1936" (Seal, 1991, pp. 296-297). The list has been used as a basis for vocabulary instruction and research since its development. With the emergence of English for Academic Purposes (EAP) in 1970s, there was a plethora of research to figure out the most important vocabulary for different scientific areas, such as engineering, medicine and business (Barber, 1962; Cowan, 1974; Farmer, 1976; Friel, 1978; Inman, 1978; Kirkham, 1978; Wingard, 1981, all cited in Nelson, 2000). Vocabulary was mainly divided into three categories: technical, nontechnical, and sub-technical words. Sub-technical vocabulary is the "words with high frequency and/or wide range of occurrence across scientific disciplines, not usually found in basic general English courses" (Farrel, 1990).

There were some studies which tried to create a vocabulary list for general academic purposes as the sub-technical vocabulary of academic register. Assuming that university students know a general service vocabulary, the researchers tried to work out the most important words of academic English beyond West's (1953) GSL. Campion and Elly (1971) and Praninskas (1972) worked on academic corpora to work out the words that occurred frequently across a range of academic texts. Lynn (1973) and Ghadessy (1979) produced their lists of academic vocabulary by gathering the words above which university students had written annotations. Xue and Nation (1984) combined and edited these four lists to create the University Word List (UWL), which consisted of 840 word families and covered around 8.5% of academic texts. However, Coxhead (2000) stated that the UWL "lacked consistent selection principles and had many of the weaknesses of the prior work" (p. 214). Coxhead herself explored a 3.5-million-word corpus of academic texts to develop her Academic Word List (AWL). The list consisted of 570 word families and covered around 10% of the corpus.

Many language teachers and scholars have pointed to GSL and AWL lists, together containing 2570 word families, as a reference source for language teaching and learning in EAP. University students are recommended to learn these words to acquire vocabulary competence that is needed for reading their academic texts effectively. However, there have been some criticisms against the two lists.

Some scholars criticized GSL for its age, size and not taking the concept of coverage into account (Engels, 1968; Nelson, 2000; Richards, 1974). AWL was also criticized for being biased for some academic disciplines and against some others (Hyland & Tse, 2007). The coverage of

the AWL words over the four areas in Coxhead's own corpus was not the same: Commerce (12%), Law (9.4%), Arts (9.3%), and Science (9.1 %). The AWL covered only around 6 % of the agriculture, biology and medicine corpora, but 11% of the social sciences texts (Cobb & Horst, 2004; Hyland & Tse, 2007; Munoz, 2015). Moreover, the AWL includes many words that are specific to some disciplines (*levy, commodity, subsidy*) and many high frequency academic words are missing in the list (*absorb, library, urban*). More than 270 AWL word families were less frequent in Chen and Ge's (2007) corpus of medical texts. Moini and Islamizadeh's (2016) indicated that 189 AWL word families were not frequently used in their linguistics corpus and 224 words were highly frequent in their corpus but absent in the AWL. Vongpumivitch, et al. (2008) indicated that 95 AWL word families were of low frequency in their corpus of applied linguistics and there were 128 highly frequent words which were absent in the AWL. Over 25% of the AWL did not overlap with academic words found in Khani and Tazik's (2013) academic corpus.

Moreover, recently there have been some criticisms against a single academic vocabulary list arguing that words may have different meanings and functions in different academic disciplines (Hyland & Tse, 2007). Therefore, some scholars have proposed that each academic discipline should have its own vocabulary list and there have been some studies which have developed word lists for specific academic disciplines (e.g., Chung, 2009; Esfandiari & Moein, 2015; Lei & Liu, 2016; Munzo, 2015; Ward, 2009). Esfandiari and Moein, analyzing a corpus of food science texts, developed a word list for food science and technology and Munzo identified the vocabulary of agriculture semi-popularization articles. Moreover, more recently there have been some studies trying to work out the most frequent technical words for some academic disciplines (e.g., Coxhead & Demecheleer, 2018; Hsu, 2018: Tongpoon-Patanasorn, 2018). Coxhead and Demecheleer explored written and spoken corpora of plumbing and developed a plumbing word list which covered 30% of the written academic corpus and 11% of the spoken academic corpus. Coxhead, Demecheleer and McLaughlin (2016) identified the technical vocabulary of carpentry. There also have been some studies working on spoken academic corpora and developing academic word lists for spoken academic English (e.g., Dang, Coxhead & Webb, 2017).

Despite the vast number of studies investigating and developing vocabulary lists for various specific fields of study such as Medicine (Chen & Ge, 2007; Lei & Liu, 2016; Wang, et al., 2008), Engineering (Mudraya, 2006; Ward, 1999; Ward, 2009), Applied Linguistics (Khani & Tazik, 2013; Vongpumivitich, et al., 2008), Finance and Economy (Li & Qian, 2010; Sutarsyah, 1993), Agriculture (Martinez, et al., 2009; Munoz, 2015),

Chemistry (Valipoori & Nassaji, 2013), Social Sciences (Kwary & Artha, 2017) and Nursing (Yang 2015), there have been almost no studies, to the best knowledge of the researcher, investigating academic words in psychology texts. As psychology is an important academic field of study, the researcher felt a need to prepare a word list for psychology. Furthermore, it was attempted to explore the status and coverage of GSL and AWL words in psychology texts. The present study tried to develop the psychology vocabulary list by investigating a corpus of 3.4 million running words, a representative corpus including texts from various psychology sub-discipliners. It developed the psychology word list through figuring out the GSL and AWL word families which are highly frequent in psychology texts and those general and academic words which are of high frequency in psychology texts but absent in the GSL and AWL lists. To that end, the following research questions were proposed:

1. Which GSL and AWL word families are highly frequent in psychology texts?
2. Which general and academic words are highly frequent in psychology texts but absent in the GSL and AWL?
3. How do the size and coverage of a psychology word list compare to those of a list containing GSL and AWL words?

3. Method

3.1. The Psychology Corpus

The corpus employed in the present study consisted of psychology texts and included 3.4 million running words. The corpus was composed of journal articles published in scholarly journals available on the internet. As psychology is a very broad discipline and includes many sub-disciplines, the researcher identified the five major sub-disciplines of psychology by consulting some psychology PhD holders and university professors and investigating the websites of psychology faculties and departments in some major universities including Harvard University, Yale University, Michigan University, UCLA University, Iowa University and New York University. The psychology sub-disciplines included Clinical Psychology, Cognitive Psychology, Counseling Psychology, Developmental Psychology and Social Psychology. Then journal articles were collected for each sub-discipline from scholarly journals of psychology available on the internet. The journals included Journal of Cognition, Advances in Cognitive Psychology, Cognition, Journal of Clinical Psychology and Bioethics, Clinical Psychology Review, International Journal of Clinical and Health Psychology, Mediterranean Journal of Clinical Psychology, Clinical and Experimental Psychology, Journal of Applied Developmental Psychology, European Journal of Developmental Psychology, Developmental Psychology, European Journal of Counselling Psychology, Journal of Counseling and Development,

Counselling and Psychotherapy Research, The Journal of Social Psychology, British Journal of Social Psychology, Journal of Experimental Social Psychology, and International Review of Social Psychology.

The journal articles were in different formats such as Microsoft Word, PDF, html and Text. As the employed text analysis software could process only TXT and html formats, all other text types (i.e., WORD, PDF) were converted to TXT format in order to be processed by the software. Moreover, references, appendices, tables and information about the authors were deleted from the journal articles in order to include only article manuscripts. The size of each sub-corpus was around 680000 running words. Table 1 displays the information about the size of and the number of research articles in each sub-corpus. The journal articles were published since 2000 to the present time. The corpus included 561 articles and amounted to 3,432,222 running words.

T*able* 1
The Size and Number of Articles in each Sub-corpus

Sub-corpus	Size	Number of articles
Clinical Psychology	682,546	112
Cognitive Psychology	692,158	106
Counseling Psychology	681,265	98
Developmental Psychology	683,594	119
Social Psychology	692,659	126
Total	3,432,222	561

3.1.1. Text Analysis Software

The researcher used some text analysis software to analyze the corpus. The first software was TextStat 1.5, which analyzes a corpus of any size and lists the words in the corpus together with information about their frequency. It lists the words in the first column and the frequency and ratio of each word are listed in the second and third columns. The software provides the analysis output in Microsoft Word and Excel files, which can be saved for further study by the researcher. The second employed text analysis software was TextAnalys. The software adds up the frequencies of the member words of a word family to calculate the aggregate frequency (i.e., the sum of the frequencies of all the member words) of a word family. It also adds up the frequencies of the word families in a word list to calculate the total frequency of a word list in a corpus. Moreover, the software lists all the words outside a specified list according to their frequency and the researcher can identify high frequency words which are absent in the list. It lists the word families in the order of their aggregate frequency and the more frequent and less frequent word families are easily distinguished. Table 2 displays an example output of the second software.

Table2
An Example Output File of the TextAnalys Software

the:156838 --> 156838
this:12453 , these:8426 --> 20879
study:3738 , studies:4241 , studying:339 , studied:429 --> 8747
do:2855 , does:1328 , did:924 , doing, 341, done:358 --> 5806
beak:0 , beaks:0 --> 0
cottage:0 , cottages:0 --> 0
Total : 192270
cognitive:4239
american:3124

3.1.2. Word Selection Criteria

In order to identify high frequency words of psychology and develop the psychology word list, the author employed three criteria: frequency, range and non-technicality. As the corpus was almost the same size as Coxhead's Academic Corpus (i.e., 3.5 million running words), the criterion frequency was set at 100 times of occurrence, the criterion frequency which was used by Coxhead in developing her Academic Word List. The GSL and AWL word families were required to occur 100 times or more in the psychology corpus in order to be included in the psychology word list. However, for non-GSL and non-AWL words, the criterion frequency was set at 200. The minimum frequency for these words was set twice as large as the minimum frequency of the GSL and AWL words in order to find words which are really more frequent than many GSL and AWL words. Setting the frequency of 100 as the selection criterion for these words might identify words which are marginally more frequent than many GSL and AWL words occurring just below 100 times. This marginal higher frequency might be corpus specific and the words occurring just above 100 times might have frequencies below 100 in other corpora of psychology texts. The high frequency GSL and AWL words were frequently used in Coxhead's academic corpus, West's corpus and the present psychology corpus and are not corpus specific. The range criterion for the selection of words was occurring 20 times or more in at least three of the five subdisciplines. The criterion was slightly higher than Coxhead's range criterion, which was occurring ten times or more in 15 out of 28 subject areas. Finally, the words were supposed to be non-technical words. The newly identified high frequency words were to be checked in a technical dictionary, Cambridge dictionary of psychology (Matsumoto, 2009), in order to find and exclude technical words of psychology.

3.2. Data Collection Procedure

To develop the psychology word list, the researcher collected journal articles from scholarly journals related to major psychology sub-disciplines and a psychology corpus was developed. The texts were in different formats such as PDF, Microsoft Word, html, but PDF and Word texts were converted to TXT format as the text analysis software can only process TXT and html formats. Moreover, references, appendices, tables and information about the authors was excluded from the texts in order to have main texts. Then the files were loaded into TextStat software to develop a list of all the words in the corpus alongside their frequency and TextAnalys worked out the aggregate frequency of each word family and the total frequency of the word list.

The frequencies of word members of each word family were added to figure out the aggregate frequency of the word family and the frequencies of the word families of the word lists were added up to calculate the total frequency of each word list. The GSL and AWL word families whose aggregate frequency was more than 100 were identified and recorded. They were considered as high frequency words in psychology. Then the researcher reviewed the words outside the GSL and AWL word lists to find high frequency words which were absent in the GSL and AWL. Technical words of psychology were identified through consulting a technical dictionary of psychology, Cambridge dictionary of psychology (Matsumoto, 2009), and were excluded and only general English and academic words were included. Proper nouns were also left out. Words which occurred more than 200 times and had a minimum frequency of 20 at least in three sub-corpora were recorded and a list of high frequency word families outside the GSL and AWL was developed. Then the frequencies of the words in the newly developed word list were worked out and added up to calculate the list's total frequency and coverage in the corpus. Subsequently, the frequencies of the GSL and AWL word families whose aggregate frequency was below 100 were added up to calculate their total frequency and coverage in the corpus. The coverage of a word list over a corpus can be calculated by dividing the total frequency of the word list by the total number of the tokens in the corpus.

4. Results and Discussion

4.1. Results of Corpus Analysis

To find out the high frequency words in psychology texts, the author investigated the GSL and AWL word families in the psychology corpus. The corpus was also investigated to find out the general and academic words which are highly frequent in psychology texts but are absent in the GSL and AWL lists. The following word lists were identified by analyzing the corpus:

1. GSL and AWL word families which are highly frequent in psychology texts,

2. GSL and AWL word families which are of low frequency in psychology texts,

3. Highly frequent general and academic word families absent in the GSL and AWL.

The GSL and AWL word families which occurred 100 times or more in the psychology corpus were considered as high frequency words. There were 923 GSL and 475 AWL word families which occurred more than 100 times in the corpus (See Appendices A and B for the lists of GSL and AWL base words whose word families had an aggregate frequency of 100 and above). Table 3 displays the number of GSL and AWL word families which were of high and low frequency in the psychology corpus. As Table 3 shows, there were 1077 GSL word families which occurred less than 100 times in the psychology corpus and they were considered as low frequency GSL words. Also, 95 AWL word families occurred less than 100 times in the corpus. Therefore, more than half of the GSL words were not frequently used in the psychology texts and over 15% of AWL word families were of less frequency.

Table 3
High/Low GSL and AWL Words in Corpus of Psychology Research Articles

Word lists	High frequency	Low frequency
GSL word families	923	1077
AWL word families	475	95

There was also some further analysis to identify the words which are highly frequent in psychology texts but absent in the GSL and AWL lists. The criteria for selecting these words were the frequency of 200 and above and the occurrence of the words in at least three sub-corpora with a frequency of 20 times or more. The minimum frequency for these words (i.e., 200) was set higher than that of the GSL and AWL word families (i.e., 100) in order to indicate that they were really more frequent than many GSL and AWL words. Also, the occurrence of words in three sub-corpora revealed that they were not specifically highly frequent in just one or two of the sub-corpora. Further analysis of the psychology corpus revealed that 189 word families outside GSL and AWL were highly frequent in the psychology corpus (See Appendix C). The combination of these 189 word families and high frequency GSL and AWL word families created a list of 1587 word families, which was much smaller than the combination of GSL and AWL word families. To evaluate the coverage of the new list in the psychology corpus and compare it to the coverage of the list of GSL plus AWL words, the researcher divided the total frequency (i.e., the sum of the frequencies of all the member words) of the lists by the total number of the tokens in the corpus. Table 4 displays information on the size, total frequency and coverage of the list of high frequency words which were absent in the GSL

and AWL and those of the list of GSL and AWL word families which were of low frequency in the psychology corpus. The coverage of the former was much larger than that of the latter. As Table 4 indicates, the 189 word families covered 3.7 % of the corpus while the list of low frequency GSL and AWL words covered only 1.5% of the corpus. This indicates that teaching these 189 word families will benefit psychology students more than teaching them the 1172 low frequency GSL and AWL words. The former is smaller and covers larger number of running words in psychology texts.

Table 4
Size, Total Frequency, and Coverage of the Word Lists

Word lists	Size	Total frequency	Coverage
LF GSL-AWL	1172	49,734	1.5%
NHFW	189	129,263	3.7%

LF GSL-AWL = Low frequency GSL and AWL words;
NHFW = New list of high frequency words

Over 420 GSL words occurred less than 10 times in the corpus and 74 GSL words did not occur at all. Thirteen AWL words occurred less than ten times in the corpus. Table 5 shows some of the GSL and AWL words which were of very low frequency in the psychology corpus. As Table 5 indicates, many GSL words are not expected to occur frequently in psychology texts and most other academic disciplines. They are general English words that occur rarely in scientific texts (e.g., *sock*, *fence*, *chimney*, *bucket*). They may even be of less frequency in general English and everyday conversation. Expecting university students to know or learn these words is not logical. It would be much more effective to present students with vocabulary lists which do not contain such words. Also, some AWL words are not expected to be frequently used in psychology texts (e.g., *commodity*, *deduce*, *levy*, *regime*, *subsidy*) and university students majoring in psychology do not need to learn them. One would easily recognize that the presence of these words in the AWL was due to the fact that some academic disciplines like economy and law were overrepresented in Coxhead's corpus (i.e., these disciplines contributed more texts to the corpus), while some other disciplines like medicine and biology were underrepresented in the corpus.

Moreover, the study revealed many high frequency words which university students in general and psychology students in particular need to know but the words are absent in the GSL and AWL lists. Some of the words which were highly frequent in the psychology corpus but absent in the two lists include: *adolescent, characteristic, cognitive, diagnosis, emotional, et al, handbook, laboratory, urban*. As one would easily recognize, these words are very common words and are expected to be known by university students for effective reading. The absence of these words in the AWL indicates that the

employed corpus was not a truly general academic corpus and biased against some academic disciplines such as psychology.

Table 5
Example Low Frequency GSL and AWL Words in Psychology Corpus

GSL words	AWL words
Bucket	Append
Chimney	Clause
Fence	Commodity
Mud	Deduce
Oar	Estate
Plaster	Levy
Sock	Regime
Sting	Revenue
Towel	Subsidy
Weed	Tape

4.2. Discussion

Detailed analysis of GSL and AWL word families in the psychology corpus indicated that a great number of GSL words and many AWL words are of less frequency in psychology texts. Thus, the answer to the first research question (Which GSL and AWL word families are highly frequent in psychology texts?) is: 1398 GSL and AWL word families (923 GSL and 475 AWL word families) are highly frequent in psychology texts. The remaining 1077 GSL and 95 AWL word families are not frequently used in psychology texts. Most of the low frequency GSL words are general English words that mainly occur in everyday conversations and less in academic texts and the less frequent AWL words are mainly specific to some academic disciplines such as economy and law (e.g., *commodity*, *levy*, *subsidy*). The results are in line with many previous research findings. In the present study, over half of the GSL words were shown to be of low frequency in psychology texts. In several previous studies the second 1000 GSL word families were shown to have very low coverage of nonfiction texts (Engles, 1968; Hwang, 1989; Sutarsyah, 1993). Engels questioned the importance of the second 1000 word families as it covered about 4.7% of the running words in non-fiction texts. He stated "they cannot be called general service words" (p. 266). Also, the second 1000 GSL word families covered only 4.27% of the running words in Moini and Islamizadeh's (2016) academic corpus and they concluded that "it is not necessary to learn the 2nd 1000 GSL words before AWL words" (p. 79). Around 90 GSL words never occurred in Moini and Islamizadeh's corpus and 1342 GSL words did not have the required frequency to be included in their Linguistics Word List. Nation and Hwang (1995) revealed that over 450 GSL words were not present in the lists of high frequency words derived from the analysis of the Brown Corpus and Lancaster-Oslo-Bergen corpus. Mudraya (2006) exploring a corpus of

engineering texts developed a list of 1200 words, which did not include many GSL word families.

Research has also shown that many AWL words are of low frequency in some academic disciplines. Over 270 AWL words were less frequent in Chen and Ge's (2007) corpus of medical texts and they concluded that AWL "is far from complete in representing the academic words frequently used in medical RAs [research articles]" (p. 502). More than 170 AWL words were not among Yang's (2015) nursing academic word list, which included 676 word families. In Moini and Islamizadeh's (2016) study, 189 AWL word families occurred less frequently in their linguistics corpus and were excluded from their list. Valipoori and Nassaji (2013) developed a chemistry academic wordlist of 1400 word families, which included only 327 AWL word families. Over 25% of the AWL words did not overlap with academic words found in Khani and Tazik's (2013) corpus of applied linguistics.

The answer to the second research question (Which general and academic words are highly frequent in psychology texts but absent in the GSL and AWL lists?) is: 189 word families are highly frequent in psychology texts but absent in the GSL and AWL. These new words are general and academic words which are expected to occur in academic texts but due to the inadequacy of the corpora used by West (1953) and Coxhead (2000), they were not included in the lists. The 189 high frequency words covered 3.7 % of the psychology texts, while the 1172 low frequency GSL and AWL word families covered only 1.5% of the corpus. The finding is in line with most previous study results. Vongpumivitch et al. (2008) indicated that 95 AWL word families were of low frequency in applied linguistics texts and there were 128 highly frequent words in their corpus which were absent in the AWL. In Moini and Islamizadeh's (2016) study, 224 words were highly frequent in their academic corpus but absent in the AWL. In Yang's (2015) nursing academic word list, there were 278 word families which were absent in the AWL. There have been some claims that the AWL is biased for and against some academic disciplines and it is not a truly general academic word list. The existence of such technical words as *amendment, levy, estate, subsidy* and the absence of such general academic words as *characteristic, cognitive, laboratory, urban* corroborates the fact that Coxhead's academic corpus and her AWL were biased for some academic disciplines like economy and law and against some university fields such as psychology and medical sciences. The AWL covered 11% of the social sciences texts and only around 6% of the agriculture, biology and medicine corpora (Cobb & Horst, 2004; Hyland & Tse, 2007; Munoz, 2015).

As for the third research question (How do the size and coverage of a psychology word list compare to those of a list combining GSL and AWL words?), the results of the present study revealed that the size of the

psychology word list (1587 word families) is much smaller than the combination of the GSL and AWL words (2570 word families) and the coverage of the former is larger than that of the latter. The coverage of the psychology word list was 2.2% larger than that of the list of GSL and AWL words, although it included 983 fewer words. In Moini and Islamizadeh's (2016) study, the 224 non-AWL/non GSL high frequency word families had a higher coverage of their academic corpus than the 1531 low frequency GSL and AWL words. Valipouri and Nassaji (2013) identified 390 word families which frequently occurred in their chemistry corpus and covered 7% of the running words.

5. Conclusion and Implications

The present research indicated that many GSL and AWL word families are not frequently used in psychology texts and psychology students do not need to master all the words in the two lists. Moreover, the study showed there are many general and academic words that frequently occur in psychology texts but are absent in the GSL and AWL and students in the field of psychology require to master them for effective reading of their academic texts. The results revealed that a list of most frequent words in psychology includes fewer words than the combination of the GSL and AWL words, while it covers a larger percentage of running words in psychology texts. Therefore, it is recommended that psychology students practice and master these words instead of all GSL and AWL word families. Investing on the words in the psychology word list will be more beneficial and at the same time less time-consuming for psychology students.

According to Nation (2016), word lists can be used for many instructional purposes, ranging from material development for language teaching to designing graded reading books, analysis of text vocabulary load, and development of language vocabulary tests. The developed psychology word list can be used by EAP teachers, materials developers, psychology students and language testers.

Materials developers can use the list in developing EAP materials. Most EAP materials are developed intuitively without considering the frequency of words in academic texts. If materials developers have access to most frequent linguistic features, such as vocabulary, and grammar, their materials will be more effective and beneficial for EAP learners. Materials for psychology students can be based on a list of most important words in the discipline and present the students with the words that they will meet most often in their academic texts. Moreover, materials developers can develop supplementary vocabulary materials to increase students' knowledge of common words used in psychology texts and improve their reading ability. As most EAP courses are short and cannot cover all important academic

words in a discipline, students need to have access to supplementary materials in order to improve their academic reading or writing.

EAP teachers can use the list for developing their own materials if there are not appropriate materials available on the market. They can also develop classroom activities and tasks to improve their students' competence in common words in psychology texts. Teachers can divide the psychology word list into several sub-lists and develop handouts to instruct the words or ask their students to study the words in each sub-list for a classroom quiz.

The list can also be beneficial for psychology students. They can design a plan to study and master the words in the list during a specific time period. They can look up the words in a dictionary and write down the words, their meaning and example sentences for them on flash cards or vocabulary notebooks. Also, they can check the words in psychology corpora through concordance programs in order to see the words in psychology contexts.

Finally, EAP test developers can use the psychology word list for developing English tests for academic purposes such as selecting and evaluating psychology students or for graduation purposes.

Almost all studies have limitations and need to be delimited to specific variables and areas and the present research was not an exception. The present study aimed at working out the most important words in psychology texts and developing a psychology word list. Interested researchers can work on variables and areas which were not included in this study. First of all, as there is a paucity of research working on psychology texts, further research is required to replicate the present study to check if the developed list is an appropriate word list for psychology or a revision of the list is required. Also, interested researchers can work out word lists for other academic disciplines such as law, sociology, physics etc.

Most general and academic word lists have worked out most frequent single words, ignoring the fact that many words in the texts are parts of some multiword units and students need to master the meanings and functions of these units. Interested researchers can focus on most important multiword units such as verb phrases and idioms and identify most important multiword units in psychology or other academic disciplines. University students have much trouble in reading their academic texts as they do not know the meaning of most common English phrases and expressions.

Also interested researchers can work on other linguistic features like grammar structures. They can find out the most frequent grammar structures in psychology or other academic disciplines. Most university students have problem with grammar structures and the list of most important grammar structures will help EAP learners enormously in increasing their linguistic

competence and comprehension of their academic texts. Finally, the present researcher worked on written psychology texts, further research can investigate most important words in spoken texts, like university lectures, in academic disciplines.

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Appendices

Appendix A: The list of the base words of the 923 GSL word families highly frequent in the psychology corpus. The words are listed according to the aggregate frequency of their word families.

the	organization	skill	we	nation	point	avoid	sample
of	about	through	so	various	standard	little	real
and	include	disease	form	refer	depend	share	department
be	test	although	set	whether	explain	actual	content
to	change	if	condition	three	remain	order	responsible
in	perform	lead	describe	appear	thought	instrument	conscious
a	most	number	practice	several	exist	sleep	you
that	problem	because	each	history	reflect	expect	decrease
for	model	understand	situation	where	fail	past	force
as	inform	care	after	view	usually	opportunity	open
have	level	should	common	toward	language	now	small
with	important	his	measure	own	pass	advance	intend
or	experience	know	quality	believe	future	heart	animal
this	I	year	give	sense	word	young	encourage
on	life	pain	help	begin	reason	move	hospital
health	example	first	mean	rate	political	home	search
by	school	being	age	live	fact	before	divide
an	system	out	low	place	class	mind	effort
society	person	way	employ	strong	just	combine	build
their	time	influence	read	very	current	main	great
it	learn	among	relation	across	due	deal	trust
from	many	particular	ill	scale	lack	population	rule
more	all	follow	nature	while	call	least	figure
not	need	only	even	produce	without	meet	blood
can	see	into	concern	brain	demand	exercise	solve
use	two	value	man	interest	trial	every	desire
other	educate	press	cause	certain	century	account	male
patient	provide	member	direct	clear	introduce	independent	war
study	increase	anxiety	memory	large	represent	fear	college
these	support	become	parent	then	grow	propose	treat
may	find	show	medicine	pattern	offer	accord	express
they	will	type	old	continue	wide	course	full
which	woman	review	rather	article	up	fit	key
at	control	suggest	early	stage	come	frame	discipline
such	what	less	extend	country	especial	position	prepare
also	apply	take	possible	international	good	few	eat
how	state	case	question	experiment	degree	go	why
however	its	prevent	long	play	note	examination	book
develop	general	manage	teach	determine	loss	hand	self
work	both	would	field	discuss	either	industry	material
act	base	improve	any	body	our	attempt	food
effect	those	over	might	plan	power	observe	essence
child	risk	no	thus	under	simple	party	object
one	though	able	think	second	she	event	reward
group	often	term	compare	public	therefore	write	prefer
difference	result	part	regard	receive	subject	still	gain
some	science	likely	world	feel	law	hold	probable
than	family	reduce	must	difficult	best	sometimes	accident
new	human	attend	further	try	ask	program	west
people	university	he	satisfy	better	allow	poor	aim
do	report	consider	profession	choose	critic	back	end
who	train	within	another	screen	literature	since	female
when	during	present	tend	idea	argue	table	formal
but	make	behave	recent	necessary	four	purpose	speak
there	well	association	same	day	seem	origin	dead
between	high	sport	much	like	special	cost	against

adopt
free
too
agree
single
yet
operation
month
turn
together
accept
weigh
address
leave
religion
get
bring
equal
true
separate
mother
practical
beyond
union
space
say
perhaps
detail
carry
pay
broad
look
judge
city
record
always
late
recognize
doctor
severe
respect
upon
short
crime
girl
frequency
violent
face
answer
thing
boy
court
until
reach
head
progress
amount
easy
distinguish
serious

around
modern
white
want
step
start
confidence
delay
next
moral
immediate
anger
matter
regular
friend
reserve
protect
explore
correct
instead
office
week
fair
tool
close
guide
moreover
net
youth
business
staff
translate
name
size
deliver
once
whose
today
substance
whole
here
govern
far
noise
side
quite
witness
per
please
indeed
arise
rapid
latter
line
list
raise
extreme
motor
rise
limit

average
claim
attract
along
shape
near
north
master
decide
balance
popular
light
connect
hear
add
house
suffer
right
brown
recommend
keep
race
interfere
collect
company
voice
absence
total
moderate
middle
complete
kind
damage
tell
contain
lose
put
hall
mechanic
strike
agent
strength
advice
skin
prejudice
gay
discover
my
sign
burn
universe
comfort
speed
distance
mark
suspect
message
picture
again
sound

last
hour
return
almost
bad
talk
harm
private
advantage
road
repeat
opinion
alone
safe
down
black
already
entire
mention
spend
remember
car
local
rare
tie
committee
happen
marry
habit
enter
quick
elder
board
fall
green
join
king
signal
mix
half
love
surprise
former
disturb
eye
left
attack
cover
stand
drink
English
above
compose
letter
machine
room
hope
resist
neglect
frequent

proper
away
permit
someone
something
council
never
birth
twenty
deep
police
nurse
story
false
excellent
die
drive
match
cheat
threaten
weak
crash
punish
art
father
engine
prove
game
enough
listen
qualify
visit
excess
off
stop
store
worry
surround
root
nor
paper
hunt
tobacco
enjoy
boundary
compete
lie
mere
flow
lay
gather
wish
run
danger
travel
arrange
vote
date
confuse
organ

soon
rest
center
chance
except
chest
east
character
inquire
possess
president
berry
stay
lung
belong
gradual
slow
opposite
persuade
familiar
promise
occasion
heavy
draw
arm
undergraduat
e
hard
else
below
bear
guilty
mass
quarterly
hill
replace
suit
doubt
money
break
sympathy
park
air
cold
win
neither
upper
yield
top
breath
joint
wrong
exact
spell
notice
host
night
mild
box
seven

hire
walk
ever
minute
overcome
baby
otherwise
moment
ideal
imagine
defeat
behind
son
street
limb
telephone
ground
retire
approve
big
market
fix
door
cure
thousand
length
gap
red
born
miss
shock
lesson
sort
artificial
narrow
circle
worse
pure
sentence
admit
wife
modest
track
bone
surface
suppose
firm
touch
sing
sad
forward
permanent
smoke
nineteen
ago
apart
spread
royal
path
reproduce

excite
expense
print
check
eight
water
kill
cross
send
sick
fashion
block
nothing
struggle
appoint
relieve
slight
electricity
price
charge
belt
forget
affair
stem
supply
caution
post
arrive
refuse
rat
count
escape
passage
thorough
destroy
neck
music
happy
invite
property
unless
watch
sudden
strict
title
quantity
complicated
cut
blame
page
conversation
map
wall
strange
heal
stone

Appendix B: The list of the base words of the 475 AWL word families highly frequent in the psychology corpus. The words are listed according to the aggregate frequency of their word families.

	similar	seek	attach	unique	proportion
psychology	major	link	section	comprehensive	compensate
research	conflict	final	phenomenon	alter	annual
individual	consequent	normal	emphasis	consent	summary
culture	team	target	element	sufficient	revise
theory	perspective	interpret	survive	document	transport
process	design	conduct	discriminate	derive	transmit
assess	impact	economy	initial	hypothesis	version
journal	intelligent	empirical	evolve	project	debate
intervene	consist	publish	topic	explicit	capable
factor	aspect	ethnic	statistic	cooperate	apparent
environment	select	minor	aid	concentrate	voluntary
respond	contribute	legal	capacity	series	infer
stress	indicate	orient	underlie	expand	technical
approach	benefit	aware	commit	administrate	hierarchy
perceive	primary	previous	detect	prospect	generation
function	academy	colleague	compute	restrict	ideology
identify	technique	facilitate	image	confer	accompany
physical	data	distinct	decade	intrinsic	index
involve	create	style	visual	notion	differentiate
job	resource	mechanism	contact	constitute	obvious
vary	predict	implicate	despite	enable	exhibit
found	construct	expose	considerable	edit	formula
mental	complex	category	reside	publication	core
sex	appropriate	instruct	stable	circumstance	highlight
specific	dimension	alternative	initiate	phase	vision
method	gender	expert	chapter	incorporate	specify
role	valid	emerge	approximate	option	advocate
outcome	adapt	intense	access	qualitative	mutual
focus	conclude	partner	subsequent	assign	eliminate
goal	maintain	accurate	objective	correspond	inhibit
issue	attribute	integrate	author	ensure	constrain
task	potential	regulate	shift	energy	acknowledge
motive	range	diverse	resolve	exclude	automate
define	investigate	norm	adequate	input	sustain
evaluate	establish	feature	modify	mediate	utilize
affect	available	survey	overall	trend	labor
strategy	assume	internal	dominate	contemporary	implicit
evident	promote	domain	reinforce	fundamental	isolate
adult	relevant	bias	transfer	foundation	tense
attitude	whereas	criteria	relax	region	text
depress	period	item	brief	finance	duration
analyze	enhance	framework	transit	pursue	clarify
context	rely	policy	ethic	convene	attain
achieve	component	contrast	prior	display	insight
require	volume	instance	philosophy	classic	confirm
positive	consult	network	practitioner	couple	conform
professional	injure	technology	dynamic	distribute	cycle
structure	react	incidence	decline	authority	flexible
participate	tradition	estimate	guideline	rational	symbol
occur	adjust	consume	monitor	illustrate	undergo
concept	demonstrate	acquire	globe	manual	anticipate
area	status	recover	secure	code	fund
communicate	challenge	error	generate	sequence	contract
proceed	source	assist	furthermore	theme	media
interact	principle	external	reveal	grade	retain
community	institute	obtain	persist	federal	equivalent
significant	occupy	innovate	implement	imply	encounter

logic
label
ultimate
coordinate
ongoing
somewhat
ignorant
visible
eventual
mode
abstract
hence
reject
precede
induce
trigger
reverse
preliminary
converse
sole
welfare
manipulate
nevertheless
site
thereby
scope
minimize
paradigm
percent
deny
civil
presume
diminish
legislate
comment
mature
priority
controversy
protocol
convince
exceed
whereby
conceive
schedule
remove
cite
crucial
precise
ambiguous
terminate
virtual
constant
vehicle
violate
locate
transform
output
parallel
comprise
passive
restrain
nuclear
integrity
substitute
refine
appreciate
sum
format
via
devote
complement
negate
enforce
equip
discrete
invest
device
dramatic
inherent
predominant
incentive
widespread
license
definite
purchase
contrary
commission
grant
military
route
impose
trace
immigrate
undertake
minimal
interval
overlap
restore
corporate
distort
accommodate
income
accumulate
random
chemistry
lecture
abandon
principal
register
revolution
coherent
bond
subordinate
simulate
allocate
release
inevitable
compatible
ratio
justify
liberal
supplement
temporary
pose
identical
so-called
likewise
maximize

Appendix C: The list of the base words of the 189 high frequency word families in psychology texts which are absent in GSL and AWL. The words are listed according to the frequency of their word families.

et al
cognition
treatment
emotion
clinic
personality
disorder
cope
associate
therapy
characteristic
cancer
counsel
athlete
diagnosis
interview
chronic
psychiatric
stimulus
spatial
typical
career
impair
drug
neural
distress
physiology
score
interpersonal
surgery
trait
handbook
basis
competence
multiple
severe
client
correlate
adolescence
abuse
versus
engage
vocation
biology
medication
rehabilitate
alcohol
syndrome
laboratory
gene
healthcare
collective
stereotypes
feedback
verbal
climate
arouse
appraise
peer
caregiver
long-term
prevalence
mood
overview
deficit
nerve
infection
representation
coach
breast
infant
adhere
inventory
questionnaire
immune
physician
cell
personnel
societal
executive
efficacy
optimal
victim
intellect
encyclopedia
mortal
activate
feminist
aggressive
suicide
dysfunction
cue
autonomy
origin
jury
coronary
workplace
substantial
determinant
acute
span
recall
fatigue
leisure
socialize
urban
glossary
harass
hypnosis
longitudinal
withdraw
diet
ecology
diabetes
adverse
vulnerable
onset
etc.
pregnancy
obesity
muscle
lifestyle
mentor
bully
eyewitness
hostile
follow-up
likelihood
graduate
esteem
stigma
bore
bulletin
curriculum
recipient
indirect
collaborate
session
math
affirm
rape
intergroup
testimony
elicit
traffic
normative
aviation
retrieve
internet
asthma
wellbeing
privacy
congress
comply
oral
antecedent
profile
episode
barrier
archive
salient
facial
strain
pathway
prescribe
panic
era
marital
superior
crisis
temporal
literate
extrinsic
spouse
addict
turnover
elevate
continuum
relapse
periphery
respire
nucleus
indigenous
concrete
array
fluid
species
integrative
averse