Syntactic structures of Turkish research article titles in medicine and engineering

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ABSTRACT

The title is of vital importance to research articles as it summarizes the content in several words and grabs the attention of readers. When selecting articles pertinent to their research, the prevalence of online publication leads readers to use online search engines like Google Scholar, which generally displays the first few words of a title, making the title highly important. This study aimed to investigate some key features, such as length, style, syntactic structure and punctuation marks of titles in Turkish research articles in medicine and engineering. To this end, we selected 1,200 titles in four leading journals publishing research articles in these disciplines. As a tool to collect data, document analysis was used in the study to analyze such features of titles and in analyzing the data, descriptive analysis technique was used. The study revealed that both medicine and engineering have almost the equivalent title length. Titles in both disciplines are dominated by single-unit ones and both single-unit and compound titles are predominated by nominal group construction. The results also suggested some disciplinary differences: Compound titles were more common in medicine than in engineering. Medical titles appear to have used more varied syntactic structures in forming titles. Moreover, medical titles have shown a high degree of complexity in terms of punctuation usage. The differences might be attributed to disciplinary practices set out in these two fields. The results of the present study will provide novice writers with ample opportunity to construct their titles as best they can while maintaining their effort to build and enhance their academic writing skills.

Keywords: Titles, title length, syntactic structures, medicine, engineering.

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INTRODUCTION

The title is the first part of a research article (RA) that editors, prospective peer reviewers and readers encounter. As suggested by Bazerman (1985) readers decide, after seeing the title, whether or not to read further, which makes researchers compose with great care a title that attracts and keeps readers' attention to read the article (Bavdakar, 2016). In the literature, the importance of titles is so well documented that they are called the "face" (Annesley, 2010) and "highway billboard" (Belcher, 2021) of the article; "texts in miniature" (Haggan, 2004), "labels" (Gastel and Day, 2022), "mini abstracts" (Hudson, 2016), "abstract of the abstract" (Diao, 2021), "the most important summary" (Paiva, Lima and Paiva, 2012), and "the

gateway to the contents of a scientific article" (Bavdakar, 2016). Researchers' use of so many different expressions for titles shows how important they are. According to Kulkarni (2013), titles condense the content of an article in a few words and they are the most important indicative of the number of people that will read them.

Attributes of a good title have been defined in detail in some academic writing textbooks, style manuals and editorials. According to Grant (2013, p. 259), "first and foremost, the title should be informative." A good title will inform readers clearly about the topics, findings and contents of the article (Penrose and Katz, 2004).

Secondly, it should be clear and have one meaning

(Annesley, 2010). Every reader should receive the same meaning after reading it. To Bavdakar (2016), it should not leave room for multiple interpretations or confuse the reader about the message it is trying to convey.

Thirdly, it should be concise; not too long and not too short. A long title can look unfocused, distracting, boring, and confuse the readers due to too many words (Annesley, 2010; Bavdakar, 2016). A very short title, however, could lack adequate information, not fulfilling its main function of informing readers about the content of the study. The number of words in a good title should be sufficient to convey the main topic and content of the article (Bavdakar, 2016). APA (2020) is one of the few manuals that give an exact number of words a title should have, 12.

Fourthly, it should contain some keywords relating to the topic of the paper (Hartley, 2008; Kulkarni, 2013). Every researcher wants their article to be found easily. Today's readers will most likely come across a title when conducting an electronic search for an article by entering a few key terms. So, if the title includes keywords that can be searched or indexed, it is easier for users to access that article (Bavdakar, 2016). Moreover, it is beneficial to place the terms you want to be linked with your work as early in the title as possible because search engines like Google, normally display only the first 6 to 7 words of a title (Annesley, 2010).

Fifthly, a good title needs to attract a reader (Lewison and Hartley, 2005). When searching relevant works, readers usually encounter thousands of titles and it is not possible for them to read all titles in detail. Hence, a title needs to be noticeable in database result lists and appeal to potential readers (Fox and Burns, 2015).

Lastly, a title should not include waste words, abbreviations, jargon and numerical values (Bavdakar, 2016; Caramelli, 2011; Gastel and Day, 2022). Waste words like "study, investigation, development," or "observations" need to be avoided as Gastel and Day (2022) indicate they make titles unnecessarily long and readers are aware that no work can be written without studying, investigating, developing, or observing something. Besides, if the readers are not experts in the subject matter of the work, abbreviations will confuse them (Annesley, 2010).

LITERATURE REVIEW

Previous research papers have investigated the titles from different perspectives, in terms of length (Diao 2021; Hyland and Zou, 2022; Kerans, Marshall, Murray and Sabate, 2020), style and syntactic structures (Appiah, Ankomah, Osei and Hattoh-Ahiaduvor, 2019; Haggan, 2004; Nagano, 2015), punctuation usage (Anthony, 2001; Buter and van Raan, 2011; Diao, 2021), lexical density (Anthony, 2001; Diao, 2021; Nagano, 2015), and the effects of some title characteristics on the rate of citation (Jacques and Sebire, 2010; Paiva et al., 2012; Thelwall

2017). Moreover, several diachronic studies investigated some characteristics of titles over time (Fox and Burns, 2015; Goodman and Smith, 2000; Lewison and Hartley, 2005).

The titles of research articles in psychology contain 12 words on average (Whissell, 1999), 9 words in computer science (Anthony, 2001), and 12, 11, and 13 words in gynecology, law and business, respectively (Appiah, et al., 2019). More recently, Hyland and Zoo (2022) found that titles in the soft sciences tend to be longer than those of the hard sciences. Hudson (2016) demonstrated the increased number of authors resulted in a longer title length. In a diachronic study, Lewison and Hartley (2005) found that titles became longer over time due to the fact that compound titles became more popular. Researchers have also looked at the relationship between citations articles receive and title length, and in one of these studies, Paiva et al. (2012) showed that articles with short titles are more frequently cited.

Considering the number of segments titles have, they are usually classified as single units or compounds. Compound titles allow RA writers to pack more information into their titles. One part of the compound title can be used to inform and the other to attract the readers. This makes it possible for writers to achieve a balance between the two objectives of their titles. However, four possible combinations for compound titles were identified by Swales and Feak (1994): problem-solution, general-specific, topic-method, and major-minor. In the first combination, for example, the first part of the title includes the problem and the second one includes its solution. Hartley (2007) demonstrated that students and academics are inclined to prefer compound titles to single-unit ones. There is also evidence that compound titles are cited more often (Buter and van Raan, 2011; Haslam, Ban, Kaufmann, Loughnan, Peters, Whelan and Wilson, 2008; Jacques and Sebire, 2010). The usage of compound titles seems to differ substantially according to discipline. For example, Soler (2007) found that 41% of titles in anthropology comprised compounds, whereas the rate for biology titles was only 5%. After reviewing 17 studies, Hartley (2007) revealed that compound titles are more common in the soft sciences than they are in the hard sciences. In a large-scale study, a similar finding was also obtained by Hyland and Zoo (2022). They examined 5,070 titles from 6 different disciplines and found that soft science titles included more compounds (72%) than hard science titles (15%). In almost all areas of science publishing, the use of compound titles increased from the 1980s to the early 2000s (Lewison and Hartley, 2005).

Hartley (2012) specified 13 types of titles, but three broad categories seem to be used widely by researchers: descriptive/indicative, declarative/informative, and question/interrogative. Descriptive titles only describe the topic of the study (Bavdakar, 2016). These titles are also known as the nominal type because they consist only of noun phrases (Milojevic, 2017). Declarative titles indicate

the findings or conclusions of the study (Goodman and Smith, 2000; Wager, Altman, Simera and Toma, 2016). Being in the form of a sentence they are also called full sentence (FS) titles (Jamali and Nikzad, 2011). Indicating the topic of the study in question form, interrogative titles are commonly used to attract the attention of the reader (Gustavii, 2008). Among these three types, the nominal type seems to be the most popular one. In the field of biological and social sciences, Soler (2007) examined 480 RA titles and found nominal group constructions to be the most widely used ones. In a study of 417 medical article titles, Wang and Bai (2007) discovered a high prevalence of nominal structures. In both soft and hard sciences, this type prevailed (Busch-Lauer, 2000; Fortanet, Posteguillo, Coll, and Palmer, 1998). On the other hand, FS titles were noted as a characteristic of science articles, particularly those in biology, by Berkenkotter and Huckin (1995). Soler (2007) found that in biology and biochemistry, FS titles account for 51 and 46% of all RA titles, respectively. In contrast, there were no instances of this structure in linguistics or psychology. Soler stated that full sentence title construction was a peculiarity exclusively of titles of biology and biochemistry. Since these disciplines mostly rely on evidence such as tables, photographs, figures, etc. supporting their results, the confidence of researchers in their findings leads them to form their titles in full sentences. Haggan (2004) studied literary, linguistic and scientific article titles, and found that FS titles were predominant in biology. Hyland and Zoo (2022) revealed that the occurrence of question titles comprised only 8.5% of all titles in their corpus. Hudson (2016) showed that they are hardly present in the fields of engineering and mathematics, but are very prevalent in the social sciences.

Diao (2021) found that 79% of titles in his corpus included 10 different punctuation marks, the most widely used one being colon (40%). Anthony (2001) and Appiah et al. (2019) analyzed punctuation in compound titles and demonstrated that the colon was predominantly used between the two parts of the titles. A study of over 500,000 titles in the Web of Science database found that punctuation marks, such as colons and hyphens, are often used in the titles and these articles have higher citation rates in general, maybe because the absence of such marks are considered unusual (Buter and van Raan, 2011).

Existing research on Turkish RA titles has revealed that there are very few studies on this topic. In one of them, Kan (2017) studied the syntactic structure of 200 titles in Turkish education and literature and found that 53% of titles were nominal, 30% were V-ing phrases, and 16% were compound structures. There was only one FS structure. The topic-scope combination was used the most (42%) to form compound titles. Pilten Ufuk (2017a) examined 298 social science titles and revealed that the typical title consisted of 9 words; the length of the title and article did not appear to have any relationship; descriptive titles dominated the corpus (90%), many titles (74%)

included punctuation marks and apostrophe was the mostly used one. In a diachronic study, Pilten Ufuk (2017b) investigated punctuation usage in history titles and found that the number of titles that used punctuation marks increased over time (from 31% between 1937 and 1942 to 87% between 2011 and 2016). Güneş and Çevik's (2016) study of 447 RA titles in three education faculty journals reported that 25.9% of the titles had unnecessary words; 4.5% of them used abbreviations and one-third of them included punctuation marks.

The literature suggests that there is a dearth of empirical research on the syntactic structures of Turkish RA titles. Moreover, few studies have probed into the titles of journals in the field of education, Turkish education and literature, social sciences and history. No study has yet examined the characteristics of Turkish RA titles in medicine and engineering. This research opportunity allows the researcher to address this gap by conducting an exploratory analysis of the syntactic structure of titles in the aforementioned two fields. Moreover, according to YOK (2023), there are over 300,000 international students at Turkish universities and the a great number of these students are at faculties of engineering and some of them do graduate studies. When writing their theses, they will be required to compose good titles for their works and this study will aid them in this respect. The study sought answers to the following questions:

1. What types of titles are predominantly used in Turkish RAs in medicine and engineering and what are the average lengths of these titles?
2. What are the syntactic structures and punctuation marks used in the titles of Turkish RAs in these two disciplines?
3. Are there any disciplinary differences in the length, type, structure and punctuation of Turkish RA titles in medicine and engineering?

METHOD

Research design

Qualitative research approach was used in the study. This approach refers to a study that uses qualitative methods of data collection such as observation, interview and document analysis to reveal perceptions and events realistically and holistically (Yıldırım and Şimşek, 2005). Among these methods, document analysis was used in the study. Creswell and Creswell (2018) stated that text and picture data are the foundation of qualitative research. In order to achieve the study's goal, the purposive sampling technique was used to choose the disciplines to examine.

Dataset

The data of the study comprised titles of two disciplines:

medicine and engineering. The titles were collected from the tables of content of four journals: Journal of Istanbul Faculty of Medicine, Ege Journal of Medicine, Pamukkale University Journal of Engineering Sciences and Uludağ University Journal of the Faculty of Engineering. These four journals were chosen because they are nationally prestigious ones in medicine and engineering. The first and third journals are indexed in the Emerging Sources Citation Index (ESCI) and the others are indexed in the TR index, the most popular national index in Turkey. Three hundred titles were gathered from each journal using their tables of contents. We started with the final issue of 2022 and went back through time until we collected 300 articles. Each discipline is represented by 600 titles. As a result, we produced a dataset of 1,200 titles which was higher than any other research on Turkish RA titles done to date. Articles published under reviews, case reports, editorials and image presentations were not included in the study. The collected titles were coded into an Excel spreadsheet for further analysis. Table 1 shows the essential data, including journals, number of issues, titles, and total words.

Table 1. Data size and composition.

Discipline	Journal	Year	Vol./No.	Titles	Words
Medicine	Journal of Istanbul Faculty of Medicine	2015 - 2022	78(1) – 85(4)	300	6,919
	Ege Journal of Medicine	2016 - 2022	55(2) – 61(4)	300	
Engineering	Pamukkale University Journal of Engineering Sciences	2020 - 2022	26(4) – 28(7)	300	6,868
	Uludağ University Journal of the Faculty of Engineering	2019 - 2022	24(3) – 27(3)	300	
Total				1,200	13,787

Data analysis

The major focus of this study was to analyze some features of the Turkish RA titles. The features we were interested in were as follows:

■ Title length
■ Title style
■ Syntactic structure of titles
■ Punctuation marks

As a tool to collect data, document analysis was used in the study to analyze such features of titles and in analyzing the data, descriptive analysis technique was used. In this technique, the data are analyzed and summarized in accordance with the predetermined themes (Yıldırım and Şimşek, 2005). In a time-consuming process, we read all of the titles one by one, and for each title, we found their length, style, structure, and punctuation marks. Title length was simply understood as the number of words a title had. We defined words as a chain of letters appearing between spaces. Title lengths were first measured with Microsoft Excel and then Microsoft Word was used to double-check the word count. The following criteria were followed to determine the number of words in a certain title:

1. Words were counted individually: *Tedarik zinciri risklerinin yapısal eşitlik modeli ve bulanık analitik hiyerarşi süreci ile analizi (13 words) / Analysis of supply chain risks by structural equation model and fuzzy analytical hierarchy process* (Pamukkale University Journal of Engineering

Sciences, 101)[1]

2. Words with hyphens were counted as one word: *COVID-19 pandemisi sırasında Türkiye'den uluslararası acil tıp literatürüne katkılar: Bibliyometrik bir analiz (12 words) / Contributions from Türkiye to the international emergency medicine literature during the COVID-19 pandemic: A bibliometric analysis* (Ege Journal of Medicine, 310)

The title style is defined as the number of units a title has. If a title is composed of one unit, it is categorized as a single-unit title; if a title is made up of two units, it is classified as a compound title. Titles were categorized manually as being single unit or compound, and they were stored separately in different files.

Syntactic structure in this study refers to elements such as noun phrases, prepositional phrases, V-ing phrases and sentences. To carry out the syntactic structure analysis of titles, we reviewed the related literature and saw that every researcher seemed to classify titles into different groups. For example, Haggan (2004) lists three different titles: compound, full sentence, and a third group consisting mostly of noun phrases. Soler (2007) suggests four types: compound, full sentence, nominal group and question. On the other hand, Cheng, Kuo and Kuo (2012) describe five types: compound, nominal, V-ing phrase, full sentence and prepositional phrase. The problem with these categorizations is that all of them include a compound title and it is clear that a compound title also includes either a full sentence, a question, a noun, V-ing, or a prepositional phrase. The number of units in a title is confused with the syntactic structure of titles. Moreover,

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[1] 101 refers to the title number in the dataset.

such a categorization does not give enough information about the syntactic structure of compound titles. Are they composed of a full sentence and a noun phrase, a question and a prepositional phrase or two noun phrases, etc?

Thus, this study analyzed the syntactic structure of single unit and compound titles separately. This allowed the researcher to illustrate each one's syntactic structure clearly and in a more detailed way. The researcher categorized titles syntactically into nominal groups, full sentences, questions, V-ing and prepositional phrase constructions. The question could have been incorporated into the full-sentence construction, but following Soler (2007), it was analyzed separately for clarity.

The researcher copied and pasted all titles into a different Microsoft Word document to determine the punctuation marks used in the titles, then entered punctuation marks in the search box and found their total numbers. Ten types of punctuation marks were determined: hyphen, colon, comma, apostrophe, parentheses, question mark, dash, period, semicolon and quotation marks.

The reliability of the study was ensured in two ways. First, the researcher sought expert opinion. Two academics from the Turkish language department of a state university helped him with the syntactic classification of some controversial titles. Secondly, intra-reliability tests were carried out. The data was re-examined and reanalyzed two weeks after the initial coding and a reliability of .98 was found.

RESULTS

This section presents the results of the analysis of our data. The results are presented in terms of title length, title style, syntactic structure and punctuation marks.

Title length

One of the defining features of a title is the number of words it has. Since there is a gap in the literature on the average length of Turkish RA titles in medicine and engineering, one of the aims of this study was to fill in this gap. Table 2 presents the average text length of the titles along with the shortest and longest ones. The result of the analysis indicates that both disciplines have an equivalent title length of around 11.5 words. Moreover, the word count of the shortest and the longest titles in both disciplines is very similar, too. However, the longest title, at 28 words, is in medicine.

Table 2. Word length of titles by discipline.

	Title length		Total words	M
	Shortest	Longest		
Medicine	3	28	6,919	11.5
Engineering	3	25	6,868	11.4

Title style

In terms of style, in this study, titles were categorized as single-unit or compound titles. Titles composed of one unit were classified as single unit while those composed of two parts were classified as compound. The two parts are mostly separated by a colon [that is why Hartley (2005) calls them colonic], or sometimes by a hyphen, a dash, or a period. Examples of both types are presented below:

1. *Fonksiyonel gruplu polistirenlerin fotolitografik özelliklerinin incelenmesi / Evaluation of photolithographic properties of functional groups containing polystyrenes* (Pamukkale University Journal of Engineering Sciences, 6).
2. *Piroliz gazından karışık kültür kullanılarak sentezgaz fermentasyonu ile biyoetanol üretimi: Isıl ön işlem etkisi. / Bioethanol production by syngas fermentation from pyrolysis gas using mixed culture: Heat pre-treatment effect* (Pamukkale University Journal of Engineering Sciences, 210).
3. *Anadolu'daki rinoplasti adaylarının radyo-paleontolojik*

değerlendirilmesi ve karşılaştırılması. Kimi ameliyat ediyoruz? / A radio-paleontological evaluation and comparison of Anatolian rhinoplasty patients and the literature. Who are we "engaged" to operate? (Ege Journal of Medicine, 452).

Since example 1 shows the title in a single segment, it was designated as a single unit title. Examples 2 and 3 were classified as compound titles because they represent the title with two segments, one with a colon and one with a period, respectively. According to Hyland and Zoo (2022), compound titles provide a good way for RA writers to include their studies two different features and this makes them stand out from other studies on the same topic.

We can see from Table 3 that, in both disciplines, the single unit titles predominated. 76% of medicine titles were made up of single units, while about 90% of engineering titles were composed of single units. Thus, we find that compound titles are less common in engineering and more common in medicine. Roughly, one-fourth of medicine titles are of compound type, suggesting that physicians prefer them more than engineers do.

Table 3. The distribution of title style.

	Medicine		Engineering	
	n	*%*	*n*	*%*
Single unit titles	457	76.2	538	89.7
Compound unit titles	143	23.8	62	10.3
Total	600	100	600	100

Title structure

Following Cheng et al. (2012), this study categorized RA titles syntactically into five groups: nominal, full sentence, question, prepositional and V-ing phrase constructions. The examples for each category of titles are given below:

The nominal construction: *Dondurularak kurutulmuş meyve tozlarının keklerin bazı fizikokimyasal özellikleri üzerine etkisi / The effect of freeze dried fruit powders on some of the physicochemical properties of the layer cake* (Pamukkale University Journal of Engineering Sciences, 113).

The full sentence construction: *Yüksek trigliserid glikoz indeksi kalp yetmezliği varlığıyla ilişkilidir / Elevated triglyceride glucose index is related to the presence of heart failure* (Journal of Istanbul Faculty of Medicine, 62).

The question construction: *Tip 2 diyabetli yaşlı bireylerde kırılganlığı etkileyen faktörler nelerdir? / What are the factors affecting the frailty of elderly people with type 2 diabetes?* (Journal of Istanbul Faculty of Medicine, 103).

The V-ing phrase construction: *Görüntü işleme teknikleri ve robot kol ile nesneleri kategorilerine ayırma / Categorizing objects with image processing techniques and robot arm* (Uludağ University Journal of the Faculty of Engineering, 349)

The prepositional phrase construction[2]: *Terapötik hipotermi tedavisi alan çocukların motor gelişim sonuçları: ebeveyn görüşleri ile birlikte / Motor development outcomes of children who have undergone therapeutic hypothermia: with parents' views* (Journal of Istanbul Faculty of Medicine, 31).

Table 4. Syntactic structure of single unit titles.

	Medicine		Engineering	
	n	*%*	*n*	*%*
Nominal group	422	92.3	527	98.0
Question	26	5.7	0	0
Full sentence	8	1.8	0	0
V-ing phrase	1	0.2	11	2.0
Total	457	100	538	100

Table 4 presents the basic figures of syntactic structure for single-unit titles in medicine and engineering. As can be seen from the table, nominal group construction has the highest percentage (92.3 and 98%, respectively) of all types of title structures in both disciplines. In medicine, 26 titles (5.7%) are in the form of questions, eight titles (1.8%) are full sentences and one title is in the form of V-ing phrase construction. The last one was recorded in 11 titles (2%) in engineering. On the other hand, no title using prepositional phrase construction was found in single-unit titles.

In relation to syntactic structure of the compound unit titles in both disciplines, the findings show that juxtaposed nominal constructions are mostly preferred by RA authors, as they are recorded 100% occurrence in engineering and more than 85% occurrence in medicine (Table 5). The results also suggest that the researchers in medicine have used four other combinations in compound titles. 10 titles (7%) were in the form of a nominal and question; seven titles (4.9%) were made up of a question and a nominal construction and three titles began with a full sentence and ended with a nominal structure. In all, the least used structure was a combination of nominal and prepositional phrases, which occurred only once.

Punctuation marks

An overview of the punctuation mark usage is presented in Table 6.

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[2] Our corpus included only one prepositional phrase construction and it was in the second part of a compound title.

Table 5. Syntactic structure of compound unit titles.

	Medicine		Engineering	
	n	*%*	*n*	*%*
Nominal / nominal	122	85.3	62	100
Nominal / question	10	7.0	0	0
Question / nominal	7	4.9	0	0
Full sentence / nominal	3	2.1	0	0
Nominal / prepositional	1	0.7	0	0
Total	143	100	62	100

Table 6. Titles with and without punctuation marks.

	Medicine		Engineering	
	n	*%*	*n*	*%*
Titles with punctuation	300	50	202	33.7
Titles without punctuation	300	50	398	66.3
Total	600	100	600	100

The number of titles with and without punctuation is the same, with 300 (50%), in medicine, whereas engineering has 202 titles (33.7%) with and 398 titles (66.3%) without punctuation. Overall, punctuation marks usage in medicine titles is much more prevalent than those in engineering.

Table 7. Usage of punctuation marks.

	Medicine		Engineering	
	n	*%*	*n*	*%*
Hyphen	129	26.0	107	35.8
Colon	120	24.1	57	19.1
Comma	80	16.1	36	12.0
Apostrophe	60	12.1	30	10.0
Parenthesis	30	6.0	40	13.4
Question mark	43	8.7	0	0
Dash	17	3.4	14	4.7
Period	9	1.8	11	3.7
Semi colon	9	1.8	3	1.0
Quotation marks	0	0	1	0.3
Total	497	100	299	100

Table 7 illustrates the punctuation marks found in RA titles. Altogether, ten types of punctuation marks which are hyphen, colon, comma, apostrophe, parentheses, question mark, dash, period, semicolon and quotation marks were found in the titles. Of these, hyphens, colons and commas are the most widely used ones in medicine while hyphen, colon and parenthesis are the most widely used ones in engineering. Quotation marks were found only in one title which belonged to engineering. When compared to engineering, medicine has a considerably high use rate of the hyphen, colon, comma, apostrophe and semicolon. Apart from the similar frequency of use of dashes and periods, engineering has a higher frequency of using parenthesis. On the other hand, titles including question mark were found only in medicine.

DISCUSSION AND CONCLUSION

One of a scientific article's most crucial elements is the title. We gathered and analyzed a dataset of 1,200 Turkish RA titles in medicine and engineering. The analysis

revealed that the average text length of titles in medicine was 11.5 words. Although the languages in which the titles were written are different, this finding is in agreement with that of Wang and Bai (2007), who found English medicine RA titles were 11.0 words long. However, this result contradicts Soler's (2007) finding, who reported an average title length of 15.5 words in the same discipline. One possible explanation would be that she selected a sum of 80 titles from two different medical journals and thus it is unlikely that a corpus such small would provide a representative sample for medicine. Our data showed that the average title length is 11.4 words in engineering, which corroborates the findings of Hyland and Zoo (2022) that engineering titles are 11.1 words long. Our study also demonstrated that Turkish RAs in medicine and engineering have more or less the equivalent title length, suggesting that there is no disciplinary difference between them.

In agreement with previous studies (Hyland and Zoo, 2022; Moattarian and Alibabaee, 2015; Nagano, 2015) single-unit tiles dominated our data. We can see that three-quarters of medicine titles and 90% of engineering ones are of single unit. In Nagano's (2015) study, 88% of fluid engineering titles and in Moattarian and Alibabaee's (2015) study, 93% of civil engineering titles were made up of one unit. These results are consistent with Hyland and Zoo's (2022) finding that single-unit titles abound in hard disciplines. The reason according to them is that hard science readers are "relatively better defined than the social science readers" and thus single titles that are "typically unadorned and explicit, speaking to the community directly" are suitable for them (p. 7). On the other hand, about one-fourth (23.8%) of our titles in medicine are of compound type.

More than 95% of the single unit titles in the dataset were nominal titles. This result is clearly in line with previous studies (e.g., Busch-Lauer, 2000; Haggan, 2004; Moattarian and Alibabaee, 2015; Soler, 2007; Wang and Bai, 2007) on RA titles which demonstrated an obvious prevalence of nominal titles over other ones. According to Wang and Bai (2007), the power of compacting information in an economically sound manner, via several pre- and post-modifiers makes nominal titles to be preferred by researchers. Regarding discipline-specific nominal titles constituted 92.3% of the titles, whereas the other structures (question, FS and V-ing phrase) recorded 7.7% in medicine. Among engineering single unit titles, the nominal structure recorded 98.0% as against 2.0% for V-ing phrase. Thus, only two types of syntactic structures were found in engineering titles. Titles in the form of full sentences and questions are nonexistent in engineering articles. Anthony (2001) also found question titles to be extremely rare in his study. Besides, Hyland (2002) found them in the "soft" as opposed to the "hard" disciplines. That seems to be due to disciplinary differences. In medicine, 26 (5.7%) single-unit titles were in the form of questions. Cook and Plourde (2016) showed question titles to be rare

in natural science but frequent in sociology and political science journals. With respect to the occurrence of FS titles, our data included only eight (1.8%) occurrences of this structure in medicine, which contradicts Soler's (2007) study, in which she found 16% of medical titles in this construction. Milojevic (2017) states that the use of full-sentence titles has been somewhat controversial, especially in the medical literature.

The findings on the syntactic structure of the compound unit titles in both disciplines demonstrate RA writers' preference for juxtaposed nominal constructions, as they are recorded 100% occurrence in engineering and more than 85% occurrence in medicine. Once again, we can see that whether single unit or compound, nominal construction in titles is greatly favored over other ones. The results also suggest that the juxtaposed elements have a more diverse appearance in medicine and include nominal/question (10 titles and 7%), question/nominal (7 titles and 4.9%), full sentence/nominal (3 titles and 2.1%) and nominal/prepositional (1 title and 0.7%). This might be because compound titles are more commonly used in medicine than in engineering in our study.

Half of the medical titles included punctuation marks while one-third of titles in engineering had punctuation marks. In accordance with this result, a sum of 497 punctuation marks was found in medical titles but 299 of them were found in engineering titles. The most commonly used punctuation marks in our data were hyphen, colon and comma. Hyphen was common because some discipline-specific terms like "*Bi-2212 superconductors, 3D-DCT method, 6063-T5 al tubes, sol-gel process, Covid-19, non-syndromic hearing loss*" included this punctuation mark and they were heavily used in the titles in our dataset. It was also used between the two parts of some compound titles. On the other hand, the usage of colon was only related to the compound titles. Because it was only used in compound titles. Our data included 205 compound titles and 86% of them were separated by a colon and the rest by a hyphen or a period. Diao (2021), who studied RA titles in Library Science and Scientometrics, also found these three punctuation marks to be the most frequently used ones, although their ranking of them was slightly different, namely, the colon was the most used one followed by comma and hyphen. The data on question marks is somewhat related to the data on syntactic structures of titles since titles in the question forms were only found in medicine.

By analyzing title length, title type, syntactic structure and punctuation marks of RA titles, this study also sought to find out whether there are disciplinary differences between medicine and engineering. The findings show that medicine and engineering titles have the same length. However, there are some interesting disciplinary differences between these two disciplines in several factors such as title types, title structures and punctuation marks. As suggested by Milojevic (2017) and Hyland and Zou (2022), this might be because researchers are trying

to follow the standards and disciplinary practices set out in their fields.

Limitations and implications

Our study has some limitations. First, for each discipline, articles from two journals were analyzed. It is possible that the articles selected might not represent those of all medical and engineering journals. Second, more convincing results can be obtained by compiling a larger dataset containing titles from the same fields. In order to identify disciplinary differences in terms of title construction, future research may analyze the structure of Turkish RA titles in other disciplines.

Pedagogically, the findings of this study should be incorporated into the curriculum of the academic Turkish course given at Turkish universities to both native and non-native speakers. Titles and their writing practice should be one of the topics to be addressed in this course. Students can be informed about the appropriate rhetorical practices of their discipline in the preparation of titles by acquainting them with the choice of title length, style, syntactic structure and punctuation marks. Besides, the results of the present study can also be used as a basis to stress textual schemata and rhetorical patterns in the formulation of titles in medicine and engineering in research methods courses and supervisory sessions for graduate students.

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