# A Corpus Analysis of Adjectival Patterns in a Psychology Textbook

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**Abstract**
This paper investigates the semantic, syntactic, and morphological characteristics of key adjectival patterns in a psychology textbook. First, it identifies the most frequent adjectives, then assesses their (a) grammatical behaviors and (b) semantic preference and prosody. Second, it identifies the most frequent adjectives that participate in comparative and superlative constructions, then explores how they are used in context via concordancing. The results show that the most frequent adjectives in the text are classifying adjectives in the attributive position. Left collocations associated with the adjectives suggest a strong preference for the ideational function, many in the form of multiword lexical units (MLUs). Attributive noun combinations suggest a strong preference for mental states, conditions, and phenomena with neutral prosody. Finally, comparatives were far more common than superlatives, many in the form of MLUs and hedging.

## Introduction

Researchers and practitioners are constantly seeking to understand the linguistic characteristics of specialized registers in English (Biber et al., 2007, p. 157). Motivated by an interest in psychology, I chose to investigate adjectival structure and use because adjectives are vital components of sentential meaning. Observing adjectives that frequently occur in a psychology textbook is essential to comprehending and producing related discourse. This paper aims to reveal the most frequent adjectival patterns of a psychology textbook, which could have potential ESL teaching implications concerning scientific discourse.

## Adjectives

According to *Longman Student Grammar of Spoken and Written English* (Biber et al. 2002), adjectives describe or limit the qualities of people, things, and abstractions (p. 188). Categorizing the characteristics of specific adjectives—according to their semantic, syntactic, and morphological characteristics—reveals the moves and strategies of an academic genre or discipline (Henry & Roseberry, 2001). In this paper, the adjectival structures under examination are organized in Figure 1.



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Figure 1
*Key Adjectival Structures*

| | | |
|---|---|---|
| 1. Semantic Effects<br>(descriptive vs. classifying) | Descriptive<br>O The *new* school…<br>O The very *new* school… | Classifying<br>O The *primary* school…<br>X The ~~very~~ *primary* school… |
| 2. Syntactic Roles<br>(attributive vs. predicative) | Attributive (AA)<br>*(det) + ADJ + N* | Predicative (PA)<br>*(det) + N + is/am/are + ADJ* |
| 3. Morphological Inflections<br>(comparative *-er* vs. superlative *-est*) | *dark, dark**er**, dark**est***<br>*base + (-er) or (-est)* | |

Furthermore, Figure 2 displays key characteristic differences amongst the adjectival structures in question. Some forms and roles do not apply to all adjectives.

Figure 2
*Variability in the Defining Characteristics of Adjectives*

| morphological inflection | attributive role | predicative role | descriptive meaning | gradable | example |
|---|---|---|---|---|---|
| + | + | + | + | + | *big* |
| - | + | + | + | + | *beautiful* |
| - | + | + | ? | - | *absolute* |
| - | - | + | + | + | *afraid* |
| - | - | + | + | ? | *alive* |
| - | + | + | - | + | *different* |
| - | + | ? | + | ? | *lone* |
| ? | + | + | - | - | *mere* |

*Note.* Adapted from Biber et al. (2002, p. 189).

To illustrate, consider the following examples for their semantic characteristics:

1) *Recent research has unconvered new techniques by which researchers* <...> (Psychology 001.txt)
2) *A primary appraisal involves judgment about* <...> (Psychology 002.txt)

These adjectives modify different head nouns (*research, techniques* and *appraisal*) and result in differing semantic effects. Descriptive adjectives, such as Example (1), are typically used to characterize the referent of a nominal expression and can show different degrees of quality (Biber et al., 2002). Additionally, they are often conjoined with intensifiers, such as *very*, in order to strengthen its meaning or intention. On the other hand, classifying adjectives, such as Example

(2), cannot be intensified. In fact, they are known for limiting or restricting a noun's referent rather than describing characteristics (Biber et al., 2002; Troyka, 1993). In short, adjectives are known to modify—that is, describe or limit—nouns, pronouns, and word groups that function as nouns (Troyka, 1993). Next, consider the following examples for their syntactic characteristics:

3) *Inducctive reasoning uses empirical observations to construct* <...> (Psychology 001.txt)
4) *Scientific knowledge is empirical.* (Psychology 001.txt)

These adjectives are placed in different sentence positions and result in differing syntactic roles. Attributive adjectives, such as Example (3), precede and modify the head noun (*observations*) within a noun phrase (*empirical observations*). They add valuable information to noun phrases or clauses. On the other hand, predicative adjectives, such as Example (4), are typically used after a copular verb (*is*) and function as a complement of the subject (*scientific knowledge*) or object. Interestingly, specific adjectives tend to have a strong preference for one of these two positions. For example, topical adjectives (endings with *-al*), have a strong preference for the attributive position, whereas adjectives with prefix *a-* prefer the predicative position (Biber et al., 2002). Last, consider the following examples for their morphological characteristics:

5) *There is greater awareness of ADHD now than in the past.* (Psychology 003.txt)
6) *This profession will have the greatest growth of all job classifications.* (Psychology 002.txt)

These are gradable adjectives as shown by morphological inflections: the comparative and superlative suffix. Comparative adjectives (*-er*), such as Example (5), are typically used to compare differences between two things. On the other hand, superlative adjectives (*-est*), such as Example (6), are typically used to mark a superior or inferior relationship. Based on the language user, comparative or superlative forms would be selected amongst descriptive adjectives to enhance the communication of a noun's value, dimension, physical property, time/speed, human propensity, chronology/age, and color (Wulff, 2003; Biber et al., 2002). These underlying meanings are often tied to the user's stance or opinions towards the subject or object. A similar effect is achieved across morphemes that participate in comparative and superlative constructions, as shown in Examples (7) and (8):

7) <...> *structured interviews were more effective at predicting subsequent job performance of the job candidate.* (Psychology 002.txt)
8) *It has been found that one of the most effective ways to increase achievement in school districts with below-average reading scores was to pay the children to read.* (Psychology 001.txt)

These examples demonstrate how words such as *more/most* and *less/least* are acceptable—if they precede a descriptive adjective (*effective*)—to use in comparative (*more, -er*) and superlative (*most, -est*) constructions. In this case, the comparative construction in Example (7) shares a similar effect as Example (5), and the superlative construction in Example (8) shares a similar effect as Example

(6). Exceptions to these basic constructions include irregular adjectives, such as *better/best* and *worse/worst*.

It is the above characteristics and structures of adjectives that will be identified, analyzed, and discussed in this paper. Specifically, this paper will explore the grammatical behaviors and semantic preference and prosody of high frequency adjectives, and comparative and superlative constructions of adjectives in a psychology textbook.

## Corpus Linguistics and Analysis of Textbooks

Corpus linguistics (CL) has widely impacted empirical analyses of language structure and use. With a mixture of machine and human effort (McEnery & Wilson, 2003), we can obtain linguistic knowledge from large bodies of authentic written or spoken materials[1] using a descriptive method, textual format, and powerful analytic tools provided by computer technology. CL is not based upon "the rumination of theorists" (McEnery & Wilson, 2003, p. 449), or what is theoretically possible with language, rather, how the actual language is used systematically, in naturally occurring texts (Biber et al., 1998). Work in English CL was first popularized in the 1950s and continued to break barriers in English studies until the first digital corpus was created, nearly one decade later (Leech & Smith, 2006). Computers relieved humans of toilsome work, such as the systems of gathering corpus data or manually-to-automatically encoding parts of speech (Francis & Kucera, 1979; Garside et al., 1987). Linguists praise digital corpora to be "the most authentic and reliable methodological tools of obtaining scientific facts" about languages (Jovanovic, 2005). According to Biber et al. (1998), linguistic analyses have gradually shifted the focus from structure to use, as many investigations of language use were once "unfeasible or simply impossible" without computer technology. In particular, semantic theory—the study of semantic preference and prosody—have become a recent center of interest. According to Almeida (2019), these studies are considered register- or domain-dependent and heavily supported using corpus data. CL studies of semantic preference involves the analysis of collocation (Sinclair, 1996; Partington, 2004) and elements of word combinations or phraseology (Gass & Selinker, 2008), whereas semantic prosody pertains to the positive, negative, or neutral associations that words' collocates engender (Begagić, 2013; Hu, 2015; Cabezas-García & Faber, 2019). The series of items that a word collocates frequently with is called a semantic set (Partington, 2004), semantic consistency (Louw, 1993), or semantic environment (Sinclair, 1991, p. 112). Nowadays, systematic sets of words that co-occur in a language can be easily identified thanks to computer technology.

Corpus research on English textbooks, journals, and other writings has revealed interesting language features of specific genres, registers, and domains. According to Swales (1990), from a genre theory perspective, expert language users that share a set of communicative purposes "shape[s] the schematic structure of the discourse and influences and constrains choice of content and style" (p. 58). This can be seen through a series of corpus studies. In *A Typology of English Texts* (Biber, 1989), 'scientific exposition' is one of five text types examined. According to

1 This may include, but may not be limited to, publications, academic writing, web articles, everyday conversations, movie transcripts, and more.

their analysis, scientific exposition identifies language that is "extremely informational, elaborated in reference, and technical and abstract in style and content" (p. 38). For example, Wang and Khunkhenova (2016) noted language features in scientific discourse, such as hedges (e.g. *most*, *possible*), that help authors "reduce commitment and negotiate the meaning between the reader and the writer" (p. 45). Another study points to the existence of formulaic expressions in social (soft) and hard science textbooks and scholarly papers, while another highlights noun + noun combinations that differ between ecology, chemistry, management, and education disciplines (Biber et al., 2004; Oghyanous, 2018; Iwatsuki et al., 2022). More specific to adjectives, Kartal (2017) discovered that in academic texts, evaluative adjectives—which may include comparative or superlative forms—made up nearly half of the total number of adjectives. However, the evaluative form types did not frequently occur in the top 100 adjectives extracted from the texts (Kartal, 2017). In an earlier study, Wood and Appel (2014) discovered that business and engineering university textbooks contained high frequencies of multiword lexical units (MLUs), few of which were evaluative forms. Although these discoveries add valuable descriptions of specific language use in scientific discourse, there are little to no published works that focus on adjectival patterns in psychology, a hyponym of the social science genre.

## Corpus Linguistic Analysis of Adjectives

Past corpus research has addressed a narrow scope of characteristics and structures of adjectives that occur in different contexts and for different purposes. Using a top-down and bottom-up approach, some patterns of English adjectives noted in studies include adjective intensification (Lorenz, 1999), prenominal adjective order (Wulff, 2003; McMahon, 2008), adjectival compounding (Jovanovic, 2005; Conti, 2006), evaluative adjectives (Breban, 2010; Ağçam & Özkan, 2015), among others. Each of these studies utilizes specific, machine-readable language corpora that allow for natural language processing (NLP). Through learner corpora, Lorenz (1999) observed that adjectives were the most frequent focus of intensification (qualities of degree) in argumentative writing and noted differences between native and non-native speakers. Through a monolingual corpus, Wulff (2003) described prenominal adjective order to be governed by phonological, syntactic, semantic, and pragmatic factors, of which, McMahon (2008) claimed syntax and semantics to be the most influential for error analysis using learner corpora. Also analyzing specialized corpora, Breban (2010) observed how comparable adjectives identify key concepts in literature and optimize 'recipient-design.' Examining specialized and learner corpora, Ağçam and Özkan (2015) revealed that author stance is commonly communicated through likelihood adjectives. These studies inspired my search for the distribution and grammatical behaviors of adjectives in a monolingual, specialized corpus.

## Research Questions

1. What are the most frequent adjectives in the text? What are their grammatical behaviors (e.g. syntactic roles, semantic structures) and semantic preferences and prosody (e.g. adjective-and-noun collocations, positive or negative associations)?

2. What are the most frequent adjectives that participate in comparative and superlative constructions in the text? How are they used in context?

## Methodology

### The Corpus

The corpus for this study is Spielman et al.'s (2020) "Psychology" textbook provided by OpenStax (available at openstax.org), totaling nearly 300,000 tokens and 17,000 types. The tagged (annotated) and untagged (unannotated) versions of this text were divided into eight text files. A corpus-based analysis was carried out using Laurence Anthony's AntConc 3.5.9 (Windows) 2020 freeware. This toolkit allowed for data collection via concordancing and text analysis.

### Analytical Procedures

Upon selecting the key adjectival structures to investigate, as shown in Figure 1, the appropriate POS tags (part-of-speech annotations) and hits (occurrences) for searching key adjectival structures were determined using AntConc's TreeTagger Tag Set (58). Table 1 displays the key POS tags used for basic searches:

Table 1
*Key AntConc Tags for Key Adjectival Structures*

| Tag | Word Type | Example |
|---|---|---|
| *_JJ | adjective | *old* |
| *_JJR | comparative adjective | *older* |
| *_JJS | superlative adjective | *oldest* |
| *_NN | singular noun | *table* |
| *_NNS | plural noun | *tables* |
| *_DT | determiner | *the* |
| *_VB/Z/P | singular and plural *be* | *be, is, am/are* |

To accomodate research needs, key POS tags were configured into tagsets (a string of POS tags) that matched the key adjectival structures under examination. For example, the most basic searches for adjectival structures included descriptive, classifying, and attributive adjectives (*_JJ *_NN or *_JJ *_NNS); predicative adjectives ([*_DT] *_NN *_VB/Z *_JJ or [*_DT] *_NNS *_VBP *_JJ); comparative adjectives (*_JJR); and superlative adjectives (*_JJS).

The first research question focuses on the most frequent adjectives in the text. Using AntConc's Word List function, the top adjectives were extracted and confirmed via concordancing and the *_JJ tag. Next, the grammatical behaviors of the top 5 adjectives were evaluated based on their syntactic roles and function. *Syntactic roles* were identified using the tagset

for adjectives in the attributive position (*_JJ *_NN or *_JJ *_NNS) and predicative position ([*_DT] *_NN *_VB/Z *_JJ or [*_DT] *_NNS *_VBP *_JJ). Next, the function and semantic structures of the same 5 adjectives were identified by setting the number of n-grams (contiguous sequence) to three. This word range appears as 1L, 2L, and 3L on the screen, which highlights the left contexts of the adjective searched. Through concordancing and KWIC (Key Word in Context) functions, the left collocations of the 5 adjectives were examined and categorized by function. *Functions* refer to the three major metafunctions of language (Halliday, 1985; Wood, 2015, p. 128) and include ideational function (content-oriented), textual function (text-oriented), and interpersonal function (participant-oriented) (Hyland, 2007).

Semantic preference and semantic prosody, on the other hand, were determined through attributive noun combinations. Using the same 5 adjectives, the settings were adjusted to balance the right contexts of adjectives searched. Through concordancing and KWIC functions, the most frequent attributive noun combinations were identified and examined for semantic preference and semantic prosody using the system presented in Sidupa & Wastono's (2019) and Cabezas-García & Faber's (2019) studies.

For *semantic preference*, terms were assigned a lexical domain based on the content or "relation, not between individual words, but between a lemma or word form and a set of semantically-related words" (Stubbs, 2001, p. 65). For example, Partington's (1998) study of the intensifying adjective *sheer* revealed that the types of words that co-occurred with the node pertained to five specific semantic sets: magnitude, weight, or volume (*the sheer volume of reliable information*); force, strength, or energy (*the sheer force of his presence*); persistence (*sometimes through sheer insistence*); strong emotion (*sheer joy in life*); and physical quality (*he didn't have…the sheer glamour of evil*). Although there is no standard set of categories to classify semantic preference, the three specific sets that were utilized in this study were 1) mental states, conditions, and phenomena (e.g. *the ability to engage in sexual behavior… does not affect sexual motivation* or *sexual orientation is an individual's emotional and erotic attractions to*); 2) behaviors and interactions (e.g. *social facilitation improved performance when an audience is watching*); 3) institutional or discipline aspects (e.g. *providing psychological treatment within the criminal justice system*). These semantic sets of the top adjectives shaped their semantic prosody (Partington, 2004).

The second research question focuses on the most frequent adjectives that participate in comparative and superlative constructions in the text. Using the Word List function, the top constructions were extracted and confirmed via concordancing and the tags, *_JJR and *_JJS. Next, the top 20 constructions were organized into two columns (left for comparative, right for superlative), from most to least frequent. Based on introspection and the textual information found in concordance lines, each construction was marked with favorable (F), unfavorable (U), or mixed (M) positions. For further analysis, the regular forms *great, greater, greatest* and the irregular forms *more/most, less/least* were examined.

## Corpus Analysis

### What Are the Most Frequent Adjectives in the Text?

Table 2 displays the five most frequent adjectives in the text.

Table 2
*Top 5 Most Frequent Adjectives*

| Adjectives | Hits (Occurrences) |
|---|---|
| *social* | 570 |
| *psychological* | 418 |
| *mental* | 277 |
| *human* | 241 |
| *sexual* | 230 |

Immediately, we notice that four of the five adjectives displayed are topical adjectives (adjectives ending in *-al*) (Biber et al., 2002). Although the high frequency of *psychological* reflects the subject matter of the textbook, the most common adjective actually is *social*, which may suggest a strong focus on the social aspects of psychology in the textbook. Also, while the high frequency of the adjective *human* indicates the central concern of the textbook on human psychology, the other two common adjectives, *mental* and *sexual,* may suggest the two main topics in human psychology discussed in the textbook.

***What Are the Grammatical Behaviors of the Top Five Adjectives?***

Table 3 displays the five most frequent adjectives according to their syntactic roles. Adjacent to these adjectives are their number of hits (occurrences) and percentages of distribution in the attributive and predicative positions.

Table 3
*Attributive vs. Predicative Positions of the Top Five Adjectives*

| Adjective | Attributive positions | Predicative positions |
|---|---|---|
| *social* | 568 (99.65%) | 2 (0.35%) |
| *psychological* | 414 (99.04%) | 4 (0.96%) |
| *mental* | 277 (100%) | 0 (0%) |
| *human* | 241 (100%) | 0 (0%) |
| *sexual* | 299 (99.67%) | 1 (0.33%) |

The top adjectives in Table 3 all show a strong preference for the attributive position. This result makes sense when we consider the types of adjectives displayed. In this case, *social, psychological, mental,* and *sexual* are topical adjectives (adjectives ending in *-al*), which, as mentioned

above, favor the attributive position (Biber et al., 2002). This pattern was consistent for most adjectives (97.4%) that occurred in the textbook.

An examination of the left collocations associated with the top five adjectives shows a preference for the ideational function and classification (Tables 4-8). Additionally, they tend to occur frequently with multiword lexical units (MLUs)[2]. The most common MLUs associated with these adjectives tend to follow the [determiner + noun phrase + *of* + adjective + noun phrase] structure, such as *a variety of, the study of, in the context of,* and *to the effect of* (Tables 4-8).

Table 4
*Left Collocates and Function of* Social

| Collocates | Function |
|---|---|
| *a variety of* | Ideational (93%) |
| *deficits in* | |
| *a study of* | |
| *a subfield of* | |
| *some examples of* | |
| *(e.g., behavior-)al and* | |
| *the impact of* | |
| *based on the* | |
| *the effect of* | |
| *a measure of* | |
| *the influence of* | |
| *the development of* | |
| *the types of* | |
| *the power of* | |
| *and other* | Textual (7%) |

2 Other terms for this linguistic phenomenon include set phrases, prefabricated word combinations (Sinclair, 1991; Cowie, 1994), lexical bundles (Biber & Conrad, 1999), formulaic sequences or expressions (Wray, 1999), phraseological units (Biber & Barbieri, 2007), and multiword terms or sequences (Cabezas-Garcia & Faber, 2019).

Table 5
*Left Collocates and Function of* Psychological

| Collocates | Function |
|---|---|
| *in the context of* | Ideational (87%) |
| *the development of* | |
| *the study of* | |
| *the use of* | |
| *as a function of* | |
| *the effect of* | |
| *the history of* | |
| *high levels of* | |
| *result in* | |
| *explaining a* | |
| *a wide range of* | |
| *some degree of* | |
| *quality control for* | |
| *there is a* | Textual (13%) |
| *and other* | |

Table 6
*Left Collocates and Function of* Mental

| Collocates | Function |
|---|---|
| *a type of* | Ideational (100%) |
| *the concept of* | |
| *symptoms of* | |
| *family history of* | |
| *focused on how* | |
| *teaching about* | |
| *suffering from* | |
| *signify a* | |
| *a stigma associate with* | |
| *the stigma attached to* | |
| *period of* | |
| *decreased* | |
| *less likely to* | |
| *suffering from* | |
| *focused on how* | |

Table 7
*Left Collocates and Function of* Human

| Collocates | Function |
|---|---|
| *from the perspective of* | Ideational (100%) |
| *the field of* | |
| *the use of* | |
| *the role of* | |
| *the nature of* | |
| *the development of* | |
| *the incredible diversity of* | |
| *root causes of* | |
| *the conditioning of* | |
| *sex differences in* | |
| *positive aspects of* | |
| *the treatment of the* | |
| *research involving* | |
| *the value of* | |
| *the function of* | |

Table 8
*Left Collocates and Function of* Sexual

| Collocates | Function |
|---|---|
| *based on* | Ideational (93%) |
| *the ability to engage in* | |
| *one form of* | |
| *another form of* | |
| *the result of* | |
| *the origins of* | |
| *measurement of* | |
| *the regulation of* | |
| *the focus on* | |
| *based solely on their* | |
| *the perpetrators of* | |
| *the physical signs of* | |
| *the victims of* | |
| *risky* | |
| *there is a* | Textual (7%) |

The left collocations associated with *social*, *psychological*, *mental*, *human*, and *sexual* show a preference for the ideational function (95% average), which may reflect the informational nature of the text.

***What Semantic Preference And Prosody Are Detected?***

The most frequent nouns associated with *social*, *psychological*, *mental*, *human*, and *sexual* (attributive noun combinations) were identified and data for the 25 most common attributive noun combinations are reported in Table 9.

Table 9
*Attributive Noun Combinations*

| Adjectives | Noun Collocates | | | | |
|---|---|---|---|---|---|
| *social* | *psychology* (128) | *support* (57) | *role(s)* (39) | *anxiety* (31) | *facilitation* (11) |
| *psychological* | *disorder(s)* (132) | *association* (42) | *bulletin* (32) | *research* (21) | *treatment* (10) |
| *mental* | *health* (88) | *illness(es)* (54) | *disorder(s)* (39) | *processes* (10) | *set* (7) |
| *human* | *behavior(s)* (34) | *factors* (24) | *development* (9) | *sexuality* (6) | *nature* (6) |
| *sexual* | *behavior(s)* (41) | *orientation* (40) | *harassment* (17) | *abuse* (12) | *motivation* (12) |

As shown in Table 9, the nouns associated with the top five adjectives refer to mental states, conditions, and phenomena (*psychology, anxiety, disorder, health, illness, orientation, motivation*), behaviors (*behaviors, harassment, abuse*), abstraction (*support, roles, processes, set, behaviors, factors, development, nature*), and the organizational aspects of the field (*research, association, bulletin*).

Zooming in a bit further, each attributive noun combination was examined for its semantic preference and prosody (positive, negative, or neutral) in Table 10.

Table 10
*Semantic Preference and Semantic Prosody Analysis*

| Modifier | Header | Semantic Prosody | Semantic Preference |
|---|---|---|---|
| *social* | *psychology* | N | INSTITUTIONAL_DISCIPLINE ASPECTS |
| | *support* | + | INSTITUTIONAL_DISCIPLINE ASPECTS |
| | *role(s)* | N | INSTITUTIONAL_DISCIPLINE ASPECTS |
| | *anxiety* | - | MENTAL STATES_CONDITIONS_PHENOMENA |
| | *facilitation* | + | BEHAVIORS_INTERACTIONS |
| *psychological* | *disorder(s)* | - | MENTAL STATES_CONDITIONS_PHENOMENA |
| | *association* | N | INSTITUTIONAL_DISCIPLINE ASPECTS |
| | *bulletin* | N | INSTITUTIONAL_DISCIPLINE ASPECTS |
| | *research* | + | INSTITUTIONAL_DISCIPLINE ASPECTS |
| | *treatment* | + | INSTITUTIONAL_DISCIPLINE ASPECTS |
| *mental* | *health* | + | MENTAL STATES_CONDITIONS_PHENOMENA |
| | *illness(es)* | - | MENTAL STATES_CONDITIONS_PHENOMENA |
| | *disorder(s)* | - | MENTAL STATES_CONDITIONS_PHENOMENA |
| | *process* | N | MENTAL STATES_CONDITIONS_PHENOMENA |
| | *set* | N | MENTAL STATES_CONDITIONS_PHENOMENA |
| *human* | *behavior(s)* | N | BEHAVIORS_INTERACTIONS |
| | *factors* | N | MENTAL STATES_CONDITIONS_PHENOMENA |
| | *development* | + | MENTAL STATES_CONDITIONS_PHENOMENA |
| | *sexuality* | N | BEHAVIORS_INTERACTIONS |
| | *nature* | N | BEHAVIORS_INTERACTIONS |
| *sexual* | *behavior(s)* | N | BEHAVIORS_INTERACTIONS |
| | *orientation* | N | MENTAL STATES_CONDITIONS_PHENOMENA |
| | *harassment* | - | BEHAVIORS_INTERACTIONS |
| | *abuse* | - | BEHAVIORS_INTERACTIONS |
| | *motivation* | N | MENTAL STATES_CONDITIONS_PHENOMENA |

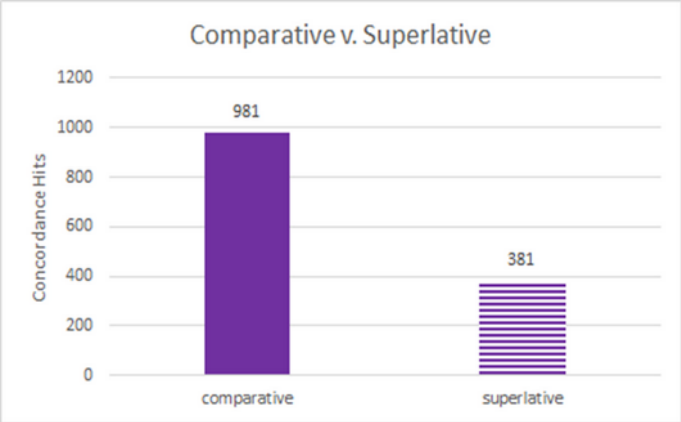
In Table 10, the results suggest a strong preference for mental states, conditions, and phenomena (44%), behaviors and interactions (28%), and institutional or discipline aspects (28%) with an average of neutral (52%), positive (24%), and negative (24%) prosody. Attributive nouns categorized as mental states, conditions, and phenomena or behaviors and interactions had a higher chance of having negative prosody (36% - 29%) (e.g. *most people suffering from mental illnesses are not hospitalized*, *another form of sexual harassment is the threat of withholding reward if a sexual request is* refused or *sexual harassment are unwelcome sexual advances*) than institutional or discipline aspects (0%). Attributive nouns categorized as institutional or discipline aspects reflected only positive prosody (57%) (e.g. *high levels of social support showed indications of better immune functioning*) or neutral prosody (43%) (e.g. *social psychology is the study of how people affect one another*), which may suggest a focus in the positive roles of psychological research, abstractions, or programs (institutional or discipline aspects) that are designed to educate and help the population deal with mental or behavioral issues.

**What Are the Most Frequent Adjectives That Participate in Comparative And Superlative Constructions in the Text?**

Figure 3 displays the overall frequency of comparative and superlative constructions in the text.

Figure 3

*Comparative v. Superlative Construction*




As Figure 3 shows, comparative constructions were far more common than superlative constructions in the textbook. In fact, the frequency of comparative constructions is double the frequency of superlative constructions. Perhaps one explanation for this trend is the text's tendency to make comparisons between two entities. Results to a query for the top 20 comparative and superlative constructions are displayed in Table 11. The labeling of constructions as favorable (F), unfavorable (U), or mixed (M) positions is based on textual evidence.

In Table 11, the adjective *likely* occurs most frequently in both comparison and superlative constructions (e.g., *more/most/less/least likely to*). These constructions could be considered MLUs that function as hedging. This confirms Wang and Khunkhenova's (2016)

suggestion that hedging is common in scientific discourse. Considering the other adjectives, the majority seem to be descriptive. Although the comparative construction uses the participial form (e.g., *less skilled*), the superlative does not.

Table 11
*Most Frequent Adjectives in Comparative and Superlative Constructions*

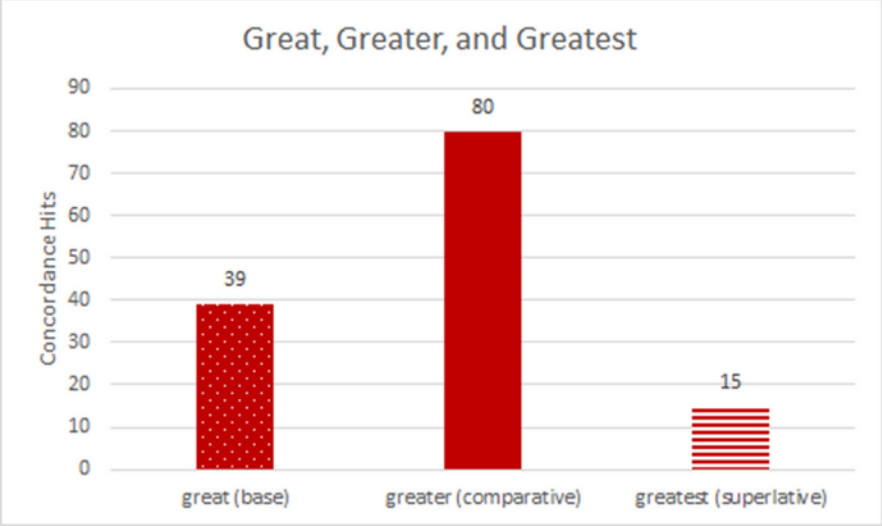
| Top Adjectives in Comparative Construction | Top Adjectives in Superlative Construction |
|---|---|
| *more likely to* (122) (F) | *most likely to* (23) (F) |
| *greater* (80) (F) | *highest* (32) (M) |
| *less likely to* (24) (F) | *most common* (17) (M) |
| *more effective* (14) (F) | *greatest* (15) (F) |
| *more common* (12) (F) | *most effective* (8) (F) |
| *more complex* (12) (F) | *most evident* (8) (F) |
| *more recent* (11) (F) | *most important* (7) (F) |
| *more difficult* (6) (U) | *latest* (7) (F) |
| *more important* (6) (F) | *happiest* (5) (F) |
| *more positive* (6) (F) | *best …* (4) (F) |
| *more efficient* (5) (F) | *most basic* (4) (M) |
| *less common* (5) (F) | *most famous* (3) (F) |
| *more persuasive* (4) (F) | *most frequent* (3) (F) |
| *better …* (3) (F) | *most influential* (3) (F) |
| *less severe* (3) (F) | *most appropriate* (3) (F) |
| *less attractive* (3) (U) | *least likely to* (2) (U) |
| *less intense* (3) (M) | *least reliable* (1) (U) |
| *less expensive* (2) (F) | *least productive* (1) (U) |
| *less skilled* (2) (U) | *least happy* (1) (U) |
| *worse …* (2) (U) | *worst …* (1) (U) |

### *How Are They Used in Context?*

For further analysis, the regular forms *great*, *greater*, *greatest* and the irregular forms *more/most*, *less/least* will provide some insight on how these frequent constructions are used in concordance lines. To start, Figure 4 displays the findings for *great*, *greater*, and *greatest*:

The results of this search show that comparative forms have a higher frequency than the base and superlative forms. To obtain a glimpse into why this might be the case, let us examine the concordance lines in Example Sets 1 through 3 to see how they are used in context.

Figure 4
*Great, Greater, and Greatest*




Example Set 1: Concordance Lines of *Great*

(1) *Some people will exert a great amount of effort, while others will exert little effort.*
(2) *In recent years, the amygdala has received a great deal of attention from researchers interested in understanding the biological basis for emotions, especially fear and anxiety.*
(3) *Despite these increases in productivity, Taylor's theory received a great deal of criticism at the time because it was believed that it would exploit workers and reduce the number of workers needed.*
(4) *These findings were very controversial and drew a great deal of attention, sparking an international forum on whether children should be vaccinated.*
(5) *If Skinner were alive today, he would probably think this was a great idea.*

The concordance lines in Example Set 1 provide a contextual snapshot of the base adjective "*great*." This adjective is most often used in fixed expressions (MLUs) of quantification[3](e.g. *a great deal of* or *a great amount of*) and to signal transitions between past and emerging research (e.g. *a great deal of attention from researchers*, *Taylor's theory received a great deal of criticism at the time*, or *Skinner…would probably think this was a great idea*).

Example Set 2: Concordance Lines of *Greater*

(1) *His work also inspired legal changes that protect the rights of people in psychiatric institutions and allow such individuals a greater degree of influence and responsibility over their lives.*
(2) *On the average, boys are 3 times more likely to have ADHD than are girls; however, such findings might reflect the greater propensity of boys to engage in aggressive and antisocial behavior and thus incur a greater likelihood of being referred to psychological clinics.*

3 Quantification is connected to research-oriented structures, ideational functions, or classifying domains (Hyland, 2007).

(3) *Relationships have a 50% greater likelihood of survival compared to those with weak or insufficient social relationships.*
(4) *Men, non-Whites, and individuals in lower socioeconomic status (SES) groups report experiencing a greater number of traumatic events than do women, Whites, and individuals in higher SES groups.*
(5) *A statistical review of 10 longitudinal studies involving initially healthy individuals revealed that those with elevated depressive symptoms have, on average, a 64% greater risk of developing heart disease than do those with fewer symptoms.*

As shown in the concordance lines in Example Set 2, the comparative adjective "*greater*" is most often used in MLUs of quantification and accuracy-oriented hedging devices (following Hyland's model of hedges in scientific discourse, in which hedges are fractionated into content-oriented and accuracy-oriented hedges, 1998, p. 156). Examples are *a greater likelihood of* or *a greater number of*, of quantity or quality.

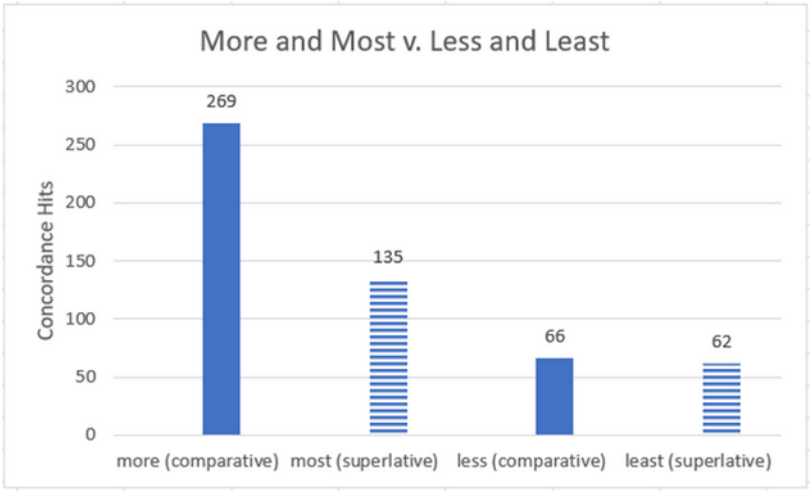
Example Set 3: Concordance Lines of *Greatest*

(1) *Suicide is not listed as a disorder in the DSM-5; however, suffering from a mental disorder—especially a mood disorder—poses the greatest risk for suicide.*
(2) *However, from 2006 to 2009 the greatest increase in stress levels occurred among men, Whites, people aged 45-64, college graduates, and those with full-time employment.*
(3) *Between 2006 and 2009, the greatest increases in stress levels were found to occur among Blacks, those aged 45-64, the unemployed, those without college degrees.*
(4) *Clifton argued that our strengths provide the greatest opportunity for growth.*
(5) *The greatest benefit of naturalistic observation is the validity, or accuracy, of information collected.*

The superlative adjective "*greatest*" is most often used in MLUs of quantification (e.g. *greatest increase in*) and to describe possibility (e.g. *greatest opportunity for* or *greatest benefit of, greatest risk for*).

Next, let us consider the overall frequency of *more* and *most* versus *less* and *least* constructions in Figure 5. The results show that comparative forms continue to outnumber superlative forms. This trend suggests that in the psychology textbook examined, comparative constructions are typically used to describe the differences between two entities, which is more commonly done than superlative constructions, which are typically used to make absolute statements about a superior or inferior relationship. This observation is illustrated by the concordance lines in Example Sets 4 through 7. On the other hand, despite comparatives being more common for both items, the difference is much smaller for *less/least*. One reason for this was due to the high frequency idiom *at (the very) least*, which can be used to describe the lowest possible assessment (e.g. *at least one month*).

Figure 5
*Most and Most v. Less and Least*




Example Set 4: Concordance Lines of *More*

(1) *In 2008, the test was again revised, using more advanced methods, to the MMPI-2-RF.*
(2) *Furthermore, recent research suggests that both cyberbullying victims and perpetrators are more likely to experience suicidal ideation, and they are more likely to attempt suicide than individuals who have no experience with cyberbullying.*
(3) *A 14-year study of 1,377 American Legionnaires who had served in the Vietnam War found that those who perceived less social support when they came home were more likely to develop PTSD than were those who perceived greater support.*
(4) *As Eagly, Johannesen-Schmidt, & van Engen (2003) point out, research shows that transformational leadership approaches are more effective than transactional approaches, although individual leaders typically exhibit elements of both approaches.*
(5) *Similarly, more attractive speakers are more persuasive than less attractive speakers.*

Example Set 5: *Concordance Lines of "Most"*

(1) *The reason is most likely encoding failure.*
(2) *Although adoption studies have supported the hypothesis that genetic factors contribute to schizophrenia, they have also demonstrated that the disorder most likely arises from a combination of genetic and environmental factors, rather than just genes themselves. For example, investigators in one study examined the rates of schizophrenia among 303 adoptees*
(3) *A study of adoptees whose biological mothers had schizophrenia found that the adoptees were most likely to develop schizophrenia.*
(4) *Dyslexia is the most common learning disability in children.*

(5) *Their review is aimed at determining which coping strategies are most effective at offsetting negative health outcomes associated with racism-related stress.*

Example Set 6: Concordance Lines of *Less*

(1) *Recent research has shown that minorities are less likely to access mental health services than their White middle-class American counterparts.*
(2) *In addition, those who became involved in the community were less likely to develop PTSD, and they were more likely to experience a remission of PTSD than were those who were less involved.*
(3) *Similarly, more attractive speakers are more persuasive than less attractive speakers.*
(4) *This method of rest increased worker productivity from 12.5 to 47.0 tons moved per day with less reported fatigue as well as increased wages for the workers who were paid by the ton.*
(5) *While sleep apnea is less common in thin people, anyone, regardless of their weight, who snores loudly or gasps for air while sleeping, should be checked for sleep apnea.*

Example Set 7: Concordance Lines of *Least*

(1) *For example, children with anxiety disorders were least likely to have received treatment in the past year, while children with ADHD or a conduct disorder were more likely to receive treatment.*
(2) *Which of the following adolescents is least likely to be targeted for bullying?*
(3) *Fixed interval is the least productive and the easiest to extinguish.*
(4) *For example, Dierdorff & Wilson (2003) found that job analyses developed from descriptions provided by people holding the job themselves were the least reliable; however, they did not study or speculate why this was the case.*
(5) *U.S. workers least happy with their work stress and pay <...>*

In all, these findings reveal that comparative and superlative constructions are used, in the text, to describe probability and signal superiority through a favorable position (57% - *more, most, less, least*), inferiority through an unfavorable position (29% - *less, least*), and occasional neutrality through a mixed position (17% - *less*).

## Conclusion

### Summary of Findings

This paper has examined adjectival patterns in a psychology textbook. Concerning my first research question, the most frequent adjectives were defined as topical classifying adjectives. This led me to confirm that most adjectives occurred in the attributive position throughout the text. Collocations associated with the most frequent adjectives' left contexts suggested a strong preference for the ideational (content-oriented) function. Comparatively, attributive noun collocations suggested a strong preference for mental states, conditions, and phenomena with neutral prosody. For my second research question, comparative constructions (with favorable position) were far more common than superlatives. These results came as no surprise due to the

nature of topical, classifying adjectives (Biber et al., 2002). However, one finding that was consistent in nearly every search was the existence of MLUs and hedging devices (e.g. *more likely to*). The structures with the highest frequency were strongly correlated with MLUs—particularly [determiner + noun phrase + *of* + adjective + noun phrase], such as *a variety of, the study of, in the context of,* and *to the effect of*—and accuracy-oriented hedging devices. This information, in addition to my originally intended research, could prove beneficial for ESL teaching implications in scientific discourse.

**Limitations and Future Research**

The present study's biggest limitation is the small sample size. In the process of data collection, it became clear that a larger sampling frame is essential. A corpus composed of a single textbook may give us interesting details about the use of certain forms, but it does not provide sufficient evidence to write comprehensive register descriptions (Biber et al., 2007, p. 257). To better understand the distinct features in the target text, a multi-dimensional (MD) analysis is required. MD analyses focus on register variation between two perspectives (e.g. at least two ESP topics). One recommended secondary corpus that can be used in future research is the learner's corpus MICUSP (Michigan Corpus of Upper-Level Student Papers). It could be insightful to compare what forms occur most frequently in a textbook in comparison to forms that occur most frequently in student writing.

A second limitation of the study is the fact that only one researcher coded the data for semantic preference and prosody. Future research should have more than one coder to verify the categorization and add to the strength of the analysis.

**Teaching Implications**

Based on the data collected, there are some potential ESL teaching implications, particularly in the fields of English for Specific Purposes (ESP) and NLP. Biber et al. (2007) shares that both researchers and practitioners are constantly seeking to understand the linguistic characteristics of specialized registers in English (p. 157). There are many aspects of language that can be described systematically, thanks to CL (Biber et al., 2007). One of the main goals of this type of research is "to design the best possible materials and activities to help students comprehend and produce these registers properly" (Biber et al., 2007, p. 157). In other words, the most frequent characteristics and structures of language we notice are forms that students 1) will be exposed to and 2) expected to use (Hinkel, 2018). To learn and master them, these forms can be learned incidentally, through inductive reasoning, or guided by the teacher (Hsu, 2006). With this in mind, perhaps the adjectival patterns discovered in this paper could be used for the purpose of assessing and teaching language. For example, there were high frequencies of comparative constructions and other adjectival structures that existed as MLUs. These examples could be extracted from the text, synthesized, and used in ESL teaching—whether it be content-based, task-based, project-based, or data-driven. In fact, some linguists encourage the focus of MLUs in extension to single-word vocabulary (Biber et al., 2004; Granger et al., 2006, Hinkel, 2018). Hedging devices are an honorable mention, as they are not uncommon to scientific discourse

(Hyland 1998, 2005). In all, these applications could improve students' morphological awareness and semantic maps.

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