HACETTEPE ÜNİVERSİTESİ
EĞİTİM BİLİMLERİ ENSTİTÜSÜ

Department of Foreign Language Education
English Language Teaching Program

INFLUENCE OF THE LINGUISTIC MULTI-COMPETENCE ON TURKISH EFL TEACHERS' PRONUNCIATION OF STRESS-TIMED RHYTHM IN ENGLISH

Tunay TAŞ

Master's Thesis

Ankara, (2021)

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DİLSEL ÇOKLU YETERLİĞİN TÜRK İNGİLİZCE ÖĞRETMENLERİNİN İNGİLİZCE VURGU TEMELLİ RİTMİN SESLETİMİNE ETKİSİ

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Master's Thesis

Ankara, (2021)

Acceptance and Approval

To the Graduate School of Educational Sciences,

This thesis, prepared by **TUNAY TAŞ** and entitled “Influence of the Linguistic Multi-Competence on Turkish EFL Teachers’ Pronunciation of Stress-Timed Rhythm in English” has been approved as a thesis for the Degree of **Master** in the **Program of English Language Teaching** in the **Department of Foreign Language Education** by the members of the Examining Committee.

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Abstract

Linguistic multi-competence holds that the knowledge of more than one language in the L2 user's mind results in an overall system in which there is a constant state of inter-connectedness between cross-language components. The aim of this study is to investigate the influence of linguistic multi-competence on L2 speech rhythm through acoustic analysis. The study design comprised the criteria of L2 evidence, (outer) baselines, multiple-language evidence, and total system. The study was conducted online via audio-conferencing. The study group consisted of seven multi-competent Turkish EFL teachers, who have successively acquired English as their L2. Across three elicitation methods, read and spontaneous speech samples were collected from the multi-competent participants for both English and Turkish. The speech data, segmented by the researcher, were analysed using Praat, measuring rhythm metrics ΔC and %V, as well as articulation rate. The acoustic analysis has yielded that the type of rhythm in Turkish speech differs from that of English, highlighting rhythm as a language-specific property that needs to be accommodated in L2 acquisition. Furthermore, it was revealed that even highly proficient non-native teachers of English bear traces of their L1 in L2 speech rhythm, which could denote that it is nearly impossible to constrain the effects of knowing multiple languages in speech production. It was accordingly concluded that rhythm, affected by the idiosyncratic state of bi/multilingual cognition, is a suprasegmental feature that needs to be integrated into the L2 user's multi-competence as part of an inter-connected meaning-making system.

Keywords: pronunciation, multi-competence, rhythm, stress-timed, syllable-timed

Öz

Dilsel çok yeterliğe göre ikinci dil kullanıcısının sahip olduğu birden fazla dil bilgisi zihinde diller arası bileşenlerin birbirine sürekli bağlı olduğu bütüncül bir sisteme yol açmaktadır. Bu çalışmanın amacı akustik analiz ile dilsel çoklu yeterliğin ikinci dil ritmine etkisini incelemektir. Araştırma, ikinci dil verisi, (dış) dayanaklar, çoklu dil verisi ve bütüncül sistem kriterlerini kapsayacak şekilde tasarlanmıştır. Çalışma sesli telekonferans platformları aracılığıyla çevrimiçi bir şekilde yürütülmüştür. Katılımcı grubu, İngilizceyi anadillerinden sonra edinmiş yedi çoklu yeterlik sahibi Türk İngilizce öğretmenini kapsamaktadır. Bu katılımcılardan hem İngilizce hem de Türkçe doğaçlama konuşma ve okuma örnekleri üç farklı yöntemle toplanmıştır. Araştırmacı tarafından segmentasyonu yapılan ses verileri sesletim hızı ve ritmik metrikler olan ΔC ile %V aracılığıyla Praat yazılımı üzerinde incelenmiştir. Akustik analiz neticesinde, ritmin ikinci dil edinimi sırasında bağdaştırılması gereken dile özgü bir özellik olduğu öne çıkarılarak Türkçe ritmin İngilizcedekinden farklı olduğunu bulunmuştur. Buna ek olarak, çok iyi derecede dil yeterliğine sahip ana dili İngilizce olmayan öğretmenlerin bile ikinci dil ritminde ana dillerinin etkisinin olduğu ortaya konmuştur. Bu bulgular, konuşma sırasında birden fazla dil bilmeye bağlı etkilerin engellenmesinin neredeyse imkânsız olduğunu işaret edebilir. Sonuç olarak, bireylerin çoklu dil bilişselliğinden etkilenen ritmin birbirine bağlantılı bir anlam yaratma sisteminin parçası olarak ikinci dil kullanıcısının çoklu yeterliğine entegre edilmesi gerektiği kanısına varılmıştır.

Anahtar sözcükler: sesletim, çoklu yeterlik, ritim, vurgu temelli, hece temelli

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Symbols and Abbreviations

SLA: Second language acquisition

ELT: English Language Teaching

L1: Mother tongue

L2: Second/Foreign language

IL: Interlanguage

MC: Multi-competence

IPA: International Phonetic Alphabet

RQ: Research question

σ: A syllable unit

Δ: A change or difference; standard deviation

Sp: Speaker

Syll/s: Syllables uttered per second

Chapter 1
Introduction

There is no doubt that one of the fundamental requirements for interpersonal meaning-making is that speaker-hearers communicate without violating the perimeters of mutually intelligible and comprehensible pronunciation. This, in particular, holds true for communication taking place in the medium of a second/foreign language. There are certain segmental and suprasegmental challenges posed to L2 users in order to be mutually intelligible, since they are expected to perform in a language with a sound system that is typically different, and possibly distant, from that of their mother tongue (Flege, 1980). Unlike the approaches tied to segmental phonology, 'the prosodic (or suprasegmental) approach', as Yule (1989) puts it, brings forwards stress, rhythm, and intonation as the key factors in the production of intelligible and comprehensible speech. According to the prosodic approach, speaking with correct pronunciation is not only a matter of formal accuracy in phonemic production but also a matter of functional effectiveness that helps speaker-hearers get their messages across, for which the role of suprasegmental features could be considered as being paramount in communication-oriented pronunciation teaching.

The Roman poet Ennius (239 BC–169 BC) had once asserted that he possessed 'three hearts' because he could speak three languages: Oscan, Greek, and Latin. Although it is now known that human beings cannot normally have three hearts, or Ennius might have been figurative in his claim, the current issues in bi/multilingualism, analogous to Ennius's assertion, continue in a remarkably similar vein. It is still a point of discussion how L2 users manage to deal with multiple languages in the same mental faculty and single out the right piece of linguistic knowledge to put to use whenever it is required so. Just as we have only one heart, to Ennius's great chagrin, any language additionally learnt by an individual is to be stored and maintained within the same neurolinguistic eco-system, which is best captured by the term multi-competence. The result of knowing and using more than one language, proposed by multi-competence, is a total system in which languages are inter-connected with one another in a dynamic and multi-dimensional way (Cook, 2016a).

As the concept of multi-competence stands upon the grounds of wholistic bi/multilingualism, it assumed that all languages known and used by a multi-competent speaker-hearer constitute an overall system thanks to a 'blurring' of linguistic boundaries caused by (relative) integration of cross-linguistic components. The manifestation of this overall system brings about certain effects of L1 on L2 (or L*n*), and vice versa, hence irrevocably changing L2 users' mind (Cook, 2003). This sort of bi/multilingualism distinguishes multi-competent language users from monolingual cognition (Bialystok, 2017). In this respect, the L2 user cannot be divided into two monolinguals, and L1 (or L*n*) is still active in the background when performing in an L2 setting (Grosjean & Li, 2013). Different orientations in how these multiple languages are stored within the individual's multi-competence become an important source of enquiry for second/foreign language teaching and learning, including those related to pronunciation teaching. One of such cross-linguistic differences could be observed in the timing and patterning of speech rhythm. 'As far as is known, every language in the world is spoken with one kind of rhythm or with the other' (Abercrombie, 1967, p. 97), and if an L2 user needs to speak with a kind of rhythm that is different from that of his/her mother tongue, it may potentially become an intelligibility problem, as phonetic or phonological alignment may not be established between interactants and cause communication breakdowns because of mutual disagreements at segmental and suprasegmental levels. This situation highlights L2 users' cross-language pronunciation and how they can integrate different kinds of rhythm into their multi-competence, which is essentially the background of this thesis.

Statement of the Problem

It is not unorthodox for most L2 users to display levels of self-perceived competence relatively lower than their mother tongue in speaking (Dewaele, 2007). Partly contributing to this phenomenon prevalent amongst L2 users, pronunciation can be reckoned as one of the most challenging aspects of any language for speaker-hearers to acquire in the course of formal education. As successful spoken communication largely relies upon intelligible speech produced with sufficient comprehensibility, speaking with correct pronunciation can be regarded as the backbone of interpersonal meaning-making from a phonological perspective. In this

regard, rhythm, a suprasegmental feature, is known to cause intelligibility problems when there is a perceivable difference between the timing present in the target language and L2 users' mother tongue (Halliday, 1989). Surveys amongst language teachers give support to this presumption, indicating that rhythm in English is seen as a major area of difficulty on the subject of production and perception of L2 speech (Burgess & Spencer, 2000). Taking into account that Turkish L2 users of English have already entrenched a sort of syllable-timed rhythm in their minds, the stress-timed rhythm manifested in English could be a problematic variable to their multi-competence, which is also discussed by Watson (1991) with respect to the dependence upon L1 by bi/multilinguals' who have successively acquired their L2. This is a predicament exemplified with the difficulties in stress placement experienced by Turkish students and teachers of English (e.g. Demirezen, 2015; Tas & Khan, unpublished). It is, therefore, a necessity to investigate the influence of being a multi-competent L2 user on how stress-timing and syllable-timing affect each other and cause rhythmic deviations in L1 and L2 spoken production. In the current context, however, there has been little to none research acoustically conducted on the rhythm that is employed by Turkish L2 users of English, in particular by language teachers, who are supposedly the major source of linguistic input and the facilitator of learning in a classroom setting.

Aim and Significance of the Study

The aim of this research is to investigate rhythmic interactions between syllable-timing of Turkish and stress-timing of English from the perspective of multi-competence. It is sought to explicate some of the suprasegmental difficulties experienced by Turkish L2 users of English so that a deeper understanding in this regard can be reached with a view to highlighting the importance of rhythm in communication. Because L2 users, in fact, cannot be regarded as two monolinguals concurrently functioning in a single mind, according to the concept of multi-competence, they deserve to be evaluated in their own right. The study aims to accomplish this through acoustic measurements and several rhythm metrics, which further signifies its methodological importance, since there is a conspicuous lack of acoustic analyses done in the Turkish context of teaching English pronunciation.

Reported communication problems, in particular those pertaining to stress placements and their timings in spoken language, necessitate a re-evaluation of suprasegmental features used by multi-competent L2 users of English. It is, hence, a pedagogically valuable way to start from investigating foreign language teachers, for they most often directly model the target language pronunciation to L2 learners in a typical classroom setting. The current study deviates from traditional views based upon monolingual speaker-hearer groups by virtue of acknowledging that Turkish L2 users of English have entrenched an allegedly syllable-timed rhythm in their cognition, which might affect their language processing and L2 performance even in a monolingual speech mode. Consequently, how syllable-timing and stress-timing interact with one another needs to be addressed as a potential means of improving speakers' intelligibility and offering pedagogical implications for the teaching of rhythm in L2 pronunciation.

Amongst the aims of the study is to inform the field of ELT with respect to foreign language teachers' pronunciation skills as a core component of their linguistic competence so that a principled link can be established between content knowledge and pedagogical practice. It is, hence, underlined that the values pertaining to rhythm metrics that have been presented in this research could have significant implications as to which parts of the English language rhythm are conceivably challenging for those teachers and learners whose mother tongue is Turkish. An important point of motivation in this regard is not only to classify the respective languages into certain rhythm classes but also to probe into the underlying linguistic mechanism that causes bi/multilingual speaker-hearers to differ from monolinguals. The data and findings here could serve as a potential source of solutions that may be offered to mitigate suprasegmental problems found in communication if such cross-linguistic deviations in speech rhythm may happen to be regarded as a threat to mutual intelligibility.

Research Questions

Based upon an examination of temporal correlates of speech rhythm through a number of rhythm metrics, it is aimed within the scope of the study to investigate the influence of being a multi-competent L2 user on the pronunciation of Turkish teachers of English with respect to stress-timing and syllable-timing. With the stated

enquiry borne in mind, there are three research questions that have been formulated to seek for empirical evidence on bi/multi-directional relationships, at phonetic and phonological levels, dynamically formed between languages known and used by multi-competent English language teachers:

RQ1: What are the multi-competent participants' articulation rates in story, sentences, and spontaneous speech in English/Turkish?

RQ2: What are the scores of ΔC obtained from the multi-competent participants in story, sentence subsets, and spontaneous speech in English/Turkish?

RQ3: What are the scores of %V obtained from the multi-competent participants in story, sentence subsets, and spontaneous speech in English/Turkish?

Assumptions

It is assumed within the scope of the study that:

1. The results obtained from Turkish L2 users of English will contribute to foreign language research in the field of pronunciation, possibly forming a comparative baseline for future studies;
2. The participants will truthfully contribute to speech data, without manipulating their natural L1/L2 performance;
3. The items in the instrument will elicit reliable read and spontaneous speech samples;
4. Software-based acoustic analysis will be an ideal method for measuring temporal intervals and produce reliable results;
5. Collected data will objectively be analysed according to rhythmic variables and rhythm metrics, irrespective of the participants' proficiency in other areas.

Limitations

The convenience-based sampling method with purposive elements implemented for collecting speech data from language teachers is a potential limitation to the generalisability of findings. The number of participants is limited to

seven multi-competent L2 users, and they largely represent the population of Turkish teachers of English who have ‘successively’ acquired English, that is, at a later frame of time than the acquisition of their mother tongue. Segmentation of the data was done by one researcher, so it might be subject to an unaccounted margin of error. The data set created is limited to 2726 seconds (45 minutes and 26 seconds) of elicited speech samples collected within the limited period of time lasting from January 11 to March 22 in 2021.

Definitions

Accent: ‘the linguistic phenomenon in which a particular element of the chain of speech is singled out in relation to surrounding elements’ (Fox, 2000, p. 115).

Bi/multilingualism: the state of knowing two or more languages at any level.

Consonantal interval: a frame of time in which a phoneme or a cluster of phonemes with the consonantal feature is articulated by the speaker (e.g. stops, fricatives, affricates).

Isochrony: (estimated) temporal equality in the division of given rhythmic units.

L2 user: a person who knows and uses a second/foreign language at any level.

Multi-competence: ‘the overall system of a mind or a community that uses more than one language’ (Cook, 2016a, p. 2).

Rhythm: perceived/exhibited timing and patterning of the spoken language, arranged according to such rhythmic units as stress peaks and number of syllables.

Second/foreign language: any language known and used by the speaker-hearer other than his/her mother tongue.

Sonority: ‘the particular term referring to the carrying power of individual sounds’ (Cruttenden, 2014, p. 25).

Stress: a cover term that is often used in the sense of ‘stress-accent’.

Stress-accent: manifestation of accent through a combination of ‘a number of features, including pitch, duration, intensity, and perhaps other properties’ (Fox, 2000, p. 126).

Stress-timed language: a language that has a perceived rhythmical regularity mostly on the basis of stressed syllables in an utterance.

Syllable-timed language: a language that has a perceived rhythmical regularity mostly on the basis of number of syllables in an utterance.

Vocalic interval: a frame of time in which a phoneme or a cluster of phonemes with the vocalic feature is articulated by the speaker (e.g. short and long vowels, derived glides).

Chapter 2
Literature Review

This chapter begins by briefly introducing two basic approaches (i.e. monolingual and bi/multilingual) on how to view individuals who know and use more than one language at any level. Following the introductory remarks on the place of L2 users in the contemporary world, differing cross-linguistic orientations that are observable in bi/multilingual individuals are examined in connection with compound, coordinate, and subordinate relationships that may be formed between language components. In doing so, the underlying aim is to elucidate how a combination of multi-directional relationships formed between cross-language components within the L2 user's multi-competence results in an idiosyncratic state of cross-linguistic language ability, which can hypothetically be spotted on the integration continuum proposed by Cook (2003). Upon examining the proposition of constant inter-connectedness within multi-competence, traversing in-between integration and separation, the notion of multi-competence is described in keeping with three key premises and some of the operational definitions used in previous works on multi-competence. The focus thereafter shifts on to cross-linguistic interactions in spoken language at phonetic and phonological levels, presenting an overview of segmental and suprasegmental features of pronunciation. It is then explained how speech rhythm is perceived to be a logical consequence of the recurrence of a specific type of basic rhythmic unit on a relatively regular temporal basis. In this respect, certain characteristics of the stress-timing of English are considered with reference to typological differences between syllable-timed and stress-timed languages. Finally, global and local metrics used in quantifying speech rhythm are addressed as a means of discriminating syllable-timing and stress-timing, along with a review of previous studies on rhythmic classification of languages through metrics.

Monolingual and Bi/Multilingual Perspectives to Language

> As Julia Kristeva once remarked, "Speaking another language is quite simply the minimum and primary condition for being alive" (Cook, 2007b, p. 26).

Acquisition of a language is one of the basic communicative *instincts* for people to form an interactive relationship with other surrounding human beings (Pinker, 1995), regardless of varying accounts put forth as to how this implicit drive

emerges within the individual and functions at a larger scale in society. Excluding a few marked internal (e. g. neurobiological deficiency) and external (e. g. being deprived of language input) inhibitions, most people undergo a common process of forming the linguistic basis for their mother tongue. In this sense, neither the language entity per se nor its sub-components, such as syntax, morphology, and phonology, is essentially difficult for a child to acquire as part of L1. To illustrate from the lenses of articulatory phonetics, it is asserted that a child can effortlessly speak any language because our 'speech organs are theoretically capable of producing an infinite number of sounds' (Demirezen, 1987, p. 5) within physiological constraints.

Given the relative simplicity of L1 acquisition, learning an additional language becomes a bit more complicated because another set of knowledge pertaining to a second/foreign language (L2) permeates into this existing linguistic system and is stored in the same mental faculty. Such a phenomenon, either occurring in a natural setting or an institution of formal education, is what seems to set the course of SLA research. One the prominent concerns of SLA research is about how L2 users manage to employ multiple meaning-making systems so skilfully, which leads us to the term multi-competence (Cook, 1991). Contrary to the popular belief that monolinguals outnumber bi/multilinguals, in fact, the latter exceeds the former by far in numbers (Cook, 2003). According to British Council (2013), there are approximately 1.75 billion people worldwide speaking English as an international medium of communication, science, diplomacy, and so on. The ubiquity of English highlights L2 users and their unique neurolinguistic architecture inasmuch as it is exponentially getting more difficult to find pure monolingual native speakers in the world (Cook, 2003).

Unlike the past centuries, it is nowadays nearly impossible for individuals to avoid being exposed to several languages other than their L1. The advancement of technology and logistics has indisputably increased the ease of accessibility at an unprecedented rate. Living in such a multilingual world necessitates principled ways of looking at people speaking more than one language. The first one is monolingual approach that sees bi/multilinguals from the perspective of L1 monolinguals. According to the monolingual perspective, irrespective of the effects of an already acquired mother tongue, learners acquire a new language by adding pieces of L2-

related information into their language faculty, which perhaps could be exemplified by the no-transfer and full-access (to universal grammar) argument (see Han, 2004). The second approach, on the other hand, relates to *bi/multilingual perspective* that assumes a qualitative change on the way of being an L2 user. According to the bi/multilingual approach, speaker-hearers know and use multiple languages in an integrated manner, 'each language potentially differing from that of someone who speaks it as a monolingual' (Cook, 2016a, p. 1). This bi/multilingual perspective acknowledges that L1, L2, L3 etc. exist within the same neurolinguistic eco-system in the individual's mind, supported by such evidence as second language speech learning that indicates multiple languages sharing a common phonological space (Flege, 1995). It is stated in consonance with this perspective that there could also be a varying degree of separation or integration between certain sub-components of language(s), which are, in turn, assumed to be in a multi-dimensional and multi-directional relationship.

The cross-linguistic relationship between multiple languages, according to the bi/multilingual approach, can occur in many a different way under contextually diverse circumstances. In formal education, the idiosyncratic state of L2 users' mind seems to be ignored to a great degree, which can be observed by having a tentative look at the current situation of foreign language teaching in Turkey. The recent official English language curriculum, prepared and published by the Ministry of National Education (MNE) (2018), refers to *transfer* as if it were merely an act of moving something from one place to another by stating that 'language learning process in [L2 users'] native language … can be transferred to the second language' (p. 5). Superficially simple, the relationship illustrated by the Turkish MNE does not comply with the principles upheld by the concept of multi-competence because in the process of L2 acqusition, 'there are not necessarily discrete objects labelled L1 and L2 and no process of moving something from one place to another' (Cook, 2002a, p. 18). Whether intentionally or in an ad-hoc manner, if the ELT practice in Turkey continues to ignore a likely multi-directional relationship underlying learners' linguistic multi-competence, that could very likely hamper the search for the 'causes of lack of communicative competence among most Turkish learners of English' (MNE, 2018, p. 6), to which this research aims to address from a phonological perspective on the basis of premises drawn from multi-competent L2 users.

Bi/Multilingualism and Multi-Competence

> [Learning] a second language is not just adding rooms to your house by building an extension at the back: it is rebuilding all the internal walls (Cook, 2005 as cited in Scott, 2016, p. 445).

Cross-linguistic orientations in bi/multilingualism. Despite the convenience that accounts on conceptual cross-linguistic relationships could offer if bi/multilinguals, or rather L2 users in a general sense, had multiple heads, they have to do with one single mind (Grosjean, 1989). As a result, there are assumed to be several types of neurolinguistic architectural designs defining how bi/multilingual speaker-hearers make use of more than one language. Weinreich (1953), for example, differentiates three possible cross-linguistic patterns that might be formed in the individual's mind: compound, coordinate, and subordinate. A *compound* pattern is an integrated network between a shared conceptual representation and its respective but distinct linguistic formulations (Cook, 2002a). In a compound system, the L2 user links the same integrated concept to all the languages s/he can speak, rather than forming and storing separate conceptual representations anew for each language. Hence, it is theoretically quite possible that the shared concept is akin to that created by monolingual native speakers of respective languages, but not the identical one if examined at a closer look. In a similar vein, Watson (1991), summarising some of the findings from phonology research, states: 'In both production and perception … bilinguals behave in ways which are at once distinct from monolinguals and very similar to them' (p. 44), which could be explained through a shared but modified conceptual framework.

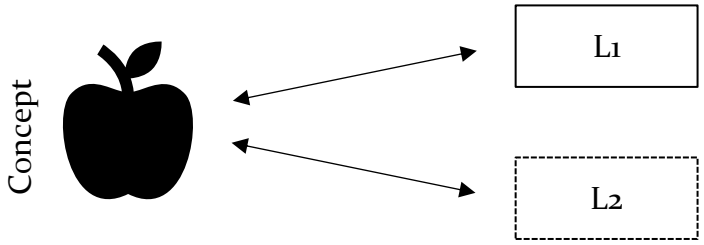

Figure 1. Compound Relationship Between Concepts and L1, L2.

In a *coordinate* system, unlike the former, conceptual formulations pertaining to different languages are hypothetically contained in separated compartments, together with their corresponding linguistic representations. A coordinate bilingual, then, according to Weinreich (1953), can keep the concepts belonging to particular

languages apart from one another, exerting a higher degree of selective control over the links created for them. Diversified instantiations that are formed independently of each other could possibly pave the way for a 'perfect code-switcher', a feature that is often attributed to the notion of balanced bilinguals (Toribio, 2001). In this regard, an example from pronunciation could be a Turkish L2 user of English who is able to switch between Turkish and English intonation contours in perfect harmony with the language being spoken at that moment. Because languages in a coordinate system feed on their own concepts through distinct links, there are expected to be no, or rather negligible, interference from L1 to L2, or vice versa.

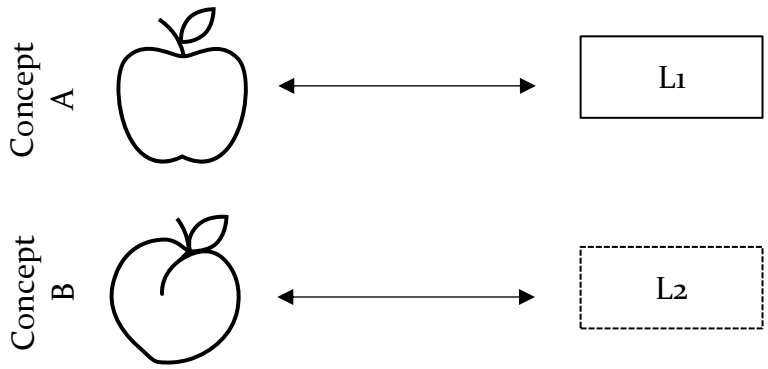

Figure 2. Coordinate Relationship Between Concepts A, B and L1, L2.

Another configuration of probable cross-linguistic patterns named by Weinreich (1953) is a *subordinate* system, in which L2 elements have to follow the route formerly specified by L1 in order to access to a target concept. Because the formation of a new cognitive mechanism is heavily dependent upon prior cognitive structures (Ausubel et al., 1978), it is put forth that learning an L2, one way or another, occurs by virtue of an already known language, which is most often L2 users' mother tongue (Stern, 1992). In a subordinate configuration, there is only one concept, akin to a compound system; however, this pattern does not directly link any L2-related properties with existing concepts. The concept stays the same as in L1 without incorporating L2-related elements. In a subordinate orientation, L2 learning is parasitic on the linguistic structures previously entrenched by L1, some phonological and lexical effects of which are reported to be especially observable in successive language acquisition (Grosjean & Li, 2013). An example in this case could be a beginner-level learner who can produce L2 output only by trying to find translation equivalations drawn from his/her mother tongue. As the concept is

directly linked to the mother tongue, but not to the target language (L2), if there happens to be some variation between these languages at the conceptual level, it is not incorporated into the existing pattern and may thus be lost in meaning-making in some unspecified way.

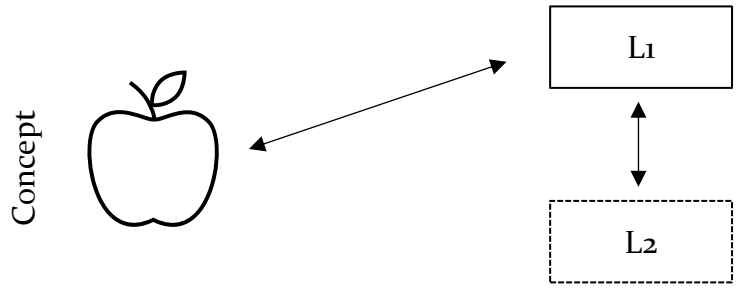

Figure 3. Subordinate Relationship Between Concepts and L1, L2.

Certain traces of the patterns of cross-linguistic relationships described in this section can be found in most language learning models, including assumptions underlying language teaching methods and SLA research. From time to time, preferences as to which of the possible cross-linguistic patterns could best represent the L2 user seem to vary amongst teaching methods, in accordance with the given paradigm that is popular at the time (Cook, 2009a). In addition to compound, coordinate, and subordinate cross-linguistic orientations suggested by Weinreich (1953), Cook (2002a) points out that there may be overlaps in languages and/or concepts, so it is virtually never a state of complete integration or separation. On that account, a same concept may be shared independently by two or more languages acquired by the L2 user (i.e. not necessarily being a compound state), or different concepts may partially be shared, not only showing a certain degree of similarity but also some sort of difference. Hence, in an overlapping relationship between languages, there are expected to be instances of both integration and separation to a certain extent, allowing for the possibility that the L2 user employs phonology, lexicon, and other systems belonging to these languages simultaneously yet with varying degree of integrative control over them.

The identity of L2 user that is described by multi-competence can possibly encompass all the patterns of cross-linguistic orientations thus far mentioned with distinct combinations and some overlaps, even if it is only a theoretical possibility. To draw a hypothetical analogy, a learner's timing of voicing before the articulation of plosives (i.e. voice onset time) might be in-between two reference points

belonging to monolingual speaker-hearers of L1 and L2; his/her timing and patterning of syllables and stress peaks might be perfectly aligned with the particular rhythm of the given language; and his/her pronunciation of an L2 phoneme, say /θ/, might persistently be substituted with an L1 phoneme, like /t/, due to a lack in the L1 phonemic inventory. The imaginary cross-linguistic relationships exhibited by this L2 user are likely to be interpreted as a sign of compound, coordinate, and subordinate orientations in various features of pronunciation, respectively. It is, at the same time, rather difficult to draw a clear-cut line for overlapping links between concepts and languages, since the presumption of a complex and merging cross-linguistic relationship calls for a deeper understanding of the phenomenon being investigated.

> From Saussure to Chomsky, 'homo monolinguis' is posited as the man who uses language—the man who speaks. This idea had no place in early Greece, or in the Middle Ages; even today it is alien to many people. In their daily life in Java or in the Sahel, a great number of people still feel at home in several kinds of discourse, each of which, to the modern perception, is conducted in a distinct language (Illich & Sanders, 1988, pp. 52–53).

If bi/multilingualism is, indeed, the new norm in the contemporary world by virtue of its extraordinarily pervasive nature (Vaid & Meuter, 2016), and the days of *homo monolinguis* are long gone, it is amongst feasible considerations to regard people who know and use more than one language in their own right. This proposition, in every respect, should apply to second/foreign language education, the primary purpose of which is to convert monolingual L1 speakers, as disputably asserted by the majority of curricular policies, into multi-competent L2 users. Failure to understand what bi/multilingualism brings into an individual, both on the part of language teachers and learners, is one of the reasons why there happens to be recurring reports of discrepancies between what is expected in theory and what actually takes place in a language classroom. Approaches, methods, techniques, and materials come into existence and then disappear, unveiling a practice of second/foreign language teaching that has been in flux for many years. Although teaching methods are preferred to be described with labels that are favoured by their proponents, 'a visitor from a previous century might have been struck by the similarity between these classrooms' (Cook, 2002b, pp. 328–329) because of a large body of shared assumptions that would be aligned with a monolingual

speaker-hearer's characteristics—which, in turn, neglects the unique nature of bi/multilingual cognition and is oblivious to the L2 user's multi-competence.

It is the adopted perspective on bi/multilinguals that prescribes goals in second/foreign language teaching and, accordingly, determines criteria by which relative success is measured. Therefore, the type of cross-linguistic patterns subsumed under a teaching method, in a sense, determines what is acceptable and what is not; what is to be regarded as an error and what is not to be. Phonology of a language, thanks to being a feature that is easily distinguishable in second/foreign language speech, is one of the areas where the effects of the choice between monolingual and bi/multilingual perspectives can be observed through examining the degree and type of emphasis placed on pronunciation teaching. This fact does not only concern second/foreign language learners, but it is also a salient topic for teachers, who are, in turn, superficially classified into native and non-native speaker-hearers of the target language without a thorough contemplation of various ramifications that stem from being a multi-competent L2 user with unique language constellations.

The integration continuum. The question of how bi/multilingual speaker-hearers should be viewed in education requires a critical decision, which, as a repercussion, could render much of the existing research obsolete if the definition of an L2 user is operationalised from a dissimilar perspective (Cook, 2007b). This decision usually revolves around a cline of *fractional* and *wholistic* views on bi/multilingualism, in quite a similar line with what thus far has been introduced under the theme of monolingual-basis versus bi/multilingual-basis (Grosjean, 1989). In relation to the distinction between fractional and wholistic views on bi/multilingual language users, it is indicated that implications that could be drawn for second/foreign language teaching vary over a wide range of possibilities. By virtue of the fact that the specific neurolinguistic architecture borne by a bi/multilingual individual has a direct impact on the expected patterns of cross-linguistic orientation, it is of utmost importance for the field of ELT to take into account distinctive variables that may stem from the regarding views on bi/multilingualism.

A fractional view, much like traditional arguments depending upon a monolingual basis, holds that a person who is able to speak multiple languages is composed of detached and distinguishable competences owned by L1, L2, L3, and

so on (Grosjean, 1989). Just as these competences, separately originating from corresponding languages, differ from one another in absolute terms, they should theoretically resemble the ones possessed by monolingual native speaker-hearers of those languages. In other words, in a fractional view on bi/multilinguals, it is believed that an individual is the sum of multiple discrete pieces of competencies belonging to specific languages, ignoring the probability of a qualitative change in their overall competence that could be caused from incorporating additional languages into an existing neurolinguistic system. It is, hence, assumed in this fractional view that 'the bilingual is (or should be) two monolinguals in one person' (Grosjean, 1989, p. 4), which ultimately leads to a long-winded quandary of who the 'real' bi/multilingual is, placing a small percentage of L2 speakers, defined as balanced or perfect bi/multilinguals against the majority of L2-speaking population whose second/foreign language proficiency is not necessarily identical to that of a monolingual native speaker-hearer.

A wholistic view, as discussed by Grosjean (1985), attaches another level of complexity to the neurolinguistic identity of L2 users. It is posited according to this wholistic view that, contrary to the fractional perspective, the bi/multilingual's mind is in a dynamically composite state as a result of elements that pertain to more than one language entering the same neurolinguistic ecosystem. It is, hence, an integrated language ability, not virtually separate pieces of grammatical knowledge put together, upon which a wholistic view of bi/multilingualism positions itself. According to proponents of wholistic bi/multilingualism, the L2 user's competence is the ever-changing product of a constant interaction between multiple languages, which arouse certain controversies over the (im)plausibility of reaching an 'end-state' as a second/foreign language user. It is, then, suggested that the coexistence of two or more languages in a single mind constitutes a different but complete system of communicative language ability at bi/multilingual individuals' disposal (Grosjean, 1989). A significant caveat stated in this regard is that this difference is not only quantitative, resulting from the acquisition of multiple languages, but also qualitative, denoting a unique state of mind that distinguishes bi/multilinguals from monolinguals. Consequently, a wholistic view considers a bi/multilingual language user *not* to be the sum of two or more languages but a specific speaker-hearer (Grosjean, 1985).

A distinction between integration and segregation is not uncommon in neuroscience, as they are two fundamental procedures of information processing occurring in human brain. It is assumed that conscious experiences rely upon the capability of our cognitive system to integrate incoming information (Tononi, 2004), which may neurobiologically be called adaptive behaviour. The ongoing process is not necessarily a mutually exclusive one: that is, information is not merely integrated into a sort of amalgamated competence; it is also segregated so as to keep apart sensory streams. In conjunction with this theory, functional connectivity of neural architecture may change from time to time, engendering the idea of a dynamic relationship between integration and segregation, which may, as an interactive process, be affected differently under varied circumstances and even by certain drugs (Luppi et al., 2021).

To address the issue laid out on the opposing grounds of fractional (based upon segregation) and wholistic (based upon integration) views, Cook (2002a; 2003) proposes an integration continuum on which a multi-directional relationship between separation and integration is displayed. The integration continuum, say composed of an L1 and an L2, is intended to reflect how these languages relate to one another as linguistic components of the L2 user's multi-competence. On one end of this continuum is located separation (i.e. what is implied with the terms coordinate, fractional, or segregation), where L1 and L2 elements are independent of each other. On the other end of the continuum is located integration (i.e. what is implied with the terms compound and wholistic), where a juxtaposition of L1 and L2 elements brings about a singularly unified linguistic system. As one might anticipate, the focal area on the integration continuum is somewhere in-between: inter-connection, where languages are in liaison with each other to some degree, depending upon the L2 user and varying in effect according to given areas of a language (Cook, 2002a).

Phonology, for example, might be more integrated than other areas of language for an L2 user, showing two (or more) sound systems have somehow merged comparatively better than lexicon, syntax, and so on. On the other side, another L2 user might have a fully different configuration determining the shape of his/her multi-competence, where a different area of language demonstrates a higher degree of integration. The significance underlying this argument is that 'neither total

separation nor total integration can be completely true' (Cook, 2002a, p. 12). Despite their proponents' trenchant claims, research fails to prove the bi/multilingual's access to one common or two (or more) separated conceptual systems (Francis, 1999). Therefore, the assertion of inter-connection reinforces that 'total separation is impossible since both languages are in the same mind; total integration is impossible since L2 users can keep the languages apart' (Cook, 2003, p. 7), shifting the locus of multi-competence to an intermediary but indefinite position on the integration continuum.

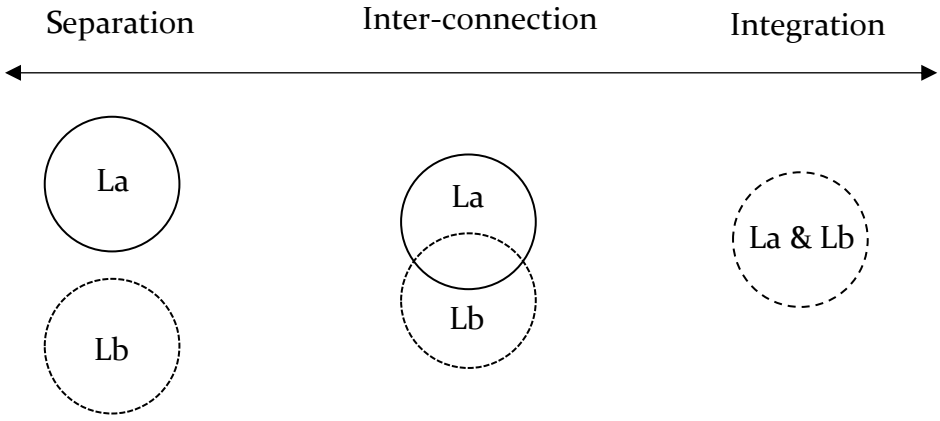

Figure 4. The Integration Continuum of Possible Cross-Linguistic Relationships in Multi-Competence (Cook, 2003, p. 9).

Were one to imagine two extreme poles on this continuum as black holes, the purpose of multi-competence would well be defined as the endeavour to find a wormhole somewhere in-between (Cook, 2007b). The opposing ends of separation and integration are analogous to black holes because research findings that one end claims to be true, in a crude sense, become meaningless once the preferred point of view is changed to the other. Rather than transfer, which connotates a one-way shift (irrespective of the direction), the integration continuum is about how languages constantly interact with each other as a total system in multi-dimensional and multi-directional fashion. The constant interaction, as mentioned above, happens to be in varying degrees with somewhat inconsistent patterns, possibly unique to every L2 user. When a certain amount of L2 input enters the related linguistic system, it is not only likely to have an effect on the L2 user's interlanguage, but it will also induce some changes in his/her L1 (Flege, 1987; Kang & Guion, 2006; Lee S. A., 2018) and possibly influence other cognitive processes taking place in

the same or near mental environment (Grosjean & Li, 2013), some of which may not even be directly related to language-related functions.

One of the credible explanations to this interactive phenomenon between separation and integration is that a plurilingual human brain never *switches off* a language entirely when using another (Marian & Spivey, 2003). As the deactivation of L1-related elements in L2 production and reception, as well as the deactivation of L2-related elements in L1 production and reception, is only done partially (Blair & Harris, 1981; Ikeda, 1995), languages other than the one that is being used at the moment are still somewhat active in the background. Apart from bilingual speech mode, in which multiple languages are intentionally kept active by the user; the simultaneous activation can be observed in monolingual speech mode as well, in which, for example, L1 would still be functioning in an L2-only setting, perhaps without the L2 user's awareness, but to a lesser degree when compared with bilingual speech mode (Grosjean & Li, 2013). Having multiple languages in the same neurolinguistic system, albeit at different levels of activation, could be listed as one of the reasons behind 'instances of deviations from the norms of either language … as a result of [bi/multilinguals'] familiarity with more than one language' (Weinreich, 1953, p. 1). This proposition, then, identifies any possible deviation from the norms of L*n* as an expected repercussion of not being on the two extreme ends of the integration continuum (i.e. total separation or total integration), decentralising the focus on what has traditionally referred to transfer as an *anomaly* in cross-linguistic behaviour.

Provided that languages are in a converging relationship, interwoven with one another in an individual's mind as multi-competence entails, there is expected to be constant variation in the total system, which makes it difficult to predict precisely where an L2 user might be standing on the integration continuum at a specific frame of time, or where the direction of next movement would be. In any case, it is reasonable to keep in mind that whilst a particular area of language might be integrating with its L2 (or L*n*) counterpart for the time being, other areas might, perhaps, stay in the same state or gravitate towards the opposite direction, separating from their counterparts. Some significant aspects of versatility and inter-connectedness of the concept of multi-competence are also captured by Dynamic Systems Theory (DST) (Herdina & Jessner, 2002). By the same token, DST asserts

embedded yet non-linear development in L2 users' multi-competence, tactfully claiming that 'there may be no "languages" in our brain at all, only a merged system …' (de Bot, 2016, p. 138) that takes a complex shape through a series of multi-directional modifications.

The notion of multi-competence. It is intentional that neither a direct definition nor a descriptive model of multi-competence has thus far been introduced in the section. Also noted by Cook (2010), language-related research must first delineate the foundations upon which it is based in detail before venturing into further ideas. Considering the basic idea behind its origination, as briefly outlined in the previous sub-section under the heading of cross-linguistic orientations in bi/multilingualism, multi-competence could be described as a matter of perspective in which L2 users, including second/foreign language teachers and learners, are regarded as unique users of language thanks to being familiar with more than one language. The term multi-competence, in opposition to Chomsky's (1986) often-cited idea of L2 learners embodied as imitative of, or rather failed, native speakers, was put forth by Cook (1991) with a view to filling a theoretical lacuna in SLA research. Until then, there was not a phrase that single-handedly covered the compound state of bi/multilinguals' cross-language ability despite such established terms as L1 competence, L2 competence, and interlanguage (Cook, 1995).

Encapsulated in a single term, the concept of multi-competence relates to multiple languages (that are the goal of second/foreign language teaching), L2 users (whose brain do not 'split' after learning a new language), and a compound state of knowledge (that transcends language-confined functions and affects overall cognition). All these tenets play a key role in finding an operational definition: recently glossed as 'the overall system of a mind or a community that uses more than one language' (Cook, 2016a, p. 2). Although a number of definitions have been operationalised in the past (see Table 1), the nucleus of the concept of multi-competence has stayed the same. One noticeable change in the choice of wording in provided definitions is that 'grammar' was replaced with 'knowledge', which, afterwards, has become 'overall system' in order to avoid misunderstandings that may be caused from the Chomskyan sense of grammar. Through these changes in the definition, it is aimed to clarify that the implied state of cross-linguistic knowledge

is dynamic and cannot perforce be derived from the traditional sense of static knowledge.

Another change, as discussed by Brutt-Griffler (2002) in the context of macroacquisition of second/foreign languages, has expanded the scope of multi-competence from plurilingual individuals to multilingual communities. Just as a multi-competent individual skilfully makes use of a multitude of languages to meet his/her communicative needs, a multilingual speech community likewise acts in a communicative harmony on a daily basis. The expansion in the scope, adding 'community' to the operational definition, arguably makes it relevant to talk about two kinds of linguistic multi-competence: *narrow multi-competence*, related to a plurilingual individual and his/her language abilities; and *broad multi-competence*, related to a group of speaker-hearers interacting with one another in a multilingual community. This research on Turkish EFL Teachers' L2 speech rhythm is essentially about the former, but it does not necessarily exclude probable implications that could be drawn for the latter.

Table 1

Definitions of Multi-Competence as Operationalised by Vivian J. Cook

Year	Definition
(1991, p. 112)	The compound state of a mind with two grammars.
(1995, p. 93)	An individual's knowledge of a native knowledge and a second language.
(2002a, p. 10)	The knowledge of more than one language in the same mind.
(2003, p. 2)	The knowledge of two or more languages in one mind.
(2007b, p. 17)	The knowledge of two languages in one mind.
(2013, p. 1)	The knowledge of more than one language in the same mind or the same community.
(2016a, p. 2)	The overall system of a mind or a community that uses more than one language.

The notion of multi-competence cannot be taken as an entirely psychological or sociological concept (Cook, 2013); rather, it is a matter of perspective, a school of thought, that is readily applicable to varied areas of L2 acquisition and language teaching (Cook, 2009a). According to the perspective that multi-competence entails,

‘the L1, the interlanguage, and other mental processes are all internal to the L2 [user]’ (Cook, 2007b, p. 17), ‘therefore [it] involves the whole mind of the speaker’ (Cook, 2013, p. 1), which makes it essential to ‘regard the L2 user as a person in their own right rather than as a defective native speaker’ (Cook, 2009b, p. 55) because ‘rather than inefficiently imitating the target language, L2 [users] create their own language out of the resources they have available to them’ (Cook, 2016b, p. 27). The compound state of knowledge suggests a complex and multi-dimensional interaction between languages within multi-competence. As multi-competence is implied to be associated with an overall system, each new language learnt by the L2 user modifies it in some complex way, involving qualitative aspects of the language faculty. The assumption overrides traditional views of transfer, which is typically portrayed as something moving from L1 to L2, and it adds another layer of research by examining how L2 (or L*n*) entering multi-competence affects L1 in the L2 user’s mind (Cook, 2003), the outcomes of which, as contemporary research shows, are claimed to modify cognition and the way language processing takes place for bi/multilinguals (Kroll & Bialystok, 2013).

The constant inter-relationship between languages is one of the major factors that dynamically determine the L2 user’s overall language ability, say, in monolingual speech mode of L1/L2, or in other bi/multilingual speech modes. Granted that languages learnt by the L2 user, indeed, affect one another as propounded by the conceptual foundation of multi-competence, then, it may have its merits to bear in mind four cross-linguistic scenarios presented by Bassetti and Cook (2011), as they could readily be seen as an extension of Weinreich’s (1953) three major types of conceptual orientations. Bassetti and Cook (2011) speculate that the L2 user uses only L1 concepts in (i) ‘the only-concept scenario’; switches between L1 and L2 (or L*n*) concepts in (ii) ‘the double-concepts scenario’; integrates both L1 and L2 (or L*n*) concepts into a single concept in (iii) ‘the one-integrated-concept scenario’; and lastly devises a totally new concept in (iv) ‘the original-concept scenario’ (Bassetti & Cook, 2011, pp. 172–174). A unique configuration of these possibilities, as well as a specific constellation of multiple languages, sets the L2 user apart from monolingual speaker-hearer groups. It is, hence, scientifically plausible to consider L2 users as a specific group of speaker-hearers rather than

failed native speakers or mere imitations of monolingual language users (Cook, 2007a).

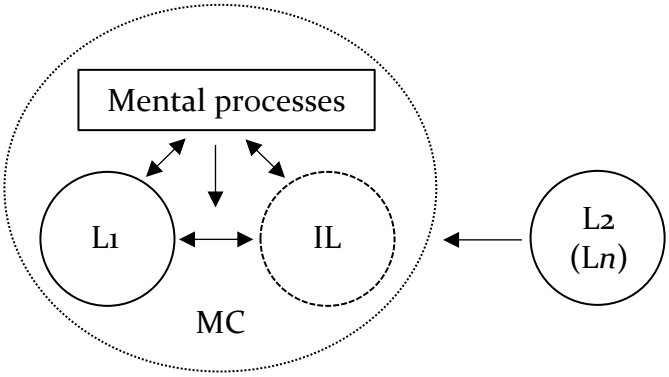

Figure 5. A Sample Representation of Multi-Competence Adapted from Cook (2007b).

As shown in the figure, multi-competence encompasses an overall system including the L1 competence, various mental processes that take place in given bi/multilingual cognition, and the interlanguage(s). The interlanguage that is described here does not refer to a crystallised form of static knowledge or an imperfect version of L2; rather, it is a dynamic component of multi-competence, interacting with other linguistic and cognitive components in the individual's mind so as to function as 'a whole system at some level' (Cook, 2016b, p. 28). Accordingly, the interlanguage is not an entity detached from bi/multilingual cognition; mental processes affect both L1 and IL(s), albeit possibly in different manners, directions, and at varying forces. Essentially, multi-competence is about the totality of these elements and how they co-exist and influence one another, but the concept itself does not simply denote a bi/multilingual competence that is the sum of several monolingual competences. Once a new language enters the shared linguistic eco-system, within which multi-competence acts as a wholistic mechanism, it is taken for granted that monolingual cognition has irreversibly been altered, and the plurilingual individual is now attributed with a sort of 'bi/multilingual' way of thinking and behaving.

The L2 that is depicted in the above figure is an outer element, property of a group of monolingual speaker-hearers by definition. To be able to take the possession of both L1 and L2, one must have two (or more depending upon L*n*) instantiations of monolingual cognition in the same mind, one of which belongs to

L1 and the other one is reserved for L2. This is simply posited as an impossible situation in neurolinguistic terms (Grosjean, 2008). Rather, L2 users have an independent system of their own, in which a sort of bi/multilingual cognition is in effect, instead of a collection of monolingual competences. Multi-competence thus involves L1, various mental processes, and IL, but not the original state of L2: even if one's language ability in L2 performance can become similar to that of a monolingual native speaker, to a degree which it may even paradoxically be indistinguishable to most people (see Osgood, 1949, for a discussion of similarity paradox). There are fundamental differences in the structure of a multi-competent L2 user's mind: one is that L2 users always have an L1 'lurking' in the background despite inhibition mechanisms. As exemplified with monolingual and bilingual speech modes (Grosjean & Li, 2013), 'L2 users never switch off either language entirely' (Cook, 2016b, p. 28). The L2 performance, in this regard, stems from the compound architecture of multi-competence, which is a highly important detail that should not be disregarded in second/foreign language teaching, especially for the teaching of L2 pronunciation.

A way of summarising what the stream of multi-competence research has principally settled upon is to specify a few premises that represent the general characteristics of the conceptual framework underlying multi-competence. Within this direction, Cook (2016a) suggests three key premises that can readily establish a common basis for a multi-competence perspective: (i) 'multi-competence concerns the total system for all languages (L1, L2, Ln) in a single mind or community and their inter-relationships; (ii) multi-competence does not depend on the monolingual native speaker; (iii) multi-competence affects the whole mind, i.e. all language and cognitive systems, rather than language alone' (pp. 7–15). These three premises constitute the backbone of multi-competence research and could become the foundation of second/foreign language teaching practice should national education policies in a country acknowledge the underlying assumptions made within the conceptual orbit of multi-competence.

The first premise entails a total linguistic system, composed of L1, L2, and Ln (note that L2 here is used as a conventional representation, not particularly referring to the outer element in Figure 5), that acts as a whole in coordination at some cognitive level. This idea stems from the fact that processing of multiple

languages largely takes place within the same neural architecture (Stowe, 2006). As a consequence of operating through the same network, languages added to multi-competence are inter-connected with one another, within 'an eco-system of mutual interdependence' (Cook, 2016a, p. 7). This inter-connectedness is demonstrated through the integration continuum, on which gravitational force and direction may vary, but it is impracticable to individualise the existence of L1, L2, and Ln since they are all in the same mind. As for bi/multilinguals' pronunciation, for example, research evinces the simultaneous activation of cross-language systems of phonology (Friesen & Jared, 2011), which indicates a sort of phonological inter-dependence in the L2 user's mind despite typological distance between languages and other probable cross-linguistic differences.

The second premise relates to the identity of L2 users and their right to be evaluated in their own nature. Only a small percentage of English speakers around the world can be classified as *pure* monolingual native speakers. In the modern era, an overwhelming majority of the human race, whether through institutional education or by other means, speak, listen to, write, and read in multiple languages. Therefore, it is questionable to place the monolingual native speaker at the centre of foreign language teaching, whom L2 users may never encounter throughout their entire life. When the inclination of human mind towards learning languages is taken into account, 'monolingualism can be considered as a widespread form of language deprivation' (Cook, 2009a, p. 57). This shifts the focus of multi-competence on to non-native speakers, using any second/foreign language for a variety of purposes. Correspondingly, de Swaan (2001) proposes a four-level hierarchy that categorises L2 user groups in terms of where and why they may use a target language. These groups can be identified with *peripheral*, or local in Cook's (2009b) terms, *central*, *supercentral*, or *hypercentral* language groups according to their place in the hierarchy of the global language system (see Table 2). Because the functional use of L2 and groups' needs differ at each level, second/foreign language teaching should aim at the correct place in this hierarchy, adjusting itself to requisites that come with varying L2 user groups (Cook, 2009b). It is of utmost importance that goals, methods, materials, and other elements in formal second/foreign language teaching should be aligned with what a specific group in the hierarchy necessitates, otherwise what L2 users are measured against could perhaps be the repercussion

of a misalignment, not virtually a set of success criteria regarding how they are likely to use the target language itself.

Table 2

L2 User Groups in the Global Language System (de Swaan, 2001)

	Hierarchy	Intended use of the language
A	Local	Taking part in a monolingual L2 community
B	Central	Taking part in a multilingual L2 community (e.g. ESL)
C	Supercentral	Specialist cross-national uses (e.g. EFL, ESP)
D	Hypercentral	A wide range of purposes across the globe (e.g. ELF)

Note. The term peripheral has been replaced with local (i.e. native local language) (Cook, 2009b).

The third premise is the link between language and other cognitive mechanisms, hinting at a blurring of boundaries in the brain of multi-competent L2 users. Sometimes connected to linguistic relativism, this premise holds that language is not necessarily confined to cognitive activation of certain linguistic elements in our minds; rather, it is the result of many different cognitive mechanisms that are in a continuous interaction. For instance, one should be able to access to temporal functions in the cognition in order to produce or comprehend a simple process of vowel lengthening, which may, indeed, be the same cerebral source of his/her sense of time in the daily life. The same analogy applies to other areas too, such as space and motion, where neurophysiological findings from the activation of motor cortices seem to confirm a link to action verbs (Ewert, 2016). Therefore, the whole mind is presumed to be affected by multi-competence, including language, cognitive systems, and their respective sub-systems. In the related field, learning a second/foreign language is attributed to certain positive (e.g. increased creativity, metalinguistic awareness) and negative (e.g. a state of interlingual ‘confusion’ according to earlier accounts) effects on the L2 user. Irrespective of different, and perhaps subjective, interpretations of these slants, it is observable that speaker-hearers of each specific language ‘pay different kinds of attention to events and experiences when talking about them’ (Slobin, 1996, p. 89), which suggests that adding a new language into the L2 user’s multi-competence is likely to have some

effects on the connected cognitive mechanisms as well; for example, some changes in the perception of temporal patterns may occur in consonance with the accommodation of a specific style of speech rhythm inherent in a given language.

In consequence, the concept of linguistic multi-competence refers to a wholistic view of bi/multilingualism. Components of L1, L2, and Ln are all dynamic and inter-dependent parts within a system that functions in relation to bi/multilingual cognition. Consequently, L2 users inevitably differ from monolingual native speaker-hearers with regard to their particular state of mind. This necessitates a greater and more informed kind of attention paid to the nature of teachers and students in second/foreign language teaching, especially in such areas as pronunciation where subtle nuances can play an important role in interpersonal meaning-making. It will be the subject of the following section to break down which features of pronunciation are included in the study with a view to explicating how L2 users' pronunciation can be examined from the perspective of multi-competence.

Features of Pronunciation

The common basis upon which any interpersonal meaning-making system depends is to produce the message, on the part of speaker or writer, and understand it, on the part of hearer or reader. It is this basic *communicative principle* that human interaction revolves around. Spoken, written, and signed languages have to make use of a set of conventions and rules in order not to violate this implicit principle. Whilst mechanics of writing, for instance, can be claimed to be relatively fixed, the success of spoken interaction largely relies upon correct pronunciation, the perimeters of which seem to be more flexible than the conventions utilised by other modalities. Greater flexibility, as well as more frequent deviations from the standards, could become a source of sensitivity towards the L2 user's speech in communication, which highlights the significant place pronunciation holds in multi-competence.

It is often useful to break down pronunciation into its constituents so that roles played by each part can be studied in detail. Just as letters, or graphemes in a more technical sense, are combined to make up a piece of writing, like the one you are reading at the moment, sounds and certain prosodic elements are required for speaking. In the conventional way of describing speech, two main features of

pronunciation are used to define phonetic and phonological layers within which an utterance is produced. The first group are named *segmental features* and comprise individual sound blocks at phonemic level, often referred to as phonemes under labels of consonants and vowels. The second group are *suprasegmental features* that include prosodic elements of a language such as stress and intonation. It is the suprasegmental features that this study aims to focus on, in particular how rhythm is maintained in spoken L2 English. It must be borne in mind that features of pronunciation are not necessarily divorced from one another: accent, for example, may affect rhythm and intonation or induce phonemic changes. From a phonetic point of view, suprasegmental features are normally associated with subglottal and laryngeal components, on which segmental features are superimposed since they modify an already existing stream of air at the supralaryngeal component (Fox, 2000). From a phonological point of view, suprasegmental features, being comparatively more syntagmatic, can be claimed to be superimposed on segmental features. An utterance, complying with the communicative principle, essentially needs the interplay between these two levels in order to be intelligible, comprehensible, and interpretable.

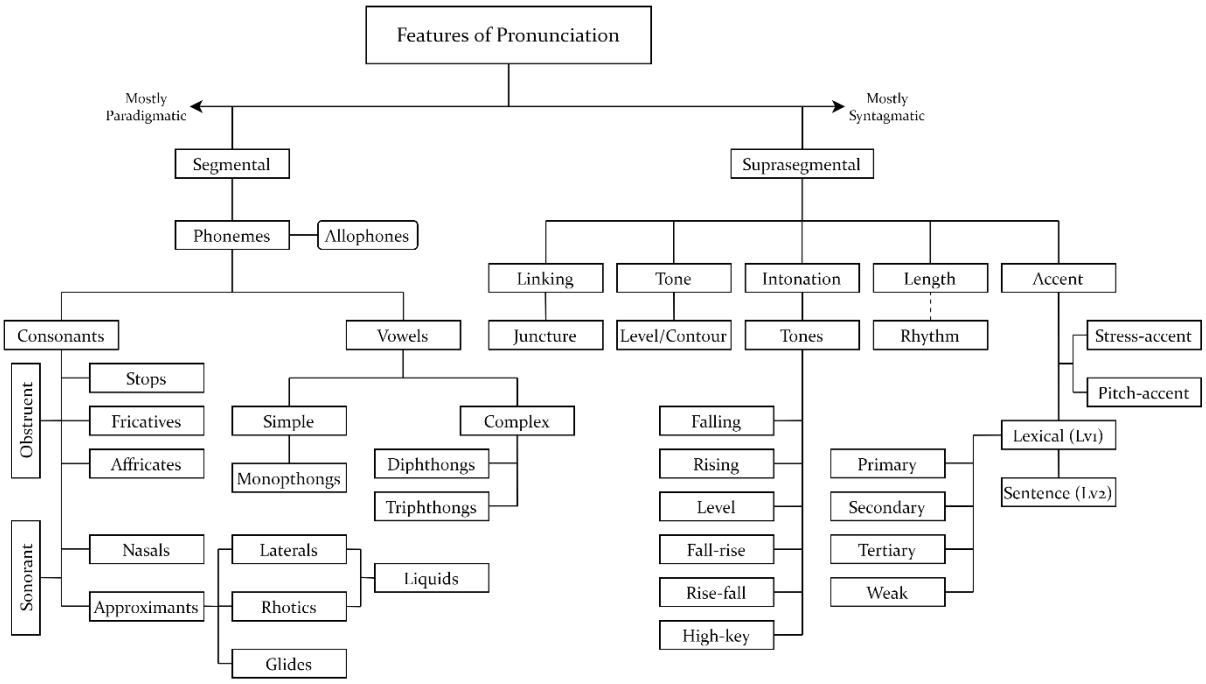

Figure 6. An Overview of Segmental and Suprasegmental Features of Pronunciation.

As can be seen from the figure, there are several categories under segmental and suprasegmental features, simultaneously functioning in speech production. Languages vary in such features with regard to which aspects they tend to focus on. As a result of this fact, there is a great diversity as regards how speakers' pronunciation in a particular language differs from that of speakers of other languages. Each language, in this sense, specialises in using only a small set of specific sounds (Cook, 2008), as well as structuring its prosody through a selective combination of various suprasegmental features. Therefore, characteristics of a language should carefully be taken into account in second/foreign language teaching, as learners are likely to have already established at least one sound system as part of their mother tongue acquisition. It may pose some difficulties for L2 users when they encounter a sound system that is organised in a dissimilar way than their L1 features with which they are already familiar, possibly because of disparate phonemic inventories and a novel structure of prosody that needs to be accommodated, including features related to target intonation contours, stress placements, muscular movements, and so on.

Beyond discussions about the feasibility of a contrastive analysis between phonology of two or more languages in a language teaching setting, multi-competence posits an inevitable interaction in the L2 user's mind, concurrently affecting all the languages known and used. It is foreseeable that pronunciation of an L2 user, including both segmental and suprasegmental features, will sound somewhat different from a monolingual native speaker's pronunciation because 'the student does not learn a foreign language from scratch' (Lado, 1961, p. 33); there is already at least one language existing in his/her multi-competence. As a new set of phonological features enters the L2 user's multi-competence, this process affects phonology of L1 too. Presumably, the wholistic system is gravitated away from ends that represent L1 or L2 monolingual native speakers. It is for this reason that even in a monolingual speech mode, it is possible to find traces of allegedly deactivated languages (Grosjean & Li, 2013), including some unintentional switches between languages at various levels of language processing (Poulisse, 1999). The cross-linguistic effect of this interplay that multi-competent L2 users exhibit is called 'deviations' by Weinreich (1953).

Such deviations, resulting from the familiarity with more than one language, have also been termed transfer, interference, influence, assimilation, and other probable alternatives. Often attributed to 'similarities and differences between the target language and any other language that has been previously (and perhaps imperfectly) acquired' (Odlin, 1989, p. 27), types and ranges of deviations are one of the major problems in second/foreign language teaching in terms of pronunciation. A Turkish learner of English, for example, might not be able to form a new concept for the English phoneme /w/ at an earlier stage of L2 acquisition. Due to a lack in L1 phonemic inventory, the target phoneme /w/ might possibly be accessed through the already available Turkish phoneme /v/, leading the L2 user to pronounce the word 'what' as /vɒt/ in a subordinate relationship (see Figure 3). However, as the L2 user becomes more proficient, there is likely to be an inclination towards integrated- or original-concept scenarios, which can as well be claimed to be under the influence of the hierarchical place held by L2 user groups in a given instructional context (see Table 2).

Rhythm in spoken English. Rhythm is a suprasegmental feature that arises from 'the timing and patterning of length and stress in syllables, phrases, and sentences' (Lado, 1961, p. 30). A well-known typology of how different spoken languages arrange their rhythm is proposed by Pike (1945), who divides languages into *stress-timed* and *syllable-timed* as to whether stress peaks or the number of syllables characterise rhythmic 'pulses' in speech. A stress-timed language (e.g. English), according to this proposition, is expected to organise its rhythm around stressed syllables so that each *foot* (i.e. a basic unit including an accented syllable and unaccented syllables following) more or less follows a similar temporal pattern. In English, this is achieved through 'bunching up' unstressed syllables for 'the stresses [to] remain equidistant from each other' (Carr, 1993, p. 217), which perceptually creates a predictable 'mental beat' on which the spoken language operates and gives the listener an impression of syllables carefully patterned on the basis of relative prominence (Gimson, 1956). A syllable-timed language (e.g. Spanish, Turkish), on the other hand, constitutes a sort of rhythm according to the number of syllables, treating each syllable somewhat equally. Therefore, syllables in the latter type are considered to resemble the timing of one another and occur at

equal intervals of time, as opposed to unaccented and accented syllables varying in their articulatory force as in the case of stress-timed rhythm.

Studies on prosody consistently show that English is a member of stress-accent languages, employing a number of phonetic manifestations to accentuate certain syllables for the construction of its rhythm (Fox, 2000). Acoustic correlates inherent in English stress-accent can be listed as duration, intensity, frequency, and segmental quality (Roach, 2009). These are manifested in the spoken language as length, loudness, pitch, and vowel reduction: a stressed syllable becomes slightly longer, louder, and reaches higher levels of pitch compared with unstressed syllables. Because this type of rhythm is *mostly* timed according to the stresses, unstressed syllables are de-emphasised in such ways as shortening their durations by reducing vowels or even eliminating them as much as possible (Carr, 1993). Consequently, intervals between feet are presumed to resemble each other, as every one of them contains a single stressed syllable and possibly other 'compressed' unstressed syllables.

As a result of stress-timing, syllables bearing the stress-accent tend to stand out amongst others, which creates a perception of rhythm in which feet recur at fairly regular intervals of time. In order to maintain such regularity between the stresses, syllables considerably vary with regard to articulatory force exerted by the speaker in stress-timed languages. Contrary to the relative distribution of prominence amongst syllables in stress-timing, in languages with syllable-timed rhythm, all syllables receive more or less the same prominence, which brings about a sort of inter-syllabic equality in duration. It is for this reason that the length of an utterance depends largely upon the total number of syllables in a syllable-timed language, whereas it is typically determined by the number of feet in a stress-timed language. The length of an utterance in stress-timing is attributed to these stress peaks in a crude sense, since each foot contains only one accented syllable as its peak unit.

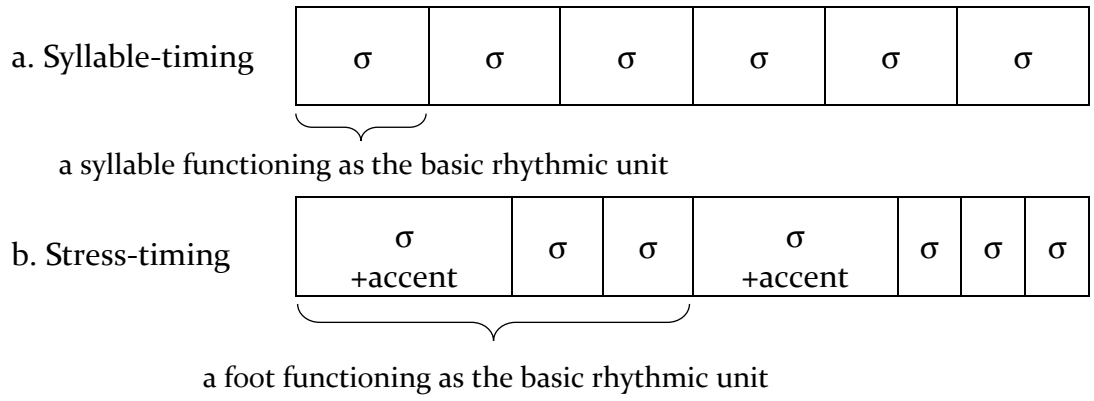

Figure 7. Simplified Illustration of the Difference Between Syllable- and Stress-Timing.

Laver (1994) cautions against oversimplifications of speech rhythm with the caveat that there is more than 'timing' to the auditory impression of rhythmical prominence. Amongst the factors determining the type of rhythm in a language are considered syllable structure, vowel reduction, and fixed/variable accentuation at lexical/sentence level (Dauer, 1983). Because there is perceivably greater inter-syllabic variation in a stress-timed language, the corresponding system of phonology, for example, should possess certain phonological requisites to allow for its speakers to alter vowels constituting syllable structure. In other words, the vowel system should be flexible enough for tolerating the variation stemming from different degrees of accentuation and attenuation, such as 'schwaisation'. In this line, Odisho (2014) points out a likely relationship between a multivalent vowel system and stress-timed rhythm, as opposed to a univalent vowel system and syllable-timed rhythm. Whilst vowel quality and quantity are heavily affected by accent in the former type, as in English; they tend to resist such changes in the latter type, as in Turkish. It is partly thanks to this flexibility of vowels found in stress-timed languages that certain syllables are reduced, so the recurrence of interstress intervals seems to take place at a regular pace.

The principle of equal temporal division between rhythmic units is called *isochrony*. Although the strong version of isochrony is often discredited (Crystal, 1996), a weaker version, as suggested by Fox (2000), certainly holds an important place in prosodic structure. In this regard, 'rhythm, as a phonological and mental

phenomenon does not require such phonetic precision' (ibid., p. 98) because it is, in fact, not totally bound up with absolute temporal equality, as 'considerable latitude is allowed without destroying the sense of rhythm' (ibid., p. 90). Hence, it is helpful to consider rhythm on a matrix—with orthogonal dimensions, as discussed by Nolan and Asu (2009), conceivably allowing the co-existence of different kinds of rhythm in a language—rather than as a pure dichotomous classification (Crystal, 1996), which might have originally been intended by Pike too (1945), who classified English as a stress-timed language produced with recurrent bursts of speed but acknowledged that the same phonological structure also depends upon number of syllables to a considerable extent. Turkish, the multi-competent participants' mother tongue in this study, can be placed near the syllable-timed end of this continuum, whereas English is a language characterised with the properties of the stress-timed end (see Table 3), the discrepancy between which becomes a significant point of consideration for the teaching of pronunciation in second/foreign language education.

It is a source of problem for speakers that come from a syllable-timed background to be expected to perform in a stress-timed foreign language. Halliday (1989), in the same line, notes difficulties leading to intelligibility problems in such cases faced by L2 users of English. A Turkish L2 user of English has an allegedly syllable-timed rhythm in his/her multi-competence as part of L1 acquisition, and the stress-timed rhythm attributed to English can be considered as an outer element in this scenario (see Figure 5). In order for the L2 user to incorporate the mentioned stress-timed rhythm into his/her multi-competence, there needs to be an interaction between two given sound systems. To exemplify in Weinreich's (1953) terms, one may speak English with a syllable-timed rhythm as in a subordinate relationship, without paying attention to accentuation and perhaps sounding a bit awkward in a phonological sense. Another case could be a coordinate relationship in which the L2 user perfectly switches between syllable-timed rhythm and stress-timed rhythm whenever speaking in Turkish and English, respectively. One may also integrate these two different types of rhythm as in a compound relationship and use a composite type of timing, merging the elements of L1 with that of L2. Demonstrated via the integration continuum (Figure 4), the concept of multi-competence regards two extreme ends (total separation and total integration) as being unlikely and

assumes a variable state of constant inter-connectedness between two (or more) language systems. Therefore, the multi-competent speaker-hearer is expected to employ a rhythmic system that is at once distinct from, yet very similar to, that of two monolingual speaker-hearer groups of these corresponding languages.

Measuring Stress-Timing

It has been long known that only a finite number of sounds can we utter in succession until before the stock air passing through the trachea is lost (Sweet, 1877). Under normal circumstances, speech is divided into certain clusters called breath-, sound-, or thought-groups which, in turn, contain smaller phonological units. These units roughly include, as briefly mentioned in the previous section, the foot, the syllable, and the mora (i.e. a sub-syllabic constituent). Because languages are perceived to differ in ways they organise their speech rhythm (Abercrombie, 1967), it is thence advanced that isochrony could be sought after in one of these three units (Ladefoged & Johnson, 2014). One of the canonical observations of spoken English in this regard was made by Lloyd James (1940), using the 'Morse code' metaphor to describe how accented syllables (dashes) stand out amongst unaccented syllables (dots); this intuitive observation later found empirical support through studies focusing on bi/multilingual infants' capability of distinguishing stress-timed rhythm from syllable-timed rhythm (Bosch & Sebastian-Galles, 1997; Byers-Heinlein et al., 2010; Mehler et al., 1996). In addition to infants' ability to perceive language-specific regularities in the speech signal, it is also observed that rhythmic properties in child speech, produced by infants as young as 2-year-olds, display cross-linguistic distinctions that are acoustically detectable through interval-based rhythm metrics (Payne et al., 2011). Sweet (1877), in his pioneering book on phonetics, put forwards how the division of basic rhythmic units in languages is marked by accent: 'the strength of each separate force-impulse … tends to diminish progressively, until a new impulse begins, which in its turn diminishes progressively' (p. 89), which is still plausible in our current understanding of how feet or syllables may be timed and patterned in accordance with perceptual rhythm (see Figure 7).

The typology proposed by Pike (1945) is a general one, and, perhaps, many languages fall somewhere in-between this dichotomy. Amongst some others, Laver (1994) thus prefers the terms syllable-based and stress-based to refer to preferred

types of rhythm in specific languages and reserves the terms syllable-timed and stress-timed for exemplifying two extreme ends. This terminological preference is in alignment with Roach (1982), who addresses the controversy over the (lack of) phonetic precision in presumed isochrony of stress-timed languages. However, it may not be favourable to diminish the distinction between these two types of timing, as Crystal (1994) notes how strikingly different English sounds when it is spoken with an isosyllabic rhythm. For example, it is, indeed, the case that a syllable-timed variety (e.g. an English creole spoken on the islands of the Caribbean) leaves an entirely distinct auditory impression if it is to be phonologically compared with the standard British English, which is characterised with stress-timing (Crystal, 1994) 'as if there were a conspiracy in [this variety of] English to maintain a regular rhythm' (Ladefoged & Johnson, 2014, p. 126).

In order to account for the differences in perceived rhythm, Laver (1994) upholds three general properties found in speech: 'segmental sonority, syllabic weight, and lexical stress' (p. 527). According to his postulation of perceived rhythm, coincidence of these properties and their particular permutations could point to where a language is positioned on a typological continuum (see Table 3). It should be underlined that the permutation in question is subject to numerous fine-grained variables, such as how lexical stress is utilised. A language may not follow the specific configuration of acoustic cues pertaining to stress-accent in spoken English (Fry, 1979) but still be classified as a stress-timed language, perhaps leaving an auditory impression that is distinct from other stress-timed languages. It is partly thanks to this ambiguity of rhythm that measuring it is a problem in itself, steering researchers' focus onto a number of global and local metrics proposed for the quantification of speech rhythm.

Table 3

General Characteristics of the Typological Continuum of Speech Rhythm

	← Syllable-timing	Stress-timing →
Reference point	Inter-syllabic intervals	Interstress intervals
Consonants	A smaller inventory; similar sonority	A larger inventory; widely varying sonority
Vowels	A smaller inventory (univalent); similar length and sonority	A larger inventory (multivalent); widely varying length and sonority
Syllable structure	A few possibilities (e.g. CV, CVC)	Many possibilities (e.g. V, CV, CCV, CCVC, etc.)
Syllables in words	Limited to a standard number	Flexible in numbers
Phonetic duration of syllables	Comparable mean; lower SD	Differing mean; higher SD
Accent (Lv1)	Not utilised or peripheral; fixed in its place	Greatly utilised; relatively free in its place
Global metrics	High %V; low ΔC	Low %V; high ΔC
Local metrics	Low PVIs	High PVIs

One of the earlier empirical research on measuring stress-timed rhythm was done by Roach (1982). Roach tested two claims that had previously been made by Abercrombie (1967), on the rhythmical classification of six languages: French, Telugu, Yoruba, English, Russian, and Arabic. Upon the collection of approximately two minutes of unscripted speech produced by the users of each language, the data were segmented with the help of intensity meter traces. The first challenged claim was that phonetic duration of syllables in a stress-timed language would be more variable than in a syllable-timed language. To cite an example, he reported his findings on the standard deviation of syllable durations in French as 75.5 and in English as 86. Although Roach maintained that these figures were not sufficient enough to support a clear-cut classification, the variation found in English (an allegedly stress-timed language) was nevertheless greater than in French (an allegedly syllable-timed language). The second challenged claim was that ‘stress pulses’ would be more evenly placed in a stress-timed language thanks to isochronic feet. The variance was calculated through dividing each tone-unit by interstress intervals, and figures reported by Roach were 617 for French and 1267

for English, which was contradictory to the ‘uneven’ placement of stressed syllables in syllable-timed languages. It is, however, obligatory to reiterate that French may be classified as a non-accentual language whilst English is a stress-accent one (Fox, 2000), raising questions about the degree to which ‘accent’ was utilised by their respective speakers. Another problem relates to accent placement: the greater variance observed in English could have been caused by the ‘variable’ lexical stress as opposed to ‘fixed’ lexical stress that is attributed to most syllable-timed languages.

Another remarkable study on the factors affecting the distinction between stress-timed and syllable-timed languages was carried out by Dauer (1983). In this study, Dauer likewise compared a group of allegedly syllable-timed languages (Spanish, Greek, and Italian) with English as a representative of stress-timed languages. Each informant in the study was asked to read aloud a passage that was selected from a novel or play. A phonetician along with a native speaker marked accented syllables in the recordings that lasted about 2 minutes long. The results revealed that the average intervals between accented syllables was between 0.4s and 0.5s for all speakers, showing an inconsistency in the classification of stress-timing and syllable-timing. Then, syllable structure was discussed as a constituent of perceived rhythm: Dauer (1983) asserted that English had a variety of syllable types (CV 34%, CVC 30%, VC 15%, V 8%, CVCC 6%), whereas Spanish, like French, was restricted to a narrower spectrum of syllables (CV 58%, CVC 22%, CCV 6%, V %6). In the conclusion, Dauer (1983) stated that differences observed between syllable-timed and stress-timed languages were ‘ultimately a product of the entire linguistic system’ (p. 60). In a later paper, Dauer (1987) elaborated on her idea of the phonetic and phonological components within this linguistic system and claimed that length, pitch, segmental quality, and functions of accent were the major components of linguistic rhythm.

Ramus et al. (1999) proposed a metrical solution to the typological categorisation of languages into rhythm classes. It was their assumption that the perception of rhythm originates from the successive alternation between vowels and consonants in the speech signal. As a stress-timed language tends to have more complex types of syllables, it would be plausible to expect that stress-timing displays a relatively low proportion of vocalic intervals (%V) and a high standard deviation of

consonantal intervals (ΔC). They tested these metrics on eight languages and managed to classify English, Polish, Dutch (stress-timed); French, Italian, Spanish, Catalan (syllable-timed); and Japanese (mora-timed) into their corresponding categories. It was, for instance, found that English has a low %V (40.1%) and relatively high ΔC (53.5 when calculated in milliseconds). Nespor et al. (2011) further reported their unpublished findings on several other languages, including Turkish which demonstrates a high %V (around 48.5%) and a relatively low ΔC (around 52 when calculated in milliseconds). The combination of these results supports the classification of English as a prototypical stress-timed language and Turkish as an allegedly syllable-timed language, at least from a viewpoint that assumes speech rhythm as a perceptual product of recurrence of vocalic and consonantal intervals. The theoretical background to interval metrics %V and ΔC is fundamentally based upon the rhythmical impression that is created by the alternation of high-sonority and low-sonority elements in the speech signal.

The studies on acoustic correlates of rhythm are not limited to the aforementioned global metrics that Ramus et al. (1999) proposed. A well-known local metric is pairwise variability index (PVI), developed by Low et al. (2000) and later expanded upon by Grabe and Low (2002). Similar to %V and ΔC, PVI examines vocalic and consonantal intervals in the speech signal but adds a local measurement that reflects the degree of variability in these consecutive intervals, which is likely to be greater in stress-timed languages. Typological classifications made through PVI values mainly agree on the classification of languages into stress-timed and syllable-timed groups but appear to eschew mora-timed ones such as Japanese (Setter & Sebina, 2018). Other global metrics are that proposed by Dellwo (2006): VarcoC (ΔC/meanC) and VarcoV (ΔV/meanV), accounting for rate-normalised measurements via coefficient variability. It is claimed by some researchers that VarcoV could, in particular, produce some effective results regarding rhythmic deviations amongst L2 users that switch between L1 and L2 (White & Mattys, 2007a). Nonetheless, it must be borne in mind that all these metrics alone are just broad indicators and may not always be a reliable source for grouping languages into clear-cut rhythm classes (Arvaniti, 2012).

Originating from the observation that neither L1 nor L2 could be held fully accountable for most phonemic errors encountered in L2 users' speech (James,

1985, as cited in Flege, 1987), the research at phonetic level provided fairly replicable evidence for distinguishing L2 users from L1 and L2 monolingual speaker-hearer groups, together with the evidence of bi/multi-directional L1-L2 interactions at this level (Flege, 1987; Yang & Fox, 2017). It is suggested that bi/multilingual language users' speech production and perception are in a complex relationship amenable to several factors, which may include cross-linguistic effects of the dominance of a particular language as a linguistic component of multi-competence and inter-speaker/hearer variation (Piccinini & Arvaniti, 2018). In concert with what the concept of multi-competence would envisage, Flege et al. (2003) revealed a continuous interaction between multiple sound systems within L2 users' multi-competence through a comprehensive examination of the production of vowels. Such findings from the segmental level would as well be a predictor of a likely relationship at the suprasegmental level. Carter (2005), for example, found that nPVI-V values of Spanish L2 users of English in his study was in-between the values obtained from speaker groups of L1 Spanish and L1 English. Lin and Wang (2005), testing %V and ΔC metrics on Chinese L2 users of English, demonstrated that their participants' rhythmic performance was distinct from English monolingual speaker-hearers.

A multi-directional study on speakers of Spanish, French, English, and Dutch was conducted by White and Mattys (2007a), who examined how L1 with a different type of timing could influence L2 performance in speech rhythm, with baselines obtained from native speaker groups. Their results revealed that the mean scores of metrics belonging to native English speaker group were 38 for %V and 59 for ΔC, lending credence to the discriminative reliability of %V and ΔC. As for the cross-linguistic influence, there were some noticeable traces of speakers' mother tongue when they performed in a second/foreign language that is affiliated with a different type of timing. Eng_{Sp} (L1 Spanish L2 English, performing in English) group tended to have somewhat lower ΔC (57) and higher %V (41) than monolingual English speakers, possibly being affected by the syllable-timing of their mother-tongue, Spanish. The cross-linguistic differences in the data were more drastic for PVI metrics: for example, L2 users' nPVI-V scores, both in English and Spanish, denoted a gradient transition along the cline in either direction of L1 and L2 rhythms. Nonetheless, rhythmic discrepancies between L1 and L2 reasonably dwindled when

such comparisons were made with Dutch L2 users of English and English L2 users of Dutch, which could be linked with that the respective languages arguably belong to the same stress-timed category of speech rhythm. The influence that L1 has on L2 speech rhythm highlights L2 users as unique users of the target language, conceivably signifying the role of multi-competence in the cross-linguistic realisation of rhythm.

White and Mattys (2007b) discuss that especially vowel-related metrics, including %V, VarcoV, and nPVI-V, can be listed as robust discriminators between stress-timed and syllable-timed languages. They add to their discussion by emphasising the potential capability of %V and VarcoV in discriminating L2 users' interlingual performance with respect to 'gradient' changes in rhythm. This rhythmic gradience in longitudinal L2 exposure in the target language environment was also captured by Ordin and Polyanskaya (2014), whose results demonstrated that L2 users' scores of nPVI-V and nPVI-C tended to be higher, nearing towards a stress-timed characteristic of English, as the years of the participants' residence in Britain increased. It is, thus, plausible to assume that rhythm, like other aspects of pronunciation, could well be subject to the wholistic nature of multi-competence, 'calibrating' itself on the integration continuum according to conceptual relationships formed between multiple sound systems.

A comprehensive study on the usefulness of rhythm metrics was that conducted by Arvaniti (2012). In her research, there were six languages included: English, German, Italian, Spanish, Korean, and Greek. Unlike White and Mattys (2007a), the data collected by Arvaniti (2012) only consisted of L1 evidence from the native speakers of each language in order to test the capability of such rhythm metrics in discriminating different types of timing. It was found that methodological choices and inter-speaker variation were amongst causes of the disparity in results that rhythm metrics claim to represent. For example, English speakers' ΔC scores were 68, 49, and 55 for sentence subsets constructed with complex, simple, and unchecked syllable structures, respectively. The mean metric scores for English, involving results of the speech samples from a short story, sentences, and spontaneous speech, were 60 for ΔC and 45.7 for %V. Although there are, indeed, multiple factors affecting the duration of vocalic and consonantal intervals in the speech signal (Arvaniti, 2009), Arvaniti (2012) states that 'results from %V, ΔC, and

rPVI-C, the metrics that do not normalise for speaking rate, were more consistent and showed a bigger language effect size…' (p. 365) than rate-normalised metrics.

It is another notable example from Gabriel et al. (2015) that they found the typological distance between languages within L2 users' language constellations could impact the production of foreign language speech rhythm, along with such extralinguistic factors as multilingual and phonological awareness. They tested two metrics, %V and VarcoV, through an investigation of the speech produced in French (syllable-timed) and English (stress-timed) by Mandarin Chinese (syllable-timed) heritage speakers and German (stress-timed) L1 speakers. In their findings, learners with a dominant syllable-timed language (e.g. Mandarin) within their multi-competence seemed to benefit from their phonological background when speaking in a syllable-timed foreign language (e.g. French). This finding echoed in the case of stress-timed languages: learners with a stress-timed mother tongue (e.g. German) tended to achieve more consistent and somewhat target-like scores in a stress-timed L2 (e.g. English). They concluded that multilingual identity and phonological awareness are just as important as prosodic closeness between languages, and they should decidedly be promoted in pronunciation teaching.

When the data available on Turkish L2 users of English and Turkish L1 speakers are considered, to the author's best knowledge, there are no published studies based upon rhythm metrics concerning the former group at the time of this research. As for the latter, the current state of our knowledge about the (presumable) place of Turkish L1 speakers on a plane of rhythm metrics is far from complete. In one of the few studies on this topic, Mairano (2011), according to the data collected from 1 standard Turkish speaker, presents metric scores 53.3 for ΔC and 44.9 for %V as the values attributed to Turkish speech. Another example is that provided by Nespor et al. (2011), who visually represent the Turkish data on a ΔC and %V plane around the values ~52 and ~48.5, respectively for corresponding rhythm metrics. Other than the limited data presented by these studies, speech rhythm in Turkish remains as an under-researched area, and the field seems to fall short of explaining the type of rhythm in Turkish and its possible effects on learning a second/foreign language in terms of rhythm metrics.

Summary and Research Gaps

This chapter has outlined the key premises of multi-competence and touched upon rhythm as a suprasegmental feature of pronunciation that is liable to cross-linguistic influence within the L2 user's idiosyncratic state of multi-competence. In doing so, possible types of cross-linguistic orientations were scrutinised with some considerations for multi-directional interactions at phonetic and phonological levels. Subsequently, speech rhythm was examined in relation to temporal variations of basic rhythmic units and perceived patterning of stress-timed and syllable-timed languages. Following this, rhythmic measurements, as likely indicators of typological distance between languages as regards the alternation of vocalic and consonantal components in the speech signal, were elaborated into a number of global and local metrics that could conceivably discriminate different types of timing.

A growing body of research based upon rhythm metrics notwithstanding, a search of literature reveals that, except for few instances (e.g. White & Mattys, 2007a), there is a certain lack of multi-directional studies carried out with multiple-language evidence collected from the same group of multi-competent L2 users and set against monolingual or bi/multilingual baselines. In addition, there has been little to none research done regarding rhythm metrics on the subject of cross-linguistic characteristics displayed by Turkish L2 users of English. Given that the data available on Turkish speaker-hearers' speech rhythm are extremely limited, a study with a considerable number of participants, a large size of data set, and multiple-language evidence could have significant implications for pronunciation teaching in ESL/EFL settings. The implications drawn from such multi-directional studies with an emphasis on pronunciation could establish a firm ground for a multilingual/plurilingual approach that acknowledges teachers and learners as multi-competent L2 users and references their knowledge of more than one language.

In this regard, this study aims to shed light upon the cross-linguistic influences on the pronunciation of multi-competent Turkish teachers of English with specific reference to the rhythmic patterning and timing of speech. Bearing in mind that little research on speech rhythm, using acoustic analysis and standard segmentation criteria, has been undertaken in the Turkish context, it is aimed within the scope of this study to fill this research gap by providing a comparative baseline

of metric results as well as creating a pedagogical point of reference in which multi-competence, as a wholistic language ability, is upheld and L2 users are regarded in their own right. This kind of a wholistic language ability in cross-language rhythm could be associated with competence in *multiphonology* or *pluriphonology*, as has been termed by Pennington (2015) on the subject of a translingual foundation of pronunciation that is beyond monolingual views adopted in the past.

Chapter 3
Methodology

It is the endeavour in this chapter to delineate the details pertaining to methodology, in which research pattern, study design, setting, participants, data collection procedures, instruments constructed for different elicitation methods, and metrics used in data analysis will be explained.

There can said to be two sides of multi-competence research: first, findings of an existing study could be interpreted from the perspective of multi-competence on an ad hoc basis; second, a study could specifically be designed to elicit multiple-language data from multi-competent L2 users. The current study falls into the second group, where the design lends itself to an analysis of cross-linguistic relationships at various levels. Ortega (2016) remarks that there are a number of methodological criteria that multi-competence research should meet. These criteria are often subsumed under methodological choices that correspond to collecting L2 evidence, setting comparative and interpretive baselines obtained from L1 monolingual groups and possibly other multi-competent L2 user groups, collecting multiple-language evidence in L1, L2, and L*n*, and accounting for other variables related to how these could be linked to the total system. Following the framework that Ortega (2016) puts forth for the investigation of cross-linguistic influence, the study design of this research is outlined as follows:

Table 4

Outline of the Study Design According to General Criteria of Multi-Competence Research

Criteria	Detail
L2 evidence	'YES, a main group from the same L1 background of interest'
Baselines*	'YES, more than one baseline native monolingual group as interpretive yardsticks for each of the languages'
Multiple-language evidence	'YES, data in target language and first language'
Total system	'YES, L1, L2 data elicited from the same participants in the bilingual group'

Note. Interpretive baselines have been included from some of the comparable studies.

In the study, pronunciation is chosen as the target level of cross-linguistic influence. In order to investigate the outlined domain of multi-competence, acoustic analysis has been employed as the research method. Because speakers are not randomly assigned and the independent variable, which is the participants' linguistic multi-competence, is to some extent controlled (see Table 5), the procedure followed is similar to quasi-experimental research. In this respect, the duration of vocalic and consonantal intervals was calculated using audio-visual cues obtained from the acoustic spectrum, which shows information related to frequency, intensity, and other fine details in the speech signal. The vocalic and consonantal intervals in the speech data were labelled through manual segmentation done by the researcher, the details of which are provided in the section of data analysis.

The entire process of acoustic analysis was guided through spectrographic information obtained from the acoustic cues processed through Praat[1], which is a piece of software prevalent amongst phoneticians working in the field of acoustic phonetics. As stated by Zsiga (2013), the advancement of digital speech processing made acoustic analysis available to a greater number of researchers, and if done properly, 'digital recordings will be of better quality than analog tape recordings' (p. 126) and thus produce accurate and reliable results in a comparatively shorter time frame. A spectrogram for each digital recording has been created using Praat, where 'frequency is shown on the vertical axis, time on the horizontal axis, and the energy at any frequency level either by the density of blackness in black and white display, or by colours in a colour display' (Cruttenden, 2014, p. 20). Consequently, acoustic information displayed on the spectrogram and the waveform was the primary determinant throughout segmentation (see Figure 8, for an example).

Setting and Participants

Setting. The study had initially been planned to be conducted at Hacettepe University in Turkey; however, this had to be cancelled due to precautions taken against the global pandemic at the time. All the data comprising participants' voice recordings have been collected via online meetings. These meetings were held on Zoom—a cloud platform that can be used for audio conferencing—after being

[1] This software has been developed by Paul Boersma and David Weenink, and it is freely available on www.praat.org. (The version used in this study is 6.1.41)

scheduled on a date and time according to the participants' convenience. During the online meetings, the participants were either at their place of work or at home, located in various cities across Turkey. Because the physical environment in each session of data collection would vary, the participants were beforehand asked to go into a quite room, where no background noise could interfere with digital recording and distort overall acoustic quality. In each meeting, a laptop was the reported device that was used by the participants, so they were given instructions on placing themselves where they could directly see the screen and remain no more than one metre away from their device for the sake of a similar proximity effect.

The setting of this research can as well be defined with respect to the wider social context of communicative and pedagogical uses of English in Turkey. If one were to trail behind Wilkins's (1972) dichotomy of foreign and second languages, the communicative role of English in Turkey could be conceived of as constrained to that of a foreign language, with its predominant use for education and other instrumental purposes. From the viewpoint of the global language system as proposed by de Swaan (2001), the intended use of English in Turkey corresponds to a supercentral place in the hierarchy. This supposedly entails a specialised use of English as an L2, rather than being an indispensable communicative tool required for functioning as an active member of a monolingual or multilingual L2 community. It is, thus, a supercentral contextual setting in which this research has been conducted, involving multi-competent L2 users that are likely to interact with, but not necessarily limited to, language user groups in the same hierarchical place.

Participants. Results of the study represent the speech data collected from seven multi-competent participants, all of whom have operationally been defined as Turkish teachers of English. As multi-competent L2 users, these participants are speaker-hearers of the two corresponding languages: Turkish, acquired as the mother-tongue; and English, successively acquired as a foreign language. Although some of the participants notified the researcher that they had previously been exposed to other languages such as German and French, this 'L3' component has been kept out of equation, since their self-perceived competence in these languages was not higher than beginner or elementary level—which is in consonance with a methodological solution proposed by Cook (2003) to the quandary of finding 'pure' monolingual or L2 user groups.

The sampling method employed for the purpose of this study is convenience-based: the participants were selected regarding their willingness to contribute, availability of time, and accessibility via online audio-conferencing. As stated by Dornyei (2007), convenience sampling in L2 research can sometimes be partially coincident with a purposive element. The purposive elements incorporated in the sampling of this study are that the participants should have been acquired English at a later time than their mother tongue, more or less representing the context with which the target population is bound, and they should have no major linguistic component (i.e. above the level of basic user) other than Turkish and English within their multi-competence.

The participants were graduates from ELT departments of several state universities located in Turkey, including Hacettepe University, Bogazici University, Erciyes University, and Istanbul University. These state universities are often considered to be distinguished, and they are deemed at the higher end of the success scale thanks to high-ranking scores required for entrance. With this conjecture in mind, it could be conceivable to imagine the participants as in a prestigious teacher profile in the given context. The collected demographic data indicate that there were 6 female speakers and 1 male speaker, whose ages varied from 23 to 34 (M=24.9, SD=3.7). At the time of data collection, three participants reported to be teaching in primary education, and two participants declared secondary education as their institutional level, with at least 1 or more years of past teaching experience. The other two participants (Sp5 and Sp6) were not affiliated with any institution of formal education, but Sp5 had previously worked in tertiary education for 6–10 years, and Sp6 was experienced in offering English lessons to a diverse learner profile for 1–5 years.

As for the dialectal variation, the models of pronunciation that the participants had been exposed to in the course of their L2 acquisition were General American (also called North American English) and General British (or Received Pronunciation); none of the participants had a deviant accent that might affect the results of the study. The variety of Turkish that the participants spoke is a non-regional dialect that can easily be understood by the educated population of Turkish speaker-hearers, sometimes referred to as ‘Istanbul dialect’. There were not any records of speech or hearing disorders expressed by the participants; they are

assumed to be in a healthy condition in terms of their cognitive and muscular systems used for speech production.

Table 5

Preliminary Information About the Participants

	Demographic Information				Linguistic Components of Multi-Competence		
Sp	Age	Sex	Institutional level	Teaching experience	L1	L2	Ln
#1	23	F	Primary	1–5 years	Turkish	English	German
#2	25	F	Primary	1–5 years	Turkish	English	German
#3	23	F	Primary	1–5 years	Turkish	English	German, Korean
#4	23	F	Secondary	1–5 years	Turkish	English	French, Japanese
#5	34	F	Freelance	6–10 years	Turkish	English	German, Italian
#6	23	M	Freelance	1–5 years	Turkish	English	German
#7	23	F	Secondary	1–5 years	Turkish	English	German

Note. Ln, under the heading of linguistic components of multi-competence, comprises languages to which the participants have been exposed in a formal education setting or similar online courses, and thus haphazard linguistic encounters with other foreign languages are excluded.

Data Collection

At the first stage, interested participants that agreed to contribute to the research were sent informed consent forms in English and Turkish, and the informants filled in a general background form to collect preliminary data about their general demographic information, institutional level they worked at the time of data collection, past teaching experience, and language background. The informed consent forms were collected through Google Forms and were accepted by each participant by having them check a box that stated their agreement to the terms of the research (see Appendix-C for English and Appendix-D for Turkish). Individual meetings were scheduled with each participant so that data collection sessions would consist of two attendants: the researcher and the participant. It was through

face-to-face meetings that the spoken data set in the study has been created, despite the attendants' geographically dispersed locations. During online meetings, some participants joined the sessions with their cameras on whilst others opted for audio-only conferencing. In cases where the participants had their cameras on, no video recording was done; only the audio from the elicitation stage was collected as speech data. The digital recordings were directly saved to the researcher's computer using Audacity[2] at 44.1kHz sampling rate with 24-bit quantisation in mono channel. Any personal conversation between the researcher and the participant was not included in these voice recordings.

At the elicitation stage, the participants were asked to speak with a natural pace and repeat any word or sentence that they felt they had had a disfluency problem, which might have been caused by reasons such as misreading or unfamiliar pronunciation. In order to minimise this factor, they were allowed some time to skim through the story and sentences before they were ready to begin speaking. The procedure of data collection followed the order of short story, sentences, and spontaneous speech, respectively. For the reading part of the experiment (short story and sentences), the researcher screen-shared a PowerPoint presentation through the tool provided by the audio-conferencing platform. The text was displayed in vertically centred 28-point Calibri font, in black colour on a plain white background with left-hand side justification. Following the short story, sentences were displayed one by one, in the identical fashion with a pseudo-randomised order that had previously been done by the researcher. Lastly, in order to elicit spontaneous speech samples, the participants were directed two prompt questions and were requested to choose one and provide a relevant answer for about one to two minutes. One minute was determined as the threshold length for spontaneous speech samples, and the remaining parts of spontaneous speech were excluded from analysis so that each participant's contribution to the data set was in a standard size.

The combination of three elicitation methods, including the short story, sentences, and spontaneous speech, has yielded the spoken data set that is about 25 minutes for English and 20.5 minutes for Turkish (see Table 6). The size of this

[2] It is a piece of open-source audio software that is freely available on www.audacityteam.org. (The version used in this study is 2.4.2.)

data set is notably comparable to other studies on metrics used for the typological classification of speech rhythm. One of the important aspects of this data set is that it allows intra-group comparisons of interlingual performance, since multiple-language evidence was collected from the same group with a pretty similar language background and a shared L1. The contribution made to the total data set per speaker was approximately 3.5 minutes for English and 3 minutes for Turkish. The time span of data collection was a ten-week period, lasting from January 11 to March 22 in 2021.

Instruments

In accordance with the criteria of multiple-language evidence and the availability of a total system, materials used in the instrumentation are presented in English and Turkish. The instruments comprise three elicitation methods: a short story, three sentence subsets, and prompt questions for spontaneous speech (see Appendix-A for English and Appendix-B for Turkish). In order to replicate a 'monolingual speech mode', instruments belonging to English and Turkish were administered separately, avoiding extraneous variables that might derive from intentional code-switching. In other words, L2 evidence was collected through the English version of the instrument, adopted from Arvaniti (2012) thanks to her gentle courtesy of giving permission to use the same set of materials; and L1 was evidence was collected through the Turkish version of the instrument, constructed by the researcher in an attempt to achieve a sort of instrumentation comparable to that of English.

Story. Reading a short story is one of the important elicitation methods for collecting running speech samples. For this part of the experiment, the story that was selected is 'The North Wind and the Sun', which is translated into Turkish as 'Poyrazla Güneş'. The versions used in the study are the ones that are available in IPA transcriptions with narrative samples. Specifically, the IPA transcriptions, regarded as the point of reference throughout the analysis, were that provided by Ladefoged (1999) for English and Zimmer and Orgun (1999) for Turkish. The English version consisted of eight sentences whilst the Turkish version had five sentences. The versions were deemed comparable to one another in terms of the text length.

Sentences. In light of Dauer's (1983) discussion about the effect of syllable structure on the perception of speech rhythm, three distinct sets of sentences were created. Each subset had five sentences, resulting in a total of fifteen sentences for English and another fifteen for Turkish. The reason behind using multiple subsets was to observe the effect size of elicitation methods and materials choice on the results obtained from given metrics, following the same methodological choice made by Arvaniti (2012). The first 'stress-timed' subset was designed to comprise various complex syllable structures and consonant clusters, which can typically be found in a stress-timed language. The second 'syllable-timed' subset, on the contrary, mostly contained simple syllable structures and open syllables, which can be considered amongst characteristics attributed to a syllable-timed language. The third 'unchecked' subset was uncontrolled in terms of syllable complexity, and it was composed of authentic sentences extracted from literary works of the respective languages. The general criteria for sentences were that they had to be meaningful in a decontextualised setting and demonstrate minimal variation in length as regards the mean number of syllables, which was determined to be about 18 syllables for both languages.

As mentioned, the sentence subsets were labelled as 'stress-timed', 'syllable-timed', and 'unchecked'. It was intentionally aimed to manipulate the phonetic duration of vocalic and consonantal intervals in the first two subsets, but the last group of sentences were unchecked and included sentences randomly picked from original works, provided that they were of comparable length in syllable numbers. It should be noted that despite descriptive labels of 'stress-timed' and 'syllable-timed', there were not any manipulations made to the sentences as regards stress-placement or feet isochrony, since such manipulations might jeopardise the credibility of the elicitation instruments. The only manipulation that was done concerns the distribution of complex syllable structures: the stress-timed subset contained comparatively more closed syllables and consonant clusters. The order of sentences was pseudo-randomised by the researcher at the elicitation stage, for keeping a natural balance that would be present in an everyday scenario of speech production.

Spontaneous speech. Given that a large proportion of daily verbal communication is mostly impromptu and contains lots of redundancy, unplanned

speech greatly differs from carefully constructed sentences used in elicitation. The presence of isochrony in spontaneous speech has been a topic of debate amongst researchers, some of whom claimed that it is a 'subjective' phenomenon rather than an 'objective' one (Laver, 1994). It is for this reason that spontaneous speech, in addition to read speech, should be taken into account in research so as to reach a more comprehensive understanding of linguistic rhythm. In order to elicit samples of spontaneous speech from the participants, two prompt questions were prepared for each language. At this stage of data collection, the participants were asked to answer one of these prompt questions. The questions were about general discussion points that the participants would be likely to have a past experience they can share or an idea that could at least be speculated about for at least a minute or two. The choice as to which question would be answered was done by the participant, and the recordings were cut off at the one-minute marker to be analysed as part of spontaneous speech.

The following table illustrates the instruments and elicitation methods that have been used in data collection, along with the estimated sample size per speaker and the total data set collected from seven Turkish L2 users of English.

Table 6

Data Collection Instruments and Data Set

Elicitation Methods	Estimated Sample Size Per Speaker		Total Data Set (in seconds)	
	English	Turkish	English	Turkish
Short story	5 sentences	8 sentences	308	276
Sentences (3 subsets)	15 sentences	15 sentences	687	487
Spontaneous speech	1-minute	1-minute	505	463

Data Analysis

At the first step of data analysis, recordings collected via the mentioned elicitation methods were divided into smaller audio files containing individual utterances. This procedure was a precaution taken to ensure that metric scores

were locally calculated and accurately represented the mean values obtained from utterances. The boundaries of utterances in the short story and sentence subsets were predetermined, as explicitly displayed in their orthographic presentation, and utterances from spontaneous speech were separated according to the participants' pause placements. Therefore, some of the utterances in spontaneous speech were not complete and grammatically correct sentences. Ungrammatical sentences and other phonological phenomena (e.g. epenthesis, cluster reduction, segmental substitution) were not excluded from analysis, since they were considered to stand for the authentic human behaviour in spoken communication. All utterances were analysed as in the actual shape they were produced by the participants. However, filled pauses, mid-utterance pauses, disfluent parts where the participants corrected themselves afterwards, and false starts were excluded from data analysis for the sake of standardisation of measurement.

Segmentation of the data was manually done by the researcher using audio-visual cues obtained via Praat, simultaneously examining formant structures on spectrograms, pitch contours, envelopes, periodicity displayed on waveforms, and other acoustic cues such as intensity plots processed by the software. Throughout the process of segmentation, standard phonetic criteria (e.g. Machac & Skarnitzl, 2009; Stevens, 1999) were followed to label vocalic and consonantal intervals, and syllables were labelled in accordance with the maximum onset principle (Selkirk, 1981). The rationale behind measuring vocalic and consonantal intervals—rather than individual phonetic duration of each segment—is that proposed by Mehler et al. (1996) and adopted in many empirical studies based upon rhythm metrics (e.g. Ramus et al., 1999). It is hypothesised on account of Mehler et al.'s (1996) experimental observations that persons, often naïve to complex phonetic and phonological phenomena, tend to perceive speech rhythm as the successive alternation of vowels and consonants, mostly attending to high sonorous speech units that carry accent and also determine syllable weight thanks to their nucleus (peak) position in syllable structure. Following this phonetic postulation, phonemes were segmented by the researcher and classified as being either vocalic or consonantal. In doing so, intervals were marked on onsets and offsets of vowels and consonants, or clusters of vowels and clusters of consonants.

Since the segmentation was done on intervals, the sentence ‘Then the shined out warmly’, for example, was labelled as: /ð/ /e/ /nð/ /ə/ /s/ /ʌ/ /nʃ/ /aɪ/ /nd/ /aʊ/ /tw/ /ɔː/ /(r)ml/ /i/. Considering the standards followed throughout segmentation, labelling decisions were based upon available acoustic information to a great extent, yet in few cases, where displayed acoustic information was not enough for the researcher to label a vocalic or consonantal boundary accurately, auditory cues were as well exploited. Utterance-initial plosives and unreleased plosives in phrase-final positions were excluded from all analyses. Phonemes with a hiatus between them were labelled as two separate intervals. Aspiration following the release of a plosive was included in the consonantal interval. Elided vowels and syllabic consonants without an acoustic characteristic of being vocalic (e.g. fully developed formant structure) were regarded as consonantal and included in the adjoining consonantal interval.

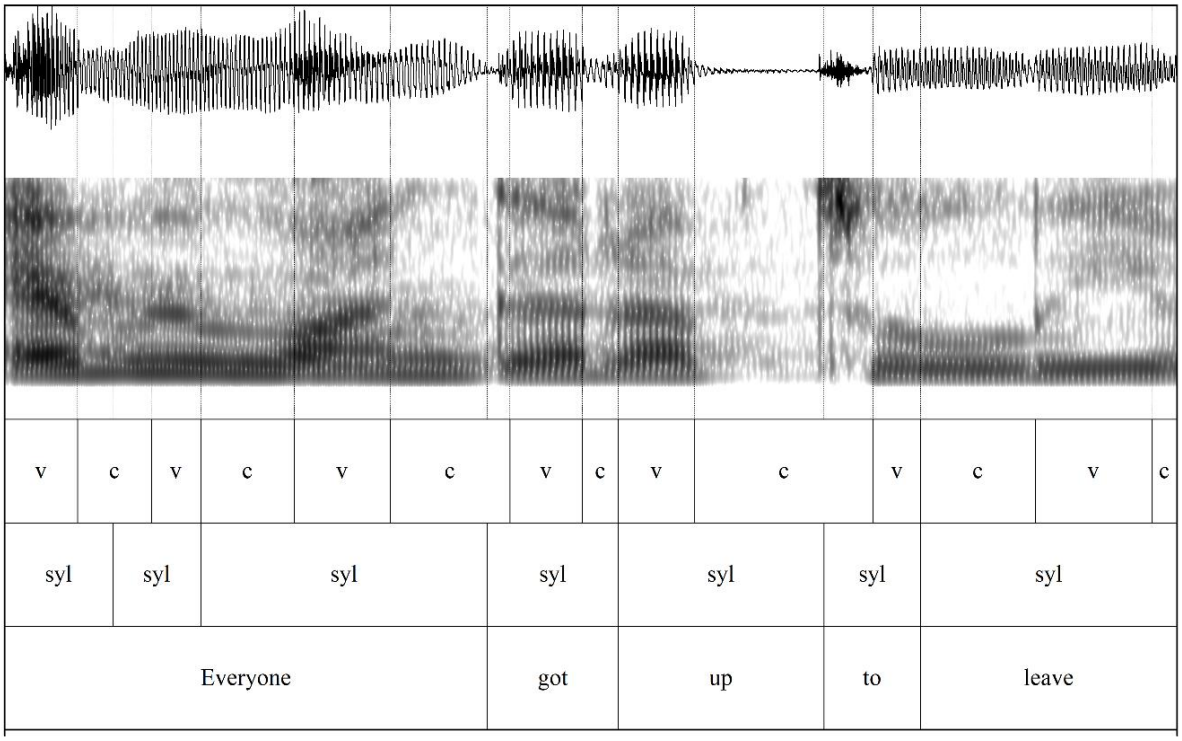

Figure 8. Illustration of Segmentation Using one of the English Utterances (Sp7).

Glides, liquids, and Turkish ‘ğ’ (i.e. soft g) were conditional on some additional criteria due to their articulatory and acoustic ambiguity. It was necessary to devise a standard procedure for the segmentation of approximants due to their ambivalent phonotactic behaviour. In alignment with some of the previous studies on rhythm metrics, such as Ramus et al. (1999) and Nespor et al. (2011), glides

were regarded as consonantal if they were in a pre-vocalic position, yet they were counted as vocalic when in a post-vocalic position. The adopted view is that glides that pattern with consonants are phonemic (phonemic glides) whilst glides that pattern with vowels are allophonic variants (derived glides); a basic distinction that stems from positional variance (Levi, 2011). In parallel with glides, liquids in English, a segmental class consisting of laterals and rhotics, are ordinarily articulated as approximant sonorants. The placement of boundaries for liquids, likely to pose some challenges for segmentation due to exhibiting a fairly high sonority like glides, were also standardized so that a fair cross-linguistic comparison could be made. The midpoint of transition periods, as indicated by relative intensity at F2 and F3, was labelled as the segmental boundary of laterals, and a 'cycle-oriented' approach (see Machac & Skarnitzl, 2009) was adopted whenever acoustic cues were sufficient enough to determine boundaries surrounding rhotics (see also Parker, 2008, for a discussion of the sonority of segments).

As for Turkish 'ğ', the phonetic profile of the particular phoneme was taken into consideration: if there was visible evidence of friction on the spectrogram, it was measured as a consonantal interval, according to its classification as a voiced velar fricative in IPA; but when there was no visible friction, it was treated as a lengthening of the preceding vocalic interval and included in the adjoining vocalic interval. In cases where the speakers did not display a phonetic realisation of 'ğ' altogether, it was not measured as part of any interval.

The transcription of the speech data was done with three consecutive tiers on Praat: on the first tier, vocalic intervals and consonantal intervals were labelled using the symbols V and C; on the second tier, words were divided into individual syllables, marked on their respective syllabic boundaries; on the third tier, grammatical and lexical words across utterances were transcribed orthographically. The duration of the vocalic, consonantal, and syllabic intervals labelled on the text-grid files was derived using a Praat script that was written by Lennes (2020). The values of phonetic durations were then transposed into the Excel spreadsheet that was prepared by the researcher.

In the course of data analysis, articulation rate and two rhythm metrics were calculated for each utterance. Articulation rate denotes the rate at which syllables uttered per second, excluding silent pause time, and is used as a measurement in

this analysis by virtue of Lloyd James's (1940) metaphorical observation of 'Morse code' and 'machine gun' speech rhythms made for stress-timed and syllable-timed languages, respectively. Most of the studies in the field have previously interpreted this observation from the viewpoint of 'Morse code' rhythm, indicating that accentuation was the reason underlying this perception attributed to stress-timing. However, in this study, considering the multi-competent participants' L1 (Turkish), which is an allegedly syllable-timed language (e.g. Topbas, 2007; Demirezen, 2015), a 'machine gun' viewpoint should be taken into consideration, since a hypothetically higher articulation rate in such syllable-timed languages could as well be a factor contributing to perceived rhythm. In order to explicate possible relationships between articulation rate and rhythm classes, the participants' cross-linguistic articulation rates were calculated across three elicitation methods.

Amongst metrics proposed for the typological classification of speech rhythm, ΔC and %V (Ramus et al., 1999) have been selected for the analysis of consonantal and vocalic intervals in the data. The rationale behind this choice was partly related to reasonably consistent results achieved through these two global metrics in some of the previous studies and their discriminative capability when combined on the same plane. It is expected that taking advantage of the consistency observed in the rhythm metrics ΔC and %V could be helpful in terms detecting possible rhythmic deviations in the multi-competent participants' L1 and L2 performance. Another consideration was that the scope of this study concerns foreign/second language teachers and learners, some of whom may not necessarily have enough expertise in phonology or statistics to infer what other metrics (e.g. PVIs) convey in practical terms. As a result, rhythm metrics ΔC and %V were deemed robust interval measures and used for analysing the speech data consisted of multiple-language evidence.

Table 7

Summary of Measures and Rhythm Metrics Used in Data Analysis

Metrics	Description
Articulation rate[a]	The number of syllables uttered per second excluding silent pause time.
ΔC[b]	The standard deviation of consonantal interval duration across utterances.
%V	The sum of vocalic interval duration divided by the total duration of vocalic and consonantal intervals and multiplied by 100.

Notes. The description of metrics ΔC and %V are of Ramus et al. (1999).

[a]Major disfluencies (e.g. hesitations) and silent pauses longer than at least 100 milliseconds were excluded.

[b]As standard deviation values depend upon the unit of time in which they are measured, the calculations have been made in milliseconds for simpler inter-metric comparisons.

Chapter 4
Findings

The chapter separately presents the results pertaining to each research question. The focus in the following sub-sections is on how being a multicompetent language user affects the spoken production across multiple languages in terms of linguistic rhythm. An empirical probe into speech rhythm could allow to explore the hypothetical boundaries of stress-timed and syllable-timed languages as regards temporal correlates that are perceived and produced by multi-competent speaker-hearer groups. On this matter, one of the aims is to demonstrate whether having a command of more than one language instils a change in the participants' cross-linguistic articulation rate (RQ1). As a crude indicator of the perception of speech rhythm, articulation rate could shed some light upon how the construct of basic rhythmic units (e.g. syllable) is realised by different languages with respect to occurrence frequency. Afterwards, the detailed findings obtained from two global metrics, based upon interval measures, are presented. With the scores of rhythm metrics ΔC and %V, it is aimed to investigate the influence of linguistic multi-competence on the standard deviation of consonantal duration (RQ2) and on the overall percentage of vocalic intervals present in the examined data set (RQ3). In order to explicate any likely bi/multi-directional relationships in cross-language pronunciation, the results from the multi-competent participants' performance in English are presented in comparison with the results from their mother tongue, Turkish. Finally, the main findings are summarised in a comparative table, along with a number of outer baselines.

Below are presented the three research questions and their respective findings relating to articulation rate, ΔC, and %V:

RQ1: What are the multi-competent participants' articulation rates in story, sentences, and spontaneous speech in English/Turkish?

The first research question seeks to find out the effect of knowing and using multiple languages on the multi-competent participants' cross-linguistic articulation rate. In order to answer this research question, syllabic intervals in the data set were labelled to the exclusion of silent pause time and major disfluencies, and the rate at which syllables uttered per second was calculated. The findings derived from three elicitation methods are presented in the subsequent sub-sections.

Short story. Table 8 presents the data of cross-linguistic articulation rate in terms of number of syllables articulated per second in the short story called 'the North Wind and the Sun' ('Poyrazla Güneş' in the Turkish version) for English (L2) and Turkish (L1) across all speakers. The data in this table comprise multiple-language evidence collected from the same bi/multilingual group of Turkish EFL teachers.

Table 8

Participants' Cross-Linguistic Articulation Rate in Story

Speakers	Articulation Rate in Story (syllable/second)	
	English	Turkish
Sp1	3.9	6.2
Sp2	4.6	6.4
Sp3	4.1	6.3
Sp4	4.6	6.8
Sp5	4.5	6.7
Sp6	4.3	6.4
Sp7	4.8	6.8
Average (SD)	4.4 (0.3)	6.5 (0.2)

As is shown above, the analysis of running speech samples from the short story has yielded that the participants' articulation rates in English (Sp1=3.9 syll/s,

Sp2=4.6 syll/s, Sp3=4.1 syll/s, Sp4=4.6 syll/s, Sp5=4.5 syll/s, Sp6=4.3 syll/s, Sp7=4.8 syll/s) were substantially lower than in Turkish (Sp1=6.2 syll/s, Sp2=6.4 syll/s, Sp3=6.3 syll/s, Sp4=6.8 syll/s, Sp5=6.7 syll/s, Sp6=6.4 syll/s, Sp7=6.8 syll/s). In this respect, the grand mean of articulation rate was found to be 4.4 syll/s (SD=0.3) for English and 6.5 syll/s (SD=0.2) for Turkish. This result suggests that the multi-competent participants articulated syllables in their first language (Turkish) at a much faster rate than in their second language (English) when reading the short story. The ratio of difference between the average of L1 and L2 scores was measured as 48.1%.

Sentence subsets. Table 9 presents the data of cross-linguistic articulation rate in terms of number of syllables articulated per second in the read sentences, averaging the means of stress-timed, syllable-timed, and unchecked subsets, for English (L2) and Turkish (L1) across all speakers. The data in this table comprise multiple-language evidence collected from the same bi/multilingual group of Turkish EFL teachers.

Table 9

Participants' Cross-Linguistic Articulation Rate in Pooled Sentences

Speakers	Articulation Rate in Sentences (syllable/second)	
	English	Turkish
Sp1	4.3	6.1
Sp2	4.7	6.6
Sp3	4.2	6.3
Sp4	4.8	6.7
Sp5	4.7	6.6
Sp6	4.4	6.4
Sp7	4.8	6.8
Average (SD)	4.6 (0.2)	6.5 (0.2)

Akin to the results from the short story, the above table, which contains the means of articulation rate of the pooled sentences, displays that the participants'

articulation rates in English (Sp1=4.3 syll/s, Sp2=4.7 syll/s, Sp3=4.2 syll/s, Sp4=4.8 syll/s, Sp5=4.7, Sp6=4.4 syll/s, Sp7=4.8 syll/s) were substantially lower than in Turkish (Sp1=6.1 syll/s, Sp2=6.6 syll/s, Sp3=6.3 syll/s, Sp4=6.7 syll/s, Sp5=6.6 syll/s, Sp6=6.4 syll/s, Sp7=6.8 syll/s). The grand mean of articulation rate was found to be 4.6 syll/s (SD=0.2) for English and 6.5 syll/s (SD=0.2) for Turkish. This result likewise suggests that the multi-competent participants' first language speech (Turkish) was consistently faster than their second language speech (English) when reading the pooled sentences. The ratio of difference between the average of L1 and L2 scores was measured as 42.6%.

Spontaneous speech. Table 10 presents the data of cross-linguistic articulation rate in terms of number of syllables articulated per second in the samples of spontaneous speech for English (L2) and Turkish (L1) across all speakers. The data in this table comprise multiple-language evidence collected from the same bi/multilingual group of Turkish EFL teachers.

Table 10

Participants' Cross-Linguistic Articulation Rate in Spontaneous Speech

Speakers	Articulation Rate in Spontaneous Speech (syllable/second)	
	English	Turkish
Sp1	3.6	5.8
Sp2	4.3	6.2
Sp3	3.7	5.7
Sp4	4.2	6.2
Sp5	4.5	6.1
Sp6	3.8	6.2
Sp7	4.5	6.0
Average (SD)	4.1 (0.4)	6.0 (0.2)

It is indicated with the results shown above that the participants' articulation rates in English (Sp1=3.6 syll/s, Sp2=4.3 syll/s, Sp3=3.7 syll/s, Sp4=4.2 syll/s, Sp5=4.5 syll/s, Sp6=3.8 syll/s, Sp7=4.5 syll/s) were substantially lower than in

Turkish (Sp1=5.8 syll/s, Sp2=6.2 syll/s, Sp3=5.7 syll/s, Sp4=6.2 syll/s, Sp5=6.1 syll/s, Sp6=6.2 syll/s, Sp7= 6.0 syll/s) in the samples of spontaneous speech. The grand mean of articulation rate was found to be 4.1 syll/s (SD=0.4) for English and 6.0 syll/s (SD=0.2) for Turkish. This result implies that whilst the multi-competent participants articulated syllables in their first language (Turkish) at a faster rate than in their second language (English), the overall articulation rate in spontaneous speech was noticeably slower than reading the short story or pooled sentences for both languages (cf. Table 8 and Table 9). The ratio of difference between the average of L1 and L2 scores in the samples of spontaneous speech was measured as 47.6%.

RQ2: What are the scores of ΔC obtained from the multi-competent participants in story, sentence subsets, and spontaneous speech in English/Turkish?

In addition to the rate at which basic rhythmic units articulated, the perception of speech rhythm is known to be dependent upon the successive alternation of high and low sonority elements in the speech signal. The second research question deals with low sonority elements in the speech signal and seeks to find out the effect of knowing and using multiple languages on the standard deviation of consonantal intervals. In order to answer this research question, consonantal intervals in the data set were labelled by the researcher, and the standard deviation of their phonetic durations was calculated at sentence level (in milliseconds). The findings derived from three elicitation methods are presented in the subsequent sub-sections.

Short story. Table 11 presents the means of ΔC metric scores in the short story called ‘the North Wind and the Sun’ (‘Poyrazla Güneş’ in the Turkish version) for English (L2) and Turkish (L1) across all speakers. The data in this table comprise multiple-language evidence collected from the same bi/multilingual group of Turkish EFL teachers.

Table 11

Means of ΔC Metric for L2 (English) and L1 (Turkish) Speech in Story

Speakers	ΔC: Story	
	English	Turkish
Sp1	62.6	46.5
Sp2	53.9	45.4
Sp3	60.4	44.5
Sp4	54.2	45.9
Sp5	54.8	44.1
Sp6	59.2	45.1
Sp7	56.6	41.3
Average (SD)	57.4 (3.1)	44.7 (1.6)

Regarding the data obtained from the short story, the analysis of the standard deviation of consonantal intervals has yielded that the participants' ΔC metric scores in English (Sp1=62.6, Sp2=53.9, Sp3=60.4, Sp4=54.2, Sp5=54.8, Sp6=59.2, Sp7=56.6) were significantly higher than in Turkish (Sp1=46.5, Sp2=45.4, Sp3=44.5, Sp4=45.9, Sp5=44.1, Sp6=45.1, Sp7=41.3). The grand mean of ΔC scores was found to be 57.4 (SD=3.1) for English and 44.7 (SD=1.6) for Turkish. In light of these ΔC scores, the multi-competent participants' second language (English) speech showed a greater variation than their first language (Turkish) speech. This result suggests that consonantal intervals in the running speech samples were more comparable to one another for Turkish than they were for English, in terms of the means of their phonetic duration. The duration of consonantal intervals in the English running speech samples was differing and demonstrated a relatively larger variation.

Sentence subsets. Table 12 presents the means of ΔC metric scores in the read sentences, separately for each subset, for English (L2) and Turkish (L1) across all speakers. The data in this table comprise multiple-language evidence collected from the same bi/multilingual group of Turkish EFL teachers.

Table 12

Means of ΔC Metric for L2 (English) and L1 (Turkish) Speech Separately Presented for Each Sentence Subset

Speakers	ΔC: 'Stress-timed'		ΔC: 'Syllable-timed'		ΔC: 'Unchecked'	
	English	Turkish	English	Turkish	English	Turkish
Sp1	71.9	52.7	50.8	39.8	58.2	38.6
Sp2	69.9	48.8	45.7	36.8	52.9	41.4
Sp3	73.6	51.7	50.3	40.5	58.5	40.0
Sp4	68.5	48.3	43.9	37.4	55.0	40.5
Sp5	67.7	49.6	47.8	35.5	54.7	41.1
Sp6	73.1	49.9	47.6	37.3	56.2	40.7
Sp7	69.2	46.1	45.4	33.8	53.6	39.8
Average (SD)	70.6 (2.1)	49.6 (2.0)	47.4 (2.4)	37.3 (2.1)	55.6 (2.0)	40.3 (0.9)

The analysis of the standard deviation of consonantal interval durations in the read sentences was done in a comparative fashion between the three subsets. The participants' ΔC scores of the stress-timed sentence subset for English (Sp1=71.9, Sp2=69.9, Sp3=73.6, Sp4=68.5, Sp5=67.7, Sp6=73.1, Sp7=69.2) were consistently higher than for Turkish (Sp1=52.7, Sp2=48.8, Sp3=51.7, Sp4=48.3, Sp5=49.6, Sp6=49.9, Sp7=46.1). The grand mean of ΔC scores of the stress-timed subset was calculated to be 70.6 for English (SD=2.1) and 49.6 for Turkish (SD=2.0).

The syllable-timed sentence subset had been manipulated in quite the opposite way of the former. The participants' ΔC scores of the syllable-timed subset for English (Sp1=50.8, Sp2=45.7, Sp3=50.3, Sp4=43.9, Sp5=47.8, Sp6=47.6, Sp7=45.4) were consistently higher than for Turkish (Sp1=39.8, Sp2=36.8, Sp3=40.5, Sp4=37.4, Sp5=35.5, Sp6=37.3, Sp7=33.8). The grand mean of ΔC scores of the syllable-timed subset was calculated to be 47.4 for English (SD=2.4) and 37.3 for Turkish (SD=2.1).

The last one was the unchecked sentence subset and consisted of samples picked out from authentic works of the respective languages. The participants' ΔC scores of the unchecked subset for English (Sp1=58.2, Sp2=52.9, Sp3=58.5, Sp4=55.0, Sp5=54.7, Sp6=56.2, Sp7=53.6) were as well higher than for Turkish (Sp1=38.6, Sp2=41.4, Sp3=40.0, Sp4=40.5, Sp5=41.1, Sp6=40.7, Sp7=39.8). The grand mean of ΔC scores of the unchecked subset was found to be 55.6 for English (SD=2.0) and 40.3 for Turkish (SD=0.9). As is evident from the grand mean values presented in Table 12, the sentence subsets, whether manipulated or not, tend to show the same pattern in which English speech exhibits a higher degree of variation than Turkish speech in the phonetic duration of consonantal intervals.

Furthermore, Table 13 presents the means of ΔC metric scores in the read sentences, averaging the means of stress-timed, syllable-timed, and unchecked subsets (see Table 12), for English (L2) and Turkish (L1) across all speakers. The data in this table comprise multiple-language evidence collected from the same bi/multilingual group of Turkish EFL teachers.

Table 13

Means of ΔC Metric for L2 (English) and L1 (Turkish) Speech in Pooled Sentences

Speakers	ΔC: Sentences (pooled)	
	English	Turkish
Sp1	60.3	43.7
Sp2	56.2	42.3
Sp3	60.8	44.1
Sp4	55.8	42.1
Sp5	56.7	42.1
Sp6	59.0	42.6
Sp7	56.1	39.9
Average (SD)	57.8 (2.0)	42.4 (1.3)

When the values from the three sentence subsets were pooled together, the participants' ΔC scores for English (Sp1=60.3, Sp2=56.2, Sp3=60.8, Sp4=55.8,

Sp5=56.7, Sp6=59.0, Sp7=56.1) were higher than for Turkish (Sp1=43.7, Sp2=42.3, Sp3=44.1, Sp4=42.1, Sp5=42.1, Sp6=42.6, Sp7=39.9). The grand mean of ΔC scores of the pooled sentences was found to be 57.8 for English (SD=2.0) and 42.4 for Turkish (SD=1.3). The analysis of the pooled sentences displayed the same trend that was observed for each distinct subset, in which the variation of consonantal intervals in the multi-competent participants' English speech was greater than in their Turkish speech.

Spontaneous speech. Table 14 presents the means of ΔC metric scores in the samples of spontaneous speech for English (L2) and Turkish (L1) across all speakers. The data in this table comprise multiple-language evidence collected from the same bi/multilingual group of Turkish EFL teachers.

Table 14

Means of ΔC Metric for L2 (English) and L1 (Turkish) Spontaneous Speech

Speakers	ΔC: Spontaneous Speech	
	English	Turkish
Sp1	79.4	51.7
Sp2	67.9	46.8
Sp3	77.5	48.5
Sp4	72.5	45.6
Sp5	69.3	46.5
Sp6	74.1	47.4
Sp7	68.0	43.8
Average (SD)	72.7 (4.3)	47.2 (2.3)

According to the results obtained from the analysis of spontaneous speech, the participants' ΔC scores in the samples they provided for English (Sp1=79.4, Sp2=67.9, Sp3=77.5, Sp4=72.5, Sp5=69.3, Sp6=74.1, Sp7=68.0) were as well higher than for Turkish (Sp1=51.7, Sp2=46.8, Sp3=48.5, Sp4=45.6, Sp5=46.5, Sp6=47.4, Sp7=43.8). The grand mean of ΔC scores of the samples of spontaneous speech was calculated to be 72.7 for English (SD=4.3) and 47.2 for Turkish

(SD=2.3). The pattern of the results from spontaneous speech is similar to that was observed in the short story and the sentence subsets but with larger variation at a higher scale, which indicates that the phonetic duration of consonantal intervals in unplanned speech tends to vary more than reading out a set of predetermined sentences (cf. Table 11 and Table 13).

RQ3: What are the scores of %V obtained from the multi-competent participants in story, sentence subsets, and spontaneous speech in English/Turkish?

The previous research question was about the temporal variability of low sonority elements in the speech signal. The perception of speech rhythm is largely reliant upon being able to notice high sonority elements in successive alternations. The focal point of the third research question is to examine these high sonority elements. It is aimed within the scope this research question to find out the effect of knowing and using multiple languages on the proportional time allocated to vocalic components in the speech signal. In order to answer this research question, vocalic intervals in the data set were labelled by the researcher, and the total percentage of their phonetic duration was calculated. The findings derived from three elicitation methods are presented in the subsequent sub-sections.

Short story. Table 15 presents the means of %V metric scores in the short story called ‘the North Wind and the Sun’ (‘Poyrazla Güneş’ in the Turkish version) for English (L2) and Turkish (L1) across all speakers. The data in this table comprise multiple-language evidence collected from the same bi/multilingual group of Turkish EFL teachers.

Table 15

Means of %V Metric for L2 (English) and L1 (Turkish) Speech in Story

Speakers	%V: Story	
	English	Turkish
Sp1	44.2	42.6
Sp2	45.0	43.0
Sp3	46.2	42.6
Sp4	45.5	42.4
Sp5	44.2	42.9
Sp6	46.1	43.2
Sp7	43.9	42.7
Average (SD)	45.0 (0.9)	42.8 (0.3)

As is shown in the table above, the analysis of vocalic intervals in the running speech samples from the short story has revealed that the participants' %V scores for English (Sp1=44.2, Sp2=45.0, Sp3=46.2, Sp4=45.5, Sp5=44.2, Sp6=46.1, Sp7=43.9) were slightly higher than for Turkish (Sp1=42.6, Sp2=43.0, Sp3=42.6, Sp4=42.4, Sp5=42.9, Sp6=43.2, Sp7=42.7). The grand mean of the vocalic proportion in the whole stretch of the short story was found to be 45.0% for English (SD=0.9) and 42.8% for Turkish (SD=0.3). It is suggested in light of these results that the overall duration of vocalic intervals takes up a proportion lesser than that of the consonantal component in both languages.

Sentence subsets. Table 16 presents the means of %V metric scores in the read sentences, separately for each subset, for English (L2) and Turkish (L1) across all speakers. The data in this table comprise multiple-language evidence collected from the same bi/multilingual group of Turkish EFL teachers.

Table 16

Means of %V Metric for L2 (English) and L1 (Turkish) Speech Separately Presented for Each Sentence Subset

Speakers	%V: 'Stress-timed'		%V: 'Syllable-timed'		%V: 'Unchecked'	
	English	Turkish	English	Turkish	English	Turkish
Sp1	43.6	38.8	52.0	46.9	45.0	41.2
Sp2	42.5	39.0	48.4	48.2	44.9	42.4
Sp3	43.8	39.2	51.9	48.3	45.7	42.5
Sp4	43.1	38.3	50.0	47.4	44.0	40.8
Sp5	41.3	40.1	47.5	48.0	43.8	41.9
Sp6	43.6	38.5	51.3	47.7	45.4	41.3
Sp7	42.6	38.3	47.0	47.5	45.5	40.5
Average (SD)	42.9 (0.8)	38.9 (0.6)	49.7 (1.9)	47.7 (0.5)	44.9 (0.7)	41.5 (0.7)

The proportion of the vocalic component in the read sentences was calculated in a comparative fashion between the three subsets. The participants' %V scores of the stress-timed sentence subset for English (Sp1=43.6, Sp2=42.5, Sp3=43.8, Sp4=43.1, Sp5=41.3, Sp6=43.6, Sp7=42.6) were consistently higher than for Turkish (Sp1=38.8, Sp2=39.0, Sp3=39.2, Sp4=38.3, Sp5=40.1, Sp6=38.5, Sp7=38.3). The grand mean of the vocalic proportion in the whole stretch of the stress-timed subset was found to be 42.9% for English (SD=0.8) and 38.9% for Turkish (0.6). The speech samples examined in this manipulated stress-timed category, deliberately composed of more closed syllables and consonant clusters, consequently displayed the lowest %V scores of the three sentence subsets for both languages.

Unlike the former, the syllable-timed category had been manipulated to contain relatively more open syllables and fewer consonant clusters, in which the participants' %V scores for English (Sp1=52.0, Sp2=48.4, Sp3=51.9, Sp4=50.0, Sp5=47.5, Sp6=51.3, Sp7=47.0) were more or less higher than for Turkish (Sp1=46.9, Sp2=48.2, Sp3=48.3, Sp4=47.4, Sp5=48.0, Sp6=47.7, Sp7=47.5). The

grand mean of the vocalic proportion in the whole stretch of the syllable-timed subset was calculated to be 49.7% for English (SD=1.9) and 47.7% for Turkish (SD=0.5).

Lastly, the unchecked sentence subset was uncontrolled in terms of syllable structure and consonant clusters, in which the participants' %V scores for English (Sp1=45.0, Sp2=44.9, Sp3=45.7, Sp4=44.0, Sp5=43.8, Sp6=45.4, Sp7=45.5) were also higher than for Turkish (Sp1=41.2, Sp2=42.4, Sp3=42.5, Sp4=40.8, Sp5=41.9, Sp6=41.3, Sp7=40.5). The grand mean of the vocalic proportion in the whole stretch of the unchecked sentence subset was calculated to be 44.9% for English (SD=0.7) and 41.5% for Turkish (SD=0.7). In this regard, the unchecked category resulted in producing somewhat intermediate %V scores, which are lower than the syllable-timed subset but higher than the stress-timed one.

Furthermore, Table 17 presents the means of %V metric scores in the read sentences, averaging the means of stress-timed, syllable-timed, and unchecked subsets (see Table 16), for English (L2) and Turkish (L1) across all speakers. The data in this table comprise multiple-language evidence collected from the same bi/multilingual group of Turkish EFL teachers.

Table 17

Means of %V Metric for L2 (English) and L1 (Turkish) Speech in Pooled Sentences

Speakers	%V: Sentences (pooled)	
	English	Turkish
Sp1	46.9	42.3
Sp2	45.3	43.2
Sp3	47.1	43.3
Sp4	45.7	42.2
Sp5	44.2	43.3
Sp6	46.8	42.5
Sp7	45.0	42.1
Average (SD)	45.9 (1.0)	42.7 (0.5)

When the values from the three sentence subsets were pooled together, it was revealed that the participants' %V scores for English (Sp1=46.9, Sp2=45.3, Sp3=47.1, Sp4=45.7, Sp5=44.2, Sp6=46.8, Sp7=45.0) reached higher values than that of Turkish (Sp1=42.3, Sp2=43.2, Sp3=43.3, Sp4=42.2, Sp5=43.3, Sp6=42.5, Sp7=42.1) on average. The grand mean of the vocalic proportion in the whole stretch of the pooled sentences was calculated to be 45.9% for English (SD=1.0) and 42.7 for Turkish (SD=0.5). This result indicates that the vocalic proportion in the participants' English speech is slightly higher than that of Turkish speech and, quite close to the results from the short story, the overall duration of vocalic intervals takes up a proportion lesser than that of the consonantal component in both languages.

Spontaneous speech. Table 18 presents the means of %V metric scores in the samples of spontaneous speech for English (L2) and Turkish (L1) across all speakers. The data in this table comprise multiple-language evidence collected from the same bi/multilingual group of Turkish EFL teachers.

Table 18

Means of %V Metric for L2 (English) and L1 (Turkish) Spontaneous Speech

Speakers	%V: Spontaneous Speech	
	English	Turkish
Sp1	47.2	44.4
Sp2	46.3	44.9
Sp3	48.3	45.3
Sp4	45.1	44.1
Sp5	43.5	44.7
Sp6	46.9	43.5
Sp7	45.8	45.2
Average (SD)	46.2 (1.4)	44.6 (0.6)

When the table above is examined, it can be stated that the participants' %V scores in the samples they provided for the analysis of spontaneous speech for English (Sp1=47.2, Sp2=46.3, Sp3=48.3, Sp4=45.1, Sp5=43.5, Sp6=46.9,

Sp7=45.8) tended to be slightly higher than for Turkish (Sp1=44.4, Sp2=44.9, Sp3=45.3, Sp4=44.1, Sp5=44.7, Sp6=43.5, Sp7=45.2) on average. The grand mean of the proportion of vocalic intervals in the samples of spontaneous speech was in this case found to be 46.2% for English (SD=1.4) and 44.6% for Turkish (SD=0.6). This result indicates that the overall proportion of the vocalic component in spontaneous speech is likely to be greater than it is for read speech (cf. Table 15 and Table 17).

Summary of the Findings

In order to highlight the main findings of the study, a recap of the metric values given in the preceding sub-sections is presented. The intra-group results are averaged together across three elicitation methods in a grand mean size for cross-linguistic comparisons. A summary table, with an overview of the whole data set, is thence provided below to increase the readability of the results offered by the research questions.

Table 19

Summary of the Main Findings with Comparable Baselines

Speakers	Multi-Competent L2 Users		Comparable Baselines	
	English	Turkish	English	Turkish
Interval measures				
ΔC	62.6 (7.8)	44.8 (2.6)	53.5[a], 56.7[b], 59[c], 73[d], 60[e], 69[f],57.3[l]	53.3[g], ~52[h]
%V	45.7 (1.2)	43.4 (1.0)	40.1[a], 41.1[b], 38[c], 41[d], 45.7[e], 45.7[f], 38.7[l]	44.9[g], ~48.5[h]
Articulation rate				
Syllables/second	4.3 (0.2)	6.3 (0.2)	4.8[i], 5[k]	5.2[i], 6,7[j]

Notes. Metric results presented in this table represent the average values calculated from the short story, pooled sentences, and spontaneous speech. Means of standard deviations are given in round brackets.

[a]The values, rounded to the nearest integer, are taken from Ramus et al. (1999).

[b]The values are taken from Grabe and Low (2002).

[c]The values are of English first language speakers and are taken from White and Mattys (2007a).

[d]The values are of adult English speakers and are taken from Payne et al. (2011).

[e]The values, achieved through comparable methodology, are of monolingual English speakers and are taken from Arvaniti (2012).

[f]The values, rounded to the nearest integer, are of adult English L2 speakers who are in the third year of residence in the L2 environment and are taken from Ordin et al. (2014).

[g]The values, rounded to the nearest integer, are of 1 speaker of standard Turkish and are taken from Mairano (2011).

[h]The values are estimates of the visual representation of unspecified data belonging to Turkish speakers and are taken from Nespor et al. (2011).

[i]The values, rounded to the nearest integer, are of L1 speakers of English and Turkish reading the North Wind and the Sun and are taken from Bradlow et al. (2017).

[j]The value is of adult Turkish speakers' articulation rate and is taken from Cangi et al. (2020).

[k]The value is of an adult male speaker of North American English and is taken from Dauer (1983).

[l]The value is of six adult speakers of Leeds variety and is taken from Rathcke and Smith (2015).

As is revealed in the summary of the results derived from the three research questions, the study has reached some important findings regarding the type of rhythm in Turkish and its effects on second/foreign language speech production. It is shown that English demonstrates greater variability in the phonetic duration of consonantal intervals with a higher degree of standard deviation (ΔC=62.6, SD=7.8). On the other hand, Turkish, as might be expected from its relatively simpler syllable structure, does not show much differentiation as to how consonantal intervals are timed and patterned in spoken production (ΔC=44.8, SD=2.6). It can be extrapolated from these findings that English features a characteristic that is attributed to stress-timed languages (i.e. high ΔC) whilst Turkish gravitates towards syllable-timed languages with respect to the variability of consonantal intervals (i.e. low ΔC).

As for the results achieved through %V metric, it is shown that English speech contained a relatively higher percentage of vocalic component in the speech signal (%V=45.7, SD=1.2) when compared with Turkish (%V=43.4, SD=1.0). The results suggest a pattern that is contradictory to the prototypical classification of these languages according to a dichotomy-driven typology of speech rhythm, since Turkish, as an allegedly syllable-timed language, would be expected to reach a higher value of %V than that of English. What the results obtained from ΔC and %V metrics could imply regarding the type of linguistic rhythm employed in these two languages is further discussed in the following chapter.

One of the main components of language is the rate at which it is spoken by its L1/L2/Ln users. The results across different elicitation methods have shown that the participants' average articulation rate in English was lower (4.3 syll/s, SD=0.2) than in their first language, Turkish (6.3 syll/s, SD=0.2). It is suggested by these values that Turkish could be considered amongst languages spoken with a high articulation rate. English, on the contrary, could best be considered amongst languages spoken with a relatively low articulation rate.

In order to examine the inter-speaker variation in the speech data, the multi-competent participants' individual average scores in English and Turkish are plotted over the following scatter chart. ΔC scores are given on the Y axis, and %V scores are given on the X axis.

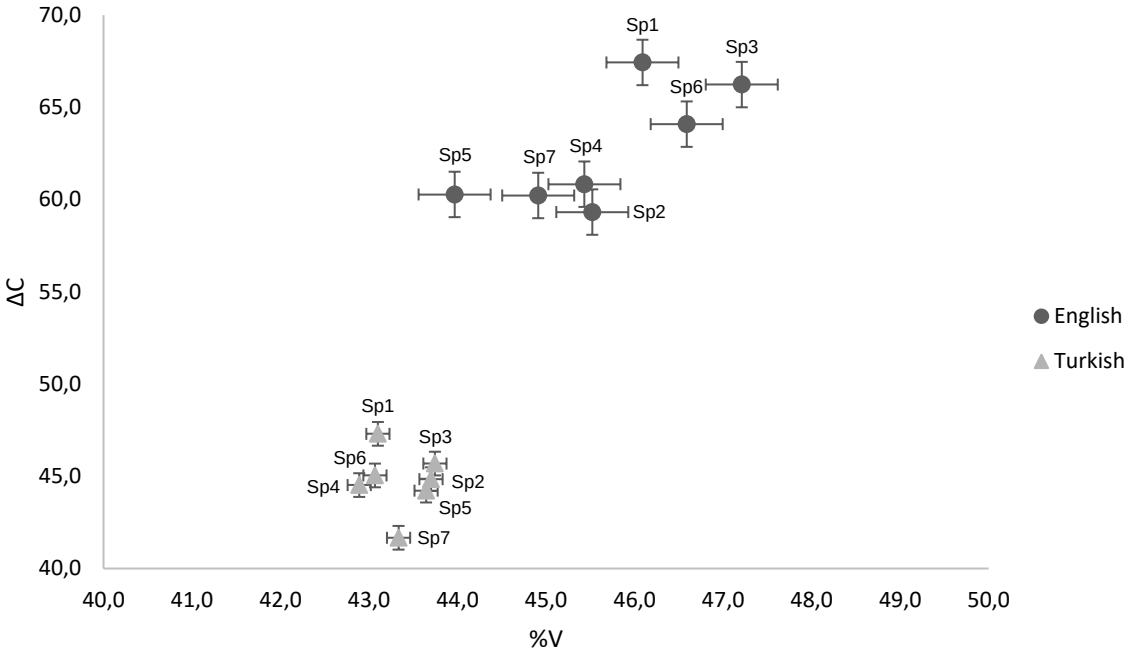

Figure 9. Inter-Speaker Variation on the %V – ΔC Plane.

Note. Error bars represent standard errors around the mean score.

As is made evident by the figure, the difference between inter-speaker variation in two languages is straightforwardly noticeable. The data of Turkish speech, which is the participants' first language, are scattered over a smaller area at the lower left-hand side of the chart. The data of English speech, which is the participants' L2 in this case, are dispersed over a larger area at the higher right-

hand side of the given chart. The disparity between the multi-competent participants' L1 and L2 plots implies that their performance in a second/foreign language is likely to be less stable and more dependent upon the individual characteristics. Spoken production in L1, albeit still subject to some degree of inter-speaker variation, can be conceived as relatively more reliable in terms of the common rhythmic characteristics possessed by its native speakers. In this connection, the variation in L2 performance might indicate varying rates of accommodation of the target language rhythm, whilst consistency observed in L1 performance could denote an already entrenched prosodic system as a dominant linguistic component within multi-competence.

Chapter 5
Discussion, Conclusion, and Suggestions

The last chapter is devoted to a comprehensive discussion of the findings with references to the concept of multi-competence and L2 users' unique bi/multilingual speaker-hearer identity. The following section first provides a concise overview of the study, summarising the key points of the research and its major findings. Then, all the research questions are discussed in detail. In doing so, the discussion, taking certain interpretive yardsticks into account, touches upon articulation rate and two interval measures used in the analysis. The type of speech rhythm in the participants' mother tongue is re-visited, and its possible effects on L2 spoken production is as well discussed in the given context. Following, a section of conclusion presents the final remarks related to the study. Lastly, a number of pedagogical and methodological implications are outlined, along with considerations and suggestions for future research.

An Overview of the Study

It is upheld by linguistic multi-competence that the knowledge of multiple languages in the same mind leads to a sort of wholistic language ability, in which bi/multilingual cognition irrevocably replaces the individual's monolingual cognition. Using an approach that acknowledges bi/multilingual speaker-hearers' pervasive knowledge of more than one language, the current study has set out to explore the rhythmic characteristics exhibited by Turkish L2 users of English. In this regard, the research has acoustically analysed the speech signal in the data collected from seven Turkish EFL teachers, who were recruited through convenience sampling with the proviso that they had acquired English at a later frame of time than their mother tongue, Turkish. In order to investigate the properties of speech rhythm in the multi-competent participants' spoken production in the respective languages, one rate measure (articulation rate) and two rhythm metrics that are based upon interval measures (ΔC and %V) have been used in the data analysis. Consequently, the research has focused on the interlingual disparity between the participants' ΔC and %V metric scores, in addition to their cross-linguistic articulation rate. The results have, indeed, succeeded in discriminating the type of rhythm used in English speech and Turkish speech. L1 and L2 performances were found to be differing in

terms of the inter-speaker variability, conceivably hinting at the multi-competent participants' varying levels of accommodation of the target rhythm and overall command of multiphonology.

Discussion of the Results

This section is divided into three points of discussion. Each research question is separately discussed in accordance with the L2 user perspective that linguistic multi-competence entails. It should be borne in mind that the cross-language comparisons made in the following sub-sections are not meant to regard non-native English teachers as failed native speakers. Rather, it is aimed to sketch a descriptive portrait of Turkish L2 users of English as regards certain variables found in speech rhythm.

Cross-linguistic articulation rate (RQ1). One of the prominent constituents of prosody in a language is articulation rate. From the perspective of articulatory phonetics, it reflects the motor control in speech production and is often a robust discriminator between languages, since it excludes pauses and disfluencies in the speech signal. Resistant to such extraneous factors, articulation rate could itself contribute to the perception of speech rhythm as a language-specific variable. In the study, the research question 'What are the multi-competent participants' articulation rates in story, sentences, and spontaneous speech in English/Turkish?' tried to reveal the participants' cross-linguistic articulation rate across different elicitation methods.

Upon the labelling of syllable boundaries, the number of syllables uttered per second was calculated. It was found that the participants' overall articulation rate was 4.3 syll/s (SD=0.2) for English and 6.3 syll/s (SD=0.2) for Turkish. This result highlights a drastic difference as to how many syllables the participants uttered in L1 and L2 spoken production. The fact that the multi-competent participants' L2 speech was consistently articulated at a slower rate than baselines of English L1 speech is in agreement with the results reported in other studies that claim L2 speech to be slower than L1 speech (e.g. Bradlow et al., 2017). The finding of the speakers' 4.3 syll/s articulation rate in English L2 speech could therefore be an effect of a possible accommodation process ongoing in their multi-competence, since it is slower than outer baselines of English L1 speech (see Table 19). This

indicates that the presumption of L2 speech being slower than L1 speech is also valid for Turkish L2 users of English as far as the given results considered. As Pennington and Rogerson-Revell (2019) note, 'focusing on pronunciation accuracy may require explicit control that interferes with other aspects of message generation and slows down speech' (p. 35), which could be a feasible explanation as to why many L2 users are observed to speak at a slower articulation rate. For most L2 users, pronunciation is an aspect that is possibly yet to be 'automatised' at a degree referenced to native speaker-hearers whilst L1 pronunciation is already in a 'auto-pilot' mode, requiring much less explicit control so that freed-up cognitive resources can be used to foreground other aspects of speech production.

The results also confirm that English, a member of the Germanic languages like Dutch and German, is consistently spoken with a relatively slow articulation rate below 5.5 syll/s, as opposed to the Romance languages, the articulation rates of which are typically above 6 syll/s (Arvaniti & Rodriquez, 2013). Traditionally, comparisons were made between the articulation rate of English, as a representative of stress-timed languages, and some Romance languages, like Spanish, with a higher speaking rate and are arguably acknowledged to be syllable-timed. However, the comparison in this case is not made between English and a Romance language. Turkish belongs to the Turkic branch of the Altaic language family, which is further proposed to be connected with other Transeurasian languages like Korean and Japanese (Robbeets & Bouckaert, 2018). Unfortunately, the data available on the rhythmic properties of the Transeurasian languages are quite limited and sometimes controversial. It is, hence, an arduous task to link the type of rhythm found in Turkish speech with a reliable source of data that could be used as an interpretive baseline.

The limited data suggest that Turkish is amongst languages spoken with a relatively high articulation rate, which is around 6.7 syll/s according to Cangi et al. (2020). The results obtained from the first research question, revealing that the multi-competent participants uttered 6.3 syll/s on average in Turkish, give support to the argument that Turkish has a high articulation rate. Considering the fact that the Romance languages tend to be spoken at faster rates than English and are often given as prototypical examples of syllable-timing (e.g. Spanish, Italian), the high articulation rate in Turkish speech could strike as a prosodic similarity with such

languages and may even suggest the presence of a kind of syllable-timing at the first glance. Paucity of reliable data on the Altaic languages notwithstanding, studies on such Transeurasian languages as Korean (Bradlow et al., 2017) and Japanese (Pellegrino et al., 2011) also denote a rate of articulation higher than that of English. In this connection, it could be speculated that the relatively high articulation rate in the Transeurasian languages, involving Turkish, plays a role in the perception of their specific linguistic rhythm although it may not necessarily be in the same way that it affects the Romance languages.

The link between articulation rate and stress-timing or syllable-timing is not direct and is, indeed, a hypothetical one at best. It is, however, tempting to argue that syllable-timed languages are likely to be amongst ones spoken with higher rates of articulation. One of the reasons underlying this link could simply be explained in terms of the distribution of syllable types in a language. Following Dauer's discussion (1983), languages that are perceived to be syllable-timed are often the ones that are affiliated with simpler syllable structure (e.g. V, CV, CVC) whilst languages that are attributed to be stress-timed demonstrate a more balanced distribution of syllable types and allow for more complex syllable structure (e.g. CV, CVC, CCV, CCVC, CVCC). What this argument about syllable structure entails is that languages with simpler syllable structure require lesser articulatory effort in spoken production and, hence, are likely to result in a high articulation rate. Nonetheless, languages with more complex syllable structure necessitate the speaker to be able to produce longer and more complex syllables more often, naturally exerting more articulatory effort and slowing down the rate at which syllables could be uttered. This implied phenomenon, English having more complex syllable structure (Dauer, 1983), seems to be reflected in the discrepancy found between the multi-competent participants' articulation rate—that is, 4.3 syll/s for English versus 6.3 syll/s for Turkish, the latter of which, for instance, is known not to permit consonant clusters in initial positions (Csato & Johanson, 1998).

Once a combination of relatively simple syllable structure and syllables functioning as basic rhythmic units (see Figure 7) is taken into consideration, it is, then, quite natural to come up with the observation of 'machine-gun' rhythm (Lloyd James, 1940) in the perception of allegedly syllable-timed languages that are spoken with a high articulation rate. Accustomed to a kind of 'linear' speech

production, Turkish L2 users of English might need to adjust themselves to the prosodic requirements of the trochaic rhythm of English (i.e. speaking with rhythmic units of foot in which syllables located at left-hand side are accented), including a slower articulation rate but with more information density (Pellegrino et al., 2011). In this line of discussion, the rate at which syllables are uttered per second could be regarded as a language-specific property and might require explicit training on the part of English L2 users that are not accustomed to the trochaic rhythm of English.

As for the differences observed between elicitation methods, the research has found the short story (4.4 syll/s for English and 6.5 syll/s for Turkish) and pooled sentences (4.6 syll/s for English and 6.5 syll/s for Turkish) to be consistently faster than spontaneous speech (4.1 syll/s for English and 6.0 syll/s for Turkish). This finding is in congruence with the results reported in other studies utilising multiple elicitation methods (e.g. Bradlow et al., 2017). Spontaneous speech, as opposed to read speech, tends to be slower because it is mostly impromptu and demands a greater cognitive effort on the part of the speaker. This effect of increased cognitive load, as shown in previous studies (Bortfeld et al., 2001), can as well be observed in the difference between the multi-competent participants' articulation rates in read and spontaneous speech samples examined in the study. In order to illustrate the distinction between elicitation methods, one may reckon with Levelt's (1989) model of speech production. When reading out a bunch of sentences or a story, the speaker need not exhibit much cognitive effort, for conceptualisations have already been made, and thoughts have readily been formulated in proper linguistic forms for the speaker. Nevertheless, the speaker is required to conceptualise his/her thoughts and formulate them in accordance with the available linguistic options and, then, articulate the final output in a typical instance of spontaneous speech, which possibly causes articulation rates to slow down due to more cognitive processes taking place at the same time.

It should be noted that in measuring articulation rate, age and gender are amongst variables that can have a significant impact on results. The group of multi-competent participants in this study is quite homogeneous in terms of the variable of age, but gender is not equally distributed. There were more females than males in the participant group that contributed to the data set. Therefore, the results might have been affected by the number of females included in the research. It is a known

fact that the anatomy and physiological features involved in the production of speech are somewhat different for women from men (Hixon et al., 2020). Given that there are some studies revealing the overall articulation rate of female speakers being slower than that of male speakers (e.g. Lee & Doherty, 2017), the values of articulation rates reported in this research might have marginally been affected by the factor of gender.

One of the most important aspects of rhythm is that when L2 users of English come from a different linguistic background with no rhythmic stress, as is arguably the case in this study, their multi-competence needs to adjust itself to a new sort of prosodic structure, possibly altering features entrenched in L1 prosody in the process of doing so. The trochaic rhythm of English utilises stress-accent to make the left-hand syllable more prominent than following unaccented syllables in a foot, which could be considered as a factor that can slow down the speaker's articulation rate because of higher articulatory effort required for higher pitch, longer duration, and increased intensity needed in the process of accentuation. Turkish, however, can be claimed to make a lesser use of stress-accent, as the difference between accented syllables and unaccented ones is not as much striking as in English for most of the time. The relatively less prominent accent in Turkish lends itself to a higher rate of articulation, which, at the same time, requires multi-competent Turkish L2 users of English to accommodate a new kind of stress-accent, perhaps making their speech sound more 'syllable-timed', or slowing down their articulation rates until the full articulatory control is achieved at different stages of speech production in the course of L2 acquisition.

ΔC metric scores (RQ2). It is claimed by Ramus et al. (1999) that ΔC is one of the acoustic indices that can cross-linguistically be used to discriminate types of linguistic rhythm. It reflects the variability in the duration of consonantal intervals in the speech signal, which is supposed to be greater for those languages that are often attributed to be stress-timed (Nespor et al., 2011). In the study, the research question 'What are the scores of ΔC obtained from the multi-competent participants in story, sentence subsets, and spontaneous speech in English/Turkish?' tried to reveal the standard deviation of consonantal intervals in the multi-competent participants' spoken production across different elicitation methods. The goal underlying this research question was to probe into whether or not hypothetical

patterns of ΔC (i.e. higher ΔC for stress-timing and lower ΔC for syllable-timing) applied to Turkish L2 users of English.

It has accordingly been found that the multi-competent participants' ΔC metric scores for English are quite high on average (ΔC=62.6, SD=7.8). This finding is in alignment with previous studies of rhythm metrics that reported comparatively high levels of variability in the duration of consonantal intervals in English speech (Ramus et al., 1999; Grabe & Low, 2002; White & Mattys, 2007a; Mairano, 2011; Arvaniti, 2012; Ordin & Polyanskaya, 2014; Rathcke & Smith, 2015). Given the proviso that stress-timed languages pattern with high ΔC scores (e.g. English, German, Dutch), this finding could be interpreted as an empirical sign of English belonging to a rhythm class that is perceptually different from languages that consistently pattern with low ΔC scores (e.g. Spanish, Italian, French).

In contrast with English, the multi-competent participants' ΔC metric scores for Turkish are fairly low (ΔC=44.8, SD=2.6). This finding, when compared with the results of Turkish speakers in previous studies, presents some values that are lower than that reported by Mairano (2011) and Nespor et al. (2011), which suggests that Turkish speech could be more 'even-timed' than expected, at least in terms of consonantal durations. However, it should be noted that the results reported by the mentioned studies are best taken with a grain of salt due to the fact that in Mairano (2011), the values presented are of one native Turkish speaker's data collected via a single elicitation method (read samples of the North Wind and the Sun), and in Nespor et al. (2011), the estimate scores are from unpublished results of an unspecified number of Turkish speakers. In this regard, the current study, using the data obtained from seven speakers across three elicitation methods, can be claimed to fill an important gap in the field by providing a more reliable baseline for ΔC metric scores belonging to Turkish speech.

A feasible explanation of the discrepancy between the multi-competent participants' scores for English and Turkish to some extent lies underneath syllable structure, in line with earlier observations made by Dauer (1987) as regards the components of linguistic rhythm and their inter-connectedness in a wholistic framework. A common way for syllables to gain weight in most languages is the addition of consonants. The larger number of syllable types permitted in a language, the greater chances are that the number of consonants included in the syllable will

vary, resulting in higher levels of variability and hence higher ΔC scores. In other words, if, for example, CV is the most common syllable type in a language, the duration of consonantal intervals will inevitably resemble one another, reducing ΔC scores. Therefore, the multi-competent participants' ΔC scores in this research give further support to that English deviates from Turkish in terms of syllable structure, which perceptually affects speech rhythm and possibly leads to a typological distinction between these two languages as far as consonantal variability is concerned.

Turkish speech, having relatively low ΔC scores, seems to pattern more with the Romance languages such as Spanish (e.g. White & Mattys, 2007a) and Italian (e.g. Arvaniti, 2012). If we assume these Romance languages to be prototypical syllable-timed languages, Turkish could then be considered as being closer to the syllable-timing end of a typological continuum of speech rhythm thanks to sharing the same characteristic. A major factor causing the multi-competent participants to demonstrate low ΔC scores in Turkish is that whilst clusters of consonants are common at word-initial and word-final positions in English, the former position is typically not permitted in Turkish, except for a number of borrowings from foreign languages (Kemaloglu et al., 2017). Another reason could be linked with the differences observed in utterance-final lengthening. During the analysis of the spoken data, the lengthening of utterance-final syllables has been observed in both languages; however, cases in Turkish tended not to be as accentuated as English ones. A detailed analysis of this phonological phenomenon is beyond the scope of this paper and could perhaps be tracked down to particular suprasegmental differences between these respective languages.

According to the neurolinguistic account of wholistic bilingualism given by Grosjean (1989), bi/multilingual speaker-hearers have to function in a state of mind in which the co-existence of multiple languages leads to an integrated language ability. This presumption, captured as one of the key premises of multi-competence (Cook, 2016a), entails a sort of cross-linguistic influence that is constantly in effect. The high degree of variability in consonantal intervals in English that the multi-competent participants showed in this research proposes an implication related to the existence of such cross-linguistic interactions at phonetic level. Although the general assumption for L2 users would be to achieve intermediary scores in-

between two monolingual groups of native speakers in an expected scenario of accommodation, an example of which could be observed in Spanish-English speakers in White and Mattys (2007a), it may not always be the same trend that is manifested. The pattern of accommodation followed by a group of L2 users, as well as its pace, may differ according to contextual constraints imposed by the hierarchical place with which they are associated (see Table 2; de Swaan, 2001), in addition to typological distances between speaker-hearers' mother tongue and the target language.

The methodological criteria followed in the study are comparable to those in Arvaniti (2012), incorporating similar elicitation methods (i.e. collecting both read and spontaneous speech samples) and using the same short story (the North Wind and the Sun) and the same sentence subsets for English (i.e. sentences in the three subsets are identical). The mean of ΔC values, calculated from eight monolingual English speakers, was reported by Arvaniti (2012) to be 60.0, which makes it an arguably reliable baseline thanks to similar materials selection and a comparable number of participants. In the current study, the mean of the multi-competent participants' ΔC scores for English is found to be 62.6, representing the data of Turkish L2 users of English. Also tentatively discussed by Gut (2012), interval metrics measuring consonantal variability have in some cases been proved to discriminate native and non-native speech. By the same token, it is tempting to argue that ΔC metric has here been found to differentiate between monolingual L1 speech and bi/multilingual L2 speech, in light of the comparison between the results presented in this research and the outer baseline provided by Arvaniti (2012).

To reiterate, the mean of the multi-competent participants' ΔC scores is 44.8 for Turkish and 62.6 for English, yet the monolingual baseline for English could be presupposed as 60.0 (Arvaniti, 2012). Whilst at a first glance it may look as if the multi-competent participants have overshot the target, this pattern can suggest cross-linguistic influence at a deeper level of language processing and cognition. It is advanced that, even in a monolingual speech mode, L2 users activate information about multiple languages, involving those related to L1 or perhaps other linguistic components within their multi-competence (Grosjean & Li, 2013). The cause of this phenomenon is often attributed to the idea that 'the acquisition and use of two languages embedded in a mental conceptual structure that is at the centre of human

thought and behaviour necessarily results in a different configuration that found for single-language minds' (Kroll & Bialystok, 2013, p. 497). In this vein of discussion, the greater consonantal variability that is demonstrated by the multi-competent participants in English, despite relatively more 'even-timed' L1 evidence obtained in Turkish, could be linked with a sort of cross-linguistic influence stemming from phonetic and phonotactic reasons.

Consonant clusters at the beginning of words, as mentioned earlier, are not permitted in Turkish, and at other positions, they tend to be relatively simple when compared with English (e.g. clusters formed with three or more consonants occur much more frequently in English). It is, therefore, natural to envisage for Turkish speech to have ΔC scores lower than that of English, but the interesting result in this research is that the multi-competent participants' ΔC scores are not in-between two points of reference; they are higher than the monolingual baseline. If Turkish were more even-timed, then Turkish L2 users of English could be expected to speak English with a value of ΔC that is lower than the one belonging to monolingual native speakers of English, yet this is not the case in the given situation. Rather, what the results suggest is a sort of cross-linguistic influence that is in effect at the articulatory level due to the speakers' familiarity with phonetically different languages.

As put forwards by the concept of multi-competence, L2 users' language ability depends upon an overall system formed as a result of the knowledge and use of multiple languages (Cook, 2016a). In this regard, Turkish speaker-hearers of English can be considered in a cross-linguistic conundrum. Consonantal intervals involving a small number of consonants are unmarked in the sound structure of Turkish, implying that Turkish native speakers are much more accustomed to articulating CV sequences than, say, CCV or CCCV ones. This is verified by Maddieson's (2013) entry about the feature of syllable structure in the *World Atlas of Language Structures*, in which Turkish falls into the category of 'moderately-complex', but English is regarded as 'complex'. In this conjunction, the multi-competent participants in this research have been observed to have a certain amount of difficulty in the articulation of such complex strings of consonants, which, in turn, extends the duration of consonantal intervals longer than it would take for a monolingual native English speaker to utter.

The explanation of this pervasive influence can be sought after the orientation of cross-linguistic relationships that are established at the articulatory level. The high variability in the duration of consonantal intervals may be the repercussions of compound (see Figure 1) or subordinate relationships (see Figure 3) affecting the multi-competent participants' phonetic and phonological abilities. To illustrate, the consonant cluster at the beginning of the word 'strange' is likely to be conceptualised as a whole '/str/' by most English native speakers, who would usually articulate it as if it were a single phoneme in a typical scenario of speech production. Clusters like this are quite natural in English phonotactics and native speakers of English do develop required advanced phonetic skills in the course of their L1 acquisition. Nonetheless, for Turkish speaker-hearers of English, /str/ would arguably be more likely to be perceived as /s/ + /t/ + /r/, since individual concepts are formed for the corresponding phonemes but not for a cluster of them in the course of their L1 acquisition. This is one of the reasons why many Turkish speakers of English tend to epenthesise a short vowel like /ə/ or /ɪ/ in-between such strings of consonants, as they may yet to develop the necessary advanced phonetic skills due to a profound lack of cluster concept in their L1.

The articulation sequence of an interval like /str/ for a Turkish L2 user of English could then be hypothesised to be composed of individual instances of /s/, /t/, and /r/ phonemes rather than a compound cluster phoneme, which naturally exerts relatively more cognitive and articulatory effort and hence increases the variability of consonantal intervals in parallel with longer frame of time required for the speaker to process it during speech production. Therefore, the pattern of rhythmic accommodation within L2 users' multi-competence should not be conceived of as restricted to phonotactic structure; rather, it should be conceptualised within a wholistic framework of prosody in which a mastery of phoneme production is also a significant variable. In this regard, the values of ΔC for English, which are higher than the monolingual baseline (Arvaniti, 2012), could be an indicator of a subordinate or compound cross-linguistic orientation that facilitates the multi-competent participants' speech production in English through the activation of phonemic concepts previously formed for Turkish consonants, causing their articulation of consonants to take more time than the expected yardstick until their inter-connected cognitive and articulatory skills are integrated to

a greater degree (see Figure 4; Cook, 2003), and the rhythmic properties of English as an L2 are accommodated accordingly (see Figure 5; Cook, 2007b). In this respect, the fact that the bi/multilingual speakers' ΔC scores differ from the monolingual English speakers (Arvaniti, 2012) highlights that there are not separate competences in L2 users' minds; rather, L1 and L2 could be considered to be contingent upon one another, which is essentially captured with the term multi-competence.

The cross-linguistic pattern observed here can be claimed to represent an ongoing process of integration, and as a result it shows that speech rhythm, like other suprasegmental features of pronunciation, is subject to speaker-hearers' idiosyncratic state of multi-competence, which should be taken into consideration as an important part of the teaching of target pronunciation. Similar patterns are also found in the rhythmic development of L1 child speech, as Payne et al. (2011) show that the consonantal variability decreases in parallel with the increasing degree of mastery in phoneme production. Furthermore, albeit for a different language pair, Stockmal et al.'s study (2005) as well suggests that the durational variability in consonantal intervals in non-native speech is higher than native speech, and it suitably decreases with the increasing level of competence in target language pronunciation. That speech rhythm demonstrates more target-like features as the multi-competent language user moves along the integration continuum is what these findings have in common, implying that inter-connected features of pronunciation are to a considerable extent malleable and can dynamically be adjusted in accordance with developing competences in L1, L2, or Ln.

As for the effects of elicitation methods on ΔC values, the consonantal variability in spontaneous speech (ΔC=72.7 for English and ΔC=47.2 for Turkish) has been found to be substantially greater than in the short story (ΔC=57.4 for English and ΔC=44.7 for Turkish) and pooled sentences (ΔC=57.8 for English and ΔC=42.4 for Turkish). This finding agrees with the variations observed between ΔC scores in different elicitation methods used in Arvaniti's study (2012). It is hereby shown that consonant production in spontaneous speech tends to be more variable and less controlled than it is in read speech, most probably due to higher cognitive load that causes speakers to have a lesser control over their articulation. The direction of change is the same for English and Turkish, suggesting that L1 and L2

speech both demonstrate an increase of consonantal variability in spontaneous speech although the effect size for L2 speech is found to be greater. One of the main reasons behind this finding is that English is already a high-ΔC language, meaning that a change in speaking styles is likely to occur by a margin larger than a low-ΔC language such as Turkish. Another explanation relates to differing levels of reliability that stem from the discrepancy between native and non-native competences. Turkish is the participants' L1, and they are naturally good at controlling their speech production in different styles of speaking; however, English is acquired later than their mother tongue and functions as their L2, in which they have less experience in motor control of speech muscles and other cognitive or articulatory processes that affect speech production—even though they are highly proficient L2 users of English.

A consistent trend of change in ΔC scores was also found between sentence subsets. To recap, the stress-timed subset had been manipulated to contain more closed syllables and consonant clusters as opposed to the syllable-timed subset containing more open syllables and fewer consonant clusters, whilst the unchecked subset was uncontrolled in terms of syllable structure or any kind of clusters. As expected, the consonantal variability in the stress-timed subset (ΔC=70.6 for English and ΔC=49.6 for Turkish) was greater than in the syllable-timed subset (ΔC=47.4 for English and ΔC=37.3 for Turkish), which implies that ΔC metric is prone to materials selection and can be manipulated in conformity with the number of closed or open syllables included in the text. On the other hand, the unchecked subset was found to produce intermediate scores (ΔC=55.6 for English and ΔC=40.3 for Turkish), suggesting that excerpts taken from original works are likely to increase the validity of rhythm metric scores by virtue of the fact that ΔC scores obtained from them are neither extremely high nor too low but tend to be around the average values characterised with values of read speech in these respective languages. This pattern, again in alignment with that is shown by Arvaniti (2012), indicates that neither of the manipulated subsets should be taken as an absolute point of reference. Rather, a combination of different subsets or a set of sentences randomly taken from authentic works could constitute a more reliable baseline for read speech considering that the means of ΔC scores in pooled sentences, in which

the scores obtained from the three subsets are averaged, are found to be quite close to those in the short story.

An important implication that could be drawn from the findings of this research question is that bi/multilingual speaker-hearers, indeed, appear to switch between rhythmic styles when speaking different languages, at least according to what rhythm metrics can offer at the moment. It is, hence, plausible to assume that speech rhythm, just as lexis or grammar, is to some degree language-specific and may cause L2 users some difficulty if L1 and L2 display different characteristics as regards the timing and patterning of spoken language (e.g. switching between a low-ΔC language and a high-ΔC language). This is because bi/multilingual cognition does not necessarily isolate information about languages learnt, as discussed by Kroll and Bialystok (2013). Instead, features belonging to additional languages are somehow integrated to this overall system (Cook, 2007b), which occurs in distinct ways for multi-competent individuals. Therefore, finding traces of L1 in L2 speech rhythm, as shown in the study, is quite natural because the 'switch' from one language to another takes places within the shared bi/multilingual cognition, in which, as Grosjean and Li (2013) argue, languages known by the L2 user stay (partially) active even if they are not the medium of communication in a given situation. By the same token, it is very likely to find traces of L2 in L1 speech rhythm according to the multi-directional relationship between languages that is outlined by Cook (2003), with the proviso that there is readily a reliable baseline belonging to monolingual L1 speakers that can be used as an interpretive yardstick.

%V metric scores (RQ3). Vocalic intervals are high sonority elements that play a crucial role in the perception of rhythm. Akin to ΔC metric, Ramus et al. (1999) propose that the proportion of vocalic components in the speech signal is another interval measure (i.e. %V) that can cross-linguistically be used to discriminate types of linguistic rhythm. It reflects the overall proportion allocated to vocalic intervals across utterances, which is supposed to be higher for languages that are often affiliated with syllable-timed rhythm (Nespor et al., 2011). In the study, the research question 'What are the scores of %V obtained from the multi-competent participants in story, sentence subsets, and spontaneous speech in English/Turkish?' tried to reveal the proportion of vocalic components in the multi-competent participants' read and spontaneous speech samples. The goal underlying this research question

was to probe into whether or not hypothetical patterns of %V (i.e. lower %V for stress-timing and higher %V for syllable-timing) applied to Turkish L2 users of English.

It has been found that the ratio of vocalic component in the speech signal is moderately high for English on average (%V=45.7, SD=1.2). This finding is considerably higher than values reported in most of the previous studies (Ramus et al., 1999; Grabe & Low, 2002; White & Mattys, 2007a; Rathcke & Smith, 2015). Despite seemingly being in incongruence with these studies, the values reached in this research coincide with the results of some other studies (Arvaniti, 2012; Ordin & Polyanskaya, 2014). In fact, a close alignment is somehow established with the average %V metric score reported by Arvaniti (2012), which unveils an important finding since the metric results in Arvaniti's study (2012) are obtained from a monolingual group of English speakers and achieved through comparable methodology. Given the proviso that stress-timed languages pattern with low %V scores (e.g. English, German, Dutch), the particular finding at hand raises certain issues related to the threshold that should be met by a language to be acknowledged as a member of syllable-timed languages that pattern with high %V scores (e.g. Spanish, Italian, French).

The analyses carried out in this study are constrained to the language pair of English and Turkish; therefore, some prototypical stress-timed or syllable-timed languages are left out of an inner comparison. In this respect, a comparison with an outer baseline can be made considering the harmony between the results in the current study and the multiple-language data presented by Arvaniti (2012). The grand mean of the participants' %V metric scores calculated for English appear to be identical in both studies. Arvaniti's data indicate that languages that are typically posited to be syllable-timed, such as Spanish and Italian, consistently display higher %V values than English. Moving from this yardstick, the findings offered by the present research support the postulation that English patterns with a group of languages that are different from those characterised with high %V values. It is, hence, plausible to assume that on a typological continuum of speech rhythm, English, displaying a comparatively low %V as a Germanic language, is a representative of the rhythmic group that are affiliated with stress-timing (see Table 3).

On the other side of this language pair, a rather surprising finding has emerged. The mean of the multi-competent participants' %V scores for Turkish is found to be moderately low (%V=43.4, SD=1.0). Despite the lack of a reliable interpretive baseline, the average value unearthed in this research is lower than those asserted by Mairano (2011) and Nespor et al. (2011), suggesting that the ratio of vocalic component in the signal of Turkish speech might, in fact, be lower than expected. It should be borne in mind that the cited studies present the limited data on Turkish speech in terms of number of speakers and types of elicitation methods. The current study, however, triangulates the results of rhythm metrics via speech samples collected from seven Turkish native speakers across three elicitation methods. On this point, although there might possibly be differences with such studies regarding the process of segmentation, the results achieved in this research represent a substantially larger data set.

It is a contradictory finding that Turkish has a lower %V value than English. According to the point that syllable-timed languages are claimed to be located on a typological continuum of speech rhythm (Table 3), Turkish is presumed to pattern with high %V languages, but the results at hand suggest otherwise in terms of the proportion of vocalic component in the speech signal examined. If Turkish is, indeed, a syllable-timed language as claimed (e.g. Topbas, 2007; Demirezen, 2015), it would then be expected to display higher %V values than stress-timed languages, say, English or other aforementioned Germanic languages. Considering that %V, mostly unaffected by changes in speech rate, is upheld as the most reliable rhythm metric for measuring L2 speech (Gut, 2012), the reason behind this mismatch can be sought after three main variables: language-specific properties, the degree of discrepancy between L1 and L2 performances, and materials selection.

An inspection of syllable structure reveals that the canonical syllable type in Turkish is CV (Topbas, 2007) whilst English demonstrates a more diversified distribution of syllable types such as CVC, CV, CVCC, CCVC, CVC (Dauer, 1983). The fact that CV is the canonical syllable type in Turkish, in fact, denotes a supposedly higher ratio of vocalic component to the total duration of an utterance, but this is not confirmed as far as the values of %V concerned. As Maddieson (2013) outlines, English has a relatively more complex syllable structure, which, in turn, allows for a greater number of syllable types, leading to an increase in the proportion

of consonantal component in the speech signal. Therefore, an expected outcome for English is to have a low %V value, which is arguably supported in this research according to the outer baselines; and it is expected for Turkish to have a high %V value, which is not confirmed in the analysis of the multi-competent participants' L1 speech because Turkish is found to have a %V value even lower than English. Despite the salience of intuitive distinction between the types of rhythm employed in Turkish and English, the rhythm metric %V has produced conflicting results in this language pair when more complex syllable structure of English is taken into account. A contrastive analysis of syllable structure between Turkish and English is beyond the scope of the study; however, it could be illuminating to investigate its effects on the quantification of linguistic rhythm.

An important language-specific feature that directly affects rhythm is vowel reduction. English has a multivalent sound system that shows the flexibility of reducing some of the vowels in its inventory to an unstressed sound (schwa). This feature can be regarded as an essential phonological tool for stress-timing because the perception of stress-timed rhythm depends upon attenuating unstressed syllables through vowel reduction as much as it depends upon accentuating stressed syllables through stress-accent. The feature of vowel reduction has a profound impact on %V metric because when a vowel is reduced to schwa, it becomes less prominent and shorter in its phonetic duration, which ends up decreasing %V values. On the other hand, Turkish has a univalent sound system in which vowels are typically not permitted to change when they are unstressed. Although, for example, %V scores would be different between weak and strong forms of some words in English, this does not occur in Turkish. All things considered, English displays a feature that is likely to decrease speaker-hearers' %V metric scores whilst Turkish lacks such a multivalent feature. From a phonological perspective, Turkish is again expected to have a %V value higher than English, which, as a cross-linguistic difference, fails to explain the results at hand.

Another language-specific difference can be found between the English phonemic inventory and the Turkish phonemic inventory. According to the International Phonetic Association, English (Ladefoged, 1999) has a larger inventory of vowels than Turkish (Zimmer & Orgun, 1999). The differences between vowels used by speaker-hearers of this language pair lead us to a phonetic

perspective for a viable explanation of the reason why the ratio of vocalic component in the speech signal is relatively low for Turkish. A key factor that determines the length of a vocalic interval is intrinsic duration of vowels, implying that the Turkish vowels could overall be shorter than the English vowels. A tentative look at the studies on the duration of vowels in these languages appears to prove this assumption: many Turkish vowels (Arisoy, et al., 2004) tend to be shorter than English ones (Jacewicz et al., 2007). Furthermore, English speech is known to make an extensive use of diphthongs and triphthongs. Featuring a set of vowels the intrinsic durations of which are comparatively short and being largely dependent upon monophthongs for the construction of nuclei of syllable structure could be amongst the reasons why the results achieved in this research indicate a relatively low proportion of vocalic component in Turkish speech. In addition to these points, the high vowels in Turkish are known to undergo devoicing in certain positions (Jannedy, 1995), which is another consideration that should be kept in mind because such cases were labelled as part of the adjacent consonantal intervals in the process of segmentation, in congruity with the reliance upon acoustic cues.

It must cautiously be underlined that the low %V values obtained from Turkish speech samples do not necessarily make them sound more stress-timed, Turkish speech still arguably sounds closer to the group of languages that are affiliated with syllable-timing. This is because consonantal intervals in Turkish are more even-timed than that of English, and there are other suprasegmental factors contributing to this phenomenon. One is the effect of accentuation on stressed syllables: if a syllable in English carries stress-accent it becomes perceptually more prominent and approximately 1.5 times longer than its unaccented form (Dauer, 1987). Accentuation through stress-accent and attenuation through vowel reduction greatly contribute to how English speech is rhythmically perceived to be stress-timed. Turkish speaker-hearers, contrary to the former, are not required to be sensitive to the perceptual differences between accented and unaccented syllables, perhaps due to the fact that accent is not linguistically useful in most of Turkish communication. It is for this reason that explicit suprasegmental training might be needed for Turkish L2 users of English to use linguistic rhythm effectively in meaning-making.

In addition to the language-specific features that have hitherto been mentioned, the multi-competent participants' %V metric scores are also affected by the degree of discrepancy between their L1 and L2 performances. The results from Turkish speech samples, displaying a smaller standard deviation, prove that L1 performance is more stable than L2 performance. This might indicate that in the participants' bi/multilingual cognition, L2, which is English in this case, is still in the ongoing process of integration, whereas L1 is already entrenched, and the articulatory skills required for its speech production are mastered somewhat better than they are for English. This process of integration notwithstanding, a surprising finding offered by this research relates to the multi-competent participants' particular %V scores in English speech. According to Grosjean and Li (2013), L1 should to some extent be active even in a monolingual L2 speech mode, an expected outcome of which in this case could be the transfer of Turkish vowel /ɯ/ into English as a replacement of reduced vowel /ə/, provided that the participants have yet to constitute a distinct compound or coordinate concept for it (see Figure 1 and Figure 2).

The postulated scenario of transfer would be presumed to increase the multi-competent participants' values of %V in English speech. However, considering the outer baseline (Arvaniti, 2012), the bi/multilingual speakers in this research have somehow achieved the same average %V metric score as the monolingual speakers of English. Acknowledging that there might, indeed, be significant variations between the standard deviation of the %V values in this research and those in the outer baseline, the closeness between the metric scores obtained by the bi/multilingual and monolingual speaker-hearer groups support the claim that the L2 users of English in this study were quite competent English teachers who would not be likely to struggle modelling the target language rhythm to learners, at least in terms of vocalic intervals. As for the claim made by Grosjean and Li (2013), regarding the pervasive influence of wholistic bilingualism, the results achieved in this research do not necessarily reject the conception of parallel activation. Rather, it is shown that, Turkish L2 users of English can successfully incorporate the concept of vowel reduction into their multi-competence at a certain level of proficiency in the target language. As the interaction between L1 and L2 phonetic subsystems may result in the assimilation or dissimilation of some phonetic

categories (Flege et al., 2003), the way that the multi-competent participants accommodate English vowels may still vary. For instance, /ə/ could be integrated into a compound concept in terms of quantity but not quality (e.g. it may be articulated at a point of articulation that is close to Turkish vowel /ɯ/), which would explain why the multi-competent participants produce %V scores similar to the monolingual group of English speakers but 'sound' different from them. This fact supports Watson's (1991) idea that bi/multilingual speaker-hearers might be close to monolingual groups in terms of their production and perception, but they are, in fact, distinct from them due to their bi/multilingual cognition that is dynamically re-shaped in accordance with the L2 user's unique place on the integration continuum, as Cook (2007a) suggests. On the other hand, what this closeness between the monolingual native speakers of English (Arvaniti, 2012) and the bi/multilingual group of participants in the this study implies is that %V as a rhythm metric could not always be a robust indicator of the accommodation process for every language pair, contrasting with the proposition put forth by White and Mattys (2007a).

Multi-competence is a total system that functions on the basis of unique configurations of cross-linguistic relationships formed by bi/multilingual speaker-hearers (Cook, 2016a). In this regard, what may be difficult for Turkish L2 users of English to accommodate in the target language rhythm might be different from what is difficult for Spanish L2 users of English, which would in part explain the contrast observed between this research and White and Mattys's study (2007a) as regards the discriminative capability of %V metric. Taking into consideration that L1 is a major linguistic component within multi-competence and is in constant interaction with L2 and other mental processes (see Figure 5), language-specific properties belonging to L1 will inevitably influence how the accommodation of L2 is carried out. With respect to the quantification of speech rhythm, the proof for this postulation comes from the variation in metric scores achieved by different groups of L2 users of English. For instance, the pattern of accommodation exhibited by Turkish L2 users of English in this research, indeed, appears to be distinct from Spanish L2 users of English in White and Mattys's study (2007a), possibly suggesting that the idiosyncratic state of multi-competence affects how the target rhythm is integrated into bi/multilingual speaker-hearers' pronunciation. It is for this reason that the cross-linguistic influence between Turkish and English would differ from, say, the one

between Spanish and English despite the fact that both Turkish and Spanish are located towards the syllable-timed end on a typological continuum of speech rhythm. In this regard, Turkish speaker-hearers' knowledge of their mother tongue should not be neglected as a potential variable of cross-linguistic influence in teaching English rhythm, which requires language teachers to be aware of certain conceptual points that can pose learners some challenges in the integration of the target language rhythm.

Regarding the effect of elicitation methods on %V values, the overall proportion of vocalic component in spontaneous speech (%V=46.2 for English and %V=44.6 for Turkish) has been found to be slightly greater than in the short story (%V=45 for English and %V=42.8 for Turkish) and pooled sentences (%V=45.9 for English and %V=42.7 for Turkish). This pattern, as was the case for ΔC metric, agrees with the direction of change in %V scores across elicitation methods shown in Arvaniti's study (2012). It is revealed that vocalic component in spontaneous speech tends to be at a higher ratio when compared with read speech. The consistency found in the differences between read and spontaneous speech samples proves that the two corresponding styles of speech vary with respect to rhythm. Spontaneous speech is mostly unplanned and necessitates a longer phase of linguistic formulation in the course of interaction, which puts a greater degree of cognitive effort on speaker-hearers, possibly resulting in a phase of articulation that is less-controlled compared with read speech. One of the many reasons of higher values of %V in spontaneous speech is that it is a common communication strategy for language users to elongate a particular syllable to gain extra time before they linguistically formulate their following thoughts. This is a kind of strategy that the multi-competent participants in this research have as well been observed to make use of, an example for which could be the elongation of the syllable /æ::nd/ in order to take more time for thinking and formulate their following utterance.

Aside from the distinction between read and spontaneous speech, materials selection strikes as an extremely important variable as the results from the sentence subsets demonstrate. To recap, the syllable-timed subset had been manipulated to include more vowels as opposed to the stress-timed subset containing more consonants, whilst the unchecked subset was uncontrolled in terms of the ratio of vocalic or consonantal material. In harmony with expectations, the vocalic proportion

in the syllable-timed subset (%V=49.7 for English and %V=47.7 for Turkish) was higher than in the stress-timed subset (%V=42.9 for English and %V=38.9 for Turkish), which confirms the discussion put forth by Renwick (Renwick, 2011): %V is contingent upon the ratio of open syllables included in elicitation materials. The unchecked subset, consisting of authentic samples from original works, was found to produce %V scores that are in-between these two manipulated subsets (%V=44.9 for English and %V=41.5 for Turkish). The results show that it is an arduous, if not impossible, task to constrain the effect of elicitation methods and materials selection on rhythm metrics.

An important implication that could be drawn from this research question is that bi/multilingual speaker-hearers, as was the case for ΔC, appear to switch between rhythmic styles when speaking different languages, adjusting the ratio of vocalic material in their speech accordingly. In this regard, it is amongst feasible considerations to regard %V as a rhythmic component that could be a language-specific property L2 users need to integrate within their multi-competence. Partly due to joint activation of multiple languages, re-organisation of linguistic and cognitive systems is a process idiosyncratically carried out for bi/multilinguals (Kroll & Bialystok, 2013), throughout which it is possible to find traces of L1 in L2 speech rhythm or vice versa. According to the comparison between the results offered by this research question and the monolingual baseline (Arvaniti, 2012), it seems to be easier for Turkish L2 users of English to accommodate the vocalic proportion in their L2 speech than to adjust consonantal variability. Nonetheless, it must be borne in mind that the multi-competent participants in this study are highly proficient L2 users of English, who may have readily passed a certain 'threshold' in the accommodation of L2 rhythm. Learners, at an earlier stage of this process of accommodation, may show different characteristics as to how vocalic and consonantal components are timed and patterned in various kinds of speech production.

Conclusion

The fundamental purpose of this study was to investigate the influence of linguistic multi-competence on L2 speech rhythm. Turkish L2 users of English were chosen as the target population, and multiple-language evidence was collected from seven highly proficient Turkish EFL teachers. The results of the acoustic analysis,

using articulation rate and two interval-based rhythm metrics (ΔC and %V), were worth attention. It was revealed that there is a consistent pattern discriminating the type of rhythm in Turkish L1 speech and English L2 speech, highlighting the fact that the timing and patterning in speech production could well be a language-specific property that needs to be accommodated in the course of language acquisition. It is, hence, of utmost importance to regard linguistic rhythm as a prosodic property that is inter-connected within a complex meaning-making system. Just as, for example, one uses a different set of words or phonemes, the specific type of rhythm in L2 speech should as well be integrated into the L2 user's multi-competence accordingly. Furthermore, the comparison between the multi-competent participants and outer baselines has evinced that bi/multilingual speaker-hearers' rhythm, indeed, differ from that of monolingual native speaker-hearers, especially with respect to consonantal variability in the speech signal. As a result, the knowledge of more than one language in bi/multilingual cognition is posited to be a profound factor underlying the deviation of English L2 speech rhythm from English L1 speech rhythm. An important conclusion of this study is that neither total separation nor total integration of rhythm seems to be possible for multi-competent L2 users. As the data of Turkish L2 users of English indicate, L1 and L2 rhythms cannot entirely be separated by virtue of sharing the same cognition, supported by the discrepancy of ΔC and %V values between bi/multilinguals and monolinguals. At the same time, they are not reduced into a single conception because L2 users can skilfully keep the languages apart, which can be observed from the multi-competent participants' deliberate switches from ΔC and %V values pertaining to Turkish to that of English.

Pedagogical Implications

A number of important pedagogical implications can be drawn from the results achieved in the study. First of all, it should be borne in mind that linguistic rhythm is likely to be perceived as a language-specific property, denoting that English and Turkish differ as to how speech is timed and patterned by their speaker-hearers. In this vein, the rhythm in English must be learnt like any other features of pronunciation that are considered to be essential for L2 users to be understood in communication. Speaking with correct rhythm is a part of speaker intelligibility, and there is substantial evidence indicating that instruction of suprasegmentals may

result in improved intelligibility (Levis, 2018). This study showed that the accommodation of the target language rhythm is a challenging task even for highly proficient non-native English teachers. Therefore, Turkish learners of English may require explicit instruction with a principled focus on cross-linguistic prosody in order to be able to accommodate the stress-timed rhythm in English. It is, therefore, advisable to keep rhythm as one of the suprasegmental priorities in pronunciation teaching. Whilst doing so, it could be feasible to view rhythm as an internal mechanism of prosody within a complex meaning-making system, since, as Fox (2000) states, rhythm is inter-connected with other paradigmatic and syntagmatic features of pronunciation, including phonetic subsystems, stress-accent, and so on.

Confirming this inter-connectedness, the study showed that articulation rate, vowels, and consonants are all amongst the factors that affect speech rhythm. If a bottom-up approach to pronunciation teaching were adopted, it could be beneficial for L2 users to focus on individual phonemes because increased phonemic accuracy is very likely to contribute to L2 rhythm as well. In a top-down approach, learners may benefit from instruction on how English prosody plays an active role in conveying meaning, which perhaps could be carried out in a comparative fashion with Turkish prosody. As the results indicate, bi/multilingual speaker-hearers' rhythm is somewhat different from that of monolingual native speakers. It could be important to raise L2 users' awareness of which kinds of rhythm they may encounter when interacting with different language user groups (see Table 2). As de Swaan (2001) underlines, the intended use of the target language to some extent depends upon the hierarchical place at which it is spoken. Hence, assuming that English language learners in Turkey are in the category of supercentral, it may be facilitative to familiarise them with the type of rhythm used in, say, the local category. A command of how rhythm may vary depending upon bi/multilingual and monolingual speaker-hearer groups is also expected to contribute to communicative competence.

A crucial point that is not to be neglected in this respect is that L2 users should not be regarded as failed native speakers, as emphasised by Cook (2002a). The results achieved in this research support the mentioned standpoint by showing that even highly proficient non-native teachers of English bear traces of their L1 in L2 speech rhythm. It is nearly impossible to constrain the influence of linguistic multi-

competence on L2 speech rhythm, since there cannot be multiple monolingual cognitions in the same mind. Therefore, an approach that references L2 users' knowledge of more than one language could be more suited to pronunciation teaching in the present context so as to set more realistic goals in education. Such goals are often posited to revolve around being a 'successful L2 user' (Cook, 2016a) and a 'resourceful speaker' (Pennycook, 2012), who are competent enough in the ability called multiphonology or pluriphonology, as termed by Pennington (2015). With regard to the scope of the study, a successful L2 user, in this case, can well be defined as one who skilfully changes their speech style and linguistic rhythm according to the language that is being spoken at the time of communication without violating mutual intelligibility.

Methodological Implications

The speech data collected in the study were analysed via software-based acoustic analysis, in which consonantal and vocalic intervals were manually labelled by the researcher. This method of analysis has worked well: despite being time-consuming on the part of the researcher, it accurately enabled to reach important findings that shed some light upon a number of rhythmic characteristics exhibited by multi-competent Turkish L2 users of English. Moving from the accuracy that manual labelling offers, one of the methodological implications in this regard is that manual segmentation done through the examination of acoustic cues still supersedes many methods of automated segmentation as of the time this research has been conducted. Therefore, manual labelling done by researchers can yield more valid results considering that rhythm metrics dependent upon interval measures are heavily reliant upon the placement of interval boundaries.

Another important methodological implication relates to criteria according to which segmentation is done. Studies on rhythm metrics may differ in terms of the criteria of segmentation followed by researchers. To overcome this problem, this study adhered to a set of standards that were laid out by some of the pioneering works (Ramus et al., 1999) in addition to following standard segmentation criteria (Machac & Skarnitzl, 2009). In order to come up with comparable findings, the criteria of segmentation used in analyses should explicitly be stated, especially those regarding pauses and acoustically ambiguous phonemes such as glides. If

methodological unity is adversely affected by different rules applied in labelling, comparisons of cross-linguistic performance in speech rhythm may yield futile results.

As for the use of different elicitation methods to collect data, an important variable of rhythm studies can be claimed to lie underneath the type of speech that is measured. Many research studies in the field have calculated rhythm metrics on the basis of data collected from read speech in which speakers are asked to read a predetermined passage or sets of sentences. The findings at hand, however, clearly prove that there is a significant difference between the rhythm in read speech and spontaneous speech. It is for this reason that using only read speech samples in the analysis of rhythm metrics may not be a true representative of L1 or L2 rhythm—which is one of the reasons why one may find overlaps of metric values amongst languages attributed to different rhythmic classes, in a cross-study comparison. A combination of multiple elicitation methods, as employed in this study, could be more feasible in terms of revealing true values of rhythm metrics belonging to a particular language.

For the collection of spontaneous speech samples, prompt questions were employed in the study. This method, addressing speaker-hearers' 'spoken production', was chosen because of its liability towards more standardised data collection procedure. If enough control over the procedure could be established, it may also prove useful to collect and analyse spontaneous speech samples from 'spoken interaction'. Naturally occurring interactions between L1 and/or L2 groups can strengthen the methodology and reveal further insights into monolingual and bi/multilingual speakers-hearers' speech rhythm, provided that a comparable procedure is followed amongst instances of interaction being analysed.

The study design in this research adhered to four main criteria suggested by Ortega (2016): L2 evidence, baselines, multiple-language evidence, and total system (see Table 4). The framework suitably lends itself for multi-competence research and other investigations of cross-linguistic influence. In this study, all the four criteria were met to the extent that the contextual factors allowed. Although the relatively homogeneous group of multi-competent participants were found to produce illuminating results, certain findings seemed to cast grave doubts on the reliance upon outer baselines. Due to differences in procedure and segmentation

criteria employed in studies, establishing inner baselines through monolingual control groups is likely to prove more useful when investigating cross-linguistic influence over a multi-competent group of speaker-hearers.

Suggestions for Further Research

Within the growing body of multi-competence research, pronunciation needs more attention at the target level of cross-linguistic influence. The focus in this study is placed on the investigation of speech rhythm through some interval measures. Because the data available on Turkish speaker-hearers are rather limited in terms of rhythm metrics, further research is recommended to confirm the values of rhythm metrics presented here. The data set in this study is composed of elicited read and spontaneous speech samples; it could be illuminating to compare them with speech samples collected from naturally occurring interactions.

The group of participants included in this study are highly proficient Turkish EFL teachers. Future studies could investigate the possibility of a developmental pattern in L2 speech rhythm by examining groups of English L2 users at varying proficiency levels. Moreover, establishing a monolingual baseline for Turkish speech would be a reasonable step to reach more conclusive results about how L1 speech rhythm and L2 speech rhythm affect one another. As the concept of multi-competence concerns the changes in L1, as well as those in L2, it could also be feasible to examine the effects learning English as a foreign language on Turkish L1 speech rhythm.

As discussed earlier, the multi-competent participants' %V scores for Turkish were arguably lower than expected. Considering the intuitive salience of syllable-timed rhythm in Turkish speech, it would be interesting for future studies to delve into the rhythmic characteristics that discriminate Turkish from the Romance languages such as Spanish and Italian, which are often given as prototypical examples of syllable-timing. On a typological continuum of speech rhythm, a further inquiry should be made into whether Turkish is 'less' syllable-timed than those Romance languages from a global perspective. Such an inquiry could yield important results as to why certain points of English rhythm are accommodated relatively easily, yet others pose more challenges to Turkish L2 users of English.

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APPENDIX-A: Elicitation Instrument in English

Methods of Elicitation: L2 Evidence (sentences adopted from Arvaniti, 2012, p. 368)

	Text
Story (The North Wind and the Sun)	The North Wind and the Sun were disputing which was the stronger, when a traveller came along wrapped in a warm cloak. They agreed that the one who first succeeded in making the traveller take his cloak off should be considered stronger than the other. Then the North Wind blew as hard as he could, but the more he blew the more closely did the traveller fold his cloak around him; and at last the North Wind gave up the attempt. Then the Sun shined out warmly, and immediately the traveller took off his cloak. And so the North Wind was obliged to confess that the Sun was the stronger of the two.
Sentences (stress-timed)	Andrew introduced McGivney to my best friends, Clare, Lindsey, and Kris. The problem required quite a long of strange equations and wasn't very easy. It was pretty clear from his presentation that he didn't know the product well. The production increased by three fifths in the last quarter of 2007. I just called Trent to confirm the appointment we had scheduled last Monday.
Sentences (syllable-timed)	Lara saw Bobby when she was on the way to the photocopy room. Everyone got up to leave as soon as the teacher said to do so. Tina did better than anyone of us could hope to do in the race. Sally and I were at Annie's house today planning our party. Two-year-old Lucy has macaroni and cheese every day for dinner.
Sentences (unchecked, from F. Scott Fitzgerald's *The Great Gatsby*, 1925)	When a man gets killed, I never like to get mixed up in it in any way. Through this twilight universe Daisy began to move again with the season. It was nine o'clock when we finished breakfast and went out on the porch. Some little boys had come up on the steps and were looking into the hall. I called Gatsby's house a few minutes later, but the line was busy.
Prompts for spontaneous speech (only one)	Do you think we will be able to colonise and establish a settlement on Mars in the near future? If you could travel back in time, whom would you like to meet and why?

APPENDIX-B: Elicitation Instrument in Turkish

Methods of Elicitation: L1 Evidence

	Text
Story (Poyrazla Güneş)	Poyrazla güneş, birbirlerinden daha kuvvetli olduklarını ileri sürerek iddialaşıyorlardı. Derken, kalın bir palto giymiş bir yolcu gördüler. Bu yolcuya paltosunu çıkarttırabilenin daha kuvvetli olduğunu kabul etmeye karar verdiler. Poyraz, var gücüyle esmeye başladı. Ancak, yolcu paltosuna gitgide daha sıkı sarınıyordu. Sonunda poyraz uğraşmaktan vazgeçti. Bu sefer güneş açtı; ortalık ısınınca yolcu paltosunu hemen çıkardı. Böylece poyraz, güneşin kendisinden daha kuvvetli olduğunu kabul etmeye mecbur kaldı.
Sentences (stress-timed)	Kürşat pastel renklerin hâkim olduğu resmi çok sevmişti. Böyle saygın bir heykeltıraş karşısında konuşmak zordur. Mektupta yazdıklarım gerçekten hiçbir art niyet barındırmıyor. Karşılaştığım, aklımdan geçen İstanbul'dan hayli farklıydı. Türkçe'nin toplumsal katmanda üstlendiği rol yadsınamaz.
Sentences (syllable-timed)	Kaleme aldığı bu gerici düşünce ona yakışmadı. Odamı maviye boyayınca eskisi gibi olmadı. Anadolu zamanı tanımayan yapısıyla bilinir. Huzur verici sesi ile alandaki herkesi büyüledi. Sanatçı eserini ebediyete kendisi taşımalı.
Sentences (unchecked, from H. Nihal Atsız's *Ruh Adam*, 1972)	Selim şimdi anlaşılmaz şekilde ızdırap duyuyordu. Karanlıktaki kadın çok yakında, yanı başındaydı. Bütün bunlar bir genç kızın bir iki sözüyle mi olmuştu? Edebiyat, hakikatlerin hayalle süslenmesidir. Onun gönlünden geçen fırtınalarla rahatsız edildim.
Prompts for spontaneous speech (only one)	Sizce bir yabancı dili öğrenme aşamasında konuşma dili ve sesletim mi yoksa yazı dili mi daha önemlidir? Dünya dışı yaşam formları arayan bir uzay aracıyla gönderilmek üzere konuşma hakkı edindiniz, mesajınız ne olurdu?

APPENDIX-C: Informed Consent Form in English

Dear participant, (Date: …/…/2021)

The purpose of this research is to investigate the suprasegmental phonologic interaction between Turkish and English in terms their syllable and stress timings. It aims to analyse the collected speech data through a number of different computer-based acoustic measurements. During this, your private details will not be associated with the voice recordings. The data will only be used within the scope of this research, carried out as a partial fulfilment of MA degree by Tunay Taş with the permission of Hacettepe University Ethics Commission. Also, the data will not be shared with any other third parties. Participating in this research is completely voluntary and expects you to read a passage and a set of sentences, then respond to a sample situation in English and Turkish. You have the right to resign from the research at any time: if you contact the researcher, your data and demographic information will be deleted and excluded from the analysis. Should you have any further enquiries afterwards, you can contact the researcher by emailing him to be informed about the study.

I express my deepest thanks for your invaluable contribution.

MA Student: Tunay Taş
Hacettepe University

Supervisor: Prof. Dr. İsmail Hakkı Mirici
Hacettepe University

By signing and/or filling in this form, I hereby allow the researcher to collect my voice recording as part of this research. I also understand that some recordings may appear publicly for the sake of academic dissemination.

Name and surname:			
Age and sex:			
Teaching experience:			
( ) 1-5 years	( ) 6-10 years	( ) 11-15 years	( ) 15+ years
Do you currently work at an educational institution?			
( ) No	( ) Yes, Primary	( ) Yes, Secondary	( ) Yes, Tertiary
Order of acquisition (Turkish and English):			
( ) Successive		( ) Simultaneous	
Are you familiar with other languages? (Basic, Independent, or Proficient User)			

APPENDIX-D: Informed Consent Form in Turkish (Optional)

Değerli katılımcı, (Tarih: …/…/2021)

Bu araştırmanın amacı hece ve vurgu zamanlaması bakımından Türkçe ve İngilizce arasındaki parça üstü fonolojik etkiletişimi incelemektir. Araştırma sırasında, çeşitli bilgisayar temelli akustik ölçümler ile toplanan ses verilerinin analiz edilmesi hedeflenmektedir. Bu süreçte şahsi bilgileriniz ses kayıtları ile ilişkilendirilmeyecektir. Toplanan veriler sadece, Hacettepe Üniversitesi Etik Komisyonu izni dahilinde araştırmacılar Prof. Dr. İsmail Hakkı Mirici ve Y.L. öğrencisi Tunay Taş tarafından lisansüstü derecesi bitirme tezi olarak yürütülen çalışmalar kapsamında kullanılacaktır. Buna ek olarak, verilere yalnızca araştırmacının erişimi olup üçüncü şahıslarla paylaşılmayacaktır. Bu araştırmaya katılım tamamen gönüllük esasına dayanarak; sizden İngilizce ve Türkçe metinler ve cümleler okuyup ardından sunulan duruma yanıt vermeniz beklenmektedir. İstediğiniz an vazgeçerek çalışmadan çekilebilirsiniz: Araştırmacı ile iletişime geçtiğiniz takdirde verileriniz ve şahsi bilgileriniz silinerek analiz dışı bırakılacaktır. İlerleyen süreçte merak ettiğiniz bir şey olması dahilinde, araştırmacılara eposta yoluyla ulaşabilirsiniz.

Kıymetli katkılarınızdan dolayı en içten teşekkürlerimi sunuyorum.

Y.L. Öğrencisi: Tunay Taş
Hacettepe Üniversitesi

Danışman: Prof. Dr. İsmail Hakkı Mirici
Hacettepe Üniversitesi

İşbu formu imzalayarak ve/yahut doldurarak araştırmacının yukarıda bahsedilen çalışmanın bir parçası olarak sesimi kaydetmesine izin veriyorum. Ayrıca, toplanan bazı ses verilerinin akademik yayım bağlamında alenen gözükebileceğinin farkındayım.

Ad soyad:			
Yaş ve cinsiyet:			
Öğretim tecrübesi:			
( ) 1-5 yıl	( ) 6-10 yıl	( ) 11-15 yıl	( ) 15+ yıl
Halihazırda bir öğretim kurumunda çalışıyor musunuz?			
( ) Hayır	( ) Evet, İlköğretim	( ) Evet, Ortaöğretim	( ) Evet, Yükseköğretim
Dil edinme sırası (Türkçe ve İngilizce):			
( ) Birbiri ardına		( ) Eşzamanlı	
Başka diller ile aşinalığınız var mı? (Temel, Bağımsız veya Yetkin Kullanıcı)			

APPENDIX-E: Ethics Committee Approval

T.C.
HACETTEPE ÜNİVERSİTESİ
Rektörlük

Sayı : 35853172-101.02.02
Konu : Tunay TAŞ (Etik Komisyon İzni)

EĞİTİM BİLİMLERİ ENSTİTÜSÜ MÜDÜRLÜĞÜNE

İlgi : 09.11.2020 tarihli ve E-51944218-101.02.02-00001321528 sayılı yazı.

Enstitünüz Yabancı Diller Eğitimi Anabilim Dalı İngiliz Dili Eğitimi Bilim Dalı Yüksek Lisans programı öğrencilerinden **Tunay TAŞ**'ın **Prof. Dr. İsmail Hakkı MİRİCİ** danışmanlığında yürüttüğü **"Dilsel Çoklu Yeterliğin Türk İngilizce Öğretmenlerinin İngilizce Vurgu Temelli Ritmin Sesletimine Etkisi"** başlıklı tez çalışması Üniversitemiz Senatosu Etik Komisyonunun **24 Kasım 2020** tarihinde yapmış olduğu toplantıda incelenmiş olup, etik açıdan uygun görülmüştür.

Bilgilerinizi ve gereğini saygılarımla rica ederim.

e-imzalıdır
Prof. Dr. Vural GÖKMEN
Rektör Yardımcısı

Hacettepe Üniversitesi Rektörlük 06100 Sıhhiye-Ankara
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Duygu Didem İLERİ

APPENDIX-F: Declaration of Ethical Conduct

I hereby declare that…

- I have prepared this thesis in accordance with the thesis writing guidelines of the Graduate School of Educational Sciences of Hacettepe University;
- all information and documents in the thesis/dissertation have been obtained in accordance with academic regulations;
- all audio visual and written information and results have been presented in compliance with scientific and ethical standards;
- in case of using other people's work, related studies have been cited in accordance with scientific and ethical standards;
- all cited studies have been fully and decently referenced and included in the list of References;
- I did not do any distortion and/or manipulation on the data set,
- and **NO** part of this work was presented as a part of any other thesis study at this or any other university.

07/06/2021

Tunay TAŞ

APPENDIX-G: Thesis Originality Report

15/06/2021

HACETTEPE UNIVERSITY

Graduate School of Educational Sciences

To The Department of Foreign Language Education

Thesis Title: Influence of the Linguistic Multi-Competence on Turkish EFL Teachers' Pronunciation of Stress-Timed Rhythm in English

The whole thesis that includes the *title page, introduction, main chapters, conclusions and bibliography section* is checked by using **Turnitin** plagiarism detection software take into the consideration requested filtering options. According to the originality report obtained data are as below.

Time Submitted	Page Count	Character Count	Date of Thesis Defence	Similarity Index	Submission ID
15/06/2021	136	229772	07/06/2021	12%	1606867727

Filtering options applied:

1. Bibliography excluded
2. Quotes included
3. Match size up to 5 words excluded

I declare that I have carefully read Hacettepe University Graduate School of Educational Sciences Guidelines for Obtaining and Using Thesis Originality Reports; that according to the maximum similarity index values specified in the Guidelines, my thesis does not include any form of plagiarism; that in any future detection of possible infringement of the regulations I accept all legal responsibility; and that all the information I have provided is correct to the best of my knowledge.

I respectfully submit this for approval.

Name Lastname:	Tunay TAŞ
Student No.:	N19130029
Department:	Foreign Language Education
Program:	English Language Teaching
Status:	☒ Masters ☐ Ph.D. ☐ Integrated Ph.D.

ADVISOR APPROVAL

APPROVED
Prof. Dr. İsmail Hakkı MİRİCİ

APPENDIX-H: Yayımlama ve Fikrî Mülkiyet Hakları Beyanı

Enstitü tarafından onaylanan lisansüstü tezimin/raporumun tamamını veya herhangi bir kısmını, basılı (kâğıt) ve elektronik formatta arşivleme ve aşağıda verilen koşullarla kullanıma açma iznini Hacettepe Üniversitesine verdiğimi bildiririm. Bu izinle Üniversiteye verilen kullanım hakları dışındaki tüm fikri mülkiyet haklarım bende kalacak, tezimin tamamının ya da bir bölümünün gelecekteki çalışmalarda (makale, kitap, lisans ve patent vb.) kullanım haklan bana ait olacaktır.

Tezin kendi orijinal çalışmam olduğunu, başkalarının haklarını ihlal etmediğimi ve tezimin tek yetkili sahibi olduğumu beyan ve taahhüt ederim. Tezimde yer alan telif hakkı bulunan ve sahiplerinden yazılı izin alınarak kullanılması zorunlu metinlerin yazılı izin alınarak kullandığımı ve istenildiğinde suretlerini Üniversiteye teslim etmeyi taahhüt ederim.

Yükseköğretim Kurulu tarafından yayınlanan "Lisansüstü Tezlerin Elektronik Ortamda Toplanması, Düzenlenmesi ve Erişime Açılmasına ilişkin Yönerge" kapsamında tezim aşağıda belirtilen koşullar haricince YÖK Ulusal Tez Merkezi / H.Ü. Kütüphaneleri Açık Erişim Sisteminde erişime açılır.

- Enstitü/ Fakülte yönetim kurulu kararı ile tezimin erişime açılması mezuniyet tarihinden itibaren 2 yıl ertelenmiştir. (1)
- Enstitü/Fakülte yönetim kurulunun gerekçeli kararı ile tezimin erişime açılması mezuniyet tarihimden itibaren … ay ertelenmiştir. (2)
- Tezimle ilgili gizlilik kararı verilmiştir. (3)

07/06/2021

Tunay TAŞ

"Lisansüstü Tezlerin Elektronik Ortamda Toplanması, Düzenlenmesi ve Erişime Açılmasına İlişkin Yönerge"

(1) Madde 6. 1. Lisansüstü tezle ilgili patent başvurusu yapılması veya patent alma *sürecinin devam etmesi durumunda, tez danışmanının önerisi ve enstitü anabilim dalının uygun görüşü Üzerine enstitü veya fakülte yönetim kurulu iki yıl süre ile tezin erişime açılmasının ertelenmesine karar verebilir.*

(2) Madde 6. 2. *Yeni teknik, materyal ve metotların kullanıldığı, henüz makaleye dönüşmemiş veya patent gibi yöntemlerle korunmamış ve internetten paylaşılması durumunda 3. şahıslara veya kurumlara haksız kazanç; imkânı oluşturabilecek bilgi ve bulguları içeren tezler hakkında tez danışmanın önerisi ve enstitü anabilim dalının uygun görüşü üzerine enstitü veya fakülte yönetim kurulunun gerekçeli kararı ile altı ayı aşmamak üzere tezin erişime açılması engellenebilir.*

(3) Madde 7. *1. Ulusal çıkarları veya güvenliği ilgilendiren, emniyet, istihbarat, savunma ve güvenlik, sağlık vb. konulara ilişkin lisansüstü tezlerle ilgili gizlilik kararı, tezin yapıldığı kurum tarafından verilir*. Kurum ve kuruluşlarla yapılan işbirliği protokolü çerçevesinde hazırlanan lisansüstü tezlere ilişkin gizlilik kararı ise, ilgili kurum ve kuruluşun önerisi ile enstitü veya fakültenin uygun görüşü Üzerine üniversite yönetim kurulu tarafından verilir. Gizlilik kararı verilen tezler Yükseköğretim Kuruluna bildirilir.*
Madde 7.2. *Gizlilik kararı verilen tezler gizlilik süresince enstitü veya fakülte tarafından gizlilik kuralları çerçevesinde muhafaza edilir, gizlilik kararının kaldırılması halinde Tez Otomasyon Sistemine yüklenir*

** Tez danışmanının önerisi ve enstitü anabilim dalının uygun görüşü üzerine enstitü veya fakülte yönetim kurulu tarafından karar verilir.*