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Intonation Patterns in Adult Male and Female Speech: A Sociophonetic Study on People Living in Oran

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Dedications

This work is dedicated to:

my beloved parents

my brothers Mohamed and Ilies

my sister Lamis

my sister-in-law Ilham

my niece Ilina

my best friend Fawzia

the spirit of my recently departed grandmother

and

to all my true-hearted well-wishers.

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Thank you all,
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Abstract

The present study attempted to experimentally analyze the intonational patterns realized by male and female speakers of Algerian Arabic as spoken in Oran, within the Autosegmental-metrical theory. Particularly, it was established on the basis of a threefold aim: (1) to examine the tonal inventory and tunes makeup in this variety; (2) to probe the ways intonation contributes to the phonological and phonetic marking of narrow focus structure (Informational Focus and Contrastive Focus) and broad focus structure; and (3) to investigate any potential gender-related intonational variation in Oran speech community apropos of tonal configuration, prosodic focus encoding, and pitch range realization within different types of tunes. To this end, a select group of adult speakers of this dialect were recorded during the production of controlled and semi-controlled speech material. The experimental analysis of the F0 contour revealed that this dialect demonstrated a rich tonal inventory which brought about the composition of several tunes with distinct pragmatic meanings. Besides, both qualitative and quantitative results exhibited that intonation served as an integral part in encoding focus structure and distinguishing between narrow focus and broad focus through on-focus phonetic enhancement and post-focus compression. Ultimately, the results of the sociophonetic scrutinization underpinned the already-established assumption which stipulates that intonation does mirror the speaker's gender identity.

Keywords: intonation, Algerian Oran Spoken Arabic, Autosegmental-metrical theory, prosodic focus, gender, pitch range, acoustic analysis

List of Phonetic Symbols

Consonants			**Examples from OSA**	
Symbol	**Description**	**Arabic symbol**	**Transliteration**	**Gloss**
ʔ	A glottal stop	ء	/ʔammant/	I believed
b	Voiced bilabial stop	ب	/bi:du/	bucket
t	Voiceless alveolar stop	ت	/tu:m/	garlic
θ	Voiceless interdental fricative	ث	Non-existing in this dialect	
ʒ	Voiced palato-alveolar fricative	ج	/ʒmal/	Camal
ħ	Voiceless pharyngeal fricative	ح	/ħli:b/	milk
x	Voiceless velar fricative	خ	/xu:x/	Peach
d	Voiced alveolar stop	د	/dalla:ʕ/	watermelon
ð	Voiced interdental fricative	ذ	Non-existing in this dialect	
r	Voiced alveolar trill	ر	/ru:ħ/	Go!
z	Voiced alveolar fricative	ز	/zbi:b/	raisin
s	Voiceless alveolar fricative	س	/salla:ka/	comb
ʃ	Voiceless palato-alveolar fricative	ش	/ʃi:ra/	girl
$s^ʕ$	Voiceless alveolar emphatic fricative	ص	/$s^ʕ$wa:laħ/	Things
$d^ʕ$	Voiced alveolar emphatic stop	ض	/$d^ʕ$aw/	light
$t^ʕ$	Voiceless alveolar emphatic stop	ط	/$t^ʕ$ajja:ra/	plane
$ð^ʕ$	Voiced interdental emphatic fricative	ظ	Non-existing in this dialect	
ʕ	Voiced pharyngeal fricative	ع	/ʕagrab/	Scorpion
ɣ	Voiced velar fricative	غ	/ɣa:li/	expensive
f	Voiceless labio-dental fricative	ف	/fu:l/	broad bean
q	Voiceless uvular stop	ق	/qarʕa/	bottle
g	Voiced velar stop	ڤ	/garʕa/	bald
k	Voiceless velar stop	ك	/kasra/	bread
l	voiced alveolar lateral	ل	/li:m/	lemon
m	Voiced bilabial nasal	م	/malħ/	salt
n	Voiced alveolar nasal	ن	/na:mu:s/	Mosquito
h	Voiceless glottal fricative	ه	/hwa/	air
w	Voiced labio-velar semi-vowel	و	/wa:h/	yes
j	Voiced palatal semi-vowel	ي	/jad/	hand

Vowels	**Examples**	
Symbols	**Transliteration**	**Gloss**
a:	/ba:b/	door
a	/qarʕa/	A bottle
u	/gutlah/	I told him
u:	/ħu:t/	fish
i	/ɣa:li/	expensive
i:	/ʒi:b/	pocket
e	/sfenʒ/	Donets

List of Abbreviations and Acronyms

AM: Autosegmental-Metrical

AP: Accentual Phrase

BF: Broad Focus

CF: Contrastive Focus

dB: decibels

ERB: Equivalent Rectangular Bandwidth

F: degrees of freedom

F: female

F0: Fundamental Frequency

H: High

Hz: Hertz

IF: Informational Focus

ip: intermediate phrase

IP: Intonational Phrase

IQs: Incredulity questions

IS: Information Structure

ISQs: information-seeking questions

L: Low

M: male

max: maximum

min: minimum

ms: milliseconds

N: number

Non-ISQs: non-information-seeking questions

OSA: Oran Spoken Arabic

p: probability (*p* value)

PFC: Post-focus compression

PWd: phonological word

RQs: rhetorical questions

SD: Standard Deviation

St: Semitones

ToBI: Tones and Break Indices

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GENERAL

INTRODUCTION

General Introduction

A well intelligible spoken message is not merely made up of what is uttered, but of how it is uttered as well. In other words, despite the fact that any utterance requires a well-linguistically formed structure, the way a speaker's voice goes up and down gives the listener further clues to the intended message. Arguably, all languages are characterized by speech melodic differences ensued from the rising and falling of the pitch of voice at word level or over a stretch of utterance. Stating it from a theoretical standpoint, pitch can be utilized to distinguish lexical meanings within a short utterance, i.e., a syllable, a morpheme, or a word (Cruttenden,1986; Ladefoged & Johnson, 2011). This type of pitch variation is referred to as 'tone' which typically occurs in 'tone languages' such as Mandarin Chinese, Thai, and Cantonese. However, if pitch modulation spans over a longer stretch of utterance, i.e., a phrase or a sentence, to convey syntactic, pragmatic, and paralinguistic meanings, it is referred to as 'intonation'; a phenomenon which occurs in all languages (Gussenhoven, 2004; Ladefoged & Johnson, 2011). In this respect, "[I]t would be wrong to classify languages as either tonal or intonational because all languages have intonation" (Katamba, 1989, p. 239). Intonation, therefore, represents an indispensable factor in speech regulation.

Crucially, intonation constitutes an integral part of prosody. The latter is a wide realm which is primarily concerned with the examination of the suprasegmental features, i.e., the features that stand above the individual phoneme, or a segment. As a corollary, we embrace Ladd's (2008) premise that the term 'intonation' denotes "the use of *suprasegmental* phonetic features to convey 'postlexical' or *sentence-level* pragmatic meanings in a *linguistically structured* way" (ibid., p. 4). On this view, intonation is a prosodic property meant to lend further weight to the pragmatic meaning correlated with a phrase or the whole utterance by means of the suprasegmental features, namely fundamental frequency (F0), intensity, and duration. Such suprasegmental features stand for the acoustic correlates of intonation. Looked at perceptually, they are represented as pitch,

loudness, and length, respectively; with pitch "being the principal perceptual correlate of intonation" (Cruttenden, 1986, p. 05).

As already stated, pitch modulation can eminently convey several distinct kinds of information. Grammatically, it is used to denote the form of utterance (statements, questions, commands, etc.). Syntactically, it pinpoints the boundaries of syntactic constituents. Pragmatically, it underpins the expression of focus and information status in the discourse. Paralinguistically, it signals the attitudinal and emotional state of the speaker and reveals information about his/her personal profile like regional dialect, gender, age, and social class.

The prosodic realm has been a fertile field of inquiry which has sparked the interest of a large number of researchers cross-linguistically as well as across Arabic spoken varieties. In this connection, the present dissertation attempts to instrumentally probe intonation in Oran Spoken Arabic (OSA, henceforth), a variety of Algerian Arabic spoken in the west of Algeria, which is marked by a paucity of experimental research addressing both phonological and phonetic perspectives. There exists only a handful of works that tackled this issue. To this end, the current research endeavor adopts the Autosegmental-Metrical approach (AM) which examines intonational patterns on the basis of phonological and phonetic accounts (Ladd, 2008). Hence, it principally seeks to fill this gap in the literature of Algerian linguistics as well as enriching the scope of Maghrebi prosody and Arabic prosody in general. Even more importantly, the employment of intonational aspects may be contingent upon the social and cultural factors that mirror the identity of the speaker. However, intonational variation appears to lack robust attention in the existing literature. In this regard, the present study tends to inspect the realization of certain intonational features with reference to the speaker's gender. Taken together, we attempt to contribute to the phonological, phonetic, and sociolinguistic literature of Algerian Arabic in general and Oranee dialect in particular.

Strictly speaking, the prime aim of the current dissertation is threefold: (1) to analyze the tonal inventory and tunes composition of Oran spoken Arabic within the Autosegmental-Metrical approach; (2) to investigate whether and how intonation functions as a contributing strategy to cue Information Structure, specifically Focus structure, in this dialect; and (3) to examine gender-related intonational differences in the current speech community.

In order to attain these aims, we attempt to answer the following intertwined research questions:

- What categories of tonal inventory does OSA possess in terms of pitch accents, phrase accents, and boundary tones?
- How are sentences intonationally cued within the AM approach in OSA?
- Does OSA demonstrate intonational marking of Information Structure, particularly Narrow Focus in comparison to Broad Focus? What phonological and acoustic strategies are used?
- Do male and female speakers of OSA exhibit the same employment of intonational patterns?

Accordingly, we suggest the following hypotheses which serve as a foundation for the current research endeavor:

- We anticipate that Algerian Arabic as spoken in Oran possesses a rich tonal inventory due to its intricate linguistic profile and to the perplexity that appears in understanding the speakers of this variety compared to certain Arabic varieties.
- We expect distinct tune compositions that mark sentences based on their linguistic structure and also contextual setting.
- We predict that intonation will show a statistically significant influence on cuing and distinguishing focus types in this dialect.

- We hypothesize that female and male speakers of Oran dialect will show salient disparity in the realization of the intonational features.

The present dissertation is designed as follows. Chapter one sketches the theoretical tenets upon which this study is anchored. Specifically, it introduces the most relevant properties of the AM framework which couches our preliminary model of intonation proposed for OSA. Moreover, the chapter depicts the common hallmarks in the linguistic landscape of the dialect under scrutiny, in pursuit of attaining a comprehensive account of the prosodic demeanor exhibited in the current study.

Chapter two reviews some of the relevant studies existing in the vast body of literature tethered to the scope of the present study. The overview covers cross-linguistic as well as cross-dialectal empirical studies that have embraced the AM model of intonational phonology, with robust attention to the Arabic literature. Essentially, in accordance with the main objectives of this study, the chapter presents first an overview of some previous studies that explored the tonal categories and tunes make up across ample varieties. Second, it reports the major properties brought about by the prior prosodic literature on Focus-intonational encoding. Third, it provides a cross-linguistic survey of the sociophonetic literature that probed gender-based intonational variation.

Chapter three is chiefly devoted to the methodology adhered in the present dissertation. It describes the participants that took part in this research project. It also delineates the four speech tasks embodied for corpus design. Additionally, the chapter presents some details about recording procedures, phonological analysis and the phonetic measurements carried out in this research endeavor. Further pertinent methodological details are provided within the respective chapters.

Chapter four focuses on analyzing the categories of the tonal inventory in OSA including pitch accents, phrase accents, and boundary tones. It examines the tonal composition of different tunes which are pragmatically constrained. Particularly, the analysis covers distinct types of tunes,

such as declarative, yes/no question, wh-question, rhetorical question, incredulity question, continuation/plateau, request, and imperative tunes, in addition to a melodic analysis of three pragmatic meanings conveyed via the employment of the question word /ʃawala/ 'what' in isolation. The chapter also presents an interpretation of the results obtained.

Chapter five reports the results of the experiment conducted on the prosodic correlates of Focus-marking in OSA. The experiment comprises both qualitative and quantitative comparisons of broad focus and narrow focus. The latter involves Informational Focus and Contrastive Focus occupying three sentential positions. Results of the quantitative scrutinization are based on statistical evaluation of the acoustic measurements. The chapter then provides a discussion of the findings related to this intonational pattern.

Chapter six is dedicated to report the results obtained from the examination of any potential effect of gender on the realization of intonational patterns in Oran speech community. Notably, results cover the differences in the employment of tone categories and melodies as well as Focus intonational cues between male and female speakers of OSA. Besides, the chapter presents the statistical results of the acoustic analysis carried out on the gender-related variation in pitch range, which is measured using not only Hertz but also Semitones and ERB pitch scales to eliminate sex-related physiological differences. The analysis also incorporates the effect of tune type on gender-related pitch range differences. Subsequently, a sociophonetic account is provided to interpret all the findings.

Each chapter is rounded off by a conclusion of the main findings. Eventually, the dissertation provides an all-encompassing conclusion of the core findings and their implications. This comprehensive conclusion also outlines some inherent limitations and puts forth some specific desiderata for future studies concerning the prosody of OSA and Algerian Arabic in general.

CHAPTER ONE:

THEORETICAL FRAMEWORK

AND

GENERAL BACKGROUND

Chapter One: Theoretical Framework and General Background

1.1 Introduction

The current dissertation seeks to analyze the intonational system of Algerian Oran spoken dialect within the framework of Autosegmental-metrical phonology. In this respect, the current chapter is primarily devoted first to demystify the basic tenets in this framework and second to introduce the dialect under-research. This chapter is then composed of two major sections: Section 1.2 covers the theoretical background associated with the subject matter of this dissertation. Section 1.3 is confined to propose a linguistic overview of the dialect under scrutinization.

1.2 Theoretical Framework

1.2.1What is Intonation?

Intonation constitutes an integral part of prosody. The latter is viewed, throughout this thesis, as an umbrella term that covers the suprasegmental patterns employed to form prosodic phrases within which one word is relatively perceived more prominent than another, generating an overall musical tune. To make a crucial headway in analyzing intonation, it is therefore indispensable to demystify the prosodic realm, and how intonation constitutes, ergo, an integral part of it.

Prosody is the study of word phrasing, how several prosodic phrases can be generated from the same string of words; prominence, how identical chain of words are accented differently; and intonation, how different tunes can be attributed to the identical string of words via pitch modulation. On the basis of this insight, prosody is prerequisite to elucidate the contribution of the suprasegmental tools including pitch patterns, loudness, rhythm, tempo, and vowel quality to the lexical, syntactic, discoursal, communicative, and attitudinal meaning of prosodic phrases.

Notwithstanding, unlike the other prosodic patterns that do not spread out the word-level such as stress, tone, and accent, intonation is rather post-lexical. It embraces a string of pitch modulations ensued from the rising and falling of the voice over a stretch of linguistically structured utterance as well as within one word or a phrase to convey a pragmatic meaning. As Cruttenden (1986) has postulated, "[i]ntonation involves the occurrence of recurring pitch patterns, each of which is used with a set of relatively consistent meanings, either on single words or on groups of words of varying length" (1986, p. 07). Accordingly, intonation designates the melody of speech which is predominantly brought about by pitch variation. The latter is a perceptual correlate which is physically generated by the iteratively combined vibrations of the vocal cords during the production of voiced segments of speech. The frequency of these vibrations is labeled fundamental frequency (F0), measured in Hertz (Hz). This acoustic correlate works in tandem with other correlates like intensity (measured in dB) and duration (measured in ms) to distinguish utterances linguistically and paralinguistically, yet maintaining the same lexical identity.

Intonation as a prosodic feature of pronunciation has been found to fulfill different functions. As Gussenhoven (2002) has outlined: "[I]ntonation is used to route the semantic contents of particular morpho-syntactic constituents to semantic categories of information status" (p. 48). Arguably, its primary function culminates in linguistics. Intonation plays a pivotal role in disambiguating the syntactic structure of given information as well as permuting the flow of speech by demarcating the beginning and end of its miscellaneous components. Besides, it has a salient role in demystifying the type of a sentence as a question, statement, command, request, etc. Moreover, it is highly employed to highlight particular parts of speech to the listener. Even more importantly, intonation may not affect the semantic meaning of the utterance, yet it has a robust impact on its pragmatic interpretation. Crucially, the intended meaning of what is said is inevitably contingent upon the situational or contextual settings of the utterance. Hence, intonation is prerequisite to make it possible for the listener to extrapolate the setting-driven information out

from the melody of speech. Paralinguistically, prosody may aid in revealing a speaker's attitude and emotional state such as anger, sadness, fear, excitement, surprise, boredom, etc., as well as pinpointing the speech community he/she belongs to.

1.2.2 The Autosegmental-Metrical Model of Intonational Phonology

The present dissertation embraces the recently most prevalent approach to the analysis of intonational structure, labeled "Autosegmental-Metrical" (henceforth, AM), which originates back to Pierrehumbert's (1980) doctoral thesis and then amended in Beckman and Pierrehumbert (1986), Pierrehumbert and Beckman (1988), Pierrehumbert and Hirschberg (1990), Ladd (1996, 2008), among others. However, the term autosegmental-metrical was first introduced by Ladd (1996), and it echoes the correlation between two crucial tenets in intonational phonology: (1) the autosegmental angle which emanates from Goldsmith's (1976) work, and (2) the metrical angle which follows Liberman and Prince (1977). The former implies that a single tune should be treated independently from the segmental tier (i.e., text); and the latter designates phrasing and prominence, i.e., breaking up utterances into prosodic units and highlighting certain parts.

Following the advent of the AM theory, intonation patterns have been scrutinized based on both phonological and phonetic accounts embracing the premise that instrumental measurement of F0 constitutes 'a source of data' for phonological description (Ladd, 2008, p. 43). Accordingly, the theory "adopts the phonological goal of being able to characterise contours adequately in terms of a string of categorically distinct elements, and the phonetic goal of providing a mapping from phonological elements to continuous acoustic parameters" (ibid.). This being so, intonational studies working with the AM model are contingent upon a laboratory phonology approach. The model uses two levels of abstraction (i.e., phonology): autosegmental and metrical in addition to a phonetic experimentation based on the acoustic data ensued from F0, duration, and amplitude.

As a matter of fact, unlike the other models available in the literature of intonation; for instance, the British School, in which pitch modulation is depicted in terms of pitch configurations

represented phonologically as tonal movements, such as a fall, rise, fall-rise, or rise-fall (Halliday, 1967; Brazil, 1981), pitch modulation is portrayed in the AM model as a chain of targets which assign the relevant points in the intonation contour as tones; for example, High (H) and Low (L) tones. These tones reflect the phonologically significant points correlated with either prominent syllables or phrasal boundaries, while the remaining contour is completed by means of phonetic interpolation between determined tonal points which coincide with specific F0 values. Put differently, within the AM framework, tones are deemed to be 'autosegments, i.e., independent from the segmental string (Arvaniti, 2022), and phonologically tethered with the metrical structure of an utterance. In this respect, two distinct types of tones are posited: *pitch accents* and *edge tones*. Pitch accents are aligned with metrically strong syllables, i.e., sentence-level stress. They can be monotonal (H* or L*) or bitonal (such as H*+L, H+L*, L*+H). The asterisk (*) stands for the lexically stressed syllables which are the most vital constituents of the prosodic phrase. These starred tones are juxtaposed to 'leading' or 'trailing' tones, i.e., immediately preceding or following the starred tones, respectively. The two tones are separated by an intervening plus sign (+) in a bitonal pitch accent. This representation implies instances where the pitch accent incorporates "rapid local F0 movement rather than just a local maximum or minimum" (Ladd, 2008, p. 88).

Edge tones, on the other hand, are the tones that associate with phrase boundaries. They comprise two types: phrase accents (annotated as H- or L-) and boundary tones (annotated as H% or L%) adopted from Pierrehumbert (1980). Boundary tones are employed to appoint the edge of an Intonation Phrase (IP) which is defined as "a segment of speech composed of words over which a tune, a perceptually coherent intonational contour, is realized" (Watson, 2002, p. 10), usually signaled by a pause and vowel lengthening in the final word. Alternatively, phrase accents appoint the edge of an intermediate phrase (ip), a phrasal unit that comes below the intonation phrase syntactically equivalent to relative clauses, adjuncts, and alternative questions as an illustration.

Accordingly, a well-structured tune or an F0 contour, in accordance with Pierrehumbert's (1980) analysis of English intonation, must consist of at least one or more pitch accents followed by a phrase accent and a boundary tone, as displayed in Figure 1.1 below,

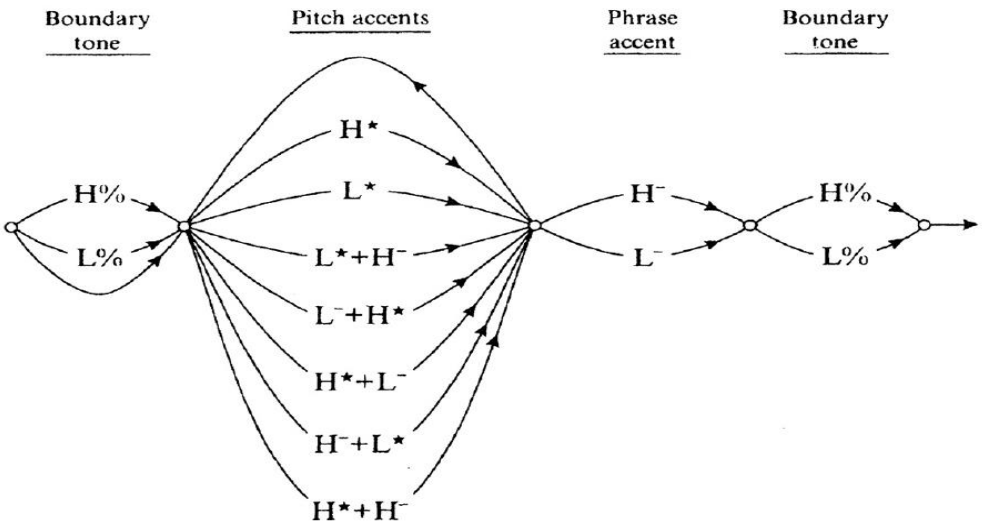


Figure 1. 1 Phonological model for English tunes according to Pierrehumbert (1980)

The left edge boundary tone currently represented as %H or %L entails that the utterance begins from a high or low pitch level. However, this boundary tone is optional and it is typically discarded in most of recent studies that adhere to AM model.

Furthermore, the theory establishes a coherent prosodic structure that collaborates with the tonal tier. The units of this structure are tune-independent. That is, they hinge upon the intonation of the utterance rather than its syntactic makeup (Selkirk, 1984; Nespor & Vogel, 1986). Canonically, the prosodic hierarchy is postlexically built upon three major levels of phrasing: Intonational Phrase (IP), intermediate phrase (ip), and Accentual Phrase (AP). Nevertheless, these prosodic phrases are constrained by the *Strict Layer Hypothesis* (ibid.) in which one level is made up of one or more constituents of the immediately lower level. Simply explained, an IP is composed of one or more ips and marked by a boundary tone at the end. An ip involves one or more APs, and it is intonationally arranged as having one or more pitch accents and finally marked

by a phrase accent without a boundary tone (Pierrehumbert & Beckman, 1988). Eventually, an AP is thought of as having a content word (e.g., a verb, a noun, an adverb, and an adjective) which bears the pitch accent and a facultative grammatical word (e.g., a preposition, a conjunction, etc.). Notwithstanding, these hierarchical levels are not constantly found within a specific structure. In fact, the number of the prosodic phrases varies from one language to another (ibid.). Figure 1.2 illustrates a prosodic hierarchy of the English proverb 'too many cooks spoil the broth' which is based only on two levels, as presented by Gussenhoven (2004, p. 124).

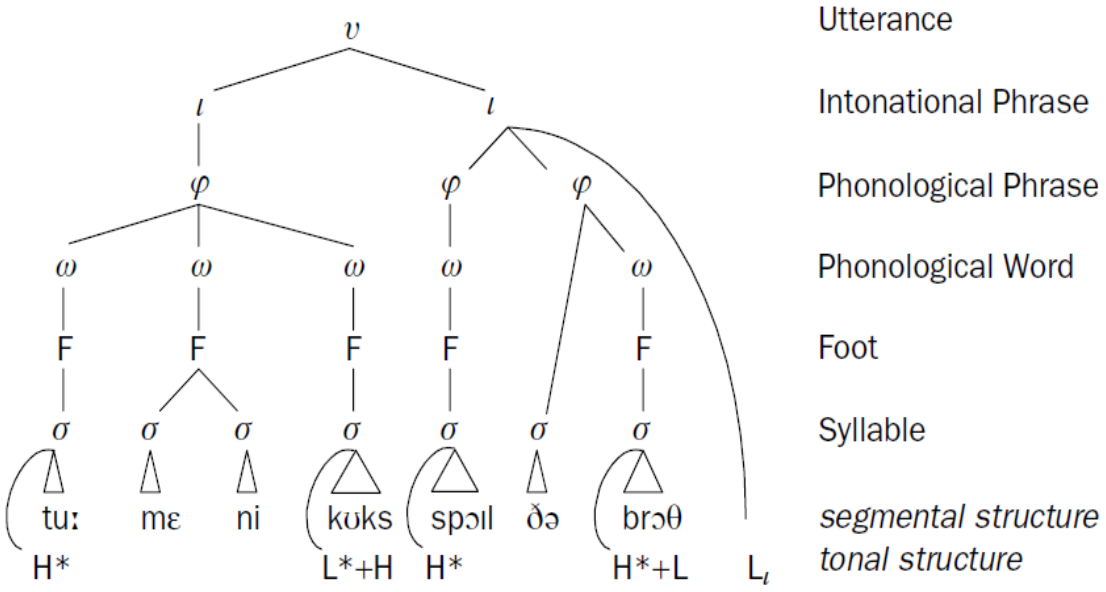


Figure 1. 2 The hierarchical prosodic structure of the English proverb 'too many cooks spoil the broth' (taken from Gussenhoven, 2004)

Arguably, AP has exhibited a sparse existence in the literature of AM intonation. To illustrate, AP has been found most often in languages and varieties that stipulate utterances replete with prosodic words that embrace pitch accents, including Japanese (Beckman & Pierrehumbert, 1986), Korean (Jun, 2005), French (Jun & Fougeron 2000, 2002), Egyptian Arabic (Al Zarka, 2013), Farasani Arabic (Abbas & Jun 2021), and Syrian Arabic (Al Hasan & Mahanta, 2022).

It is further noteworthy to elucidate that this constituency hierarchy shapes the prosodic units postlexically. At the word level, however, the prosodic structure includes a Prosodic Word

(PW), the lowest intonationally marked prosodic unit which can be found in all languages (Jun & Fletcher, 2014), in addition to foot, syllable, and mora (Frota, 2000).

As a prerequisite for the discussion of AM intonational phonology, it is worth casting light on the ToBI (*Tones and Break Indices*) notation system developed in the early 1990s to represent the intonation of American English. This system consists of multiple tiers, yet the two main tiers are "those indicating the tones in the F0 contour and the break indices that label the strength of each word boundary" (Ladd, 2008, p. 104). It is primarily generated based on Pierrehumbert's (1980) examination of intonation but with marginal amendments including the reduction of break indices. In addition, the system is currently called MAE-ToBI (Mainstream American English ToBI). Parallel to English, the ToBI transcription conventions have been spanned to other languages, such as: Greek, Dutch, German, Italian, Japanese, and Korean[1].

1.2.3 Tonal Implementation Rules in AM Theory

The AM framework posits that the association of tones with the given syllables is governed by the interpretation of the phonological representation into a phonetic one. Crucially, the theory encloses various implementation rules responsible for this interpretation, assigning actual F0 values to abstract tones 'scaling', on one hand, and controlling the transition within the targets forming the F0 contour 'interpolation'.

According to Pierrehumbert (1980), the scaling of F0 values is contingent upon the speaker's bottom pitch range. In essence, it is determined via four main factors: Declination, Downstep, Upstep, and Final lowering.

First, Declination, which prominently affects both H and L tones, refers to a continuous fall of F0 accompanied with narrowing the pitch range throughout the course of an utterance (Pierrehumbert, 1980). Second, Downstep effect appears in a sequence of two H tones where the

[1] Consider the eleven ToBI systems summarized in June (2005).

second high peak is characterized by a lower value than the immediately preceding one in scaling. This rule was embraced by Liberman and Pierrehumbert (1984) to appoint to the phonetic effect evoked by a preceding bitonal accent at the level of a single underlying pitch accent. However, Ladd (2008, p. 97) averred that "downstep is itself an independently selectable phonological option, which can apply, or not, to essentially any accent in any sequence." This independently downstepped peak is signaled with '!' diacritic. Third, as opposed to downstep, Upstep implies an unexpected step up within a sequence of pitch accents, yet it also refers to a raising in F0 values of the boundary tones after H- phrase accents, as the case of a plateau H-L% phrasal-boundary combination. Upstep effect in this contour is observed to elevate the low boundary tone L% to match the same scaling level of the preceding high phrase accent H-. The last rule is Final lowering which triggers further lowering in the F0 scaling of the tones occurring at the end of an utterance, suggesting speech completeness (Chahal, 2001).

1.2.4 Prominence Hierarchy

The prominence hierarchy represents the phonological relationship between lexical and post-lexical units. At the lexical level, prominence is signaled by means of word stress which is governed by the set of phonological patterns postulated in a given language. Post-lexical (or intonational) prominence is reflected by the pitch accents and nuclear accents which are primarily associated with the pragmatic meaning conveyed by the melody of an utterance. Figure 1.3 below demonstrates the hierarchy of both levels starting from unaccented syllables to the most prominent syllable in the phrase.

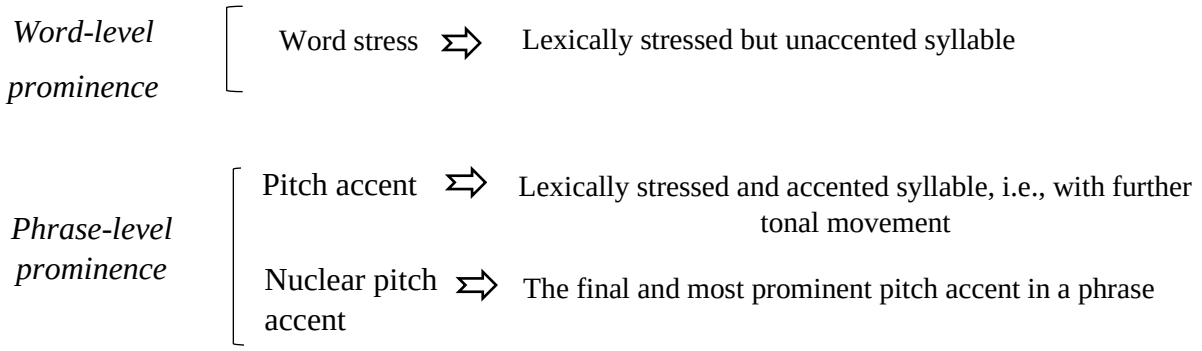


Figure 1. 3 Prominence Hierarchy at word and phrase level (according to literature)

Stressed syllables are prominent syllables but unaccented at the lexical/word level. Pitch accents are more prominent than the stressed syllable by virtue of carrying an extra tonal event. However, they are only allocated to the lexically stressed syllable in an utterance. What is superior to these units is the nuclear pitch accent which is the most prominent pitch accent assigned on the final pitch accented syllable.

1.2.5 Information Structure: Focus

Intuitively, when people engage in conversations, their aim is to reach mutual understanding about a particular aspect of the world. To achieve this, they maintain a 'discourse model' (Gussenhoven, 2008) to monitor how their communication is contributing to the shared understanding and to make clear how their information pertains to the listener's existing comprehension. As a corollary, it can be inferred that the significance of information in a discourse lies not in the information itself, but rather in how it is structured. This is known as 'Information Structure' (IS) (Halliday, 1967). In other words, IS refers to how various parts of the sentence convey the overall meaning, as it pertains to the context of the preceding conversation. There exist different categories of information structure, including givenness, topic, and focus (Féry & Krifka, 2008; Féry, 2017). The latter is the main concern of the current dissertation.

Focus can be seen as a means of communicating details or emphasizing certain parts of a sentence deemed as the most significant or newsworthy aspect of information, based on the context

of the conversation (Halliday, 1967; Lambrecht, 1994; Xu & Xu, 2005). This IS category appears in different types. The one that relates to an answer to a wh-question and presents a new piece of information is known as 'Information Focus' (IF henceforth) (Kiss, 1998) or 'presentational focus' (Selkirk, 2002), as illustrated in (1) below:

(1) Jim ate an orange.

(2) a. Who ate an orange?

b. What did Jim do to an orange?

c. What did Jim eat?

The same sentence in (1) can transfer various types of information to the hearer, determined by the discourse situation: The subject $[\text{Jim}]_{\text{IF}}$ is the focused material which corresponds to the context in (2a); The verb $[\text{ate}]_{\text{IF}}$ is the focused material which corresponds to the context in (2b); and the object $[\text{an orange}]_{\text{IF}}$ is the focused material which corresponds to the context in (2c). Focusing the different parts of the sentence conveys different kinds of unpredictable new information instigated by the wh-questions (Al-Zaidi, 2014), as in (2).

The second type of focus relates to the part of the sentence standing as a contrast to and rejection of an alternative already mentioned in the discourse. This is known as 'Contrastive Focus' (CF henceforth) or 'corrective focus', like in (3) where the focused element in (3b) contradicts the information presented in (3a):

(3) a. Did John eat an orange yesterday?

b. $[\text{Jim}]_{\text{CF}}$ ate an orange yesterday.

Another differentiation related to focus has been frequently established based on the size of the focused element. In this regard, the scope of Focus can encompass the entire utterance or larger constituents on the one hand, or only a particular constituent on the other hand (Gussenhoven, 2004; Krifka, 2008; Hellmuth, 2011). According to Ladd (2008, p. 215), the former is referred to as 'broad focus' or 'sentence focus' whereas the latter is referred to as 'narrow focus'.

Broad focus is often viewed as ‘neutral focus’ (Gussenhoven, 2004, 2008; Xu & Xu, 2005; Al-Zaidi, 2014).

Research on focus has revealed a cross-linguistic diversity in the way the new or most important piece of information is highlighted. This extends from the use of morphological cues by tethering particular markers to the focused constituent to syntactic movement manipulation by assigning focus to specific syntactic positions such as clefting, and/or drawing upon prosodic prominence (Gussenhoven, 2004; Elordieta, 2008).

Generally, intonation plays a pivotal role in encoding focus across many languages despite some discrepancies attested in how to mark it. Empirical studies have shown that the focused constituent correlates with the nuclear pitch accent and is phonetically accentuated by means of higher F0 value, longer duration, and greater amplitude in comparison to its non-focused counterpart (Xu & Xu, 2005; Hellmuth, 2006, 2011; Wang & Xu, 2011; Al-Zaidi, 2014; Féry, 2017; among others). A further significant marker of prosodic focus is the deaccentuation of post-focus items in the utterance, also known as ‘Post-Focus Compression’ (PFC), which is acoustically realized through “the reduction of pitch range and amplitude of all post-focus components in an utterance” (Xu, 2011, p. 152). Further details are presented in the next chapter.

1.3 General Overview of OSA (the dialect under research)

In the current section, we shift our theoretical overview to the description of the dialect under research from various angles, with strong focus on the phonetic and phonological features that characterize this variety of Algerian Arabic. This overview will set the stage for our analysis of the intonational system of this dialect.

1.3.1 Locality and General Presentation

The Algerian linguistic profile is highly marked with its complexity that stems chiefly from the co-occurrence of multiple varieties. These are: Algerian Arabic, the mother tongue of the

majority of Algerian speakers; Berber, the mother tongue of the indigenous people; Modern Standard Arabic, the first official language in Algeria; and French, the language of the colonizers which still has a crucial impact (consciously and unconsciously) on the Algerians' speech. However, Algerian Arabic per se is widely characterized by regional spoken varieties stretched over the West, Central, Eastern, and Southern parts of the country.

The dialect under scrutiny in the present dissertation is Oran Spoken Arabic (OSA), a sub-regional variety spoken in the city of Oran, located in the North-Western Coast of Algeria. Historically, owing to its ideal geographical location, the city had been widely exposed to distinct invasions, including (but not limited to) the Banu-Hilaal Muslim, Spanish, Ottoman, and French invasions, and subsequently to a progressing rural migration, which all-inclusively generated multiple layers of perplexity in the linguistic hub of the dialect. In the following, we provide an insight of the linguistic properties which distinguish this variety from the other spoken varieties in Algeria.

1.3.2 Phonetic and Phonological Overview

1.3.2.1 Phonemic Inventory

It is fairly evident that Algerian Arabic possesses a different phonemic inventory, primarily in terms of the consonantal sounds, compared to Modern Standard Arabic and its concomitant vernaculars. Effectively, new phonemes borrowed from the French language have made their own way to the consonantal inventory of Algerian Arabic. Nevertheless, the distribution of the consonantal inventory varies across the sub-regional varieties spoken throughout the cities of Algeria. The following table exhibits the consonantal inventory of OSA:

Table 1. 1 Consonantal inventory of Oran Spoken Arabic

		Bilabial	Labio-dental	Alveolar	Post-alveolar	Palatal	Velar	Uvular	Pharyngeal	Glottal
Stops		p b		t d			k g	q		ʔ
Emphatic stops				tˤ dˤ						
Fricatives			f	s z	ʃ ʒ		x ɣ		ħ ʕ	h
Emphatic fricatives				sˤ						
Nasals		m		n						
Liquids	**Trill**			r						
	Lateral approx-imant			l						
Glides (semi-vowel)		w				j				

In this scope, it is important to elucidate some relevant segmental properties, as displayed above. Initially, despite the dominant occurrence of the [g] allophone as a phonetic realization of the uvular /q/ sound in OSA, both consonants form minimal pairs with different semantic meanings. This indicates that this sound functions as a phoneme in this dialect.

/qarʕa/ ‘a bottle’ vs. /garʕa/ ‘bald-feminine’

/qa:bel/ ‘he agrees’ vs /ga:bel/ ‘take care of/ to face’

/qla/ ‘he fried’ vs /gla/ ‘he roasted’

In addition, the substitution of /q/ with /g/ would yield unfamiliar realizations in OSA.

/qrallu/*[2] vs. /grallu/ ‘cockroach’

/qadra/* vs. /gadra/ ‘cooking pot’

In the same vein, /q/ cannot be substituted with /g/ in certain instances, as observed in several Arabic vernaculars.

[2] * indicates an unfamiliar pronunciation.

/gaʃʃ/* vs. /qaʃʃ/ ‘clothes’

/ʕgal/* vs. /ʕqal/ ‘mind/ remember’

Besides, the voiceless stop /p/ also occurs as a phoneme in OSA, mainly pronounced in the French borrowed words.

/plasˤi:tˤa/ < French: *placette* ‘plot’

/paki:tˤa/ < French: *paquet* ‘pack’

Additionally, the phonemic status of French /p/ and /b/ is also evident in this dialect.

/pu:mpa/ <French: *pompe* ‘pump’ as opposed to /bu:mba/ < French: *bombe* ‘bomb’

A further French consonant sound that entered the consonantal system of OSA is the sound /v/, as in /va:nij/ < French: *vanille* ‘vanilla’.

Moreover, OSA is characterized by geminated consonantal sounds, occurring in the initial, medial, and final positions, akin to Standard Arabic and the colloquial forms. Gemination refers to the cluster of two identical consonants without a vocal interval.

/lli:m/ ‘the lemon’ /ʒalla:ba/ ‘a traditional feminine dress’ /mell/ ‘he got bored’

/ddi:t/ ‘I took’ /maddi:t/ ‘I gave’ /madd/ ‘give’

However, unlike the other Arabic varieties which maintained the four major emphatic sounds, OSA demonstrates only three alveolar emphatic phonemes: /tˤ/, /dˤ/ and /sˤ/.

/tˤi:n/ ‘clay’ /sˤa:m/ ‘he fasted’ /dˤaw/ ‘light’

1.3.2.2 Allophonic Features

A number of allophonic realizations appear in the Algerian Arabic dialect as a result of several phonological processes, such as assimilation, deletion, insertion, and syncope. In the following, we introduce the major allophonic changes that occur in OSA.

The phoneme /q/ in Algerian Arabic is realized as [g] in OSA in restricted contexts.

/qa:lli/ → [ga:lli] ‘he said to me’

/qalb/ → [galb] ‘heart’

/qahwa/ → [qahwa] and not [gahwa]* ‘coffee’

/maqla/ → [maqla] and not [magla]* ‘cooking pan’

The voiceless interdental /θ/ in Algerian Arabic is pronounced as [t] in OSA:

/θu:m/ → [tu:m] ‘garlic’

/θaʕlab/ →[taʕlab] ‘fox’

The voiced interdental /ð/ is pronounced as [d] in OSA:

/ðhab/ → [dhab] ‘gold’

/ðbaħ/ → [dbaħ] ‘he slaughtered’

Similarly, its emphatic counterpart is realized as an emphatic alveolar [dˤ]:

/ðˤhar/ → [dˤhar] ‘back’

/ðˤfur/ → [dˤfur] ‘nail’

The emphatic /dˤ/ is assimilated to [t] when it is clustered with /t/.

/gbadˤtah/ → [gbattah] ‘I grabbed it’

It is also assimilated to [ʧ] in negation form.

/ma-ʕradˤ-ʃ/ → [ma-ʕra-ʧ] ‘I did not invite’

The emphatic fricative /sˤ/ is realized as [zˤ] when it is followed by the alveolar /d/.

/sˤdam/ → [zˤdam] ‘bump into’

/sˤdar/ → [zˤdar] ‘chest’

The voiced bilabial /b/ is pronounced as its voiceless cognate [p] when it is clustered with a voiceless consonant.

/bħar/ → [pħar] ‘sea’

/ħabs/ → [haps] ‘jail’

/q/ in Algerian Arabic is substituted with [k] in OSA when it is clustered with a voiceless consonant.

/qtal/ → [ktal] ‘he killed’

/qsam/ → [ksam] ‘he divided’

/f/ is realized as [v] in some verbs when followed by a voiced consonant.

/sˤaffaq/ → [sˤavvag] ‘to applaud’

/fqas/ → [vgas] ‘to hatch’

/f/ is also pronounced as [t] when it is clustered with /t/.

/ʃaft/ → /ʃatt/ ‘I saw’

/ɣ/ is replaced with [x] when it is followed by a voiceless sound.

/ɣsalt/ → [xsalt] ‘I washed

/ɣfalt/ → [xfalt] ‘I forgot about’

The pharyngeal sound /ʕ/ is pronounced as [ħ] when it is clustered with a voiceless consonant.

/ʕsal/ → [ħsal] ‘honey’

/kaʕk/ → [kaħk] ‘cake’

The lateral approximant /l/ is realized as a nasal sound [n].

/zalzla/ → [zanzla] ‘Earthquake’

The nasal sound /n/ is assimilated to [m] like Standard Arabic.

/manbaʕd/ → [mambaʕd] ‘later’

The post-alveolar sound /ʒ/ and alveolar /z/ are exchanged within the same word.

/ʕʒazt/ → [ʕzaʒt] ‘I felt lazy’

/ʒha:z/ → [zha:ʒ] ‘trousseau’

The glottal stop /ʔ/ in Standard Arabic is substituted with a long vowel sound in OSA:

/kaʔs/ → [ka:s] ‘a glass’

/ʒiʔna/ → [ʒi:na] ‘we came’

The glottal stop /ʔ/ is also replaced with a glide [w] or [j], pronounced as a lateral [l], or eliminated when it appears in the final position of the word.

/ʔakkala/ → [wakkel] ‘to give eating’

/ʔams/ → [ja:mes] ‘yesterday’

/ʔardˤ/ → [lardˤ] ‘land’

/wudˤu:ʔ/ → [wdˤu] ‘ablution’

Diphthongs in Standard Arabic like /aj/ and /aw/ are realized as a long simple vowel sound.

/zajt/ → [zi:t] ‘oil’ /lawn/ → [lu:n] ‘color’

However, there exist also instances where these diphthongs are attested, mainly when they occur in pharyngeal or uvular environments (Guerrero, 2015, p. 278).

/ħawʃ/ ‘courtyard’ /ħajtˤ/ ‘wall’

Consonant and vowel sounds when adjacent to an emphatic sound are affected by the pharyngealization process within the same syllable, which triggers a secondary articulation at the back tongue position. An exception is for the consonant /j/ which is not affected when clustered with an emphatic sound (Salem, 2017).

/ftˤu:r/ → [fˤtˤo:ˤr] ‘lunch’

/tˤla:g/ → [tˤlˤa:ˤg] ‘divorce’

/sˤwa:leħ/→ [sˤwˤa:ˤleħ] ‘things’

/dˤja:f/ → [dˤja:f] ‘guests’

1.3.2.3 Consonant Clusters

One of the highly remarkable features that characterizes OSA like all Maghrebi Arabic dialects is the occurrence of consonant sequences. Particularly, these Arabic varieties are marked with the loss of unstressed short vowels in words’ initial syllables due to syncope process (Watson, 2002). This phonological realization was driven by the linguistic friction with Berber, the indigenous language of the country. As a result, complex onsets are greatly evident in this Maghrebi dialect compared to Standard Arabic.

/ħali:b/ → /ħli:b/ ‘milk’ /xaru:f/ → /xru:f/ ‘sheep’

/ðunu:b/ → /dnu:b/ ‘sins’ /nuʒu:m/ → /nʒu:m/ ‘stars’

/kita:b/ → /kta:b/ ‘a book’ /ʃiha:b/ → /ʃha:b/ ‘meteor’

Beside the initial sequences, this dialect also contains final sequences akin to Standard Arabic.

/bard/ ‘cold’ /ʒald/ ‘skin’ /ʒurħ/ ‘wound’

/numt/ ‘I dreamt’ /ħugd/ ‘hatred’ /mardˤ/ ‘disease’

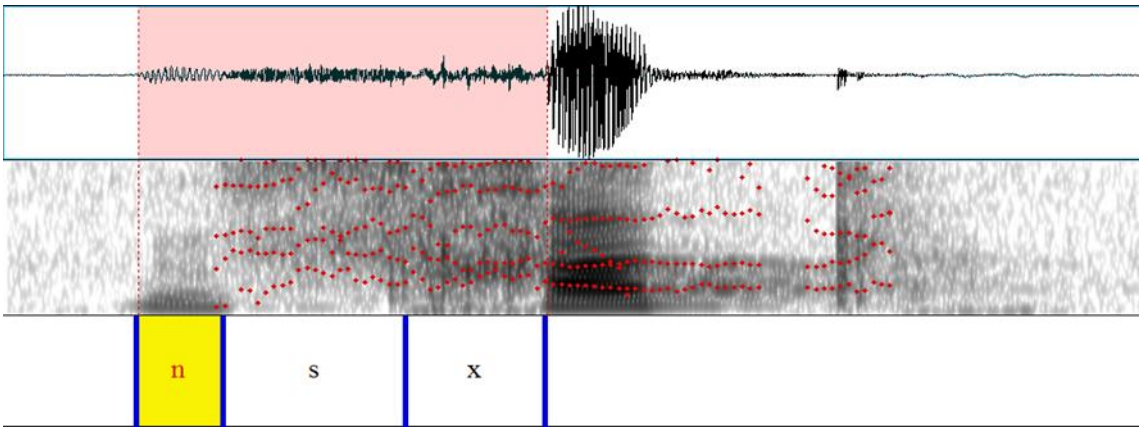
Furthermore, unlike the other Arabic vernaculars, Algerian Arabic including OSA allows the sequencing of three consonants. However, Bouhdiba (1988, p. 189) has contended that this triple combination of consonants “only occur across boundaries. They are either the result of an assimilatory process or the product of a stem and affix combination”. The following are some illustrations of triconsonantal clusters occurring in OSA:

/nsxatˤ/ ‘he disappeared’

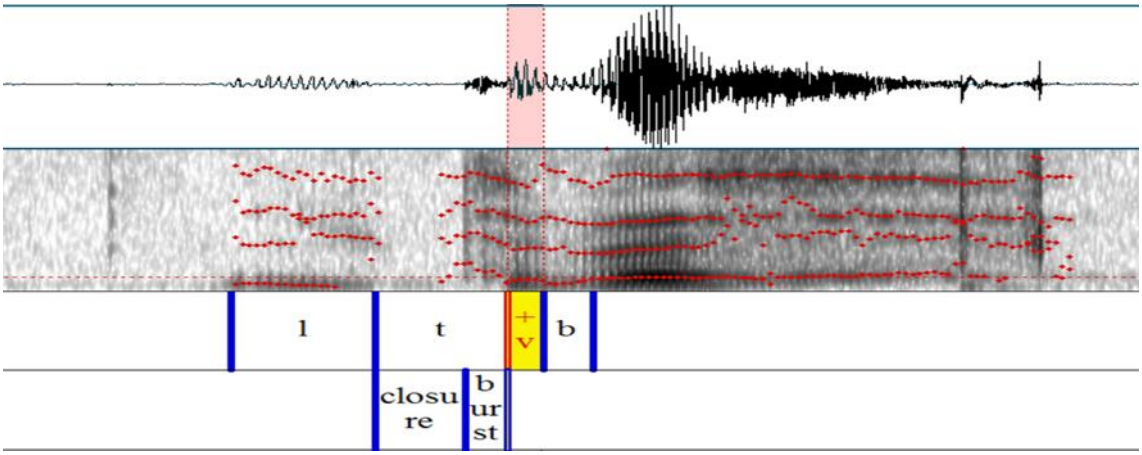
/lʕbar/ ‘the-measure’

/stfa:d/ ‘he benefited’

Notwithstanding, an important point worth introducing here is that not all biconsonantal and triconsonantal combinations perceptually judged as clusters (i.e., there is no intervening vowel) are in fact true clusters. Acoustically, the gestural coordination of consonants may reveal a short vocalic interval in a wide number of sequences while keeping audibly pure clusters, as attested experimentally in Salem (2017). This acoustic feature may also be evident in the current experimentation. As an illustration, consider Figure 1.4 (a and b) below:



a. Acoustically pure consonant cluster in the word /nsxatˤ/ ‘disappeared’



b. Acoustically non-pure consonant cluster in the word /ltbas/ ‘worn’

Figure 1. 4 Spectrographic illustrations of consonant sequencing (Salem, 2017, p. 97)

1.3.2.4 Syllable Structure

Syllable structure in OSA is distinct from the other Arabic vernaculars. This stems from vowel elision which yields to a wide appearance of complex onsets. Nevertheless, a syllable in this dialect, similarly to all Arabic dialects, cannot start with a nucleus regardless of its position in the word (Bouhdiba, 1988). Additionally, although the most basic syllable (CV) type is universal and evident in several Arabic varieties, this syllable is less frequent in OSA apart from minor instances like /ʒa/ ‘he came’ (ibid., p.170). A brief sketch of the major syllable types existing in this dialect is outlined below. In this respect, a few qualifying remarks are in order here: First, gemination is indicated with two consonants (CC). At this point, it important to mention that

throughout the current study, when geminated consonants occur in medial positions of non-monosyllabic words, the first consonant is assigned as a coda to the first syllable, while the second consonant is taken as an onset of the next syllable. Second, syllables encompassing a short vowel are labeled as (-V-). Third, syllables involving a long vowel are presented as (-VV-) within the same syllable. This segmentation aids the syllabification of the words according to their weight, as will be highlighted in the subsequent section. Consider the following syllable types (underlines are only used to refer to the target syllable in disyllabic or polysyllabic words):

CV	/ʒa/ 'he came'	/ʃaʒ.ra/ 'a tree'	/ħaw.ma/ 'the neighboring'
CCV	/lqa/ 'he found'	/bna/ 'he built'	/qra/ 'he studied'
CVC	/men/ 'from'	/nar.fed/ 'I hold'	/maq.la/ 'cooking pan'
CVCC	/madd/ 'give'	/lardˤ/ 'land'	/talʒ/ 'snow'
CCVC	/xraʒ/ 'he got out'	/ʃʕar/ 'hair'	/ktaf/ 'shoulder'
CVVC	/ħu:t/ 'fish'	/ɣa:r/ 'he got jealous'	/ma:r.gi:n/ 'clever. plural'
CVV-	/qa:.ri/ 'intellectual'	/ʒal.la:.ba/ 'feminine dress'	/ba:.jen/ 'clear'
CCVV-	/mra:.ja/ 'mirror'	/ʕba:.ja/ 'dress'	/msa:.si:k/ 'hair pins'
CCVVC	/bʕa:d/ 'far. plural'	/kla:t/ 'she ate'	/mra:dˤ/ 'sick. plural'
CVVCC	/la:zz/ 'moving aside'	/ʃa:dd/ 'holding'	

1.3.2.5 Stress

As previously indicated in section 1.2.4, stress refers to a prominent syllable in a word at the lexical level. Accent (or pitch accent), on the other hand, is concerned with the F0 movement at the post-lexical level, which plays a pivotal role in conveying pragmatic meanings. Arabic is a stress-accent language (Watson, 2002; Jun, 2005), in which pitch accents are assigned to lexically stressed syllables. As a corollary, it is crucial to demystify stress patterns in OSA in order to get a better grip on accent assignment in our experiments.

Watson (2011, p. 2990) has postulated that "stress location is a function of both syllable weight and syllable position". Notably, syllable weight is divided into three main categories (the examples are provided above):

(1) Light syllables: open syllables (CV)

(2) Heavy syllables: open syllables with a long vowel (CVV), or closed syllables with a short vowel and a coda (CVC)

(3) Super-heavy syllables: closed syllables with a long vowel and a coda (CVVC), or closed syllables with a short vowel and two codas (CVCC), or with a long vowel and two codas (CVVCC).

Consequently, Arabic prosodic literature has postulated that stress location is highly predictable, proposing that stress falls on the ultimate syllable if it is superheavy; otherwise, on the penultimate syllable if it is heavy; otherwise, on the antepenultimate syllable or the word-initial syllable (Watson, 2011; Chahal & Hellmuth, 2014). With respect to OSA, Bouhdiba (1988) has analyzed stress patterns in this dialect. According to him, stress assignment in OSA is contingent upon the following rules (p. 217, 219):

(1) Stress a superheavy ultima.

(2) Otherwise, stress: a) a heavy penult

b) a heavy ultima

(3) Otherwise, stress a light antepenult and monosyllabic words.

Accordingly, here are some examples:

/ɣur. ˈja:n/ 'a kid' (stress on the ultimate superheavy syllable)

/ʒa. ˈma:l/ 'a proper name' (stress on the ultimate superheavy syllable)

/ˈwi:n.ta/ 'when' (stress on the penultimate superheavy syllable)

/ˈɣad.wa/ ‘tomorrow’ (stress on the penultimate heavy syllable)

/ˈba:.jen/ ‘clear’ (stress on the penultimate heavy syllable)

/ˈwi:n/ ‘where’ (stress on the monosyllabic word)

1.3.3 Lexical Features

Owing to the linguistic contact with several languages, including Berber, Spanish, Turkish, and French, the lexical inventory of OSA is replete with a great number of loanwords. However, these words were exposed to phonological and morphological changes to adapt the linguistic system of the dialect. In the following we provide some illustrations of some borrowed words which are frequently used by the old and/or young speakers of this dialect.

- Berber Loanwords:

/fakru:n/ ‘a tortoise’ /fartˤatˤu/ ‘a butterfly’

/zarzu:mijja/ ‘ a lizard’ /ɡarʒu:ma/ ‘a throat’

- Spanish Loanwords:

/li:xijja/ ‘bleach’ /ba:su:ra/ ‘garbage’

/ʧangla/ ‘flip flop’ /su:ma/ ‘a sum of money’

- Turkish Loanwords:

/tˤubsi/ ‘a plate’ /baʃma:q/ ‘slipper’

/ʃa:rba:t/ ‘sweetened fruit juice’ /ka:ʕetˤ/ ‘paper’

- French Loanwords:

/tˤa:bla/ ‘a table’ /friʒida:r/ ‘fridge’

/furʃi:tˤa/ ‘a fork’ /martˤu/ ‘a hammer’

1.3.4 Code-Switching to French

Code-switching is a common linguistic behavior in bilingual or multilingual speech communities. It stands for the alternation of two or more languages or varieties within the same

conversation (Milroy & Muysken, 1995). Intriguingly, due to the long-term French colonization, Algerian speakers exhibit by no means conscious and non-conscious use of Arabic-to-French code-switching over long or short stretches of speech.

Essentially, OSA speakers like all Algerian speakers tend to switch back and forth between the two languages at sentence/clause boundaries (inter-sentential code-switching) or within the same sentence or clause at word boundaries (intra-sentential code-switching). The following are some instances of both types of code-switching (the French code is enclosed between two slashes):

- Inter-sentential code-switching:

/sɛ vʁɛmɑ̃ ẽteʁsɑ̃ mɛ/ ʕandi ki:fah fe-dda:r

'It's so interesting, but I have the same at home.'

/ʒø sˤɥi dɛzɔlɛ/ mannaʒemʃ nʒi

'I'm sorry! I can't come.'

- Intra-sentential code-switching:

xasˤni /klɑ̃dɛstɛ̃/ jwasˤsˤalni l-el-/aeʁɔpɔʁ/

'I need a gypsy cab to drive me to the airport.'

ħakmetni /siʁkylasjɔ̃/ fe- /ʁɔ̃ pwɛ̃/ sˤsˤba:ħ

'I got stuck in traffic at the roundabout this morning.'

1.4 Conclusion

Given that the crux of this study is to explore the intonational patterns of OSA within the AM approach, we provided in the present chapter the fundamental tenets of this approach. Subsequently, a description of the linguistic landscape of this dialect was depicted. However, it is now requisite to review some of the relevant literature within the scope of this dissertation before wading through our experimental analysis. This is the main objective of following chapter.

CHAPTER TWO:

LITERATURE REVIEW

Chapter Two: Literature Review

2.1 Introduction

The exploration of the intonational patterns of languages and spoken dialects has sparked off the interest of a great number of researchers. The present chapter is devoted to review some of the prominent studies in this large realm, with special attention to Arabic prosodic literature. The goal is to provide a crucial backdrop to the analysis to be undertaken in the present thesis. Accordingly, this chapter is organized as follows: Section 2.2 endeavors to cast light on a wide number of studies that have inspected intonation within the AM approach both cross-linguistically and across Arabic spoken varieties. Section 2.3 surveys crucial studies that have addressed intonational encoding of focus. Section 2.4 is dedicated to the main sociophonetic studies that have examined gender-related intonational variation. Section 2.5 closes the present chapter with a conclusion.

2.2 Intonation Cross-linguistically and Across Arabic Varieties

The fact that all languages are spoken with intonation, it ignited a spate of variationist research on how to typologize intonational systems throughout the worldwide languages and their concomitant spoken varieties. Despite the existence of some universal prosodic aspects, numerous studies have aimed, mainly within the powerful Autosegmental-Metrical (AM) framework, to determine the extent of variation in the employment of pitch across different languages and within dialects of a single language (Jun, 2005; Jun & Fletcher, 2014; Arvaniti, 2022; Chahal, 2006; Chahal & Hellmuth, 2014; El Zarka, 2018; and Hellmuth, 2019; among others).

Roughly speaking, it has been reported in the literature that prosodic variation is built upon various parameters. These include, but not limited to, the role of pitch events within a linguistic mechanism, the size of pitch accents and edge tones in the inventory, the organization of the

constituents that shape prosodic phrasing, prominence marking and allocation, differences in the alignment rules, as well as differences in prosodic cueing of information structure categories (Hellmuth, 2019 cf. Jun, 2005).

As has been portrayed in Moussa (2019), some languages employ pitch events to distinguish word meaning (e.g., Chinese, Japanese, Igala) or to map out sentence-level structure. Besides, intonation can serve a prominence-lending role, where certain tones in an intonational contour are linked to lexically stressed syllables in the prosodic structure (pitch accents as in English), or a demarcative role, where other tones are associated with the boundaries of phrasal constituents within this structure (edge tones as attested in Japanese and French), or it can fulfill both functions simultaneously as Arabic (Chahal, 2006). As for postlexical phrasing, languages may classify words or syllables into accentual phrases (APs) or organize them based on syntactic function within an intermediate phrase (ip) or an Intonation Phrase (IP). In the same vein, languages may exhibit different accent distribution strategies, either densely or sparsely by marking only the nuclear component within a specified domain while deaccenting or compressing other pitch events. Moreover, a further difference between languages is affined to the phonetic attributes used to signal prominence, with some languages employing stress, accent, duration, segment realization, and amplitude together, while others rely solely on some of these features. Analogously, languages may reflect phrasal edges via tonal or non-tonal cues, or a combination of both, where the former involve variations in F0 configuration and the latter include dynamic aspects like juncture, lengthening, and pausing (Jun, 2005; Hyman, 2006; Jun & Fletcher, 2014; Hellmuth, 2019; and Arvaniti, 2022).

In the following, we primarily focus on exploring the existing body of literature pertaining to Arabic intonation, specifically emphasizing on previous experimental studies conducted within the AM framework. This serves as a foundational basis to launch our analysis and allows us to establish an accurate and dependable comparison between the intonational system of Algerian

Arabic as spoken in Oran and that of other Arabic dialects. At first sight, there is a great consensus among early descriptive studies of Arabic dialects carried out within the British school of intonation (e.g., Mitchell, 1993) as well as among recent studies within the AM intonational phonology (e.g., Chahal, 2001, 2006; Hellmuth, 2006, 2014; 2019; El Zarka, 2018) on assigning Arabic along with its spoken dialects within the intonational languages typology. This being so, pitch movement applies postlexically without imparting any lexical distinctions. In addition, all Arabic varieties exhibit stress-timing (as described by Watson, 2011) and head-prominence-lending, meaning that the syllable with lexical stress carries the pitch accent; thereby enhancing the prominence of both the syllable and the entire word (Chahal, 2006; El Zerka, 2018).

The study of Arabic intonation within the AM theory has been pioneered by Chahal (2001) on Lebanese Arabic (LA) as spoken in the Northern city of Tripoli. She has suggested that LA exhibits a tonal inventory made up of six pitch accents (H*, L+H*, L*, !H*, L+!H* and H+!H*), three phrase accents (H-, L- and !H-), and two boundary tones (L% and H%). High pitch accents and phrase accents are often subject to downstep (!H* and !H-) whereas boundary tones are found to be subject to upstep. Pitch accents are occasionally tethered with lexically stressed (metrically strong) syllables. Additionally, she pointed to five intonational tunes: (1) declarative tunes marked with a falling F0 configuration to the lowest part of the speaker's pitch range (L-L%)[3]; (2) question tunes marked with high rising edges (H-H%) utilized in both yes/no questions and wh-questions; (3) plateau tunes in which a high plateau stretches from the nuclear accent to the edge (H-L%) used to display incompleteness; (4) marked continuation tunes indicated by a fall to a low level in the speaker's range then a rise to mid-pitch (L-H%); and (5) stylized downstepped plateau tunes (!H-L% and !H-H%) used to express politeness and gentle admonishment. As for intonational phrasing, LA was observed to comprise three postlexical prosodic elements: a phonological word (PWd) which is potentially accented, an intermediate phrase (ip) where the final pitch accent

[3] Also referred to as 'pointed hat' or 'flat hat' in t'Hart et al.'s (1990) terminology.

functions as the nuclear accent and marked by phrase-final lengthening, and an Intonational Phrase (IP) delineated by either a low boundary tone (L%) or a high boundary tone (H%).

Moreover, in her survey of some cross-dialectal literature on Arabic intonation, Chahal (2006) has reported some typological patterns of intonation based on secondary analysis of some prior descriptive studies. These include variations in the nuclear melodies: certain dialects permit intricate contours like fall-rise, rise-fall, rise-fall-rise, or rise plateau (evident in Jordanian Arabic), while others exhibit simpler nuclear tunes like fall, rise, or level (as observed in the Kuwaiti dialect). Furthermore, the inventory of pitch accents was found to differ across Arabic dialects. For instance, Jordanian Arabic was reported to have H*, L*, and H+L* pitch accents, contrasting with Lebanese Arabic mentioned above.

Analogously, Hellmuth (2006) has investigated the intonational system of Egyptian Arabic (EA) spoken in Cairo. In contrast to LA, EA is characterized by a dense accent distribution in which every content word (a PWd) bears a pitch accent, as Figure 2.1 shows below, (this pattern was also observed in Emirati Arabic, as pinpointed by Blodgett et al., 2007), as well as a limited pitch accent inventory in which only one commonly occurring pitch accent is observed (L+H*).

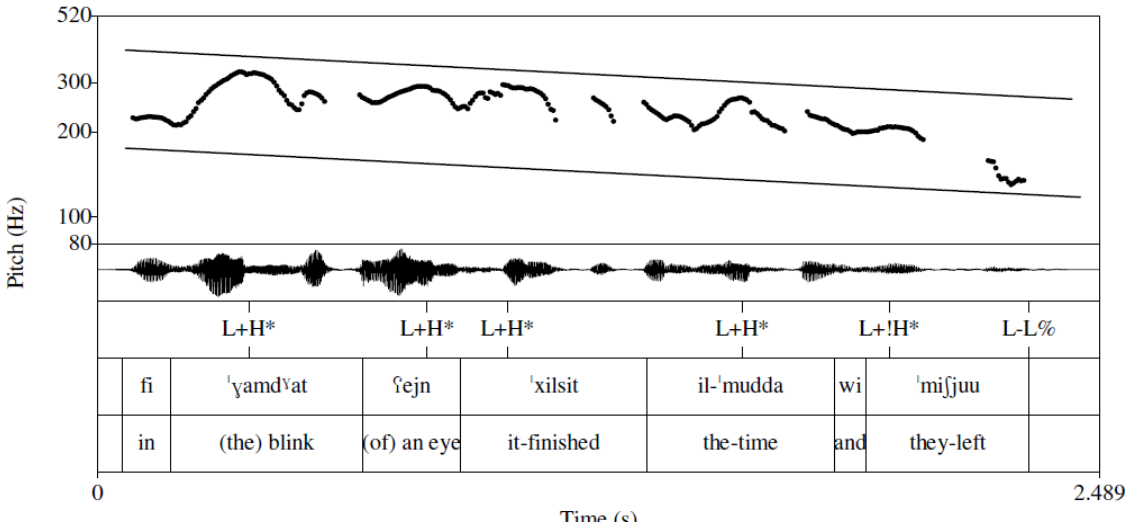


Figure 2. 1 An example of a declarative sentence with a dense accent distribution in Egyptian Arabic (retrieved from Chahal & Hellmuth, 2014, p. 36)

In addition, the ultimate pitch accent within an intonation phrase is typically expressed with a condensed pitch range owing to final lowering. Regarding the edge tones, she argued that the most frequent combinations of phrase accents and boundary tones noticed in this dialect are 'L-L%' in declaratives and wh-questions and 'H-H%' in continuation rise and yes/no questions.

Alternatively, Hellmuth (2014) has further analyzed another Arabic variety, Sanaani dialect spoken in Yemen. She suggested that this dialect is characterized by a rich pitch inventory opposed to Egyptian Arabic. This consists of 'H*, L*, L*+H, L+H*', and two marginally occurring accents 'LH*L and H*H'. As regards boundaries, four combinations have been figured out: 'L-L%, H-H%, H-L%, and L-H%'.

In the same vein, Moussa (2019) carried out a thoroughly phonetic and phonological examination of intonation in Jeddah Arabic within the AM approach. She has demonstrated that this dialect consists of a rich tonal inventory: four pitch accents (H*, L*, !H*, and L+H*) which align with metrically strong syllables, three phrase accents (L-, H-, and !H-), in addition to the boundary tones (L% and H%). The study touched upon various intonational tunes: (1) declarative tunes which were found to be marked with a falling edge (L-L%) preceded by different nuclear accents (H*, L*, !H*, or L+H*); (2) yes/no and wh-question tunes which were both marked with a high rising edge (H-H% and !H-H%, respectively) and combined with L+H* for the former and with H* for the latter; (3) polite requests which displayed a similar contour as yes/no questions; (4) imperatives were also identical to declarative tunes ending in a fall (L-L%) and preceded by a !H* nuclear accent; (5) plateau 'uncertainty/non-finality' tunes marked with different contours (H* H-L%, !H* !H-L%, or L+H* L-H%); and (6) continuation tunes realized with a high rising edge (H-H%) combined frequently with L+H* nuclear pitch accent. Regarding the constituency hierarchy, Moussa (2019) has argued that the dialect encompasses three prosodic constituents (PWs, ips, and IPs). The Intonational phrases (IPs) are indicated by pre-boundary lengthening of the stressed syllable and right-edge-boundary tones, whereas the intermediate phrases (ips) are

signaled by pre-boundary lengthening (with a greater degree than that of IPs) and right-edge-phrase accents.

At this juncture, one crucial qualifying remark is in order vis-à-vis the hierarchy of the prosodic constituents in Arabic dialects. While the abundant research has contended that most Arabic spoken varieties are composed of three prosodic units (i.e., PWs, ips, and IPs), as delineated above, more recent publications have vouched for a further unit which is the Accentual Phrase (AP). This constituent has been found to be evident in several dialects such as Farasani Arabic spoken in Saudi Arabia (Abbas & Jun, 2021) in which — in addition to IPs and ips – it is denoted with an AP boundary tone (Ha) on its right edge and a low tone (la) on its left. Similarly, this pattern has also been attested in Syrian Arabic (Al Hasan & Mahanta, 2022). Even more intriguingly, this variety of Syrian Arabic has been found to encompass six nuclear pitch accents (H*, L+H*, L*, L*+H, !H*, H+H*, and H+L*) along with four phrase accents of the shape (La and Ha) on the right edges of Accentual Phrases (Aps), (H- and !H-) on the right edges of intermediate phrases (ips), and three boundary tones (L%, and H%, and !H%) marking the edges of Intonational Phrases (ibid.).

Shifting our review from Middle Eastern Arabic dialects to those in North of Africa, it appears to us that Maghrebi Arabic has not received its due share of attention in comparison to the other Arabic vernaculars. Only a handful of studies targeted the intonational patterns in these dialects, allegedly due to their intricate prosodic system. Crucially, a quick review of the pertained literature reveals that Moroccan Arabic has as yet attracted the greatest attention (e.g., Benkirane, 1998; Yeou, 2005; Yeou et al., 2007; Hellmuth et al., 2015). The most comprehensive analysis to date has been provided by Benkirane (1998) who qualitatively investigated the prosodic features of different sentence types, including yes–no questions, declaratives, imperatives and wh-questions. According to El Zarka's (2018, p. 12) report, Benkirane (1999–2000, p. 90) has averred that intonational contours in this dialect have been found to lack the peaks and troughs as compared

to other Arabic dialects. Pitch events are typically marked on the phrase-final syllable or on the two final syllables within an Intonation Phrase. For instance, declarative tunes are realized with a rise-fall and continuation tunes are realized with a high rise, both extending over the final syllables. Even more importantly, it has been reported that pitch events are in essence post-lexical and cannot be contingent upon lexical stress, due to the fact that Moroccan Arabic lacks lexical stress. This claim has also been vouched for by Bruggeman et al., (2020). Consequently, it is reasonable to assume that MA does not display a prominence-lending function (i.e., it's not a 'head-marking' language in Jun's (2005) typology) as the other scrutinized Arabic dialects. Instead, it may fall within the typology of edge-marking languages like French (Jun, 2005) where tonal events only mark the edges of prosodic phrases (El Zarka, 2018; Hellmuth, 2020). The most plausible explanation for this defying pattern is imputed to 'contact-induced change' resulting from interactions with Amazigh and French languages (Hellmuth, 2020).

A further Maghrebi dialect which has triggered scattering studies on intonation is Tunisian Arabic. A significant examination of yes/no questions has been carried out by Bouchhioua et al. (2019). Results revealed that this type of interrogatives is marked with a complex pitch contour: a rise-plateau contour in the north (Tunis) and a noticeable rise-fall in the south-east of Tunisia. The latter pitch contour has been found to be intriguingly followed by an epenthetic vowel at the end of the utterance. Such a segmental question-marker is most likely emanating from historical linguistic contact with Italian language (Hellmuth, 2020).

On the other hand, scant attention has been paid to the intonational patterns in Algerian Arabic, the dialect under scrutiny in the present study, in the Arabic literature. This is putatively owing to the intricate prosodic system and pervasive diversity that characterize the Algerian linguistic profile. One of the early remarkable initiative investigations of Algerian intonation has been attempted by Guella (1984). The researcher proposed a descriptive analysis of some intonational contours, alongside syllabification and stress patterns in the dialect of Nedroma (near

Tlemcen), located in in the northwestern part of Algeria. Guella (1984) has postulated that statements are marked with a fall stretched over the end of the utterance. Likewise, commands and exclamations are also marked with a fall, with a higher fall characterizing more commands. Yes/no questions are realized with a rise initiating earlier to express politeness, a high rise to express strong doubt, and with a low rise to express probability, whereas wh-questions are characterized with a fall pitch contour.

An empirical study has been conducted by Benali (2004) on the prosodic features that mark the identification as well as the distinction of two Algerian spoken dialects (Algiers and Oran dialects) based on production and perception experiments. His acoustic experiment drew on three main measurements: flow rate (measuring the number of syllables per second), F0 height, and F0 range. He has averred that Algiers dialect demonstrated higher melodic variations (faster flow rate, higher F0, and larger F0 range). Oran dialect, on the other hand, was mainly characterized by significant syllabic lengthening.

Recently, an experimental investigation conducted by Bougrine et al. (2018) sought to map out an identification system of Algerian spoken dialects (spoken in the departments of Algiers, Oran, Djelfa, Laghouat, Bousaada, and Adrar). The study was based on prosodic features, mainly intonation and rhythm. The intonational measurements drew upon three parameters: pitch global values of syllable nuclei (in Hz) in addition to pitch range (in Semitones (St)), the proportion (in %) of tone direction (static level, rise, and fall), and tonal size pitch trajectory measured within/between syllable nuclei (St/s). The researchers have found out that better identification patterns were fulfilled for Laghouat dialect. No disparity was detected between Djelfa and Bousaada dialects. Oran and Algiers spoken dialects, on the other hand, revealed the least detection. Nonetheless, the researchers have not displayed the results of the measured intonational features nor did they elucidate how these features characterize each of the covered dialects. Yet,

Bougrine et al.'s (2018) study lends further evidence in favor of not only the linguistic diversity but also the prosodic perplexity that characterize Algerian Arabic.

In this connection, upon reviewing both Arabic and Algerian prosodic literature, it can be inferred that the intonational system of Algerian Arabic has not yet been neatly probed apart from a few preliminary studies that examined certain patterns within the framework of the descriptive British school. To this end, the present research attempts to make a significant stride towards casting light on this under-researched angle of the dialect. It seeks to provide both phonetic as well as phonological scrutinization of intonational patterns in Algerian Arabic as spoken in Oran on the basis of the influential AM approach which is advocated in most current studies.

2.3 Prosodic Focus

A wide number of languages use distinct strategies that generate prominence to indicate a designated informational significance correlated with specific words in an utterance, usually interacted with word order and syntactic construction. In this regard, a further pivotal function of intonation is to draw attention to focused elements of information by means of prosodic prominence to promote discoursal interpretations. Nevertheless, it has been reported that this pattern is language specific (Ladd, 2008). Different languages possess distinct prosodic cues to focus marking, while there exists also a set of other languages that do not have this pattern at all (Ladd, 2008; Vallduví, 1992). Several languages draw upon syntactic movements, i.e., word order to determine focus constituents in a sentence (ibid.). As pinpointed in the previous chapter, focus constituents can be categorized into two primary types: (1) broad focus, where larger portions of the sentence are emphasized as new or noteworthy, and (2) narrow focus, where only a single element is highlighted to introduce new information to the discourse (referred to as informational focus) or to correct the existing background information (known as contrastive or corrective focus).

Recently, acoustic research demonstrated that across numerous languages, narrow focus is relatively marked with the most prominent prosodic feature – nuclear pitch accent of different shapes – regardless of its sentential position. Alternatively, in broad/neutral focus utterances the nuclear accent is assigned to the final pitch accent preceding the phrasal boundary, receiving the most promoted phonetic properties in terms of F0 variations, duration, segmental realization, and/or amplitude in comparison to the preceding items within the same phrase (Jun, 2005; Xu & Xu, 2005; Hellmuth, 2006, 2011; Ladd, 2008; Wang & Xu, 2011; Chahal & Hellmuth, 2014; Al-Zaidi, 2014; Féry, 2017; Moussa, 2019; Arvaniti, 2022; among others). Additionally, alongside the phonetic amplification of the on-focus item, the post-focus components may undergo de-accentuation or Post-Focus Compression (PFC) (Xu, 2011). A fundamental premise emanating from this discussion is that information structure lends further evidence to the relative hierarchical order of prominence which depicts the phonological position and significance of pitch accents within a phrase in a given language. Notwithstanding, this prosodic pattern is inconsistently manifested across languages and dialects.

Cross-linguistically, there exists a plethora of recent empirical studies which aimed at investigating the intonation-based encoding of focus. Face (2002) has carried out a phonetic and phonological examination of the utilization of intonation to identify the narrow/contrastive focal word in comparison to broad focus in Spanish. The study employed the answer-question paradigm to spur 20 participants from Madrid to produce both focus conditions in initial and medial sentential positions. Results revealed an L+H* focal pitch accent emanated from an early F0 peak mainly used to indicate contrastive focus. Additionally, an L*+H pitch accent is used to mark both broad and narrow focal words. A major phonetic correlate associated with contrastive focus was the F0 peak height in which F0 peaks for an L*+H under contrastive focus were notably higher in both initial and medial positions (250 Hz and 222 Hz, respectively) than their counterparts under broad focus in the same positions (201 Hz and 197 Hz, respectively). A further intonational

strategy as suggested by Face (2002) involved the employment of phrasing through the insertion of H- or L- intermediate phrase boundary tones at the end of the word in contrastive focus followed by a brief pause. In this connection, Spanish language as elucidated by Face (2002) seems to be compatible with a set of several languages like Hungarian and Korean (Vogel & Kenesei, 1987; Jun, 1996) where phrasing constitutes a useful prosodic pattern to reflect focus. Conversely, languages like English, Italian, and European Portuguese were reported to lack this pattern (Gussenhoven, 2004; 2004; Frota, 2000; D'Imperio, 2002; Ladd, 2008).

Even more intriguingly, certain studies have yielded asymmetrical results for the same scrutinized language. For instance, Silkirk's (2002) examination of the distribution of pitch accent under both informational focus and contrastive focus categories in American English has displayed that a constituent associated with information focus is marked with a high pitch accent (H*), while a constituent associated with contrastive focus is assigned a bitonal tone, a low pitch accent followed by a high pitch accent aligned with the target stressed syllable (L+H*) (also depicted by Pierrehumbert & Hirschberg, 1990). On the contrary, Hedberg and Sosa (2008) in their analysis of spontaneous dialogue of American English have found out that both information-focused and contrastive focused constituents can be marked with L+H* pitch accent.

A further remarkable experimental study on American English has been conducted by Xu and Xu (2005) targeting not only the on-focus elements but the post-focus elements as well. A detailed acoustic examination of F0 contours has been performed to distinguish between narrow and broad focus occurring in different positions within short declarative sentences produced as answers to prompt questions. Results revealed that narrow focused words were characterized by higher F0 peaks (maximum F0 was 11.0 St vs. 8.2 St), larger excursion size, thus expanded pitch range (difference between maximum F0 and minimum F0 was 4.4 St vs. 1.4 St), faster rise speed (23.4 St/s vs. 9.5 St/s), and longer duration (222.6 ms vs. 195.4 ms) than their counterparts under broad focus relatively in all sentential positions. The effect of focus on the prosodic-acoustic

mechanisms (F0 height, excursion size, rise speed, and duration) has been underpinned in several studies cross-linguistically (Eady and Cooper, 1986; Xu, 1999; Xu and Sun, 2002; D'Imperio, 2002; Baumann et al., 2006; Chen et al., 2009; Breen et al., 2010; among others) and across many Arabic varieties which will be accumulated in a subsequent discussion.

Moreover, in addition to the accentuation of the focused component manifested through the acoustic mechanisms of F0 changes, intensity, and duration, there is also greater impact on the realization of the entire target utterance. Crucially, the post-focus words have been found to be largely characterized by reduced pitch range and intensity relative to broad focus counterparts, whereas the pre-focus items within the same sting did not undergo any noticeable change. Accordingly, an additional parameter of intonational focus is the de-accentuation of the post-focus material, also referred to as *Post Focus Compression* (PFC), as suggested by Xu (2011). This pattern has been reported for numerous languages such as, but not limited to, Swedish (Bruce, 1982), American English (Cooper et al., 1985), Mandarin Chinese (Xu, 1999), French (Jun & Fougeron, 2000), German (Féry & Kugler, 2008), Korean (Lee & Xu, 2010), and Arabic (discussed below).

In much the same way, a considerable body of Arabic prosodic literature has aimed at casting light on focus cueing through intonation mechanisms. Chahal (2001, see also Chahal & Hellmuth, 2014) has carried out qualitative and quantitative analyses, comparing narrow focus (informational focus in particular) with its neutral/broad counterpart at three different positions within a sentence (initial, medial, and final) in Lebanese Arabic. Qualitatively, she has noticed that both focus types carry either H* or L+H* nuclear accents without any distinction. Instead, speakers employed de-accentuation as a phonological marker to pinpoint narrow focus in which the post-focus words exhibited absence of F0 movement. In addition, She has discovered a further phonological strategy whereby the initial target narrow material may appear in a separate IP break indicated by !H-L% edge tone and considerable phrase-final lengthening, followed by an adjacent

IP with the remaining string of words characterized by compressed pitch range, as displayed in Figure 2.2 below:

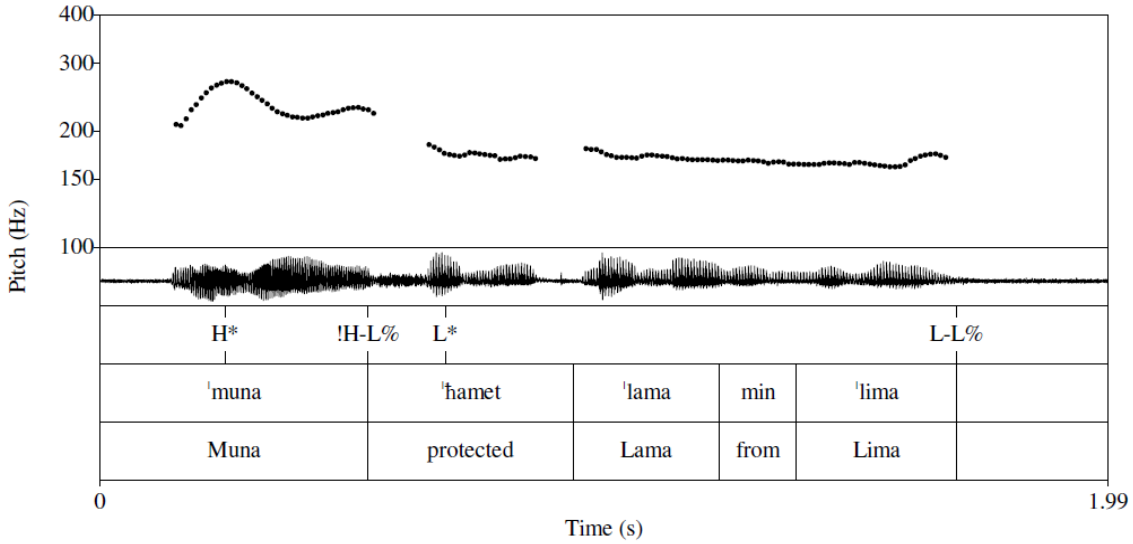


Figure 2.2 An example of initial-sentential narrow focus /ˈmuna/ realized in its own IP followed by de-accented post-focus words in a separate IP(Retrieved from Chahal & Hellmuth,2014,p. 52)

Quantitatively, Chahal (2001) has underpinned her phonological description with a phonetic examination drawing upon various acoustic measurements (F0, amplitude RMS, vowel first and second formant frequencies F1/F2, and duration). Results revealed that the words in narrow focus were realized with larger pitch excursions (pitch range), higher F0 peaks, higher intensity, and longer duration relative to those occurring in neutral/broad focus. Besides, pre- and post- focus surrounding words were produced with compressed pitch excursions.

Likewise, Hellmuth (2006, 2009, 2011; see also Chahal & Hellmuth, 2014) has analyzed different cues to prosodic reflexes of focus in Egyptian Arabic. She has found out that only F0 excursion is used to mark contrastive focus (produced in expanded pitch range), whereas duration, intensity, and spectral tilt displayed no disparity. Additionally, the words following the contrastive focused target were marked by a compressed pitch range. Qualitatively, albeit pitch accent was not an indicator of focus, given that all focused and non-focused words were realized in L+H* pitch

accent, phrasing was evident in marking contrastive focus exhibited by the insertion of a phrase boundary tone L- and phrase-final lengthening.

A further empirical study on prosodic reflexes of narrow informational focus compared to broad focus in Egyptian Arabic has been attempted by Cangemi et al. (2016). In addition to an across-speakers global experiment, the authors investigated inter-speaker differences in intonational encoding of focus. They argued that speakers showed stronger asymmetry in the employment of F0 turning points alignment rather than scaling, mainly for F0 low turning points. In narrow focus condition, both high and low turning points were typically aligned earlier compared to broad focus. Yet, in certain utterances, it was observed that the high turning points were scaled higher in narrow focus than in broad focus. Furthermore, El Zarka et al. (2020) have also examined different categories of focus (contrastive, informational, and broad foci alongside topic-encoding) in terms of prominence across the entire contour within the same Arabic vernacular. The results supported the assumption that narrow focus is plainly cued by relative prominence. This was acoustically attested through higher F0 scaling in focused words and compressed pitch range, lower intensity, and shorter duration in post-focus words. Even more interestingly, the results demonstrated additional register lowering of post-contrastive-focus, indicating a gradual prominence cue to focus that extended throughout the entire intonation contour of the utterance.

Intriguingly, Yeou et al. (2007) have conducted a variationist investigation of prosodic marking of contrastive focus in three Arabic dialects: Moroccan Arabic (MA), Yemeni Arabic (YA), and Kuwaiti Arabic (KA). The study relied on three major acoustic measurements: F0 peak alignment, the accented vowel duration, and rise size (or excursion size measured as the difference between F0 minimum and F0 maximum). The authors disclosed that all the three dialects revealed a significant effect of contrastive focus on excursion size and vowel duration. Yet, the largest excursion size was noticed in MA (5.33 St) and the least size difference in YA (0.33 St), indicating

that expanded pitch range was used as marker of narrow focus in both MA and KA dialects but not in YA. As for duration, longer vowels were produced in contrastive focal words compared to their non-contrastive counterparts in the three dialects (MA: 49 ms, YA: 35 ms, and KA: 29 ms). F0 peak alignment, on the other hand, was found to be contingent upon the target syllable type. In MA, the F0 peak appeared within the accented syllable in closed syllables but outside the syllable in open syllables, but no significant impact was observed in Yemeni Arabic and Kuwaiti Arabic since the F0 peak falls within or close to the end of the accented vowel regardless of the syllable type. Yeou et al. (2007) have further noticed that post-focus constituents in all the three dialects were marked by de-accentuation. Additionally, a distinct pattern was observed, particularly in MA, where pre-focus elements were also subject to de-accentuation. Nevertheless, Yeou et al.'s (2007) finding of post-focus de-accentuation in Moroccan Arabic has previously been confirmed by Benkirane (2000).

Another acoustic experiment has been carried out by Al-Zaidi (2014; see also Al-Zaidi et al., 2019) on Hijazi Arabic. He provided a thoroughly phonetic and phonological examination of how intonation is used to encode three types of focus (neutral focus, informational focus, and contrastive focus) occurring in initial and penultimate positions within a sentence. He vouched for the use of excursion size, intensity, and duration as acoustic correlates of marking prosodic focus. Both information focus and contrastive focus were produced with larger pitch range than their neutral counterpart, with greater significance for contrastive focus. The stressed syllables in either the target information or contrastive focus was longer than in neutral focus, also with greater significance for contrastive focus. Intensity displayed higher values in all focus types, but even higher values for sentence-penultimate contrastive focus compared to information and neutral focus. Besides, the post-focus items were lowered and compressed exclusively when information or contrastive focus is in sentence-initial position, while pre-focus material exhibited no remarkable difference. Al-Zaidi (2022) has further examined the prosodic encoding of focus in

Taifi Arabic (an urban Hijazi Arabic dialect in Saudi Arabia), emphasizing particularly on the correlation between pitch-accent distribution and contrastive and informational focus marking. He argued that in the declarative utterance, regardless of whether it is focused or not, every content word receives a pitch accent. This implies that de-accentuation was not a pivotal parameter utilized by speakers of this dialect to indicate focus. In fact, this pattern was predominantly observed in utterances with initial contrastive focus. In terms of the distribution of pitch accents, similar to many other languages previously reported, Taifi Arabic did not exhibit a distinct type of pitch accent specifically assigned to the focused word; instead, it was realized through either H* or L+H* pitch accents. Nonetheless, Al Zaidi (2022) went on to emphasize the importance of considering variations in accent distribution among Arabic dialects when developing a comprehensive intonational model for Arabic dialects.

In the same vein, a further Arabic dialect spoken in Saudi Arabia has been analyzed by Moussa (2019). In her phonetic and phonological research endeavor to posit a comprehensive model of intonation in Jaddah Arabic based on the AM approach, Moussa (2019) has investigated the ways broad and narrow focus are prosodically cued in this dialect. Accordingly, results provided evidence in favor of the employment of this pattern. Quantitative measurements revealed that narrow focus words were produced with greater phonetic enhancement (higher peak, intensity and rise speed, longer duration, and expanded excursion size) compared to the other words within the same utterance and to broad focus counterparts. Qualitatively, Moussa (2019) has demonstrated that both narrow focus and broad focus were assigned either H* or L+H* nuclear pitch accents. Consequently, the shape of accent was not considered as a strategy to distinguish between the two types of focus. However, another phonological strategy was applied in this regard. An intra-speaker variation has been observed under narrow focus condition where some speakers placed the target element in a separate intermediate or intonational phrase marked by high phrase tone (H-) or boundary tone (H%), respectively. This showed that phrasing can be considered as a

positive strategy to mark narrow focus. Figures 2.3 and 2.4 below are illustrations from Moussa's (2019) observation. An additional strategy was employed in this dialect which involved post-focus compression. This was achieved by producing the remaining portion of the string with a low pitch and small excursion until the end of the utterance.

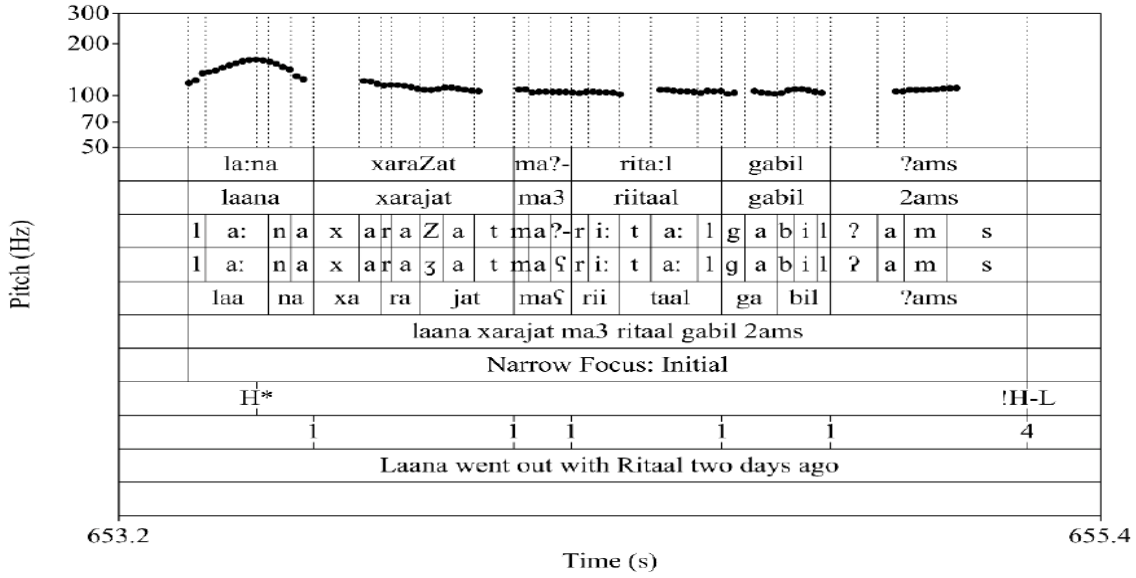


Figure 2. 3 An example of an utterance with initial-narrow focus realized as one IP (Moussa, 2019, p. 123)

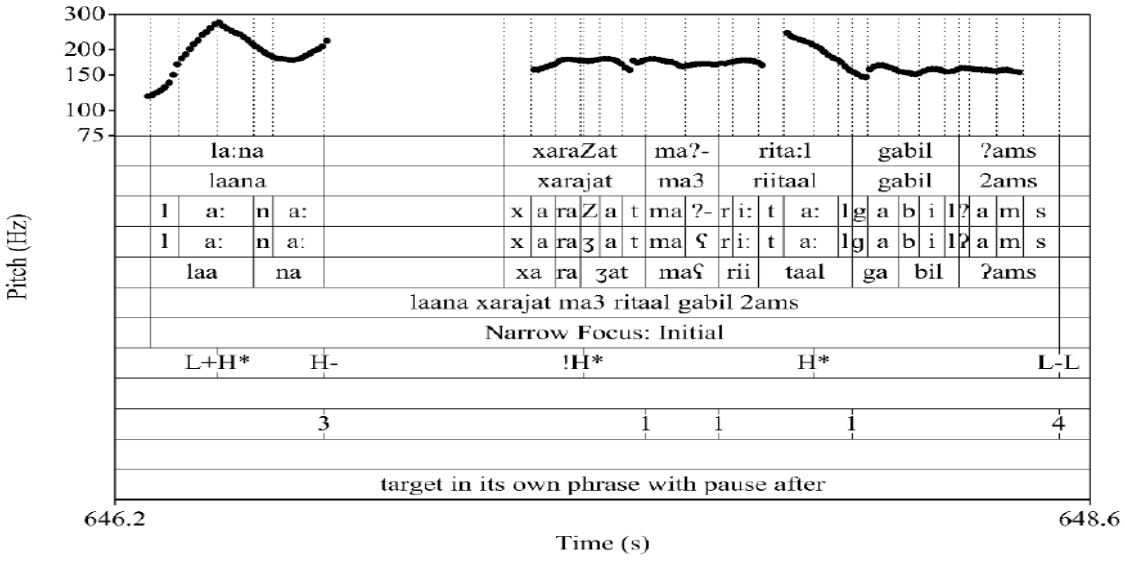


Figure 2. 4 An example of an utterance with initial-narrow focus realized as two prosodic phrases (Moussa, 2019, p 123)

Prosodic focus has also been scrutinized in Tunisian Arabic. In particular, Bouchhioua (2009) has carried out an acoustic study to decipher the distinction between lexical stress and phrasal stress (i.e., accent) by means of focus that canonically stimulates syllable accentuation, as discussed before. The researcher has figured out that whether the syllable was stressed or unstressed, it was lengthened under focus condition. Likewise, intensity increased only when the target word was focused. As a result, duration and intensity were best indicators of prosodic focus in Tunisian Arabic in addition to F0 height, spectral balance, and vowel F1 which were found to mark both lexical stress and phrasal accent.

Several investigations have been conducted to probe the prosodic effects on the production of focus in Algerian Arabic. For instance, Benali (2016) has conducted production and perception experiments to analyze the effect of prosodic focus on the identification of Algiers and Oran Algerian spoken Arabic dialects. His acoustic analysis drew on the comparison of F0 movements in the intonational contours that involve different categories of focus (broad focus, contrastive narrow focus, emphatic narrow focus, and interrogative focus) between the two dialects. Results provided evidence that the prosodic features do encode narrow focus in Algerian Arabic. Besides, a regional variation was observed in terms of emphatic and interrogative focus prosodic characteristics. The former was marked with a rise-fall nuclear accent in Algiers and with a slight rise or flat in Oran. The latter was realized with enhanced rise-fall in Algiers and with a fall-rise pitch contour in Oran. Broad focus, on the other hand, did not display any significant disparity. In addition, duration was found to affect the stressed syllables in the target words proving thus that lengthening is also a prosodic correlate to mark focus in Algerian Arabic. The perception experiment demonstrated that the prosodic pattern of interrogative focus was effective to detect either dialect, whereas emphatic narrow focus was only successful in identifying Algiers dialect.

Taken together, all these reported studies have pointed to one hardly-disputed account: intonation is prerequisite to encode focus and contributes robustly to the interpretation of certain

communicative structures. Focused constituents are pronounced with an expended pitch range, higher or changing F0, greater intensity, and longer duration. Moreover, prosodic focus can affect the entire utterance through post-focus compressed pitch range and pre-focus intact modification.

2.4 Gender

The study of language and gender equation has progressively ignited a dynamic and considerable body of research which transcended the field of sociolinguistics to reach other large interdisciplinary research arenas such as sociology, psychology, philosophy, and anthropology. At first sight, it is highly contended that the linguistic forms along with the linguistic behavior vary between men and women across all speech communities. However, before delving into intricate details, a crucial distinction has to be delineated apropos of the employment of the terms *sex* vis-à-vis *gender*.

Essentially, the term gender has been employed, since the beginning of the 1970s, to refer to the non-fixed socially and culturally established masculinity and femininity. The term sex, on the other hand, has been posited to signal the anatomical and physiological nature (Oakley, 1972 reported in Jackson, 1998 and in Talbot, 2010). In other words, sex is biologically defined at birth, in contrast to gender which is an acquired behavior that varies across societies and cultures and changes over time.

A large number of sociolinguistic studies have sought to probe language use as affected by distinct extra-linguistic - social - factors such as age, class, education, ethnicity, region, and gender. A quick survey of the literature reveals that the latter has received a remarkable attention owing to the vitality and intriguing diversity in the use of linguistic features displayed mainly in female speech.

Lakoff's (1973, 1975) seminal work "*Language and Woman's place*" has marked the history of women's language investigation. She has put forth ten linguistic features which she

assumed were more evident in women's speech than in men's. Lakoff went on to argue that this distinctive women use of language is likely to convey uncertainty and lack of confidence as well as subordinate position in society. These features are as follows (as summarized in Talbot, 2010, p. 36-38; and in Holmes, 2013, p. 302-303):

- Lexical hedges or fillers, e.g., *you know, sort of, kind of, well, you see;*
- Tag questions, e.g., *isn't she? don't you? Haven't you?*
- Rising intonation on declaratives, e.g., '*it's really good.'*
- 'Empty' adjectives, e.g., *divine, charming, cute, adorable;*
- Precise colour terms, e.g., *magenta, aquamarine, beige;*
- Intensifiers such as *just* and *so*, e.g., '*I like him so much!'*
- 'Hypercorrect' grammar, e.g., consistent use of standard verb forms;
- 'Superpolite' forms, e.g., indirect requests, euphemisms;
- Avoidance of strong swear words, e.g., *fudge, my goodness;* and
- Emphatic stress, e.g., '*it was a BRILLIANT performance!'*

In the same vein, language and gender interrelationship has sparked off a spate of variationist sociolinguistic research which aimed to investigate men and women speech differences in terms of specific lexical, morphosyntactic, grammatical, phonological, discoursal, and stylistic features (Labov, 1966; Trudgill, 1972; Milroy et al., 1994; Eckert; 2000; Eckert and McConnel-Ginet, 2003; among other influential works).

Different explanatory accounts have been established as regards this asymmetry. Notably, two main arguments have been embraced by many scholars. First, women are more inclined to employ higher levels of standard-like forms compared to men. According to Trudgill (1995), women exhibit a higher propensity for using the prestigious or the standard linguistic variants in comparison to men, primarily due to their status consciousness. Second, women are also typically regarded as innovators in bringing about linguistic change. Labov (2001, p. 321) has averred that

women are “innovators of most linguistic changes”, mainly “by those who display the symbols of nonconformity in a larger pattern of upward social mobility” (2001, p. 516). Analogously, Eckert and McConnel-Ginet (2003) have vouched for this account in that they view working-class women at the vanguard of linguistic innovation in an attempt to rebel on the existing social norms by means of utilizing distinct speech patterns, compared to men, regardless of their social class, who tend to refrain from being distinguishable.

Notwithstanding, several variationist studies have shown that these gender-based patterns do not consistently apply to all speech communities. Distinct patterning may arise not only across communities, but also within the same community. As a case in point, investigations carried out on some Arabic-speaking communities have revealed that men tend to exhibit a higher prevalence of utilizing standard linguistic forms compared to women. For instance, the variable (q) (which is the standard classical feature) is realized as [g] (a variant that characterizes the Jordanian Bedouin variety) in both Jordanian and Palestinian men speech or as [ʔ] (the prestigious variant that characterizes many Middle Eastern urban vernaculars as in Cairo, Beirut, and Damascus) in women speech (Abdel-Jawad, 1981). A further example can be noticed in the employment of the emphatic — or pharyngealized — sounds which are also standard classical items. Studies have displayed that male speakers tend to produce a strong degree of emphasis than female speakers of different Arabic dialects such as Egyptian Arabic (Royal, 1985; Wahba, 1996), Jordan Arabic (Al-Masri & Jongman, 2004; Khattab et al., 2006; Abudalbuh, 2010), and Syrian Arabic (Almbark, 2008).

A closer look to the sociolinguistic literature reveals that the analysis of phonological variation in terms of gender in addition to other social factors has received the most attention owing to the existence of a wide array of phonetic/phonological variants observed in almost all speech communities. Subsequently, this field of research has been referred to as “sociophonetics”.

It denotes the exploration of the nexus between speech production and perception of phonetic or phonological sources of variability and social factors (Foulkes & Docherty, 2006).

Nevertheless, the emphasis of the abundant sociophonetic research, to date, has been cross-linguistically on segmental features (e.g., in the variability of consonants and/or vowels), as mentioned above, at the expense of suprasegmental features of speech (e.g., stress and intonation) (Foulkes & Docherty, 2006; Clopper & Smiljanic, 2011). In this scope, it is noteworthy to signal that since the present study attempts to probe the variation of intonational patterns in terms of gender, attention therefore is predominantly directed towards casting light on some of the relevant prior studies concerned with gender-based suprasegmental variation.

It has been attested in the experimental literature that male and female speech differences are in essence anatomically-discerned. Crucially, the size of speech-related organs, especially the larynx, exhibits variation among individuals, leading to disparities in the fundamental frequency of speech between adults and children, as well as within adult males and females (Ohala, 1983). As a consequence, given that men possess vocal tracts that are comparatively lengthier than those of women, and that they also possess larger and thicker vocal cords compared to women, lower-pitched voices[4], i.e., lower average fundamental frequencies[5], are more evident in men's speech than in women's (Fant, 1966; Ohala, 1983; Talbot, 2010). Notwithstanding, in addition to these sex-attributed differences, male and female speakers often employ distinct patterns to convey certain features of gender-related identity.

It has been widely accepted that the speaker's voice quality is socially and culturally constructed. As a case in point, Henton and Bladon (1985) contended that females' voices tend to be breathier compared to males' which are characterized by creakiness that symbolizes

[4] Female speakers typically have average pitch values that fall within the range of 180 to 220 Hz, whereas male speakers tend to have average pitch values ranging from 100 to 125 Hz (Biemans, 2000, p. 34).

[5] In addition to the lower average fundamental frequencies (F0), male speakers typically produce lower values of vowel formant F1-F4, about 20%, less than females do (Fant, 1966).

masculinity. From an acoustic standpoint, this can be validated through the examination of pitch range. The latter is defined as the difference between the highest and lowest pitch values throughout an utterance (Haan & van Heuven, 1999; Daly & Warren, 2001). There exists a great consensus in the literature that female voice exhibits larger pitch ranges than male voice, and thus serving as a marker for expressiveness and emotionality in female speech. In this regard, Ohala (1983, p. 15) has provided an interpretation in which he ascribes pitch level to personality traits. He has averred that low pitch is connected to self-confident, aggressive, and dominant attitude, whereas high pitch is connected to subordinate, submissive, non-threatening, and polite attitude (Ohala, 1983; cf. Gussenhoven, 2004, p. 81).

As a corollary, a number of empirical studies that sought to analyze gender-based intonation variation have primarily concentrated on specific intonation aspects including pitch range. For instance, Henton (1989) has carried out an investigation to contest the claim that pitch range is wider in females than in males via the reanalysis of 17 prior studies across different languages. To this end, she converted the given data in these acoustic studies from a linear Hertz scale into logarithmic Semitones scale which, putatively, aligns more successfully to a human perceptual scale. She has thus figured out that a significant portion of the data originally presented on the Hertz scale, indicating a broader pitch range for women, turned out to display either no disparity between the genders or a wider pitch range for male speakers. Besides, Henton (1989) has further carried out an analysis of her own data. Similarly, she has not discovered any noteworthy disparity in Semitones pitch range between the male and female speakers. Consequently, Henton suggested that the purported difference is stereotypically founded.

Subsequently, other acoustic studies have emerged to rebut Henton's (1989) findings by means of utilizing a third scale, the Equivalent Rectangular Bandwidth (ERB) scale. Haan and van Heuven (1999) have employed this scale to scrutinize pitch range in questions between Dutch men and women. They have noticed that women utilize intonational devices associated with

questioning to a greater extent than men, as evidenced by the significantly larger range of final rises in female speech compared to that of males. Likewise, Daly and Warren (2001) have found that greater pitch range is used by female speakers of New Zealand English within the Semitones and ERB scales. A further acoustic correlate of intonation has been probed in their study which is pitch dynamism[6]. The latter has shown a similar pattern use as pitch range. In addition to their recordings, they have transformed the Henton's (1989) Hertz data into ERB, and observed wider pitch range in female speakers than in males.

Even more importantly, Daly and Warren's (2001) investigation drew upon two reading task types: sentence list and storytelling. The researchers have asserted that the selection of the task has a considerable impact on the findings of pitch range. The storytelling task has been found to display greater pitch range for women, as it closely resembles dialogue by virtue of containing numerous examples of direct speech.

Intriguingly, Daly and Warren (2001) went on to propose an interpretation for the intonational differences observed in men and women speech. They argued that "the greater the range of pitch used, the greater the perceived expression of emotion" (p. 93). Accordingly, in accordance with McConnell's (1978) claim, they contended that women often exhibit more pronounced intonation patterns due to their high level of awareness apropos of the communicative requirements within the conversational interactions (e.g., expression of emotional engagement, attitude, captivating and maintaining the listener's attention).

Apart from pitch range, a growing body of literature sought to investigate different patterns of intonation as used by men and women across various languages and dialects. Apparently, one of the most extensively investigated phenomena in relation to this matter is 'High Rising Terminal' (HRT) or often referred to as 'Uptalk'. It stands for "the phenomenon whereby an intonation

[6] Pitch dynamism refers to the degree of speed at which changes occur in a speaker's pitch range direction over time (Henton 1995).

pattern that sounds superficially interrogative is used with utterances that are clearly intended as statements" (Ladd, 2008, p. 125). In other words, it refers to the declaratives uttered with a rising tune that initiates at the level of the accented syllable and keeps rising until it attains a high level in the speaker's range at the level of the boundary tone. This pattern has been explored in a number of varieties of English, in which female speakers revealed a significant employment of HRTs compared to male speakers, as can be seen in Australian English (e.g., Guy et al., 1986), New Zealand English (e.g., Britain, 1992, 1998; Warren & Daly, 2000) and American English (e.g., Lakoff, 1975).

Several explanatory accounts have been established as regards the gender-based difference in HRT use. Lakoff (1975) has ascribed the use of this pattern to women's societal weakness and uncertainty. However, this claim has been refuted by many researchers who aver that HRTs carry positive connotations: to establish a shared understanding between speakers and listeners (McConnell-Ginet, 1978), to mark positive politeness (Britain, 1992; Cheshire, 2003), or to pinpoint nonfinality of a speaker's turn (Ladd, 1980).

Furthermore, more recent sociophonetic studies have endeavored to study gender-related intonational behavior on the basis of the tonal inventory and intonational contour variation. For instance, Clopper and Smiljanic (2011) have conducted an experimental study to examine the impact of both gender and region as extra-linguistic factors on prosodic categories such as speaking rate and on the way pauses, pitch accents, and phrasal-boundary tones are phonetically expressed and distributed across the two dialects of American English: Midland and Southern. The findings revealed that the frequency of pauses was more significant in the Southern male speech than in that of Southern females or both genders of Midland, the L-H% phrasal-boundary tone was more evident in female speech that in males', the L-phrase accent marked more the utterances of Midland female speakers than the Southern female speakers, and binary pitch accents (L+H* and L*+H) were realized more by female speakers than males who produced more the monotonal pitch

accent (H*). These findings indicate that prosodic features play a remarkable role in shaping the regional and gender identity.

Lowry (2011) has carried out a production experiment to probe the frequency of falling nuclear pattern realization by male and female speakers of Belfast British English as well as a perception experiment to analyze how listeners of this dialect correlate this pattern, compared to rise-plateau pattern, with certain social purposes. The first experiment drew upon three types of tasks: reading isolated declarative sentences, storytelling, and interactive task. Female speakers were found to utter more nuclear fall pattern than male speakers mainly in the story-reading and interactive tasks. The perception experiment, on the other hand, displayed that females' use of this pattern was perceived as a marker of "emotional involvement, expressiveness, and commitment to establishing effective interaction" (Lowry, 2011, p. 225).

A further experimental study on gender and intonational patterns has been conducted by Arvaniti et al., (2014). Drawing on two perceptual tests, they investigated the pragmatic meaning of two melodies associated with wh-questions as perceived by male and female speakers of Greek. Crucially, the researchers focused on two frequently employed intonation contours applied to Greek wh-questions: the 'L*H L-!H%' contour which encompasses a pitch accent that signals new information and a boundary tone that signals incompleteness, and the 'LH* L-L%' contour which encompasses a pitch accent that assigns contrastive focus and a boundary tone that signals completeness. The first pitch contour has been ascribed to information-seeking questions, whereas the second pitch contour has been ascribed to non-information-seeking questions denoting bias. The experiments revealed that the pragmatic significance of wh-question intonation in Greek is subject to varied interpretation, not just due to the gender of the speaker, but also influenced by the gender of the listener. Specifically, when the speaker is male and the listener is female, there is a greater inclination to interpret a wh-question as a statement carrying negative implied meanings.

A more recent work has been attempted by Huang and Zhang (2019) who investigated a number of TED talks brought about by four male and four female speakers. The results displayed that in declarative statements, females employ a rising H% boundary tone (46%) more frequently than males (8%) as a means to convey friendliness and to reduce the perception of aggression. Conversely, using a falling tone, which indicates a lack of interrogative intonation, serves as an indicator of completeness, confidence, and authority in speech. Huang and Zhang's (2019) findings matched those obtained in an earlier study by Jiang (2011). The latter, which was based on a corpus gathered from various UK cities, has evidenced that female speakers demonstrated a preference for rising boundary tones, while males typically preferred a falling boundary tone. Likewise, Jiang (2011) has assumed that this intonational variation reflects politeness and non-assertiveness in female speech, while conveying confidence and assertiveness in male speech.

Taken together, most of the gender-linked intonational variation studies have shown that women's speech is distinguished by a greater diversity and expression of intonation features compared to men, with particular emphasis on the utilization of rising tones, frequent employment of declarative questions, and exploration of the upper end of their pitch range. This disparity is claimed to emanate from their social identity which shapes the femininity of women and masculinity of men. As encapsulated by Eckert and McConnell-Ginet (1992, p. 90): "women's language has been said to reflect their conservatism, prestige consciousness, upward mobility, insecurity, deference, nurture, emotional expressivity, connectedness, sensitivity of others, solidarity. And men's language is heard as evincing their toughness, lack of effect, competitiveness, independence, competence, hierarchy, control".

Notwithstanding, upon reviewing the literature, a few qualifying remarks are in order. First, the abundant research on intonation patterns has primarily concentrated on how these patterns contribute to distinct discoursal and pragmatic meanings, with scant attention given to the potential for this prosodic feature to exhibit speaker traits including gender identity. Second, gender-based

variation in the utilization of linguistic forms turns out to be contingent upon the cultural and social affiliation that shapes the speaker's identity; therefore, this variation is not consistent across all languages, but rather differs across languages and even across different dialects within the same language. A suitable example of a segmental feature from Arabic speech communities might back up this discussion. As already mentioned, the production of the pharyngealized (or emphatic) consonants is distinguishably affined to men more than women in several Arabic dialects (Royal, 1985; Wahba, 1996; Al-Masri & Jongman, 2004; Khattab et al., 2006; Almbark, 2008; Abudalbuh, 2010; among others); however, a study by Salem and Sebane (2023) has revealed, on the basis of data normalization, that no disparity in the realization of the emphatic stop sound was observed between male and female speakers of Algerian Arabic spoken in Oran.

Alternatively, it is highly advocated in the literature that authoritative style is more likely evident in male speech in comparison to female speech which relatively demonstrates submissive voice style. However, Abdelhay's (2009) study of voice quality stylization in male and female speech within the dialect of Algerian Arabic as spoken in Mostaganem has further revealed that this pattern is also contingent upon the conversational setting that instigates a particular gender-like performance. The researcher has noticed, on the basis of perceptual experiments, that both genders were judged as authoritative as a way of implying a powerful status. Likewise, they sound submissive to show care, affection, and co-operation in social interactions.

2.5 Conclusion

Be as it may, the documented literature has postulated a one hardly-disputed premise: Arabic dialects exhibit asymmetries in terms of prosodic patterns. Besides, as has been elucidated in the current chapter, it is fairly evident that intonation as a suprasegmental feature stimulates gender-related variation. The next chapter will outline the methods upon which the present research endeavor is built.

CHAPTER THREE:

METHODOLOGY

Chapter Three: Methodology

3.1 Introduction

This chapter describes the methodology embraced in this research. It covers the participants, corpus design, recording and experimentation procedures, and general sketch of the qualitative and quantitative measurement process.

3.2 Participants

Twenty (ten male and ten female) speakers of Algerian Oran Spoken Arabic aged between 18 and 29 years old took part in the research's experiment. All were born and raised in Oran and were living there at the time of recordings. The participants selected were all studying then in the faculty of foreign languages at Oran 2 University. Hence, they exhibit a considerable degree of homogeneity in terms of age, education, ethnicity, and socio-economic background. None of them had any self-reported speech or hearing impairment.

3.3 Speech Materials

Drawing on the guidelines founded by Hellmuth and Almbark (2019) in their attempting project[7] to set an all-inclusive corpus for intonational variation in Arabic and in line with prior Arabic intonational studies' methodology (such as, but not limited to, Chahal, 2001; Hellmuth, 2006; Al-Zaidi, 2014; Moussa, 2019), database in the current research is collected based on four types of speech task: reading isolated sentences, roleplay scripted dialogue, storytelling, and story re-telling from memory. Accordingly, the construction of the corpus endeavored to guarantee that

[7] Hellmuth and Almbark's (2019) project involves database from different Arabic varieties, including: Egyptian Arabic spoken in Cairo, Iraqi Arabic spoken in Baghdad, Jordanian Arabic spoken in Karak, Kuwaiti Urban Arabic, Moroccan Arabic spoken in Casablanca, Oman Arabic spoken in Buraimi, Syrian Arabic spoken in Damascus, and Tunisian Arabic spoken in Tunis. Dataset available on: https://doi.org/10.5255/UKDA-SN-852878

the data is highly inclusive and reflective of the dialect intonational patterns, with the additional purpose of serving as a reference for future cross-dialectal comparative analyses. Moreover, it is pertinent to elucidate that the study relies on scripted (controlled) stimuli rather than spontaneous speech to reduce the variability between speakers vis-à-vis the length and (segmental, prosodic, lexical, and syntactic) composition of the utterances. To illustrate, the presence of voiceless segments causes disruptions in the F0 contour (Ladd, 2008). Therefore, in order to get a grip on such a microprosodic effect, the scripted material was developed based on voiced consonants as much as possible. Notwithstanding, engaging in narratives, a story reading followed by retelling the same story, generates a quasi-spontaneous speech; ergo enhancing the naturalness of the data (Jun & Fletcher, 2014). The speech materials are presented in detail in Appendix A.

3.3.1 Reading Isolated Sentences

The sentence list encompassed 12 target sentences with varied tunes, of which were nine interrogatives, one declarative, one request, and one imperative. The interrogative stimuli consisted of: 3 yes/no questions, 4 wh-questions that started with question words except one with sentence-medially question word to examine whether or not the sentential position of the question word has an effect on the intonational contour, and 2 rhetorical questions (non-information-seeking questions asked for effect instead of seeking for information from the listener, e.g., ‘Are you crazy?!’). Request tune was stimulated via the politeness prompt word /maʕli:ʃ/ ‘is it possible’.

3.3.2 Roleplay Scripted Dialogue

Short dialogues were designed with a twofold aim: (1) to investigate the different pragmatic interpretations of interrogatives instigated when uttered with certain melodies, and (2) to investigate whether or not and how Focus structure is intonationally cued in OSA. Before each target sentence, contextual information followed by a prompt question (presented by the

researcher) were provided. The purpose was to stimulate the natural production of melodies (first aim) and the desired types of focus (second aim) that align with the given context. This interactive approach has been promoted in numerous previous studies to generate dependable data pertaining to either the melodic patterns of interrogatives (e.g., Arvaniti et al., 2014) or the type of focus (e.g., Chahal, 2001; Xu & Xu, 2005; Xu, 2011; Jun & Fletcher, 2014; Al-Zaidi et al., 2019; Moussa, 2019; El Zarka et al., 2020).

Apart from the nine interrogative sentences in the sentence list, the roleplay dialogue was based on an elicitation task aimed to produce string-identical Information-Seeking Questions (ISQs) and Non-ISQs. Consequently, this task consisted of one more additional question uttered based on two pragmatic contexts and another question made up of a question word only uttered based on three pragmatic contexts. The details of these contexts are presented below:

- A question uttered based on two pragmatic meanings in a similar syntactic surface structure: An information-seeking yes/no question compared to an 'incredulity' yes/no question (a Non-ISQ asked to express inability or refusal to believe something),
- The question word /ʃawala/ 'What?' which is frequently utilized by speakers of Algerian Oran dialect to convey distinct pragmatic meanings. Accordingly, three contexts were chosen: answering someone calling the speaker's name, asking for repetition, and expressing incredulity.

As for focus stimuli, the target sentences were lexically, semantically, and segmentally identical, but varied in terms of sentential positions and the type of focus: Broad (neutral) focus, narrow informational focus, and narrow contrastive focus, triggered by a prompt question. Details of focus corpus are presented in Chapter Five. See also Appendix A for the all-inclusive corpus.

3.3.3 Storytelling

The story embraced in this research's experiment is one of the common folk tales from the Algerian culture. It is entitled "Ed-denya dewwaara" (What Comes Around Goes Around),

retrieved from an Algerian YouTube channel[8] affined to narrate stories and tales in Algerian Arabic. The story was then translated into Oran Spoken Arabic with the assistance of five young speakers of this dialect who and whose parents and grandparents were born and raised in Oran. After the translation phase, the researcher made some adjustment regarding the length to keep the participants engaged and not getting bored. Some instances of direct speech were incorporated in an attempt to evoke more naturalness and emotionality in the story-reading task, and thus expecting to gain a robust delineation of gender variation (Daly & Warren, 2001).

The story comprises about 34-38 sentences of which we extracted declarative, wh-question, yes/no question, imperative, and continuation/plateau tunes. Thereby, we anticipated a wide array of tunes which enrich the scope of the present research. See appendix A for the full version presented to the participants.

3.3.4 Story Re-telling from Memory

The subsequent task was re-telling of the same story from memory with the assistance of some images depicting the key events and objects in the story (See appendix A). This task was embedded to back up the corpus with more natural and spontaneous data since the participants used their own linguistic forms and styles in re-narrating the story. Notably, in contrast to the storytelling task where the utterances and their intonational cues are regulated through the use of specific punctuation marks that align with controlled syntactic phrasing and structure, the task of re-telling the story allows for inter-speaker variation in terms of the length, segments, prosody, vocabulary, and syntactic composition of the utterances. As a corollary, the anticipated addition in intonational markings included the emergence of further melodic patterns like continuation and plateau tunes along with the utilization of different levels of phrasing. Consequently, extensive gender-based intonational differences were highly expected to surface in this speech task.

[8] https://youtu.be/07u9cIkAZqQ

3.4 Procedures

The recordings were conducted in a quiet and anechoic room located within the library of the Foreign Languages Faculty at Oran 2 University. Before commencing the recording tasks, the researcher initiated a casual conversation with the participants to help them become accustomed to the recording equipment, create a comfortable environment, and promote a better production of informal and day-to-day forms. Next, the participants were provided with the stimuli presented in a random order on separate cards to prevent the occurrence of listing intonation that typically arises when utterances are presented together (Jun & Fletcher, 2014). Subsequently, they were given a few minutes for a silent-reading task to become acquainted with the stimuli, thereby reducing any potential speech disfluencies during the true production. Thereafter, they were instructed to utter the target materials in a natural manner and at a normal speech rate.

Given that the corpus for this study is constructed from four distinct speech tasks, the recording process was accordingly divided into four phases: (1) reading isolated sentences with three repetitions, (2) roleplay dialogue with three repetitions, (3) storytelling, and (4) story re-telling. Throughout all the recording phases, the researcher supervised the process. If any hesitations or errors were detected, the participants were requested to reiterate the utterance. The recordings were conducted using a Dictopro digital voice recorder, equipped with highly sensitive dual microphones and advanced noise reduction capabilities, then saved as audio files in the format of WAV.

PRAAT speech analysis software, version 6.2.10 (Boersma & Weenink, 2022), was the prerequisite tool we drew upon in this experimental study. The complete set of the scrutinized material across the following three chapters consisted approximately of 2331 tokens (including the three repetitions). F0 tracks were automatically extracted, then manually corrected. The utterances were manually segmented and transcribed using IPA phonetic symbols. Relying on PRAAT textgrids and in line with the AM model and ToBI-like transcription style, six tiers were created:

(1) syllables, (2) transliterated words, (3) gloss, (4) tones, (5) translation/orthography, and (6) comment which provides extra information. Figure 3.1 below is an illustration:

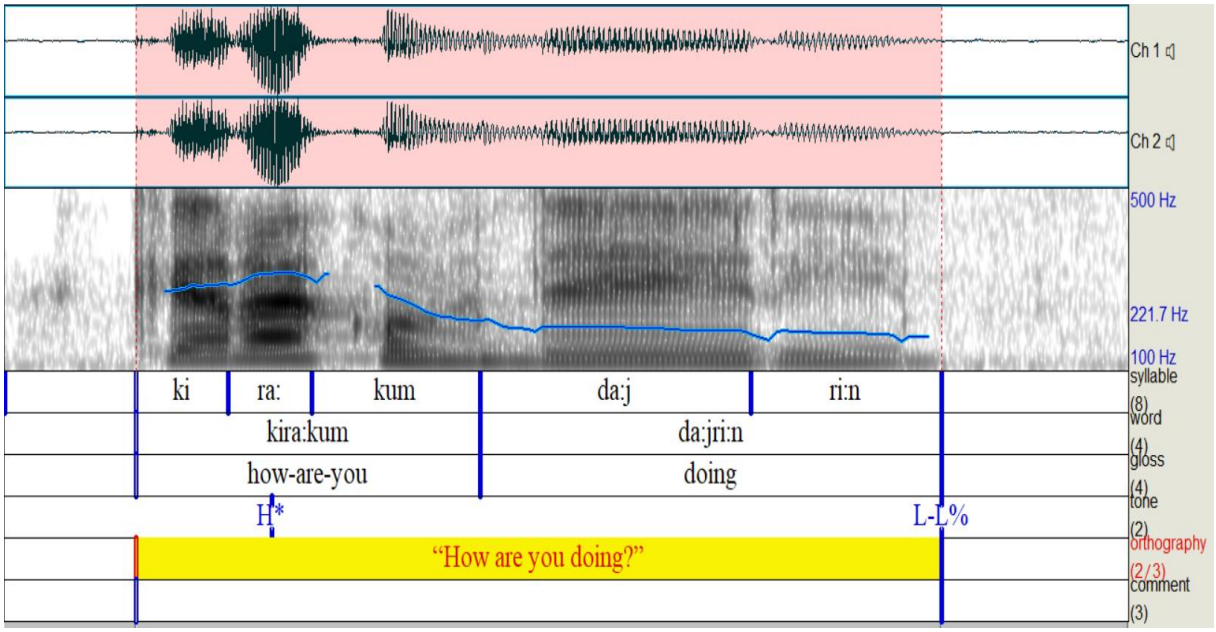


Figure 3. 1 An illustration of the PRAAT textgrids for the six tiers (Speaker F/09)

The examination carried out in the current research endeavor drew upon both phonological and phonetic details. Notably, the phonological analysis covered tone and tune composition and configuration associated with elements such as pitch accent category and distribution, and phrasal-boundary combinations. Alternatively, the phonetic scrutinization comprised different acoustic measurements, mainly confined to prosodic Focus-marking and gender-related pitch range variation. Particularly, these measurements included: F0 maximum and minimum in Hertz (Hz) and semitones (St), pitch range or excursion size (St), syllable duration (ms), syllable intensity (dB), and global pitch range in Hz, St, and ERB.

However, in an attempt to enhance comprehension and ensure better coherence in the dissertation, elucidations of these phonological and acoustic analyses are elaborated upon in the respective chapters with meticulous details.

3.5 Conclusion

To recap, we attempted by means of this chapter to demonstrate the methodology adhered in the current dissertation, following the path of a number of empirical previous studies. In the following three chapters, we report the results alongside their interpretations of our exploration of the intonational system and realization by the speakers of this spoken variety of Algerian Arabic.

CHAPTER FOUR:

INTONATIONAL TUNES

AND

TONAL INVENTORY IN OSA

Chapter Four: Intonational Tunes and Tonal Inventory in OSA

4.1 Introduction

This chapter aims to provide a preliminary intonational model of Algerian Arabic as spoken in Oran within the AM framework. In particular, we focus on examining two crucial aspects of the intonational system: the tonal inventory and the intonational contours. In the light of what have been reviewed in the previous studies on Arabic dialects (Chahal, 2001; Hellmuth, 2006; Chahal & Hellmuth, 2014; Hellmuth, 2014; Moussa, 2019; among others), we founded our methods for the current experiment as highlighted in section 4.2 below. Thereafter, we started off our exploration of the intonational account with the examination of several distinct intonational tunes (declarative, yes/no question, wh-question, rhetorical question, incredulity question, imperative, request, and continuation/plateau tunes in addition to three intonational-pragmatic meanings associated with the question word /ʃawala/ 'what') in section 4.3. Subsequently, we inspected the major categories that compose the tonal inventory of this dialect, including pitch accents, phrase accents, boundary tones, and phrasal-boundary sequences in section 4.4. A discussion of the main results in comparison to other Arabic dialects is proposed in section 4.5. Finally, we end this chapter with conclusive remarks apropos of this experiment in section 4.6.

4.2 Methods

The corpus affined to this chapter consisted of 12 read isolated sentences, 5 interrogatives from roleplay dialogue, as elucidated in the previous chapter. In addition, 11 utterances were extracted from storytelling with different tunes: continuation and plateau tunes that convey incompleteness, declarative, wh-question, yes/no question, and imperative tunes. Moreover, since the story re-telling task has evinced spontaneous/quasi-spontaneous speech, further utterances were extracted aiming to accurately underpin the analysis of the given tunes. Therefore, a total of

1240 utterances were collected for the purpose of the current experiment: (12+5) * 3 repetitions * 20 speakers + 11* 20 speakers (in addition to some utterances from story re-telling). Upon extracting the target utterances, the pitch tracks were checked by means of PRAAT to evaluate their overall acoustic features. Then, a total of 80 utterances were excluded from the analysis for the following reasons:

- the utterance involved pauses, hesitations, or disfluencies,
- the utterance is spoken with an abundance creaky voice,
- any element of the utterance exhibited narrow focus,
- the utterance was produced at an unnatural speech rate, and
- the utterance stood out as noticeably different from the rest of the dataset.

As a result, the ultimate material employed for this experiment was built on a total of 1160 utterances.

Subsequently, pitch tracks were laid out and annotated following the ToBI-like transcription style[9] (Beckman & Ayers Elam, 1997). The illustrative figures incorporated throughout this dissertation are drawn by means of PRAAT picture window and labeled with reference to the speaker's gender (M or F) and number (from 1 to 10). Each figure includes the window of waveform along with the pitch contour at the top and subsequently six tiers: the syllable tier, the word tier, the gloss tier, the Tone tier indicating the phonological intonational categories, orthography tier with the translated sentence, and finally the comment tier for any additional information or miscellaneous events about the contour.

The identification and categorization of intonational patterns rely primarily on observing the pitch contour, analyzing the movements of the fundamental frequency (F0) in accordance with the speaker's local pitch range (also referred to as the "baseline" in early literature), and through

[9] It is important to highlight that the ToBI intonational labeling system encompasses Tones and Break Indices as the name indicates; however, the break-index tier which is mainly devoted to mark lexical and phrasal junctures/boundaries is not taken into account in the present study.

repeated auditory verification, all conducted using PRAAT. The utterances are first parsed into prominent syllables and phrase boundaries. The tonal events are then determined in relation to the local pitch range and labeled with pitch accents when associated with the lexically stressed syllables (indicated by *), phrase accents when demarcating the intermediate phrase boundaries (indicated by -), and boundary tones when demarcating the Intonational Phrase boundaries (indicated by %) – usually signaled by a pause or juncture.

The phonetic transcription of F0 configuration/movement around the stressed syllables, which is linked to pitch accents, adheres to the guidelines for ToBI labeling (by Beckman & Ayers Elam, 1997). Yet, it relies predominantly on Arabic literature, specifically as reported in Chahal (1999), Chahal and Hellmuth (2014), Hellmuth (2014), and Moussa (2019). Accordingly, the table below delineates the inventory of pitch accents and their phonetic correspondences provided in the literature of various languages:

Table 4. 1 *pitch accents and their phonetic description as presented in Arabic literature*

Pitch accent	**Phonetic Description**
L*	A low flat contour or valley in the speaker's lower part of pitch range, persisted throughout the accented syllable.
H*	A high peak that starts from a mid-point in the speaker's pitch range (without a preceding steep rise), occurring on the accented syllable.
L+H*	A low valley at a low point in the speaker's pitch range followed by a steep rise to a peak during the accented syllable.
L*+H	A low valley realized during the accented syllable followed by a steep rise post-accentually.
H*+L	A high peak realized in the middle of the speaker's pitch range occurring during the accented syllable followed by a fall post-accentually.
H+L*	A fall realized during the accented syllable preceded by a high tone pre-accentually.
!H*	A downstepped peak in the middle of a speaker's pitch range realized at a lower level than a previous high peak.
H+!H*	A downstepped peak on the accented syllable realized at a lower-level high tone than a previous high tone.
L+!H*	A rising tone with a downstepped peak on the accented syllable, realized at a lower level than the previous high peaks.

Likewise, for phrase accents, the demarcation of intermediate phrases (ips) was reported to involve (H-) high phrase tone or rise, (L-) low phrase tone, and (!H-) downstepped high phrase tone. Finally, tunes are determined in terms of phrasal-boundary combinations at the edge of Intonational Phrases (IP), taking into account their specific pragmatic context. The established tunes described in the existing literature are categorized based on the following configurations: a fall to the bottom of the speaker's range (L-L%), a high rise (H-H%), a fall followed by a rise (L-H%), and a mid-level or plateau (H-L%). The schematic representations of F0 contours provided by Pierrehumbert and Hirschberg (1990) and the GToBI[10] model (German Tones and Break Indices) serve as a reference for transcribing pitch accents, edge tones, and tunes throughout this experimental dissertation.

4.3 OSA Intonational Tunes

This section is devoted to introduce the composition of the examined tunes in the present corpus taking into account the phrasal-boundary combinations, the nuclear accents, and pitch accents.

4.3.1 Declarative Tunes

As expected, the declarative tune exhibited a falling to the edge contour, achieved via the combination of L-L% phrasal-boundary tones. This combination was commonly observed to be preceded by a downstepped nuclear pitch accent !H* (78.9%). A further realization noticed for this tune is the combination of the low boundary edge with a rising bitonal nuclear accented syllable L+!H* (21%) in which the high peak accent was also downstepped compared to the preceding high accent within the phrase. Figures 4.1, 4.2, and 4.3 are some illustrations[11]:

[10] GToBI (uni-koeln.de)

[11] The default yellow axes and numbers written in red are redundant in all the figures existing in this thesis as they only appear in the screenshots of the PRAAT Picture window.

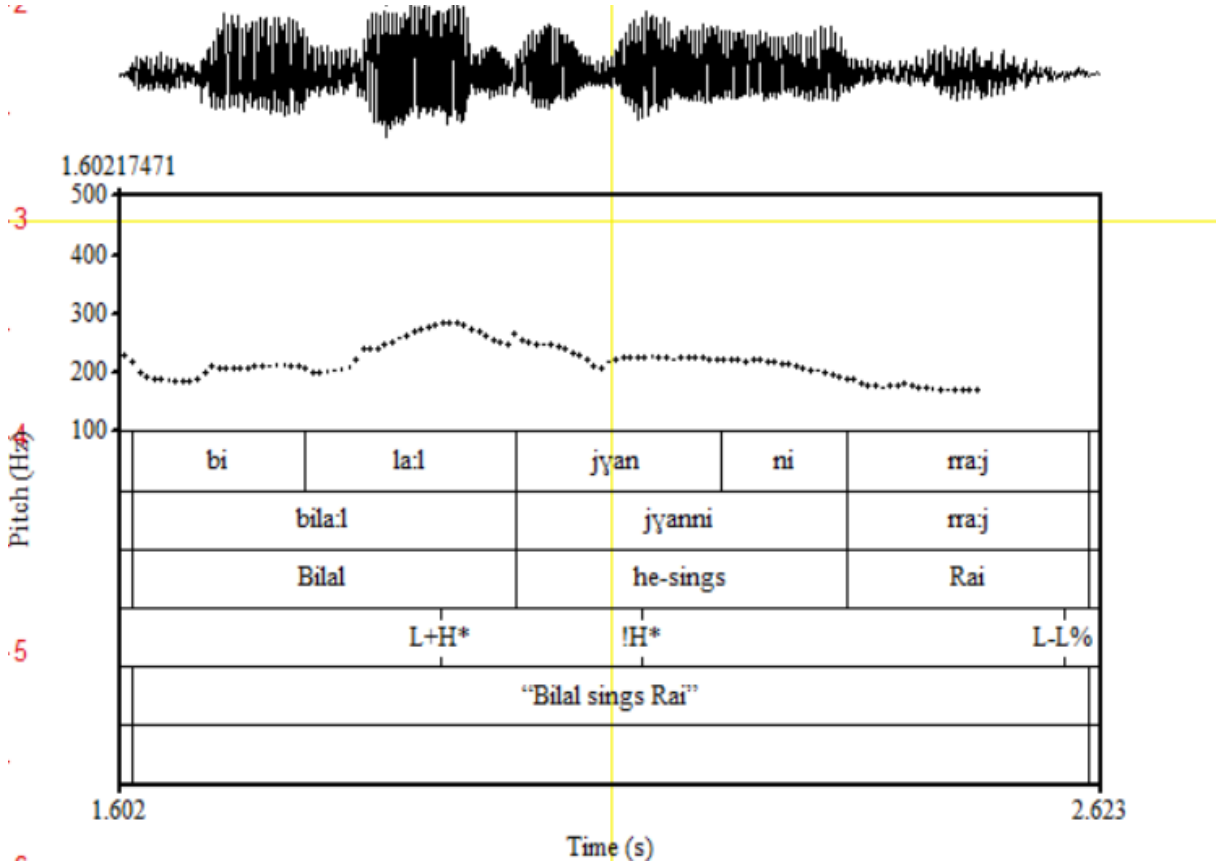


Figure 4. 1 An illustration of declarative tune (Speaker F/01)

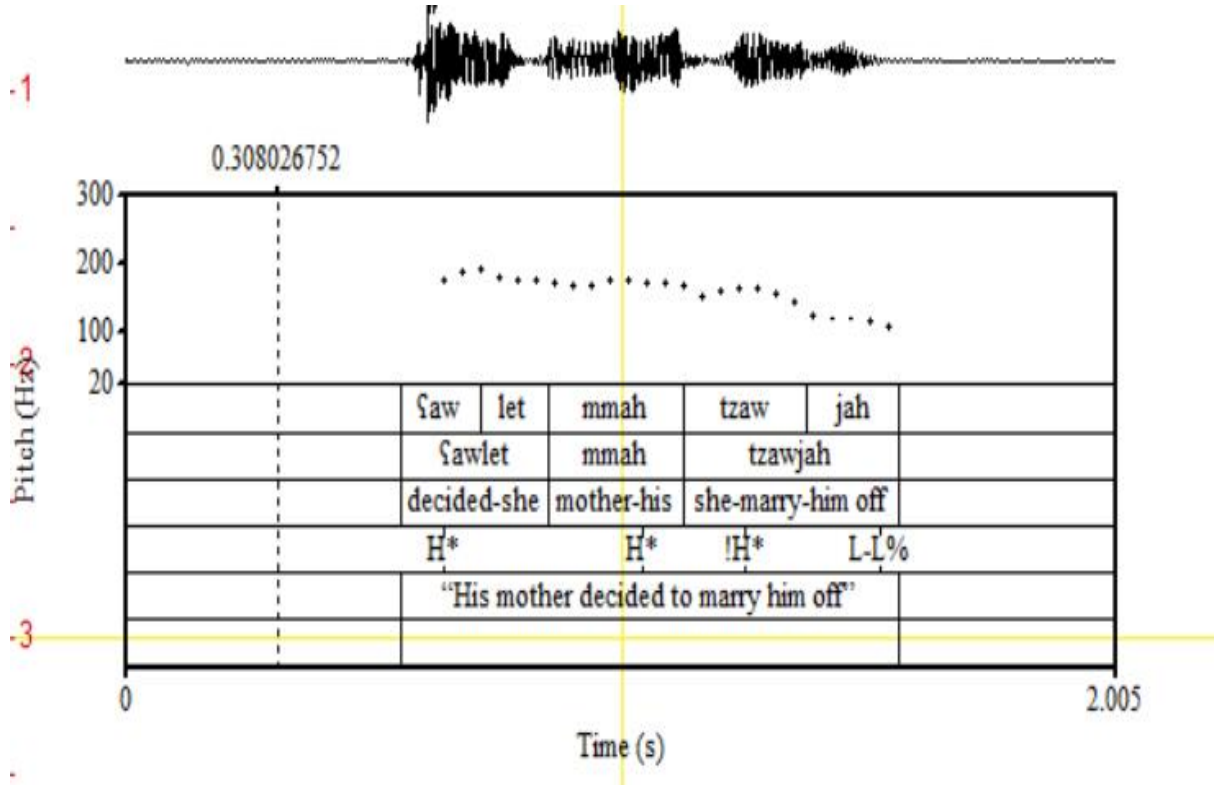


Figure 4. 2 An illustration of declarative tune from story-telling (Speaker M/01)

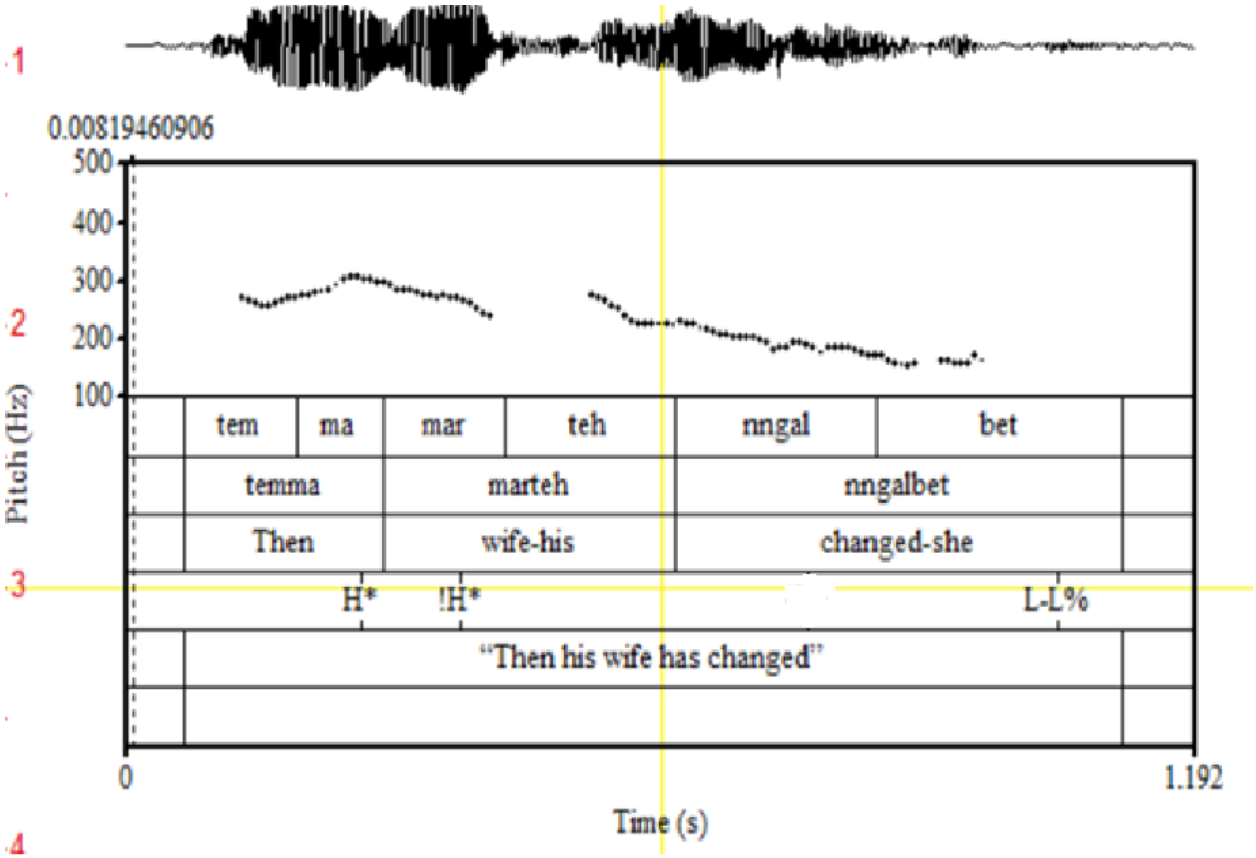


Figure 4. 3 An illustration of declarative tune from story-telling (F/01)

4.3.2 Question Tunes

The present corpus involves different types of question tunes which are dependent on distinct pragmatic meanings.

4.3.2.1 Yes/no questions

The corpus in this study encompassed three examples of yes/no questions made up of two-word and three-word utterances as well as a long utterance extracted from the story-telling task. This may greatly contribute to providing an accurate examination of the intonational composition for this type of questions. A further analysis of a yes/no utterance is presented in section 4.3.3.3.2 related to information-seeking and non-information seeking questions.

Results asserted that all yes/no questions end in high rising boundary tones H-H% (*N*=191). This edge configuration was found to be preceded by either a low L* (26.7%) or a rising L+H* (73.2%) pitch accent on the nuclear accented syllable. However, this realization was observed to be associated with the position of the nuclear accented syllable in the word. Indeed, when it occurs in a word penultimate syllable position, it carries an L* accent (Figure 4.4). On the other hand, it is significantly realized with a L+H* accent when it occurs in a word ultimate syllable position (Figures 4.5, 4.6, and 4.7).

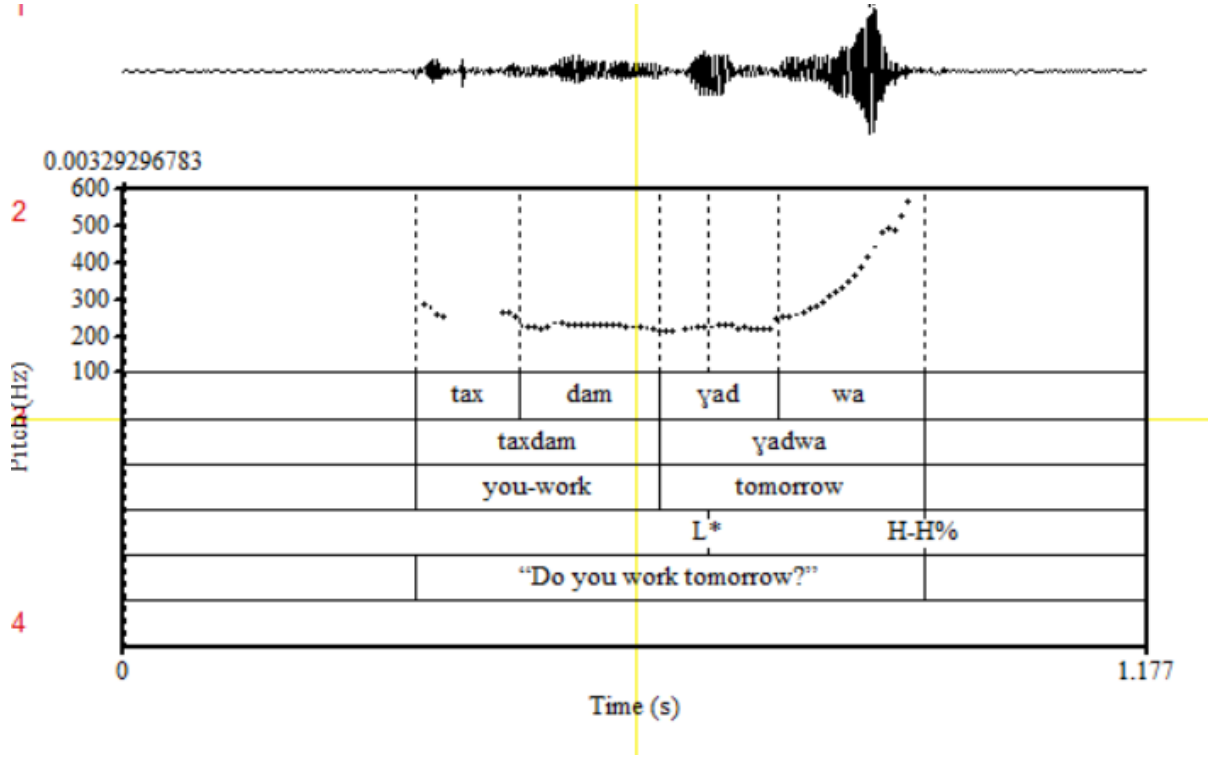


Figure 4. 4 An illustration of a yes/no question tune of the first sentence (Speaker F/03)

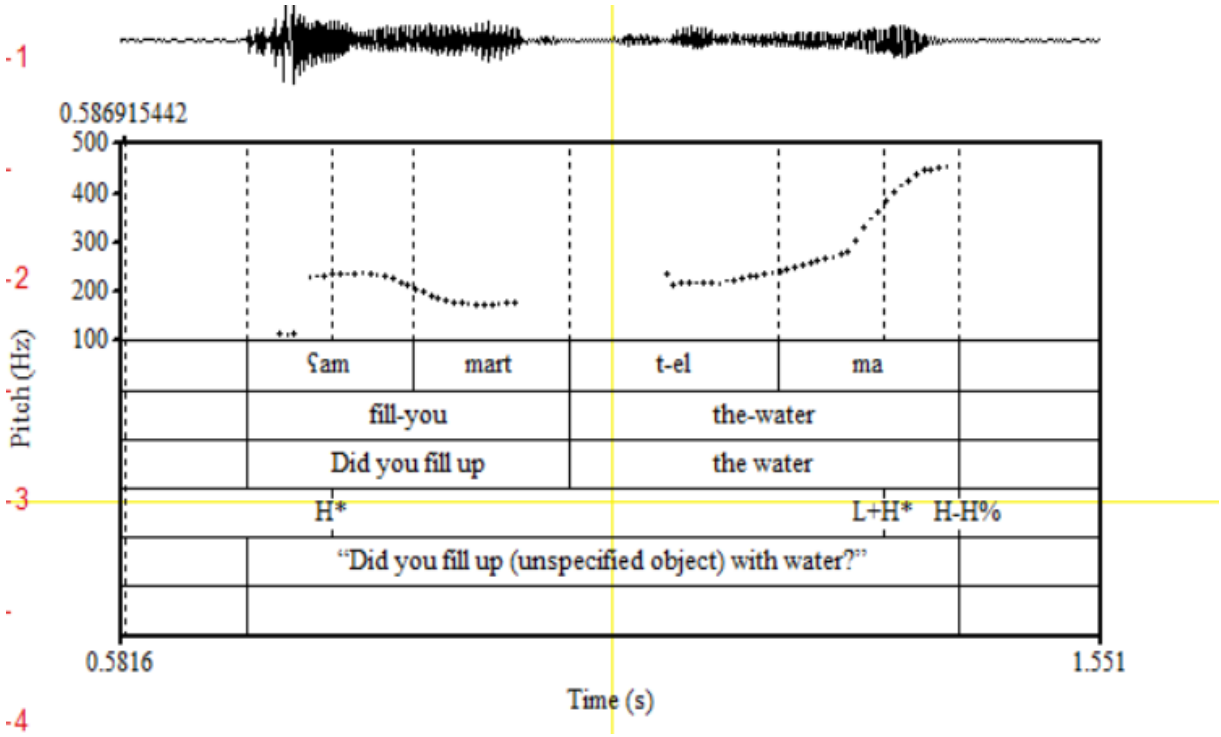


Figure 4. 5 An illustration of a yes/no question tune of the second sentence (Speaker F/06)

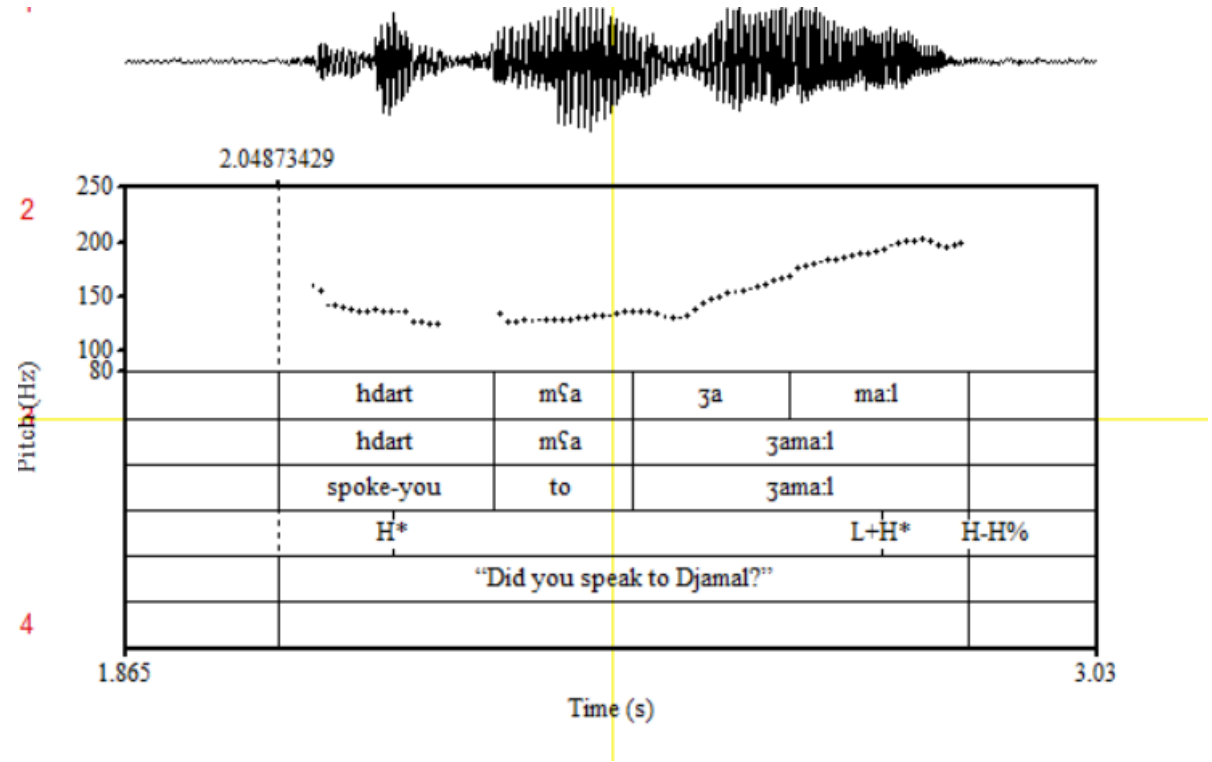


Figure 4. 6 An illustration of a yes/no question tune of the third sentence (Speaker M/08)

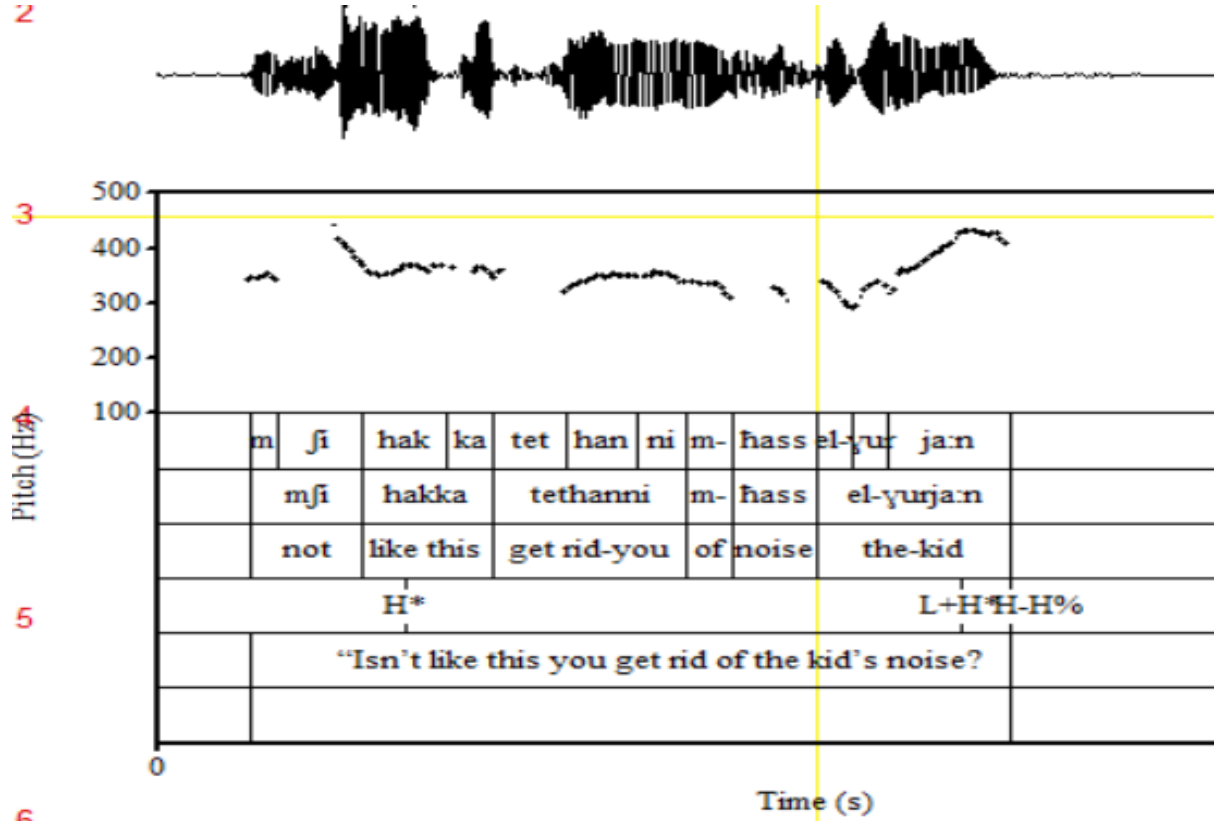


Figure 4. 7 An illustration of a narrative yes/no question tune (Speaker F/07)

4.3.2.2 Wh-questions

The analysis was built upon a total of 263 wh-question utterances based on four read (*N*= 226) and two narrative sentences (*N*= 37). Results indicated that, unlike yes/no questions, this type of interrogatives is characterized by a falling edge tone L-L% (100%) preceded by a rising that starts from the question word which bears the nuclear pitch accent. Crucially, the intonational pitch contour was found to begin with high H* (70.7%) or rising L+H* (24.7%) nuclear pitch accents followed by a level trendline which then falls at the edge of the question. Furthermore, the analysis exhibited no impact of the position of the question word on the realization of the tune. Whether it occupied the initial or medial position of the sentence, the intonational pitch contour was marked by a falling to the edge, frequently preceded by a high pitch nuclear accent H* on the question word, or sometimes by a downstepped pitch accent !H* (4.5%) when the question word is

sentence-medially and the prenuclear word starts higher (as shown in Figure 4.11). The results obtained are given in Table 4.2 and illustrated in Figures 4.8, 4.9, 4.10, 4.11, 4.12, and 4.13.

Table 4. 2 *The distribution of the wh-question tune composition in OSA*

	Nuclear pitch accent	Edge tone	Occurrence % (*N*=263)
Read sentences	L+H*	L-L%	23.4 % (*N*= 53)
	H*	L-L%	71.2 % (*N*= 161)
	!H*	L-L%	5.3 % (*N*= 12)
Narrative sentences	L+H*	L-L%	32.4 % (*N*= 12)
	H*	L-L%	67.5 % (*N*=25)

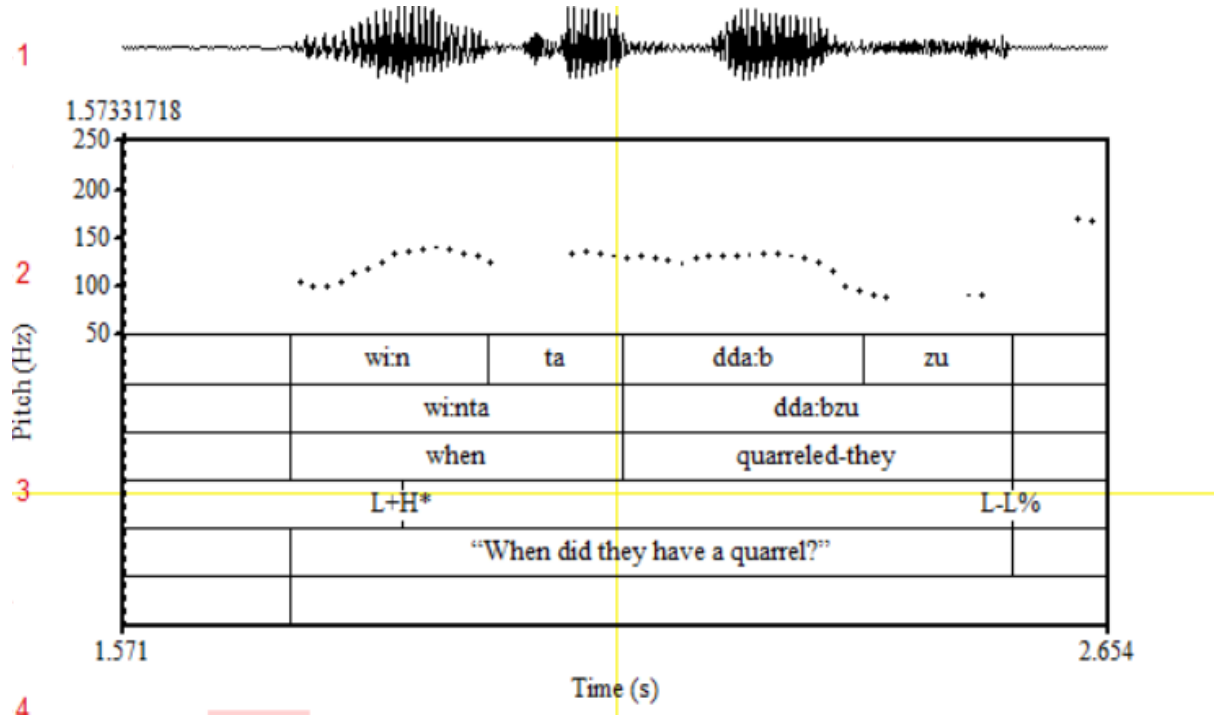


Figure 4. 8 An illustration of wh-question tune of the first sentence (Speaker M/02)

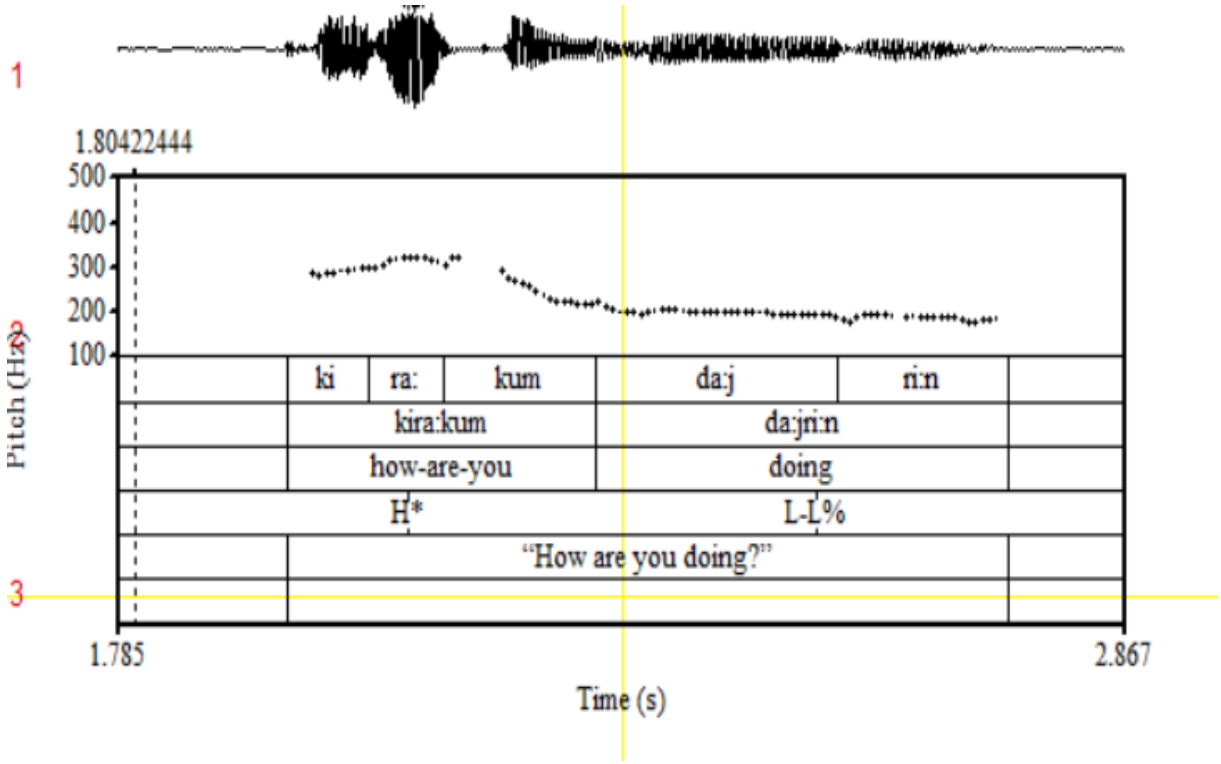


Figure 4. 9 An illustration of wh-question tune in the second sentence (Speaker F/10)

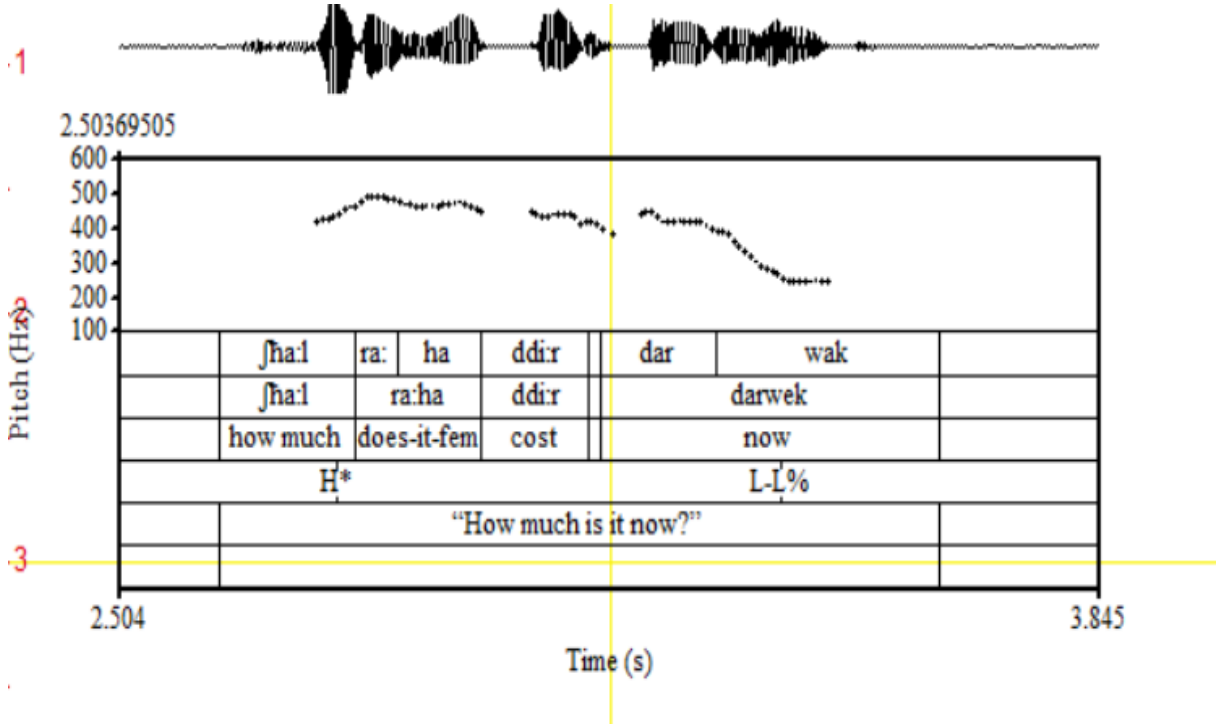


Figure 4. 10 An illustration of wh-question tune in the third sentence/Wh-word in initial position (Speaker F/09)

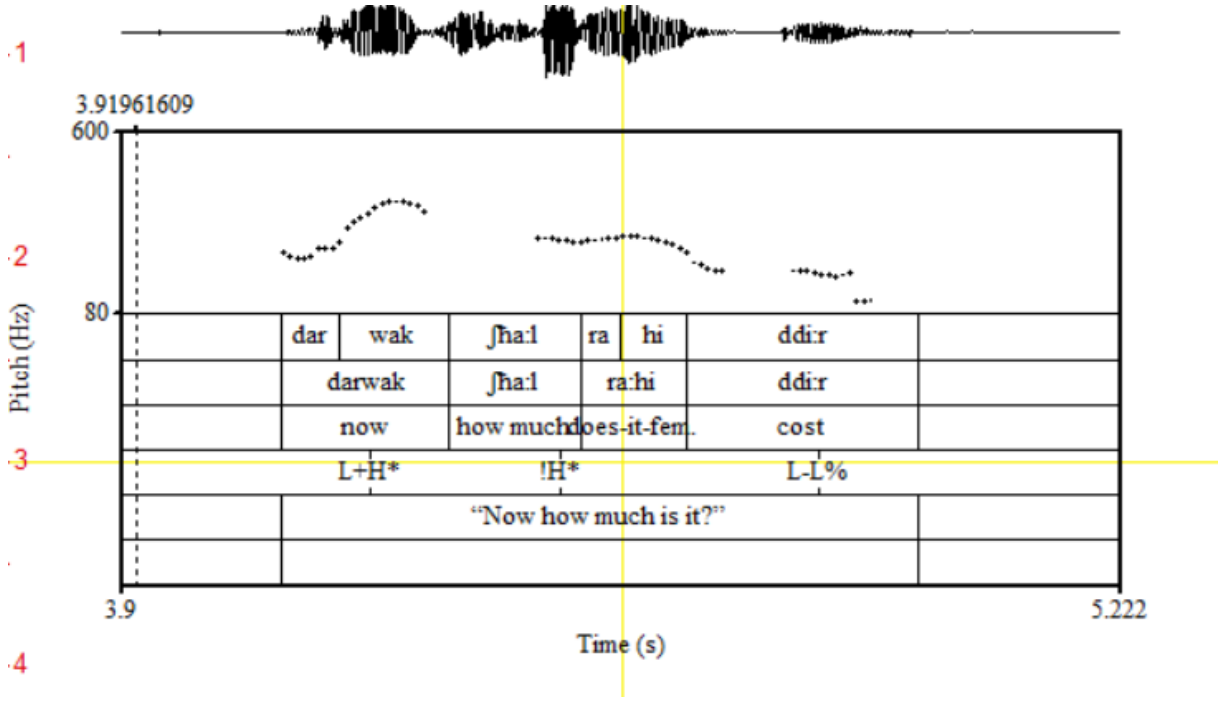


Figure 4. 11 An illustration of wh-question tune in the fourth sentence/Wh-word in medial position (Speaker F/02)

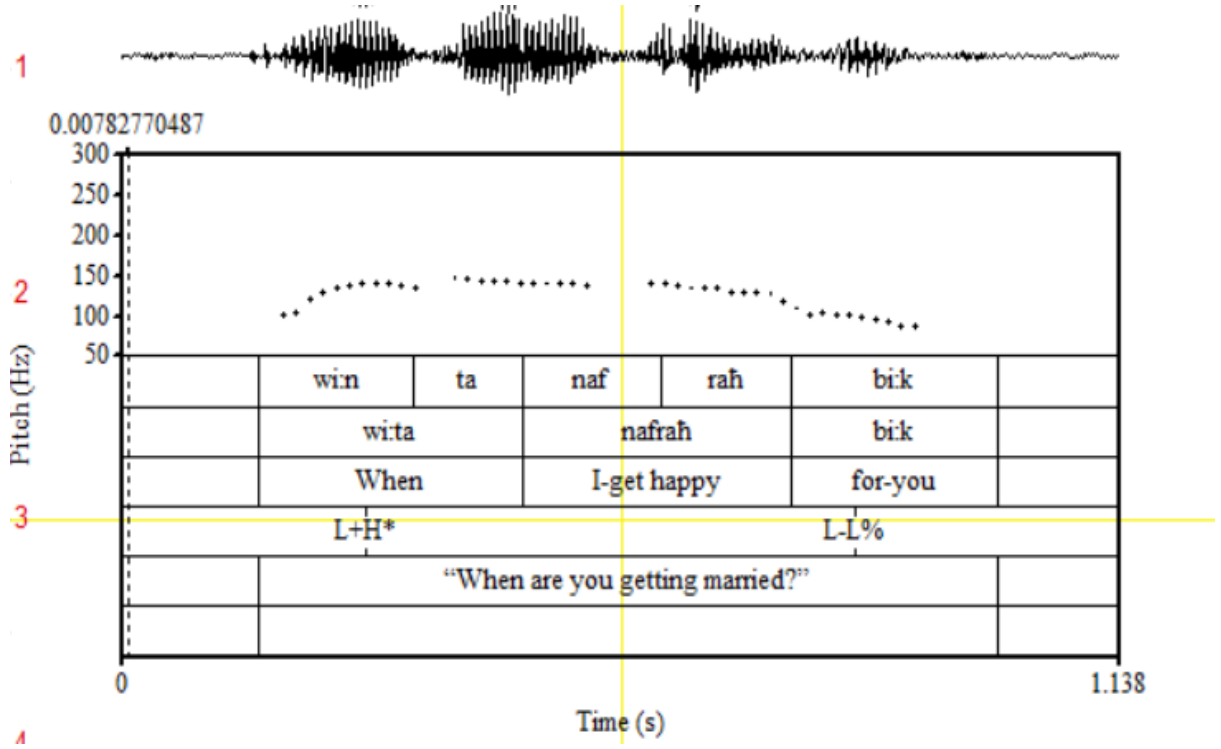


Figure 4. 12 An illustration of a narrative wh-question tune (Speaker M/01)

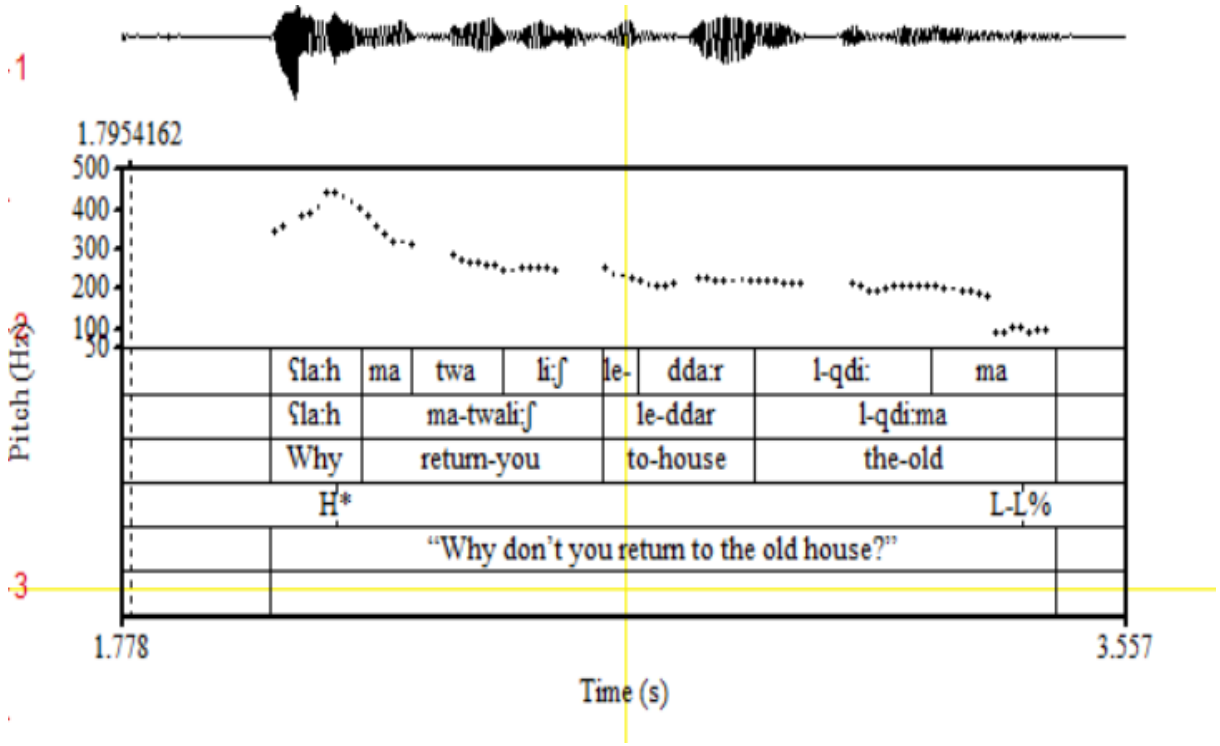


Figure 4. 13 An illustration of a narrative wh-question tune (Speaker F/04)

4.3.2.3 Information-seeking vs. non-information-seeking questions

In this section, we tend to highlight the intonational patterns of two pragmatically-based questions: (1) information-seeking questions (ISQs) which are standard questions sought to receive information from the listener, and (2) non-information-seeking questions (non-ISQs) which are non-standard questions employed not for the sake of receiving answers but to express the speaker's emotions. In this regard, two types of non-ISQs were examined in this study: Rhetorical questions (RQs) and Incredulity questions (IQs). Both questions are syntactically identical to yes/no questions. Two commonly used RQs were chosen from OSA: /ra:k fi ʕaqlek?!/ 'Are you conscious?!' and /men najtek?!/ 'Are you serious?!'. Given that these two questions are highly recognized by speakers of this dialect as non-ISQs and since they are syntactically similar to yes/no questions, they were not implemented in elicitation contexts. Besides, the intonational composition for these questions was then compared to that of yes/no questions which were

examined previously. As for IQs, string-identical ISQ and IQ were produced by the participants elicited by two related contexts, as shown below.

4.3.2.3.1 Rhetorical questions.

A total of 119 utterances entered the intonational analysis. Interestingly, results revealed that 83.1 % (*N*=99) of the data were marked with a low nuclear pitch accented syllable L* followed by an H-L% phrasal-boundary combination, and thus did not go high but instead ended in a plateau. Only 16.8 % (*N*=20) of the data, on the other hand, surfaced as yes/no question pitch contour in that they exhibited the same realization of the high rising edge H-H%, preceded by an L* nuclear accent. Figures 4.14 and 4.15 illustrate these findings.

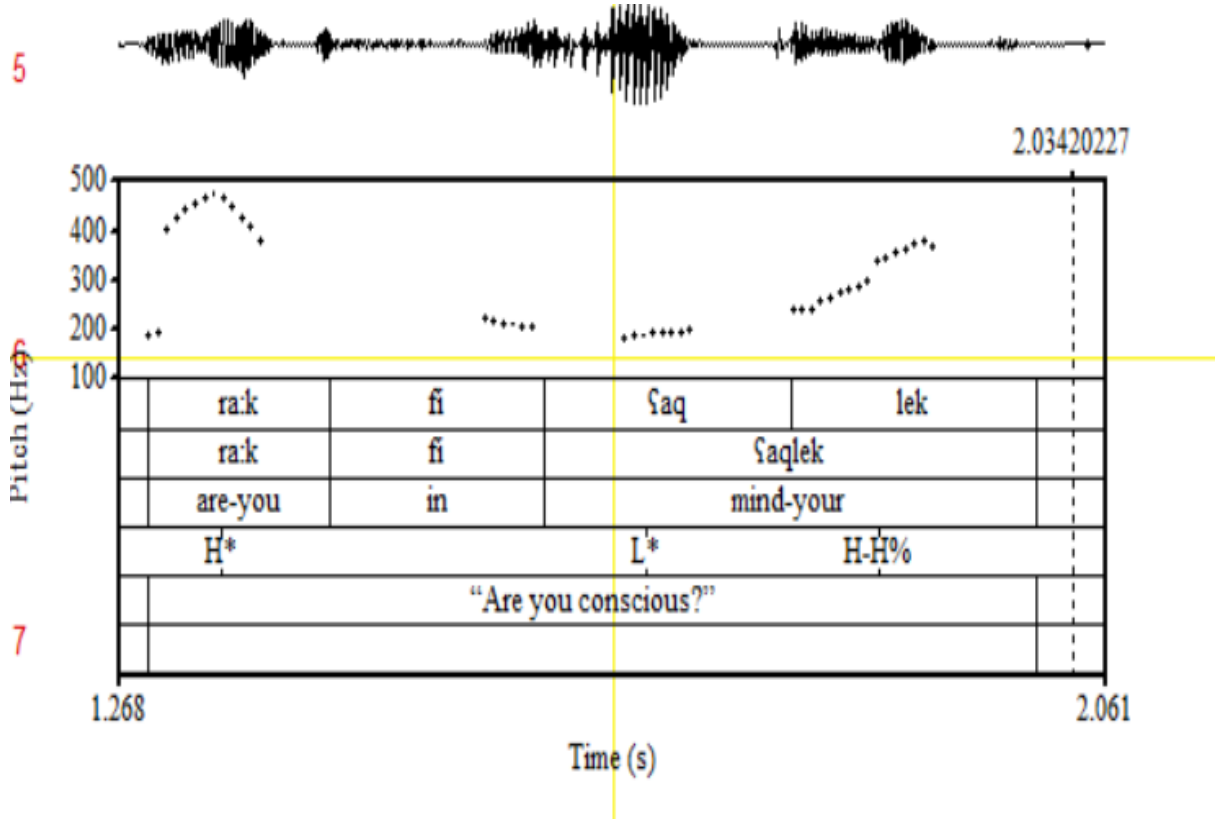


Figure 4. 14 An illustration of rhetorical question tune realized with H-H% (Speaker F/01)

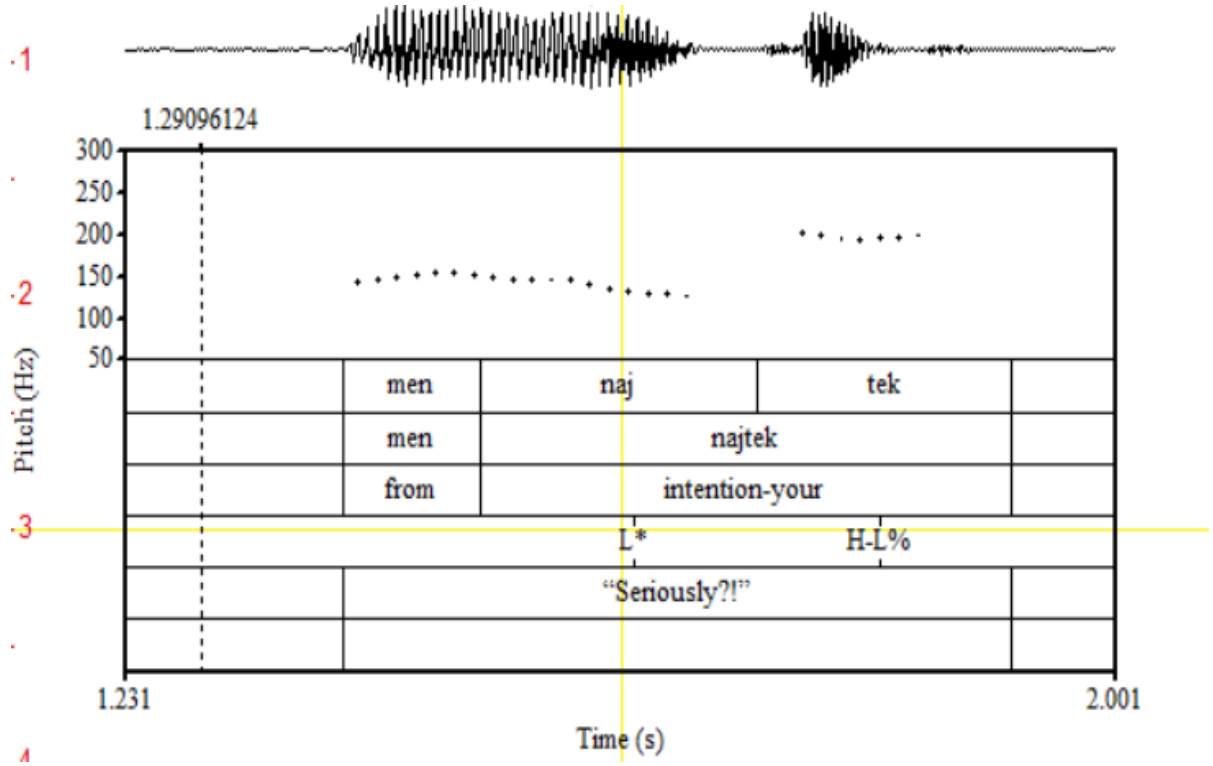


Figure 4. 15 An illustration of rhetorical question tune realized with a plateau H-L%

4.3.2.3.2 Incredulity questions.

The second analyzed type of non-ISQs was Incredulity questions (IQs). Participants were asked to produce a string-identical yes/no question /ra:ki ra:ɟħa l-ʕannaba/ 'Are you going to Annaba? (An Algerian eastern city)', interpreted as either an ISQ or IQ and triggered by means of two distinct pragmatic contexts, as explained in Table 4.3 below:

Table 4. 3 *Contexts of the ISQ/IQ questions elicited by a roleplay dialogue*.

Context 1: ISQ	You wanted to know if your aunt will go to Annaba. You asked her:
Context 2: IQ	Your aunt has told you that she is going to Annaba, but you were incredulous and could not believe that. You say:

The results obtained are displayed in Table 4.4. As can be seen, IS yes/no questions were realized with a high rising edge combination H-H%. This finding lends further support to the previous findings mentioned in section 4.3.3.1. This edge tone was found to be combined with

various pitch accents mainly L+!H* (45.6%) in which the high peak was downstepped compared to the previous high accent in the phrase, low L* (40.3%), or downstepped !H* (8%).

Incredulity questions, on the other hand, were produced with a plateau ending pitch contour H-L%, frequently combined with a high H* pitch accent (74%). Other nuclear pitch accents also occurred but less frequently, including L*, !H*, and L+!H* accents. Figures 4.16 and 4.17 provide an illustration of these realizations.

Table 4. 4 *Frequent combinations of nuclear pitch accents and edge tones for ISQ and IQ*.

Tune	IS yes/no Q (*N*=57)	IQ (*N*= 50)
L* H-H%	40.3% (*N*= 23)	0
L+!H* H-H%	45.6 % (*N*= 26)	0
!H*	14% (*N*=8)	0
L* H-L%	0	14% (*N*=7)
H* H-L%	0	74% (*N*=37)
!H* H-L%	0	6 % (*N*=3)
L+!H* H-L%	0	6 % (*N*=3)

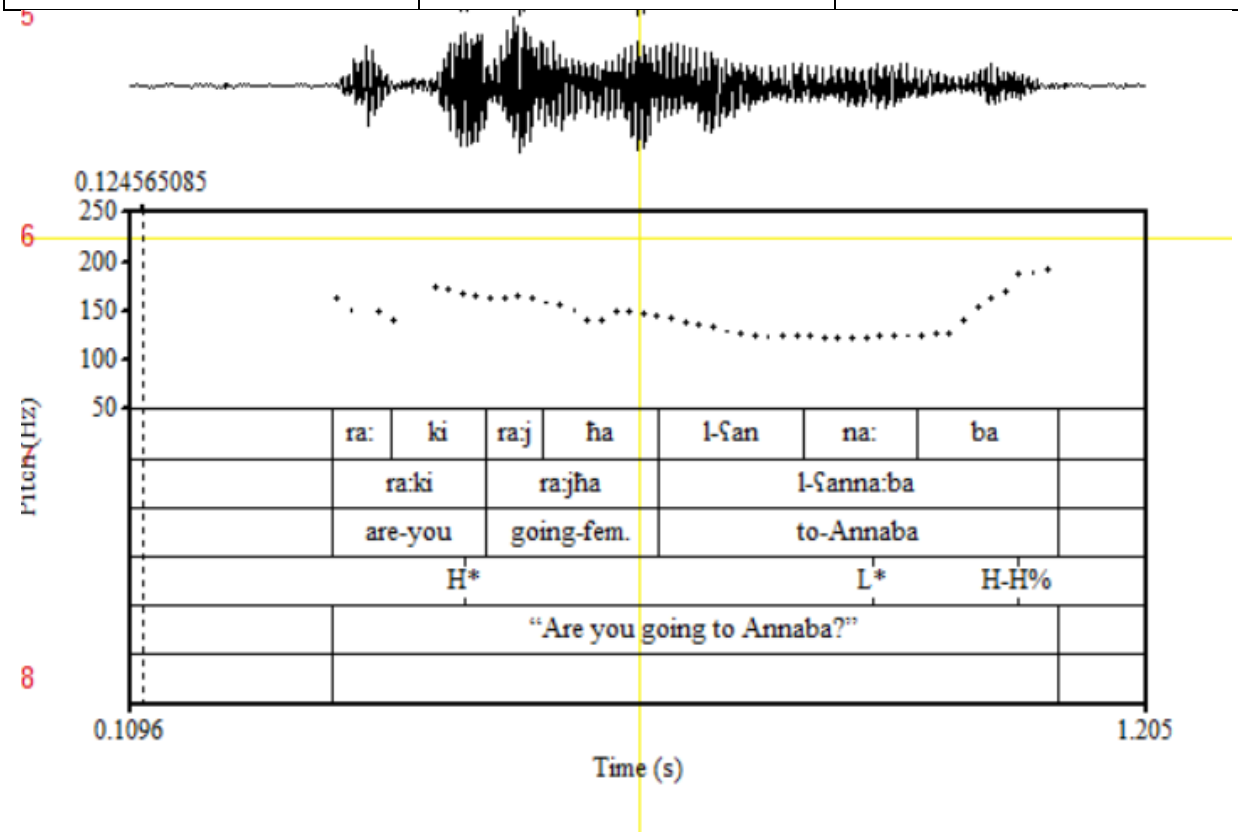


Figure 4. 16 An illustration of IS yes/no question tune (Speaker M/03)

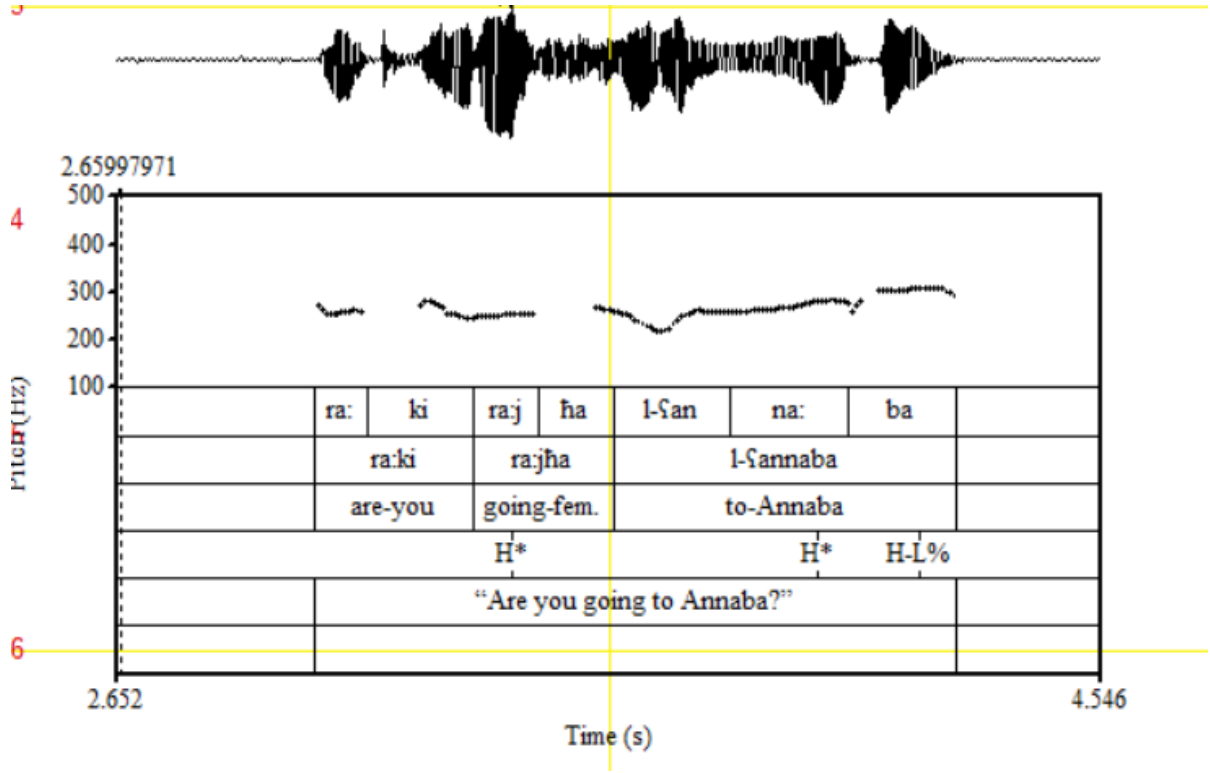


Figure 4. 17 An illustration of incredulity yes/no question tune (Speaker F/04)

4.3.2.4 Intonational meanings of 'ʃawala' ('What?')

The wh-word /ʃawala/ 'what' is used in OSA to convey distinct pragmatic meanings. In this respect, three contextual meanings were selected to probe their intonational patterns: (1) responding to someone calling the speaker's name, (2) asking for repetition, and (3) expressing incredulity. The table 4.5 illustrates the three contexts.

Table 4. 5 *Contexts of the wh-word 'ʃawala' elicited by a roleplay dialogue.*

Context (1)	Your mother has called your name '… (Participant's name!)'. You respond:
Context (2)	Your mother has told you something, but you did not catch what she said. You ask her to repeat again:
Context (3)	Your mother has told you that your aunt is going to Annaba, but you were incredulous and could not believe that. You say:

Table 4. 6 *Distribution of nuclear pitch accents and edge tones in the utterance of* 'ʃawala' *across three pragmatic contexts.*

	Responding to a call (*N*=60)	Asking for repetition (*N*=57)	Incredulity (*N*=57)	
Nuclear accent (% of occurrence)	H* (100%)	L+H* (100%)	H* (54.3%)	L* (45.6%)
Edge tone (% of occurrence)	L-L% (100%)	H-H% (100%)	H-L% (54.3 %)	L-L% (45.6%)

The results obtained, as summarized in Table 4.6, revealed that 'ʃawala' was realized in a fall towards the edge (L-L%) preceded by a high pitch accent H* when the speaker responds to their mother calling their name. However, when the speaker is asking for repetition, the pitch contour ended in a steep rise (H-H%) preceded by a bitonal pitch accent (L+H*). Finally, when the speaker tended to express his incredulity, the wh-word 'ʃawala' was often uttered with a plateau contour (H-L%) preceded by an H* pitch accent (54.3%), or with a low-level pitch contour realized throughout the bottom of the speaker's pitch range accompanied with vowel lengthening (L* L-L%) (45.6%). Nevertheless, the first pitch contour (H* H-L%) was found to be even closer to the baseline. Figures 4.18, 4.19,4.20, and 4.21 illustrate the pitch contours related to the three contexts.

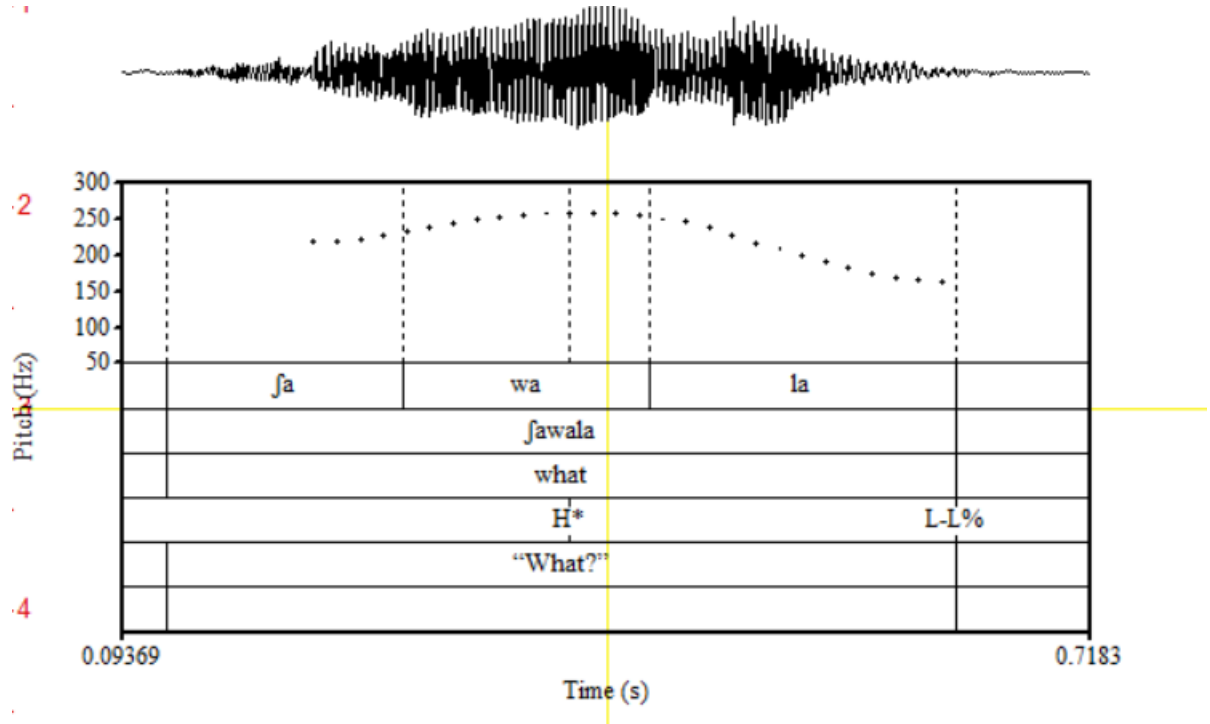


Figure 4. 18 An illustration of a frequent realization of 'ʃawala' in the answering to call context (speaker M/05)

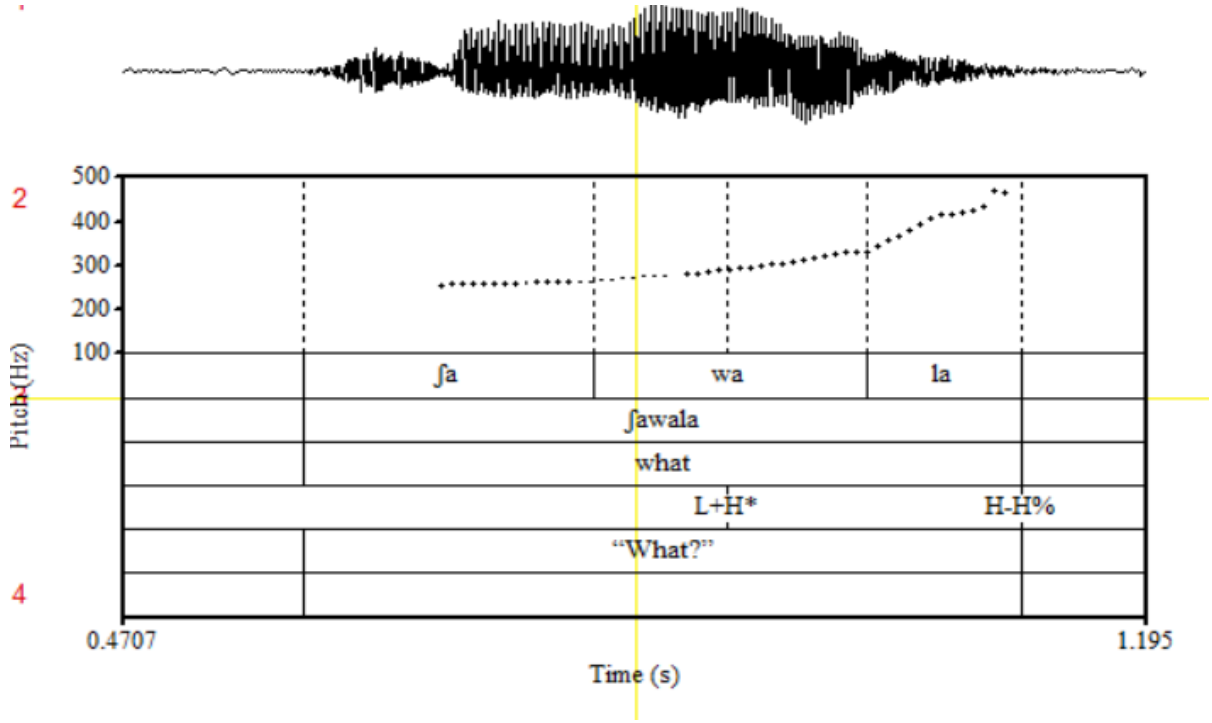


Figure 4. 19 An illustration of a frequent realization of 'ʃawala' in the asking for repetition context (speaker F/08)

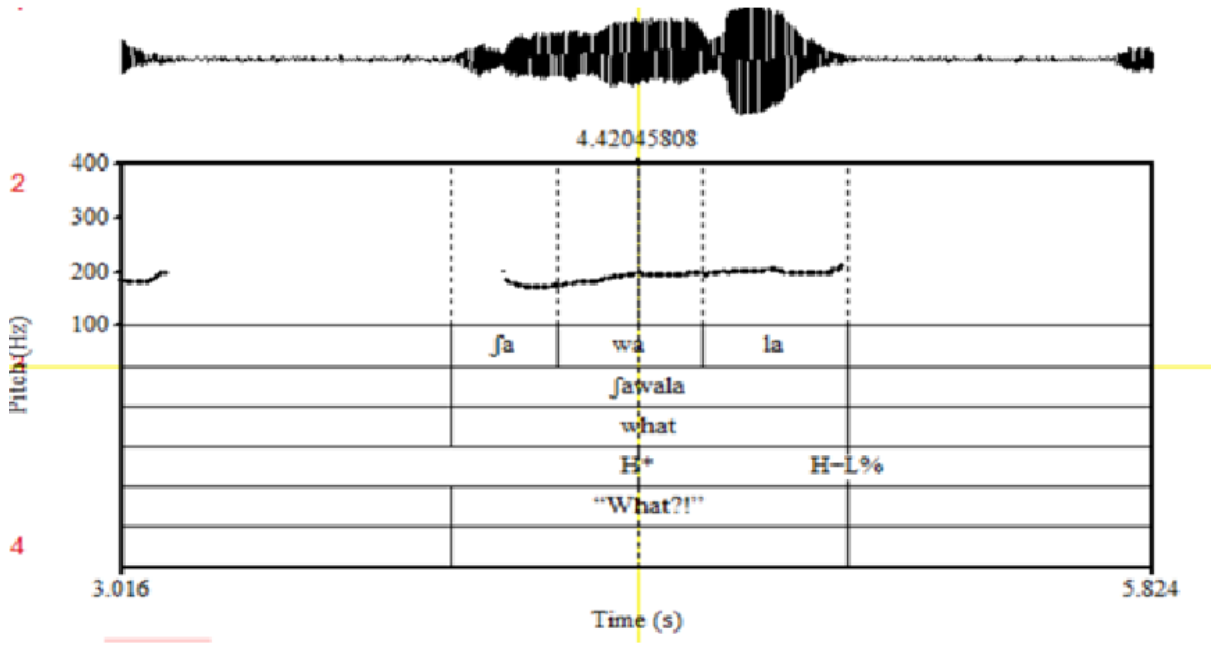


Figure 4. 20 An illustration of a frequent realization of 'ʃawala' in the incredulity context (speaker F/05)

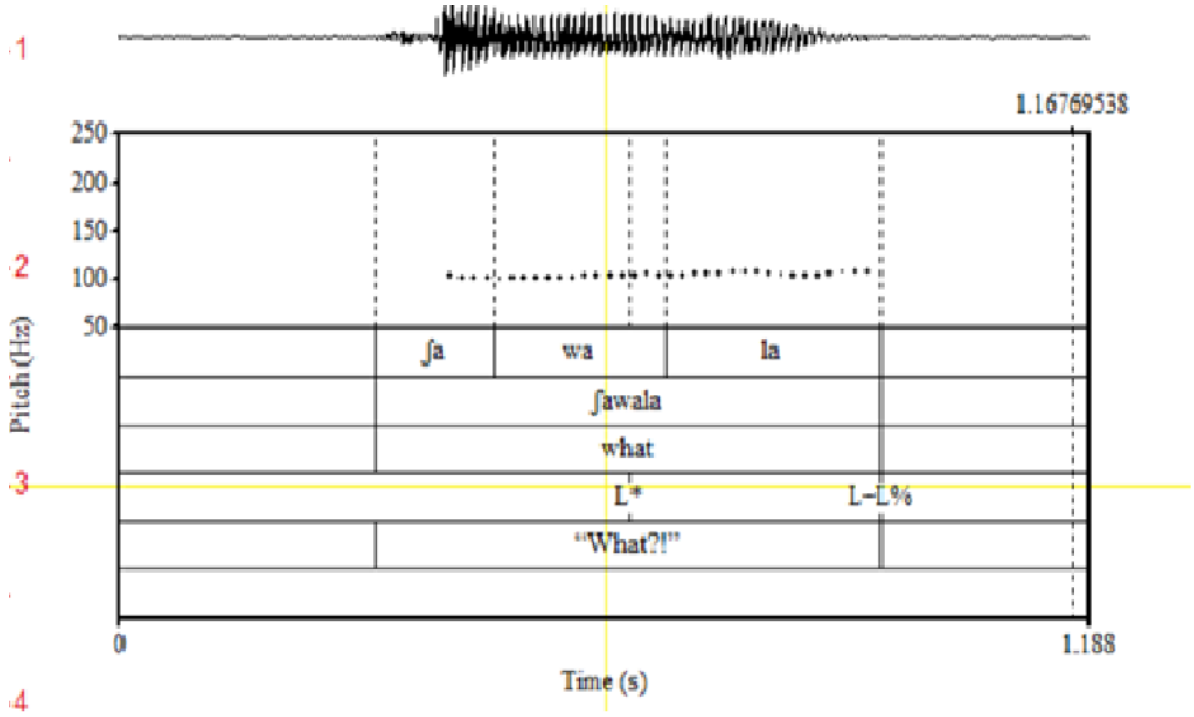


Figure 4. 21 An illustration of a frequent realization of 'ʃawala' in the incredulity context (speaker M/10)

4.3.3 Imperative Tune

A total of 72 utterances entered the scrutinization of the imperative tune obtained on the basis of two sentences (a short read sentence and a long narrative one). Intriguingly, the pitch contour was found to start with a high H* (15.2%) or a rising L+H* (84.7%) nuclear pitch accent and ends with a fall to the edge L-L%. Figures 22 and 23 below illustrate the findings of this tune:

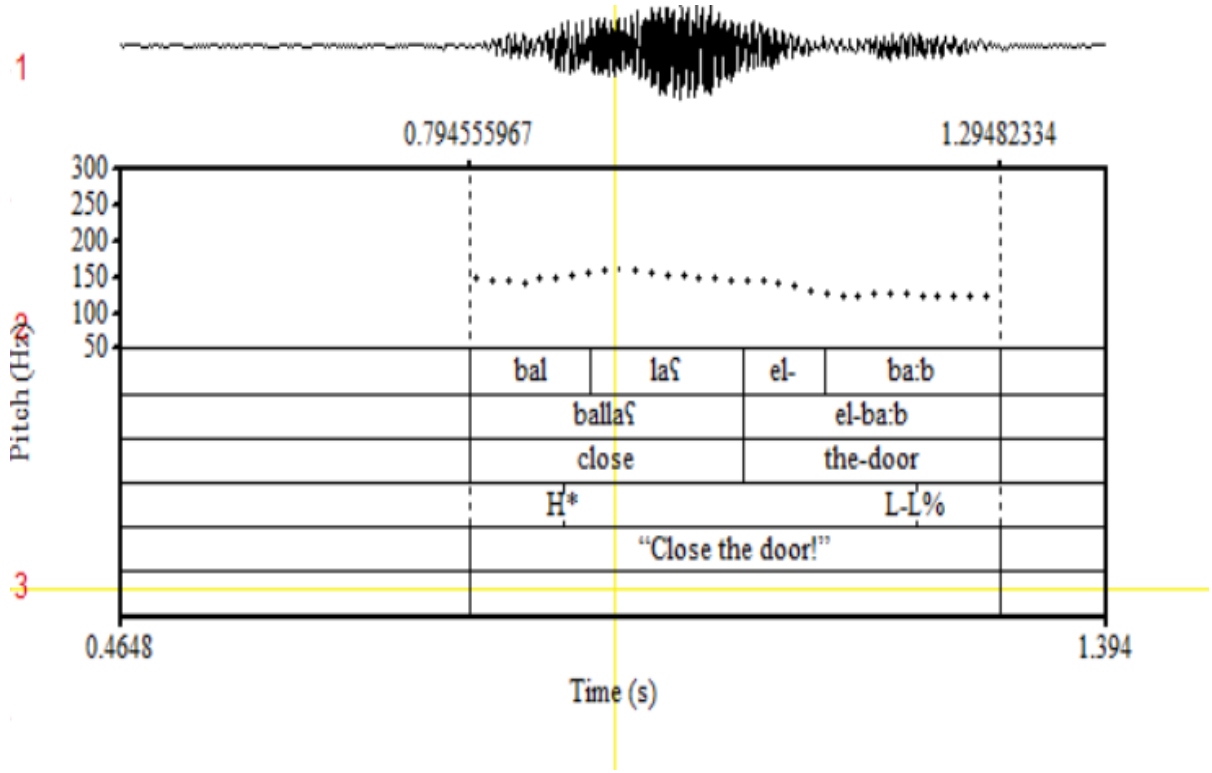


Figure 4. 22 An illustration of an imperative tune (Speaker M/07)

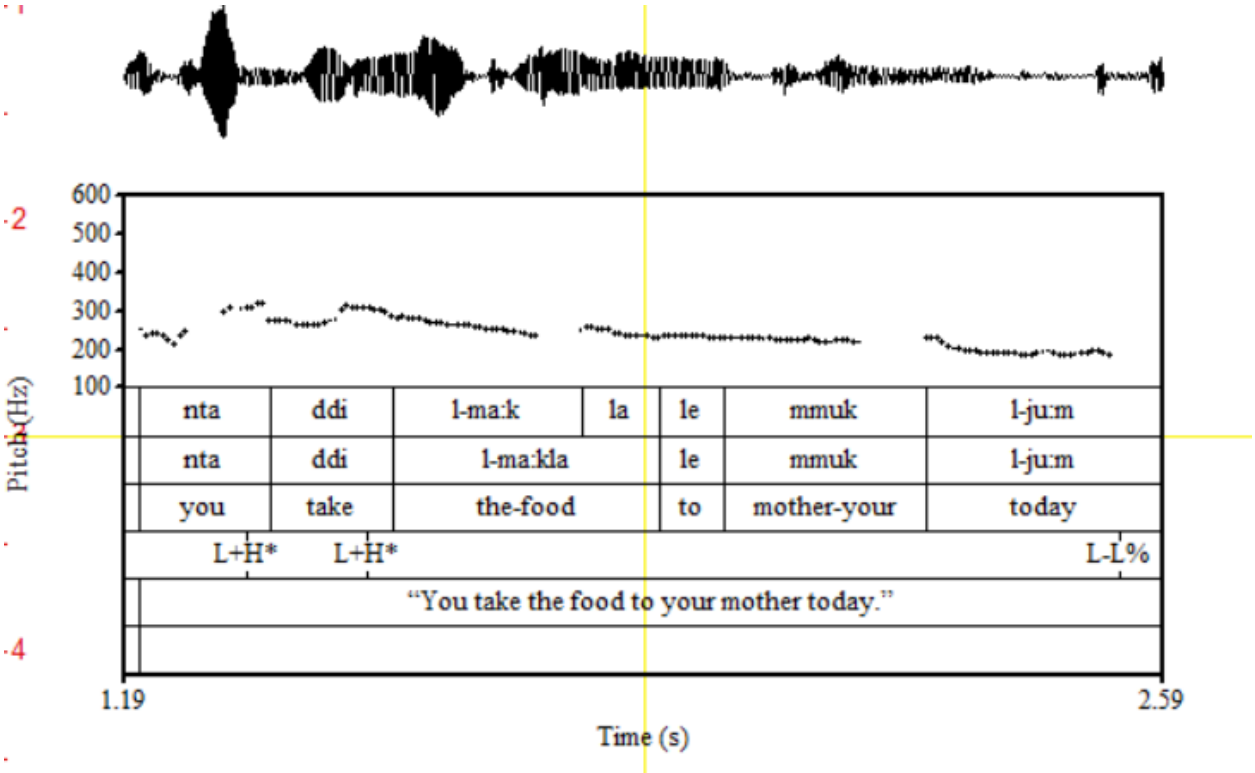


Figure 4. 23 An illustration of a narrative imperative tune (Speaker F/05)

4.3.4 Request Tune

A further tune analyzed in this study is the request tune which was involved in the read sentence task via a sentence formed similarly as a yes/no question. However, the distinction between both structures was elicited by the word /ma:ʕli:ʃ/ 'is it possible' which is used in this dialect to convey polite request. Intonationally, this tune revealed a similar pattern as a yes/no question tune in that the pitch contour was significantly marked by a high edge boundary H-H% combination. Moreover, this high rising was found to be frequently preceded by a high nuclear accent H* (65%). Other nuclear pitch accents were also produced, such as L+H* and L* (15% and 20%, respectively). Table 4.7 below and Figure 4.24 demonstrate these findings:

Table 4. 7 *Distribution of pitch nuclear accents in request tune*.

Nuclear pitch accent	Edge tone combination	Occurrence % (*N*=60)
H*	H-H%	65 % (*N*= 65)
L+H*	H-H%	15 % (*N*=9)
L*	H-H%	20 % (*N*=20)

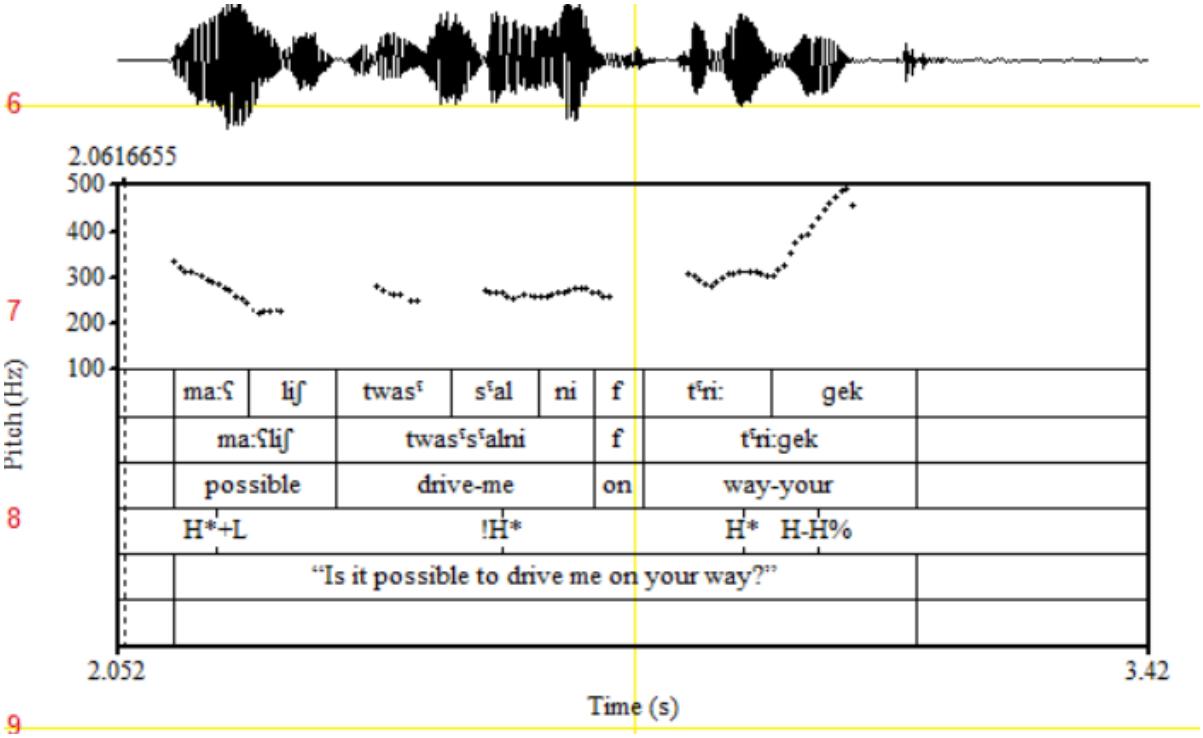


Figure 4. 24 An illustration of request tune (Speaker F/03)

4.3.5 Continuation/Plateau Tunes (non-finality)

Utterances that pragmatically signal speech non-finality were extracted from storytelling. It is noteworthy that speakers have evinced asymmetrical production of melodies. Moreover, certain speakers exhibited different patterns of phrasing during the process of narration. Although sentences were deliberately marked with punctuation marks which stimulate phonetic strategies such as pauses and vowel lengthening, which in turn aid in organizing utterances into IPs and ips, speakers' engagement with the narrative flow resulted in inequivalent intonational phrasing. Even more intriguingly, we found out that some utterances which are deemed as pragmatically incomplete were occasionally realized by some speakers with a fall to the phrasal edge L-L%, a finality-marking pattern (as shown in Figure 4.25 below). Nevertheless, a closer look to these realizations revealed that non-finality may not be marked phonologically but instead phonetically through extra vowel lengthening in the ultimate syllable. As a corollary, owing to the intra-speaker variation detected at this juncture, this section and unlike the previous ones, is primarily contingent upon a qualitative description of the intonational patterns used to express speakers' incompleteness. The most frequently observed tune was a continuation-rise indicated by a high rising ending H-H% (Figure 4.26), preceded by rising L+H*, high H*, or downstepped high !H* nuclear accents. Non-finality was also marked with a plateau tune H-L% (Figure 4.27) also combined with L+H* or !H* accents.

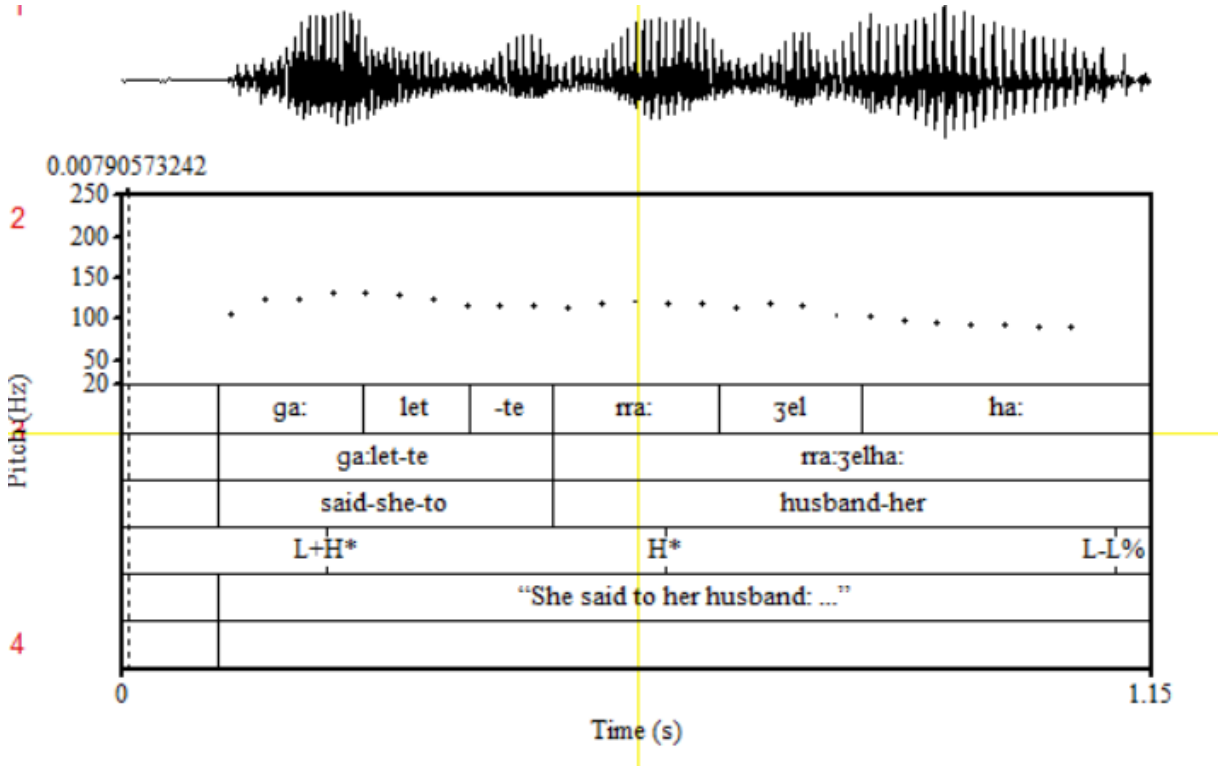


Figure 4. 25 An illustration of incomplete utterance realized with a fall L-L% and final vowel lengthening (Speaker M/02)

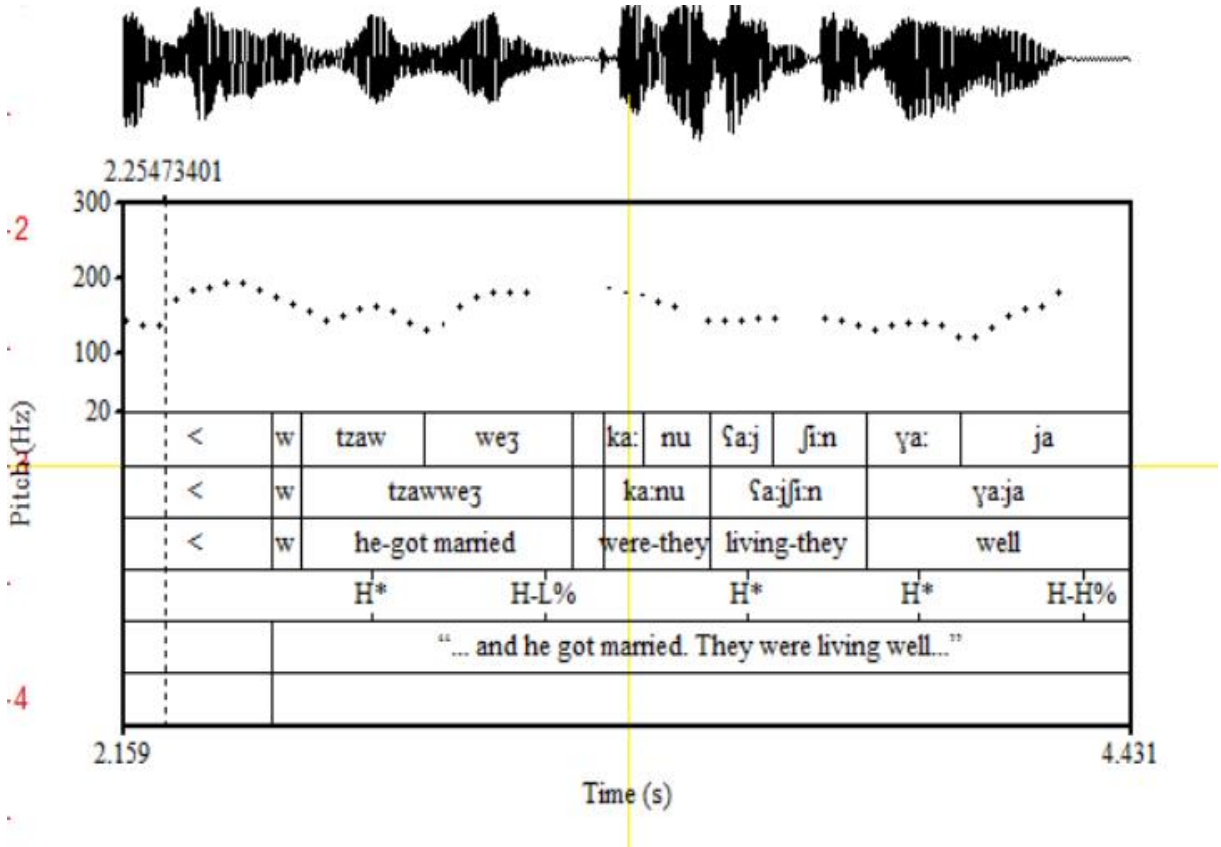


Figure 4. 26 An illustration of incomplete utterance realized with continuation-rise H-H% (Speaker M/10)

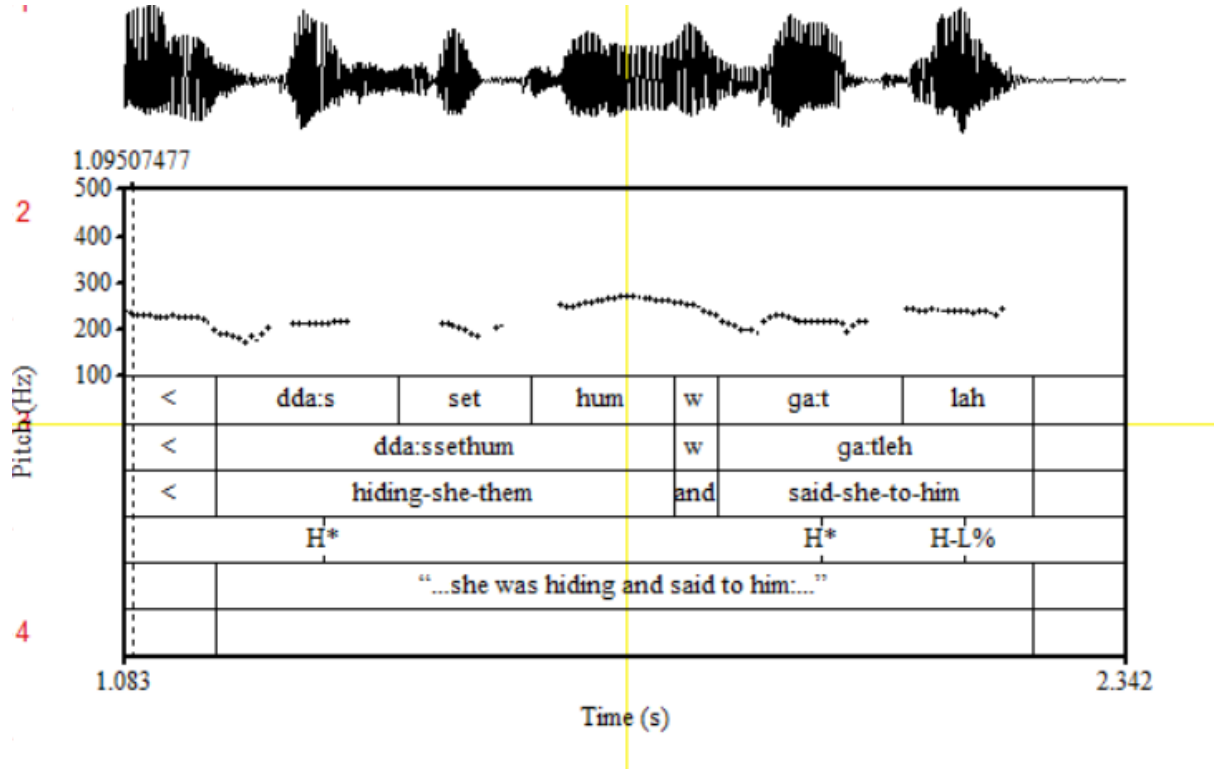


Figure 4. 27 An illustration of incomplete utterance realized with a plateau H-L% (Speaker F/10)

4.4 OSA Tone Inventory

The preliminary intonational model of OSA postulated in the current study suggests that the most frequently occurring pitch accents are: H*, !H*, L*, and L+H*. Besides, further accents may less commonly surface. These are: L+!H*, H*+L, and H+L*. In addition to these pitch accents, three phrase accents are posited: H-, !H-, and L- and two boundary tones: H% and L%. Regarding edge configurations, different phrasal-boundary combinations exist, including: L-L%, H-H%, H-L%. The following are some illustrations of these occurrences observed in story re-telling.

4.4.1 Pitch Accents

The two monotonal pitch accents were observed in this dialect: the H* and L* accents. H* is a high accent that reaches the peak of the speaker's pitch range throughout the production of the accented syllable both in nuclear and in prenuclear positions. In addition, a downstepped adjacent

accent !H* has also emerged in the utterances as it occurred as a step down in the scale of the high accent sequences. Even more interestingly, although rarely occurring , an upstep ^H* accent has been observed emerging at the right edge of non-final utterances. Figure 4.28 below illustrates these realizations. The opposite monotonal accent is the L* which was realized as a valley scaled lower in the speaker's pitch range during the accented syllable when it is phrase finally, as shown in Figure 4.29.

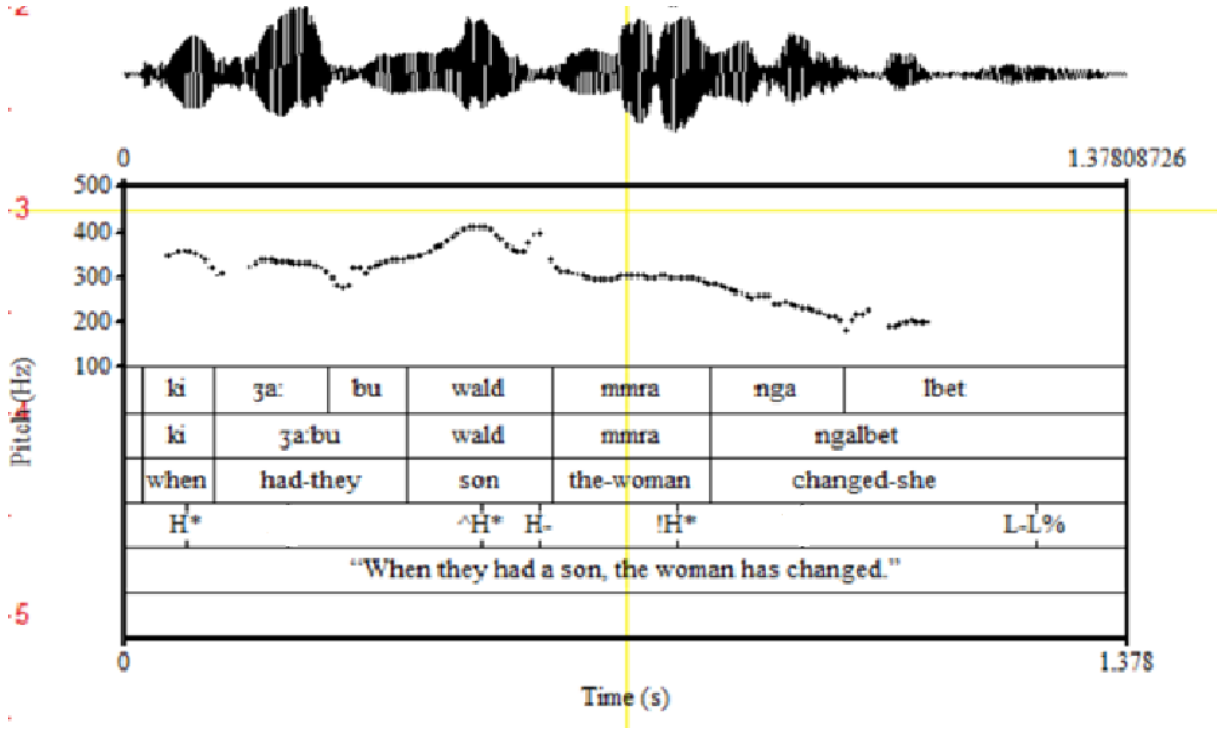


Figure 4. 28. An illustration of high pitch accents: H* on /ki/ 'when', upstepped ^H* on /wald/ 'son', and downstepped !H* on /mmra/ 'the woman', and /ˈngalbet/ (Speaker F/09)

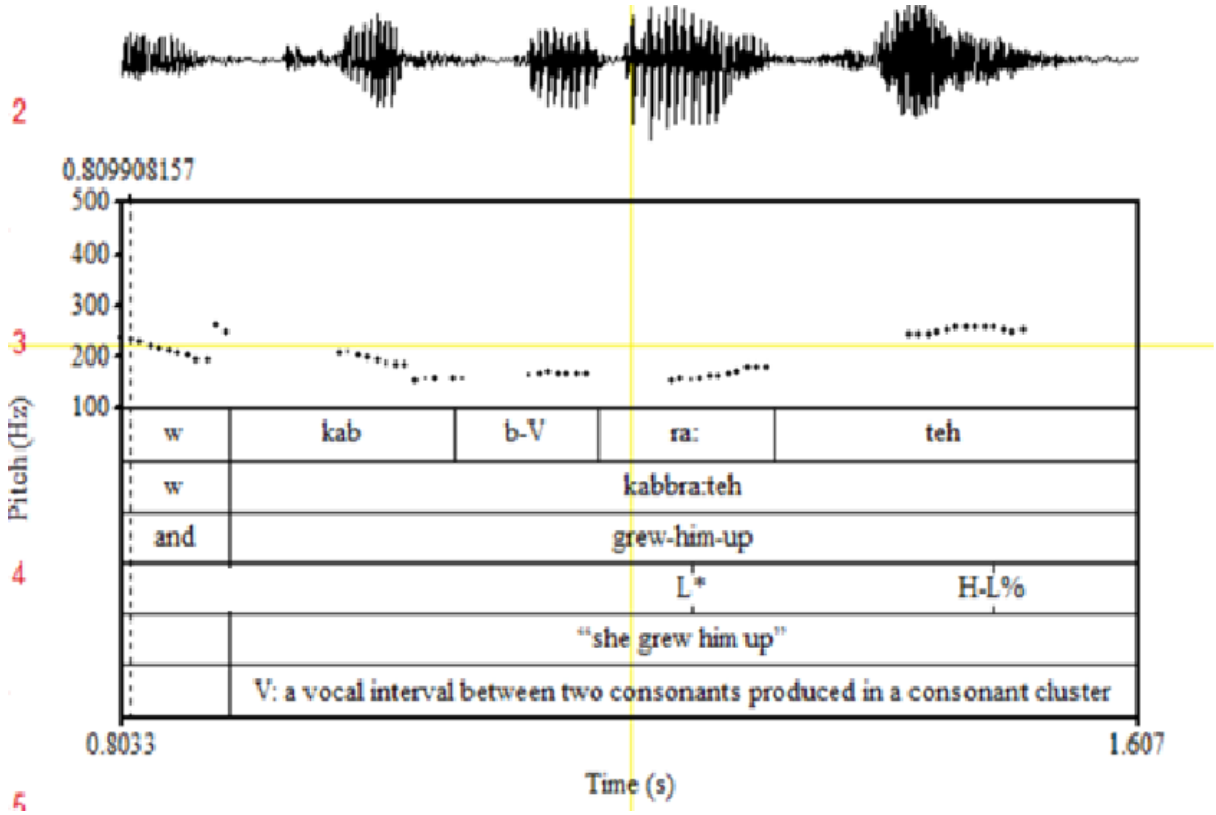


Figure 4. 29 An illustration of L* on /kabˈbra:teh/ ‘she grew him up’ (Speaker F/07)

An additional frequently occurring accent is the bitonal rising accent L+H*. This pitch accent begins with a leading L tone that takes place in a juxtaposed pre-accentual region followed by a jump to a high peak aligned with the accented syllable. An illustration is given in Figure 4.30.

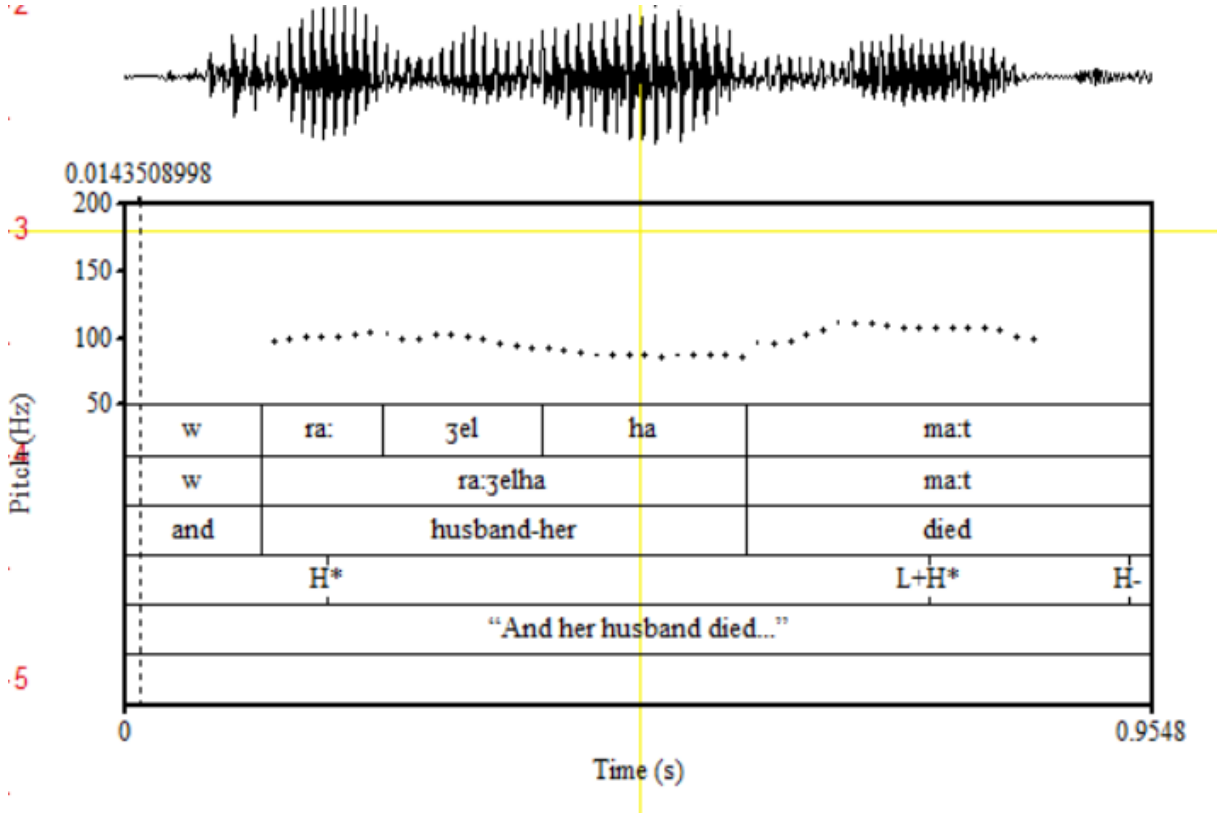


Figure 4. 30 An illustration of L+H* on /ma:t/ 'died' (Speaker M/02)

Some instances of other bitonal accents have also been noticed, with rare occurrence: the downstepped rising L+!H* which appears in Figure 4.31, the H*+L and H+L* which are distinguished in terms of the alignment with the accented syllable. The former is a high peak aligned with the accented syllable followed by a trailing L tone post-accentually, while the latter is a movement from a high H leading tone to a valley realized within the rhyme of the accented syllable, as illustrated in Figure 4.32. Notwithstanding, these accents were infrequently encountered in the corpus, which means they cannot be considered part of the pitch accent inventory of the dialect.

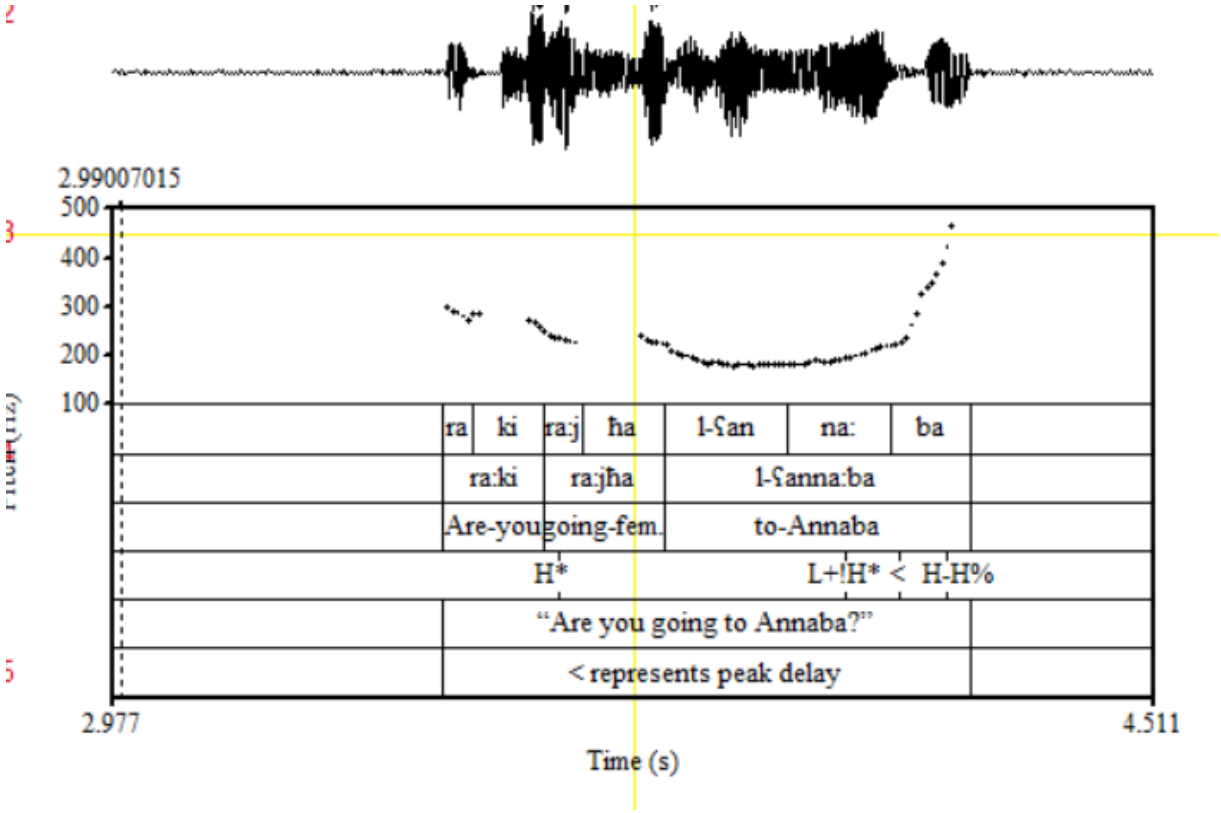


Figure 4. 31 An illustration of L+!H* on /ʕanˈna:ba/ 'Annaba' from roleplay dialogue (Speaker F/03)

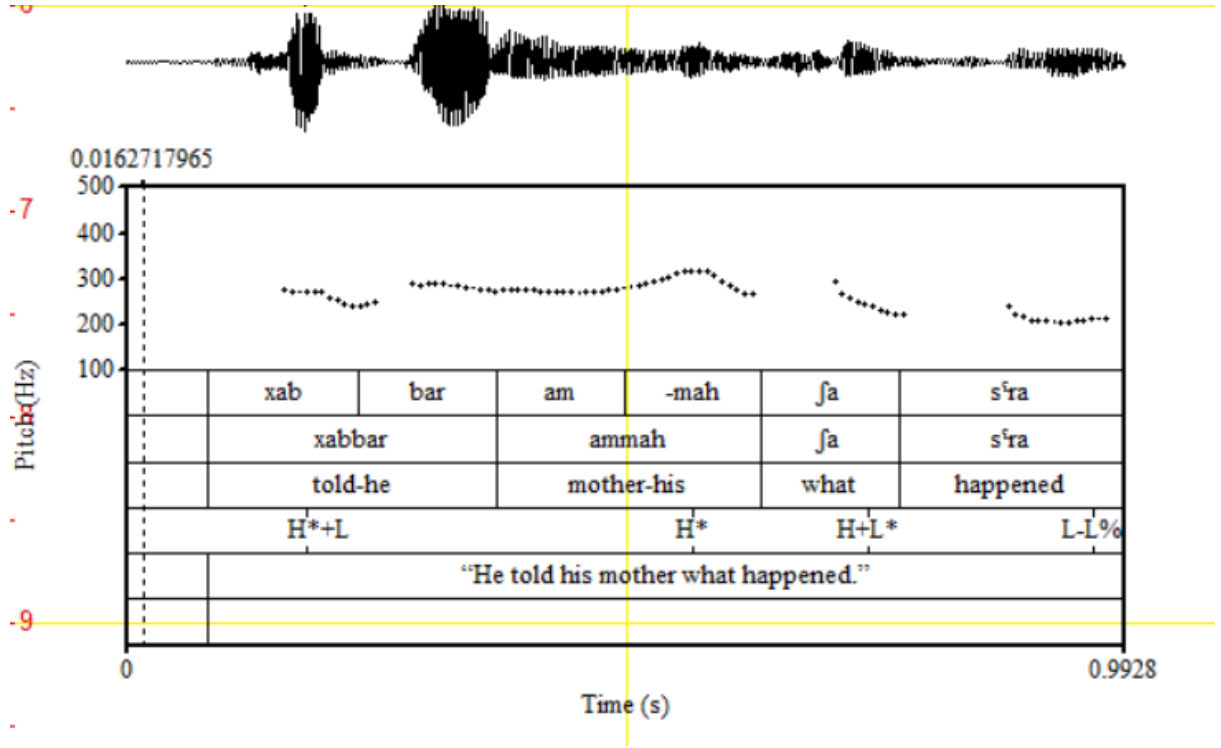


Figure 4. 32 An illustration of less frequent pitch accents: H*+L on /xabbar/ 'he told' and H+L* on /ʃa:/ 'what' from storytelling (Speaker F/03)

4.4.2 Edge Tones and Configurations

As mentioned earlier, the tone inventory in this dialect was observed to encompass three phrase accents: H-, !H-, and L- which demarcate the right edge of an intermediate phrase. These tones occurred in an independent connection with the stressed syllables in the phrase and were detected not only in conjunction with the boundary tones but also separately within longer utterances. Figures 4. 33 and 34 exhibit illustrations of how these phrase accents were produced. The H- accent was realized in the upper part of the pitch range, while the downstepped !H- accent emerged at a lower level, closer to the mid-part of the pitch range. The low L- accent, on the other hand, was evident as a sharp fall to the bottom of the pitch range.

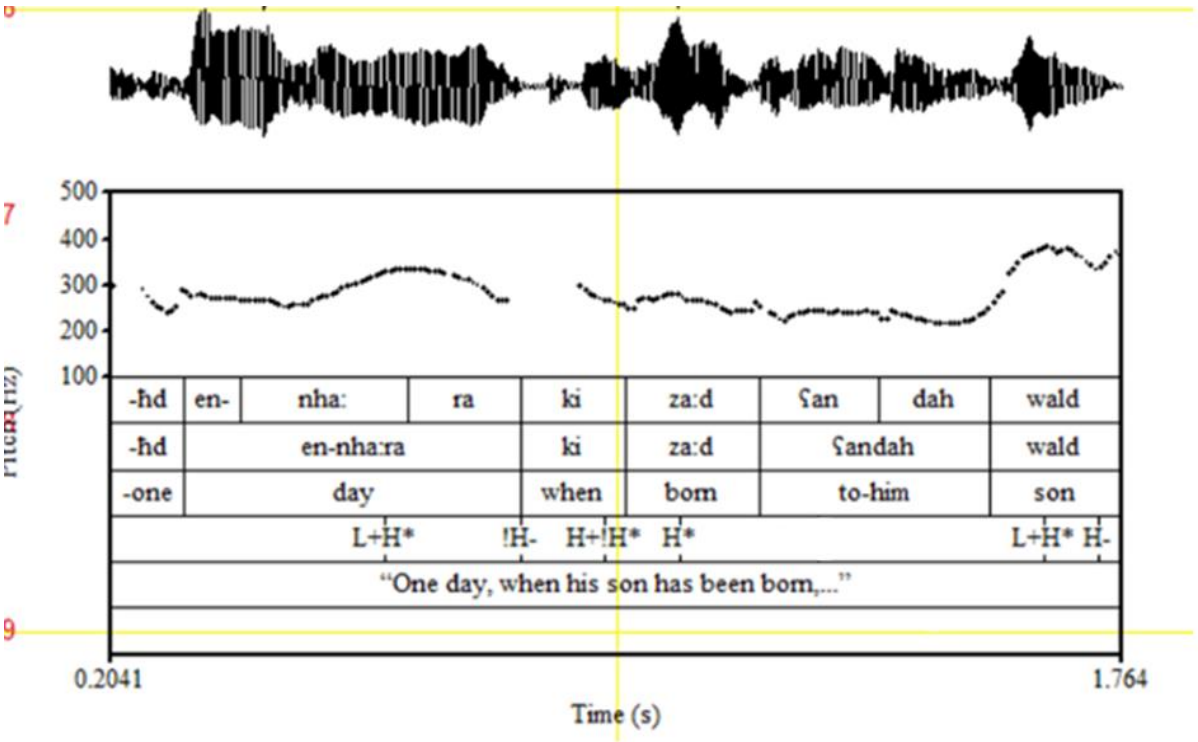


Figure 4. 33 An illustration of downstepped high phrase accent !H- on the right edge of the word /en-nha:ra/ 'day' and high phrase H- on /wald/ 'a son' from story re-telling (Speaker F/01)

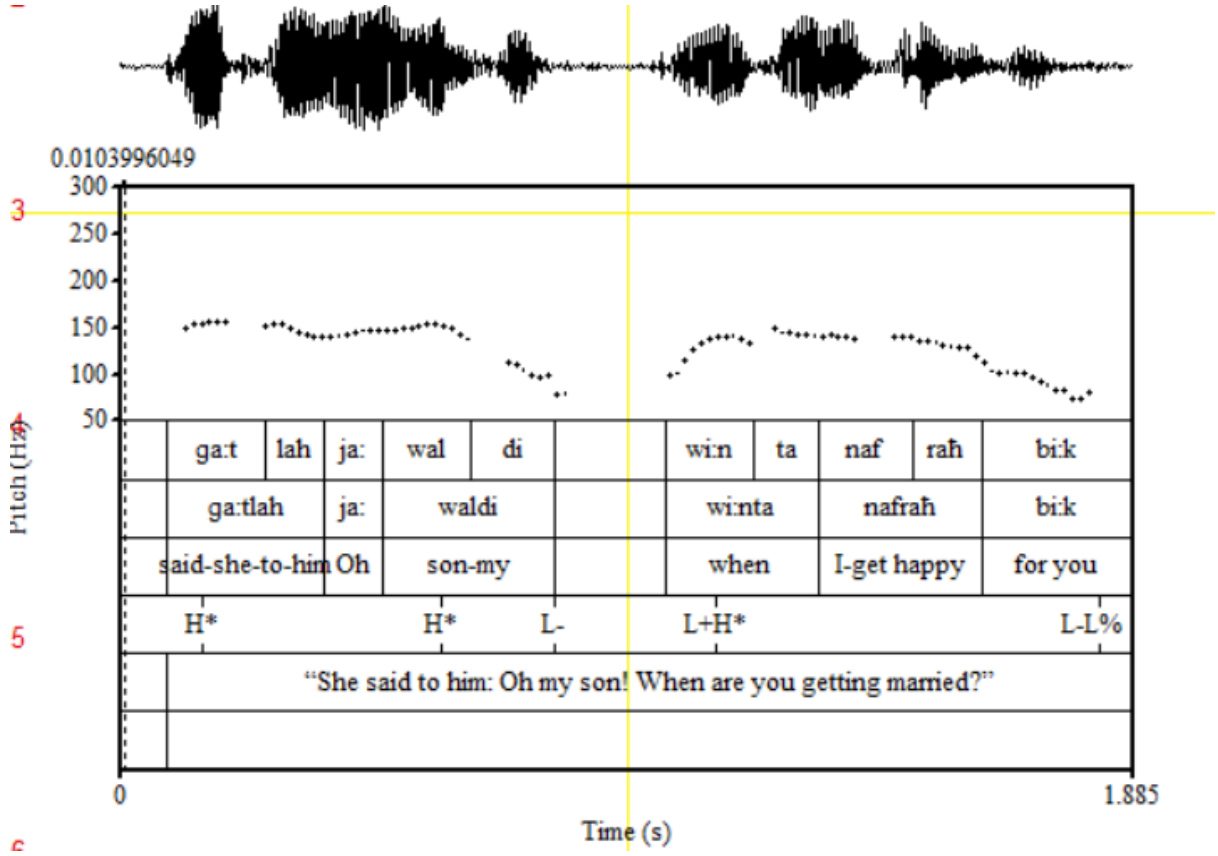


Figure 4. 34 An illustration of a low L- phrase accent on the right edge of the word /waldi/ 'my son' from storytelling (Speaker M/01)

Regarding boundary tones configurations, three types of phrasal-boundary combinations were observed in this dialect: L-L%, H-H%, and H-L%, as illustrated in the examined intonational tunes covered in the corresponding sections above. A falling L-L% configuration was found out to mainly characterize declarative tunes, information-seeking wh-question tunes, imperative tunes, and rarely to pinpoint non-finality when accompanied with extra final vowel lengthening. A high-rising H-H% boundary configuration was evident in informational-seeking yes/no question tunes, request tunes, continuation-rise tunes, and also in non-informational-seeking rhetorical question tunes. Finally, a plateau H-L% was observed in continuation-plateau tunes to mark incompleteness, also in non-informational-seeking incredulity question tunes, and sometimes in rhetorical question tunes.

4.5 Discussion

In the light of the results exhibited in this chapter, we can postulate that the Oranee dialect of Algerian Arabic consists of diverse intonational categories configured as pitch accents and phrasal-boundary combination tones, which in turn give rise to distinct intonational tunes. Notably, the tonal inventory of this dialect was found to encompass four major pitch accents: H*, !H*, L*, and L+H*. In addition, three phrase accents were observed to surface to demarcate the right edge of an intermediate phrase: H-, !H-, and L-. The dialect also showed the existence of two boundary tones: H% and L% which occurred at the edges of Intonational Phrases. With respect to the phrasal-boundary tone sequences, they were in form of L-L%, H-H%, and H-L%.

Accordingly, it is ergo evident that the tonal inventory varies across Arabic dialects, as contended by Chahal (2006). Our dialect seems to be in accord with Jeddah Arabic (Moussa, 2019) in terms of the categories that compose the tonal inventory. Analogously, Other Arabic dialects demonstrated rich tonal inventories with asymmetrical categories, as reviewed in section 2.2 of Chapter Two. These include Lebanese Arabic (Chahal, 2001; 2003), Sanaani Arabic (Hellmuth, 2014), and Syrian Arabic (Al Hasan & Mahanta, 2022).

With respect to the intonational melodies, the present experiment casted light on several tunes employed to signal various linguistic structures or to convey different pragmatic meanings. The declarative tune was displayed via the universal pattern, a falling to the edge (L-L%) to denote completeness and finality of the speaker's turn. The yes/no question tune also demonstrated a common intonational edge tone, a high rising (H-H%). The wh-question tune, however, was realized with a falling edge tone (L-L%) whether the question word occurs in the initial or penultimate sentential positions. This pattern is identical to Egyptian Arabic wh-questions, as presented in Hellmuth (2006) and Chahal and Hellmuth (2014). In contrast, other Arabic dialects showed a high rising edge (H-H%) in this tune, as the case of Lebanese Arabic (Chahal, 2001; 2003) and Jeddah Arabic (Moussa, 2019).

Contrarily, non-finality was conveyed through distinct tunes, suggesting dissimilarity across Arabic dialects. The continuation-rise (H-H%) and plateau (H-L%) tunes which were the most common patterns reported in several dialects such as Lebanese Arabic, Egyptian Arabic (only H-H%), and Jeddah Arabic, were also observed in Oran Arabic. However, the stylized falling-rising tune that surfaced in Lebanese and Jeddah Arabic dialects was not detected in this dialect. Instead, a further distinguishing pattern was revealed. Interestingly, the speakers in this experiment demonstrated a fall to the phrase edge (L-L%) accompanied with an exaggerated vowel lengthening at the end of the utterance. This being so, Oran dialect employed a segmental feature alongside a supra-segmental pattern to mark non-finality or uncertainty. In this respect, the utilization of both segmental features and pitch contour is also evident in Tunisian Arabic. Particularly, yes/no interrogatives are realized with a rise-fall intonational pattern followed by an epenthetic vowel at the end of the utterance in the south-east of Tunisia (Bouchhioua, 2009; Hellmuth, 2020).

Additional tunes examined in this chapter are the request and imperative tunes. Crucially, these two tunes were merely investigated in Moussa's (2019) study on Jeddah Arabic. Results revealed in our study were akin to those reported in Moussa (2019). The request tune was marked with a high rising edge tone (H-H%), whereas the imperative tune was realized with a falling to the edge (L-L%).

Alongside these melodies, the current study probed the intonational patterns of further utterances which received scant attention in Arabic literature. We sought to compare the intonational patterns between information-seeking and non-information-seeking questions, which are pragmatically-spurred. Essentially, the information-seeking question was in the form of a yes/no structure and thus demonstrated a high rising H-H% phrasal-boundary sequence. This context-based finding endorsed the earlier configuration as regard the yes/no question tune. The non-informational-seeking questions examined here were of two types: rhetorical questions and

incredulity questions. Both types were also in the form of a yes/no structure and employed to imply the speaker's emotional state.

The rhetorical questions exhibited more use of a plateau (H-L%) edge tone and less frequently use of a high rising (H-H%) edge tone (83.1% and 16.8 %, respectively). This indicates that information-seeking questions and (non-information-seeking) rhetorical questions are intonationally distinguished. On this view, the present result corroborates those reported in the literature that intonation serves as a well-discerning strategy to differentiate between the two types of questions. To illustrate, Dehé & Braun (2019) in their study on English have noticed that polar (i.e., yes/no) information-seeking questions ended in a high rising edge tone (H-H%), whereas polar rhetorical questions were relatively marked with a final mid-high plateau (H-L%). The researchers (Dehé & Braun, 2020) have further examined another language which is Icelandic. Their results revealed that the distinction between information-seeking and non-information-seeking questions was achieved via nuclear pitch accent category rather than boundary tone. Both polar questions (including the wh-questions in their experiment) demonstrated an L% boundary tone. However, they varied in terms of the timing of the nuclear rise: late rises (L*+H) in information-seeking polar questions and early rises (L+H*) in rhetorical questions.

In the same vein, the present chapter revealed a significant disparity in the intonational patterns between (non-information-seeking) incredulity questions in comparison to their string-identical information-seeking yes/no counterparts. The former demonstrated a plateau (H-L%) edge contour while the latter showed a high rising (H-H%) terminal tone. Again, these findings lend further support to those disclosed for rhetorical questions. Taken together, speakers of this dialect implement different intonational patterns when asking real questions as opposed to when uttering non-canonical questions.

Alternatively, we investigated the pitch contour of the question word /ʃawala/ 'what' when occurring in isolation, based on three contextual meanings: (1) responding to someone's calling

the speaker's name, (2) asking for repetition, and (3) expressing incredulity. This investigation sought to probe intonation in a one-word utterance. Results revealed that this word was pronounced with an H* L-L% pitch contour in the first context, thus ending in a wh-question edge tone-like. The same word was observed to receive an L+H* H-H% pitch contour in the second context, indicating a yes/no question edge tone. In the third context, on the other hand, the question word exhibited two different patterns: an H* H-L% or an L* L-L%. The first pattern seems to be in line with the long-utterance incredulity questions. However, the second pattern lacked an F0 peak and a high edge tone, suggesting an absence of any characterizing F0 pattern. Yet, the scrutinization of this pattern unveiled a phonetic feature instead. The word was observed to be marked with a segmental lengthening at the level of each syllable composing the word. Notwithstanding, further research in this scope is needed.

4.6 Conclusion

The present chapter casted light on the intonational system of Algerian Arabic as spoken in Oran. It was found that this dialect is symmetrical to a number of Arabic dialects that possess a rich tonal inventory. Besides, different intonational patterns were exhibited to form distinct tunes with structural and contextual meanings. A further distinguishing intonational pattern which is affined to the pitch range of these tunes is covered in Chapter six. The following chapter, on the other hand, is devoted to probe the phonological and phonetic cues employed to mark prosodic focus in this dialect.

CHAPTER FIVE:

PROSODIC FOCUS

Chapter Five: Prosodic Focus

5.1 Introduction

The present chapter endeavored to inspect whether (or not) and how focus is encoded intonationally in Algerian Arabic as spoken in Oran. To this end, we conducted an analysis of both phonetic and phonological features that differentiate narrow informational focus and narrow contrastive focus at three sentential positions in comparison to broad (neutral) focus. In line with the methods already presented in Chapter three, section 5.1 provides further details about the experiment material and measurements embraced in the current chapter. Section 5.3 reports the findings of the qualitative and quantitative analyses. Section 5.4 is devoted to the interpretations of the findings obtained in this experiment. Section 5.5 is a conclusion of the current chapter.

5.2 Methods

A question-answer paradigm was embedded in the roleplay dialogue task through interactions with the researcher in order to elicit a natural production of three focus types: (neutral) Broad Focus (BF), (narrow) Informational Focus (IF), and (narrow) Contrastive Focus (CF). This method was adopted in a considerable number of prior studies on prosodic focus (including, but not limited to, Chahal, 2001; Xu & Xu, 2005; Alzaidi, 2014; Moussa, 2019; El Zarka et al., 2020; Alzaidi, 2022). In addition, the researcher read contextual information to the participants, offering them a clear understanding of the background to generate accurate and natural responses (Jun & Fletcher, 2014). The target material consisted of a short five-word declarative sentence with voiced sounds to ensure a continuous F0 contour. This sentence was in the form of /mura:d dda:bez mʕa ʒama:l l-ba:reħ/ ‘Murad quarreled with Djamal yesterday’, uttered three times by 20 speakers of OSA with informational focus and contrastive focus at three sentential positions (initial, penultimate, and ultimate positions) compared to each other and to broad focus. The target

constituent was the proper noun 'Djamal'[12] /ʒaˈma:l/ that consists of two syllables in which stress falls on the second syllable that was made up of sonorant segments. Table 5.1 involves the context, prompt questions, and target sentences with their translations. The target constituent is enclosed between brackets.

Table 5. 1 *Stimuli with context, prompts, and target sentences alongside their translations for the three focus conditions.*

Context	
lba:reħ mura:d w ʒama:l dda:bzu w nta kunt ħa:dˁer. ʒa ʕandek sˁa:ħbek saqsa:k:… 'Yesterday, Murad quarreled with Djamal, and you witnessed that. Then, your friend came and asked you: …'	
1. Broad Focus	
Prompt	Target
ʃa: sˁra? 'What happened?'	[mura:d dda:bez mʕa ʒama:l l-ba:reħ] 'Murad quarreled with Djamal yesterday.'
2. Narrow Informational Focus	
Sentential position	Prompts	Targets
Initial	mʕa:men dda:bez mura:d l-ba:reħ ? 'Who quarreled with Murad yesterday?'	[ʒama:l] dda:bez mʕa mura:d l-ba:reħ 'Djamal quarreled with Murad yesterday.'
Penultimate	mʕa:men dda:bez mura:d l-ba:reħ ? 'Who quarreled with Murad yesterday?'	Mura:d dda:bez mʕa [ʒama:l] l-ba:reħ 'Murad quarreled with Djamal yesterday.'
Ultimate	Lba:reħ mʕa:men dda:bez mura:d 'Yesterday who quarreled with Murad?'	l-ba:reħ Mura:d dda:bez mʕa [ʒama:l] 'Yesterday Murad quarreled with Djamal.'

[12] A noteworthy point to highlight as regard this proper noun is that its pronunciation differs from the orthography form. It is pronounced /ʒaˈma:l/ in OSA but written with 'dj' as 'Djamal' and sometimes with the letter 'e' as 'Djamel'. This written form is influenced by the French script.

3. Narrow Contrastive Focus

Sentential position	Prompts	Targets
Initial	mʕa:men dda:bez mura:d l-bareħ? mʕa kari:m? Who quarreled with Murad yesterday? With Karim?	[ʒama:l] dda:bez mʕa mura:d l-ba:reħ 'Djamal quarreled with Murad yesterday.'
Penultimate	Mura:d dda:bez mʕa kari:m l-ba:reħ? Did Murad quarrel with Karim yesterday?	Mura:d dda:bez mʕa [ʒama:l] l-ba:reħ 'Murad quarreled with Djamal yesterday.'
Ultimate	l-ba:reħ mura:d dda:bez mʕa kari:m? 'Yesterday did Murad quarrel with Karim?'	l-ba:reħ Mura:d dda:bez mʕa [ʒama:l] 'Yesterday Murad quarreled with Djamal.'

After the recording phase, a total of 420 utterances (2 focus conditions [IF and CF] * 3 sentential positions * 3 repetitions * 20 speakers + one focus condition [BF] * 3 repetitions * 20 speakers) entered the analysis via PRAAT. Subsequently, 57 utterances were discarded due to unnatural speech rate and wrong focus type production. As a result, 363 tokens represented the total examined tokens for the present experiment. Thereafter, qualitative and quantitative analyses were carried out to probe the intonational marking of focus in this dialect. Strictly speaking, the qualitative analysis was based on a phonological examination of the target F0 contours -which were extracted, corrected, and smoothed previously- in terms of phrasing, pitch accent distribution and type as well as edge tones within the target phrase. Regarding the quantitative analysis, it was based on a phonetic examination of the whole focal word /ʒaˈma:l/ on one hand, and of the stressed syllable /ma:l/ on the other hand. This examination was conducted through a set of acoustic measurements including: F0 maxima (F0 max) and minima (F0 min) in Hertz (Hz) and in Semitones (St), as well as excursion size (St) for the whole word; and in terms of duration (ms) and mean intensity (dB) in addition to the previous measurements for the target stressed syllable. Moreover, alongside the scrutinization of the target focused word, the pre- and post-focused word

/muˈra:d/ was also a domain for the acoustic analysis in which it was scrutinized for F0 max, F0 min, excursion size, mean intensity, and duration. This aims to explore whether (or not) prosodic focus influences the realization of the remaining part of the utterance, as reported in section 2.3 of Chapter two. Furthermore, it is noteworthy to highlight that the logarithmic Semitones scale was utilized for all F0 measurements as a means to control gender-based anatomical differences, as will be elucidated in the next chapter (gender variation in terms of prosodic focus marking will be introduced in Chapter six).

In this respect, to put it in clearer way, the present experiment encompasses the following acoustic measurements (the conversion rate for Semitones is such that 1 St = 100Hz):

- **F0 max** (Hz/St): the peak or the highest point of F0 in the word/stressed syllable.
- **F0 min** (Hz/St): the lowest point of F0 in the word/stressed syllable.
- **Excursion size** (St): pitch range assessed as F0 max – F0 min.
- **Duration** (ms): duration of the word/stressed syllable.
- **Mean intensity** (dB): the amplitude of the word/stressed syllable.

Subsequently, statistical analysis was carried out via Repeated Measures ANOVAs to assess any significant difference between the variables introduced above and the production of focus types.

5.3 Results

5.3.1 Qualitative Analysis

5.3.1.1 Broad Focus

The phonological scrutinization of the F0 contours under broad focus condition exhibited three major intonational features: First, all the speakers produced the utterances with one Intonational Phrase, i.e., without any visible or audible intervening pauses, which indicates the absence of phrasing as a prosodic marker in this type of focus. Second, pitch accents were found

to be distributed across all the content words, marked by the presence of an F0 peak within each word, except for the final word of the phrase, the adverb of time /lba:reħ/ 'yesterday,' which was deaccented in certain utterances. Third, the target word /ʒama:l/ was observed to bear an H* or a downstepped !H* accents across all the utterances followed by an L-L% boundary combination. Consequently, this leads to claim that the target word is allocated a high pitch accent when it is not focused. Figure 5.1 displays these observations.

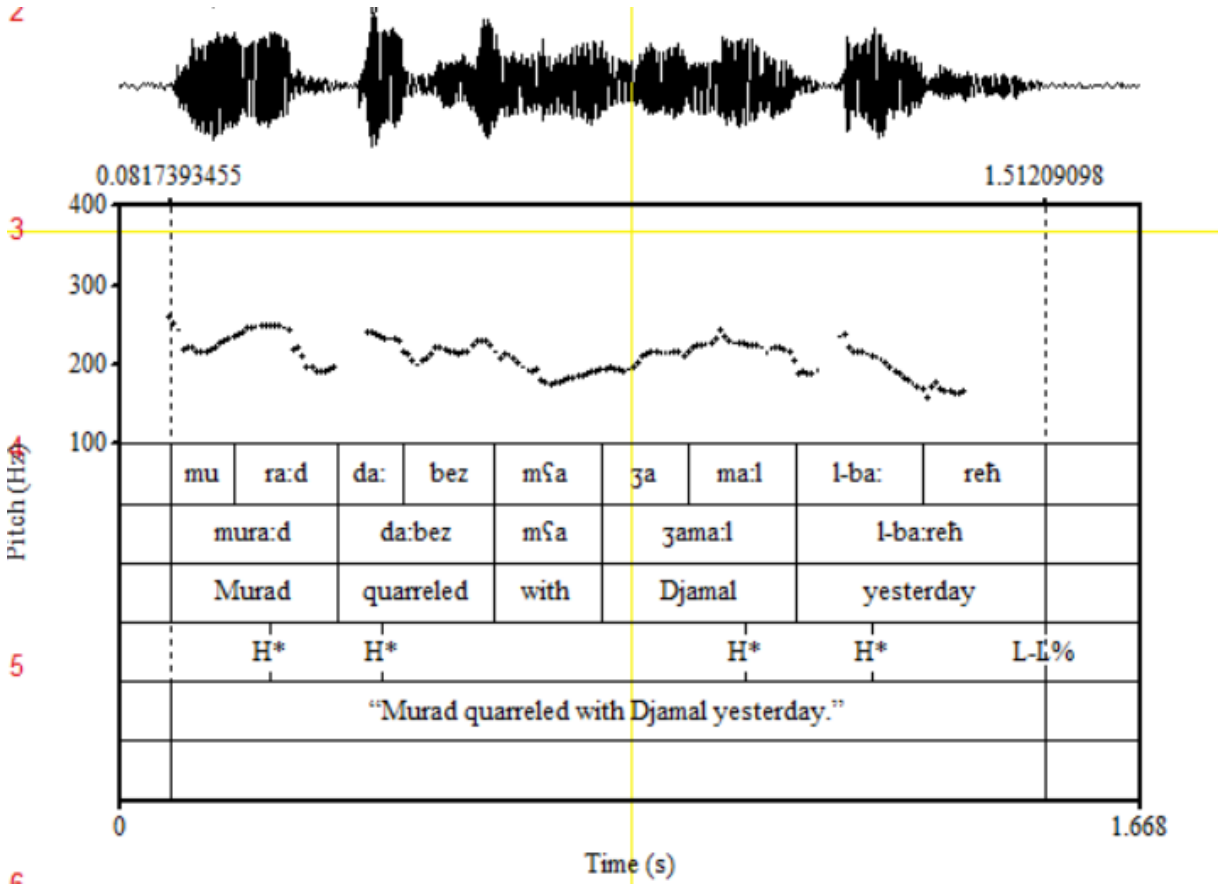


Figure 5. 1 An illustration of a broad focus utterance (Speaker F/06)

5.3.1.2 Informational Focus

Narrow informational focus was observed to be characterized by the following intonational patterns: All the utterances were realized with a non-broken intonational phrase among all participants. This finding suggests that phrasing cannot stand as a prosodic marker to distinguish

informational focus from broad focus. Additionally, when the target word was in initial position, it was marked by a rising pitch accent L+H* followed by a downtrend of F0 until the end of the utterance. When it occurred in sentence-penultimate position, the F0 peak fell on the entire word and not only on the second stressed syllable, preceded by a low level of F0. Besides, this high peak was downstepped !H* in comparison to the pre-focal word peak level. As for sentence-ultimate position, only the first syllable of the focal word was uttered with a slightly high F0 level preceded by a low accent, while the second syllable was deaccented. However, this was not observed in all utterances. Certain utterances demonstrated deaccentuation of the entire focused item by virtue of the absence of F0 peak. On the contrary, all the pre-focus items received local F0 peaks. Figures 5.2, 5.3, and 5.4 illustrate the production of IF in the three sentential positions.

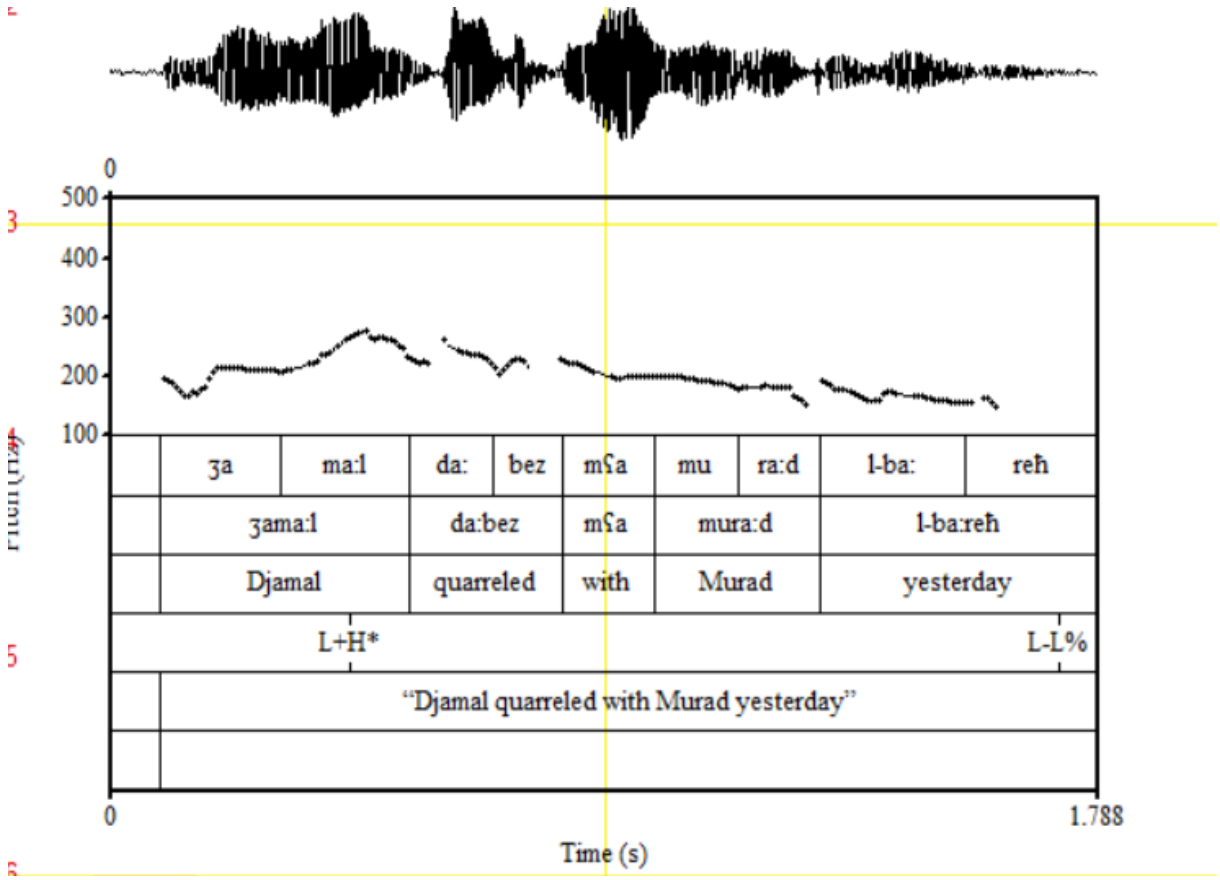


Figure 5. 2 An illustration of narrow informational focus in sentence-initial position (Speaker F/10)

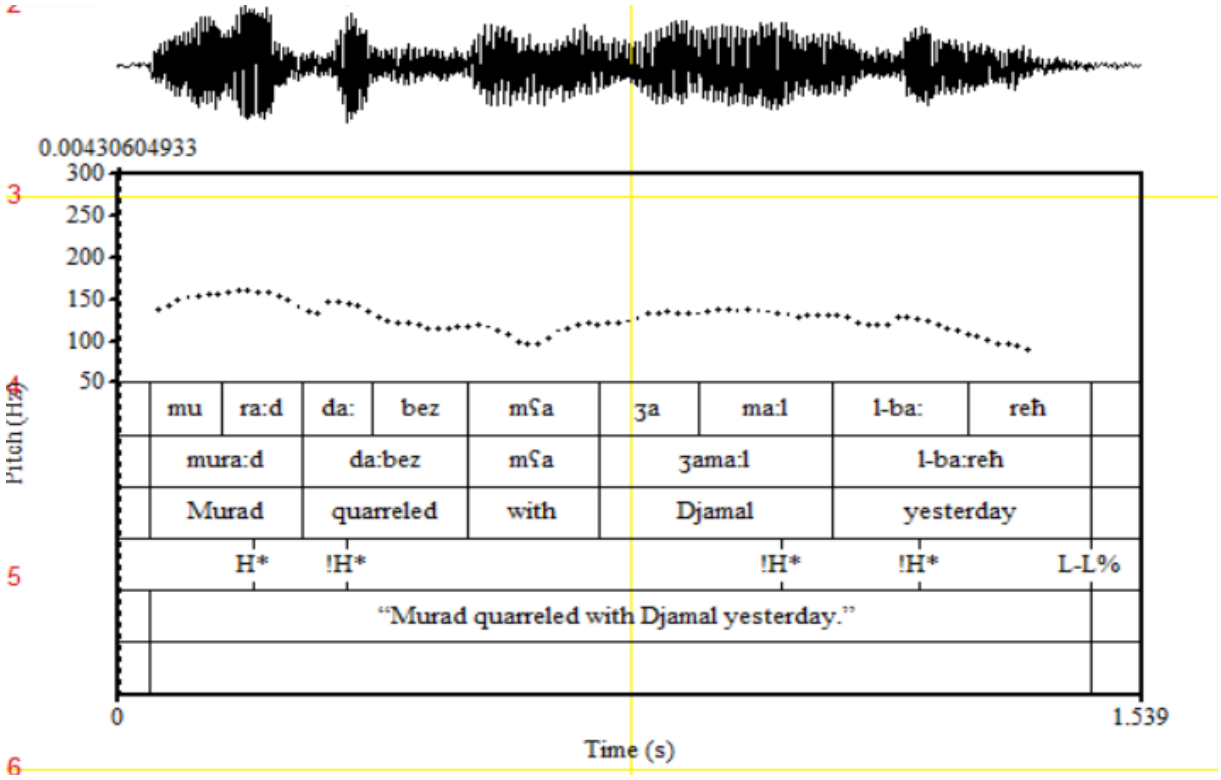


Figure 5. 3 An illustration of narrow informational focus in sentence-penultimate position (Speaker M/04)

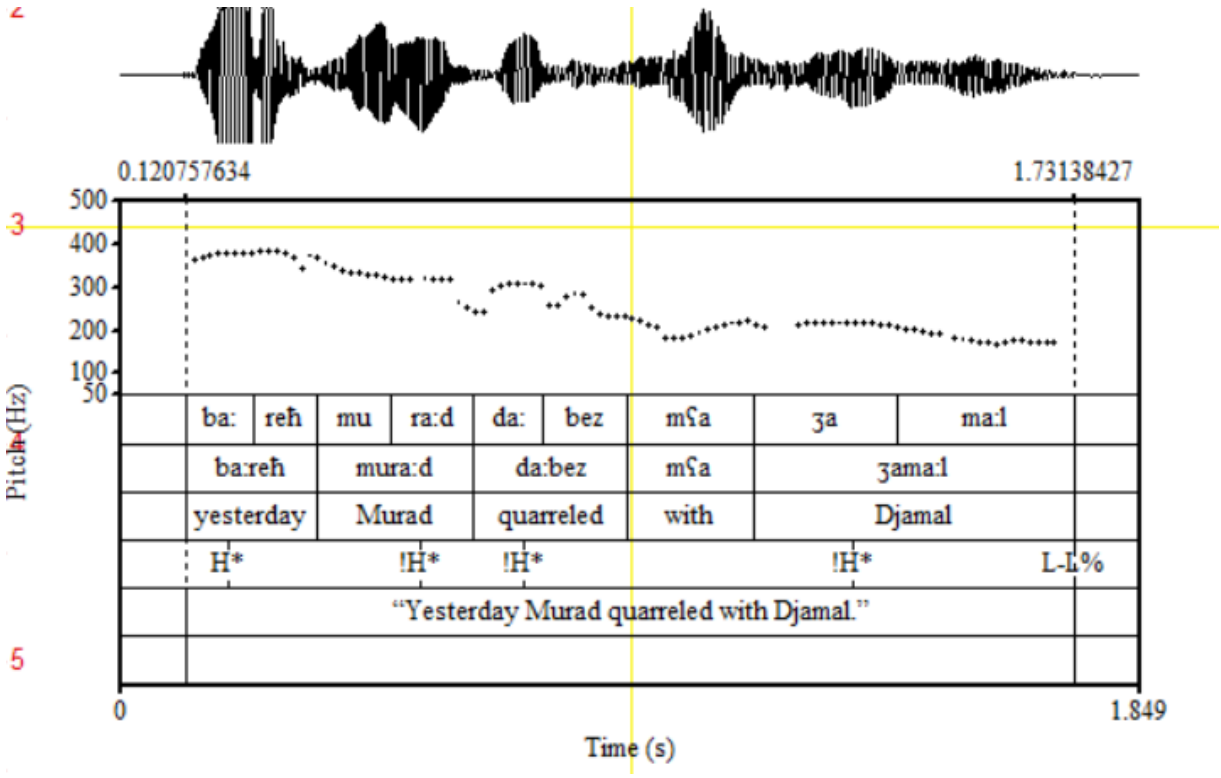


Figure 5. 4 An illustration of narrow informational focus in sentence-ultimate position (Speaker F/09)

5.3.1.3 Contrastive Focus

The third type of focus was intonationally encoded as follows: no phrasing pattern was employed by the speakers when uttering the contrastive focus sentence. As a result, it can be postulated that this pattern is not a prosodic correlate to mark either broad focus or narrow focus. As regard pitch accent type and distribution, it was found out that the target word when occurring sentence-initially received a rising pitch accent L+H* on the second (lexically stressed) syllable. However, a pertinent observation that has to be signaled is that even the first (lexically unstressed) syllable carried a local F0 peak alongside the second one. This was detected only in some utterances when speakers lengthened the first vowel, as indicated in Figures 5.5 and 5.6. Additionally, all the following post-focal constituents were spoken with a monotonous stretch of low pitch until the boundary tone L%. This realization pinpoints to the presence of post focal compression, a prosodic feature that was captured in a number of prior studies, as reported in Chapter two. In sentence-penultimate position, the target word displayed a distinct intonational behavior. The entire focused word was realized with a high pitch level, yet the F0 peak usually fell outside the stressed syllable, i.e., on the first syllable not the second. The pre-focal target word was also allocated an F0 peak. When the target word occurred in a sentence-ultimate position, F0 peak was also observed to fall outside the stressed syllable, marked by a high accent or a downstepped high accent and preceded by a low accent (L+H* or L+!H*). The second syllable, which is the target syllable, was either uttered with a low pitch stretched over the bottom of pitch range or with a pitch level that did not exceed the mid-pitch range. However, only few utterances exhibited this pattern. The focused word was observed to often lack an F0 peak and instead realized with a low pitch level, suggesting thus being unaccented in this sentential position. Consider the figures below for more clarification.

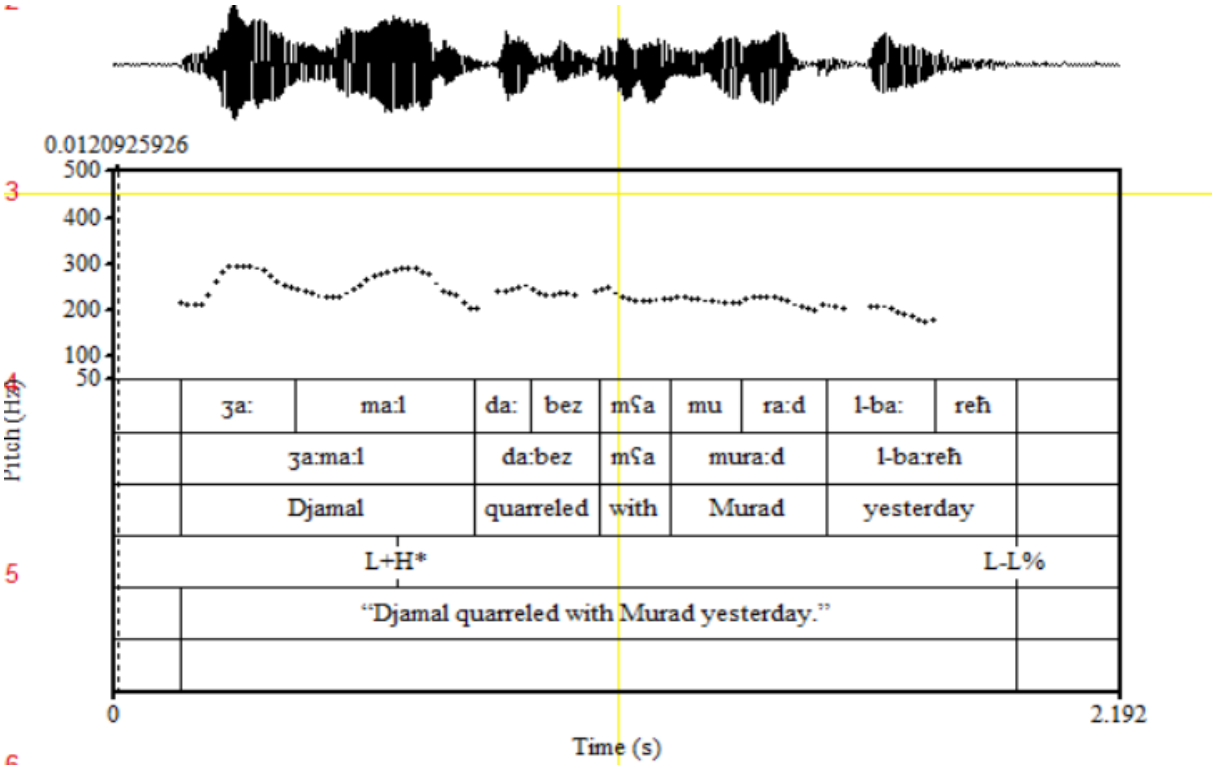


Figure 5. 5 An illustration of narrow contrastive focus in sentence-initial position (Speaker F/03)

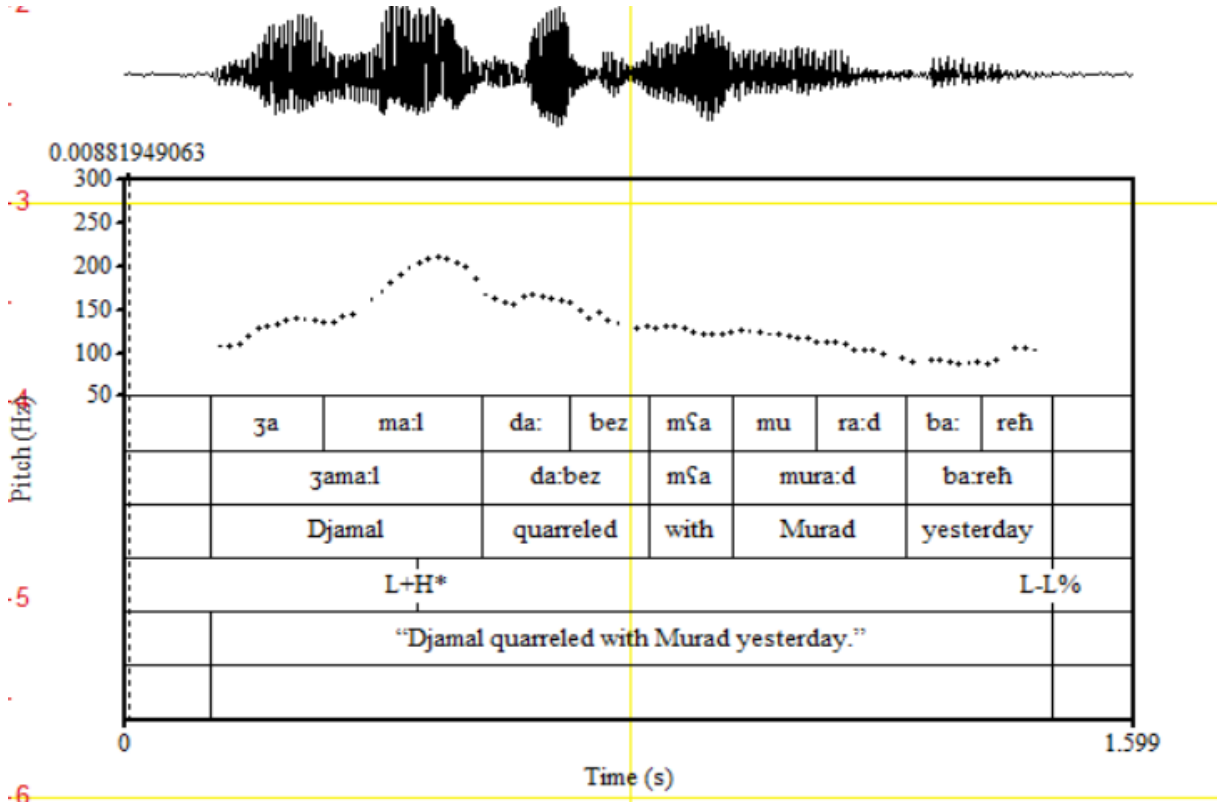


Figure 5. 6 An illustration of narrow contrastive focus in sentence-initial position (Speaker M/09)

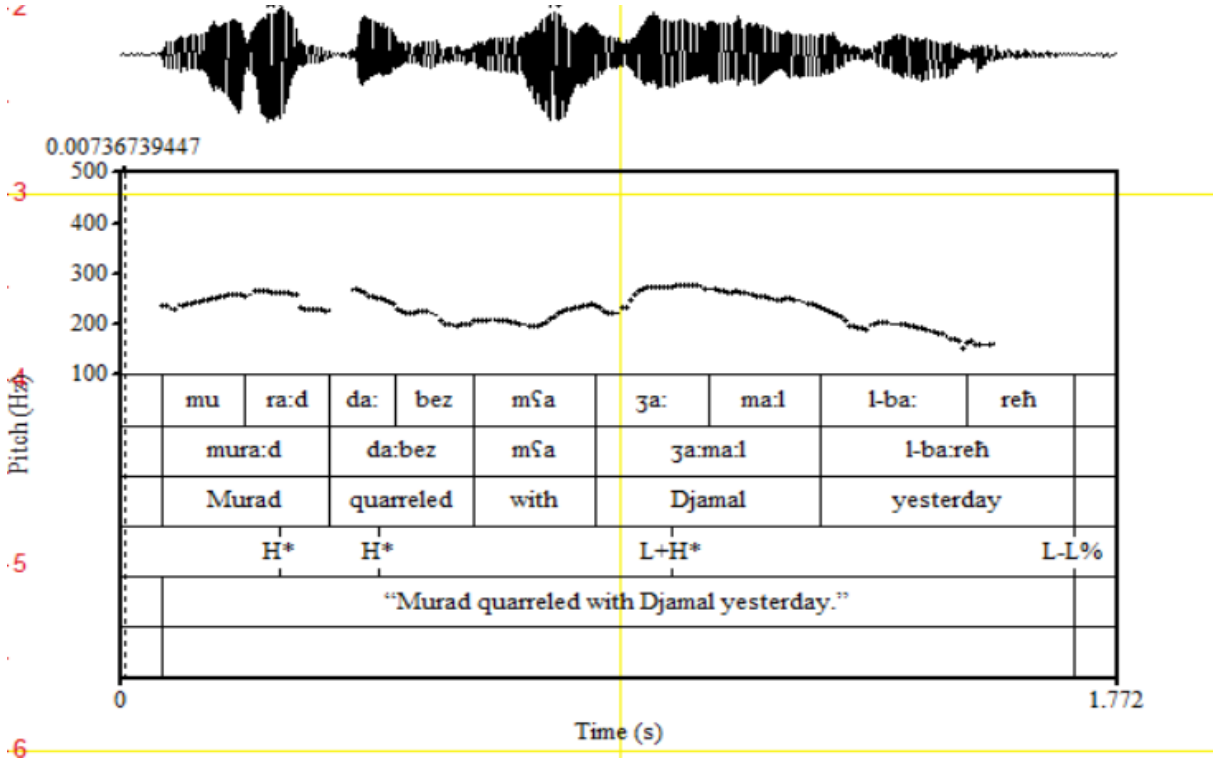


Figure 5. 7 An illustration of narrow contrastive focus in sentence-penultimate position (Speaker F/10)

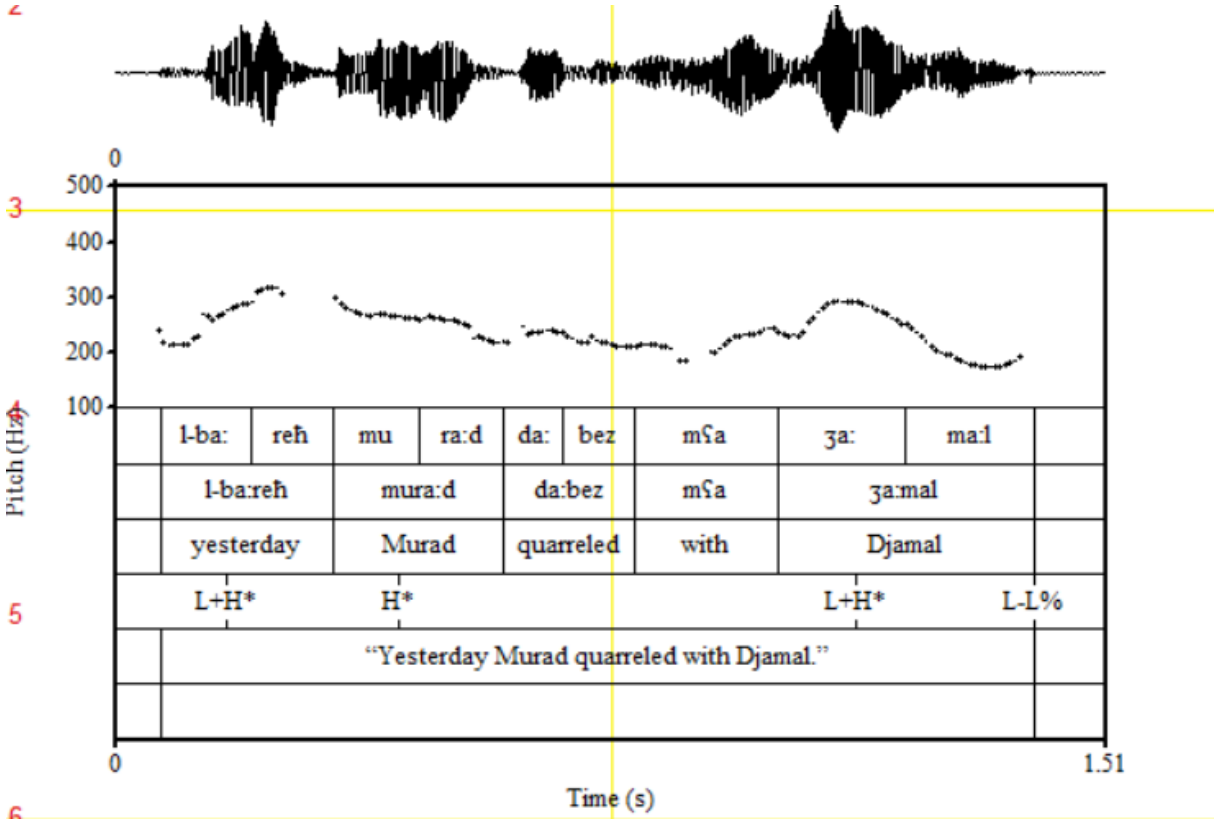


Figure 5. 8 An illustration of narrow contrastive focus in sentence-ultimate position (Speaker F/05)

5.3.1.4 Broad Focus vs. Informational Focus vs. Contrastive Focus

Relatively speaking, the phonological comparison of the intonational encoding of the three focus types in OSA can be sketched out as follows:

- Phrasing pattern was not employed neither to mark the three types of focus nor to distinguish between them.
- Pitch accent type was used to distinguish between broad focus and narrow focus mainly in initial- sentential positions. The target word was marked with a high pitch accent H* when it was not under focus (i.e., occurring in neutral sentence), and with a rising pitch accent L+H* when it was narrowly focused. Besides, both types of narrow focus (IF and CF) were characterized by the same type of pitch accent.
- F0 peaks fell on the stressed syllable under broad focus condition, stretched over the entire target word under informational focus condition, and fell outside the stressed syllable under contrastive focus condition when occurring in sentence-penultimate position.
- F0 level of the target narrow-focused words was lower when occurring in sentence-final position than of broad-focused word.
- The pre-focus word under narrow focus condition was allocated a local F0 peak; however, the post-focus counterpart's F0 was lower than that of the identical word occurring in broad focus.

Notwithstanding, these observations are primarily built on visual scrutinization of the F0 contours of focus utterances. In contrast, the next section reports the quantitative findings emanated from an acoustic examination and statistical analysis of the F0 intonational behavior.

5.3.2 Quantitative Analysis

5.3.2.1 In Initial Position

A sequence of one-way ANOVA analyses was performed to evaluate the effect of the independent variable 'FocusType' (BF/IF/CF) on the acoustic measurements, the dependent

variables, taken from both the entire word as well as the stressed syllable of the target focused constituent /ʒaˈma:l/ when occurring in the initial position of the sentence. Moreover, further series of one-way ANOVAs were conducted to assess any potential effect of focus production on the post-focal element /muˈra:d/ in the three focus conditions.

Starting with the realization of the entire target word under the three focus conditions, Table 5.2 is an all-encompassing presentation of the relative findings.

Table 5. 2 *The effect of FocusType on the production of the entire focused word in initial position*

	Focus Type					
Phonetic measures	BF		IF		CF	
	mean	*SD*	*mean*	*SD*	*mean*	*SD*
fWordF0maxHz	216.63	74.436	273.76	112.168	271.37	99.059
	F = 6.236				***p* = .002**	
fWordF0minHz	188.43	67.694	176.80	56.753	168.46	51.791
	F =1.579				*p* = .209	
fWordF0maxSt	12.337	6.333	15.980	7.383	16.259	6.349
	F =5.896				***p* = .003**	
fWordF0minSt	9.863	6.486	9.018	5.646	8.235	5.508
	F =1.046				*p* = .354	
fWordF0ExSizeSt	2.473	1.243	6.961	3.442	8.023	3.117
	F =62.872				***p* < .001**	

Note: fWord: focused word, ExSize: excursion size
significant p values less than 0.05 *are in boldface*

Accordingly, results revealed that FocusType has a statistically significant effect on the F0 max Hz, F0 max St, and excursion size St of the target focused word. However, no significant effect was attested on F0 min Hz/St indicating that this measure did not differ in all types of focus

whether in Hertz or Semitones. Complementary to these findings, the Tukey post hoc test was conducted to compare the effect between focus types on each of these phonetic measurements. Results are displayed in the following table:

Table 5. 3 *Post hoc p values* (significant if it's less than 0.05) *of the effect of FocusType on the production of the entire target focused word in initial position*

phonetic measures	BF vs. IF	BF vs. CF	IF vs. CF
fWordF0maxHz	**.006**	**.009**	.991
fWordF0minHz	.559	.184	.745
fWordF0maxSt	**.014**	**.007**	.975
fWordF0minSt	.734	.320	.770
fWordF0ExSizeSt	**< .001**	**< .001**	.116

As indicated in the table, a significant difference was found between F0 max Hz in BF utterance and that in IF utterance (p=.006) as well as between BF utterance and CF utterance (p=.009). In fact, the preceding table demonstrated that the mean values of this acoustic measure are higher under IF and CF conditions in comparison to BF condition. Besides, no significant difference (p=.991) was exhibited between both types of narrow focus, i.e., between IF and CF. As for F0 min in Hz and in St, none of the three comparisons showed a significant effect. There was a significant difference between F0 max St of BF and that of IF as well as between BF and CF utterances. Yet, the effect of CF was greater than IF (p=.014 and .007, respectively). Indeed, the mean value of F0 max St was higher in CF (16.259 St) than in BF (12.337 St). It was also higher in IF (15.980 St) than in BF, again without a remarkable difference between IF and CF (p= 975). Likewise, F0 max St showed a similar fashion as its counterpart in Hz, but with greater effect (p= <.001 for both BF vs. IF and BF vs CF). The following figures elucidate the differences between the mean values of these acoustic measurements under the three types of focus when the target word is sentence-initially.

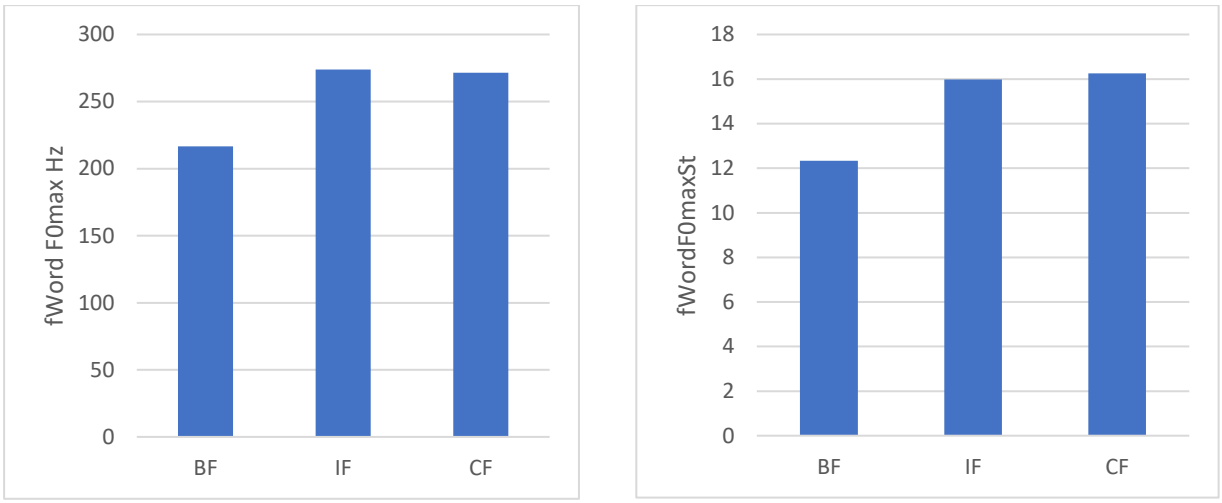


Figure 5. 9 Mean F0 max Hz (the left panel) and St (the right panel) of the target focused word according to focus type effect in initial position

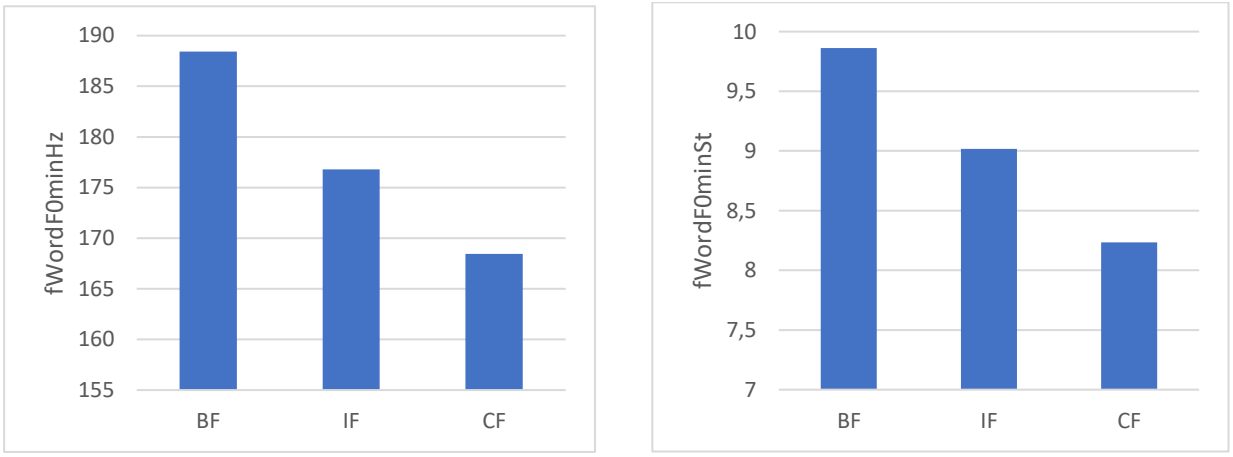


Figure 5. 10 Mean F0 min Hz (the left panel) and St (the right panel) of the target focused word according to focus type effect in initial position

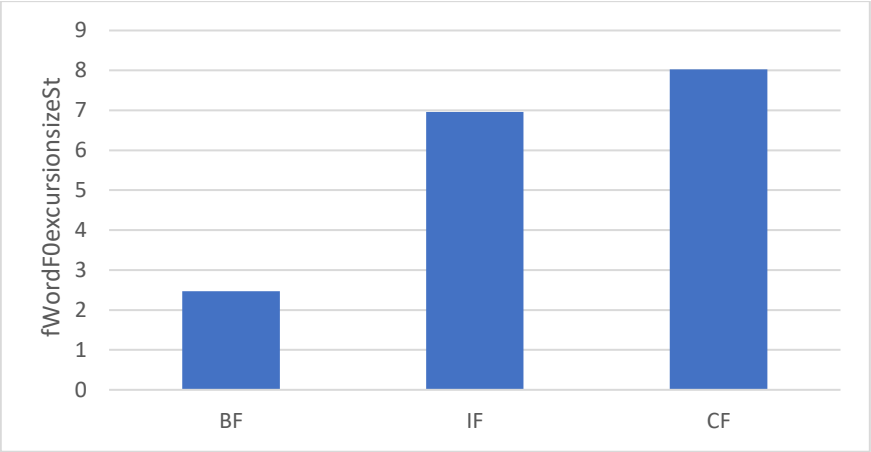


Figure 5. 11 Mean F0 excursion size St of the target focused word according to focus type effect in initial position

In a similar vein, the following is a narrowed-down domain of the effect of FocusType from the entire word to the stressed syllable of the target word. Results of all the examined acoustic measurements are summarized in Table 5.4.

Table 5. 4 *The effect of FocusType on the target syllable of the focused word in initial position*

	Focus Type					
Phonetic measures	BF		IF		CF	
	mean	*SD*	*mean*	*SD*	*mean*	*SD*
SylDurMs	165.16	21.668	224.35	36.505	275.59	51.055
		$F = 115.346$			**$p < .001$**	
SylF0maxHz	213.71	72.546	251.80	96.503	249.56	80.802
		$F = 3.602$			**$p = .029$**	
SylF0minHz	198.43	67.637	191.72	61.244	177.70	55.675
		$F = 1.659$			$p = .194$	
SylF0maxSt	12.126	6.266	14.808	6.734	14.978	5.643
		$F = 3.646$			**$p = .028$**	

SylF0minSt	10.926	6.179	10.385	5.831	9.159	5.451
		F =1.318			p = .270	
SylF0ExSizeSt	1.200	0.761	4.423	1.721	5.819	2.045
		F =121.391			**p < .001**	
SylmeanIntensitydB	73.226	2.844	75.851	3.263	77.172	3.568
		F = 21.279			**p < .001**	

Note : Syl: syllable, SylDurMs: syllable duration (ms), ExSize: excursion size
Significant p values less than 0.05 *are in boldface*

Akin to the effect on the entire word, FocusType was found to influence syllable F0 max Hz/St and syllable excursion size St. In addition, two further acoustic measurements, examined at the level of the syllable only, exhibited a main significant effect ($p < .001$): syllable duration (ms) and syllable mean intensity. In order to figure out how FocusType affected these measurements, post hoc test was carried out. Notice Table 5.5 below:

Table 5. 5 *Post hoc p values (significant if it's less than 0.05) of the effect of FocusType on the target syllable of the focused word in initial position*

phonetic measures	BF vs. IF	BF vs. CF	IF vs. CF
SylDurMs	**< .001**	**< .001**	**< .001**
SylF0maxHz	**.048**	.067	.989
SylF0minHz	.818	.175	.467
SylF0maxSt	.065	**.046**	.989
SylF0minSt	.878	.254	.520
SylF0ExSizeSt	**< .001**	**< .001**	**< .001**
SylmeanIntensitydB	**< .001**	**< .001**	.088

In the light of post hoc test results, a great significant difference was found between all pairs of focus type comparisons in terms of syllable duration. According to the preceding table, the target syllable was observed to be longer in CF than in IF, which in turn was longer than BF:

BF (165.16 ms) < IF (224.35 ms) < CF (275.59 ms). A slightly significant difference was attested between BF and IF (p= .048) in terms of syllable F0 max Hz, but not in terms of its counterpart in St (p= .065). However, the effect of FocusType on the same acoustic measure was in counter fashion. A slightly significant difference was found between BF and CF in terms of syllable F0 max St (p= .046), but no significant difference was observed for syllable F0 max Hz (p=.067). Similar to the entire word finding, there was no remarkable difference between the three types of focus in terms of F0 min Hz/St. Regarding syllable F0 excursion size St, results demonstrated greatly significant differences between all types of focus. Indeed, it was found to be larger in CF than IF than BF: BF (SD= 2.045 for CF > SD= 1.721 for IF > SD= 0.761for BF). As for syllable mean intensity (dB), there was a main significant difference between BF and the other two types of focus, in that the mean value in IF was higher than that in BF and higher in CF than that in BF. However, no disparity was detected between IF and CF in terms of intensity as well as F0 max Hz/St, as can be seen in Table 5.5 above. The figures below display these results.

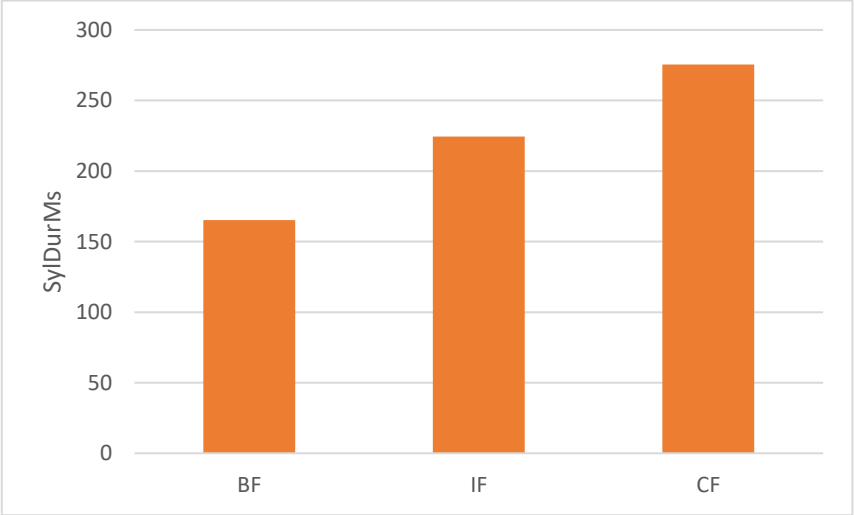


Figure 5. 12 Mean syllable duration (ms) of the target syllable according to focus type effect on the focused word in initial position

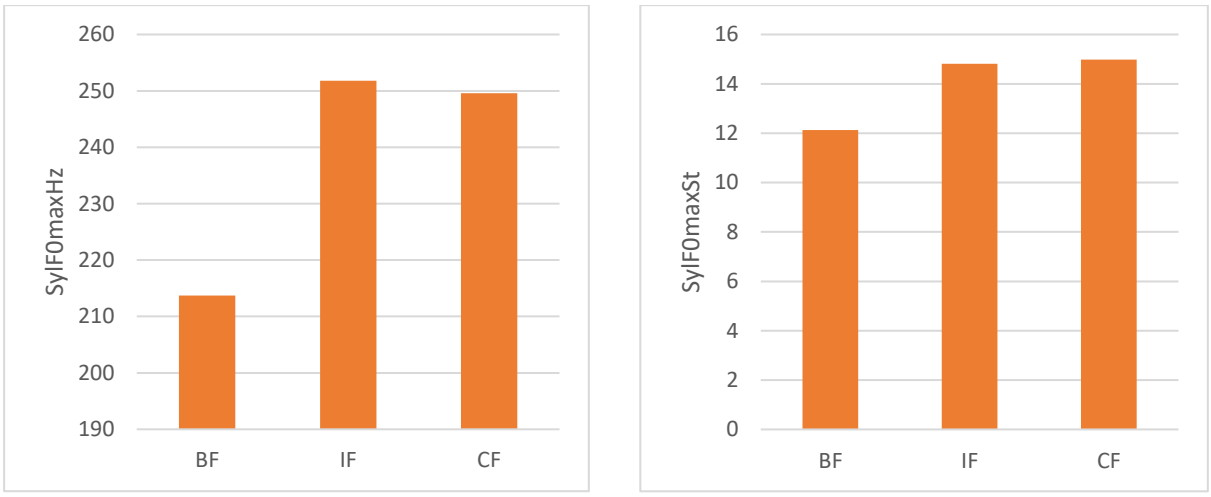


Figure 5. 13 Mean F0 max Hz (the left panel) and St (the right panel) of the target syllable according to focus type effect on the focused word in initial position

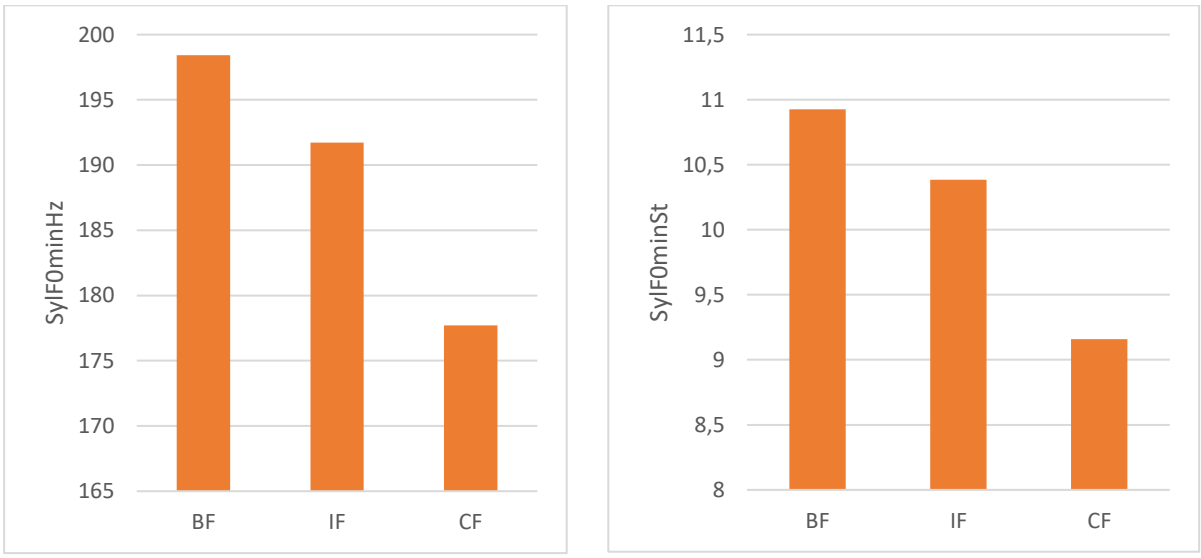


Figure 5. 14 Mean F0 min Hz (the left panel) and St (the right panel) of the target syllable according to focus type effect on the focused word in initial position

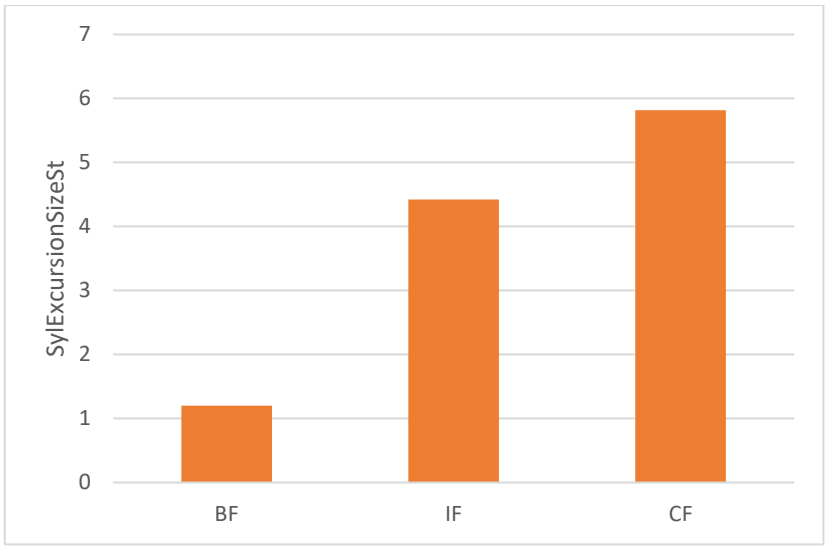


Figure 5. 15 Mean excursion size St of the target syllable according to focus type effect on the focused word in initial position

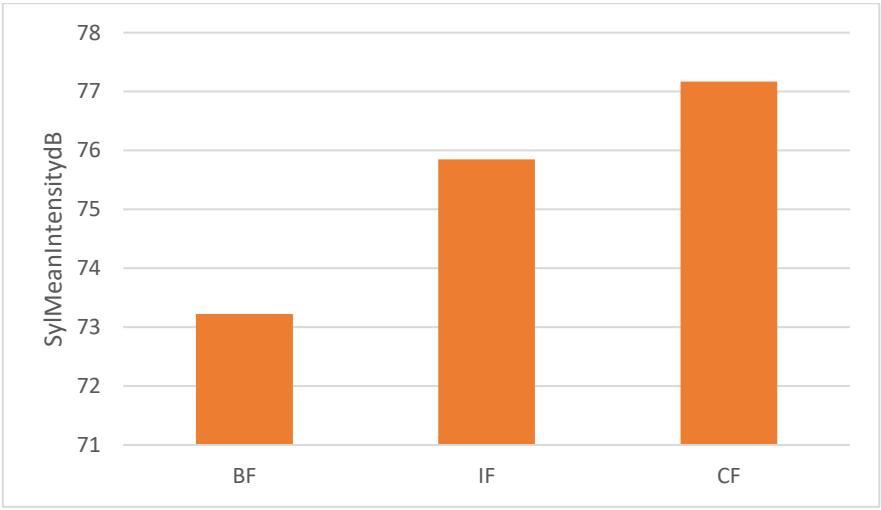


Figure 5. 16 Mean value of mean intensity (dB) of the target syllable according to focus type effect on the focused word in initial position

On the basis of the aforementioned findings reported in the tables above, a comparison between FocusType effect on the entire word and on the stressed syllable is outlined in the following. First, the effect of FocusType on word F0 max Hz/St (p= .002/.003) was greater than on syllable F0 max Hz/St (p= .029/.028). More intriguingly, results demonstrated that F0 max Hz for both the entire word and the target syllable revealed a significant difference between BF and

IF, yet the difference was higher for the word (p= .006) than the syllable (p= .048). However, the difference between BF and CF was significant for word F0 max Hz but not for the syllable counterpart (p = .009 and .067, respectively). Furthermore, while the syllable F0 max St showed no significant effect between BF and IF (p= .065) in comparison to that of the word (p=.014), the difference between BF and CF was greater for word F0 max St (p=.007) than for syllable F0 max St (p=.046). Notice Figure 5.17 below for word and syllable F0 max Hz. As for F0 excursion size St, both the entire word and syllable revealed a significant effect by FocusType. Nonetheless, the mean values were greater for word than syllable, as displayed in Tables 5.2 and 5.4 above. Both word and syllable exhibited no significant difference between IF and CF except for syllable excursion size St which was greater for CF than IF.

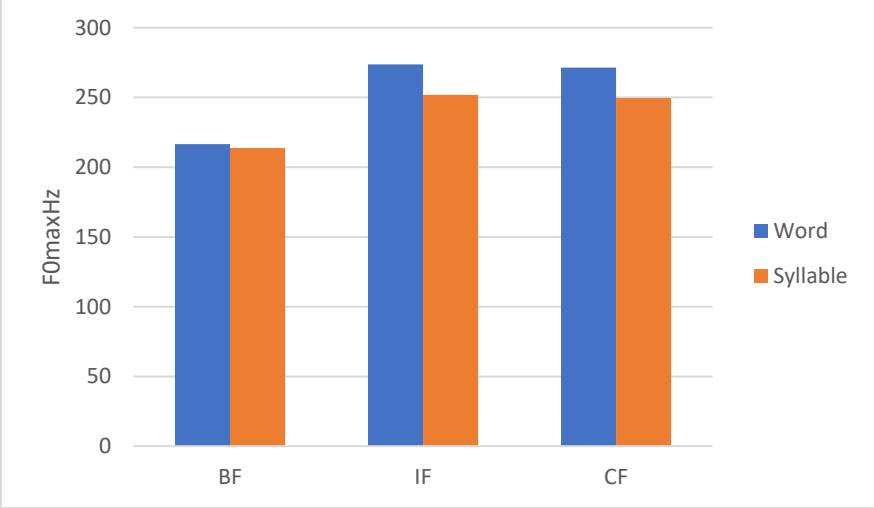


Figure 5. 17 Mean F0 max Hz for the entire word and target syllable under the three types of focus in initial position

Now, we shift the analysis from the focused constituent to the post-focused one. Results revealed that this item was influenced by FocusType in terms of F0 max Hz/St, excursion size St, and mean intensity dB. There was no significant effect for post-word duration and F0 min Hz/St. Table 5.6 depicts the results obtained for all the phonetic measurements when interacting with FocusType followed by post hoc test results in Table 5.7.

Table 5. 6 *The effect of FocusType on the post-focus constituent*

	Focus Type					
Phonetic measures	BF		IF		CF	
	mean	*SD*	*mean*	*SD*	*mean*	*SD*
PostWDurMs	279.16	55.695	294.51	31.418	284.39	27.910
	F = 1.506				*p*=.225	
PostWF0maxHz	257.18	96.421	208.47	73.915	194.39	66.823
	F = 9.210				***p* < .001**	
PostWF0minHz	171.65	61.016	176.30	58.782	165.22	58.656
	F =.468				*p* = .627	
PostWF0maxSt	15.009	6.790	11.652	6.416	10.509	6.163
	F =7.143				***p* = .001**	
PostWF0minSt	8.248	6.678	8.824	6.234	7.642	6.250
	F =.475				*p* = .634	
PostWF0ExSizeSt	6.760	3.414	2.828	1.253	2.867	1.208
	F =56.051				***p* < .001**	
PostWmeanIntensitydB	76.920	4.247	73.017	3.186	72.324	2.902
	F = 27.324				***p* < .001**	

Note: PostW: post-word (post-focused word), ExSize: excursion size
Significant p values less than 0.05 *are in boldface*

Table 5. 7 Post hoc *p* values (*significant if it's less than 0.05*) of the effect of FocusType on the post-focus item

phonetic measures	BF vs. IF	BF vs. CF	IF vs. CF
PostWDurMs	.938	.228	.401
PostWF0maxHz	**.005**	**< .001**	.636
PostWF0minHz	.913	.839	.601

PostWF0maxSt	**.021**	**.001**	.632
PostWF0minSt	.887	.874	.606
PostWF0ExSizeSt	**< .001**	**< .001**	.996
PostWmeanIntensitydB	**< .001**	**< .001**	.563

According to these results, there was a significant difference between post-focused word F0 max Hz/St in BF region and those in IF region as well as between BF and CF regions. Yet, the difference was found to be more salient for CF than IF, without any noticeable difference between these two types. Indeed, F0 max mean values were decreased relatively to focus type as follows: BF > IF > CF. In addition, results demonstrated that post-focused word F0 excursion size is significantly larger for BF than IF and even more decreased for CF. Likewise, mean intensity dB demonstrated an analogous fashion: BF > IF > CF. The differences are clearly captured in the figures below:

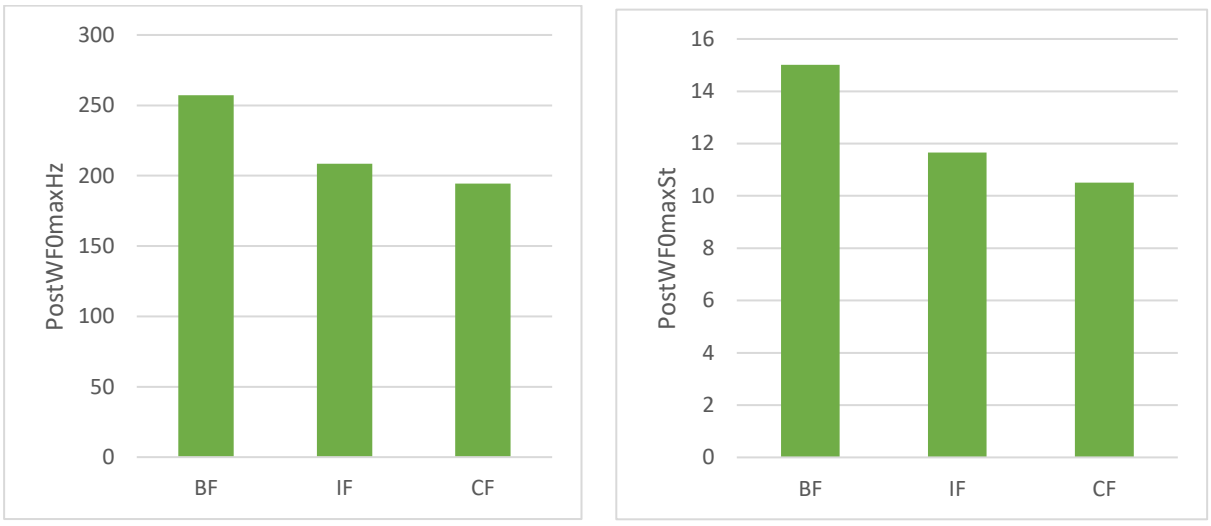


Figure 5. 18 Mean F0 max Hz (the left panel) and St (the right panel) of the post-focused word according to focus type

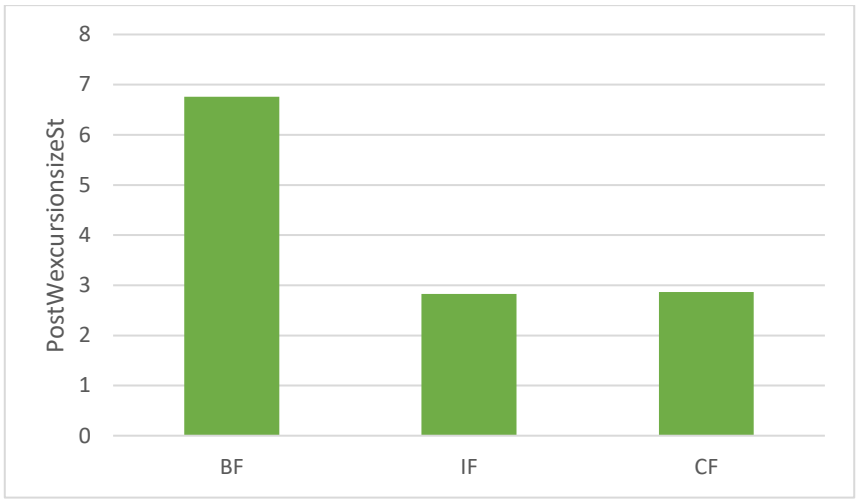


Figure 5. 19 Mean F0 excursion size St of the post-focused word according to focus type

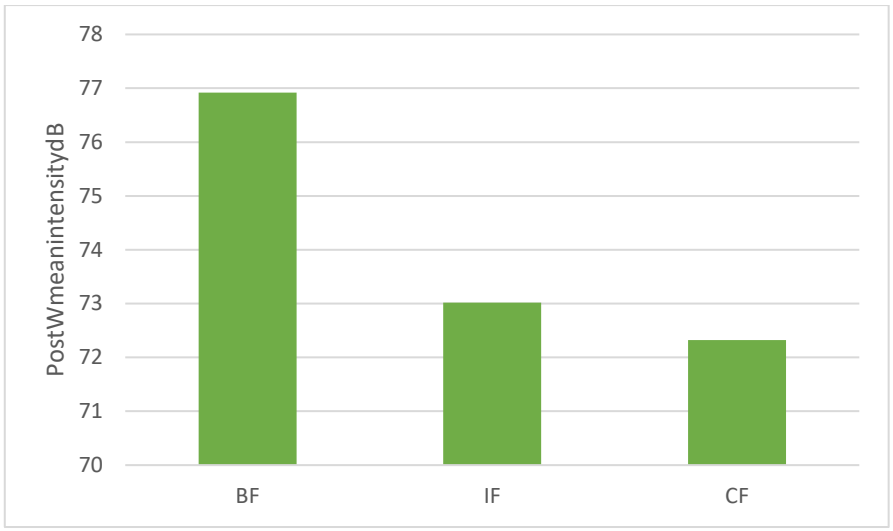


Figure 5. 20 Mean value of intensity mean dB of the post-focused word according to focus type

5.3.2.2 In Penultimate Position

In line with the results reported for the initial sentential position, this section covers the results of a series of one-way ANOVA analyses conducted on the acoustic measurements taken from the focused word (both the entire word and target syllable), when occurring in sentence-penultimate position. Beside the focused word and target syllable, we report the results for the non-target word which occurs in the pre-focus region.

To begin with, results showed that only the entire word F0 excursion size St was affected by FocusType in the penultimate position of the sentence (p= < .001). On the other hand, none of the other phonetic measurements (F0 max Hz/St and F0 min Hz/St) displayed an alteration based on the focus condition. Table 5.8 exhibits the detailed findings:

Table 5. 8 *The effect of FocusType on the production of the entire focused word in penultimate position*

	Focus Type					
Phonetic measures	BF		IF		CF	
	mean	*SD*	*mean*	*SD*	*mean*	*SD*
fWordF0maxHz	213.41	73.647	223.46	70.112	220.52	66.527
		F = .279			p = .757	
fWordF0minHz	186.26	67.899	170.79	52.688	169.40	53.527
		F =1.324			p = .269	
fWordF0maxSt	12.084	6.301	13.035	5.884	12.940	5.285
		F =.417			p = .660	
fWordF0minSt	9.649	6.504	8.426	5.770	8.300	5.624
		F =.808			p = .448	
fWordF0ExSizeSt	2.435	1.246	4.608	1.730	4.640	1.786
		F =32.772			**p < .001**	

Note: fWord: focused word, ExSize: excursion size
Significant p values less than 0.05 *are in boldface*

As can be seen, there were no statistically significant differences in the mean values of F0 max Hz/St and F0 min Hz/St among focus types, except for F0 excursion size St. In order to pinpoint how FocusType affected this measure, a post hoc Tukey test was carried out. Accordingly, a salient significant difference was detected between BF and IF as well as between BF and CF (p < .001 for both comparisons). However, no significant difference was indicated between IF and CF (p=. 995). This result stems from the fact that the mean value of F0 excursion size St was lower

for BF than IF and CF without any statistical difference between the last two types (BF: 2.435 St vs. IF: 4.608 St vs. CF: 4.640 St). Notice the following figures for more details:

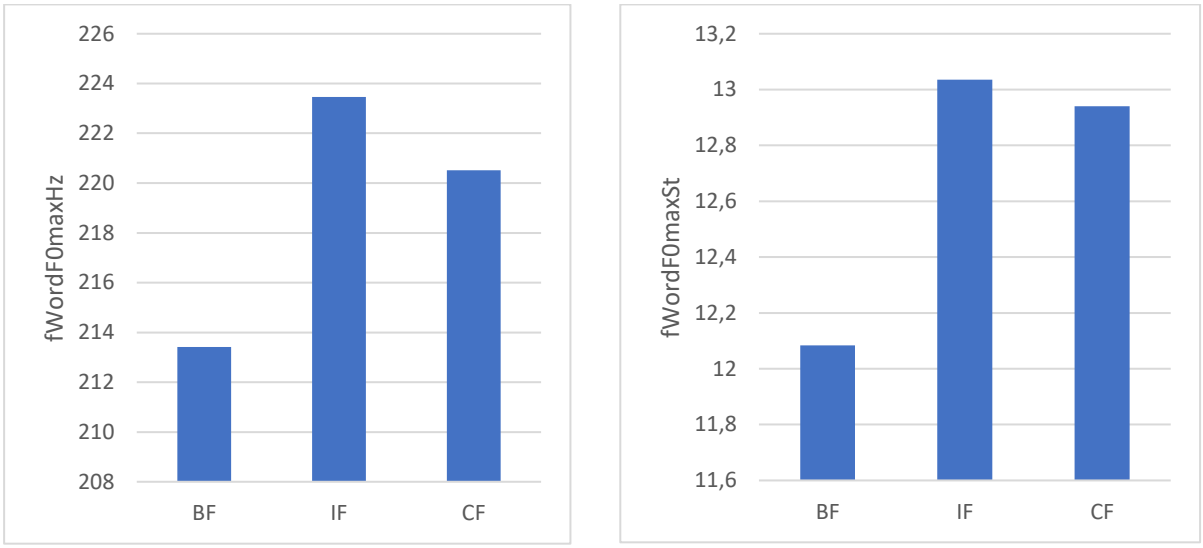


Figure 5. 21 Mean F0 max Hz (the left panel) and St (the right panel) of the target focused word according to focus type effect in penultimate position

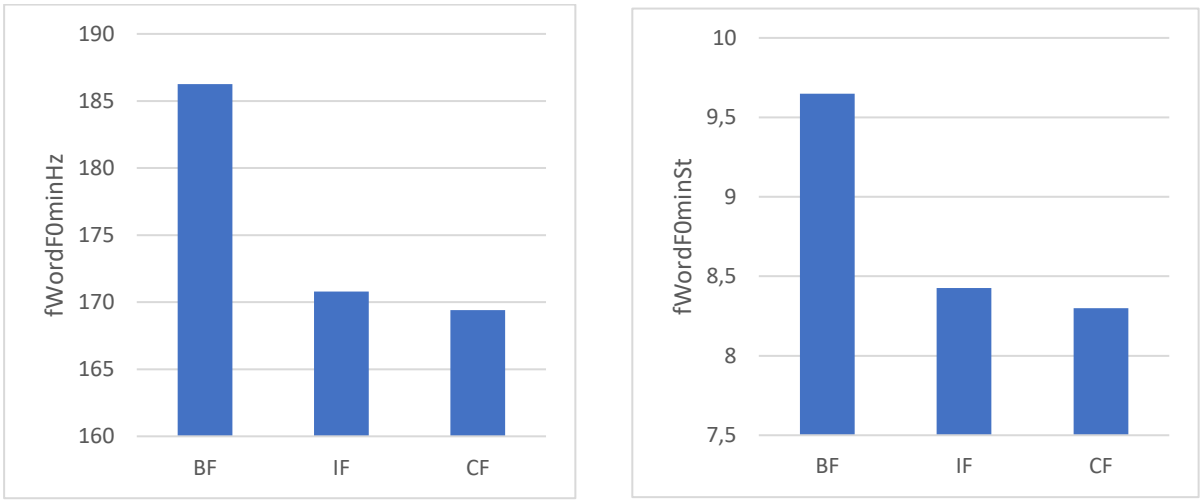


Figure 5. 22 Mean F0 min Hz (the left panel) and St (the right panel) of the target focused word according to focus type effect in penultimate position

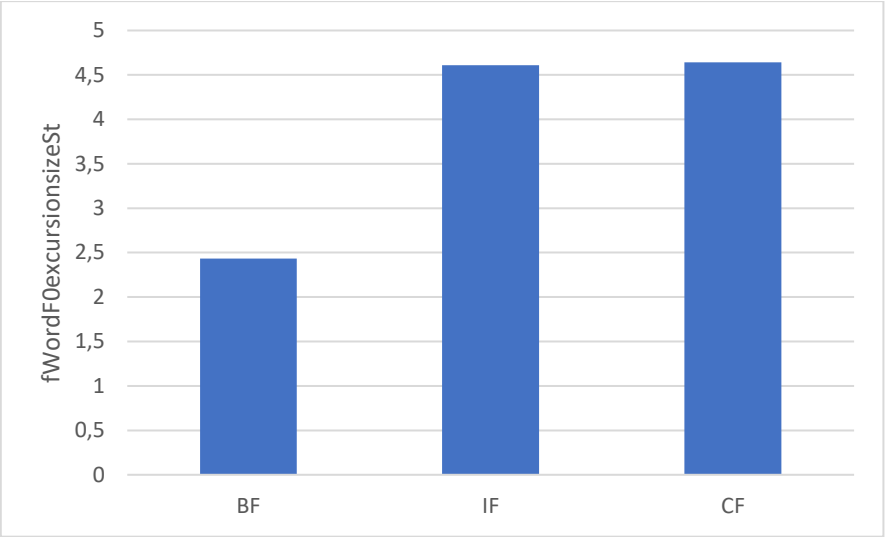


Figure 5. 23 Mean F0 excursion size St of the target focused word according to focus type effect in penultimate position

Analogously, FocusType was found to greatly influence F0 excursion size St and have no effect on F0 max and min in Hz and St at the level of the target syllable. Furthermore, syllable duration and mean intensity also revealed statistically significant effect by FocusType, as demonstrated in Table 5.9.

Table 5. 9 *The effect of FocusType on the target syllable of the focused word in penultimate position*

	Focus Type					
Phonetic measures	BF		IF		CF	
	mean	*SD*	*mean*	*SD*	*mean*	*SD*
SylDurMs	165.54	21.898	180.21	22.635	195.26	28.504
	F = 19.139				***p* < .001**	
SylF0maxHz	210.52	71.740	215.08	68.514	213.88	65.777
	F = .061				*p* = .941	
SylF0minHz	197.02	68.141	184.27	57.636	184.50	61.265
	F =.706				*p* = .495	

SylF0maxSt	11.873	6.232	12.343	6.019	12.375	5.462
		F = .118			*p* = .889	
SylF0minSt	10.749	6.219	9.673	6.018	9.699	5.789
		F =.543			*p* = .582	
SylF0ExSizeSt	1.124	.658	2.670	1.372	2.676	1.560
		F =26.956			***p* < .001**	
SylmeanIntensitydB	73.086	2.785	73.722	2.998	74.634	3.033
		F = 3.628			***p* < .001**	

Note : Syl: syllable, SylDurMs: syllable duration (ms), ExSize: excursion size
Significant p values less than 0.05 *are in boldface*

Table 5. 10 Post hoc *p* values (*significant if it's less than 0.05*) of the effect of FocusType on the target syllable of the focused word in penultimate position

phonetic measures	BF vs. IF	BF vs. CF	IF vs. CF
SylDurMs	**.008**	**< .001**	**.008**
SylF0ExSizeSt	**< .001**	**< .001**	1.000
SylmeanIntensitydB	.520	**.022**	.520

Post hoc Tukey test (Table 5.10) disclosed that syllable duration differed in all focus comparisons with high values attested in CF and then decreased as follows: CF > IF > BF (Figure 5.24). As for syllable excursion size St, no significant difference was manifested between IF and CF, but salient differences appeared when compared to their BF counterparts (Figure 5.25). Finally, syllable mean intensity dB exhibited a statistically significant difference only between BF and CF and no remarkable disparity for the other comparisons. This is due to the high mean value under CF condition in comparison to IF and CF (Figure 5.26).

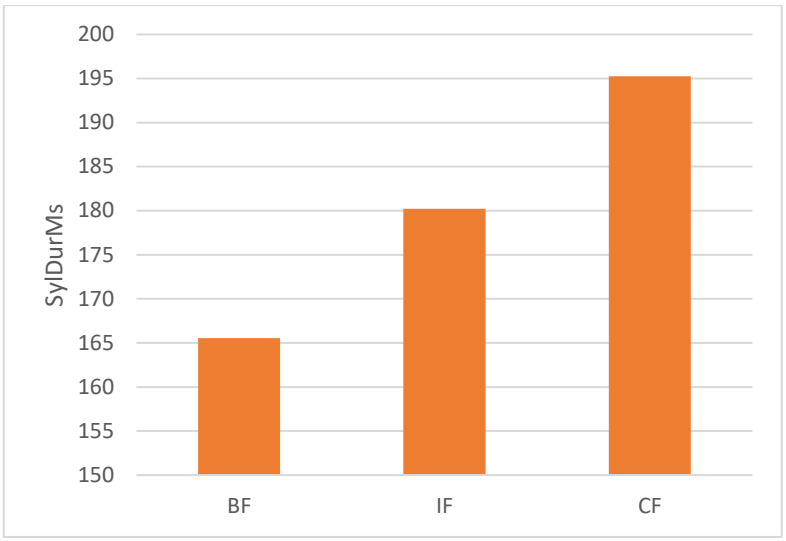


Figure 5. 24 Mean syllable duration (ms) of the target syllable according to focus type effect on the focused word in penultimate position

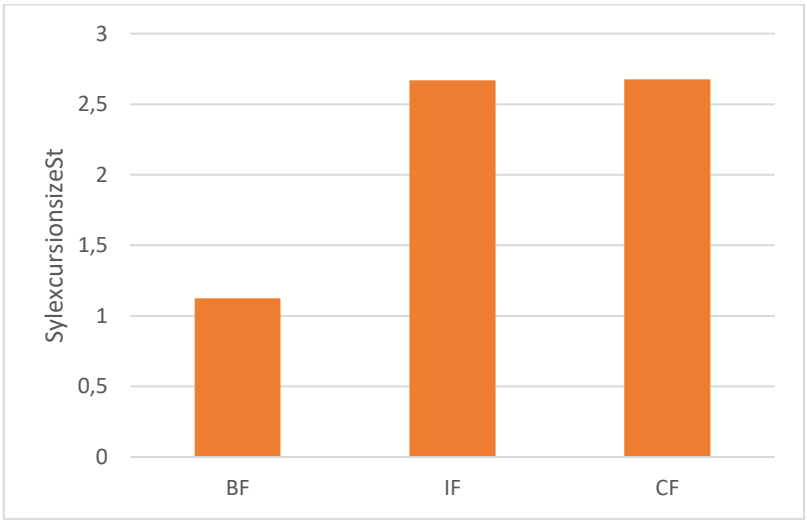


Figure 5. 25 Mean excursion size St of the target syllable according to focus type effect on the focused word in penultimate position

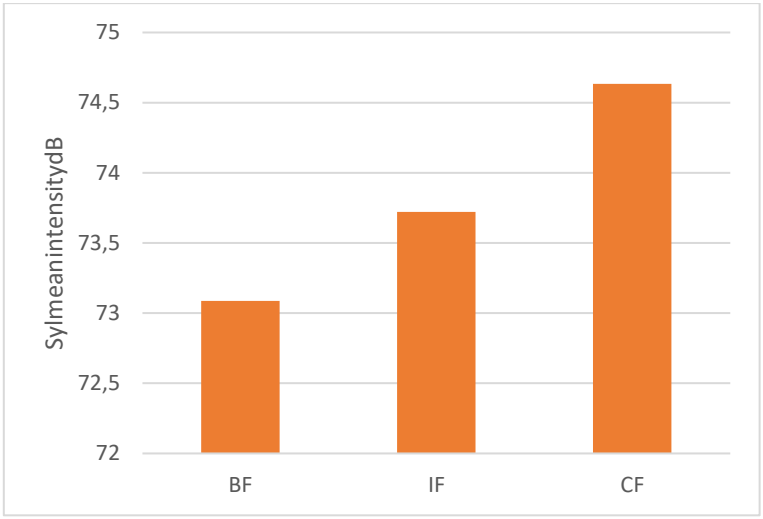


Figure 5. 26 Mean value of mean intensity (dB) of the target syllable according to focus type effect on the focused word in penultimate position

It is worth considering at this point the effect of FocusType on the entire focused word in comparison to the target syllable. As already pointed out, neither the former nor the latter evinced any statistically salient effect by FocusType. An exception occurred for excursion size St with higher values at the level of the entire word than of the syllable.

Unlike the initial position delineated in the previous section, the non-target constituent appeared in pre-focus region when the target focused word is in sentence-penultimate position. The following is related to the main findings of the effect of FocusType on the production of this element.

Table 5. 11 *The effect of FocusType on the pre-focus constituent*

	Focus Type					
Phonetic measures	BF		IF		CF	
	mean	*SD*	*mean*	*SD*	*mean*	*SD*
PreWDurMs	296.83	56.662	275.69	43.880	271.16	51.598
	F = 3.718				***p*=.027**	

PreWF0maxHz	252.45	94.839	259.80	77.080	254.50	100.582
		F = .076			p = .927	
PreWF0minHz	169.02	60.483	186.53	65.692	181.14	60.606
		F = 1.067			p = .347	
PreWF0maxSt	14.699	6.717	15.328	6.766	14.884	6.895
		F =.114			p = .892	
PreWF0minSt	7.984	6.655	9.680	6.703	9.429	5.879
		F =1.047			p = .353	
PreWF0ExSizeSt	6.714	3.471	5.647	3.606	5.455	3.374
		F =1.964			p = .144	
PreWmeanIntensitydB	76.846	4.309	75.686	4.345	76.861	3.562
		F = 1.351			p = .262	

Note: PreW: pre-word (pre-focused word), ExSize: excursion size
Significant p values less than 0.05 *are in boldface*

As exhibited in Table 5.11 above, there was no statistically significant effect when the pre-focused constituent was interacted with FocusType for all the acoustic measurements except for word duration (p=.027). Indeed, it was shortened under BF condition (296.83 ms) compared to IF (275.96 ms) and CF (271.16 ms) (See Figure 5.27). No significant effect was identified on F0 values. This suggests that the realization of the non-target word remains unaffected by either type of focus when it precedes the target focused word.

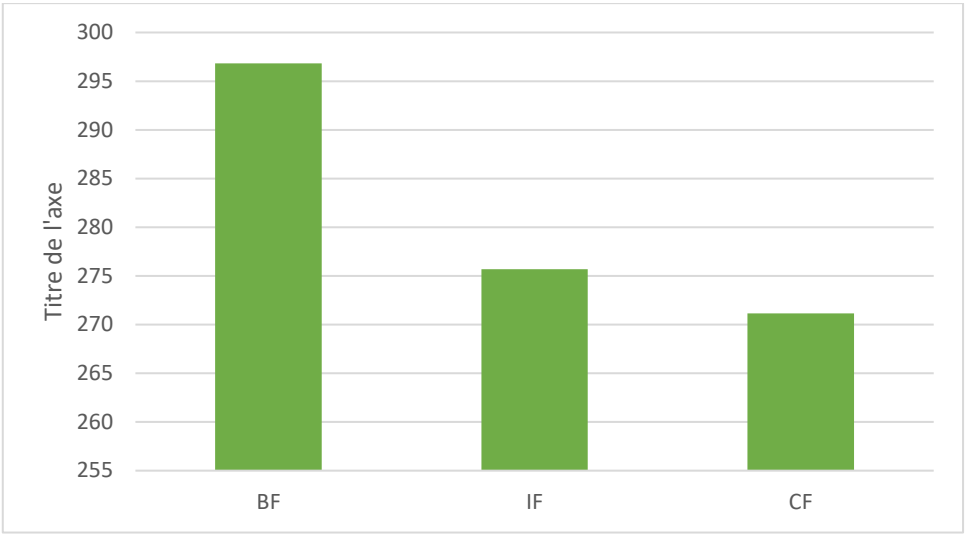


Figure 5. 27 Mean value of duration (ms) of the pre-focused word according to focus type in penultimate position

5.3.2.3 In Ultimate Position

This section covers the main findings of the effect of FocusType on the target focused constituent (word/syllable) when occurring sentence-finally, in addition to the non-target constituent which appears in the pre-focus region.

As revealed in Table 5.12, no statistically significant effect was observed on word F0 max Hz/St, suggesting that the target word was allocated an identical F0 peak under the three types of focus. The effect of FocusType on the entire word in this sentential position was restricted to F0 excursion size and intriguingly F0 min Hz/St.

Table 5. 12 *The effect of FocusType on the production of the entire focused word in ultimate position*

	Focus Type					
Phonetic measures	BF		IF		CF	
	mean	*SD*	*mean*	*SD*	*mean*	*SD*
fWordF0maxHz	212.39	73.948	201.42	57.220	222.58	66.692
	F = .426				*p* = .654	

fWordF0minHz	185.65	68.095	141.60	46.286	135.26	41.433
		F =13.637			***p* < .001**	
fWordF0maxSt	11.993	6.315	11.549	4.654	11.287	5.756
		F =.209			*p* = .812	
fWordF0minSt	9.585	6.514	5.185	5.663	4.421	5.629
		F =11.404			***p* < .001**	
fWordF0ExSizeSt	2.408	1.245	6.363	2.342	6.865	2.893
		F =61.935			***p* < .001**	

Note: fWord: focused word, ExSize: excursion size
Significant p values less than 0.05 *are in boldface*

Table 5. 13 Post hoc *p* values (*significant if it's less than 0.05*) of the effect of FocusType on the production of the entire target focused word in ultimate position

phonetic measures	BF vs. IF	BF vs. CF	IF vs. CF
fWordF0minHz	**< .001**	**< .001**	.829
fWordF0minSt	**.001**	**< .001**	.802
fWordF0ExSizeSt	**< .001**	**< .001**	.511

Post hoc test exhibited that the effect of FocusType on F0 min Hz/St was found between BF and the other two types of focus. In this regard, the mean value of this measure was lower for CF and IF than BF (Figure 5.28). As for excursion size St, a statistically salient difference was also detected between BF vs. IF and CF. In fact, the mean value which was identical for the latter two types of focus was significantly higher than that of BF (Figure 5.29).

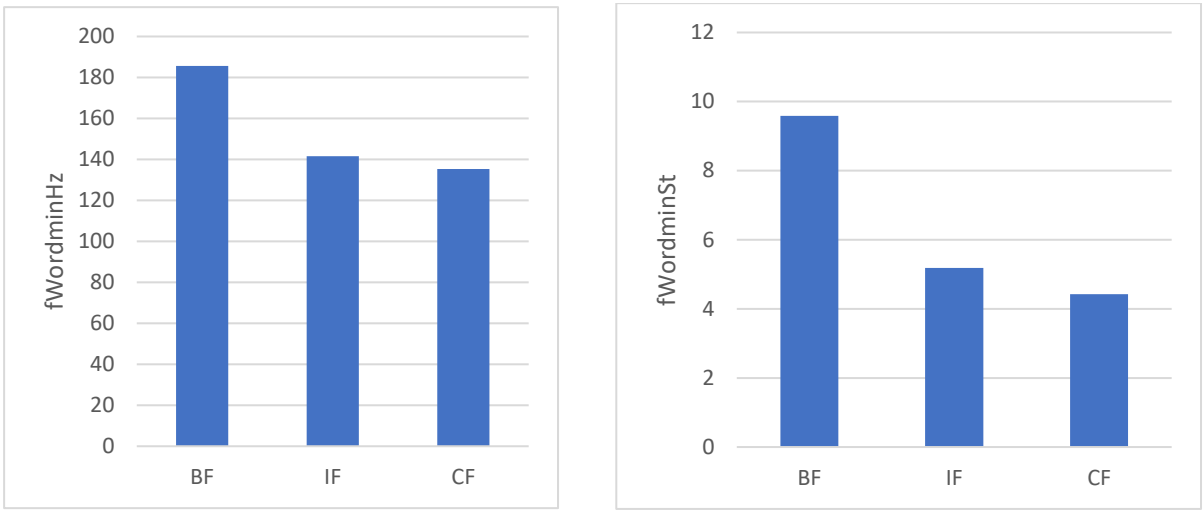


Figure 5. 28 Mean F0 min Hz (the left panel) and St (the right panel) of the target focused word according to focus type effect in ultimate position

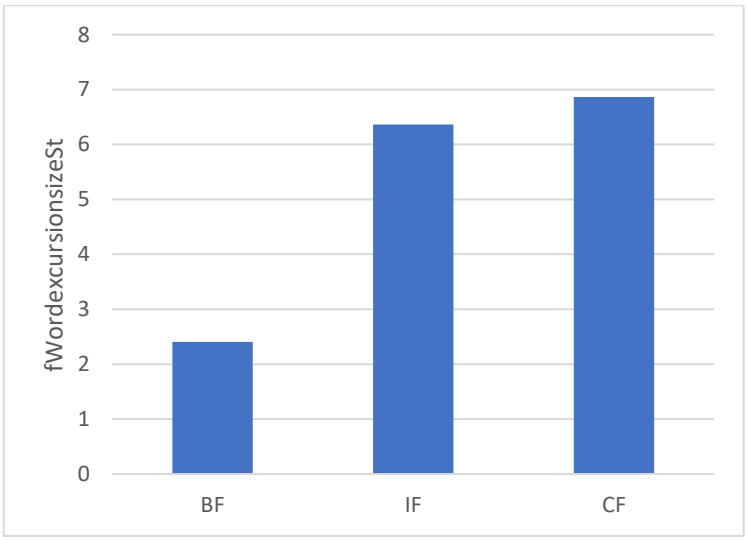


Figure 5. 29 Mean F0 excursion size St of the target focused word according to focus type effect in ultimate position

Regarding the effect on the target syllable, significant effect was marked on syllable duration ms (p= < .001), F0 min Hz/St (p= < .001), excursion size St (p= < .001), and syllable mean intensity (p= < .001). Akin to the entire word, there was no significant effect on syllable max Hz/St. In the following a detailed elucidation of the main significant findings (Table 5.14) followed by post hoc comparisons (Table 5.15):

Table 5. 14 *The effect of FocusType on the target syllable of the focused word in ultimate position*

	Focus Type					
Phonetic measures	BF		IF		CF	
	mean	*SD*	*mean*	*SD*	*mean*	*SD*
SylDurMs	165.91	22.360	198.33	31.418	208.48	39.925
	F = 26.203				***p* < .001**	
SylF0minHz	195.85	68.418	142.42	46.000	135.38	41.276
	F = 19.778				***p* = < .001**	
SylF0minSt	10.637	6.232	5.318	5.539	4.440	5.600
	F = 17.400				***p* = < .001**	
SylF0ExSizeSt	1.134	.653	4.904	2.012	5.829	6.253
	F =22.648				***p* < .001**	
SylmeanIntensitydB	73.209	2.958	69.711	4.226	70.475	3.809
	F = 12.990				***p* < .001**	

Note : Syl: syllable, SylDurMs: syllable duration (ms), ExSize: excursion size
Significant p values less than 0.05 *are in boldface*

Table 5. 15 Post hoc *p* values (*significant if it's less than 0.05*) of the effect of FocusType on the target syllable of the focused word in ultimate position

phonetic measures	BF vs. IF	BF vs. CF	IF vs. CF
SylDurMs	**< .001**	**< .001**	.250
SylF0minHz	**< .001**	**< .001**	.794
SylF0minSt	**< .001**	**< .001**	.736
SylF0ExSizeSt	**< .001**	**< .001**	.449
SylmeanIntensitydB	**< .001**	**.001**	.555

In the light of these findings, statistically significant differences appeared between BF and IF as well as between BF and IF in terms of syllable duration, min Hz/St, excursion size, and mean intensity, whereas no significant difference was attested between IF and CF. As indicated in the figures below, the syllable was longer in CF and IF than BF. F0 min Hz and St were lower in CF and IF than BF. Excursion size St was larger in CF and IF than BF. On the contrary, syllable mean intensity dB was higher in BF than IF and CF.

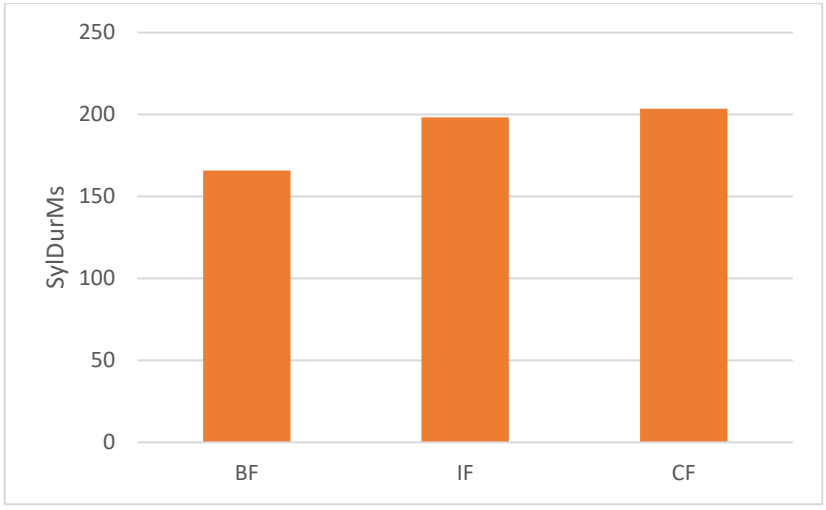


Figure 5. 30 Mean syllable duration (ms) of the target syllable according to focus type effect on the focused word in ultimate position

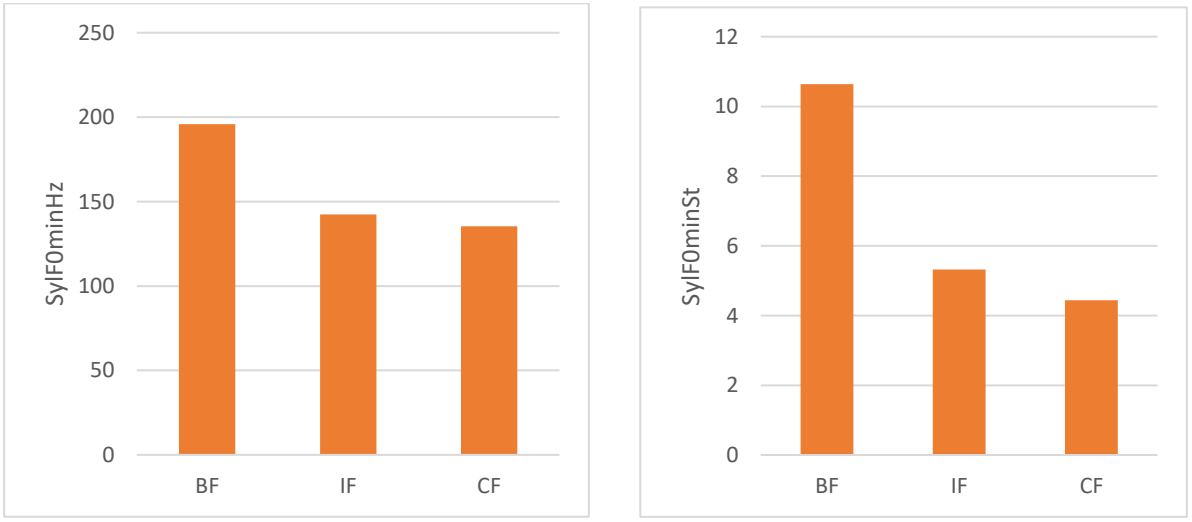


Figure 5. 31 Mean F0 min Hz (the left panel) and St (the right panel) of the target syllable according to focus type effect on the focused word in ultimate position

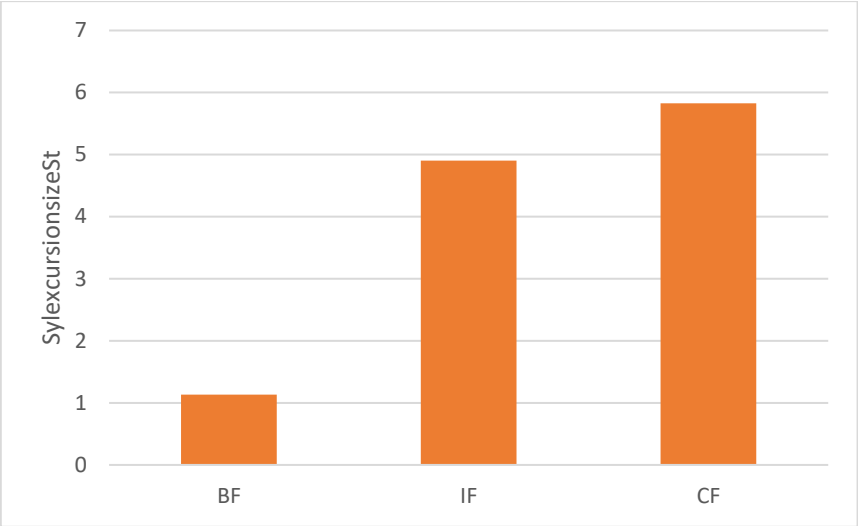


Figure 5. 32 Mean excursion size St of the target syllable according to focus type effect on the focused word in ultimate position

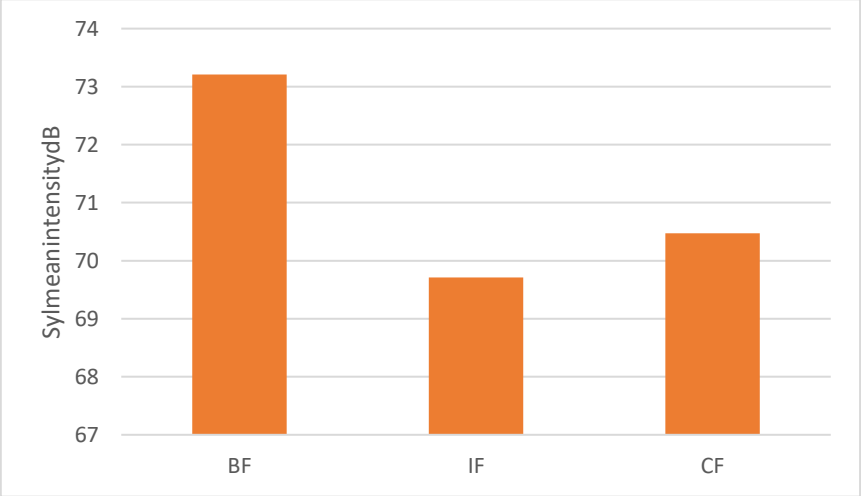


Figure 5. 33 Mean value of mean intensity (dB) of the target syllable according to focus type effect on the focused word in ultimate position

Finally, the effect of FocusType on the non-target word occurring in the pre-focus region was attested only on duration ms ($p < .001$) and F0 excursion size St ($p < .001$). Significant differences were observed between BF and CF as well as between IF and CF. The pre-focused word was longer under CF condition than under IF and BF (Figure 5.34), and characterized by a larger excursion size under BF than IF and CF (Figure 5.35).

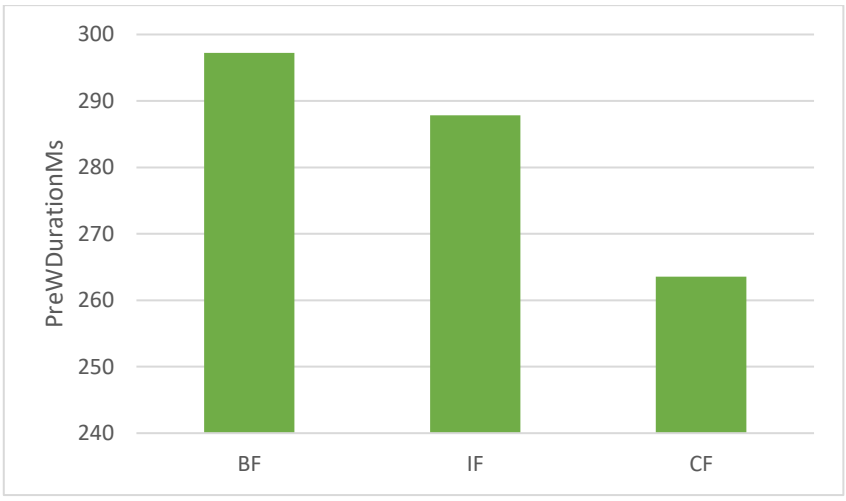


Figure 5. 34 Mean value of the pre-focused word duration (ms) according to focus type in ultimate position

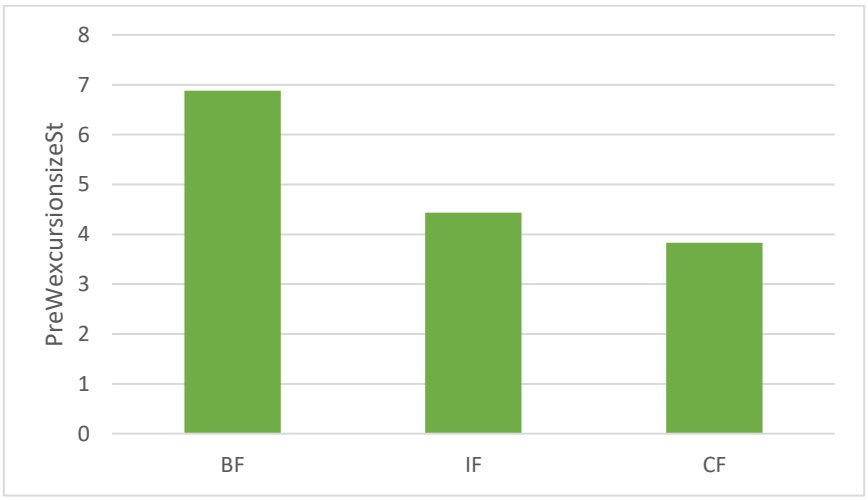


Figure 5. 35 Mean value of F0 excursion size St of the pre-focused word according to focus type in ultimate position

5.4 Discussion

This chapter sought to investigate whether (or not) information structure, Focus in particular, is intonationally encoded in the dialect of Oran Algerian Arabic. Indeed, on the basis of both qualitative and quantitative analyses, results demonstrated that several phonological and phonetic features are attributed to focus utterances depending on the type of focus (broad focus, narrow informational focus, and narrow contrastive focus) and the sentential position of the target item.

The qualitative examination revealed that all focus utterances under the three focus conditions were pronounced within the same phrase owing to the absence of an audible or visible pause. This implies that phrasing is not employed by the speakers of this dialect as a prosodic pattern to mark focus utterances or to highlight a particular type. In comparison to other Arabic dialects, this finding appears to contradict those reported for Lebanese Arabic (Chahal, 2001; Chahal & Hellmuth, 2014), Jeddah Arabic (Moussa, 2019), and Kuwaiti Arabic (Yeou et al., 2007). Yet, it matches those documented for other dialects such as Moroccan Arabic and Yemeni Arabic (Yeou et al., 2007), in addition to a number of well-studied languages like English, Chinese, Italian, and European Portuguese (Gussenhoven, 2004; Xu, 1999; 2005; Frota, 2000; D'Imperio, 2002).

A further qualitative detail observed in focus utterances is related to pitch accent type and distribution. The target focused item was allocated a high pitch accent (H* or !H*) under broad focus condition, whereas the same item received a rising pitch accent (L+H*) when occupying the initial position of narrow sentences. However, this intonational realization cannot stand as a strategy to distinguish broad focus from both types of narrow focus. This is because the same item was also marked with a high pitch accent in narrow focus sentences when occurring in the penultimate position. In this regard, we cannot claim that pitch accent type is an intonational strategy to differentiate both types of focus unless the target word is compared to the same word occurring in the initial position of broad focus sentences. Besides, this assumption would be

challenging to the other Arabic dialects. Prior research postulated that all the investigated Arabic dialects so far do not assign a particular pitch accent category to a focused constituent. This premise has been vouched for in Lebanese Arabic, Egyptian Arabic, Moroccan Arabic, Kuwaiti Arabic, Yemeni Arabic, Tunisian Arabic, Jeddah Arabic, and Taifi Arabic (Chahal, 2001; Hellmuth, 2006; Chahal & Hellmuth, 2014; Yeou et al., 2007; Bouchhioua, 2009; Moussa, 2019; Alzaidi, 2022). Even more importantly, the target word /ʒaˈma:l/ per se showed an intricate intonational behavior in the present study. Under broad focus condition (i.e., not particularly focused), F0 peak was observed to fall within the stressed syllable, which is the second syllable according to the stress rule presented in section 1.3.2.5 of Chapter One. Alternatively, it fell outside the stressed syllable under narrow focus when the target word appeared in the penultimate and ultimate sentential positions. A similar contravening finding was identified in Alzaidi et al.'s (2023) study on Emirati Arabic intonation. The researchers have figured out that unlike the rest of the examined target words, the word /ˈla.ma/ exhibited an F0 peak on the second syllable instead of the first one which was supposed to be the stressed syllable in the word. They further noticed that there were two instances of F0 movement at the level of this word where F0 decreased to a minimum point before successively rising to the second peak in the following syllable. Interestingly, this was also detected in our study, specifically on certain utterances with the word /ʒaˈma:l/ occurring in the initial position of contrastive focus sentences (See Figure 5.5 in the current chapter). A preliminary assumption that we can embrace for this intonational violation would be ascribed to F0 peak alignment in accordance with Yeou et al.'s (2007) work. Essentially, the researchers have argued that F0 peak alignment was found to be contingent upon the type of the target syllable in Moroccan Arabic. However, the analysis of this intonational pattern is beyond the scope of this dissertation.

The quantitative analysis, on the other hand, unveiled a number of acoustic cues that associate with a particular type of focus depending on the position that the target item occupies.

First, when the focused word /ʒama:l/ is sentence-initially, narrow focus was more phonetically enhanced than broad focus. The focused constituent was characterized by higher F0 maximum, broader excursion size, longer duration and higher mean intensity compared to its counterpart in broad focus utterance. The two types of narrow focus were only distinguished in terms of duration and excursion size in which contrastive focus was marked with a longer duration and larger excursion size than informational focus. Second, when the focused word appeared in penultimate position, F0 peak was identical under broad focus and narrow focus, signaled by the absence of any significant effect on F0 maximum. Only excursion size and duration were the main phonetic cues showing more increased values for narrow focus compared to broad focus. As for intensity, it was employed merely to distinguish broad focus from contrastive focus. Besides, no impact was detected on pitch employment between the two types of narrow focus. Yet, both types were discernible in terms of duration in which contrastive focus was longer than informational focus. Third, the final position did not indicate a salient impact by focus as the other positions. While F0 minimum did not demonstrate any noticeable change in the initial and penultimate positions, a significant influence was identified in this position. Interestingly, F0 minimum of narrow focus was lower than that of its broad counterpart. This suggests that the target word was stretched over the bottom of the speaker's pitch range under narrow focus condition. Additionally, by virtue of the absence of F0 maximum change, we can posit that the target word is unaccented when it is at the end of the phrase. This finding is endorsed by the remarkably weak articulation observed on spectrograms. However, this deaccentuating effect is in essence due to occurrence in phrase edges rather than the effect of focus, as it was observed for the adverbial time /l-ba:reħ/ 'yesterday'. Besides, intensity exhibited a contradictory outcome in this position. Unlike the other positions, it was found to be higher under broad focus compared to narrow focus. Nonetheless, broad focus and narrow focus were distinguished in terms of two acoustic measurements: wider excursion size

and longer duration for the former in comparison to the latter. With respect to informational and contrastive focus, no noticeable change occurred on these two types of narrow focus.

Alongside the effect on the target word in the on-focus domain, acoustic results also revealed that focus effect reaches the post-focus domain. The non-target word /mura:d/ following the narrow-focused word in initial position was characterized by a lower F0 maximum, compressed excursion size, and lower intensity compared to the same word in broad focus sentences. This finding was attested for both types of narrow focus utterances. On the contrary, when the non-target word preceded the focused word, i.e., occurring in the pre-focus domain, results displayed no striking effect on the acoustic measurements of this word in the vicinity of the focused constituent, mainly when the latter is sentence-penultimately.

Taken together, the present results are not surprising as long as they maintain the well-established behavior of prosodic focus determined in a wide array of previous studies. Narrow focus was attested cross-linguistically to be acoustically cued by means of pitch manipulation including raised F0 peak (higher F0 maximum) and expanded pitch range (excursion size) in addition to longer durational measurements and stronger intensity compared to its broad counterpart (Eady and Cooper, 1986; Xu, 1999; Xu and Sun, 2002; D'Imperio, 2002; Baumann et al., 2006; Chen et al., 2009; Breen et al., 2010; among others). This pattern was agreed upon in several Arabic dialects such as Lebanese Arabic, Egyptian Arabic, Moroccan Arabic, Kuwaiti Arabic, Yemeni Arabic, Tunisian Arabic, Jeddah Arabic, and Taifi Arabic (Chahal, 2001; Hellmuth, 2006; Chahal & Hellmuth, 2014; Yeou et al., 2007; Bouchhioua, 2009; Moussa, 2019; Alzaidi, 2022). It is worth noting, however, that higher F0 peak was only used by the speakers of this dialect to mark narrow focus in the initial-sentential position, indicating thus its weakness to stand as a phonetic cue for focus encoding.

As regard the distinction between the two types of narrow focus in this dialect, it was merely evident in the initial sentential position through longer duration and larger excursion size

for contrastive focus than informational focus. Otherwise, these two categories failed to be prosodically separate and instead functioned in a similar fashion, representing together narrow focus. As a way of comparison, Alzaidi et al. (2018) have found that both of these categories are distinguished in Taifi Arabic in initial and penultimate positions in terms of all evaluated measurements. However, in their study of Emirati Arabic, Alzaidi et al. (2023) have contended that this dialect displayed a differentiation between contrastive and informational foci in all positions (initial, penultimate, and ultimate) in terms of excursion size solely, and in terms of intensity only in initial and penultimate positions. In this connection, the researchers have argued that several previous studies often failed to recognize any distinction between these types of narrow focus due to their misleading and poor experimental methods. However, when participants were provided with an informational context, a better and clearer distinction emerged, as reported in their study. Accordingly, given that we also presented a clear and well-defined context for both categories in our experiment, our participants were able to differentiate them, primarily in the initial position.

A crucial intonational strategy employed for marking prosodic focus was figured out in the present experiment. Algerian Arabic as spoken in Oran was observed to resemble a number of reviewed dialects and languages regarding the phonetic realization of the rest of the utterance following a narrow-focused constituent occupying the initial position of either contrastive or informational sentences. As previously indicated, the non-target word was marked with a lower F0 maximum, excursion size, and intensity than its counterpart in broad focus sentences. This result indicates the presence of Post-Focus Compression (Xu, 2011) in this dialect, also indicated by the absence of F0 tonal events as displayed in the qualitative analysis. Therefore, Algerian Arabic is similar to the rest of Arabic dialects like Lebanese Arabic, Egyptian Arabic, Moroccan Arabic, Kuwaiti Arabic, Yemeni Arabic, Tunisian Arabic, Jeddah Arabic, Taifi Arabic, and Emirati Arabic (Chahal, 2001; Hellmuth, 2006; Chahal & Hellmuth, 2014; Yeou et al., 2007; Bouchhioua,

2009; Moussa, 2019; El-Zarka et al., 2020; Alzaidi et al., 2018, 2023). Besides, it seems that post-focus compression is a universal intonational pattern as it has been attested cross-linguistically in languages like Swedish (Bruce, 1982), American English (Cooper et al., 1985; Xu & Xu, 2005), Mandarin Chinese (Xu, 1999; Xu & Xu, 2005), French (Jun & Fougeron, 2000), German (Féry & Kugler, 2008), and Korean (Lee & Xu, 2010).

Alternatively, unlike pitch compression in the post-focus region, the pre-focus region was observed to maintain phonetic enhancement in both contrastive and informational utterances when the target word is in penultimate and ultimate positions. Algerian Arabic thereby contradicts Moroccan Arabic (Yeou et al., 2007) and Emirati Arabic (Alzaidi et al., 2023) where pre-focus words are deaccented, but matches other dialects such as Taifi Arabic (Alzaidi et al., 2018), Yemeni and Kuwaiti Arabic (Yeou et al., 2007). Notwithstanding, although no change emerged on the acoustic manipulation of pitch, the effect of focus in this region was manifested through durational measurements. Interestingly, the non-target word was shorter under contrastive and informational focus conditions compared to its counterpart under broad focus condition. In the light of these findings, the overall conclusion to be drawn in this scope is that durational measurements constitute a pivotal phonetic pattern utilized by the speakers of this dialect to signal focus types and differentiate focused and non-focused words. It is then in agreement with Benali's (2004) empirical research on the prosodic features of the Algerian dialects spoken in Algiers and Oran. Indeed, the researcher has contended that while Algiers spoken Arabic is highly characterized by melodic variations, Oran spoken Arabic is mainly marked with syllabic lengthening.

5.5 Conclusion

To recap, this chapter ascertained that Focus information structure is intonationally encoded in OSA drawing on phonological and phonetic details. Both types of narrow focus (informational focus and contrastive focus) were produced within the same string of utterance as

broad focus. The target focused element in the present experiment showed an intricate intonational behavior. F0 peak was found to fall on the stressed syllable under broad focus condition but outside it under narrow focus condition. Besides, the acoustic scrutinization revealed that the distinction between broad focus and narrow focus is achieved by the phonetic enhancement of the target word and post-focus compression of the non-target word. Additionally, durational measurements exhibited a pivotal role in marking focus types in OSA.

CHAPTER SIX:

GENDER AND INTONATIONAL PATTERNS

Chapter Six: Gender and Intonational Patterns

6.1 Introduction

This chapter is devoted to the investigation of gender-related intonational differences in Algerian Arabic as spoken in Oran. It is thus divided into five sections. The first section tries to identify any potential distinction in the distribution of pitch accents and phrasal-boundary combinations. The second section tends to inspect whether (or not) female and male speakers of OSA differ in the intonational marking of focus types (broad/neutral focus, narrow informational focus, and narrow contrastive focus). It is worth noting that these two first sections are complementary to Chapter four and Chapter five, respectively. The third section, on the other hand, seeks to carry out a gender-based comparison of pitch range, based on three distinct pitch scales, in the production of different types of tunes. In the fourth section, we attempt to provide a sociophonetic account for the correlation between intonational patterns and gender identity based on the main findings exhibited in this chapter. Finally, the last section is a conclusion of the major points highlighted in this chapter.

6.2 Gender and Tonal Distinction

We launch our exploration of potential gender-based intonational variation by examining the frequency distribution of pitch accent categories and phrasal-boundary combinations. To this end, the material encompassed the dataset previously analyzed in Chapter four, collected from reading isolated sentences, roleplay dialogue, and storytelling tasks. In addition, owing to the quasi-spontaneous production attested in story re-telling which resulted in non-conformity in phrasing patterns (i.e., in the number of IPs and ips) among talkers, a total of 808 extracted utterances of IP shape were analyzed particularly for the distribution of edge tone combinations between male and female speakers.

In this scope, the analysis primarily focused on the distribution of the main categories in the tonal inventory which was probed in chapter four. These involve four main pitch accents allocated a nuclear pitch accent position (H*, !H*, L+H*, and L*) and three main phrasal-boundary combinations (L-L%, H-H%, and H-L%). Table 6.1 depicts the results of the tonal distribution among both female and male talkers based on the controlled dataset that was examined in chapter four.

Table 6. 1 *Frequency distribution of nuclear pitch accents and phrasal-boundary combinations according to gender in controlled material*

	Pitch accents			
	H*	!H*	L+H*	L*
Female	17.67%	7.22%	15.16%	12.75%
Male	14.45%	6.42%	14.95%	11.34%
	Edge tone combinations			
	L-L%	H-H%	H-L%	
Female	28.40%	19.11%	4.22%	
Male	28.86%	16.81%	2.57%	

At first sight, the table showed that the distribution of the pitch accents and edge tones was more frequent in female speech compared to male speech. Nonetheless, the disparity was minor, emanating primarily from the elimination of certain utterances due to factors like disfluency, hesitation, wrong speech rate, and other technical issues, as explained in Section 4.2 of Chapter four. As a result, since female material exceeded that of males, we observe that the target tones are more evident in female speech than male speech. In the following, we focus on the distribution of phrasal-boundary combinations as produced by male and female talkers in the story retelling task.

Essentially, the uncontrolled dataset (Σ = 808 tokens) driven by means of the story re-telling task was initially divided into two classes: one for female speech, comprising 423 tokens (produced by 9 female talkers), and another for male speech, containing 385 tokens (produced by 9 male talkers). Subsequently, the distribution percentage for each edge tone combination was calculated out of the total number within each gender's speech. Results are thus portrayed in the following table:

Table 6. 2 *Distribution of phrasal-boundary tone combinations in male and female story re-telling*

Edge tone combination	Male speech (*N*= 385 /100 %)	Female speech (*N*= 423 / 100 %)
L-L%	67.18 %	63.82 %
H-H%	26.75 %	31.91 %
H-L%	6.23 %	4.25 %

As can be seen, both of male and female speech ended considerably in a fall edge tone (L-L%) compared to a high rise (H-H%). However, the plateau (H-L%) edge tone combination was less evident in the speech of both genders. Interestingly, male speech showed a slightly higher occurrence of L-L% in comparison to female speech. Alternatively, the latter revealed relatively more employment of H-H% edge tone combination than male speech. Figure 6.1 illustrates these findings:

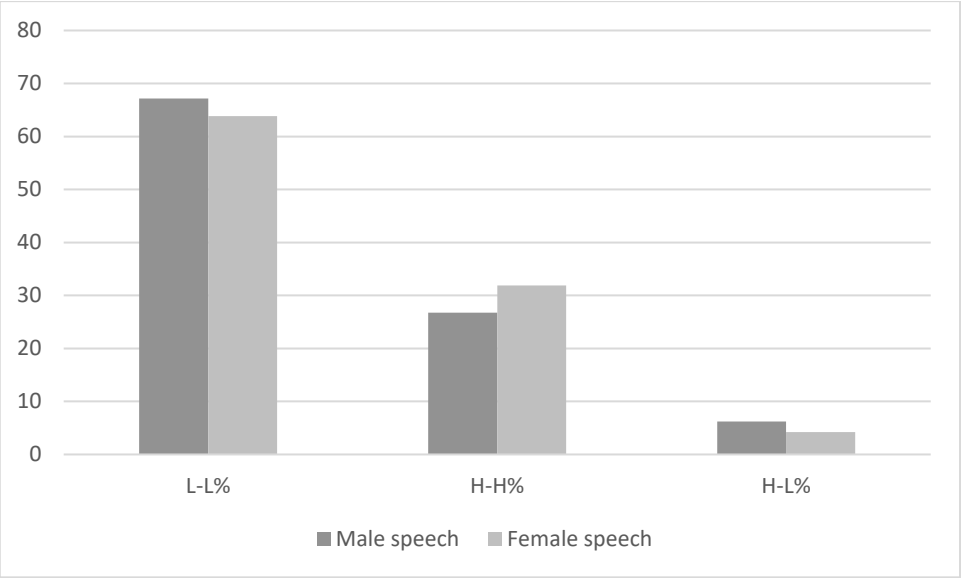


Figure 6. 1 Distribution of phrasal-boundary tone combinations in male and female story re-telling speech

6.3 Gender and Prosodic Focus

This section aims to evince the gender-related variation in terms of intonational encoding of focus: Broad/neutral Focus (BF), narrow Informational Focus (IF), and narrow Contrastive Focus (CF) in initial, penultimate, and ultimate sentential positions. To this end, a series of two-way ANOVA analyses was carried out. In line with Chapter five, we investigate the effect of 'FocusType' in interaction with 'Gender' particularly on these dependent variables: F0 excursion size St and F0 max St of the entire focused constituent, target syllable, and post-/pre-focused constituent along with the duration (ms) of the last two items. Given that F0 min did not yield any significant effect by FocusType (as evidenced in Chapter five), this measure was excluded from the analysis in this chapter. As for the ultimate sentential position, the analysis thus was based primarily on F0 excursion size St. Moreover, it should be noted that F0 values in Hertz were disregarded in this examination due to the gender anatomical differences which eminently generate higher values for females than males.

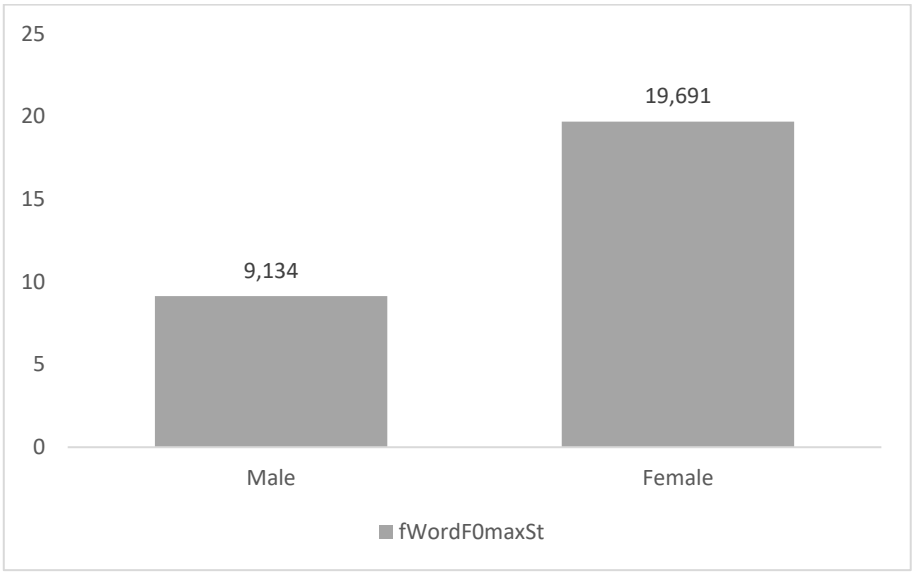
6.3.1 Initial Sentential Position

Starting with the initial position, the following table summarized the ANOVA findings of the effect of Gender and FocusType on the acoustic measurements in this sentential position.

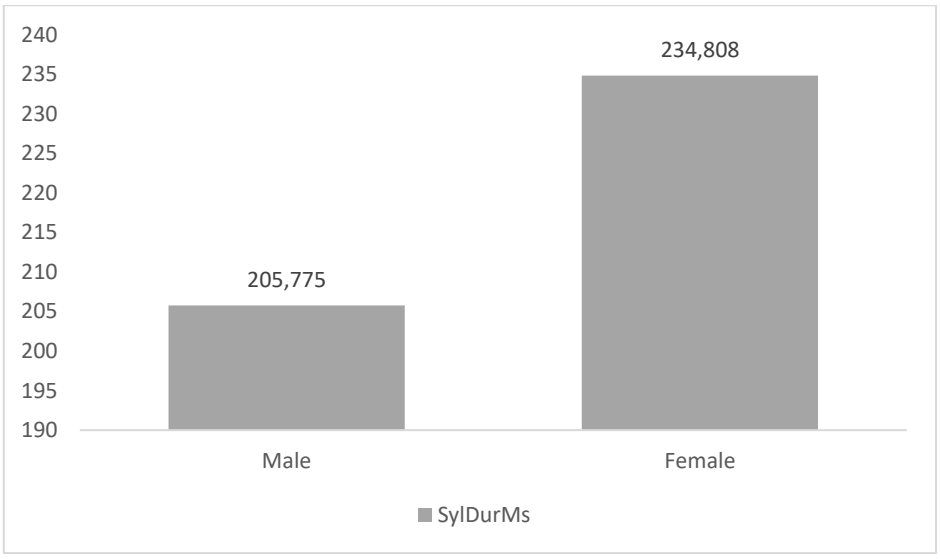
Table 6. 3 *The effect of Focus and gender on the entire focused word, the target syllable, and post-focused word in initial position*

	Phonetic measurements
	fWordF0maxSt
Gender	*p* = **< .001**
FocusType * Gender	*p* = .388
	fWordF0ExSizeSt
Gender	*p* = .160
FocusType * Gender	*p* = **.041**
	SylDurMs
Gender	*p* = **< .001**
FocusType * Gender	*p* = .453
	SylF0maxSt
Gender	*p* = **< .001**
FocusType * Gender	*p* = .211
	SylF0ExcSizeSt
Gender	*p* = **.008**
FocusType * Gender	*p* = **.036**
	PostWordDurMs
Gender	*p* = **.004**
FocusType * Gender	*p* = **.008**
	PostWordF0maxSt
Gender	*p* = **< .001**
FocusType * Gender	*p* = .922
	PostWordF0ExcSizeSt
Gender	*p* = .943
FocusType * Gender	*p* = .671
Note: fWord: focused (entire) word, Syl: syllable, DurMs: duration (ms), ExcSize: excursion size	

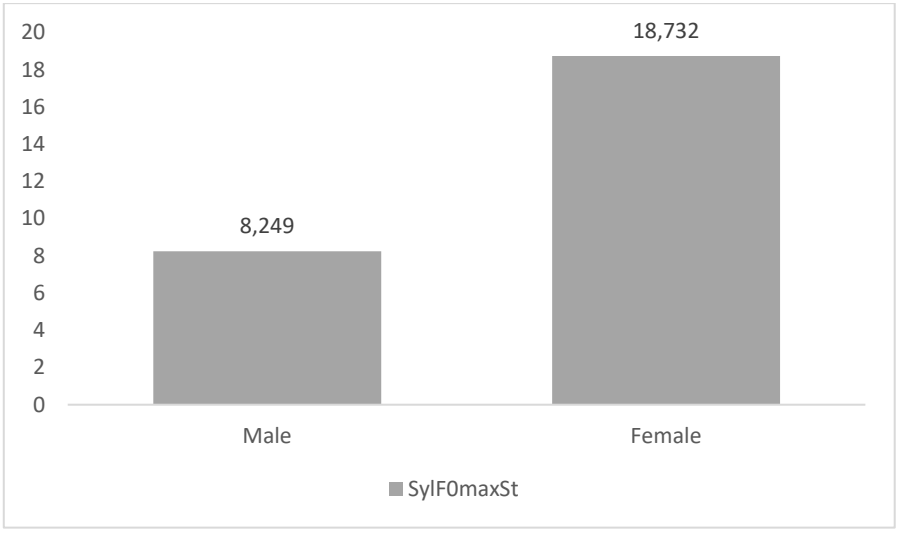
As indicated in the table above, there was a significant effect of Gender on: focused word F0 max St, syllable duration (ms), syllable F0 max St and excursion size St, post-focused word duration (ms) and F0 max St. Indeed, results disclosed that the mean values of these phonetic measurements were significantly higher for female than male speakers. The following figure (6.a-f) exposes these findings along with the corresponding mean values:



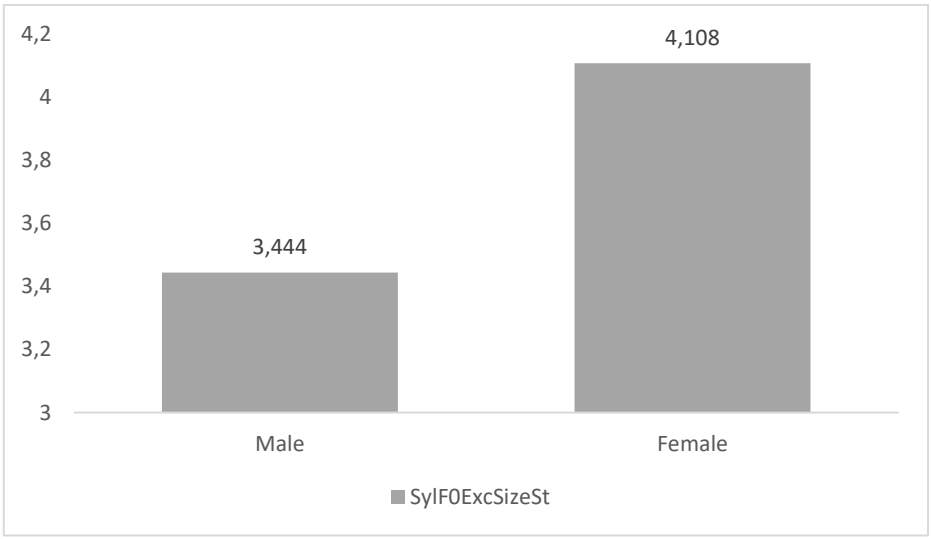
a. Focused word F0 max (St)



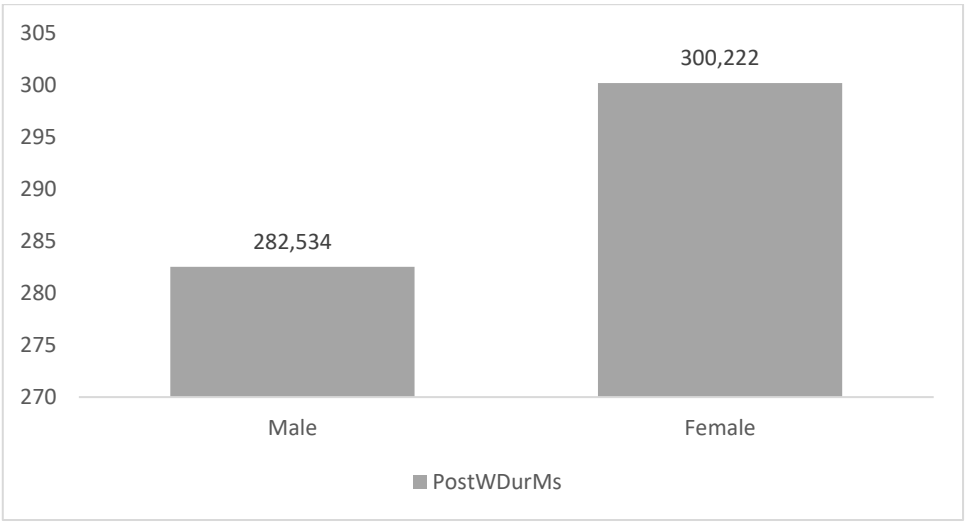
b. Syllable duration (ms)



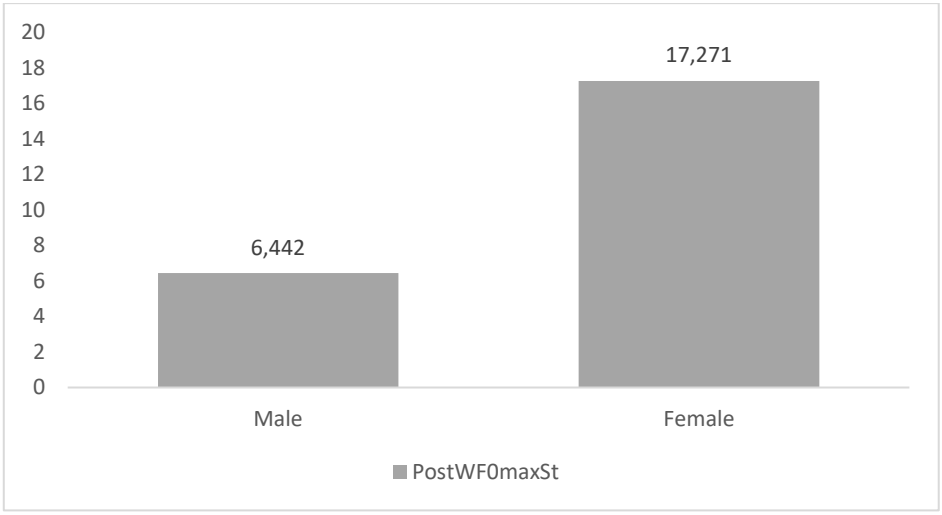
c. Syllable F0 max (St)



d. Syllable excursion size (St)



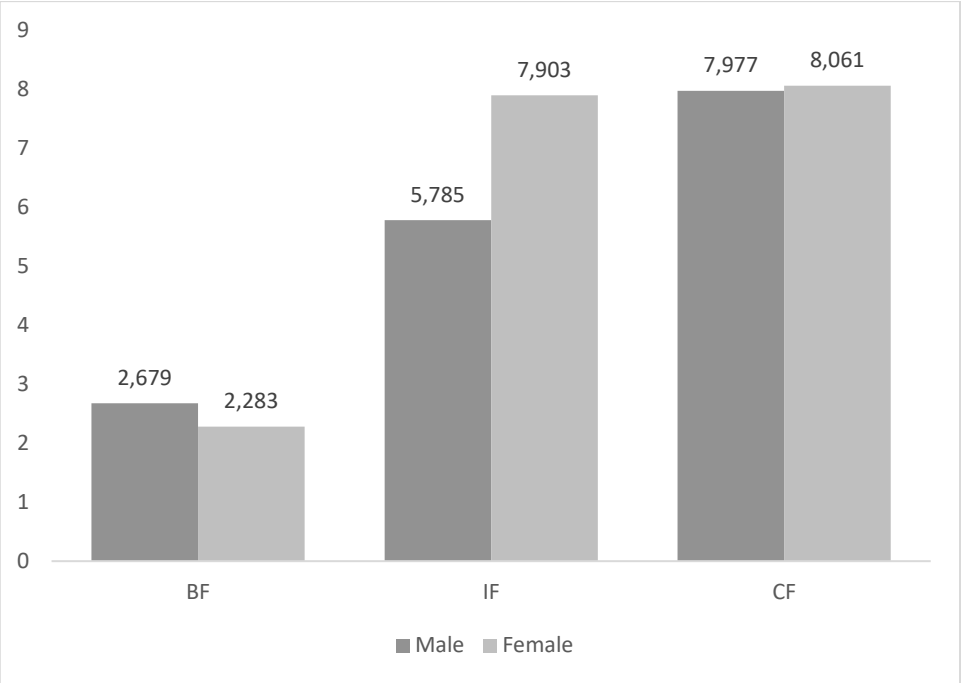
e. Post-focused word duration (ms)



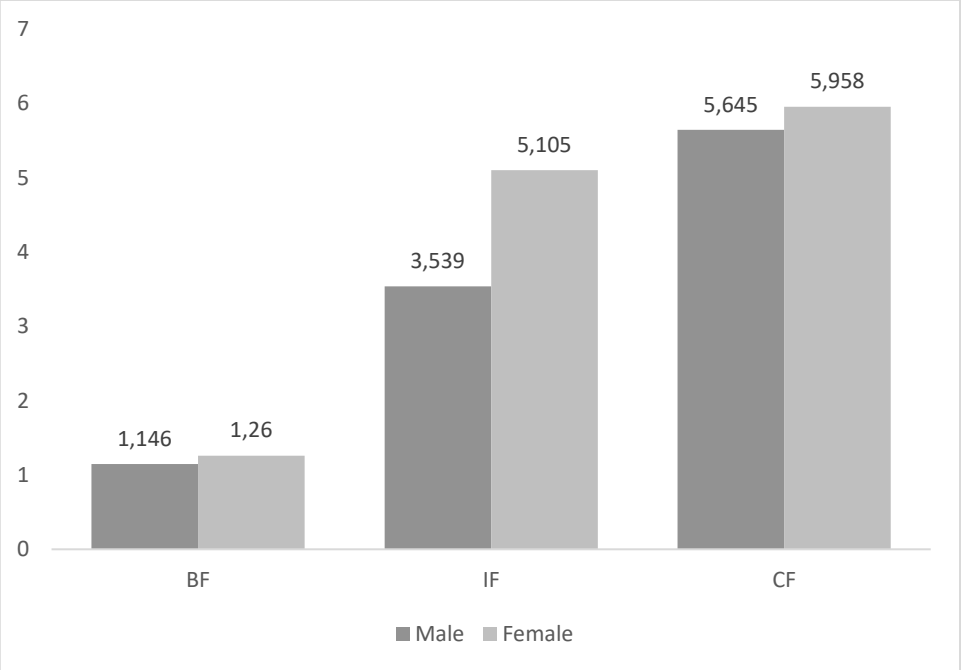
f. Post-focused word F0 max (St)

Figure 6. 2 The effect of Gender on focused word and post-focused word in initial position

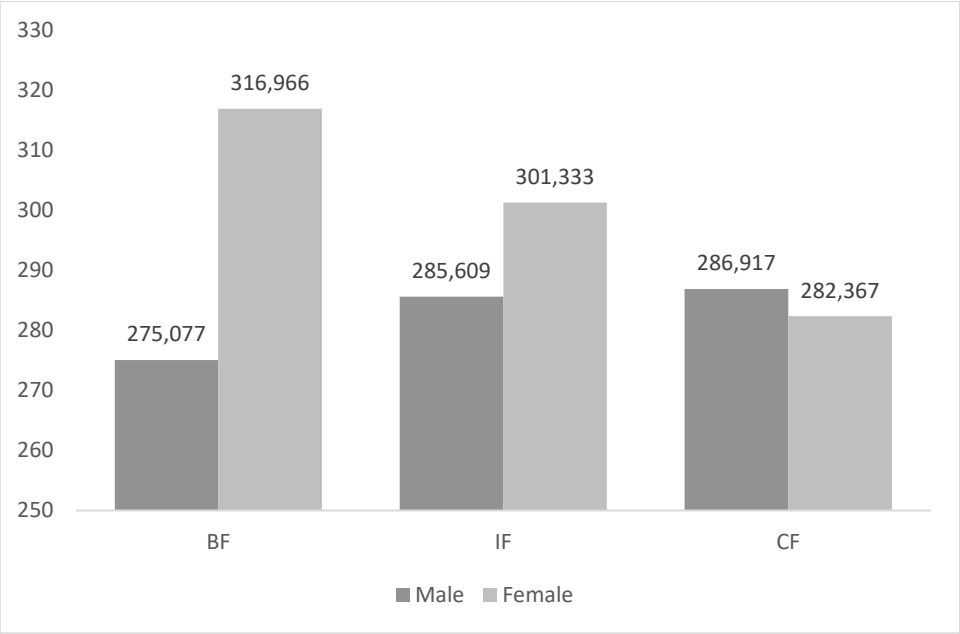
Regarding the impact of Gender * FocusType interaction, results showed that there was a minor effect on the excursion size St of the focused word as well as of the syllable. In fact, both genders demonstrated a significant difference between BF and the two types of narrow focus (IF and CF), with the latter having larger mean values. However, male speakers displayed a further difference. Unlike in female speech, the excursion size St was found to be more expanded in CF than in IF in male speech. Furthermore, a significant effect was observed on post-focused word duration (ms). This discrepancy arose from the longer duration in BF than IF and CF in female speech in comparison to male speech which showed an opposing trend. No substantial effects were identified for the rest of measurements. Notice the figure below:



a. Focused word F0 excursion size (St)



b. Syllable F0 excursion size (St)



c. Post-focused word duration (ms)

Figure 6. 3 The effect of Gender * FocusType on focused word and post-focused word in initial position

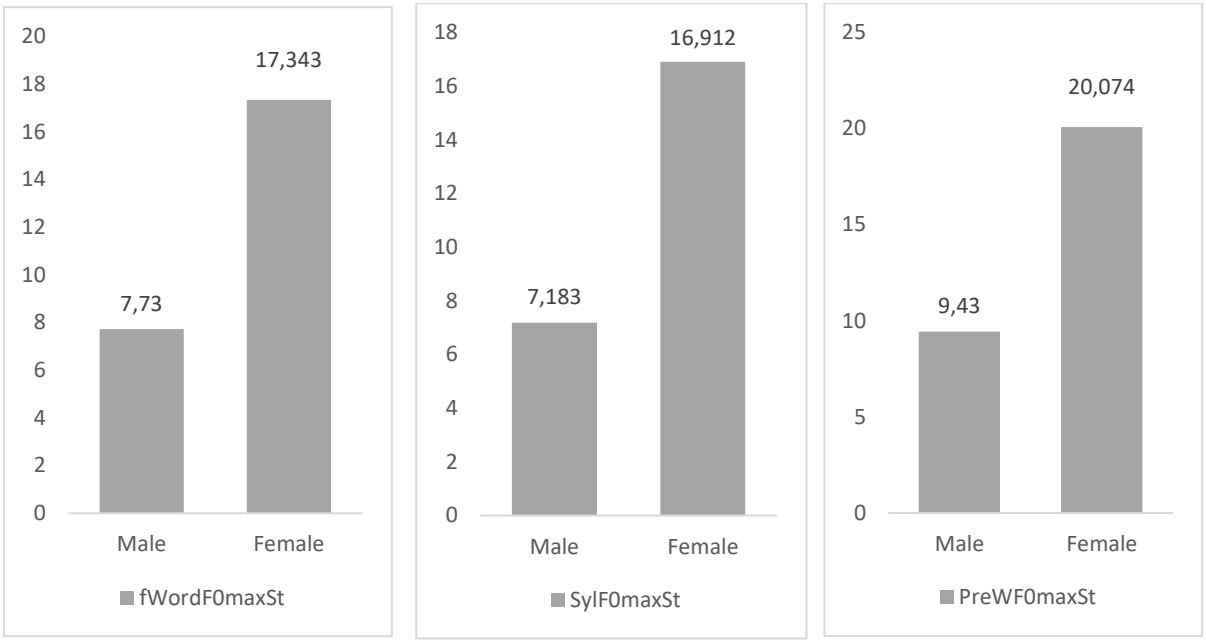
6.3.2 Penultimate Sentential Position

Table 6. 4 *The effect of Focus and gender on the entire focused word, the target syllable, and pre-focused word in penultimate position*

	Phonetic measurements
	fWordF0maxSt
Gender	p = **< .001**
FocusType * Gender	p =.059
	fWordF0ExSizeSt
Gender	p = **.049**
FocusType * Gender	p = .165
	SylDurMs
Gender	p = **< .001**
FocusType * Gender	p = .503
	SylF0maxSt
Gender	p = **< .001**
FocusType * Gender	p = .165

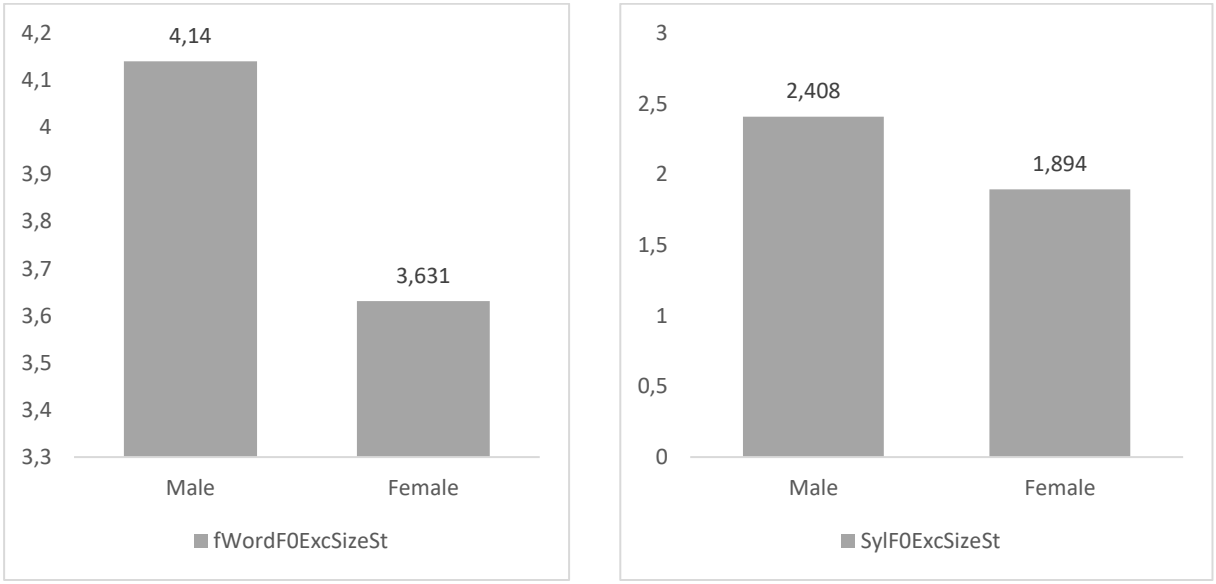
	SylF0ExcSizeSt
Gender	p = **.009**
FocusType * Gender	p = **.009**
	PreWordDurMs
Gender	p = **.005**
FocusType * Gender	p = .127
	PreWordF0maxSt
Gender	p = **< .001**
FocusType * Gender	p = .891
	PreWordF0ExcSizeSt
Gender	p = .673
FocusType * Gender	p = .694
Note: fWord: focused (entire) word, Syl: syllable, DurMs: duration (ms), ExcSize: excursion size	

As can be seen, results indicated that Gender had a salient impact on F0 max St of the focused word, syllable, and pre-focused word. Female talkers were found to produce higher values than male talkers, as shown in Figure 6.4. There was also a minor effect of Gender observed on F0 excursion size St of the focused word (p = .049) and a salient effect on that of the syllable (p = .009). Interestingly, male speakers exhibited more extended excursion size than male speakers (Figure 6.5). Moreover, Gender was found to influence the duration (ms) of both the syllable and pre-focused word, with longer duration being detected in female speech compared to male speech (Figure 6.6). On the contrary, the interaction between Gender * FocusType did not reveal any significant effect on the acoustic measurement in this sentential position except for syllable excursion size St (p = .009). In effect, results demonstrated that BF was marked with lower excursion size St than the other two types of focus in both genders' speech. However, it was larger in male speech and comparatively lower in female speech under CF type than under IF (Figure 6.7).



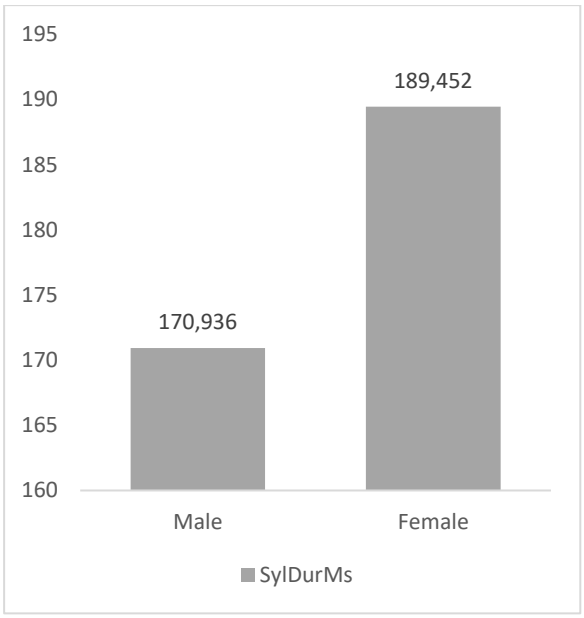
a. Focused word F0 max (St) b. Syllable F0 max (St) c. Pre-focused word max (St)

Figure 6. 4 Gender effect on F0 max (St) in penultimate position

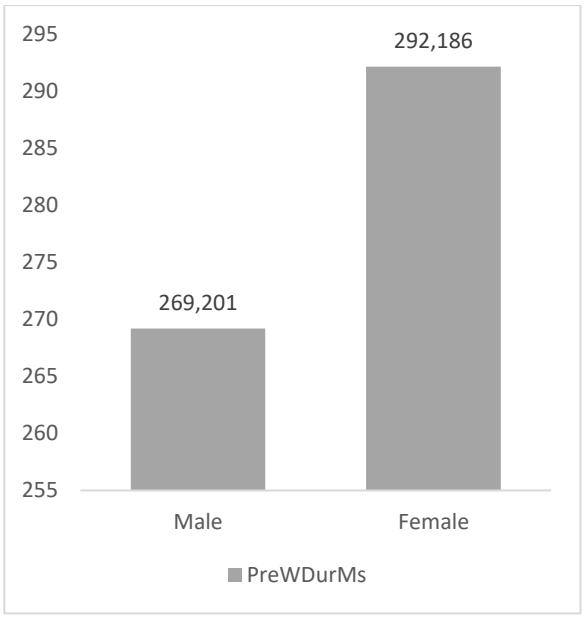


a. Focused word F0 excursion size (St) b. Syllable F0 excursion size (St)

Figure 6. 5 Gender effect on F0 excursion size (St) in penultimate position



a. Syllable duration (ms)



b. Pre-focused word duration (ms)

Figure 6. 6 Gender effect on duration (ms) in penultimate position

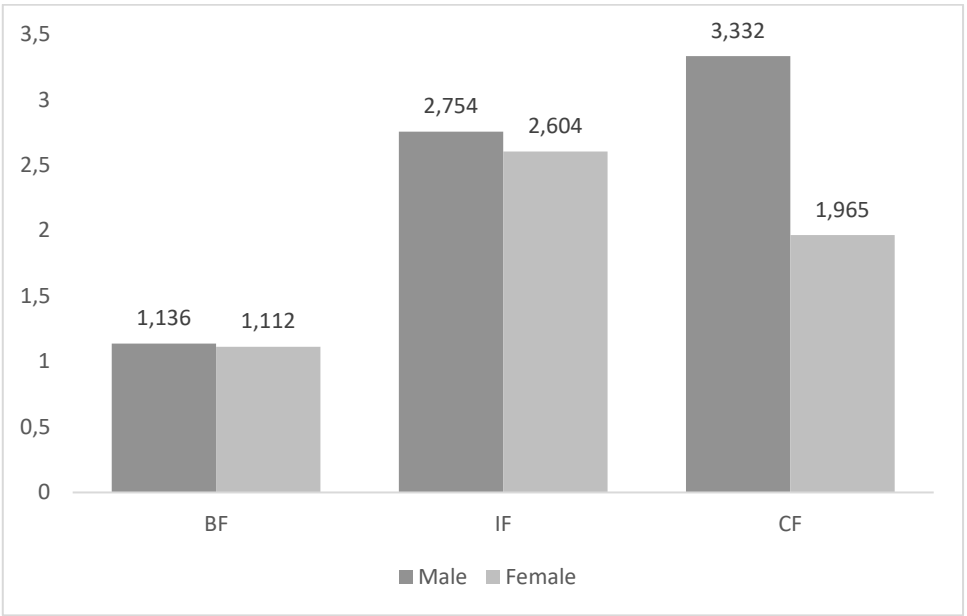


Figure 6. 7 The effect of Gender * FocusType on syllable excursion size (St) in penultimate position

6.3.3 Ultimate Sentential Position

Table 6. 5 *The effect of Focus and gender on the entire focused word, the target syllable, and post-focused word in ultimate position*

	Phonetic measurements
	fWordF0ExSizeSt
Gender	p = **.049**
FocusType * Gender	p = .410
	SylDurMs
Gender	p = **< .001**
FocusType * Gender	p = .915
	SylF0ExcSizeSt
Gender	p = **.022**
FocusType * Gender	p = .183
	PreWordDurMs
Gender	p = **.001**
FocusType * Gender	p = .098
	PreWordF0ExcSizeSt
Gender	p = .859
FocusType * Gender	p = .623
Note: fWord: focused (entire) word, Syl: syllable, DurMs: duration (ms), ExcSize: excursion size	

Accordingly, results indicated that there was a slight impact of Gender on the excursion size St of the focused word (p = .049) and a significant effect on that of the syllable (p = .022). This was due to male speakers producing larger excursion sizes than female speakers (Figure 6.8). Additionally, Gender was found to influence the duration of both the syllable and pre-focused word (p = < .001 and p = .001, respectively), as females exhibited longer durations than males

(Figure 6.9). The interaction between Gender and FocusType, on the other hand, did not exhibit any significant effect on the acoustic measurements.

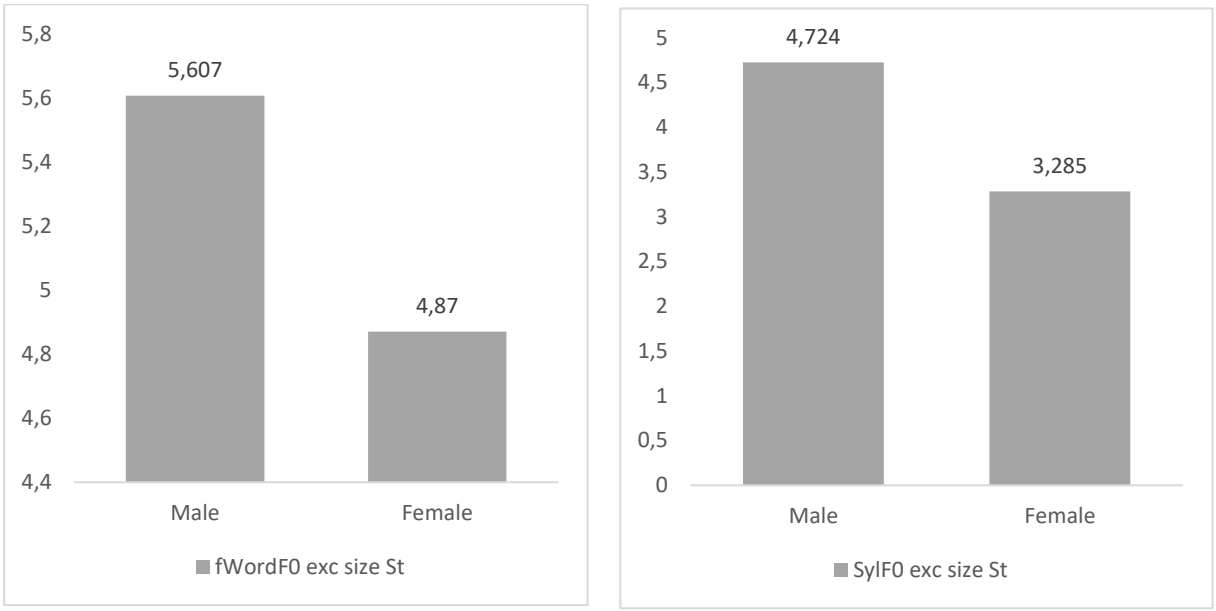


Figure 6. 8 The effect of gender on the F0 excursion size (St) of the focused word (left panel) and of the syllable (right panel) in ultimate position

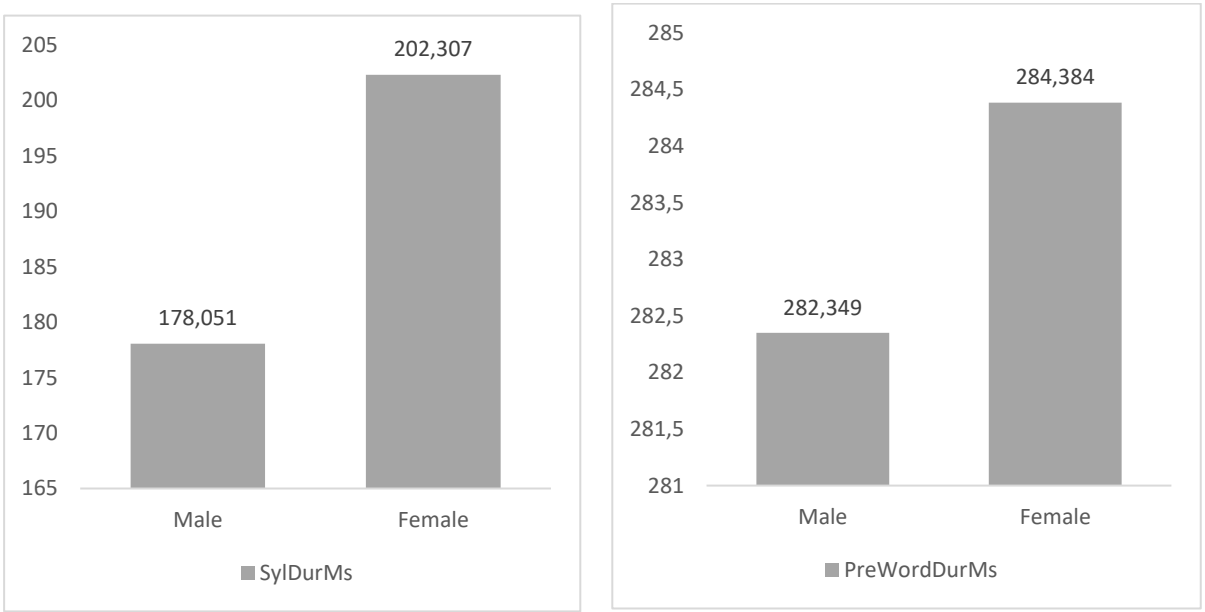


Figure 6. 9 The effect of gender on the duration (ms) of the target syllable (left panel) and of the pre-focused word (right panel) in ultimate position

6.4 Pitch Range and Tune Type

Pitch range refers to the disparity between the highest and lowest pitch values over an utterance. There is a great consensus in sociophonetic literature that female speech typically exhibits a broader pitch range compared to male speech. This observed intonational pattern has been imputed to gender-based variation, which is socially and culturally established rather than being determined by physiological sex differences (Haan & van Heuven, 1999; Daly & Warren, 2000, 2001). In fact, this variation has been accounted for with reference to personality traits that distinguish femininity from masculinity. In this regard, researchers (including Ohala1983; Eckert and McConnell-Ginet, 1992; Daly & Warren, 2001) have contended that a higher pitch is associated with emotional involvement, expressiveness, and politeness; features often characterize women speech. Contrarily, a lower pitch is viewed as a sign of self-confidence and dominance, which are features more commonly tethered to men speech. For more detailed elucidation, please refer to Chapter two (section 2.4).

On the basis of this insight, we conducted an experimentation to probe whether (or not) this stereotype holds true for both female and male speakers of Algerian Arabic as spoken in Oran. In particular, this section sought to investigate male and female pitch range differences based on three distinct perceptual pitch scales. Even more importantly, we aimed to compare male and female variation in pitch range when producing different types of tunes.

6.4.1 Pitch Scales

As prerequisite for the examination of gender-related fundamental frequency variation, it is pertinent to highlight that the dimension of the speaker's vocal tract is a key determining factor in the extent of pitch range. Crucially, because men typically possess longer vocal tracts and larger vocal cords compared to women, their speech tends to generate lower pitch values, i.e., lower F0 values (Fant, 1966). As a corollary, a number of experimental studies have delineated that when it comes to comparing gender voices, pitch measurement is in fact misleading when plotted on a

linear Hertz scale (e.g., Henton, 1989; Hermes & van Gestel, 1991; Haan & van Heuven, 1999; Daly & Warren, 2000, 2001). Instead, these studies have embraced alternative pitch scales that align better with the human perceptual system and offer more accurate normalization for capturing intonational variation linked to speaker gender, mainly: the logarithmic Semitones scale and the ERB (Equivalent Rectangular Bandwidth) scale (ibid.).

6.4.2 Methods

In the current experiment, pitch range was measured as the difference between pitch maximum and minimum (or the excursion size determined by calculating the difference between F0 max and F0 min, as we have seen in the previous chapter) over the entire utterance which we defined as an IP. In this scope, the utterances were extracted from reading isolated sentences, role-play dialogue, and story-telling, produced by 10 female and 10 male speakers of OSA. Particularly, the analysis of gender-related pitch range was contingent upon a set of 20 sentences with various types of tunes, including 4 declarative, 5 yes/no question, 5 wh-question, 2 rhetorical question, 1 incredulity question, 2 imperative, and 1 request tunes. The stimuli for this experiment are provided in Appendix B. Besides, it should be noted that 42 tokens were eliminated. Out of these, 33 were excluded due to factors such as intervening pauses, speech disfluencies, focused realizations, or unnatural speech rate. The remaining 09 were removed in order to ensure a balanced sample size between males and females. Hence, the corpus encompassed a total of 878 tokens. Subsequently, F0 contours were adjusted and smoothed. The global pitch range of each utterance was then measured drawing on three perceptual pitch scales:

- **A linear Hertz scale**
- **The logarithmic Semitones scale**, with a conversion rate of 1 St = 100Hz
- **The ERB scale**, where the conversion from Hertz to ERB was carried out (following Hermes & van Gestel, 1991, p. 97 and Daly & Warren, 2001, p. 86) using the formula below:

ERB = 16.7 LOG (1+ *f* / 165.4), with *f* representing frequency in Hertz.

Notably, we used PRAAT to gauge F0 maximum and F0 minimum both in Hertz (Hz) and Semitones (St). Then, we calculated the excursion sizes by determining the disparity between the F0 max and min values (Hz and St). Following this, we performed a conversion of excursion size from Herts to ERB via the formula mentioned above. Thereafter, Repeated Measures ANOVA tests were conducted to evaluate the effect of the independent variables 'Gender' (female / male) and 'TuneType' (the seven types of tunes listed above) on the dependent variables which were pitch range Hz, pitch range St, and pitch range ERB. However, owing to the considerable imbalance in sample sizes among the tunes, we opted to trim the overall sample size down to 654 tokens at this stage of analysis in order to attain an approximately balanced dataset.

6.4.3 Results

Initially, a number of one-way ANOVA analyses were performed to diagnose how Gender affected the pitch range as realized by male and female subjects in each type of tune (sections 6.4.3.1-7). Thereafter, a two-way ANOVA test was employed to compare the effect of Gender * TuneType as interacting variables on each pitch range scale across all types of tunes.

6.4.3.1 Pitch Range Differences in Declarative Tune

Starting with the effect of gender on the pitch range within declarative tune, results indicated that there was a statistically significant impact across all the three pitch scales: [F (1, 108) = 80.919, p = <.001] for pitch range in Hz, [F (1, 108) = 6.627, p = .011] for pitch range in St, and [F (1, 108) = 103.768, p = <.001] for pitch range in ERB. Female speakers were found to generate more expanded pitch range than male speakers, as shown in Table 6.6 and elucidated in the subsequent figure.

Table 6. 6 *Pitch range values* (Hz/St/ERB*) for female and male speakers in the declarative tune*

Pitch Scale	Female		Male		Total	
	mean	SD	mean	SD	mean	SD
Hz	154.03	61.07	73.18	26.71	113.60	62.05
St	11.25	3.36	9.76	2.66	10.51	3.11
ERB	4.65	1.26	2.61	0.78	3.63	1.46

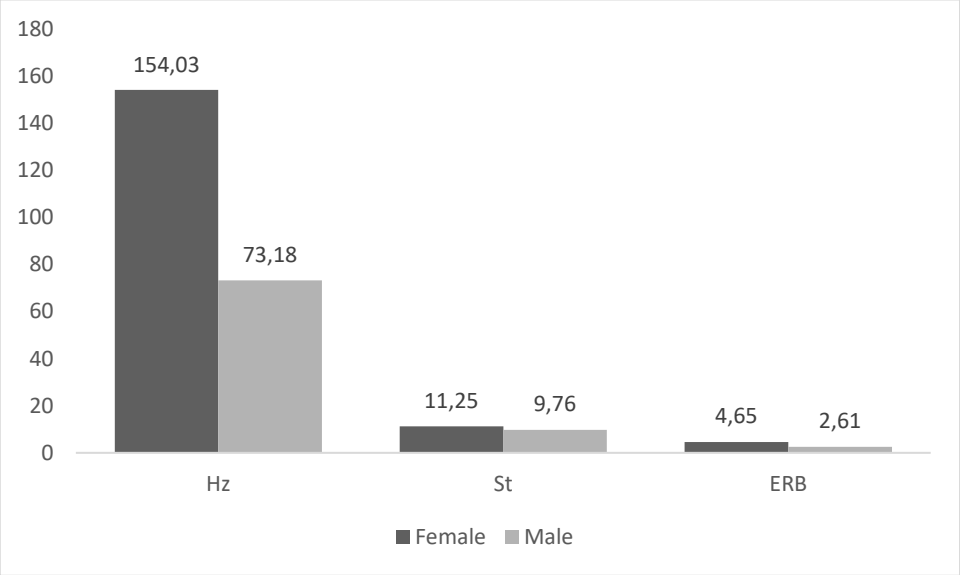


Figure 6. 10 Mean values of pitch ranges in Hz/ ST/ ERB between female and male speakers in the declarative tune

6.4.3.2 Pitch Range Differences in Yes/No Question Tune

Similarly, a significant effect of gender was observed on the pitch range within yes/no question tune. Indeed, Table 6.7 shows that female speakers were found to produce larger pitch range values compared to their male counterparts across the three pitch scales: [F (1, 250) = 281.312, p = <.001] for pitch range in Hz, [F (1, 250) = 96.602, p = <.001] for pitch range in St, and [F (1, 250) = 400.437, p = <.001] for pitch range in ERB.

Table 6. 7 *Pitch range values* (Hz/St/ERB) *for female and male speakers in the yes/no question tune*

Pitch Scale	Female		Male		Total	
	mean	SD	mean	SD	mean	SD
Hz	249.58	104.877	88.92	23.699	169.25	110.616
St	14.505	4.084	10.378	2.353	12.441	3.916
ERB	6.452	1.767	3.089	0.658	4.771	2.147

The following figure illustrates the differences in pitch range Hz/St/ERB between female and male speakers in this tune:

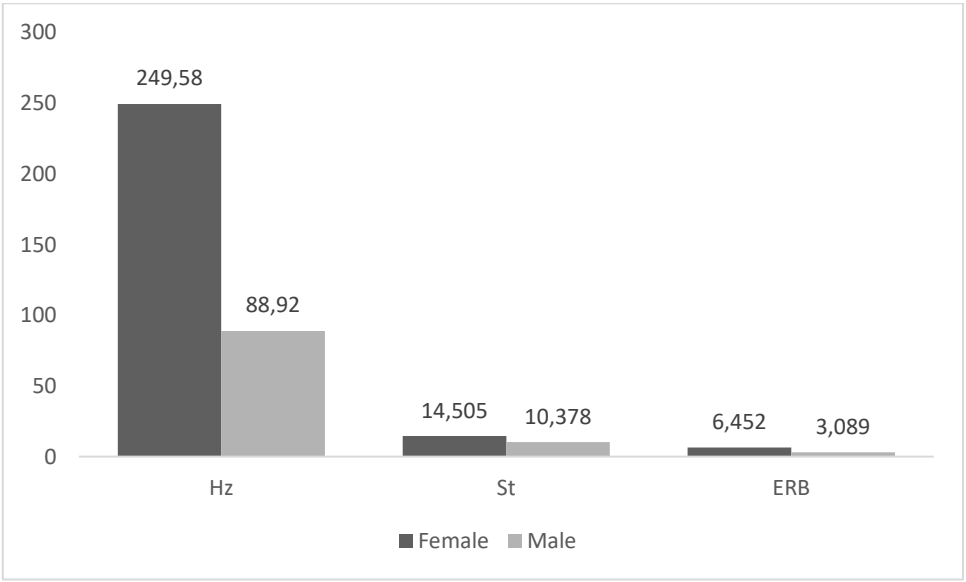


Figure 6. 11 Mean values of pitch ranges in Hz/ ST/ ERB between female and male speakers in the yes/no question tune

6.4.3.3 Pitch Range Differences in Wh-question Tune

Results revealed that female speakers' pitch range values were also larger than their male counterparts, as displayed in Table 6.8 and Figure 6.12. The effect of gender was salient for all the pitch scales as follows: [F (1, 206) = 200.839, p = <.001] for pitch range in Hz, [F (1, 206) = 10.324, p = .002] in St, and [F (1, 206) = 239.265, p = <.001] in ERB.

Table 6. 8 *Pitch range values (*Hz/St/ERB*) for female and male speakers in the wh-question tune*

Pitch Scale	Female		Male		Total	
	mean	SD	mean	SD	mean	SD
Hz	192.99	72.875	84.78	27.440	138.88	77.193
St	11.500	3.309	10.155	2.697	10.827	3.086
ERB	5.463	1.456	2.959	0.778	4.211	1.712

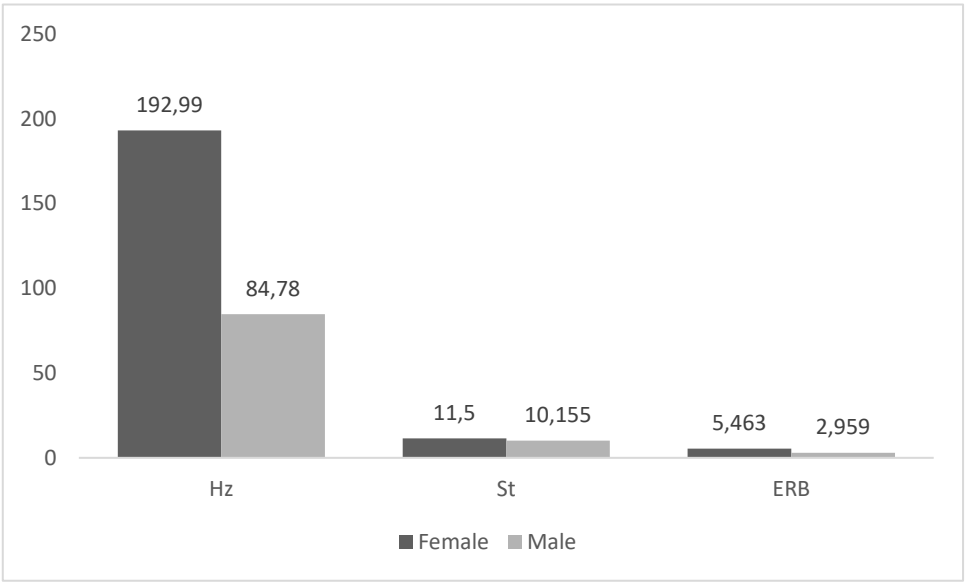


Figure 6. 12 Mean values of pitch ranges in Hz/ ST/ ERB between female and male speakers in the wh-question question tune

6.4.3.4 Pitch Range Differences in Rhetorical Question Tune

Likewise, female speakers continued to exhibit more expanded pitch range than male speakers. The effect of gender was significant in all pitch scales: [F (1, 115) = 69.155, p = <.001] for pitch range in Hz, [F (1, 115) = 16.337, p = <.001] for pitch range in St, and [F (1, 115) = 81.337, p = <.001] for pitch range in ERB. Consider Table 6.9 and the following figure below:

Table 6. 9 *Pitch range values (*Hz/St/ERB*) for female and male speakers in the rhetorical question tune*

Pitch Scale	Female		Male		Total	
	mean	SD	mean	SD	mean	SD
Hz	149.53	69.754	69.26	23.378	109.74	65.771
St	10.461	3.733	8.101	2.435	9.291	3.359
ERB	4.506	1.534	2.501	0.721	3.512	1.564

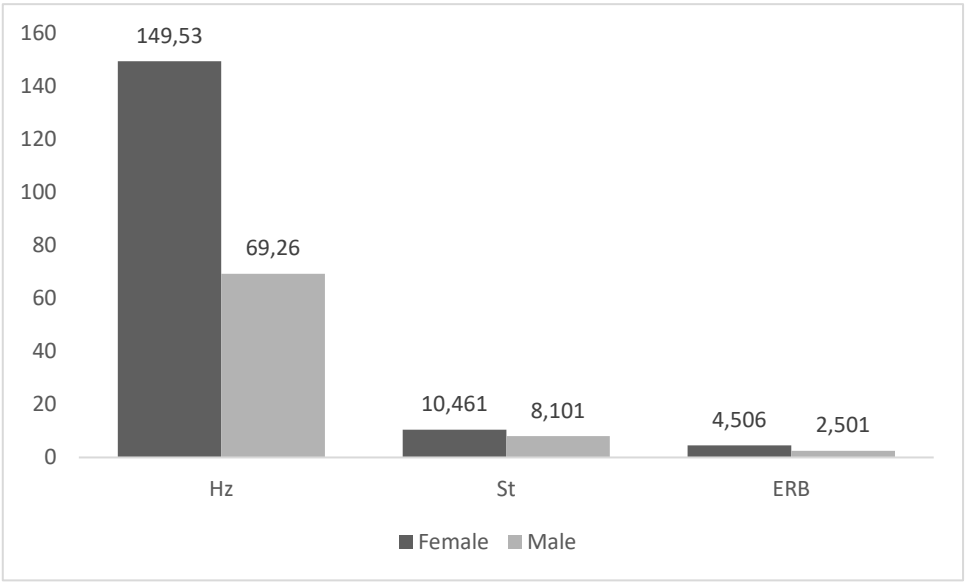


Figure 6. 13 Mean values of pitch ranges in Hz/ ST/ ERB between female and male speakers in the rhetorical question tune

6.4.3.5 Pitch Range Differences in Incredulity Question Tune

A significant effect on gender pitch range was further found in the incredulity question tune across the three scales: [F (1, 51) = 16.824, p = <.001] for pitch range in Hz, [F (1, 51) = 5.560, p = .022] in St, and [F (1, 51) = 20.827, p = <.001] in ERB. Broader pitch range was more evident in female speech than male counterpart, as can be seen in Table 6.10 and Figure 6.14.

Table 6. 10 *Pitch range values (*Hz/St/ERB*) for female and male speakers in the incredulity question tune*

Pitch Scale	Female		Male		Total	
	mean	SD	mean	SD	mean	SD
Hz	148.37	110.722	55.58	32.856	102.85	94.032
St	9.484	5.415	6.654	2.901	8.095	4.555
ERB	4.270	2.285	2.027	1.046	3.170	2.102

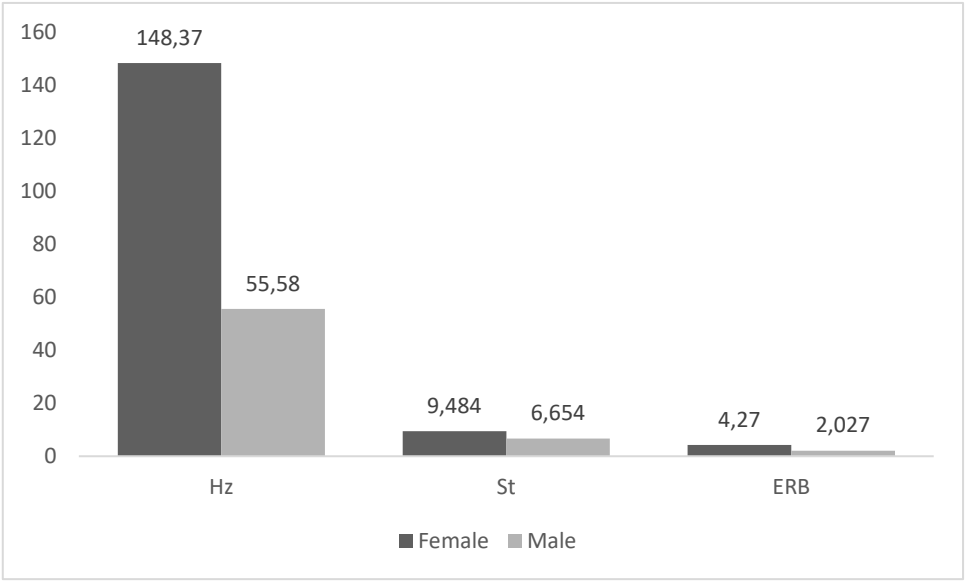


Figure 6. 14 Mean values of pitch ranges in Hz/ ST/ ERB between female and male speakers in the incredulity question tune

6.4.3.6 Pitch Range Differences in Request Tune

Analogous to the previous findings, there was a statistically salient influence of gender on the pitch range across the three pitch scales in the request tune: [F (1, 58) = 89.197, p = <.001] for pitch range in Hz, [F (1, 58) = 17.992, p = <.001] for pitch range in St, and [F (1, 58) = 114.399, p = <.001] for pitch range in ERB. Both Table 6.11 and Figure 6.15 below indicate that female pitch range values were larger compared to their male counterparts.

Table 6. 11 *Pitch range values (*Hz/St/ERB*) for female and male speakers in the request tune*

Pitch Scale	Female		Male		Total	
	mean	SD	mean	SD	mean	SD
Hz	163.90	56.656	60.40	19.824	112.15	67.040
St	10.183	2.706	7.528	2.104	8.856	2.750
ERB	4.894	1.211	2.231	0.624	3.562	1.647

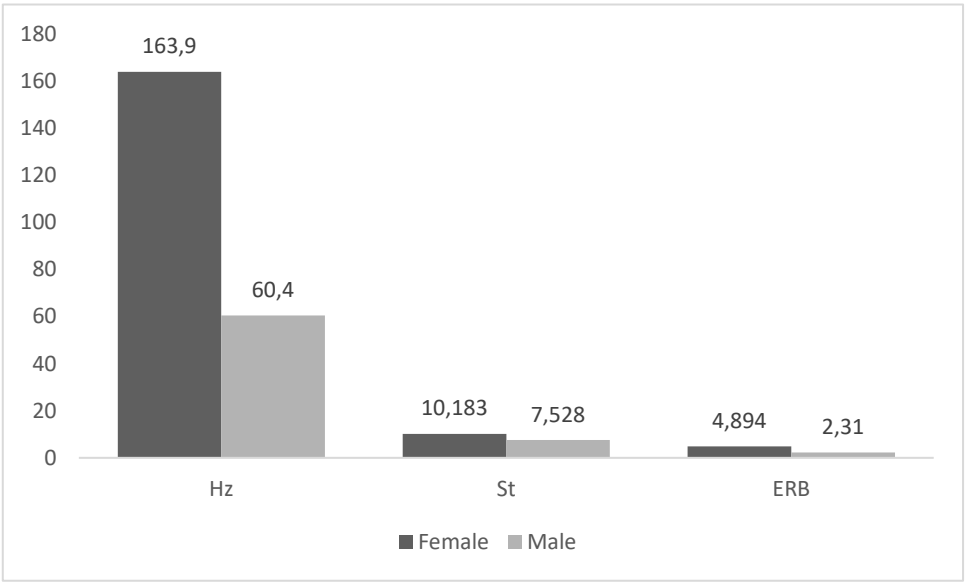


Figure 6. 15 Mean values of pitch ranges in Hz/ ST/ ERB between female and male speakers in the request tune

6.4.3.7 Pitch Range Differences in Imperative Tune

As for the last sentence type, results were akin to those observed earlier. A significant effect was found for the three pitch scales with females' pitch range broader than males': [F (1, 75) = 84.467, p = <.001] for pitch range in Hz, [F (1, 75) = 17.218, p = <.001] for pitch range in St, and [F (1, 75) = 100.201, p = <.001] for pitch range in ERB, as demonstrated in Table 6.12 and Figure 6.16.

Table 6. 12 *Pitch range values (*Hz/St/ERB*) for female and male speakers in the imperative tune*

Pitch Scale	Female		Male		Total	
	mean	SD	mean	SD	mean	SD
Hz	145.64	52.365	58.55	26.208	102.66	60.218
St	10.502	3.045	7.762	2.736	9.150	3.191
ERB	4.484	1.182	2.151	0.826	3.333	1.552

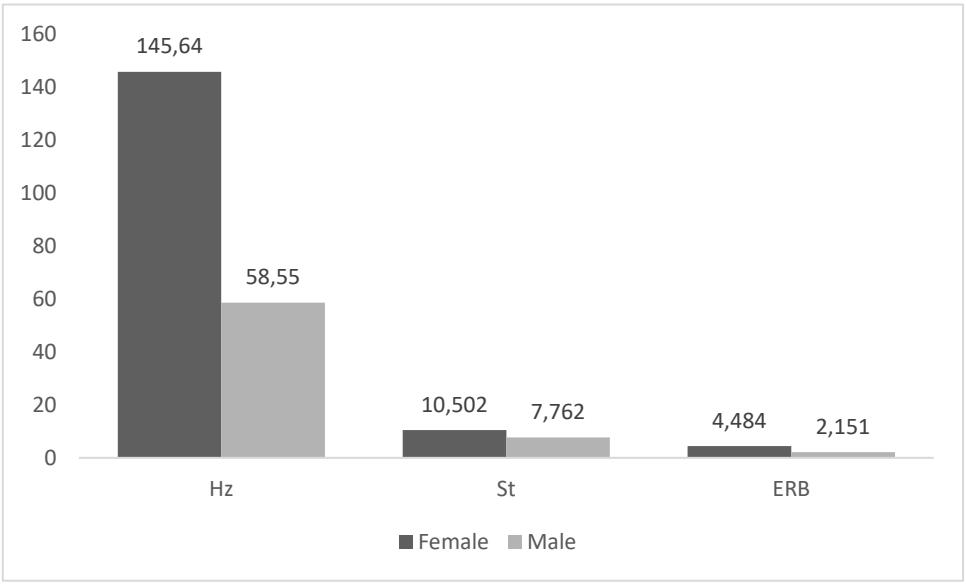


Figure 6. 16 Mean values of pitch ranges in Hz/ ST/ ERB between female and male speakers in the imperative tune

6.4.3.8 Pitch Range Comparison across all Tunes

The two-way ANOVA statistical analysis evinced a significant main effect of Gender * TuneType interaction on the pitch range across the three scales (p = < .001 for each pitch measurement scale). Crucially, results, as depicted in the following figure, demonstrated that greater differences across the types of sentences were considerably marked in female speech than in male speech. When focusing on the normalized values, the ERB scale revealed that female

speakers produced significantly broader pitch range in the yes/no question tune followed by the wh-question tune compared to the rest of tunes (6.666 ERB in yes/no question, 5.195 ERB in wh-question, and around 4 ERB in the rest of tunes). Conversely, male speakers were found to produce broader but less salient pitch range in the yes/no question and wh-question tunes, without any distinction between these two types of questions, in comparison to the remaining types of sentences (3.095 ERB in yes/no question, 3.041 ERB in wh-question, and around 2 ERB in the rest of tunes).

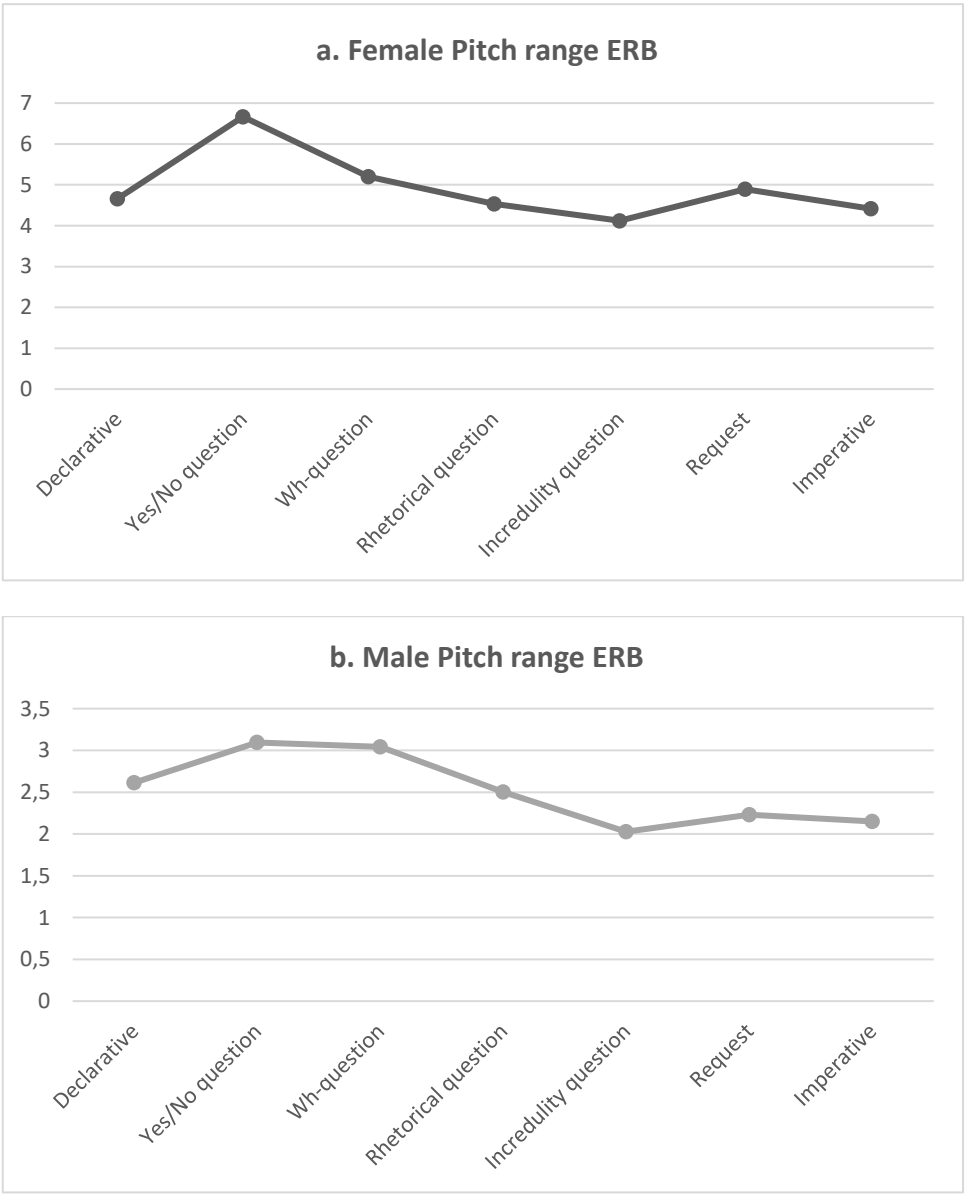
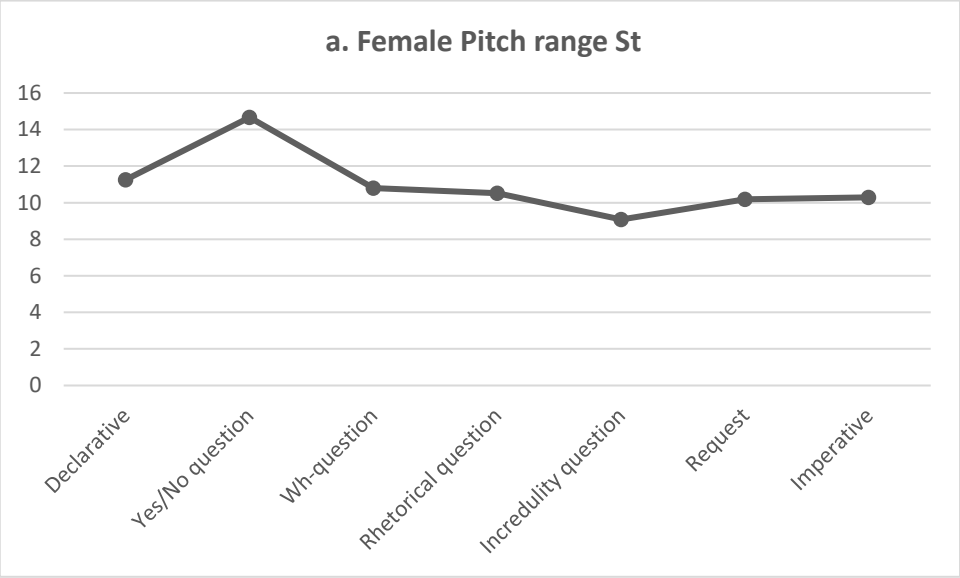


Figure 6. 17 Mean values of pitch range ERB across tunes in female speech (a) and in male speech (b)

The semitone scale displayed the same findings as regard the realization of the yes/no question tune in female and male speech. This question type was characterized by a significantly greater pitch range than the other types of sentences in female speech. In contrast, it was similar to that of wh-question in male speech, with both having higher pitch ranges than the other types of tunes. However, this scale exhibited further nuances. In both female and male speech, there was a tendency to produce larger pitch ranges in the declarative sentence compared to the remaining types of sentences. Besides, results in this pitch scale indicated that there was no significant difference in the pitch range of wh-questions between female and male speakers (10.803 St and 10.440 St, respectively). Moreover, female speakers were observed to pronounce rhetorical question, request, and imperative tunes as well as wh-question tune with broader pitch ranges, without any remarkable difference (all approximately around 10 St) in comparison to their male counterparts. The incredulity question received the least pitch ranges for both male and female speakers. These distinctions are displayed in the figure below:



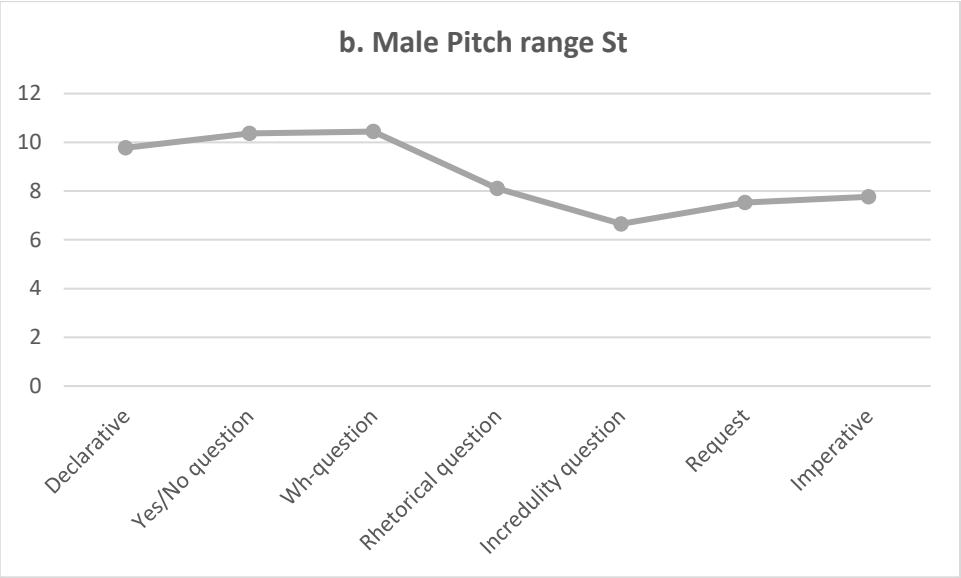


Figure 6. 18 Mean values of pitch range St across tunes in female speech (a) and in male speech (b)

6.5 Discussion

The current chapter suggests that intonation could signal some aspect of gender-related identity. Results revealed significant effects of gender on the realization of the intonational patterns in Algerian Arabic as spoken in Oran. Looking first at prosodic focus marking, both male and female speakers used intonation to encode focused constituents. Essentially, the intonational marking was highly significant to distinguish broad focus from narrow focus similarly in male and female speech. This was manifested by means of higher F0 peak, more expanded excursion size, and longer duration of the on-focus element, in addition to post-focus compression under narrow informational and contrastive foci compared to broad focus. In addition to that, both genders seemed to put more prosodic effort to mark the focused targets when occurring in the initial sentential position rather than penultimate and ultimate positions. Nevertheless, an intriguing opposition was detected in this scope. Results unveiled that male speakers particularly had a tendency to differentiate between the two types of narrow focus. They were observed to pronounce contrastive focus with more pitch range expansion than information focus. Accordingly, we can postulate that male speakers tend to employ exaggerated intonation to correct the given information even more significantly than giving the information to the listener.

Moreover, this chapter casted light on a further intonational aspect that distinguishes female speech from male speech. Our analysis pinpointed to female speakers' preference for a high rise (H-H%) phrasal-boundary combination in comparison to male speakers who were more likely to favor a falling (L-L%) phrasal-boundary combination instead. This finding is in agreement with prior research (such as Jiang, 2011; Huang and Zhang, 2019), indicating that female speakers across various speech communities are more inclined to end their utterances in a rising tone, whereas male speakers exhibit an increased use of a falling edge tone. Additionally, this tendency may be compatible to one of the prevalent intonational patterns attested as a distinguishing feature between genders speech, which is HRT (High Rising Terminal) that characterizes female speech

in particular (Guy et al., 1986; Britain, 1992, 1998; Warren & Daly, 2000; Warren, 2005b; among others). Given that these findings were dependent upon the story re-telling task where participants were asked to re-narrate the story from memory in their own style, one could assume that this intonational variation attested between the genders can be accounted for with reference to Ladd's (1980) claim: Female's inclination towards high boundary tones is primarily to signal non-finality. A further reasonable account we can posit is that females were more involved with the task of narration and more willing to maintain the listener's attention tethered to the story flow in comparison to male speakers. Indeed, in much the same way McConnell-Ginet (1978) contended that female speakers are more likely to utilize certain pitch patterns according to the communicative needs dictated by the conversational context.

Furthermore, our results confirmed that pitch range serves as an intonational marker to differentiate between female and male speech. We probed both genders pitch range using three main measurement scales: the linear Hertz scale, the logarithmic Semitones scale, and the ERB scale. The findings revealed that in all types of sentences female speakers consistently demonstrated a broader pitch range across the three scales in comparison to male speakers. In this regard, the linear Hertz pattern is not surprising since it mirrors sex-based disparity that stems from the anatomical differences between female and male speakers (Henton 1989; Haan and van Heuven, 1999; Daly and Warren 2001). As already pointed out, female speakers possess shorter vocal tracts which deliberately generate higher F0 values compared to male speakers (Fant, 1966; Biemans, 2000).

Nevertheless, both of the Semitones and ERB speech normalization scales ascertain that female speakers' larger pitch range than their male counterparts does function as a marker of gender-based disparity. This result lends support to the already-established stereotype documented in earlier research such as McConnell-Ginet, 1978; Haan and van Heuven, 1999; Daly and Warren 2001, and rebuts Henton's results. In the light of this outcome, it is fairly plausible to argue that

the relationship between a speaker's pitch range and their gender identity which is socially and culturally constructed, is not only common in Western speech communities but also in Arabic-speaking communities like the Algerian one. Given that the results demonstrated significant effects of gender on the normalized pitch range with female speakers displaying larger values than males, we can embrace Ohala's (1983) interpretation which associates pitch level with personality traits reflecting femininity in women and masculinity in men. On this view, Ohala (1983) has asserted that a low pitch is affined to self-assured, assertive, and dominant behavior, while a high pitch is linked with submissive, non-confrontational, and polite demeanor.

This sociophonetic aspect is even more conspicuous in the results obtained for gender when interacted with the type of tune. In fact, when we examined the gender-related pitch range variation in terms of seven types of sentences (declaratives, yes/no questions, wh-questions, rhetorical questions, incredulity questions, requests, and imperatives), female and male speakers showed more distinct intonational differences. Intriguingly, the yes/no question tune stood out as the most prominent distinction in female speech, marked significantly with a wider pitch range followed then by the wh-question tune in comparison to the rest of tunes. Alternatively, both types of questions were analogously marked with larger pitch range than the other tunes in male speech. However, the disparity was eminently greater in female rather than male speech. This implies that female speakers tend to demonstrate politeness in their conversation to a greater degree than male speakers, specifically when asking direct information-seeking questions.

Even more importantly, our results detected that after the yes/no question and wh-question tunes comes the declarative tune realized with more expanded pitch range compared to the rest of the examined tunes for both genders with females producing larger values than males. This can be accounted for with reference to the type of the task in which the speakers were involved. Essentially, the declarative data consisted of four statements of which three were extracted from the story-telling task and one from reading isolated sentences task, meaning that a greater part of

the data relied on the first task. It is ergo crucial to pinpoint that these extracted utterances focused on announcing the death of the old woman and her son in narrating the story (See Appendix B). As a result, speakers produced broader pitch ranges in the declarative tune as a way to express more emotionality (particularly emotions like grief, sadness, and sorrow according to the context of the story) in their speech. This finding thus corroborates the assumption documented in Daly and Warren (2001) and in Lowry (2011) in that the nature of the task could have a great impact on the findings. Both researchers have found out that stronger differences in pitch ranges were detected in the story-telling task compared to the sentence list task. Besides, it underpins the already-established argument which stipulates the broader the pitch range employed, the stronger the perceived emotional expression (McConnell-Ginet, 1978; Lowry, 2011).

Additionally, results revealed that more expended pitch ranges were realized by female speakers in the request, imperative, and rhetorical question tunes compared to their male counterparts. In this regard, one could evidently posit that female speakers demonstrated considerably an increased use of intonation as a politeness strategy to protect and show more attention to their addressee's 'face wants' during social interaction (Goffman, 1981; Brown & Levinson, 1987) since requests, orders, and rhetorical questions – the latter used to express disapproval and criticism in our corpus – are all face-threatening acts to the hearer (Brown & Levinson, 1987). With respect to the incredulity question, it was ranked as the least tune, realized with a lower pitch range compared to the other tunes for both genders. This is because such a type of questions apparently did not bear any indication of face-threat to the listener, as it merely conveys the speaker's surprise and disbelief.

Taken together, our study rebuts Lakoff's (1975) assumption that gender-based intonational variation is connected to women's uncertain and submissive demeanor. Instead, it confirms that this variation carries positive connotations, such as expressing non-finality and showing more politeness.

6.6 Conclusion

The present chapter demonstrated that gender does function as a social factor in intonational variation in OSA. Male and female speakers were found to employ distinct patterns of intonation. Crucially, female speech was characterized by a significantly increased use of a High rising edge tone (H-H%) as opposed to male speech which showed to a greater degree a use of a fall edge tone (L-L%). Moreover, male speakers tend to reveal exaggerated intonation in order to correct the given information, even more prominently than giving the information to the listener. This chapter also lends further weight to the claim that systematic differences between genders in terms of intonation are achievable when eliminating sex-based differences via Semitones and ERB pitch scales – mainly the Semitones scales. This suggests that this intonational variation is confined to the speaker's gender identity. Interestingly, female speakers displayed larger pitch ranges compared to male speakers. This disparity was also found to be contingent upon the type of tune.

GENERAL CONCLUSION

AND

RECCOMENDATIONS

General Conclusion and Recommendations

Pitch modulation serves as an indispensable means to imply linguistic, pragmatic, and social connotations. In this respect, the primary objective of the current dissertation was to examine the intonational patterns as realized by adult male and female speakers of the dialect of Algerian Oran Arabic within the AM framework. To this end, twenty adult participants who were born and raised in the city of Oran, sharing a homogeneous social background, and most importantly speaking with OSA were recorded for the purpose of this research endeavor. The following is a concise encapsulation of the main outcomes unveiled in this research endeavor accompanied with pertinent limitations and suggestions for future work.

Initially, chapters one and two were confined to the theoretical part of this dissertation which made a crucial headway in our data analysis. A galloping body of prosodic literature has embraced the AM framework in the analysis of intonational systems of languages and varieties. This framework enables the scrutinization of the phonological components in an intonation contour with reference to their phonetic realizations surfacing as F0 relevant tonal events. Thereafter, we provided a linguistic overview with special attention to the phonetic and phonological properties of the dialect of OSA. This helped us gain a robust understanding of the mechanisms of prosody in our experiments. Furthermore, we sketched out a considerable number of pertinent prior studies cross-linguistically as well as across various vernaculars of Arabic as it is prerequisite to set a strong foundation for every phase of our research endeavor (data design, collection, analysis, and discussion).

Chapter three was affined to delineate the methodology adopted in this dissertation. The present corpus was developed on the basis of four speech tasks: reading isolated sentences, roleplay dialogue, storytelling, and story re-telling. The annotation of the utterances draws upon the ToBI-like model carried out by means of PRAAT textgrids. However, the annotation in this

study was limited to Tones only. Future research is requested to cover also the Break Indices which map out lexical and phrasal junctures/boundaries. Both qualitative and quantitative examinations of the dataset were undertaken. Nevertheless, given that the speech material in the present study was primarily based on controlled and semi-controlled stimuli, future studies might expand the corpus to encompass spontaneous speech.

We launched our analysis in chapter four by examining the tonal inventory of OSA within distinct types of tunes to answer the first two research questions. The tonal inventory of this dialect was found to comprise four major pitch accents (H*, !H*, L*, and L+H*), three phrase accents (H-, !H-, and L-), in addition to two boundary tones (H% and L%). The combination of these tonal events generated different melodies with different grammatical and pragmatic meanings. However, these findings are open to criticism because they are dependent on the present speech materials. Accordingly, further investigations may add or adjust these findings. Additionally, the preliminary model of OSA intonational system proposed in the present dissertation would be underpinned in future studies if researchers on Algerian Arabic in general and OSA in particular address other relevant patterns such as prosodic structure and tonal alignment. Thereby, a thorough intonational examination within the AM theory would be provided to allow cross-linguistic and cross-dialectal comparisons.

Chapter five addressed a further intonational pattern in this dialect of Algerian Arabic. It was directed to investigate the intonational encoding of one of the Information Structure aspects. Specifically, in an attempt to answer the third research question, this chapter tended to probe both phonologically and phonetically whether (or not) and how narrow focus (informational and contrastive foci) are intonationally marked in comparison to broad focus. Results revealed deviant patterns as regard F0 configuration for the target element under narrow focus context in correlation with lexical stress patterns. As a corollary, future research should involve words with different syllabic structures (monosyllabic words or words with stress assigned to the first syllable). It is

recommended also to carry out an acoustic analysis on lexical stress assignment in Oran Spoken Arabic. Notably, recent empirical studies on Moroccan Arabic exhibited the absence of lexical stress (Bruggeman et al. 2020). As such, given that OSA falls within the same dialect continuum as Moroccan Arabic, it is advisable to re-address this prosodic feature in our dialect, adhering to the same methodological tools. Moreover, as previously mentioned, investigating F0 peak alignment might be a valuable avenue for future works to provide a better understanding of F0 movement under focus environment.

Eventually, chapter six was devoted to the sociophonetic angle of this dissertation and thereby answering the last research question raised in this dissertation. It sought to probe the gender-related intonational variation in OSA in terms of tonal configuration, prosodic focus marking, and pitch range differences in correlation with the type of sentence. It was observed that gender functions as a social factor in distinguishing such suprasegmental features in this dialect. Moreover, this chapter demonstrated that the normalization of F0 sex-based disparity through Semitones and ERB pitch scales does not eliminate gender-based systemic differences. Intriguingly, results indicated that female speakers of OSA showed higher propensity for a high rising H-H% phrasal-boundary combination compared to male speakers who were more inclined to use a falling L-L% counterpart. Besides, female speech exhibited broader pitch ranges than male speech. These realizations were found to reflect females' attention to show emotionality, politeness and care about the listener's 'face wants'. An encouraging avenue for future research in this field would be in exploring other social factors such as age, region, and socio-economic and educational background. Additionally, future research could incorporate perceptual experiments to back up the production findings.

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APPENDICES

Appendix A

Speech Materials

1) Reading Isolated Sentences

بلال يغني الراي .

Bilal sings Rai.

تخدم غدوا؟

Do you work tomorrow?

عمرت الما؟

Did you fill up (unspecified object) with water?

هدرت مع جمال؟

Did you speak to Djamal?

وينتا دابزوا؟

When did they have a quarrel?

كيراكم دايرين؟

How are you (plural) doing?

شعال راها دير دروك؟

How much is it now?

دروك شعال راها دير؟

Now how much is it?

ماعليش توصلني في طريقك؟

Is it possible to drive me on your way?

بلع الباب.

Close the door!

راك في عقلك؟!

Are you conscious?!

من نيتك؟!

Are you serious?! (Seriously ?!)

2) Roleplay Scripted Dialogue

❖ رحت عند عمتك باش تسقسيها الا راهي رايحة لعنابة. شاتقولها؟

You wanted to know if your aunt will go to Annaba. You asked her:

راكي رايحة لعنابة؟

Are you going to Annaba?

عمتك راهي رايحة لعنابة. ونتا انخلعت!! ماأمنتش!! تقولها:

Your aunt has told you that she is going to Annaba, but you were incredulous and could not believe that. You say:

راكي رايحة لعنابة؟!!

Are you going to Annaba?!!

❖ مك عيطتلك ..... نتا ترد عليها:

Your mother has called you …… (the participant's name). You respond:

شوالا؟

What?

مك هدرت معاك بصح نتا ماسمعتهاش. سقسيتها باش تعاودلك:

Your mother has told you something, but you did not catch what she said. You asked her to repeat:

شوالا؟

What ?

مك قاتلك عمتك راهي رايحة لعنابة. ونتا انخلعت!! ماأمنتش!! قلتلها:

Your mother has told you that your aunt is going to Annaba, but you were incredulous and could not believe that. You say:

شوالا؟!!

What ?!!

❖ البارح مراد وجمال دابزوا. ونتا كنت حاضر. جا عندك صاحبك سقساك: شاصرا؟

Yesterday, Murad quarreled with Djamal, and you witnessed that. Then, your friend came and asked you: What happened?

خبرته: مراد دابز مع جمال البارح.

Murad quarreled with Djamal yesterday.

البارح مراد وجمال دابزوا. ونتا كنت حاضر جا عندك صاحبك سقساك:

Yesterday, Murad quarreled with Djamal, and you witnessed that. Then your friend came and asked you:

معامن دابز مراد البارح؟

Who quarreled with Murad yesterday?

جمال دابز مع مراد البارح.

Djamal quarreled with Murad yesterday.

معامن دابز مراد البارح؟

Who quarreled with Murad yesterday?

مراد دابز مع جمال البارح.

Murad quarreled with Djamal yesterday.

البارح معامن دابز مراد؟

Yesterday who quarreled with Murad?

البارح مراد دابز مع جمال.

Yesterday Murad quarreled with Djamal.

البارح مراد وجمال دابزوا. ونتا كنت حاضر. جا عندك صاحبك سقساك:

Yesterday, Murad quarreled with Djamal, and you witnessed that. Then, your friend came and asked you:

معامن دابز مراد البارح؟ مع كريم؟

Who quarreled with Murad yesterday? With Karim?

جمال دابز مع مراد البارح.

Djamal quarreled with Murad yesterday.

مراد دابز مع كريم البارح؟

Did Murad quarrel with Karim yesterday?

مراد دابز مع جمال البارح.

Murad quarreled with Djamal yesterday.

البارح مراد دابز مع كريم؟

Yesterday did Murad quarrel with Karim?

البارح مراد دابز مع جمال.

Yesterday Murad quarreled with Djamal.

3) Storytelling

- In Arabic Script:

الدنيا دوارة

وحد المْرا مات راجلها وخلالها ولد و دار فوضاوي.

كانت مسكينة تخدم فالديار باش تكبر ولدها و تلم للعقايب.

كبر ولدها. كان نهار خدام و عشرة لا. عولت مه تزوجه.

ڤاتله : "يا ولدي...وينتا نفرح بيك؟ "

ڤالها : "نتزوج و انا معنديش دورو؟!"

جبدتله الدراهم لي كانت داستهم. ڤاتله :"هاك . بني بيهم زوج ديار: وحدة ليك و وحدة ليا."

فرح. راح بنى دارهم و تزوج.

كانوا عايشين غاية حتى زاد عنده ولد . تما مرته انڤلبت. ولت توسوسله بش يرد مه للدار القديمة.

راح عند مه و ڤالها : "ما!..علاه ما توليش للدار القديمة ؟"

حط راسه و ڤالها :" ماشي هكا تتهني من حس الغريان ؟"

أيا مه تحلبت . رفدت روحها و ولت لدارها.

وصى الراجل مرته كي طيب تتهلى فيها. بصح مرته كانت كل ما طيب تڤلعلها حقها تع اللحم.

جا النهار وين ماتت الشيبانية.

زعف عليها ولدها بزاف و مات موراها .

دارو الليام و دارت الجرارة. ديك المرا كبرت في ميزيرية. ولدها كبر و تزوج.

داها تسكن فالدار القديمة كيما جداته.

ڤال لمرته تعطيها الطرف الكبير تع اللحم.

بصح كل ما تديلها الماكلة يجي برارج و يخون اللحم.

توسوست . ڤالت لراجلها :" نتا دي الماكلة لمك اليوم."

كي جا دايلها الماكلة جا داك البرارج و داله اللحم .

خبر مه شاصرا. ڤاتله :"يا ولدي....الدنيا دوارة . نهار ليك و نهار عليك . "

❖ English Translation:

What Comes Around Goes Around

There was once a widowed woman living alone with her little son in a slum home.

The poor woman was working as a housemaid to raise her child and squirrel away money for the future.

Her son grew up. He was a precarious worker. His mother had decided to get him married off.

She asked him: “My son! When are you getting married?”

He replied: “I get married while I’m broke?!!”

She took out the money she had been saving, and told him: “Take this! Build two shanties: one for you and one for me.”

Her son got happy. He built a shanty next to theirs, and got married after.

They were living in peace until he had a baby. Thereafter, his wife had changed. She started urging him to take his mother back to the old house.

The son went to his mother and asked her: “Mum! Why don’t you return to the old home?”

He bent his head feeling sorry, and carried on saying: “Isn’t it in this way you get rid of the baby’s noise?”

Then the mother had understood. She went back to the old home.

The son asked his wife to take care of his mother’s food. However, she used to give her mother-in-law the food without her part of the meat whenever she cooked.

Then came the day the old woman passed away.

Her son felt extremely sorry for her death, and then he died.

Time passed and karma got back at the woman (the daughter-in-law).

She got old and lived in misery. Her son grew up, and got married. He took his mother to live in the old home, just like his grandmother was.

He asked his wife to give her a big part of the meat.

However, whenever she was delivering the food to the woman, a stork came and snatched the meat.

She became suspicious. She went to her husband and demanded: “You take the food to your mother today!”

When the man was taking the food to his mother, a stork came and snatched the meat.

He informed his mother about what happened.

She told him: “My son! What comes around goes around. What it is with you today can be against you on another day.”

4) Story Re-telling Visual Aids[13]

The old woman

[13] All these pictures were taken from Google images.

The old house

Stork

Meat

Appendix B

Stimuli for Gender-Related Pitch Range Variation

1. Declarative Tune:

بلال يغني الراي.

Bilal sings Rai.

راح بنى حدى دارهم وتزوج.

He built near their house and got married.

جا النهار وين ماتت الشيبانية.

The day came when the old woman died.

زعف عليها ولدها بزاف ومات موراها.

Her son felt extremely sad for her and died after her.

2. Yes/no Question Tune:

تخدم غدوا؟

Do you work tomorrow?

عمرت الما؟

Did you fill up (unspecified object) with water?

هدرت مع جمال؟

Did you speak to Djamal?

راكي رايحة لعنابة؟

Are you going to Annaba?

ماشي هكا تتهني من حس الغريان؟

Isn't it like this you get rid of the kid's noise?

3. Wh-question Tune:

وينتا دابزوا؟

When did they have a quarrel?

كيراكم دايرين؟

How are you (plural) doing?

شعال راها دير دروك؟

How much is it now?

وينتا نفرح بيك؟

When are you getting married?

علاه ماتوليش للدار القديمة؟

Why don’t you return to the old house?

4. Rhetorical Question Tune:

راك في عقلك؟!

Are you conscious?!

من نيتك؟!

Are you serious?! (Seriously ?!)

5. Incredulity Question Tune:

راكي رايحة لعنابة؟!!

Are you going to Annaba?!!

6. Request tune:

ماعليش توصلني في طريقك؟

Is it possible to drive me on your way?

7. Imperative tune:

بلع الباب.

Close the door!

(نتا) دي الماكلة لمك اليوم.

(You) take the food to your mother today.

الملخص

حاولت هذه الدراسة إجراء تحليل تجريبي للأنماط النغمية التي ينتجها المتحدثون باللهجة الوهرانية من الذكور والإناث في غرب الجزائر، ضمن نظرية القياس الذاتي القطعي. وعلى وجه الخصوص، فان هذه الدراسة قد قامت على أساس هدف ثلاثي: (1) فحص المخزون النغمي وتركيب الأنغام في هذه اللهجة؛ (2) استكشاف الطرق التي يساهم بها التنغيم في بنية التركيز الضيقة (التركيز المعلوماتي والتركيز التصحيحي) وبنية التركيز الواسعة؛ و (3) التحقيق في أي اختلاف نغمي محتمل يتعلق بالجنس في مجتمع الكلام في وهران وهذا فيما يتعلق بالتكوين النغمي، وعلامات التركيز الايقاعي، وتحقيق نطاق درجة الصوت ضمن أنواع مختلفة من الأنغام. ولتحقيق هذه الغاية، تم تسجيل عددا من ناطقي هذه اللهجة خلال إنتاج المواد الكلامية المضبوطة وشبه المضبوطة. أظهر التحليل التجريبي للمنحنى الصوتي للتردد الأساسي (F0) أن هذه اللهجة أظهرت مخزونًا نغميًا غنيًا أدى إلى تكوين العديد من الألحان ذات المعاني العملية المميزة. بالإضافة إلى ذلك، أظهرت النتائج النوعية والكمية أن التنغيم كان بمثابة جزء لا يتجزأ من تشفير بنية التركيز والتمييز بين التركيز الواسع والتركيز الضيق من خلال التعزيزالصوتي على التركيز والضغط بعد التركيز. وبالإضافة الى ذلك، لقد عززت نتائج التدقيق الصوتي الاجتماعي في هذه الدراسة الافتراض القائم بالفعل والذي ينص على أن التنغيم يعكس الهوية الجنسية للمتحدث.

كلمات مفتاحية: التنغيم، العربية الجزائرية المنطوقة بوهران، نظرية القياس الذاتي القطعي ، التركيز الإيقاعي، الجنس، نطاق النغمة، تحليل صوتي

Résumé

La présente étude a tenté d'analyser expérimentalement les modèles intonatifs, réalisés par les locuteurs masculins et féminins de l'arabe oranais parlé dans l'ouest de l'Algérie dans le cadre de la théorie autosegmentale-métrique. En particulier, il a été établi sur la base d'un triple objectif : (1) examiner l'inventaire tonal et la composition des mélodies dans ce dialecte ; (2) explorer la manière dont l'intonation contribue au marquage phonologique et phonétique de la structure focale étroite (focalisation informationnelle et focalisation contrastive) et de la structure focale large ; et (3) étudier toute variation intonationale potentielle liée au genre dans la communauté linguistique d'Oran en ce qui concerne la configuration tonale, l'encodage du focalisation prosodique et la réalisation de l'intervalle de hauteurs au sein de différents types de mélodies. À cette fin, un nombre de locuteurs de ce dialecte ont été enregistrés lors de la production de matériel vocal contrôlé et semi-contrôlé. L'analyse expérimentale du contour F0 a révélé que ce dialecte présentait un riche inventaire tonal qui a donné lieu à la composition de plusieurs mélodies aux significations pragmatiques distinctes. En outre, les résultats qualitatifs et quantitatifs ont montré que l'intonation faisait partie intégrante de l'encodage de la structure focale et de la distinction entre la focalisation large et la focalisation étroite grâce à l'amélioration phonétique focalisée et à la compression post-focalisation. Alternativement, les résultats de l'examen sociophonétique ont étayé l'hypothèse déjà établie selon laquelle l'intonation reflète effectivement l'identité de genre du locuteur.

Mots-clés : intonation, arabe parlé Algérien d'Oran, théorie autosegmentale-métrique, focalisation prosodique, genre, plage de fréquence, analyse acoustique