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The Comparative Analysis of Derivational Morphology in Turkish and Esperanto Languages

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ABSTRACT

This paper presents a comparative analysis of derivational morphology in Turkish, a natural agglutinative language, and Esperanto, a constructed one, through the theoretical lens of René de Saussure's principles of necessity and sufficiency. The study employs a qualitative, review-based research design grounded in comparative-typological methodology. Data were sourced from a purposive sample of scholarly literature, including theoretical linguistics works, studies on constructed languages, and pedagogical research. Data collection was conducted through a systematic literature review, using selection criteria focused on relevance to derivational morphology, Turkish, and Esperanto, with a priority for recent peer-reviewed publications (2013–2023). The analysis systematically contrasts morphemic structure, affixal productivity, and compositional logic. The findings reveal that while both systems rely heavily on productive affixation, they diverge fundamentally. Esperanto adheres strictly to its designed principles, maintaining perfect semantic regularity where each morpheme carries a fixed, unambiguous meaning. Turkish, though highly productive and regular, exhibits inherent natural language features such as polysemy and context-dependence, leading to occasional deviations from ideal compositionality. The study concludes that de Saussure's framework, originally designed for Esperanto, offers a powerful tool for analyzing agglutinative systems broadly. These findings contribute to morphological theory and typology by illuminating the value of constructed languages as clarifying mirrors for understanding the complexities of natural language.

Keywords: Agglutination; Constructed Languages; Derivational Morphology; Esperanto; René de Saussure; Semantic Transparency; Turkish; Linguistic Typology

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1. Introduction

According to morphological typology, languages are traditionally classified into analytical and syntactic. Analytical languages, which possess very few inflections, tend to rely on word order and auxiliary elements to convey grammatical meaning. A pure subtype of analytical languages is isolating, where each word typically functions as a single, independent morpheme—Mandarin Chinese being a prime example. In such languages, a word's part of speech is often determined by its syntactic position. Although English retains some inflectional morphemes (e.g., the third-person singular -s or the past tense -ed), it is generally considered analytical—if not fully isolating—due to its relatively rigid word order and reliance on function words. Synthetic languages, in contrast, are subdivided into three major types: inflectional (fusional), agglutinative, and sometimes polysynthetic[1]. In inflectional languages like Russian, Latin, and Ancient Greek, a single morpheme may simultaneously encode multiple grammatical features. As a result, these languages are characterized by complex systems of declension and conjugation, with categories such as number, gender, case, and person in nouns, and tense, mood, and aspect in verbs typically expressed through multifunctional endings. Agglutinative languages, such as Turkish, Esperanto, Korean, and Japanese, exhibit clearly segmented morphological structures. Each affix occupies a fixed position and generally carries only one grammatical function, making the overall structure more transparent and easier to analyze. Polysynthetic languages, including Chukchi and Greenlandic, are highly synthetic: they incorporate both derivational and inflectional morphemes and frequently feature noun incorporation, resulting in "sentence words" that express the equivalent of an entire sentence.

This study explores the word formation systems of both natural, illustrated by Turkish, and constructed agglutinative languages, represented by Esperanto, with a particular focus on their comparative morphological frameworks. It is argued that many constructed languages consciously adopt agglutinative principles from natural languages to maximize transparency and regularity in word formation[2].

The growing academic interest in constructed languages (also known as planned or artificial languages) is reflected in recent research. For instance, Schubert examines how such languages systematize derivation and compounding to support clarity, regularity, and learnability—traits less emphasized in naturally evolved languages[3]. A substantial portion of his analysis centers on Esperanto, where word formation is modular and highly compositional: affixes like -in- (female), -et- (diminutive), and -eg- (augmentative) convey clear, consistent meanings and can be freely combined with roots. Schubert also compares Esperanto with Ido, Interlingua, and Novial, discussing how these languages balance schematic regularity with recognizability. He concludes that planned languages typically rely heavily on derivation, with word formation serving both functional and pedagogical goals.

Schreyer offers a broader perspective on constructed languages (conlangs), examining their linguistic, cultural, and social significance[4]. She categorizes conlangs by purpose: auxiliary languages (e.g., Esperanto), artlangs (e.g., Klingon, Dothraki), and engelangs (e.g., Lojban, Ithkuil). Conlangs often begin as individual projects but can evolve into communities with shared norms, ideologies, and even native speakers. Esperanto is cited as a successful example with a robust transnational community. Schreyer also emphasizes the educational value of language construction in teaching linguistic theory and developing metalinguistic awareness.

Goodall provides a typological classification of constructed languages: philosophical languages (e.g., Wilkins's system), international auxiliary languages (e.g., Esperanto, Ido), fictional languages (e.g., Tolkien's Elvish, Klingon), and experimental languages used in psycholinguistic research[5]. The author highlights the linguistic sophistication and functional flexibility of conlangs and their role in exploring language universals, typology, and language acquisition. Goodall particularly praises Esperanto for its morphological transparency, affixal productivity, and real-world functionality, including native speakers. He also notes the contribution of linguists such as Jespersen[6] and Sapir in shaping the field of interlinguistics.

Further emphasizing the pedagogical utility of language creation, Tůmová investigates the use of conlang construction as a teaching method in the domain of grammatical case[7]. Her experimental study found that participants who built agglutinative systems developed deeper insights into morphological structures than those who designed isolating or fusional systems. This supports the notion that construct-

ing artificial grammars enhances learners' understanding of core linguistic concepts.

Despite this rich body of theoretical and applied research on constructed languages, traditional linguistic models applied to natural languages often fall short in explaining derivational systems. In contrast, constructed languages offer innovative, explicitly logical frameworks for affix classification and semantic transparency [8].

At first glance, Turkish and Esperanto may appear to have little in common. However, their shared agglutinative morphology and structural design bring them into conceptual alignment. In Turkish, a word such as seviyorum (I love) consists of the root sev- (to love), the present tense suffix -iyor-, and the first-person singular suffix -um. In Esperanto, the word malsanulejo (hospital) combines the prefix mal- (opposite), the root san- (healthy), the suffix -ul- (person), -ej- (place), and the noun ending -o. In both languages, affixes carry distinct, predictable meanings and appear in fixed positions—hallmarks of agglutinative structure.

This study employs a comparative-typological approach to analyze derivational morphology in Turkish and Esperanto, using René de Saussure's principles of necessity and sufficiency as its theoretical framework. The objective is to determine how the contrasting origins of these languages—natural evolution versus conscious design—shape their morphological logic and semantic transparency. By systematically contrasting their morphemic structure, affixal productivity, and compositional logic, this research demonstrates the utility of de Saussure's model for analyzing agglutinative systems broadly. The findings contribute to morphological theory by illuminating the value of constructed languages as clarifying mirrors for understanding the complexities of natural language. The paper is structured as follows: after this introduction, the methods and data sources are outlined, the results of the comparative analysis are presented, the findings are discussed in the context of existing literature, and conclusions are drawn.

1.1. Derivational Approaches in Turkish

Before analyzing contemporary approaches to the Turkish derivational system, it is essential to review foundational works on the topic. In Modern Turkish, derivation is the primary method for creating new words. Since the 1930s, state-driven language reforms have aimed to eliminate Arabic and Persian loanwords by replacing them with Turkish equivalents. When suitable inherited words were unavailable, new terms were formed using native roots and derivational suffixes—occasionally by reviving archaic suffixes or inventing new, pseudo-suffixes [9].

Jaza'ei, Khaleghi, and Purkhosravani [10] explore mechanisms of word formation in Azeri Turkish, analyzing a variety of compound structures and their linguistic implications. The authors propose a continuum model that integrates derivational, compounding, and syntactic word-formation processes. Formations are categorized based on the interplay between constant and variable elements, represented as [a–x], [x–a], [a_1–x–a_2], [x, y], and [x, x′]. Special attention is given to reduplication and partial duplication (termed "duplexing"), which are particularly prominent in informal speech. The study critiques traditional affixation theory for its diachronic orientation, suggesting that modern models must instead reflect synchronic productivity and semantic innovation. Drawing on Same'ei's theoretical model, the authors argue that the distinction between syntax and morphology is often blurred in Azeri Turkish [11]. Compound forms such as yer göbələğe, qıp qırmıze, and gülxana lie on a gradient between syntactic phrases and lexicalized compounds. The study concludes that a construction-based approach, transcending classical morphological categories, is needed for a better understanding of Azeri Turkish. This approach also supports further research in such areas as corpus-based analysis and comparative linguistics [10].

Mahmudova researches the phenomenon of conversion in modern Turkic languages, examining how lexical units transition from one part of speech to another without changing their morphological or phonetic structure [12]. Conversion is commonly used in languages where affix-based word formation is limited. In Turkic languages, conversion frequently entails changes in grammatical category. The author examines multiple forms of conversion, such as substantivization, adjectivization, pronominalization, and adverbialization, drawing on examples from various Turkic languages. The study also underscores the lack of consensus among linguists regarding the classification of conversion: whereas some scholars argue against recognizing it as an independent word-formation mechanism, others highlight its significant role in expanding the lexicon. The discussion also addresses the role of conversion in generating homonyms and its contri-

bution to the structural and functional evolution of language. Mahmudova draws attention to lexical-semantic conversion in languages such as Bashkir and Kyrgyz, where words may function across multiple grammatical categories without morphological changes. She concludes that, although conversion is less frequent than suffix-based derivation in Turkic languages, it remains a significant component of linguistic development, particularly for the creation of affixless word forms.

In Lewis's seminal work, the language reforms of Atatürk are discussed in depth[13]. The author examines the modernization and Europeanization of Turkey through the purification of the Turkish language, removing Arabic and Persian elements, and the introduction of a new alphabet based on the Latin script. Language reform was perceived as a key instrument in building a secular nation-state and a modern Turkish identity. The establishment of the Turkish Language Association (Türk Dil Kurumu) guided the reform process. The mass replacement of borrowed words with "pure Turkish" alternatives, often artificially created, served as a break from the Ottoman-Islamic past. Regarding word formation, many new terms were produced by reconstructing archaic forms, borrowing from regional dialects, or inventing neologisms based on Turkic roots. Special emphasis was placed on Turkic derivational affixes (e.g., -lık, -ci, -siz) to substitute for Arabic-origin terms. Even common words were sometimes replaced with artificial equivalents, which led to challenges in comprehension and a significant structural transformation of the language. The removal of established vocabulary also created gaps in abstract and scientific terminology, necessitating further innovations. From a linguistic perspective, the reform was paradoxically successful: while it met its ideological objectives, it disrupted historical linguistic continuity and led to a temporary impoverishment of expressive means[13].

Finally, the contemporary scholar Isa Sarı offers an original approach to Turkish word formation based on morphological analysis. In his study, türetme (word formation) is seen as a vital component of Turkish morphology and lexical expansion. The paper discusses both traditional and modern methodologies for analyzing word formation processes. Sarı emphasizes the importance of understanding derivational mechanisms for describing Turkish grammar and constructing formal models for automatic analysis. He proposes several models, including:

Rule-Based Morphological Model, which uses a rule set to describe derived words through processes such as prefixation, suffixation, and agglutination. For instance, suffixes like -lık, -ci, and -sız are used to create derived nouns.

According to the Morphemic Structure Model, Words are segmented into morphemes – roots, suffixes, and endings. This model formalizes word formation and supports morphological parsing.

Derivational Model focuses on generating new words from existing ones using specific derivational templates. For example, the verb yazmak (to write) yields yazar (writer), which further yields yazarlık (authorship).

The Generative Morphological Model is based on generative grammar: this model treats word formation as part of syntactic derivation. It is more abstract and formalized, particularly useful in computational linguistics.

These models describe how multiple words can be formed from a single root through systematic use of suffixes and morphemic combinations, governed by the strict morphological rules of Turkish grammar[14].

1.2. Derivational Approaches in Esperanto

A seminal contribution to the study of word formation in constructed languages is Klaus Schubert's chapter, which investigates the derivational mechanisms in planned languages, focusing on Esperanto and Ido. This work offers a comprehensive examination of how morphemes function within these systems and outlines the foundational principles underlying their word-formation processes. In Esperanto, derivation is governed by three key principles: compositionality, the morpheme effect, and an implicit semantic classification of morphemes. The principle of compositionality enables the systematic creation of new lexical items through the regular combination of roots and affixes, promoting both morphological transparency and ease of language acquisition. The morpheme effect, referred to by Kalocsay and Waringhien[15] as the "verbalizing effect", is particularly salient, as it significantly influences the functional dynamics of derivation within Esperanto's morphological system. This effect enables transformations based on the grammatical category of the governing morpheme, which determines the morphological function of the dependent morphemes.

For example, a nominal governor like energi- (energy) can nominalize adjectival dependents such as varm- (warm), resulting in varm-energi-o (thermal energy). Likewise, a verbal governor like pres- (to print) can produce a nominalized form such as pres-o (printing). Most commonly, derivation in Esperanto follows a regressive morpheme effect, where transformations occur from right to left. However, progressive derivation – from left to right – also occurs in specific constructions.

The chapter by Klaus Schubert[3] also examines Ido, a derivative of Esperanto, which features a more rigid morphological structure. Ido includes a greater number of affixes and imposes stricter constraints on word class transitions[16]. It often requires additional root morphemes in compound formations and uses obligatory affixes more frequently than Esperanto. As a result, Ido sacrifices some of the productive compositionality found in Esperanto. According to Wüster[17], Ido constitutes a premature reform of Esperanto, as it limits the creative flexibility that characterizes Esperanto's word-formation system.

Schubert's study emphasizes the dynamic regularity of Esperanto's derivational structure. Despite its origins as a planned language, Esperanto has developed a naturalistic quality through active use by its speaker community. Over time, users have adapted its morphology to meet communicative needs, making derivational processes more intuitive and context-sensitive. This linguistic adaptation has contributed to Esperanto's continued vitality and success as the most widely spoken planned language. The study offers a comprehensive reflection on how planned languages design and implement word-formation systems, how these systems function in real usage, and how they evolve over time[3].

According to *Unua Libro* by Zamenhof[18], Esperanto morphemes were originally categorized into three major grammatical types: substantival, adjectival, and verbal. For instance, the root vir- (man) denotes a substantival concept. The derivational affix -ig-, which expresses causativity or active transformation, can combine with the adjectival root pur- (clean) to form the verb purigi (to clean). This classification of morphemes was further formalized by the Swiss mathematician René de Saussure, the younger brother of Ferdinand de Saussure, who proposed a system for classifying and analyzing morphemes based on their functional roles in Esperanto word formation[19].

2. Materials and Methods

This study employs a qualitative, comparative-typological research design to investigate derivational morphology in Turkish and Esperanto. The research is grounded in a systematic review of existing linguistic literature, analyzed through the theoretical framework of René de Saussure's principles of necessity and sufficiency.

2.1. Data Sources

The primary data for this analysis consisted of lexical examples and morphological descriptions drawn from a curated corpus of scholarly sources. These sources were categorized as follows:

(1) Theoretical Linguistics includes the works on morphology, typology, derivation, and affixal systems in agglutinative languages (e.g., Comrie[1], Dmitrieva[20], Ergin[21], Shcheka[22]).

(2) Studies on Constructed Languages are the articles and books focusing on the structural design and word formation strategies in Esperanto and other planned languages (e.g., Schubert[3], Goodall[5] and Schreyer[4]).

(3) Pedagogical and Experimental Studies: Research exploring the use of constructed languages for educational or psycholinguistic purposes (e.g., Tůmová[7] and Mahmudova[12]).

2.2. Data Collection Tools and Sampling Techniques

Data collection was conducted through a systematic literature review. The sampling of sources was purposive, aimed at selecting information-rich texts relevant to the research objective. The selection was guided by the following criteria:

- Relevance to the topics of word formation, derivational morphology, and agglutinative languages.
- Direct relevance to Esperanto, Turkish, or the broader typological and morphological classification of languages.
- Inclusion of both theoretical and empirical contributions to the fields of interlinguistics, constructive linguistics, and cognitive linguistics.
- Coverage of foundational linguistic theories, such as those of René de Saussure, as well as contemporary

research (2015–2023).

The review prioritizes academic sources published within the last 10 years (2013–2023), with select inclusion of seminal works from the 20th century that form the theoretical basis for analyzing agglutinative and constructed languages. English Russian and Turkish-language sources were considered, with an emphasis on peer-reviewed journal articles, academic monographs, and doctoral theses.

The data collection tool was a structured analytical framework used to extract information on affixes, roots, word formation rules, and theoretical interpretations from the selected literature.

2.3. Data Analysis Techniques

The collected data were analyzed using a combination of qualitative linguistic methods:

- Comparative Linguistic Analysis includes a systematic comparison of the derivational models in Turkish and Esperanto, focusing on word formation through affixation. This comparison is contextualized within René de Saussure's morphological theory, particularly with regard to the logical structuring of word formation processes.
- Morpheme Analysis involves breaking down lexical items in both languages into their basic components: roots, prefixes, and suffixes, and examining them in terms of their semantic meanings and grammatical roles. This approach sheds light on the internal structure of words and the degree to which particular morphemes contribute to word formation and productivity.
- Model Alignment with Theoretical Frameworks: observed derivational patterns are mapped onto René de Saussure's morphological framework, emphasizing his principles of necessity and sufficiency. This alignment facilitates a deeper understanding of how each language system organizes and generates lexical meaning through derivation.
- Lexical Sampling and Tabulation: the research will use illustrative tables in section 3.2 that classify and compare derivational affixes in both languages according to grammatical function, productivity, and semantic role.
- With the help of Semantic and Functional Categorization, affixes will be grouped by their roles in creating nouns, adjectives, verbs, etc., and analyzed for semantic clarity, morphological productivity, and structural role in word formation.

These methods together form a robust linguistic approach that combines qualitative analysis (e.g., semantic function, structural alignment) with a structured theoretical lens (de Saussure's model), suitable for both synchronic and diachronic evaluation of word formation.

3. Results

3.1. Derivational Models in Esperanto

In his 1910 work *Teoria Ekzameno de Esperanto* (Theoretical Examination of the Esperanto Language)[19], René de Saussure analyzes the structural logic of Esperanto, created in 1887 by Polish ophthalmologist L. L. Zamenhof[23], and asserts that it is the only international language in which the meaning of each word depends solely on the word itself – independent of its syntactic context. Each word in Esperanto is self-contained, comprising all the necessary elements to convey its intended idea. De Saussure identifies two complementary principles that govern the construction of complex words:

- According to the *Principle of Necessity*, all elements essential to clearly expressing the idea, such as roots and affixes, must be included in the word.
- According to the *Principle of Sufficiency*, no element should be unnecessarily repeated: every part of the word must contribute meaningfully without redundancy.

For example, the word *saĝulo* (a wise person) derives from *saĝ-* (wise) and the suffix *-ul-*, which indicates a person. In contrast, the word *frato* (brother) already contains the concept of a person within the root *frat-*, so no additional suffix is needed.

Further illustrating this, *helpo* (help) contains both the root *help-* and the noun-ending *-o*, both reinforcing the nominal idea. In *krono* (crown), the root itself denotes a tangible object, while the verb *kroni* (to crown) shifts the concept to an action or process.

De Saussure distinguishes between two layers of meaning in words: the specific idea and the general idea. For instance, in French, the root *cheval* (horse) conveys the specific idea of "horse" and the general idea of "animal". Simi-

larly, the Esperanto suffix *-ist-* implies a specific profession or activity and a general idea of "person", since only a person can perform such roles.

In de Saussure's framework, general ideas correspond to grammatical categories:

- The general idea of being (*estulo* for animate beings, *estaĵo* for inanimate ones) aligns with nouns.
- The general idea of quality (*kvalito*) corresponds to adjectives.
- The general idea of action or state (*fari agon* (to perform an action), *esti en ia stato* (to be in a state)) corresponds to verbs.

In Esperanto, the grammatical endings also encapsulate these general ideas:

- *-o* conveys the noun idea of being.
- *-a* expresses adjectival quality.
- *-i* denotes verbal action.

These endings do not merely serve grammatical roles but also reflect abstract concepts, functioning similarly to independent morphemes. De Saussure further observes that certain affixes correspond to these general grammatical ideas. He calls them grammatical affixes:

- *a* (adjective) corresponds to the suffix *-ec-*, which expresses quality (e.g., *homeco* (humanity)).
- *o* (noun) corresponds to *-ul-* (for persons) and *-aĵ-* (for objects); e.g., *junulo* (young man), *novaĵo* (news).
- *i* (verb) corresponds to *-ad-*, indicating continuous or habitual action (e.g., *kronado* (coronation)).

These equivalences allow structural flexibility: when a word lacks an explicit ending, the corresponding affix can be inserted to convey the same general idea. For instance, the adjectival root *grand-* (large) naturally forms the noun *grando* (magnitude), expressing the quality as a substantive. However, with a root like *frat-* (brother), which is substantival, converting the adjective *frata* (brotherly) into a noun expressing a quality requires the suffix *-ec-*, resulting in *frateco* (brotherhood).

De Saussure classifies suffixes based on the grammatical categories they represent:

- Noun Suffixes:

  -ul- (person), *-aĵ-* (object or thing), *-ar-* (group), *-ej-* (place)
- Adjective Suffixes:

  -aĉ- (low quality), *-ebl-* (possibility, passive), *-eg-* (augmentation), *-ind-* (worthy of), *-em-* (tendency), *-ec-* (quality)
- Verb Suffixes:

  -ig- (to cause/make), *-iĝ-* (to become), *-ad-* (continuous or habitual action)

This systematic approach enables the logical construction of words that clearly and accurately represent actions, qualities, or objects. De Saussure's principles of necessity, sufficiency, and grammatical classification ensure that Esperanto maintains both clarity and expressive precision.

De Saussure also interprets certain prefixes not as morphological categories but as adverbial modifiers, because they describe how an action occurs. Examples include:

bo- (marital relation): e.g., *bofrato* (brother-in-law)

dis- (separation): e.g., *disiri* (to disperse)

ek- (sudden or initial action): e.g., *ekkrii* (to cry out suddenly)

ge- (both genders): e.g., *gepatroj* (parents of both sexes)

re- (repetition or reversal): e.g., *revidi* (to see again)

These prefixes modify the verbal meaning in an adverbial manner[19].

Otto Jespersen, in *The Philosophy of Grammar*, affirms that parts of speech – nouns, adjectives, verbs, pronouns, etc. – form a coherent system of word categories. He regards Esperanto as a language with clearly defined formal criteria, which René de Saussure effectively classifies[24].

3.2. Derivational Models in Turkish

Traditionally, morphemes in the Turkish language are divided into two main classes: nominal and verbal. M. Ergin, a prominent Turkish scholar, adopted this classification and further categorized all roots and affixes into nominal and verbal groups[21]. According to his framework, nominal morphemes are roots and affixes that express objects (nouns) and qualities (adjectives). Based on this classification, there are four major types of affixal derivation:

1. *Affixes forming nominals from nominals:*

   For example, in the word *avcı* (hunter), the root *av* (hunt) and the suffix *-cı* (indicating a profession) are both nominal. Similarly, in *evsiz* (homeless), *ev* (house) is the root, and *-siz* is a suffix meaning "without", akin to the English *-less*.

2. *Affixes forming verbs from nominals:*
   In *yaşamak* (to live), the root *yaş* (age/life) combines with the verb-forming suffix *-a-* and the infinitive marker *-mak*. Another example is *boşalmak* (to become empty), which consists of the nominal root *boş* (empty), the verbal suffix *-al-* (denoting change of state), and the infinitive suffix *-mak*.
3. *Affixes forming nominals from verbs:*
   The noun *geliş* (arrival) is derived from the verb *gelmek* (to come) using the nominalizing suffix *-iş*. Similarly, *kıskanç* (jealous) is formed from the verb *kıskanmak* (to envy) and the suffix *-ç*, which creates adjectives indicating a trait or tendency resulting from the action.
4. *Affixes forming verbs from verbs:*
   For instance, *taşınmak* (to move house) is derived from *taşımak* (to carry) with the passive/reflexive suffix *-n-* and the infinitive *-mak*. Another example is *yedirmek* (to feed), formed from the root *ye-* (to eat), the causative suffix *-dir-*, and the infinitive *-mek* [21].

The Russian linguist Shcheka followed Ergin's model by distinguishing four types of affixes in Turkish word formation: nominal from nominal, nominal from verbal, verbal from nominal, and verbal from verbal. He also classified Turkish affixes as either nominal or verbal [22].

Building on the traditional model, it is important to note that in modern grammar, nominals can be subdivided into nouns and adjectives. Therefore, morphemes may also be classified as substantival or adjectival, which provides a more refined categorization.

Beyond natural languages, similar classifications have been applied to constructed international languages. As was already mentioned, most constructed languages are agglutinative and were often created by individuals lacking formal training in linguistics. These languages, nevertheless, generally follow consistent internal rules. For instance, Esperanto was designed with an agglutinative morphological system. The foundational rules of Esperanto were outlined in his *Fundamento de Esperanto* [23].

As it was illustrated before, René de Saussure analyzed Esperanto's word formation system from a logical perspective, having proposed two key principles and classification. In 1918, he extended this framework to natural languages in his work *La structure logique des mots dans les langues naturelles considérée au point de vue de son application aux langues artificielles* (*The Logical Structure of Words in Natural Languages in Light of Their Application to Artificial Languages*). He analyzed the morphology of French, drawing comparisons with English and German, and introduced a distinction between:

- *Simple (unmotivated) words* which are single-morpheme words that form the base for derivations.
- *Compound (motivated) words,* formed by combining simple morphemes; the meaning is transparent through analysis.

For example, to clarify whether *skrib-o* in Esperanto means "the process of writing" or "a written document", one must analyze its morphemes: *skrib-* is a verbal root, and *-o* a substantival ending. The word denotes the action of writing (an abstract process). To express a tangible product of writing, one must add *-aĵ-*: *skribaĵo* (a piece of writing).

This classification model can also illuminate complex word formation in Turkish. For instance, *yağmursuzluk* (drought, literally *rainlessness*) comprises three nominal morphemes: the root *yağmur* (rain), the adjectival suffix *-suz-* (without), and the nominal abstract suffix *-luk*. According to Ergin's model, this structure is *noun + noun + noun*. However, de Saussure's logic yields a more precise analysis: *noun (root) + adjective (suffix) + noun (abstract suffix)*.

Following René de Saussure's view, homogeneous morphemes should not be repeated unnecessarily in agglutinative languages. According to the principles of necessity and sufficiency, only essential and distinct morphemes should be combined to form compound words.

According to the theoretical ideas of R. de Saussure, substantival morphemes are subdivided into:

- *Private idea morphemes*—typically roots, denoting specific objects or phenomena (e.g., *yağmur* (rain), *masa* (**Table 1**).
- *General idea morphemes*—typically suffixes, expressing abstract categories (e.g., *-lu-* indicating possession or relation).

Taking into consideration R. de Saussure's categories, the most productive Turkish suffixes can be classified in the tables below (**Tables 1–4**). This classification was already proposed by Dmitrieva [8].

Table 1. Substantive Suffixes.

Animate	Animate and Inanimate	Inanimate
-cı/-ci/-cu/-cü (profession): *balık* → *balıkçı* (fisherman) **-daş/-taş** (companion): *yol* → *yoldaş* (companion) **-man/-men** (doer): *öğretmek* → *öğretmen* (teacher)	**-cık/-cik/-cuk/-cük** *(diminutive): anne* → *anneciğim* (mummy) **-dık/-dik** (person involved)*: tanımak* → *tanıdık* (acquaintance) **-ır/-ir** *(habitual actor): yazmak* → *yazar* (writer)	**-aç/-eç** (instrument): aramak → *araç* (tool) **-ca/-ce** (abstract noun): *düşünmek* → *düşünce* (thought) **-ı/-i** (result): *yazmak* → *yazı* (text) **-lık/-lık/-lik/-luk/-lük** (a definite subject for a special purpose; collective noun) *büyük* (big) → *büyüklük* (magnitude), *göz* (eye) → *gözlük* (glasses), *ağaç* (tree) → *ağaçlık* (woodland).

Table 2. Adjective Suffixes.

Adjective Suffixes
-ane: *namuskâr* → *namuskârane* (honestly)
-ca/-ce: *Türk* → *Türkçe* (Turkish)
-dan/-den: *yürek* → *yürekten* (heartily)
-an/-en: *doğru* → *doğrudan* (directly)

Table 3. Verbal Suffixes.

Verbal Suffixes
-ar/-ır (causative): *bitmek* → *bitirmek* (to finish)
-laş/-leş (become): *ağır* → *ağırlaşmak* (to become heavy)
-dır/-dir (causative): *ölmek* → *öldürmek* (to kill)
-ıl/-il, -ın/-in (passive/reflexive): *almak* → *alınmak* (to be taken)
-ış/-iş (reciprocal): *tanımak* → *tanışmak* (to meet)
-la/-le (instrumental): *temiz* → *temizlemek* (to clean)
-mak/-mek (infinitive): *anlamak* (to understand)

Table 4. Adverbial Suffixes.

Adverbial Suffixes
-ane: *namuskâr* → *namuskârane* (honestly)
-ca/-ce: *Türk* → *Türkçe* (Turkish)
-dan/-den: *yürek* → *yürekten* (heartily)
-an/-en: *doğru* → *doğrudan* (directly)

According to **Table 1**, the substantival suffixes in Turkish reflect a wide semantic range. They can be broadly divided into:

- *Animate noun-forming suffixes* (e.g., *-cı*, *-daş*, *-man*) used to denote professions (*balıkçı* (fisherman)), social relationships (*yoldaş* (companion)), or roles (*öğretmen* (teacher)).
- *Inanimate noun-forming suffixes* (e.g., *-aç*, *-ca*, *-ı*) often denote abstract concepts or physical tools (*araç* (tool); *düşünce*, (thought); *yazı* (text)).
- *Mixed (animate & inanimate)* suffixes (e.g., *-cık*, *-dık*) serve diminutive and participial roles, and can denote both persons and objects (*anneciğim* (dear mother); *tanıdık* (acquaintance)).

The system demonstrates a high degree of *semantic transparency* and *predictability*, typical of agglutinative languages. The suffixes in **Table 1** have phonetic variants (e.g., -lık/-lik/-luk/-lük), which are selected based on vowel harmony and the phonetic environment within the word.

According to **Table 2**, adjectival suffixes in Turkish show clear derivational logic:

- *Relational suffixes* (*-sal*, *-el*) turn nouns into adjectives of attribution (*ulusal* (national)).
- *Negative or privative suffixes* (*-siz*, *-maz*) negate or express absence (*evsiz* (homeless); *utanmaz* (shameless)).
- *Possessive suffixes* (*-lı*) express having a quality (*akıllı*

(clever)).

- *Emotion-derived suffixes* (*-ç*) form adjectives from verbs with affective meaning (*kıskanç* (jealous)).

These adjectives often participate in productive compounding and clearly retain traceable semantic bases from their noun or verb roots.

According to **Table 3**, the verbal suffixes follow consistent derivational patterns:

- *Voice and valency* markers such as *-dır*, *-ıl*, *-laş* change the argument structure of the root (*öldürmek* (to kill); *alınmak* (to be taken)).
- *Action modifiers* like *-ış*, *-la* denote reciprocity (*tanışmak* (to meet)) and instrumentalization (*temizlemek* (to clean)).
- *Infinitive marker -mak* functions as a universal non-finite verbal form (*anlamak* (to understand)).

This class illustrates the *high functional load* of Turkish verbal morphology and how suffixation controls syntactic behavior.

According to **Table 4**, the adverbial suffixes demonstrate regularity and limited polysemy:

- *Manner adverbs* (*-ane*, *-ca*) denote style or method (*namuskârane* (honestly); *Türkçe* (in a Turkish way)).
- *Locative/directional adverbs* (*-dan*, *-an*) describe origin or path (*yürekten* (from the heart); *doğrudan* (directly)).

These are fewer in number compared to other classes but display *morphosemantic clarity* and often derive from adjectival roots.

The following principles can be observed in the Turkish word formation system based on the research:

- The Turkish suffix system demonstrates morphological regularity and semantic clarity, a key trait of agglutinative languages. Each suffix generally contributes a single, consistent meaning to the base word.
- Suffixes are clearly distributed across grammatical categories (noun, adjective, verb, adverb), supporting a tripartite or quadripartite morphological classification similar to René de Saussure's model.
- The meaning of derived words is almost always compositional—the result of the meanings of the base and the suffix, which supports R. de Saussure's principle of sufficiency.
- Certain suffixes (e.g., *-cı*, *-lı*, *-mak*), demonstrating their central role in word formation, are highly productive, while others (*-ane*, *-ç*) are less productive but semantically rich.
- Turkish morphological structure corresponds with de Saussure's model of private and general ideas. For instance, the word *yağmursuzluk* (rainlessness) exemplifies a compositional sequence: a specific lexical concept (*yağmur* – rain), a derivational morpheme indicating negation or absence (*-suz* – without), and an abstract nominalizing suffix (*-luk*). This layered formation reflects a logically structured semantic progression consistent with de Saussure's principles of morphological logic.

The comparative analysis of derivational models in Turkish and Esperanto demonstrates that, despite their differing origins, Turkish, as a natural language, and Esperanto, as a constructed one, both exhibit a high level of morphological transparency and agglutinative regularity. The findings indicate that derivation in both systems follows a compositional logic, with affixes consistently contributing to meaning and playing a systematic role in the expansion of vocabulary.

Esperanto, guided by René de Saussure's morphological principles, emphasizes logical construction through two key rules: the principle of necessity and the principle of sufficiency.

Turkish, though a natural language, shows similar agglutinative behavior: derivational affixes are semantically stable and contribute to high word formation productivity. However, Turkish allows for some polysemy and historical irregularities, unlike the strict compositionality in Esperanto.

The following tables summarize the main findings regarding productive suffixes in both languages, classified by grammatical category.

According to **Table 5**, the derivational models in Esperanto are as follows:

1. Following the principles of necessity and sufficiency, only heterogeneous morphemes can be combined within a single word. For example, it is not acceptable to include the suffix *-ul-* (which denotes a person) in a word that already inherently conveys the idea of a person. In the case of *frato* (brother), the root *frat-* already includes the notion of a human being, so forming *fratulo* would be pleonastic, effectively meaning *"brother-man"*—a redundancy, since the idea of

"man/person" is already embedded in *frato*. Thus, the structural model of the word is:

root (private idea of a person) + ending (general idea of a noun).

2. Conversely, a word must contain all the necessary morphemes to fully convey its intended meaning. For instance, the root *saĝ-* (wise) expresses a quality, but does not include the idea of a person. To derive a word that refers to a wise person, it is necessary to add the suffix *-ul-* (indicating a person characterized by something), followed by the noun ending *-o*, in accordance with the fundamental rules of Esperanto. The resulting word is *saĝulo* (a wise person). The structural model of the word is:

   root (private idea of quality) + suffix (private idea of person) + ending (general idea of noun).

3. A more complex example is the word *fratineco* (sisterhood or the state or quality of being a sister), where *fratin-* (sister) is derived from *frato* (brother) by means of the female suffix *-in-*. The suffix *-ec-* indicates an abstract quality or state, and *-o* is the standard noun ending. The structural model of the word is:

   root (private idea of person) + suffix (private idea of female being) + suffix (private idea of quality) + ending (general idea of noun).

Turkish suffixation aligns with René de Saussure's classification of *private* and *general idea* morphemes. However, unlike in Esperanto, parts of speech in Turkish are not formed through specific final endings. Instead, they are constructed through combinations of roots and affixes.

The agglutinative morphology of Turkish allows for clear semantic segmentation and compositional meaning. Its morphological regularity and the principle of combining only essential morphemes reflect Saussurean principles of necessity and sufficiency (**Table 6**).

For example, the word *İngiliz* (adj., English) consists only of a root and, according to the principle of sufficiency, does not require a suffix to convey the idea of quality, as this meaning is inherently included. In contrast, the word *Amerikalı* (American) consists of the root *Amerika* (a proper noun denoting the country) and the suffix *-lı*, which conveys the idea of "having a quality" or "related to." According to the principle of necessity, this suffix is required to express the adjective meaning.

Table 5. Main Derivational Suffixes in Esperanto by Grammatical Function.

Category	Suffix	Function/Meaning	Example
Noun	-ul-	person	saĝulo (wise person)
	-aĵ-	object or result	novaĵo (news item)
	-ar-	group	vortaro (dictionary)
	-ej-	place	lernejo (school)
Adjective	-eg-	augmentation	domego (mansion)
	-et-	diminutive	dometo (small house)
	-ind-	worthy of	rimarkinda (notable)
	-ec-	quality	homeco (humanity)
Verb	-ig-	causative	purigi (to clean)
	-iĝ-	inchoative/passive	puriĝi (to become clean)
	-ad-	continuous action	laborado (ongoing work)
Prefix	mal-	opposite	malbona (bad)
	re-	repetition	revidi (see again)
	ge-	both genders	gepatroj (parents)

Table 6. Analysis of Turkish Derivational Morphology based on René de Saussure's Model.

Category	Type of Morpheme	Turkish Morpheme Examples	Word Examples	Function/Description
Nouns (Substantives)	**Private idea morphemes**	Roots: *yağmur* (rain), *masa* (table)	yağmur, masa	Denote specific, concrete objects or phenomena
	General idea morphemes	*-cı/-ci* (profession), *-daş/-taş* (companion), *-man/-men* (agent), *-lık/-lik* (abstract), *-ı/-i* (result), *-ca/-ce* (abstract noun)	balıkçı, yoldaş, öğretmen, gözlük, yazı, düşünce	Express abstract categories, roles, and results

Table 6. *Cont.*

Category	Type of Morpheme	Turkish Morpheme Examples	Word Examples	Function/Description
Adjectives	**General idea morphemes**	*-lı/-li* (possessive), *-siz/-suz* (negative), *-sal/-sel* (relational), *-ç* (emotion-derived)	akıllı, evsiz, ulusal, kıskanç	Form qualities or attributes from nouns/verbs
Verbs	**General idea morphemes**	*-dır/-dir* (causative), *-ıl/-il* (passive), *-laş/-leş* (become), *-ış/-iş* (reciprocal), *-la/-le* (instrumental), *-mak/-mek* (infinitive)	öldürmek, alınmak, ağırlaşmak, tanışmak, temizlemek, anlamak	Modify voice, valency, or function of verbs
Adverbs	**General idea morphemes**	*-ane, -ca/-ce, -dan/-den, -an/-en*	namuskârane, Türkçe, yürekten, doğrudan	Denote manner, direction, or source
Motivated words	**Composite: Private + General idea morphemes**	*yağmur* + *-suz* + *-luk* → *yağmursuzluk*	yağmursuzluk (drought)	Showcase logical compositionality
Simple (Unmotivated) words	**Private idea morphemes**	*yağmur, masa, el*	—	Cannot be further broken down morphologically
Agglutination & Productivity	**Aligned with logical economy**	Highly productive: *-cı, -lı, -mak*; Less productive: *-ane, -ç*	balıkçı, akıllı, anlamak, namuskârane	High semantic transparency and regularity
Morpheme Structure	**Three-part logical pattern:** Root (private) + Modifier (adj/verb) + Abstract suffix (noun)	*yağmur* + *-suz* + *-luk*	yağmursuzluk	Follows principles of necessity and sufficiency

Following René de Saussure's morpheme classification and the derivational models observed in Esperanto, the derivational patterns in Turkish can be outlined as follows:

1. The word *akıllı* (clever) consists of the root *akıl* (a private idea denoting mind or intellect) and the suffix *-lı* (a general idea morpheme expressing possession or attribution). Unlike Esperanto, Turkish does not require a distinct final ending to indicate the part of speech; instead, affixes determine the grammatical function. Thus, the structural model of the word is:
   root (private idea of a thing) + suffix (general idea of quality).
2. Another derivational model is illustrated in the word *yağmursuzluk* (drought), which, in accordance with the principles of necessity and sufficiency, is logically divided into the following morphemes:
   yağmur (noun root with a specific, private idea of "rain") + -suz (adjectival suffix conveying the general idea of absence: "without") + -luk (substantival suffix conveying the general idea of an abstract thing or state: "-ness")

Thus, *yağmursuzluk* literally means "the state of being without rain."

Based on the analysis above, we can summarize the derivational features of Esperanto and Turkish in **Table 7**.

Table 7. Comparison of Derivational Features in Esperanto and Turkish.

Feature	Esperanto	Turkish
Language type	Constructed, agglutinative	Natural, agglutinative
Morphological transparency	Very high, no polysemy	High, but allows some polysemy
Grammatical endings	*-o* (noun), *-a* (adj.), *-e* (adv.), *-i* (verb)	None fixed; derived from suffix context
Word formation logic	Algebraic, rule-based	Morphological templates, partly historic
Productivity of affixes	Systematically high	High, with some less productive affixes
Morphological categories (R. de Saussure model)	Fully mapped to the suffix system	Partially mappable, but more complex
Example word	*malsanulejo* (hospital)	*yağmursuzluk* (rainlessness)

Although Turkish and Esperanto originate from different linguistic paradigms—natural and constructed, respectively—both demonstrate structured, agglutinative derivation that supports systematic lexical expansion. Esperanto, built upon René de Saussure's morphological principles of necessity and sufficiency, exhibits strict compositional logic: each morpheme carries a singular, transparent meaning, and only the essential elements are combined to

construct a word. Turkish, while shaped by natural historical development, often follows similar logical principles. Its derivational morphology—particularly in multi-affix constructions like *yağmursuzluk*—reflects a compositional structure that aligns with de Saussure's framework, distinguishing between private and general idea morphemes.

The analysis confirms that both languages employ derivational models that can be interpreted through Saussurean categories. In Esperanto, these principles are embedded by design, ensuring clarity and predictability. In Turkish, the principles emerge from functional necessity and linguistic economy, despite occasional polysemy and irregularities. Thus, both languages exemplify how derivation can be guided by logical principles to achieve morphological transparency and productivity. This comparative perspective enhances our understanding of agglutinative mechanisms and underscores the applicability of de Saussure's theoretical framework to the analysis of both constructed and natural languages.

4. Discussion

This study investigated derivational word-formation processes in Turkish, a typologically agglutinative natural language, and in constructed languages such as Esperanto. The findings indicate that both Turkish and Esperanto employ systematic and productive morphological strategies, albeit shaped by distinct origins and structural constraints. Turkish demonstrates a complex and dynamic system of suffixation and reduplication for lexical expansion, aligning with previous research by Mahmudova[12] and Turan[25], who emphasize the high productivity of noun-forming suffixes and the functional role of reduplication in contemporary Turkic languages. These patterns are consistent with the agglutinative typology described in foundational works by Comrie[1] and Ergin[21].

In contrast, Esperanto's word formation is largely based on a modular system of affixes, designed for maximum regularity and transparency, as detailed by Kalocsay and Waringhien[15] and de Saussure[19,26]. This is confirmed by recent typological studies on constructed languages, such as Goodall[5] and Schreyer[4], who emphasize Esperanto's role as a planned linguistic system with consistent morphological patterns aimed at ease of acquisition and use. The comparative perspective underscores the differences between natural evolution-driven morphology and intentionally designed morphologies, confirming the conclusions by Novikov[27] and Schubert[3] regarding the semantic and semiotic motivations underlying constructed languages.

Recent research over the past five years has further expanded on the typology and cognitive aspects of word formation in both natural and constructed languages. For example, Mahmudova[12] demonstrates that reduplication in Turkic languages is not merely a morphological tool but also serves pragmatic and semantic functions, contributing to nuances such as emphasis and plurality. This aligns with observations in natural language morphology that derivation often intersects with discourse functions[9].

On the other hand, the modular affixation system of Esperanto, while more limited in morphological innovation, facilitates cross-linguistic communication by providing a transparent, predictable derivational framework. Tůmová[7] provides experimental evidence that such constructed language frameworks aid in mediating linguistic concepts across speakers of different native languages, reinforcing the cognitive benefits of planned word-formation systems.

Comparing these results to other recent empirical studies, such as Jaza'ei et al.[10], who analyzed Azeri Turkish word formation, reveals convergent patterns within the Turkic language family but also highlights language-specific suffixation nuances. This supports the broader typological perspective on the interplay between language structure and sociolinguistic factors discussed by Lewis[13] in the context of Turkish language reform.

Overall, this study confirms and extends existing knowledge by integrating linguistic theory from René de Saussure and contemporaneous morphology frameworks with modern corpus-based and experimental findings[8,26]. The results suggest that while natural languages like Turkish exhibit morphological complexity shaped by historical and cultural factors, constructed languages such as Esperanto exemplify engineered linguistic regularity, serving distinct communicative goals. This comparative research enriches our understanding of how the word formation system functions in diverse language systems and acts to fuel ongoing debates in morphology and interlinguistics.

5. Conclusions

The present study has investigated the word formation processes in Turkish and Esperanto from both theoretical and comparative points of view, positioning them as typological representatives of natural and constructed agglutinative languages. Although both exhibit agglutinative morphological structures, the analysis revealed fundamental differences in their derivational mechanisms, rooted in the distinct nature of each language. Turkish, shaped by historical development, cultural context, and phonological change, exemplifies the essential evolution of a natural language. In contrast, Esperanto, as a deliberately engineered linguistic system, embodies a morphologically transparent and logically consistent structure, designed for easy acquisition and international communication.

Within the theoretical framework, concepts such as derivation, morphological conversion, and the logic of affixation were discussed in light of René de Saussure's theory of semantic algebra. These frameworks provided a foundation for analyzing examples from both languages, enabling a meaningful comparison of how lexical items are derived and structured.

The analysis of Turkish focused on common derivational affixes such as *-cı, -lık, -sız, -lı,* revealing a high degree of productivity in word formation. However, the study also noted issues such as polysemy, semantic shifts, and occasional ambiguity arising from the context-dependent nature of natural languages. In contrast, Esperanto exhibits a system where each morpheme, both roots and affixes, bears a single, clearly defined meaning. The construction of words like *lernejo* (school), derived from *lern-* (to learn), *-ej-* (place), and *-o* (noun), exemplifies Esperanto's logical and compositional derivational model, which enhances both learnability and computational tractability.

Despite their differences, both languages rely heavily on root + affix structures to generate new vocabulary and concepts. However, while Turkish reflects the irregularities and variations inherent in natural language evolution, Esperanto systematizes these processes by eliminating exceptions, embodying an idealized and rational version of morphological structure.

These findings are supported by recent research papers, mentioned in the article, which confirm the ongoing relevance of studying both natural and constructed languages in morphological typology. Such comparative analyses enhance our understanding of language processing, inform effective pedagogical approaches, and offer valuable insights for the design of artificial languages.

This study ultimately shows that while natural languages like Turkish evolve through gradual, usage-driven changes and historical layering, their structural principles can be abstracted and systematically applied in constructed languages such as Esperanto. This convergence highlights the broad applicability of morphological theory across diverse language types and reinforces the significance of interlinguistic analysis in areas such as language education, computational linguistics, and linguistic philosophy. As René de Saussure suggested, examining word formation through a framework of semantic logic facilitates the identification of cross-linguistic regularities, providing a foundation for more robust morphological modeling and comparative linguistic inquiry.

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