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Turkish EFL learners' knowledge, perception, and production of suprafixes as part of lexical competence

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Abstract

Vocabulary and grammar are crucial to language proficiency. Certain word families and grammatical categories are differentiated by prosodic features like suprafixes. In English, specific noun/adjective-verb pairs, often called disyllabic words, have primary stress on different syllables: nouns usually receive trochaic stress, while verbs receive iambic stress. Research shows that suprafixes present challenges for language learners from diverse linguistic and prosodic backgrounds. Given the limited research on Turkish EFL learners, this study investigated their knowledge, perception, and production of suprafixes. Participants were B1-level preparatory school students from a prominent state university. Data were collected using a knowledge test (n = 110), a perception test (n = 80), and a production test (n = 50). Results indicated poor suprafixational knowledge, perception, and production among Turkish EFL learners. Minor gender differences in suprafixational competence were observed, with various noun-verb pairs challenging both genders. The study concludes that Turkish EFL learners require targeted suprasegmental training focusing on suprafixes.

Keywords: affixation; derivational morphology; disyllabic words; suprafixes; suprasegmentals

Introduction

It is widely recognized that language learning requires comprehending that particular sounds correspond to specific meanings or concepts (Fromkin et al., 2022; Kasap & Pashayeva, 2020; Zsiga, 2024). This means that a significant part of our linguistic knowledge involves knowing words. In fact, word knowledge consists of the understanding of both its sound and meaning. Every word we know is stored in our mental lexicon, with its unique phonological

representation and meaning (Fromkin et al., 2022). The mental lexicon also contains information about the grammatical category of words, such as whether a word is a noun, verb, adjective, or adverb.

Furthermore, words in a language can be classified as content or function words (De Marneffe et al., 2021). The former includes open-class nouns, verbs, adjectives, and adverbs, denoting concepts like actions, objects, attributes, and ideas. The latter refers to closed-class words such as prepositions, conjunctions, pronouns, and interjections, which do not necessarily have lexical meanings. The classification of words is studied by morphology, which investigates the grammatical endings attached to words in inflectional morphology and the word-related processes like coinage and affixation in derivational morphology (Aronoff & Fudemann, 2022)

Specific words in English, such as nouns and adjectives, may only be differentiated from their etymologically related verbs through their segmental features (Celce-Murcia et al., 2010). This is exemplified by the words "breath" / breθ/ and "breathe" /briːð/, where the noun ends with a voiceless consonant (i.e., /θ/) and the verb with a voiced one (i.e., /ð/). Such vowel alternations commonly indicate the distinction between nouns and verbs in related noun-verb pairs (Celce-Murcia et al., 2010). Some noun-verb pairs can only be distinguished by voicing, such as 'use' /juːs/ and 'use' /juːz/.

In addition to these segmental features, some differences in parts of speech occur at the suprasegmental level. For instance, the noun **CON**flict /ˈkɒnflɪkt/ and the verb con**FLICT** /kənˈflɪkt/ are differentiated by alternations in both stress placement and vowels. Such alternations are often phonologically signaled in English (Celce-Murcia et al., 2010). Similarly, noun-adjective pairs ending in -ate, where the verbs are always stressed with a full vowel sound /eɪt/ and the adjectives or nouns are usually unstressed with a reduced vowel sound /ət/, such as the word "approximate" /əˈprɒksɪmeɪt/ (verb) and / əˈprɒksɪmət/ (adjective). Part of speech differences are also marked by word-stress differences in noun-verb pairs comprising a prefix-plus-stem combination (Celce-Murcia et al., 2010), such as in "**RE**call" /ˈriːkɔːl/ (noun) and "re**CALL**" /rɪˈkɔːl/ (verb) noun-verb pairs comprising a prefix-plus-stem combination (verb), where the primary stress is on the first syllable in the noun form and the second syllable in the verb form (suprafixation).

It is essential for non-native speakers to be aware of suprafixational differences and perceive and produce them accurately because failing to do so can lead to misunderstandings or confusion (Derwing & Munro, 2022; O'Brien, 2019; Sardegna, 2022). Despite comprehensive instruction on morphology and suprafixes, pronunciation is not always emphasized enough for second-language learners (Celce-Murcia et al., 2010; Kochem, 2022; Lee & Lyster, 2023). Varonis and Gass (1982) found that pronunciation and grammar impact overall intelligibility, which is crucial for effective communication (Munro & Derwing, 1995). Words and grammar are the foundation of language proficiency (Richards, 2015), as vocabulary is necessary for both perception (listening and reading) (Choi & Zhang, 2021) and production (speaking and writing) (Hinkel, 2022; Uchihara & Clenton, 2023). Research has shown that segmental and suprasegmental pronunciation features might challenge Turkish EFL learners (Topal & Altay, 2022; Topal, 2023). Therefore, accurate pronunciation, including segmental articulation, suprasegmental pitch production, and voice quality, is essential for effective communication (Celce-Murcia et al., 2010; Derwing & Munro, 2022; Pennington & Rogerson-Revell, 2019; Sardegna, 2022), especially among non-native speakers of English.

All things considered, this study aims to explore suprafixation knowledge, perception, and production among Turkish EFL learners. In doing so, it attempts to determine the so-called "suprafixational competence" of language learners in terms of vocabulary (knowledge) and

pronunciation (perception and production). This way, it intends to bridge the literature gap theoretically and practically. The subsequent research questions were addressed in this regard:

RQ (1): What is the current state of suprafixation knowledge among Turkish EFL learners?
RQ (2): How well did Turkish EFL learners perceive suprafixes?
RQ (3): How well did Turkish EFL learners produce suprafixes?

Literature Review

Lexical Knowledge as Part of Linguistic Knowledge

A strong foundation in language structure, including grammar rules, syntax, and semantics, is essential for effective communication (Fromkin et al., 2022). However, one must also possess extensive lexical knowledge to excel in any language (Caro et al., 2017). This means that language learners must deeply understand individual words and their meanings, including synonyms, antonyms, homonyms, and idiomatic expressions. With this knowledge, individuals can confidently and accurately convey their intended message, regardless of the context (Heidari, 2019; Wang et al., 2023). Furthermore, proficiency in lexical knowledge is crucial for comprehension, fluency, and even language acquisition (Alshehri & Zhang, 2022; Qian & Lin, 2020). By mastering this cornerstone of language, individuals can easily express and interpret ideas, emotions, and concepts. Therefore, it is evident that lexical knowledge is an essential tool for anyone looking to become proficient in a language and communicate effectively in diverse linguistic contexts.

Affixation Processes in English

All world languages can be studied by analyzing them as scientific fields within and across specific levels. One of these significant levels is morphology, which is defined as "the study of the internal structure of words and the rules used in forming them" (Fromkin et al., 2014, p. 71). Apart from its primary function in studying the structure of words in a language, morphology also collaborates with other areas of linguistics, such as phonology and prosody (Aronoff & Fudeman, 2022). In this study, we focus on derivational morphology, which involves forming new words by modifying the syntactic category or adding new meanings on a free or bound basis (Fromkin et al., 2022). New words can be created in English using affixes and other means of word formation.

This research focused on morphological derivation, which involves utilizing different affixes, such as prefixes and suffixes, to create new words. Affixation refers to adding a segmental affix to a base word. Affixes can be classified based on their position relative to the base word, such as prefixation and suffixation (Beck, 2017). Additionally, affixation can be categorized into different types, summarized in Table 1.

Table 1 shows that numerous categories of affixation are present in different world languages. This implies that various languages use different affixes for morphological and inflectional derivation. The present study, which centers on accentual suprafixation, examines suprafixes – a specific type of affix. Languages display varying levels of linearity and nonlinearity in their morphology (Sandler, 2021). Linear morphology is seen in English and Spanish, where a word's morphemic sequence creates the surface form (Bye, 2020). Nonlinearity of morphology is a theoretical framework where the morphemes that compose a derived word are represented independently (Frost et al., 2000). This framework helps explain the complexities of Semitic languages like Arabic (McCarthy, 1979). In English, the nonlinearity of morphology is seen in

Table 1 Categories of affixation.

Affix	Example	Description
circumfix	**ge**-spiel-**t**	one affix occurring before and after the stem
disfix	blan**che**/blan**c**	elision of a stem's portion
duplifix	**yem**yeşil	incorporation of the reduplication of a stem's portion
infix	Ós**c**ar/Os**quít**ar	an affix occurring within a stem
interfix	Arbeit**s**zimmer	linking of two stems in a compound
prefix	**para**military	an affix occurring before a stem
semi-suffix	cat-**like**	an affix before a stem but is bound with it partially
simulfix	f**oo**t/f**ee**t	an affix altering a stem's segment
suffix (postfix)	mein/mein**em**	an affix occurring after a stem
suprafix	**pro**duce (n) pro**duce** (v)	an affix altering a stem's suprasegmental feature
transfix	**k**a**t**a**b**a/ya**kt**u**b**u	a discontinuous affix that interleaves within a discontinuous stem

suprafixation (McCarthy, 1983), which involves phonological part of speech alternations that shift stress positions and alter the word's lexical form.

Suprafixation: Description, Categorization, and Significance

Suprafixation is a linguistic process that involves adding a suprasegmental feature like tone, stress, or nasalization to one or more syllables of a word's root or stem, indicating a distinct grammatical process (Beck, 2017). This process involves inflectional and derivational operations at the suprasegmental-morphological level, making it a nonlinear affixation. Beck (2017) states that suprafixation always involves applying a specific suprasegmental element or pattern, unlike suprasegmental apophony. From a theoretical perspective, suprafixation can be classified into accentual and tonal.

An accent is the emphasis on a specific syllable of a word or words in a sentence (Ladd & Arvaniti, 2023). Accentual suprafixation is a type of nonlinear affixation where one or more of the syllables in a morpheme are emphasized using stress, resulting in a semantic shift (Mel'cuk, 2006). Table 2 shows two examples from the English language:

Table 2 Examples of accentual suprafixation.

Representation level	Example 1	Example 2
Phonological	re**CORD** /rəˈkoːd/	**RE**cord /ˈrekɔːd/
Grammatical	[+V, -animate, -sing.]	[+N], [+ inanimate, + sing.]
Semantic	[RECORD]	[RECORD]

Tone refers to the fluctuations in pitch or voice pitch that can change how a word or phrase is pronounced (Zhu & Mok, 2022). Unlike accentual suprafixation, where emphasis is placed on certain syllables of a morpheme, tonal suprafixation involves using different tones on a morpheme's syllables, ultimately resulting in a shift in meaning (Beck, 2017). This is common in many African languages, such as Banda-Linda and other Ubangi, where verbs are distinguished by their temporal-aspectual characteristics through tones (Booij et al., 2004). Penner (2019, p. 37) provided the following examples of tonal suprafixation for the Ixtayutla Mixtec language:

a. ɲãɲĩ ´´ 'brother' → ɲãɲĩ ^'Brother!'
b. àté 'Andrés' → átè 'Andrés!'
c. tʃèlā 'Andrea' → tʃélà 'Andrea!'

A suprafix is an affix with a suprasegmental signal on one or more syllables, indicating a morphosyntactic operation (SIL International, 2024). They are also known as stress or tone and are considered a form of bound morphemes that cannot stand alone. Suprafixes convey a derivational or inflectional meaning by granting a suprasegmental pattern to a neutral base or a prior base with a suprasegmental form (Jackson, 2007). In simple terms, they are a sort of affix that is rather abstract.

Some languages use suprafixes to distinguish lexical differences, which are only noticeable through the suprasegmental pattern assigned by those suprafixes. For instance, the verb and noun forms of the word "permit" can be distinguished only by their suprasegmental patterns, as shown in Figures 1 and 2 by the difference between the first and second sound waves.

Figure 1 Permit /pərˈmɪt/ (verb) (Audacity Team, 1999–2021).

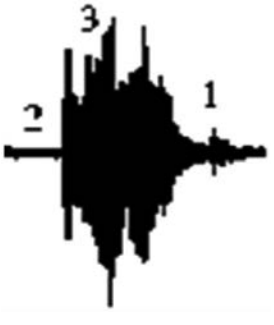

Figure 2 Permit /ˈpɜːrmɪt/ (noun) (Audacity Team, 1999–2021).

The examples above show that a suprafix serves the purpose of derivation as the use of a suprasegmental feature results in a change in the word's grammatical form. However, suprafixes do not always cause a shift in derivation. In some languages, such as the Zairian language, suprafixes help distinguish between tense-aspect forms, where four primary tense-aspect forms of verbs are marked by tones only. Welmers (1973) provided other interesting examples of overt pronouns and prefixes consisting of tones with no associated segments. Such tones somehow force their way into the following syllable. There are two types of suprafixes: additive and replacive suprafixes (Nida, 1949).

As the name implies, suprasegmental phonemes are added to the base by additive suprafixes. Such processes arise from adding suprasegmental patterns such as tone, stress, or nasalization to a base morpheme comprised solely of segmental phonemes. It can thus be speculated that additive suprafixes are affixed to bare bases without any underlying suprasegmental patterns. An example of this type of suprafix was provided by Nida (1949). In Ngbaka – a language spoken in Belgian Congo – although wà, wā, wă, and wáall mean "to clean," the distinct tones associated with the base express different tense-aspect information. From this example, it can be argued that additive suprafixes can be considered a type of tonal suprafixation.

Replacive suprafixes are affixes that replace the suprasegmental phonemes of a word's base form. This process involves substituting a suprasegmental pattern over another, which changes the word's meaning. These suprafixes can be found in African and European languages, such as English, where altering stress patterns can differentiate between word forms. For example, ngbò and ngbó both mean "swam" in Mongbandi, a language spoken in the Democratic Republic of Congo. In this example, the first word is the base form, while the second shows the verb in the second-person plural (Nida, 1949). In essence, replacive suprafixes can be considered a form of accentual suprafixation.

Learning about suprasegmentals (e.g., suprafixes) is crucial for English language learners because it helps them understand the subtle differences in pronunciation and meaning of English words (Çam, 2024). Learners can improve their ability to pronounce words accurately and communicate effectively by mastering suprasegmentals (e.g., suprafixes) (Nishio & Joto, 2022). Furthermore, studying suprafixes might help learners acquire a deeper understanding of English and expand their vocabulary. Teachers can incorporate suprafixes into their lessons to provide opportunities for active learning and encourage students to appreciate the complexity of the English language. Overall, suprafixes are a valuable tool for language learning and teaching, as they promote phonemic awareness, enhance vocabulary acquisition, and deepen understanding of English pronunciation and meaning.

Method

Research Design

A cross-sectional study design (CSS) was adopted in this study to explore the CSS is quantitative, non-experimental research design aiming to "gather data from a group of subjects at only one point in time" (Schmidt & Brown, 2019, p. 206). The main reason for its selection in this study was the lack of intervention and quick administration. CSS offers advantages such as time and cost-effectiveness, the absence of ethical concerns, and easy hypothesis generation, while it suffers from disadvantages such as the failure to make causal inferences, measure the incidence, and establish temporal relations (Wang & Cheng, 2020). Although surveys are mainly used in CSS (Creswell & Creswell, 2023), diagnostic tests might also be used to collect data (Liu et al., 2024).

Context and Participants

The study's participants were enrolled in the College of Foreign Languages of a prominent state university in Türkiye. They were aged 18–20 and engineering majors. The participants were informed about the study's content and purpose. Their voluntary participation was encouraged, as recommended for ethical concerns (Mumford et al., 2021). The participants were selected through convenience sampling (Galloway, 2005) since they were easily accessible to the researcher. Because "there is no pattern whatsoever in acquiring these respondents" (Galloway, 2005, p. 859), the researcher informed fellow instructors at his employed institution to ask their students for voluntary participation in the study. Data quality (reliability and validity) and representativeness (homogenous Turkish EFL learners) were established as suggested (Novielli et al., 2023). Since participation was voluntary, the rate of test-takers varied according to the test: KT (50 males, 60 females), PerT (40 males, 40 females), and ProT (20 males, 30 females).

The participants were all B1-level (in CEFR) preparatory school students receiving 24-hour general English lessons weekly. They used Macmillan's Skillful 2 Reading & Writing (Rogers, 2018) and Skillful 2 Listening & Speaking (Bohlke & Lockwood, 2018) as the main course materials. They took the same entrance and proficiency exams and were enrolled in B1 classes after succeeding in intra-semester exams (e.g., quizzes and midterms). Accordingly, they can be considered homogenous in terms of proficiency level and representative of EFL learners.

Procedures for Data Collection

Before the test design, a corpus of suprafixes was compiled in several steps. First, words associated with specific pairs of verb-adjective and verb-noun were collected from various sources, as Toriida (2016) recommended. Then, the acquired items were double-checked for their suitability for suprafixation. Next, their frequency was analyzed using Sketch Engine (Kilgarriff et al., 2014). Following the compilation of a frequency-based wordlist, three diagnostic tests were designed to assess Turkish EFL learners' knowledge, perception, and production levels of suprafixes. The sentences in the tests were gleaned from generative artificial intelligence tools (e.g., ChatGPT) and online websites of Cambridge and Longman dictionaries (https://dictionary.cambridge.org/ and https://www.ldoceonline.com/). The procedures for corpus design are summarized in Figure 3.

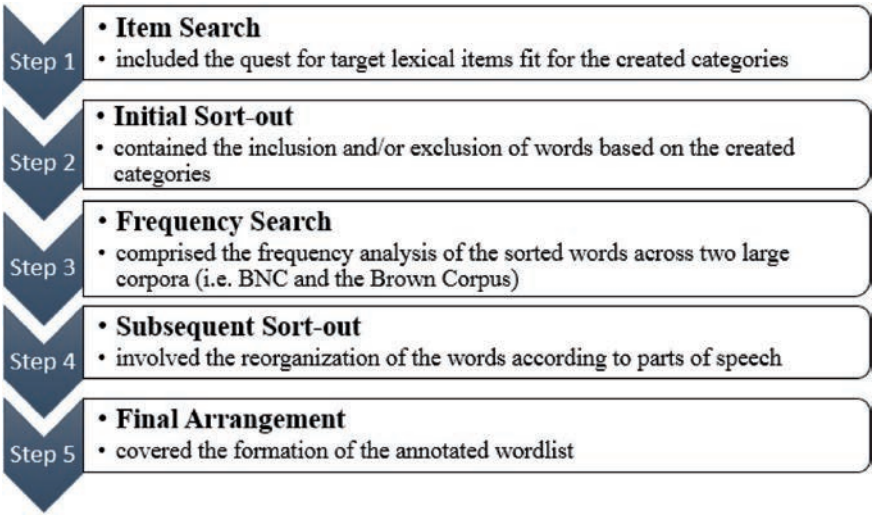

Figure 3 Summary of the procedures for corpus design.

The knowledge test (KT, Appendix 1) comprised twenty sentences, each with two choices. It aimed to assess the EFL learners' knowledge of suprafixes (placement of primary stress) in noun-verb or adjective-verb pairs. Test-takers were asked to choose the best option that demonstrates the suprafixation. The syllables with the primary stress were written in bold and capitalized for easy comprehension. The total scores were calculated over a hundred. The test scores were then grouped under five categories (i.e., 90–100: Excellent, 80–89: Good, 70–79: Average, 60–69: Fair, and 0–59: Poor) for easy interpretation. The scores were randomly categorized as excellent, good, average, fair, and poor. The explanations for the sore ranges are presented in Table 3 below:

Table 3 Description of the score ranges.

Score ranges	Description
Excellent (90–100)	a high level of mastery of the subject matter
Good (80–89)	a strong understanding of the material, with minor errors or gaps in knowledge
Average (70–79)	an adequate understanding of the subject, meeting the basic expectations for competency
Fair (60–69)	a basic but incomplete understanding of the material
Poor (0–59)	a significant lack of understanding or knowledge

The perception test (PerT, Appendix 2) was devised to assess the extent to which learners could perceive suprafixes and thus identify grammatical and semantic differences. The PerT consisted of twenty items with dichotomous options, asking test-takers to select the syllable with the primary stress after listening to sentences twice at five-second intervals. The procedures for calculation and categorization of scores also applied to the PerT.

To assess the extent to which learners could apply the primary stress to the accurate syllables, a test of production (ProT, Appendix 3) was designed. The ProT included twenty sentences, asking learners to record their voices while reading aloud them in a stress- and noise-reduced environment. The participants were then asked to email their recordings to the researcher. The scores were calculated and categorized as in the other two tests.

Procedures for Data Analysis

The study employed the Kuder-Richardson 20 (KR-20) formula for reliability before test administration. KR-20 is a statistical method used to estimate the reliability or internal consistency of tests that have binary (dichotomous) items, such as true/false or multiple-choice items with two response options (Liu, 2020). The KR-20 formula was selected for (i) its suitability for dichotomous data (Liu, 2020), (ii) measure of internal consistency, indicating how well the items on a test measure the same underlying construct (Baldwin, 2018), (iii) provision of comprehensive reliability estimation (Austin, 2019), (iv) easy calculation and wide acceptance (Todd & Bradley, 2013). KR-20 is used to measure reliability of binary items, while the Cronbach's alpha reliability coefficient is computed for general reliability of tests with more than two items (Hajjar, 2018; Liu, 2020). Values higher than 0.7 indicate higher internal consistency and test reliability (Tan, 2009). The KR-20 values calculated for each test were: KT = .75; PerT = .75, and ProT = .76, indicating good internal consistency and test reliability. The raw test scores were then transferred to the SPSS Program Version 25 for descriptive analysis.

All test scores were converted into numerical input over 100. The test scores were computed into the SPSS as correct (1) and incorrect (0). Three experienced non-native EFL teachers rated the voice recordings for the ProT. The raters were informed about the study beforehand. They then received pilot training on how to assess voice recordings. After this pilot training, the raters delivered their rating scores to the researcher, who computed them into SPSS for inter-rater reliability. The inter-rater reliability for the evaluation was found to be $\alpha = 0.88$, indicating greater consistency between the raters (Zeller, 2005). The ultimate scores were presented after the relevant descriptive analyses.

Results

Knowledge of Suprafixation Among Turkish EFL Learners

Descriptive analyses revealed that the participants scored poorly (with mean scores of 40.9 by males and 39.1 by females). The total correct answers and scores are presented in Table 4.

When the scores were categorized for meaningful interpretation, it was noted that the participants mostly received poor grades (n = 83, 75.5%), followed by fair (n = 19, 17.3%) and good (n = 8, 7.3%). No average or excellent scores were observed in the KT. Gender-wise distribution of scores also followed a similar pattern in males and females. That is, they mostly received poor, fair, and good grades. Further details can be found in Table 5.

Table 4 General descriptive statistics in the KT.

	N	Min.	Max.	M	SD
Total Correct	110	3	17	7.97	3.95
Total score	110	15	85	39.86	19.76

Table 5 The participants' scores in the KT.

Scores	Male		Female	
	f	%	f	%
Excellent (90–100)	0	0	0	0
Good (80–89)	4	8	4	6.67
Average (70–79)	0	0	0	0
Fair (60–69)	9	18	10	16.67
Poor (0–59)	37	74	46	76.67
Total	50	100	60	100

Table 6 Item difficulty analysis of the KT.

Difficulty	Total items	Items for males	Items for females
Low (10–19)	3	3, 15	3
Moderate (20–29)	10	1, 2, 6, 13, 16, 17, 19, 20	15, 17
High (30–39)	16	4, 5, 7, 8, 10, 11, 12, 14	1, 2, 5, 6, 13, 16, 19, 20
Very high (40–49)	11	9, 18	4, 7, 8, 9, 10, 11, 12, 14, 18

Items Table 6 were grouped into low, moderate, high, and very high to determine which presented the greatest and least difficulty to participants. Results showed that the items in the KT were mostly highly difficult (n = 16), followed by very high (n = 11) and moderate (n = 10) for both genders. However, the difficulty of test items ranged between moderate and high for males and high and very high for females, indicating the greater challenge for females.

A close analysis revealed that "collect (v)" and "reject (v)" were the most challenging for males, while "process (n)" and "content (n)" were the easiest. On the other hand, female students were extremely challenged by increase (n), abstract (n), reject (v), collect (v), record (n), conduct (n), construct (v), and refund (v). "Process (n)" posed no difficulty for females.

Perception of Suprafixation Among Turkish EFL Learners

Descriptive analyses demonstrated that the participants scored poorly (with mean scores of 41.5 by males and 38.75 by females). The total correct answers and scores are presented in Table 7.

Nominal categorizations of the scores indicated that participants' scores fell mostly in poor (n = 60, 74.1%), fair (n = 14, 17.3%), and good (n = 6, 8%) categories for both genders. It was also observed that females were slightly more challenged by perceiving the suprafixes than males. No average or excellent scores were observed. The distribution of scoring categories (i.e., poor, fair, good) did not vary according to gender. Additional information is displayed in Table 8.

To interpret the scores meaningfully, items were categorized in terms of difficulty. Findings revealed that the test items were mostly moderately difficult (n = 25) to perceive for both genders, followed by high (n = 8) and low (n = 7) difficulty. No extreme difficulty was reported. However, the item difficulty analysis showed that males' scores ranged between moderate and high, while females' scores fell between moderate and high/low.

A careful examination of the test items showed that "abstract (adj), accent (n), and discount (v)" did not pose a challenge for both genders, with "import (n)" as an additional suprafix for

Table 7 General descriptive statistics in the PerT.

	N	Min.	Max.	M	SD
Total Correct	80	3	17	8.02	3.97
Total Score	80	15	85	40.13	19.88

Table 8 The participants' scores in the PerT.

Scores	Male		Female	
	f	%	f	%
Excellent (90–100)	0	0	0	0
Good (80–89)	3	7.5	3	7.5
Average (70–79)	0	0	0	0
Fair (60–69)	8	20	6	15
Poor (0–59)	29	72.5	31	77.5
Total	40	100	40	100

females Table 9. However, "impact (v), update (n), transform (v), and assay (adj)" were highly challenging for both genders to perceive.

Production of Suprafixation Among Turkish EFL Learners

Descriptive analyses for the ProT revealed that there was poor production of the suprafixes by the participants (with a mean score of 43 by males and 39.1 by females). The total number of correct answers and scores are presented in Table 10.

The nominal categorization of scores indicated that the scores mostly clustered around poor (n = 37, 72.5%), fair (n = 9, 17.6%), and good (n = 4, 9.9%) categories for both genders. Although the distribution of the scores followed a similar pattern (i.e., poor, fair, and average) for both genders, females were slightly more challenged to produce the suprafixes, given their scores in poor and fair categories. As in previous tests, no excellent or average scores were observed. Further information can be found in Table 11.

Table 9 Item difficulty analysis of the PerT.

Difficulty	Total items	Items for males	Items for females
Low (10–19)	7	3, 15, 17	3, 15, 17, 19
Moderate (20–29)	25	1, 2, 4, 5, 6, 7, 10, 12, 13, 14, 16, 19, 20	1, 2 ,4, 5, 6, 7, 10, 12, 13, 14, 16, 20
High (30–39)	8	8, 9 ,11, 18	8, 9, 11, 18
Very high (40–49)	0	–	–

Table 10 General descriptive statistics in the ProT.

	N	Min.	Max.	M	SD
Total Correct	50	3	17	8.14	4.03
Total score	50	15	85	40.70	20.15

Table 11 The participants' scores in the ProT.

Scores	Male		Female	
	f	%	f	%
Excellent (90–100)	0	0	0	0
Good (80–89)	2	10	2	6.67
Average (70–79)	0	0	0	0
Fair (60–69)	4	20	5	16.67
Poor (0–59)	14	70	23	76.66
Total	20	100	30	100

Table 12 Item difficulty analysis of the PerT.

Difficulty	Total items	Items for males	Items for females
Low (10–19)	27	1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 18, 19, 20	1, 2, 5, 6, 13, 15, 16, 17, 19, 20
Moderate (20–29)	9	–	4, 7, 8, 9, 10, 11, 12, 14, 18
High (30–39)	0	–	–
Very high (40–49)	0	–	–

The items were also analyzed for production difficulty. A careful examination revealed that most of the test items were low difficulty for males and low and high difficulty for females Table 12.

Further analysis indicated that "content (n), decrease (n), convert (v), essay (n), conflict (n), permit (v), contract (v), contact (n), and progress (v)" were moderately difficulty to produce for females.

Discussion

The current study investigated the extent to which Turkish EFL learners knew, perceived, and produced suprafixes. To this end, EFL learners were given three diagnostic tests corresponding to each construct (i.e., knowledge, perception, and production). The findings generally revealed an urgent need for remedial training in suprafixes since the participants performed poorly in all three tests. Such remedial training might include exercises about the knowledge, perception, and production of suprafixes. Individually, the KT results indicated that most participants (76.67%) scored poorly (0–59), with an average score of 40 for males and females. In other words, the challenge of suprafixational knowledge did not vary according to gender. In a study, Ishikawa (2006) found varying levels of knowledge of stress patterns of Japanese students in noun-verb pairs, suggesting a similar finding since our participants also indicated different knowledge states (e.g., poor, fair, good). However, our finding disagreed with that of Vickie and Andruski (2011), revealing that Chinese and English learners typically knew about stress, that nouns typically receive trochaic stress, and that verbs typically receive iambic stress. Further analysis revealed that the KT items posed moderate to high difficulty for males and high and very high difficulty for females. Additionally, item difficulty analysis showed the most and least challenging words with suprafixes for both genders.

The PerT scores demonstrated a similar finding. The participants' scores ranged between poor (74.1%) and good (8%). The PerT results indicated that Turkish EFL learners had difficulty recognizing the primary stress in words with suprafixes, suggesting the challenge of perceiving parts of speech (i.e., verbs and nouns) while listening. Sharma (2016) reported a similar finding, concluding that Indian learners of English could not identify the primary stress in noun-verb pairs when presented in a decontextualized manner. In addition, the test results showed a slightly more successful perception of suprafixes by males (M = 41.5) than females (M = 38.75). Regardless of gender, the participants' scores mostly cumulated around the poor category (74.1%), indicating the hardship of suprafixational perception for most participants. Item difficulty analysis revealed that the PerT items posed moderate difficulty for both genders. Further analysis also exposed the most and least challenging words with suprafixes for both genders.

The ProT scores showed a similar tendency to the previous two tests. That is, most participants (72.5%) failed to articulate the words with suprafixes, with males (M = 43) performing slightly better than females (M = 39.1). The findings suggested that Turkish EFL learners could not place the primary stress accurately on noun/adjective-verb pairs, resulting in the misuse of word families in speech. This finding coincides with that of Pajunen (2020), who investigated noun-verb homographs among Finnish high schoolers. In another study, Joo (2016) found no impact of proficiency level on stress placement in noun-verb homographs, concurring with our findings because most participants failed to produce suprafixes accurately despite the same proficiency level. Item difficulty analysis showed that the ProT items were low difficulty for males and low to moderate difficulty for females. Nevertheless, the participants submitted poor productions of suprafixes, regardless of the test items' perceived easiness or difficulty. Further analysis revealed the most and least problematic words with suprafixes for the participants to articulate.

Given the significance of suprafixes for effective listening (perception) and speaking (production), it is plausible to assert that language learners must acquire suprafixational competence that covers suprafixational knowledge, perception, and production. Suprafixational knowledge reflects the understanding that language learners can identify where the primary stress is on words differentiated by suprafixes and distinguish between parts of speech in such words (e.g., content as a noun and an adjective). Suprafixational perception encompasses the recognition of primary stress and parts of speech in such words. Suprafixational production refers to accurately articulating the primary stress phonemes to distinguish word families in oral production. Taş and Khan (2022) held that language learners of diverse linguistic and prosodic backgrounds must receive explicit instruction on lexical stress since they had problems recognizing the stress patterns in words with varying syllables. Similarly, Evis and Kılıç (2020) reported that Turkish EFL learners negatively transferred their L1 prosodic rules when placing primary stress on English words and thus need explicit training. Given the vast number of English language learners from diverse prosodic backgrounds, language learners must be exposed to explicit suprasegmental training, with a particular focus on primary stress placement in noun-verb pairs.

Conclusion

This study was primarily concerned with exploring Turkish EFL learners' suprafixational knowledge, perception, and production levels. Three diagnostic tests were administered to the participants on a voluntary basis to evaluate these constructs. Results suggested that Turkish EFL learners did not have the knowledge to differentiate between words with suprafixes. Also, they failed to perceive the primary stress in noun-verb pairs in the PerT. In addition, the participants received poor grades in the ProT, implying poor articulatory performances. Altogether, the results suggest the need for explicit training in primary stress placement in suprafixes.

Since this study was exploratory by nature, additional research is required to corroborate the study's results. One study might be conducted with learners from diverse proficiency levels since this study was conducted with B1-level students. Another study might utilize different assessment tools (e.g., more contextualized means) to evaluate learners' suprafixational competences. Researchers can also look into each suprafixational construct (e.g., knowledge, perception, and production) between control and experimental groups. Similarly, the impact of various types of intervention on teaching suprafixes can be examined in other studies. Despite these limitations that can be overcome in prospective studies, the present study contributes to the literature by serving as a guide for further research.

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