The Role of Phonology in the Disambiguation of Disjunctive Questions

Mohammad Ali Salah Bani Younes

PhD

University of York

Language and Linguistic Science

September 2020

Abstract

The disambiguation of similarly-worded alternative questions (altqs) and disjunctive yes-no questions (dynqs) has sparked a debate in English. The debate revolves around which prosodic feature can disambiguate them. In Arabic, little attention has been dedicated to how these two types of disjunction question are disambiguated. What adds to the complexity of the disambiguation in Arabic is that Arabic dialects, unlike English, use two disjunctive elements, equivalent to the English *or*, in altqs and dynqs.

In order to replicate Pruitt and Roelofsen's (2013) English perception study on Arabic, the disambiguating cues pertinent to Arabic need to be used in such a perception study. Hence, a thorough investigation of the general behaviour of disjunctive elements in the literature and in a corpus of eight Arabic dialects is run; based on this investigation, four dialects are selected for further investigation of the prosodic details of their disjunctive questions (Jordanian (JA), Egyptian (EA), Kuwaiti (KA), and Syrian (SA) Arabic) in two production studies. One is analysis of corpus production data in the four dialects, and the other is a production study dedicated to JA. The results of the two production studies indicate that both choice of disjunctive element (*ʔaw* vs. *willa*) and choice of contour (late-rise vs. rise-fall) seem to play a role in the disambiguation. So, two perception studies are run to investigate the relative role of each of the cues: one on JA, and one on all four dialects. The results reveal that the choice of contour contributes significantly to a dynq reading in all dialects, and the choice of disjunctive element contributes significantly to the disambiguation in three dialects (JA, EA, and KA). This finding shows that Arabic is 'like English' in employing choice of contour in the disambiguation, but it is also different from English in employing another disambiguating cue.

Table of Contents

Acknowledgements

Happily, I dedicate the whole thesis to my MOM, DAD, and all my family, especially my darling (WIFE) and SON.

The first support I got here in York was from my supervisor, Sam Hellmuth, who has always been happy to help. I will never forget her encouraging and supporting words when I needed them. Sam, thank you very much for all you have done for me during this long journey. You were like a member of my family. She was (and will always be) a model of good supervisors, if not the best! This thesis would be nothing without your continuous support.

I would also like to thank the viva committee for their help. It is my pleasure to have world-renowned scholars with excellent academic and research reputation, Dr Christopher Lucas and Dr Nino Grillo, as examiners of this thesis. I am proud of being examined by these famous scholars.

I would also like to thank Dr Kathryn Pruitt, who was always happy to exchange emails on multiple occasions, which helped clarify many things related to her paper (which is replicated in this thesis). She was always happy to answer my questions regarding her methodology, making her paper replicable.

I am also grateful to Prof. Ali AbuSeileek, the model, for always being there to help and encourage me to be patient and never give up. He used to encourage me by telling me what happened to him when he was doing his PhD; "*Never give up* is the secret of PhDs". He is a model to follow in academia and research.

I am deeply indebted to Prof. Omar Irshied Shdiefat, the most famous scholar in intonational phonology in Jordan, for all his advice. His continuous support and advice in intonational phonology will always be much appreciated. He was always there whenever I needed his support and help, hats off! Thanks are due to this great scholar.

I would also love to express my gratitude to Prof. Shahir El-Hassan, who is a world authority in the field of Arabic prosody, as he advised on many intonational issues in Jordanian Arabic and many other Arabic dialects. He was happy to answer mobile calls at all times.

Thanks are due to Dr Saudi Sadiq, an Egyptian linguist, for his advice on Egyptian Arabic. I would also like to thank Dr Mohammad Al Azmi for his insights and advice as a native

Kuwaiti linguist. Both Dr Saudi and Dr Al Azmi helped secure good numbers of participants from their own dialects.

To all my Jordanian, Egyptian, Kuwaiti, and Syrian friends who helped me to find a suitable number of participants, I would like to say that I am forever indebted to you. Thanks are also due to all participants in my experiments.

I would like to thank the TAP (Thesis Advisory Panel) member, Dr Norman Yeo, for all he did in the TAP meetings. Thanks are also due to Dr Shayne Sloggett, Dr Eleanor Chodroff, and Dr Vincent Hughes for their stats advice within our department. They were always there and happy to help me, hats off!

Declaration

I declare that this thesis is a presentation of original work and I am the sole author. This work has not previously been presented for an award at this, or any other, University. All sources are acknowledged as References.

I declare that some parts of this thesis have been published in the following two conferences (Abstract and proceedings/ **published**):

1. Bani Younes, M., & Hellmuth, S. (2020). The role of prosody in disambiguation of disjunctive questions in Jordanian Arabic: Evidence from production and perception. Paper presented at Arabic Linguistics Forum Conference, University of Leeds (30th June - 2nd July 2020).

2. Bani Younes, M., & Hellmuth, S. (2020). Disambiguating cues of disjunctive questions. In A. Botinis (Ed.), *Proceedings of 11 the International Conference of Experimental Linguistics, 11 (PP. 1-4)*. Athens: University of Athens.

Transcription Symbols used in some examples

(Adapted from the Intonational Variation in Arabic Corpus IVAr (Hellmuth & Almbark, 2017)

Given that this thesis is primarily a phonological study, IPA was chosen, which might help make this study a contribution to the cross-linguistic understanding of the intonation of these questions. IPA is used to make this thesis accessible to readers from outside the traditional Arabic dialectology or Arabic linguistics circle. In other words, the examples, and the thesis, will be accessible by those who are interested in disjunctive questions in general, and in other languages.

Arabic Script	IPA symbol (adopted in this thesis)	Symbols in IVAr Corpus
Consonants		
أ - الهمزة	ʔ	2
ب	b	b
ت	t	t
ث	θ	th
ج	ʒ	j
ح	ħ	H
خ	x	x
د	d	d
ذ	ð	dh
ر	r	r
ز	z	z
س	s	s
ش	ʃ	sh
ش	ʧ	ch
ص	$s^ʕ$	S
ط	$t^ʕ$	T
ض	$d^ʕ$	D
ظ	$ð^ʕ$, $z^ʕ$	DH, Z
ع	ʕ	3
غ	ɣ	gh
ف	f	f
ق	q	q

ك	k	k
g	g	g
ل	l	l
ل (emphatic/dark)	lˤ	l
م	m	m
ن	n	n
ه	h	h
و	w	w
ي	j	y
v	v	v
Vowels		
ا	aː	a:
ي	iː, eː	i:, e:
و	uː, oː	u:, o:
َ فتحة	a	a
ِ كسرة	i	i
ُ ضمة	u	u

List of Abbreviations

Most of the abbreviations are based on Leipzig Glossing Rules; some abbreviations were added to suit the purpose of this thesis and to account for some grammatical functions observed in some cited examples.

1	First person
2	Second person
2lr	ʔaw with a late rise
2rf	ʔaw with a rise fall
3	Third person
ABS	Absolutive
ACC	Accusative
Altq	Alternative question
AUX	Auxiliary
DCT	Dialogue completion task
DE	Disjunctive element
DECL	Declarative
DEF	Definite
DQ	Disjunctive question
DU	Dual
Dynq	Disjunctive yes-no question
EA	Egyptian Arabic (in Experiment 2)
egca	Egyptian Arabic (in the IVAr corpus data)
ERG	Ergative
EXCL	Exclusive
F	Feminine
fco	Free conversations (in the corpus)
FUT	Future
IMP	imperative
INDF	Indefinite
INF	Infinitive
IP	Intonational phrase
irba	Iraqi Arabic in IVAr
JA	Jordanian Arabic
joam	Jordanian Arabic from Amman City (in the IVAr corpus)
joka	Jordanian Arabic from Karak City (in the IVAr corpus)
KA	Kuwaiti Arabic (in Experiment 2)
kwur	Kuwaiti Arabic (in the IVAr corpus data)
L1	First language
L2	Second language
M	Masculine
map	Map tasks
mobi	Moroccan Arabic (bilinguals) in IVAr
moca	Moroccan Arabic (from Casablanca) in IVAr
moco	Moroccan Arabic (older speakers from Casablanca) in IVAr
MSA	Modern Standard Arabic
NEG	Negative
NOM	Nominative
not-altq	Not-alternative question
Nynq	Normal yes-no question
ombu	Omani Arabic in IVAr
PARTIT	partitive
PL	Plural
POL	Polar question
POSS	Possessive
PROG	Progressive
PRS	Present
PST	Past
Q	Question particle
ret	Memory-retelling tasks
SA	Syrian Arabic (in the experiments)
SG	Singular
syda	Syrian Arabic (in the IVAr corpus data)
TR	Transitive
tuns	Tunisian Arabic in IVAr
UJA	Urban Jordanian Arabic
wlr	Willa with a late rise
wrf	Willa with a rise fall

1 Introduction

1.1 Purpose of the Study

The main aim of this study is to explore which cues disambiguate different types of string-identical disjunctive questions: alternative questions (altqs) and disjunctive yes-no questions (dynqs). The study also aims to explore the relative contribution of each cue to meaning, in Arabic. Consider the following example in English (Pruitt and Roelofsen, 2013, p. 632):

(1.1) Is Marcia allergic to dairy or soy?

Pruitt and Roelofsen pointed out that this example can be either an altq (answered with *dairy* or *soy*) or a dynq (answered with *yes* or *no*). In the first interpretation, it is “asking which of dairy or soy it is that Marcia is allergic to” (p. 632) whereas in the second it is “asking whether Marcia is allergic to either of dairy and soy, with the understanding that the distinction between the two is unimportant” (p. 633). They also reported that what disambiguates the two readings in English is prosody, such as accents on the disjuncts *X* and *Y* and choice of final contour shape: altqs have accents on both *X* and *Y* and a fall; dynqs have a single accent on *Y* and a rise (more details about other disambiguating prosodic cues from their study will follow later on).

Consequently, this study was inspired by Pruitt and Roelofsen’s (2013) experimental study addressing these issues in English. However, in order to replicate their study in Arabic, one must first scrutinise these types of disjunctive question and find out what might distinguish them from each other, given that differences between them have not previously been systematically reviewed. A legitimate query might be whether or not these question types have the same prosodic features and whether or not they are disambiguated in the same way as in English. Pruitt and Roelofsen (2013) derived the prosodic properties of disjunctive questions from the literature and tested them in a perception study. Arabic is expected to have different prosodic properties to English, motivating the replication of this area of investigation on Arabic.

Achieving this goal requires three intertwined pieces of evidence that, together, lead to an original contribution to this field in Arabic. First, because Arabic has two possible disjunctive elements, equivalent to English *or*, that can be used in both types of altqs and dynqs, a text corpus search was conducted (Chapter 4), which helped establish the nature of these two disjunctive elements and their distribution in different Arabic dialects. Second, in order to know which disjunctive element is used in which type of disjunctive question and in order to investigate the prosodic differences between altqs and dynqs, two production studies (Chapter 5) were run. The corpus production study (Section 5.4) on Jordanian (JA), Egyptian (EA), Kuwaiti (KA), and Syrian (SA) Arabic aimed to investigate the prosody of possible disjunctive question utterances from the corpus recordings. These dialects were chosen based on their disjunctive element distribution observed in Chapter 4. The JA production study (Section 5.5) was run to investigate disjunctive element behaviour and the prosodic features of disjunctive questions from newly collected data. Third, after the production study had established the prosody of altqs and dynqs and the behaviour of disjunctive elements in disjunctive questions, the choice of contour and the choice of disjunctive element were selected as independent variables in a JA perception study (Experiment 1). This results in a slightly different set of variables from the ones Pruitt and Roelofsen manipulated in their study of English. These three pieces of experimental evidence helped achieve the empirical goal of this study, namely to replicate Pruitt and Roelofsen's study on JA, but with the features pertinent to JA. The same JA experiment (Experiment 1), with slight changes in the design, was then replicated on JA, EA, KA, and SA (Experiment 2) as a first exploration of potential variation in the disambiguating cues across Arabic dialects.

1.2 Significance of the Study

Prosodic differences between altqs and dynqs have been extensively explored in English, whether experimentally or non-experimentally (e.g., Quirk, Greenbaum, Leech, & Svartvik, 1985; Aloni & van Rooy, 2002; Romero & Han, 2003; Han & Romero, 2004; Beck & Kim, 2006; Pruitt, 2008a; Pruitt, 2008b; Bartels, 2013; Truckenbrodt, 2013; Pruitt & Roelofsen, 2013; O'Mahony, 2014; Heidenreich, 2019, etc.). Different studies report conflicting results as to which cue is the most important one in setting apart these string-identical questions in English.

In Arabic, however, altqs and dynqs have not been thoroughly investigated or directly compared to each other. That is, researchers tend to refer only to either one of them. For example, some researchers (El-Hassan, 1988; Kulk, Odé, & Woidich, 2003; Hellmuth, 2018; Hellmuth, to appear, etc.) have referred only to altqs but have not addressed the prosodic cues or the choice of disjunctive element (*ʔaw* vs. *willa*) that might distinguish altqs and dynqs. To date, even those studies that provide examples of both altqs and dynqs have not specifically elaborated on their prosodic or lexical (i.e., choice of disjunctive element) differences (see, Al Amayreh 1991, for instance). In general, prosody in Arabic is rarely studied, let alone altqs and dynqs.

Consequently, the primary significance of this study stems from the fact that prosody, in general, is rarely studied in Arabic. This study is also significant because it seems that little is known about realisational differences between altqs and dynqs, as previous studies have disregarded such details in Arabic and JA in particular. This might be attributed to the fact that JA in all its varieties is understudied (Al-Hawamdeh, 2016; Al-Deaibes, 2016). Jordan has a small population, compared with other Arab countries with larger populations, which might be the reason for the lack of studies on JA (Yasin, 2012). The lack of studies on Arabic in general supports conducting this study on the prosodic aspects of altqs and dynqs with a primary focus on JA. Thus, this study fills a gap in Arabic prosodic knowledge in general, and in the prosodic design and choice of disjunctive element aspects of these questions, in JA in particular, and in the other Arabic dialects of interest in this thesis. In order to achieve this goal, corpus, production, and perception studies were carried out. The corpus and the production studies paved the way for the perception studies by deciding on the independent variables to be used, which makes this study a near replication of Pruitt and Roelofsen's study, adapted only to manipulate the correct realisational variants observed in Arabic.

This study is to the best of my knowledge the first study that experimentally investigates the disambiguating cues of altqs and dynqs in Arabic and JA. This investigation led to enhancing the understanding of which cue is significant and which one has the most important role in disambiguating altqs and dynqs in four Arabic dialects (JA, EA, KA, and SA).

1.3 Definitions of Key Terms

The following are the operational definitions of some key terms:

i) Disjunctive elements (DEs): Disjunctive elements are words that are equivalent to the English disjunctive element *or*. Some researchers (e.g., Eid, 1974; Ryding, 2005; Haspelmath, 2007) referred to the feature of exclusivity and inclusivity of disjunctive elements. More specifically, disjunctive elements in logical semantics could be classified either as exclusive or inclusive (Haspelmath, 2007). He explained the difference between the two types by reporting that "an exclusive disjunction is true if only one but not both of the disjoined propositions are true, while an inclusive disjunction is true if either one or both disjoined propositions are true" (p. 26). He provided the following examples to illustrate the two readings of the same disjunctive element (p. 26):

(1.2) Marvin died on Tuesday or Wednesday. (Exclusive)

(1.3) Mike is a psychologist or a linguist. (Inclusive)

In the first example, the person must have died on only one of the stated days, as a person cannot die twice, and cannot die on both Tuesday and Wednesday. In the second example, the person could either be a psychologist or a linguist, or even both.

Some Arabic dialects might have two or more disjunctive elements. The two most common disjunctive elements that were found to be used in altqs and dynqs in spoken Arabic in the present study were *ʔaw* and *willa*. Some studies in the literature have referred to which of them is exclusive and which of them is inclusive, and this will be discussed in Chapter 4.

ii) Yes-no questions (ynqs): Questions that can be answered with either a yes or a no, such as (1.4) below. A non-yes-no question is any kind of question that can be answered with the information required in the question other than a yes or a no, such as a wh-question.

(1.4)	biddak	truːħ	ʕa-l-beːt
	want.PRS.2MSG	got.PRS.2MSG	on-the-house

'Do you want to go to the house?'

This term is broad enough to include both *normal yes-no questions* (nynqs), such as the example in (1.4), and *disjunctive yes-no questions* that are defined below.

iii) Normal (non-disjunctive) yes-no questions: Yes-no questions that do not include any disjunctive element.

iv) Disjunctive questions: Questions that have a disjunctive element separating the offered alternatives in the question. The two most common types of disjunctive question are *alternative questions,* and yes-no questions that have a disjunctive element (i.e., *disjunctive yes-no questions*):

a. Alternative questions (altqs): They are questions offering two alternatives from which a listener has to choose only one as a suitable answer, so the disjunction in altqs is exclusive. An altq in the literature is also sometimes called a choice question (Celce-Murcia & Larsen-Freeman, 1999) or a coordinated question/coordination (see, for instance, Grabe, 2004; Hellmuth, 2018; Hellmuth, to appear). Example (1.1) above in English can have an altq reading in case the *X* and *Y* in the *X or Y* phrase are accented and accompanied with a fall, as Pruitt and Roelofsen pointed out.

b. Disjunctive yes-no questions (dynqs): yes-no questions that have a disjunctive element separating the offered alternatives in the question. Their answers are expected to begin with either a yes or a no. A negative or a positive answer to dynqs could refer to both disjuncts at the same time (as will be explained in detail in Example (3.1) in Chapter 3), so the disjunction in this type of question is inclusive, which is the opposite to the exclusive disjunction in altqs. These questions are yes-no questions, so they can also be subsumed under the general type of yes-no questions above. However, dynqs are lexically different from normal yes-no questions as they have a disjunctive element. Example (1.1) above can be a dynq with a rise and an accent on *Y*, as Pruitt and Roelofsen explained.

v) Not-alternative questions (not-altqs): Questions that end with any equivalent to the English phrase *or not*. These types of questions are answered with a yes or a no, so some researchers have referred to them as yes-no questions (e.g., Eid, 1974), and other researchers (e.g., Winans, 2019) have chosen not to classify them as yes-no questions. In this thesis, they are considered as a separate question type of altqs.[1]

vi) Mixed-questions (Mixed-qs) in this thesis refer to questions that elicit answers which match the answers of both altqs and yes-no questions. That is, they are questions that are answered with negation in addition to one of the alternatives following that negation. This type of question is found in the corpus (Chapter 4) and appears to be common in naturally occurring conversation. It might be worth noting that this thesis does not propose that 'Mixed-qs' is another category of question in semantic terms. This term is used in the data analysis only to identify hybrid or ambiguous questions. The following is an example of these questions:

[1] More details about this question type are provided in Chapter 3 (3.2.2.3)

(1.5)	a.	ʕindak	kumbjuːtar	ʕaːdi	willa	laːbtub
		have.PRS.2MSG	computer	normal	or	laptop

‘Do you have a PC or a laptop?’

	b.	laʔ	laːbtub
		no	laptop

‘no, I have a laptop.’

vii**)** Rhetorical questions: Questions that are not intended to elicit answers. This term is used in Chapter 5 (5.4) to discuss some utterances found in the corpus, but which are not discussed further.

viii) Disjunctive phrase (*X or Y*): The phrase that includes two disjuncts *X* and *Y* as well as one disjunctive element (*ʔaw*/*willa*), in altqs and dynqs as shown in examples (1.6) and (1.7). The words *alternative* and *disjunct* are used interchangeably in this thesis to refer to the *X* or *Y* constituents.

(1.6)	ʕindak	burtuqaːl	willa	manga
	have.PRS.2MSG	orange	or	mango
		(*X*	or	*Y*)

‘Do you have orange or mango?’

(1.7)	maʒd	bidrus	rijaːdˤa	ʔaw	ʕuluːm
	Majd	study.PRS.3MSG	sports	or	scinence.PL
			(*X*	or	*Y*)

‘Is Majd studying PE or sciences?’

ix) Dialect types: dialects in Chapter 4 were classified into three types, based on their tendencies for the distribution of disjunctive elements found in the literature review:

a. Type 1: this type includes dialects in which the two disjunctive elements seem each to be specialised to a specific disjunctive question (to one meaning each).

b. Type 2: this type comprises dialects in which there is an indication that one disjunctive element is specialised to one type of disjunctive question while the other is not (i.e., one disjunctive element may be specialised, and one may be general). This type of dialects is divided into Type 2A in which the specialised disjunctive element is related to altqs, and Type 2B in which the specialised disjunctive element is of dynqs (see Chapter 4, Table 4.1 for more details).

c. Type 3: this type of dialects includes dialects that might have no specialisation of disjunctive elements (i.e., both disjunctive elements might be general).

x) English-like dialects: dialects that appear to use only one disjunctive element in altqs and dynqs. This term was used in Chapter 4 to refer to the preferences found in the corpus search.

xi) MSA-like dialects: dialects that were initially classified as having two disjunctive elements: one for altqs and one for dynqs. This tentative classification was based on the preferences found in the corpus search. KA was thought to have this preference.

It is worth noting that the term *yes-no questions* is used to refer to yes-no questions in general, including both disjunctive and normal (i.e., non-disjunctive) yes-no questions. In the context of reviewing prior work, *yes-no questions* is used to mean normal yes-no questions. The *dynq* is used to refer only to disjunctive yes-no questions, and normal yes-no question is used to refer solely to normal yes-no questions.

The term Urban Jordanian Arabic (UJA) is used here to refer to the dialect spoken in any Jordanian city. The JA production study and Experiment 1 were restricted to UJA of participants who are originally from Irbid city in Jordan. The JA version of Experiment 2 included those who speak UJA from different cities, such as Irbid, Karak, Amman, etc. For simplicity and uniformity across the chapters of this thesis, all dialects of JA in the literature review will be referred to as JA whether they are urban, Bedouin, rural, etc. and across all cities. The specific dialect or city name will be referred to in a footnote, once mentioned.

The term Modern Standard Arabic (MSA) is used here to refer to the formal dialect that all Arabs can understand. Some authors in the literature review used the term *Modern Standard Arabic* and others used *Standard Arabic* to refer to the same dialect. For consistency, the term *Modern Standard Arabic* (MSA) will be used across the thesis.

1.4 Structure of the Thesis

Chapter 1 provides a general introduction to the thesis by showing the purpose and significance of this study. It also provides a list of operational definitions as well as a brief outline of the thesis.

Chapter 2 begins by defining intonation and explaining its functions, then reviews the basic intonational approaches (Impressionistic and Instrumental). It also provides general background information about the Autosegmental-Metrical Theory of intonational phonology adopted in this thesis, which is the evolution of the previously mentioned approaches. Some key intonational features of Arabic intonation are also discussed. The notation used in transcribing intonation, in this thesis, is also explained with examples. The chapter finishes with a conclusion.

Chapter 3 sets the context of the study, including the universal claims about what disambiguates between altqs and dynqs and their applicability to Arabic and JA in particular. The chapter provides general background information about altqs and yes-no questions. The dialectal and linguistic situation in Jordan, including syllable structure, lexical stress, and word order, is explained in detail followed by some concluding remarks.

Chapter 4 takes as its starting point the premise that disjunctive questions in English may need to be disambiguated by the choice of intonational contour because English has only one disjunctive element, that is used in both altqs and dynqs. In contrast, MSA has two disjunctive elements and is reported to display a preference to restrict one disjunctive element to altqs and the other to dynqs. As a result, the chapter starts by reviewing prior studies that mentioned disjunctive elements in Arabic and their usage in all utterance types, with a particular focus on disjunctive elements used in disjunctive questions. This review resulted in preliminarily suggesting that the reviewed dialects might fall into three types, in terms of the specialisation of their disjunctive elements in disjunctive questions: Type 1 (a tendency in which both disjunctive elements might be specialised to one question type), Type 2 (a tendency in which one disjunctive element might be specialised and one might be general), and Type 3 (a tendency in which both disjunctive elements might be general). Then, the Intonational Variation in Arabic Corpus IVAr (Hellmuth & Almbark, 2017) is searched to explore the distribution of disjunctive elements in eight Arabic dialects (eleven datasets). After obtaining the results for the distribution of disjunctive elements in all utterance types, special emphasis was then given to the disjunctive elements that are used in disjunctive questions. The aim of this investigation is to get a clearer picture of which disjunctive element is used in utterances in Arabic.

The main aim of Chapter 4 is to gain a preliminary understanding of the preferences of choice of disjunctive element in altqs and dynqs. Based on this chapter, EA was preliminarily classified as belonging to Type 1 or Type 2. KA and SA were assigned to Type 2 and Type 3, respectively. The picture for JA was unclear, but it was thought to belong to Type 2, based on the researcher's native intuitive. However, given that the classifications are preliminary and given that the dialects might represent the three types, they were chosen to run a perception study in. The chapter further concludes that the preferences in JA remain unclear because the corpus was not specifically designed to elicit disjunctive questions (thus only a limited number of occurrences of *willa* in dynqs in JA are observed, which may be due to chance). Therefore, the chapter recommends conducting a production study to clarify which disjunctive element is used in which type of disjunctive question in JA, with later comparison to SA.

The main aim of Chapter 5 is to provide a description of the prosody of disjunctive questions in JA, EA, KA, and SA. There are relatively few studies on Arabic dialects that address the prosody of these questions. In other words, the previous chapter established which disjunctive element is preferred in which question type, so there is also a need to establish the typical prosodic realisations of altqs and dynqs in this chapter. The resulting prosodic descriptions can then inform the choice of independent variables used in the perception study in the following chapter.

Chapter 5 starts with a brief review of the literature, then presents the results of the corpus production study that analysed audio recordings from the IVAr corpus that included potential instances of disjunctive questions from read speech. The target utterance under investigation had the syntactic form of a disjunctive question, but can also be realised in context as a rhetorical question. The disjunctive tokens were first classified as altqs and dynqs, based on the researcher's intuition before investigating their prosodic details. Then, the prosodic details were compared with the prosodic features of altqs and dynqs from the literature. This prosodic investigation showed that there were two prosodic contour shapes observed on the different tokens of this utterance in JA, EA, and KA: a late rise and a rise fall. In SA, only a rise fall was observed. Tokens with a late rise were treated as dynqs while those with a rise fall as altqs, which confirmed the researcher's initial classification of these questions. So, based on this first production data, and the literature, altqs and dynqs are confirmed to typically have different prosodic contours. This difference can be employed as a factor in the perception studies in the following chapters.

The second prosodic investigation (JA production study) used production data which were specifically designed to elicit altqs, normal yes-no questions, and dynqs in JA. Data were collected with 18 speakers in Jordan, using a dialogue completion task (DCT). The findings showed that altqs had a rise fall (over the *X or Y* portion), normal yes-no questions had a late rise, and dynqs had a late-rise contour, which is similar to what was briefly reported in the literature for this dialect, and also to what was found in the first production study of the read speech corpus data. The findings of this study clarify that altqs and dynqs are similar in terms of having accents on both *X* and *Y* (in contrast to reports for English). Accenting both *X* and *Y* was also noticed in EA, KA, and SA in the read speech corpus data (the corpus production). The study also indicated that participants used *ʔaw* and *willa* in both altqs and dynqs though *willa* in dynqs was less common (only 3%), which might be an initial indication that JA might belong to Type 2 proposed in the first part of Chapter 4. The findings of the new production data (the dialogue completion task) confirm that there are two independent variables to be used in Experiment 1 in the next chapter. The first is the choice of contour shape (late-rise vs. rise-fall), and the second is the choice of disjunctive element (*ʔaw* vs. *willa*). The same variables were also used in Experiment 2, based on the prosodic descriptions of disjunctive questions found in the literature and based on the corpus production study.

Chapter 6 first reviews prior perception studies that dealt with disjunctive questions in English and summarises the debate regarding which cue can disambiguate altqs and dynqs in English. Then, it sets out the methodology of Experiment 1 (on JA). The independent variables were: choice of prosodic contour (late-rise vs. rise-fall) and choice of disjunctive element (*ʔaw* vs. *willa*). The findings revealed that both cues play a significant role in disambiguating altqs and dynqs in JA by increasing the responses to one or other type of disjunctive question. The findings showed that the effect of choice of prosodic contour is larger than that of choice of disjunctive element. The findings also showed that tokens with both disjunctive elements were interpreted by listeners both as altqs and as dynqs, but *willa* was less commonly interpreted as a dynq. Hence, *willa* it was assumed to be specialised to altqs, confirming that JA belongs to Type 2 as the previous two chapters hinted. The next chapter, which provides more data from JA, might also confirm or reject this classification.

Chapter 7 begins by motivating the need to replicate Experiment 1 on four Arabic dialects, which were chosen based on the results from Chapter 4. Adaptation of Experiment 1 to work across dialects required minor methodological choices. For example, the on-screen response choices were presented in MSA. Given this change, another set of JA participants was recruited to facilitate comparison between results for JA, EA, KA, and SA.

The findings of Experiment 2 were, broadly, similar to those of Experiment 1. In all four dialects, the choice of prosodic contour was statistically significant in disambiguating altqs and dynqs by increasing the responses to either type of question. The choice of disjunctive element was also significant in three dialects: JA, EA, and KA. More specifically, the late-rise increased the likelihood of dynq responses, and *ʔaw* did the same. Nevertheless, the effect of choice of contour was larger than that of choice of disjunctive element insofar as their coefficient estimates are concerned. In JA, KA, and SA, choice of disjunctive element was far less important than choice of prosodic contour. In EA, however, the effects of choice of contour and choice of disjunctive element were similar in size. The findings also confirmed that JA might belong to Type 2, as KA and EA might do. SA is analysed as a Type 3 dialect.

Chapter 8 provides a general discussion of the preceding chapters. It begins with a summary of the findings of each study and highlights the main thesis contributions. It also revises the third category in Meertens' (2019) typology (prosody+dusjunctive element category) and uses the distribution of disjunctive elements and prosody in the four dialects to determine their position in this typology. Then, some languages, based on the behaviour of disjunctive element and prosody reported in the literature, were assigned to the three types of dialects, which were proposed in Chapter 4. The chapter concludes with some suggestions for future research in Arabic and English.

2 Intonation

2.0 Aim and Outline of the Chapter

This chapter introduces intonation and some key aspects and concepts that are usually referred to when exploring intonation in the literature. Section 2.1 defines intonation based on prior studies. Section 2.2 refers to the functions of intonation. Section 2.3 sets out the intonational approaches (Impressionistic and Instrumental). Section 2.4 describes the Autosegmental-Metrical Theory. Section 2.5 outlines Arabic intonation. Section 2.6 describes the notation used in this thesis to transcribe intonation. Section 2.7 is the conclusion of this chapter.

2.1 Defining Intonation

No language in the world could be said to have no intonation, i.e., it is universal (Katamba, 1989; Yip, 2002; Tench, 2005; Wells, 2006; Tench, 2015). Intonation is usually used to pass information between interlocutors in a form that is different from speech sounds or lexemes used (Nolan, 2006). In the same way that languages around the world have different sound inventories, syllable types, and stress rules, they also have their own set of intonational patterns, resulting in intonational systems that are different across languages (Tench, 2005; Tench, 2015; Aziz & Ali, 2020).

Intonation refers to how use of different pitch contours can convey different meanings to change the illocutionary force of an utterance. The most common phonetic feature that is emphasised in all definitions of intonation in the literature is pitch (see Cruttenden, 1997; Kadmon, 2001; Ladefoged, 2003; Wells, 2006; Roach, 2009; Levis & Wichmann, 2015; Igarashi, 2018), which is what people hear as a result of vocal folds vibration (see Katamba, 1989; Cruttenden, 1997; Ladefoged, 2003; Veilleux, Shattuck-Hufnagel, & Brugos, 2006). Levis and Wichmann defined intonation as "the use of pitch variations in the voice to communicate phrasing and discourse meaning in varied linguistic environments" (p. 139). These pitch variations are described as structured and as having nothing to do with word distinctions, as intonation is related to levels beyond the word level (see, for more information, Gussenhoven, 2007; Ladd, 2008; Levis & Wichmann, 2015; Tench, 2015).

Levis and Wichmann reported that intonation languages, such as English and Arabic, employ pitch as explained in their definition above, while other languages (i.e., tone languages), such as Burmese, Mandarin, Vietnamese, etc., employ pitch differently because its working domain in those languages is the lexical level. Pitch variation is not employed directly in English to identify lexemes (Yip, 2002; Wells, 2006; Levis & Wichmann, 2015; Tench, 2015). Hence, whether in intonation or tone languages, intonation manifests itself in pitch but in different ways: tone languages use pitch at the lexical level while intonation languages employ it at the post-lexical level, which is above the word level, such as on the utterance level (see Cruttenden, 1997; Wells, 2006; Chahal, 2007; Ladd, 2008; Levis & Wichmann, 2015). However, it might be worth mentioning that Yip (2002) referred to uses of pitch at both lexical and post-lexical (i.e., phrasal) levels in tone languages, such as Cantonese and Kinande, (interested readers are referred to Chapter 1, Chapter 5, and Chapter 9 in Yip's book, as giving more details about tone languages is beyond the scope of this thesis).

Finally, among the hugely different use of sounds in the universe, intonation is tied only to "the linguistic use of pitch in utterances" (Tench, 2015, p. 2). Restricting pitch only to linguistic uses makes it possible to exclude the other ways in which people employ pitch, in general, such as in singing, according to Tench.

2.2 Functions of Intonation

A considerable number of past and current studies have referred to all or some of the functions that intonation performs in English and Arabic (see, for instance, Katamba, 1989; El-Hassan, 1990; Levis, 1999; Al-Azzawi 2002; Tench, 2005; Wells, 2006; As-Samman, 2009; Roach, 2009; Al-Azzawi, 2010; Tench, 2015; El Zarka, 2017).

Among these studies, Roach, for instance, referred to four salient functions. He noted that all these functions may, in some way or another, be in a grey area, leading to a kind of overlap. The following are the most common ones:

1. Attitudinal: as the name of this function clearly shows, it is related to speakers' attitudes and reactions. In other words, a speaker can show a range of feelings that might express a variety of meanings, such as hostility, friendliness, boredom, condescension, agreement, etc. (see Mitchell, 1993; Cruttenden, 1997; McMahon 2002; Nolan, 2006; Wells, 2006; Roach, 2009; Al-Azzawi, 2010).

More precisely, this function "corresponds most clearly to the observation 'Not what they said, but the way they said it'. The 'way they said it' usually refers to the mood of the speaker or the attitude shown to the addressee or the message" (Tench, 2015, p. 20). Moreover, this function might sometimes be accompanied with some paralinguistic gestures, such as body language, which might encompass expressions that speakers' faces may suggest (Roach, 2009), and such as tempo, pitch range and the quality of speakers' voices as well as giggling (see, for more information, Katamba, 1989; Colantoni, Steele, & Escudero, 2015; Tench, 2015). Similarly, Katamba elaborated on this function by reporting that one can have an idea about the feeling or the attitude of an utterance's speaker simply by investigating its intonation. It is worth mentioning that the same function of intonation is also observed in and referred to in different Arabic studies (As-Samman, 2009; El Zarka, 2017).

2. Accentual or highlighting function: Roach referred to this function. It helps listeners recognise what word has the greatest significance in an utterance; this is done if that word is highlighted or made more prominent than the other neighbouring words. The same function was also referred to in English and Arabic by a various number of researchers (e.g., Katamba, 1989; El-Hassan, 1990 on JA; Mitchell, 1993 on Arabic; Levis, 1999 on English; Wells, 2006 on English; Tench, 2015; As-Samman, 2009 on Arabic; El Zarka, 2017 on Arabic, etc.). The following example shows that when the word *very* is accented, the utterance emphasises the importance of this word, making the utterance emphatic (Roach, 2009, p. 154):

(2.1) It was \\<u>very</u> boring.[2]

3. Grammatical: grammatical forms can be better identified by recruiting intonational cues of utterances (see, for more information, Roach, 2009). Thus, for example, the intonation used to indicate questions, in English and Arabic, is often different from that used to indicate declarative sentences: in string-identical utterances, rising intonation is usually used to mark questions while falling intonation is typically used to indicate statements (see Katamba, 1989; El-Hassan, 1991; Nolan, 2006; Wells, 2006; Roach, 2009; Al-Azzawi, 2010, Tench, 2015; El Zarka, 2017).

Other studies (e.g., El-Hassan, 1991; Tench, 2005, 2015; Nolan, 2006; Roach, 2009; El Zarka, 2017) also linked the grammatical function of intonation with distinguishing a range of similarly-worded syntactic structures, including restrictive vs. non-restrictive clauses, transitive vs. non-transitive verbs, or declarative vs. interrogative utterances. This function is

[2] Roach underlined the word *very* to show that it is the tonic (nucleus) of this utterance.

achieved in part using tonality, which is defined as "the division of the spoken material into chunks" and each of these chunks is an intonational phrase (IP) (Wells, 2006, p. 6). The following examples show how this function works (Tench, 2015, p. 21):[3]

(2.2) She washed and brushed her <u>hair</u>.

(2.3) She <u>washed</u> | and brushed her <u>hair</u>.

As the above examples illustrate, changing the intonation conveys a different meaning. Without an intonational phrase boundary after *washed*, this utterance consists only of one intonational phrase, thus, *hair* is the object of both verbs. When the boundary is placed after the first verb, the same word *hair* becomes the object only of the second verb in the second intonational phrase, and the verb in the first intonational phrase becomes intransitive (Tench, 2015).

Tonicity refers to the accenting of some words for the purpose of conveying a particular meaning or for the purpose of showing that the highlighted word is important (Wells, 2006). Tonicity can also help in disambiguating similarly-worded syntactic utterances, as the following examples show (Tench, 2015, p. 22):

(2.4) He <u>asked</u> himself

(2.5) He asked him<u>self</u>

Tench explained that the verb in the first example is transitive while it is intransitive in the second. Thus, the pronoun in the first utterance is the object whereas it is not in the second as its function is just to emphasise the fact that he is the person who did the act of asking, i.e., "*He himself asked*" (p. 22).

4. Discoursal: this function of intonation, as Roach reported, specifies, among other things, the information in an intonational phrase either as new or as old. That is, a word that conveys new information is usually, but not always, accented, whereas a word that provides background knowledge that is already known (i.e., old information) is usually not accented in

[3] The underlined words are the nuclei as Tench (2015) did this to indicate the place of the nucleus in each intonational phrase.

English, or in some dialects of Arabic (El-Hassan, 1990; Mitchell, 1993; Nolan, 2006; Roach, 2009; Levis & Wichmann, 2015; Tench, 2015; El Zarka, 2017).[4]

In JA, El-Hassan (1990) [5] provided the following example (p. 22) in which the highlighted word that conveys new information in the answer is marked with \ following El-Hassan's notation:

(2.6) a. ʔismiʕit ʔinnak ʔibtitʕaːmal bi-r-riba
hear.PST.1SG NOM that.you.2MSG deal.PRS.2MSG with-the-usury
'I heard you deal/are dealing in usury'.
b. \ kunt ʔatʕaːmal bi-r-riba
be.PST.1SG.NOM deal.INF.1MSG with-the-usury
'I used to deal in usury'.

By giving this example, El-Hassan notes that nothing new is provided to the speaker, but the highlighted word is the one that indicates that "dealing in usury" was in the past, so the speaker accented this tensed morpheme. That is, the speaker wanted the hearer to focus more on the morpheme showing the past tense to get the new information about when the action happened. He suggested that the word that presented new information was accented while the other words were deaccented, as they were already given, mentioned, or understood from the preceding context. This effect is also observed by other researchers in Arabic (Mitchell, 1993; Hellmuth, 2014) as well as in many varieties of English (Büring, 2007; Roach, 2009; Tench, 2015).

Although mainstream varieties of English follow the same pattern of accenting and deaccenting as just mentioned above, Caribbean, Indian, and Edinburgh dialects of English show some dialectal variation as already-given information tends not to be deaccented. These dialects employ relative pitch height to express differences instead of varying the nucleus position (i.e., the position of the nucleus in each of these dialects of English is always the same (Cruttenden, 1997)).

The discoursal function was also reported by some researchers to help manage turn-taking in conversations (see Katamba, 1989; Nolan, 2006; Wells, 2006). When speakers finish their turn at talk and are ready to stop talking or leave the floor, they often use a falling intonational contour. In contrast, use of a rising intonational contour, along with other cues

[4] It is worth noting that some speakers might opt for accenting old information (see Cruttenden, 1997 for cases in which old information may be highlighted in English).
[5] The JA dialect El-Hassan (1990) investigated was that spoken by educated people.

such as accelerando, often means the turn at talk is not yet finished (Katamba, 1989; Nolan, 2006).

To sum up, it seems that almost all studies reviewed above agreed on the same set of functions, but some used different terms to refer to the same function or discussed them from different perspectives, which can be confusing for readers dealing with prima facie different names. Most of the intonational functions surveyed above appear to be shared by all languages, specifically the functions that express attitudes, communicate discourse functions, organise information, etc. are all universal (see Tench, 2015). However, Tench reported that the syntactic function may not be a cross-linguistic feature, as some languages may depend, instead of intonation, on other overt syntactic devices to distinguish syntactic forms from each other. The functions of intonation were discussed above because intonation is one of the features that might distinguish different types of disjunctive questions, and in order to provide general background as this thesis is mainly concerned with intonation. The functions are relevant to the distinction between altqs and dynqs. For example, the accentuation function will be relevant in the analysis of disjuncts (*X*/*Y*) in Chapter 5 in order to find out if there are any differences between altqs and dynqs in terms of accenting the *X* or *Y*. The grammatical function (e.g., tonality) will also be useful to find out whether or not there are prosodic breaks in the disjunctive phrases, leading to differentiating between altqs and dynqs.

2.3 Approaches to Intonation: from Impressionistic to Instrumental

A number of researchers have referred to two common approaches to intonational analysis, namely the Impressionistic Approach and the Instrumental Approach and, in particular, how followers of each of these approaches defend their approach and criticise the other (e.g., Ladd, 1996; Cruttenden, 1997; Ladd, 2008; Féry, 2017). To avoid the criticisms levelled at one or other approach, the stance taken in this thesis was not to adopt only one of these approaches in the analysis. Instead, this thesis followed Cruttenden's (1997) recommendation that the ideal intonational analysis will use a combination of both approaches. In one part of this thesis, therefore, there is an analysis of experimental results using recent technological tools, such as Praat (i.e., instrumental analysis). In other places, when analysing pitch accents on the *X* and *Y* and on disjunctive elements and when deciding on overall contour shapes, both Praat pitch traces and listening to them by ear were used (i.e., instrumental and impressionistic). The following is an explanation of these two approaches followed by a review of two seminal JA studies that used each approach:

1. Impressionistic Approach: this approach, as its name shows, refers to an approach in which researchers depend on their auditory impression, rather than using technological tools, to identify any intonational phenomenon, such as intonational phrase boundaries or contour and tone shapes (see Ladd, 1996; Cruttenden, 1997; Ladd, 2008; Levis, 2012; Féry, 2017). For example, some researchers on JA (e.g., El-Hassan, 1988, 1990) used to listen to an utterance then decide whether that utterance ends with a fall or a rise. Ladd gave examples of pioneering researchers that used this approach (e.g., O'Connor & Arnold (1973) in the British School of intonation and Pike (1945) in the American structuralist counterpart).

2. Instrumental Approach: in this approach, researchers take advantage of the current availability of technological instruments and tools in their descriptions of intonation (Ladd, 1996; Cruttenden, 1997; Ladd, 2008; Levis, 2012; Féry, 2017). Studies in this approach, given the nature of the tools used, are often experimental in nature (Ladd, 1996; 2008; Féry, 2017). An example of the modern speech analysis tools that are used these days is Praat (Boersma & Weenink, 2020), which is used in the analysis of the recordings in this thesis.

Although Cruttenden confirmed that both approaches can be useful and the ideal situation is to use a combination of both, followers of each approach criticise the other. For instance, Cruttenden reported that analysing data auditorily (i.e., impressionistically) was criticised by instrumentalists as having less reliability, yielding analyses that are unscientific because of their subjective way of analysing intonation. He added that such criticisms suggest that even those who are skilful at this approach will, possibly, detect only the patterns that they experienced in their training. Hence, their reliability when listening to patterns in other languages or dialects is reduced, as their native language patterns might affect their listening to any other language (Cruttenden, 1997). Instrumentalists, thus, assert that using technological solutions in describing intonation leads to results that can be verified, so the analysis is more accurate, reliable and scientific (Cruttenden, 1997). Advocates of auditory analysis, on the other hand, questioned the efficiency of instruments. That is, they criticised the instrumental approach and commented that that approach can only be used to test selected samples, which may not be representative (Cruttenden, 1997).

There are a few pioneering studies on JA using either one of these approaches or a combination of both (e.g., Rammuny, 1989; El-Hassan, 1990). Rammuny's study is an example of an early combined instrumental and impressionistic study while El-Hassan's is an example of a purely impressionistic study.

Rammuny’s (1989) study is probably the first study that explored JA instrumentally as well as auditorily (impressionistically). Rammuny reports that he depended, for his description, on the results of a perception study, on visualisations of the acoustic properties of the signal (“strip charts”), and on his own judgements and intuitions as a native speaker. He compared the analyses of spectrograms, mingograms,[6] and strip charts to “check the validity of the strip chart analysis” (p. 23). He had a small corpus of elicited speech from 7 speakers of JA, and he focussed on the rhythm of JA as well as its intonation and stress assignment rules.

Fifty-four target items were elicited to create the corpus. These utterances represent five everyday natural conversations that include yes-no questions, negative utterances, positive utterances, and imperatives/orders. In the following perception experiment, seven professors listened to the recordings and were asked to indicate the position of stress, and to decide on the contour shape in the data they heard. Then, a consensus labelling that unified their judgments was reached, and strip charts were produced. After that, the researcher created spectrograms that were used in the comparison with the strip charts. The mingograms were used to decide whether JA is a stressed-timed dialect or not. Figure 2.1 provides an example of Rammuny’s strip chart, spectrogram, and mingogram (p. 40):

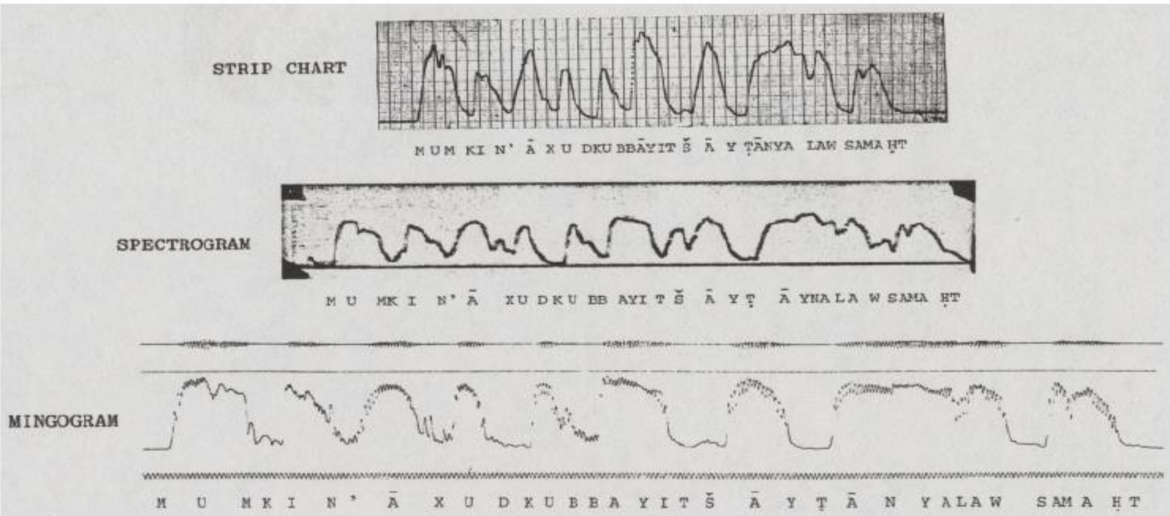


Figure 2.1 Rammuny’s strip chart, spectrogram, and mingogram (p. 40).

The results from the perception and instrumental studies as well as the researcher’s judgements were compared to reach a unified description of the dialect. Findings from comparison with the acoustic data showed that the strip charts were accurate. Rammuny

---

[6] A mingogram is an early format of a pitch trace, as seen in Figure 2.1.

suggested that this dialect employs three domains of stress: i) stress within the word is usually referred to as a lexical stress; ii) stress within the utterance in its context is called “contextual phonemic stress” (p. 38), and this level of stress might be similar to pitch accents in the Autosegmental-Metrical Theory (AM) (see Chahal, 2001 and Section 2.4); iii) lastly “sentence stress”, which was analysed as “phonemic” and can be “used only in contrastive situations for special emphasis” (p. 38), and within AM terminology, might be parallel to nuclear accents (Chahal, 2001).

In contrast to Rammuny, most of El-Hassan’s studies depended on his own descriptions and intuitions (i.e., using an impressionistic approach) to decide the place and shape of the nucleus and other contour shapes. For example, El-Hassan (1990) provided a detailed description of the accentual patterns found in many utterance types in JA, including questions. He explained the reasons behind making a word in an utterance attract the tonic (i.e., the nucleus), and showed that the nucleus position is affected by various semantic, syntactic, and contextual factors.

The information structure of sentences was shown to play an integral role in deciding which word bears the nucleus in JA. This led, as he demonstrated, to the fact that the speaker’s intended meaning plays a significant role in placing the nucleus. The following examples from El-Hassan illustrate how speakers’ meaning and stance play a significant role in tonicity and in deciding the shape of the tone on the nucleus (p. 9):

(2.7) tˤabiːb mumtaːz [\ fall]
physician excellent
‘An excellent physician’[7]

(2.8) tˤabiːb mumtaːz [/ rise]
physician excellent
‘An excellent physician’

(2.9) tˤabiːb mumtaːz [\/ fall-rise]
physician excellent
‘An excellent physician’

[7] As is the case in all cited examples in the thesis, some changes were made to the transcriptions of examples to be in line with the IPA conventions, which were presented in a table at the beginning of the thesis. The justification for choosing the IPA system in the transcriptions was referred to above the IPA table at the beginning of the thesis (p. 10). In case glosses and translations are not available in the source papers, they will be added by the author in this thesis.

In these examples, El-Hassan identified the shape of each tone impressionistically (fall, rise etc.). These examples are string-identical, and all have the nucleus on the same utterance-final word *mumtaːz*. However, they have different tone shapes on the nucleus reflecting the different meanings the speaker intended to convey. According to El-Hassan, the high falling tone in (2.7) conveys the meaning of appreciating and praising the doctor; surprise may be signalled in (2.8) with the low rising tone, but this tone may also show that the speaker is not sure about the skills of the doctor; the fall-rise tone in (2.9) might indicate that the speaker has reservations, or that the utterance is still not finished and there is something else yet to be uttered (see El-Hassan, 1990 for more details).

To sum up, the two common approaches to analysis of intonation were described above with some examples and with the advantages and disadvantages of each approach. This description paves the way for the current study, which builds on both approaches in analysing intonation.

2.4 Autosegmental-Metrical Theory (AM)

AM came as a kind of evolution of the two common approaches to analysis of intonation introduced above. It is a theory to explain intonation, i.e., it is a theory of the phonological representations underlying surface contours. Some pioneering researchers are always credited with the development of this influential theory of intonational phonology. Pierrehumbert's seminal (1980) dissertation and other key works by other researchers (e.g., Liberman, 1975; Pierrehumbert & Beckman, 1988; Ladd, 1996, 2008) are among those credited with developing and consolidating this theory. The following sections will define AM, outline its basic terminologies, and show how it is argued to be superior to other approaches.

2.4.1 Autosegmental-Metrical Theory (AM): Definition and Terminology

AM is a model of intonational phonology which provides a way of transcribing intonation, using a set of labels originally proposed as standard conventions for prosodic annotation of US English. These standardised labels are known as the *Tone and Break Index* system, i.e., ToBI (see, for more information, Cruttenden, 1997; Chahal, 1999, 2001; Beckman, Hirschberg & Shattuck-Hufnagel, 2005; Nolan, 2006; Ladd, 2008; Levis, 2012). Using ToBI labels entails that a researcher is adopting AM theory, given that ToBI is a set of labels derived through application of AM theory. In other words, ToBI is a tool for applying AM theory to data. The tone levels employed in describing contours in AM theory are only two:

High (H) and Low (L). That is, describing the shape of the F0 contour in AM relies on a consecutive sequence of H/L notations or their combinations, and this sequence is usually described in prosodic or intonational studies as the phonological representation of intonation (Kadmon, 2001; Ladd, 2008; Jun & Fletcher, 2014; Arvaniti, in press).

ToBI has appeared in many modified versions for other languages beyond US English, and a ToBI transcription consists of various tiers containing orthography, tone, and break index symbols (Beckman, Hirschberg et al., 2005; Veilleux, Shattuck-Hufnagel, & Brugos, 2006; Ladd, 2008; Hualde & Prieto, 2016). ToBI also has a tier used to note other spoken or discourse phenomena, such as speech disfluencies, but the core tiers used in transcription are the ones that are referred to in the name itself i.e., the tone and the break index tiers (Veilleux et al., 2006; Ladd, 2008). Ladd notes that the tone tier transcribes pitch events, such as pitch accents or boundary tones, and the break index tier refers to the strength of breaks, such as breaks between words (level 1) or breaks between phrases at different levels (level 3 or 4). Nevertheless, few researchers use the full set of tiers. Consider Figure (2.2) below (Chahal & Hellmuth, 2014, p. 39), which illustrates the tiers in ToBI (i.e., in AM):

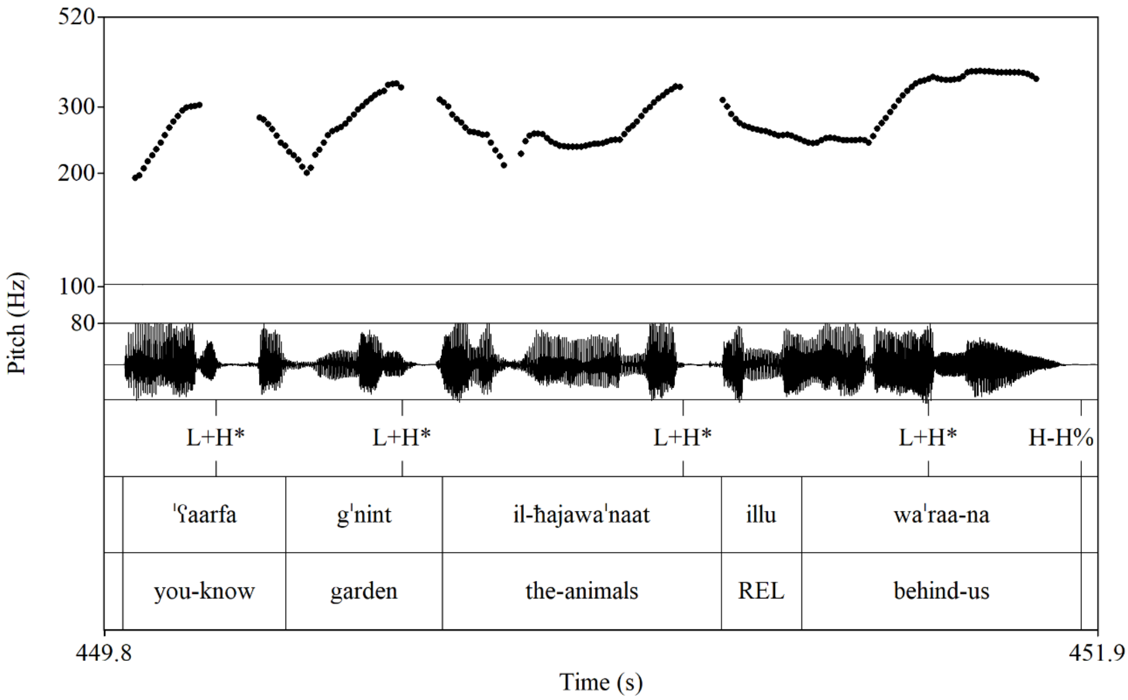


Figure 2.2. A ToBI-style pitch trace showing only three tiers for tones, words (orthography), and glosses (adopted from Chahal & Hellmuth, 2014, p. 39, Figure X.15 in the source).

Contours are composed of a sequence of pitch events (as in Figure 2.2 above) which have prominent syllables as their landing sites, and edge tones which may be assigned to final as well as initial positions in intonational phrases (Ladd, 2008; Gussenhoven & Jacobs, 2011; Jun & Fletcher, 2014). In other words, in AM, F0 contours are phonologically represented by a string of pitch accents and boundary tones (Ladd, 2008). The * denotes that a syllable is pitch accented, and it is usually found on stressed syllables (Pierrehumbert & Hirschberg, 1990; Levis & Wichmann, 2015; Hellmuth, 2020; Arvaniti, in press). The % (e.g., H%) and – (e.g., H-) are used to mark boundaries of intonational and intermediate phrases (see Section 2.6 for more details).

The first part of the name of the theory, *Autosegmental*, came from the dedicated tier for autosegments (see the upper tier in the figure above) that is used to characterise an utterance melody. The second part of the name refers to metrical salience and domains, or prosodic phrasing/tonality (Arvaniti, in press). The autosegmental nature of tones manifests itself in the fact that they appear on their own in a tier dedicated to them, so they are modelled as autonomous from segments (Arvaniti, in press; El Zarka, 2017). In other words, autosegments are dealt with separately from the segments (i.e., the text) when analysing intonation, and this allows for direct modelling of different intonation patterns on otherwise string-identical utterances.

2.4.2 AM and Other Approaches

Adopting AM as a model of intonation does not necessarily entail abandoning or neglecting the insights of older intonational approaches. The Impressionistic Approach, exemplified in the British school, and AM can deal with the same issues (i.e., what one model can account for and express is also expressible by the other), suggesting that the basic ideas of the British tradition are not completely voided by AM (Nolan, 2006; Ladd, 2008).

Some researchers (e.g., Cruttenden, 1997; Arvaniti, 2011; Levis & Wichmann, 2015) referred briefly to the advantages of introducing AM. For example, one advantage of AM, according to Arvaniti (2011), is that it successfully remedies problems faced by the previous intonational approaches, such as how pitch range is conceived of. That is, she explained that by dealing with pitch range from a phonetic perspective, “AM avoids the problems that plagued the British analyses due to the confounding of linguistic and paralinguistic aspects of pitch range (cf. the disagreements regarding whether high falls and low falls are distinct entities)” (p. 15). This casts doubts on the need for distinct types of contours called *fall* that are existent in the previous analyses (e.g., low fall, high fall, etc.). What the previous analyses considered distinct is no longer so in AM. Hence, all falls in AM arise due to some sequence of H then L, and all rises are represented as L then H, but pitch range is treated as phonetic, not phonological, in AM.

Another advantage of AM is its compatibility with the new technological tools using computers. AM is based on a binary system of level targets, low vs. high, which is not the case for the holistic contour-based British approach. As a result, annotations in AM are machine-readable and can also be used without complications in analysing intonation instrumentally (Levis & Wichmann, 2015).

Another possible advantage of AM is that, unlike the British tradition which phonetically describes the pitch of almost every syllable in the form of dots (Figure 2.3), unstressed or unaccented syllables have nothing to do with characterising the F0 contour in this approach (Ladd, 2008, p. 48):

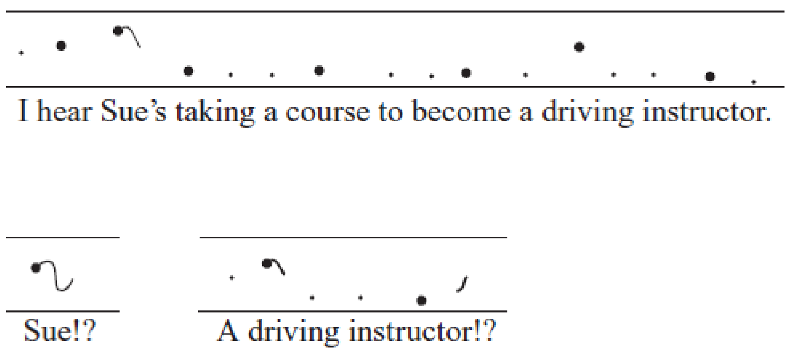


Figure 2.3. An impressionistic intonational transcription using the British tradition notations by representing each syllable with a dot (Ladd, 2008, p. 48).

Ladd criticised this way of representing intonation, as shown in the figure above, by stating that "it is by no means clear that the use and perception of intonation involves resolution into syllable pitches" (p. 48).

2.5 Intonation in Arabic

There are three seminal studies on Arabic intonation that are relevant for our purposes here, treating several dialects. Two were reviews covering different utterance types (Chahal, 2007; El Zarka, 2017) and one was restricted to altqs and yes-no questions (Hellmuth, 2018). Chahal was the first person to write an overview that specifically referred to how contours are modelled in Arabic dialects. Figure 2.4 shows the contour inventories in different Arabic dialects (2007, p. 398):

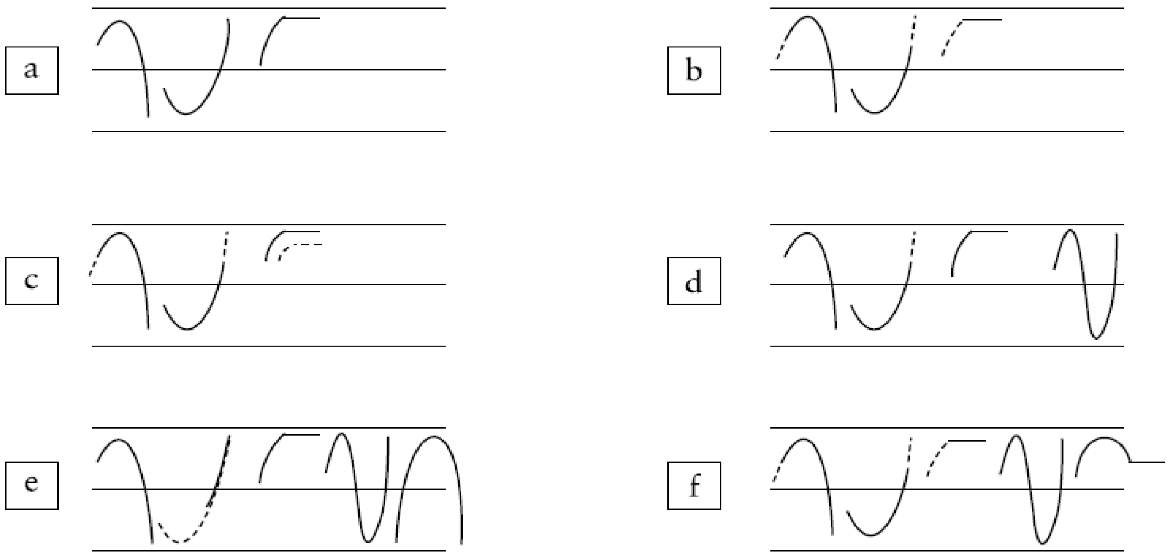


Figure 2.4. Overall contour shapes in five Arabic dialects (a: MSA, b: SA, c and d: JA, e: KA, and f: Lebanese Arabic), from Chahal (2007, p. 398).

Most studies on Arabic intonation showed that the majority of dialects share the same overall nuclear contours (see Eid, 1992 (for yes-no questions); Chahal, 2007; Hellmuth, 2018). More specifically, Chahal cited the works that provided contour inventories in each of the five dialects above and drew her own figure to visually represent these contours. She noted three contours found across all Arabic dialects: rise, fall, and level (or plateau). Although the overall contour shapes are shared with other languages, including English, their meaning nuances in each language may be different (El-Hassan, 1988; Chahal, 2007).

A key similarity between Arabic dialects, according to Chahal's review study, is the fact that pitch accents in most Arabic dialects are associated with stressed syllables, which is similar to English. She also reported that Arabic dialects use boundary tones to mark intonational phrases, which is also the case in English.

Most researchers nowadays use ToBI labels, but there is no agreement in the literature on which way of modelling intonation can best represent the intended phonological meaning: is it the whole contour or just part of it (see Bartels, 1999; Ladd, 2008; Pruitt & Roelofsen, 2013)?[8] So, these are the two ways to describe contours in intonational studies. An example

[8] See the summary in Chapter 6, Section 6.6 for what Pruitt and Roelofsen reported about this way of modelling intonation and why they did not design their perception study to test the influence of phrase tones.

of the first way of modelling intonation (as contours) was given for Arabic above (i.e., a rise, a fall, etc.), and an example of the second way for Arabic, using ToBI labels, is shown in the following table (El Zarka, 2017, pp. 5-6):

Table 2.1. *Examples of Contour Components in Different Arabic Dialects (Tonal Inventories), El Zarka (2017, pp. 5-6):*

Variety	**Scholar**	**Pitch accents**	**Phrase tones**	**Boundary tones**
Egyptian Arabic	Rastegar-El Zarka (1997)	H*L		H%
	Rifaat (2005)	H, LH, HL, L		
	Hellmuth (2006)	LH*	H-, L-	L%, H%
	El Zarka (2013)	LHL		H%
Jordanian Arabic	De Jong and Zawaydeh (1999)	H*, L*, H + L*	H-, L	H%, L%
Lebanese Arabic	Chahal (2001)	H*,!H*, L*, L + H*, L+!, H*, H+!H*	L-, H- ,!H-	L%, H%
Emirati Arabic	Blodgett, Owens, and Rockwood (2007)	H*/!H*, (LH)*	H-, L-	L%, H%
Sanʕaani Arabic	Hellmuth (2014)	H*, L*, L + H*, L*+H,?LH*L,?H+H*	L-, H-	L%, H%
Hijazi Arabic	Alzaidi (2014)	H*, L + H*, L*	L-	L%

This thesis is not concerned with the debate about which representation is better, so both ways of modelling contours will be used, for ease of future comparison, as will be shown in the next section (2.6).

As shown above, there are some key similarities among all Arabic dialects, such as the availability of shared nuclear contour shapes as shown in Chahal's (2007), El Zarka's (2017), and Hellmuth's (2018) studies. Another similarity is that declaratives have a fall in the majority of dialects (see Mitchell, 1993; El Zarka, 2017) and yes-no questions end with a rise except for Moroccan Arabic (see Eid, 1992 (for all Arabic dialects); Mitchell, 1993; Chahal, 2007; El Zarka, 2017; Hellmuth 2018), which matches a cross-linguistic tendency (see Edith, 1971). Arabic is also similar to English in the nuclear contours of wh-questions (a fall), altqs (a fall), and yes-no questions (a rise) (see El-Hassan, 1988; Mitchell, 1993; Chahal, 2007; El Zarqa, 2017; Hadjer, 2017; Hellmuth, 2018).

Despite the similarities in the intonational tunes found in Arabic dialects, a difference, according to El Zarka, appears to exist between the Western (e.g., Moroccan Arabic) and Eastern dialects (e.g., JA, EA, etc.) in terms of accenting of every content word. El Zarka reported that Eastern dialects seem to have all lexical words, compared with grammatical words, accented whereas Western dialects lack this property. El Zarka's observation about the Eastern dialects was based on and similar to the findings of various studies (e.g., Mitchell, 1993; Katanani, 2002 for Yazouri Arabic, Alzaidi, 2014 for Hijazi Arabic, Hellmuth, 2006; Hellmuth, 2020 for Egyptian Arabic; Blodgett et al., 2007 for Emirati Arabic; Al-Shawashreh, Jarrah, Al-Omari, & Al-Deaibes, 2019 for JA). However, some researchers (e.g., Katanani, 2002; Hellmuth, 2006) noted that a function word can be accented, when lengthened such as when it is the last word in an intonational phrase in Yazouri Arabic (Katanani).

Chapter 5 provides more details about yes-no question contours in the dialects to be studied in this thesis. These details are not repeated here to avoid repetition. Some studies provided intonational descriptions of different question types in Arabic (e.g., Benkirane, 1988; El-Hassan, 1988; Al Amayreh, 1991; Katanani, 2002; Al-Qadi, 2003; Chahal, 2007; Al-Omyan, 2014; El Zarka, 2017), such as wh-questions, tag questions, and echo questions. Two types of contour are reported in wh-questions. As will be seen, the two contours are sometimes reported for the same dialect, depending on the intended meaning.[9] Wh-questions in most Arabic dialects end with a fall, whether in MSA or in colloquial dialects (see Al-Khalifa, 1984; Benkirane, 1988; El-Hassan, 1988; Al Amayreh, 1991; Katanani, 2002; Ghrefat, 2007; Al-Omyan, 2014; El Zarka, 2017).

Some researchers reported a rising contour in wh-questions in some dialects (e.g., El-Hassan, 1988; Alharbi, 1991; Katanani, 2002; Al-Qadi, 2003; Ghrefat, 2007, etc.). For instance, some of the researchers who mentioned that wh-questions end with a fall also provided some examples in which wh-questions have a final rise but noted that this contour reflects certain attitudes, such as surprise or confusion or such as seeking addressees' approval (El-Hassan, 1988; Katanani, 2002; Ghrefat, 2007).

[9] Since this thesis is concerned with global phonological contours and since low-rising or falling-rising contours are, in fact, all rising contours, they will simply be referred to as a rise. The same applies to all falling contours.

Turning to tag questions,[10] some researchers reported that these questions end with a rise (El-Hassan, 1988; Al Amayreh, 1991) and that a fall is never available in tag questions in Arabic (El-Hassan, 1988). However, they were reported to have both a rise and a fall in Yazouri and Deristian dialects of Palestinian Arabic (Katanani, 2002; Al-Qadi, 2003). Such differences might be because El-Hassan’s observation was related to MSA, not to a colloquial dialect. The rise here may be influenced by the interactional context such as urging addressees to agree with the person posing the question, or showing that the speaker is proud of what is being said (El-Hassan, 1988; Katanani, 2002).

As for echo questions in Arabic, they were reported to have a final rise, to express disapproval or astonishment and to ask for repetition (El-Hassan, 1988; Al-Qadi, 2003). The fall could show that the speaker is impatient (Katanani, 2002).

The above review did not elaborate more on the intonation of other utterance types, as they are beyond the scope of this thesis. As can be seen from the above overview of some intonational features in different Arabic dialects, many features seem to be common across most Arabic dialects, but there are also slight variations. What is relevant for this thesis is the similarities and differences between the four Arabic dialects that will be investigated later on (JA, EA, KA, and SA) in terms of their intonational contours in altqs and yes-no questions. Generally, all four dialects share the same contour shapes (Chahal, 2007; El Zarka, 2017; Hellmuth, 2018), as will be shown in the detailed review of the prosody of these question types in each dialect in Chapter 5.

2.6 Notation for Transcription of Intonation

When transcribing intonation in this thesis, two methods were followed:

1. For simplicity, slashes were used to mark rises and falls, following Wells (2006): / = rise; \ = fall. Example (2.10) ends with a rise whereas Example (2.11) ends with a fall:

(2.10)	maʕaːk	ħasaːsiːjjih	min	l-fuːl	ʔaw	l-laban [/]
	with.you.2MSG	allergy	from	the-fava.bean	or	the-yoghurt

‘Do you have an allergy to fava bean or yoghurt?’

[10] Tag questions have a fixed form, which is “*miʃ heːk*” in JA (Abdul-Fattah & El-Hassan, 1994, p. 193) and its counterpart *ʔalajsa kaða:lik* in MSA (Abdul-Fattah & El-Hassan, 1994; Katanani, 2002).

(2.11) maʕaːk ħasaːsiːjjih min l-fuːl ʔaw l-laban [\]

with.you.2MSG allergy from the-fava.bean or the-yoghurt

'Which of these types of food do you have an allergy to: fava bean or yoghurt?'

2. For finer prosodic analysis of the *X or Y* phrases in disjunctive questions and of final words in yes-no questions (as in Chapter 5), International Prosodic Alphabet (IPrA) notation labels (Hualde & Prieto, 2016) within AM Theory (Section 2.4) were used. The IPrA notation system uses ToBI-style labels, but was proposed as a language-neutral and cross-linguistic labelling system (see Frota & Prieto, 2015; Hualde & Prieto, 2016). The IPrA label set was intended as a kind of general ToBI label set but was not designed only for English. The labels are used to refer to broad F0 contours in pitch traces, without paying attention to the finer phonological details of labels, such as whether a change in a label leads to a change in meaning or not.

Hellmuth (to appear) suggests that these labels can safely be used for Arabic as they were initially proposed for languages which had a long contact history with Arabic (Romance languages, see Frota & Prieto, 2015). Additionally, the purpose of this thesis is not to propose ToBI-like phonological labels for Arabic. So, using general and language-neutral labels (IPrA) was considered to be acceptable. The ToBI-style IPrA label set consists of pitch accents and boundary tones. The pitch accents are assigned to stressed syllables (see Section 2.4 & Section 2.5), and boundary tones are assigned at the edge of phrases. These labels were summarised by Hellmuth (to appear, p. 10) in Figure 2.5. An example of how these labels were used in this thesis is shown in Figure 2.6:

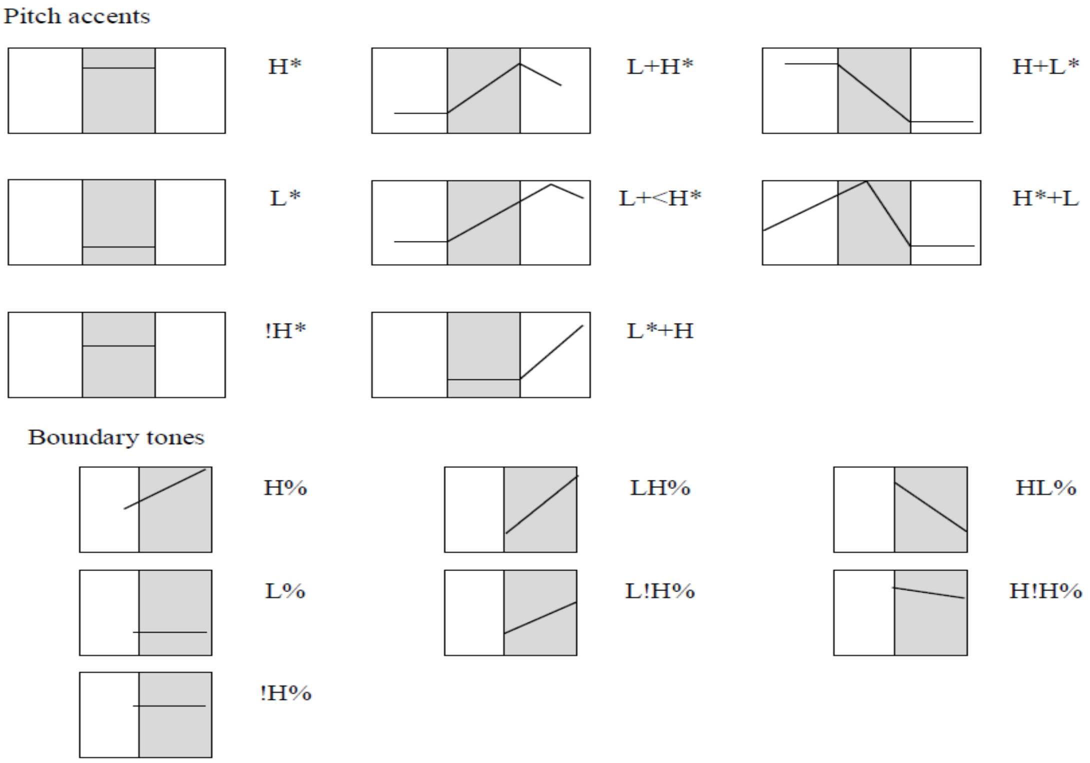


Figure 2.5 ToBI-like labels that were adopted in annotating some utterances in the thesis. The Jordanian, Egyptian, Kuwaiti, and Syrian utterances in the first part of Chapter 5 were labelled using these tagsets. Grey boxes represent stressed syllables in pitch accent labels while they represent the last syllable in boundary tone labels, from Hellmuth (to appear, p. 10).

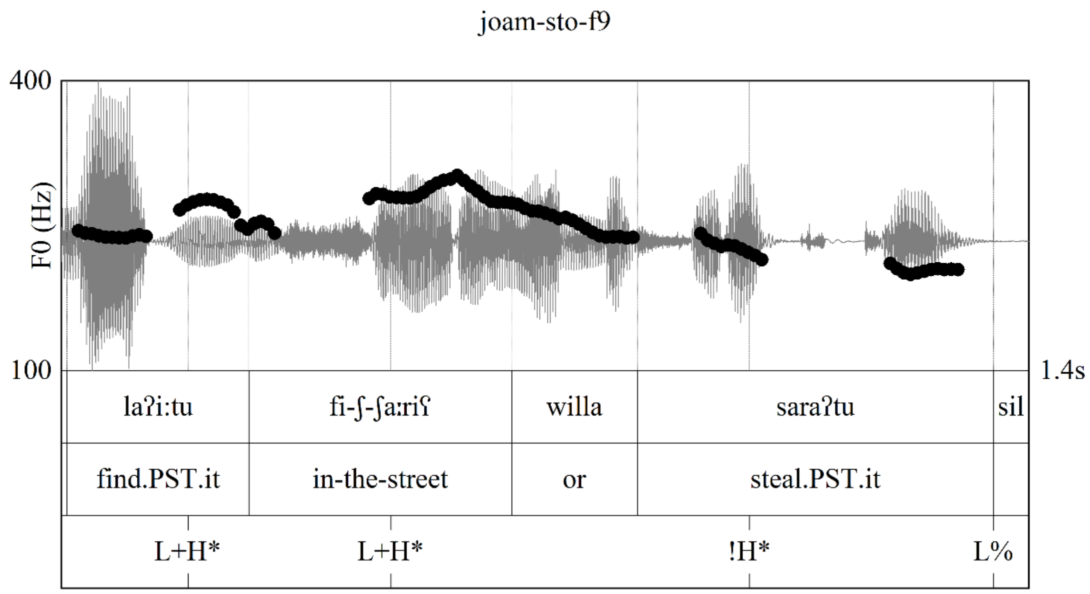


Figure 2.6. A pitch trace example of an utterance (an altq) labelled with IPrA labels [joam-sto-f9_70-72].

As is the norm in prosodic studies, pitch accents and boundary tones of an utterance are decided on using two ways: by ear (the Impressionistic Approach, Section 2.3) or using technological tools, such as pitch traces and spectrograms (i.e., the Instrumental Approach). Because, as stated above, the aim of this thesis is not to build a phonological inventory of pitch accents and boundary tones for the dialects studied here in this thesis, detailed investigation of the accurate label set to be used is beyond the scope of this thesis.

Regardless of which label is used, the important aspect in the prosodic analysis in this thesis is to describe the prosodic differences between altqs and dynqs. This is achieved by exploring whether there are accents on any part of the *X or Y* phrase or not, leading to finding out the prosodic differences. Another important aspect is to describe the shape of the overall nuclear contour (a rise or a fall), even without using any IPrA label. Therefore, when describing whether some utterances had pitch accents on disjuncts, ‘P’ was sometimes used, especially when a pitch accent was auditorily detected but its shape was not decided on, as is the case in the JA production study in Chapter 5 (5.5). An example of a pitch trace using ‘Ps’ is shown in Figure 2.7.

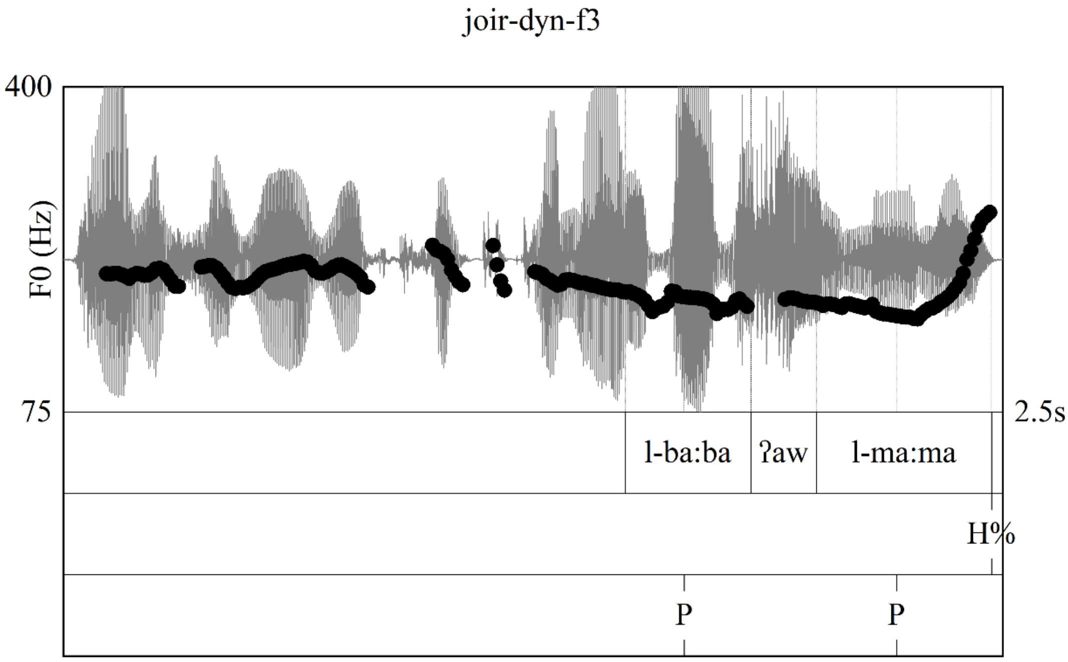


Figure 2.7. A pitch trace example of an utterance (a dynq); the ‘Ps’ were used to indicate that a pitch accent was auditorily and/or visually detected. The question is *bitħib titˤlaʕ maʕ l-ba:ba ʔaw l-ma:ma* ‘Do you like to go out with your dad or mum?’

2.7 Conclusion

This chapter provided general background information on intonation, including its basic principles, functions and approaches. It also introduced the Autosegmental-Metrical Theory of intonation and explained what it is and how it is superior to previous approaches. Then, it described some intonational patterns of some question types in Arabic and the intonational notations that will be used in this thesis. Next chapter will be more specific by introducing the context of this thesis and explaining the types of disjunctive questions (altqs and dynqs).

3 The Context of the Study

3.0 Aim and Outline of the Chapter

The aim of this chapter is to lay out the basic concepts which underpin the context of this thesis. This chapter is divided into four sections: Section 3.1 outlines the role of prosody and disjunctive elements in disjunctions. Section 3.2 describes alternative questions and yes-no questions, including their types and how they are formed, with a focus on yes-no question formation in Jordanian Arabic (JA) as it is the researcher's dialect. In Section 3.3, a description of the linguistic situation in Jordan is detailed. This section first begins with a brief background on dialectal classifications in Jordan. Then, it discusses the syllable structure, lexical stress and word order in Urban JA. Section 3.4 concludes the chapter and links it to the next chapter.

3.1 The Role of Prosody and Disjunctive Elements in Disjunction

Dayal (2016) made a strong claim about the relationship between prosody and disjunction, which was not stated to be restricted to English, though that was perhaps the intention. She referred to the debate in the literature about what disambiguates alternative questions (henceforth altqs) and disjunctive yes-no questions (henceforth dynqs) and argued that they are disambiguated solely through prosody. Consider the following examples (Dayal, 2016, p. 259):

(3.1) Do you want [tea or coffee]? [/]

a. Yes, please (tea/coffee/either one/both).

b. No, thanks (neither).

(3.2) Do you want [tea]$_{\mathbf{F}}$ or [coffee]$_{\mathbf{F}}$? [\]

a. #Yes, please/ #No, thanks.

b. Tea/ Coffee/ #both/ #neither.

Dayal suggested that (3.1) is interpreted as a dynq for two important reasons. First, the *X* and *Y* disjuncts form one intonational phrase (IP) in the *X or Y* phrase. Second, the contour shape is a rise. The answers to (3.1) provide evidence that an addressee perceived it as a dynq. Thus, this question refers to "whether you want a hot beverage, restricted to the ones mentioned. A positive answer can be followed by naming one or both options or declaring indifference, answering an implicit or explicit follow-up question, *which one*?" (p. 259). Thus, the dynq is a general one about any hot drink (Schubiger, 1958).

Further, Dayal noted that the identically worded question in (3.2) is an altq. This is evident, according to her, from three different prosodic characteristics: the focus on the *X* and *Y*, the choice of a different contour shape (i.e., a fall), and the separation of *X* and *Y* with a prosodic break ([*X*] or [*Y*]).

Thus, Dayal only referred to prosodic cues in the disambiguation of disjunctive questions: the choice of contour, accent distribution, and prosodic breaks. A legitimate question, given that she did not restrict her generalisation to English, might be about the applicability of such prosodic disambiguating cues to other languages: Is it only prosody that disambiguates altqs and dynqs in all languages? Or are there other supporting or more important non-prosodic disambiguating cues?

In other words, a question like *Do you want to visit London or York?* can be perceived in English either as an altq or as a dynq. The two readings are indeed perceptually disambiguated by prosodic cues in this language: with a fall, the question is perceived as an altq (possible answer: York), but with a rise, as a dynq (possible answer: No) (Pruitt & Roelofsen, 2013; Dayal, 2016). Pruitt and Roelofsen (2013) also assert that placing accents on both disjuncts *X* and *Y* in the *X or Y* favours an altq reading. A relevant feature of English is that it only uses one disjunctive element in disjunctive questions: *or*.

Perhaps English disambiguates the two readings of the same string of words in disjunctive questions with prosody only because there is only one disjunctive element. Not all languages have only one disjunctive element. Turkish, for instance, has three disjunctive elements that can appear in disjunctive questions (altqs and dynqs) and Finnish has two (see Gračanin-Yuksek, 2016 on Turkish; Kaiser, 2003 on Finnish). Likewise, Modern Standard Arabic (MSA) has two disjunctive elements: *ʔam* in altqs and *ʔaw* in dynqs (Fakih, 2012). Colloquial Arabic dialects display at least two disjunctive elements - *willa* and *ʔaw* - which vary in their mapping to English *or*. Consequently, the generalisation that the only relevant disambiguating cues in disjunctive questions are prosodic in nature needs to be checked against the cross-linguistic empirical facts to see whether disjunctive elements themselves have any role in the disambiguation.

Dayal's generalisation might not hold for Arabic dialects, therefore, but there is no experimental evidence as yet proving or disproving it for Arabic. So, it might be argued that there is an important cue that Dayal missed which is how many disjunctive elements a language has and the role of such disjunctive elements in the disambiguation. Meertens (2019) referred briefly to three universal categories that languages employ to differentiate altqs and dynqs: prosody-only, choice of disjunction-only, or a combination of both. The combined category, according to her, is exemplified in Basque: combining the falling contour with two accented disjuncts along with one particular disjunctive element gives rise to an altq reading. When the rise is combined with the other disjunctive element in the language, with only one accent on the *X or Y* phrase, a dynq reading is obtained.

It is as yet unknown which of Meertens' category Arabic dialects fall in; it might be prosodic-only, lexical-only (i.e., choice of disjunctive element), or the prosodic-lexical mixed category. Thus, one of the several intended contributions of the thesis is that it will show that although Dayal's claims are partially accurate for Arabic, they need modification to accommodate disambiguating cues other than the prosodic ones, in line with, but perhaps also extending, Meertens' suggested set of possible categories.

3.2 Alternative Questions (altqs) and Yes-no Questions

This section is divided into four subsections. The first gives a brief overview of altqs followed by a description of altqs in English and Arabic. The second section sheds light on three common types of altqs in these languages. The last section is a description of yes-no questions in Arabic.

3.2.1 Alternative Questions (altqs): An Overview

An alternative question, as its name indicates, is a type of question that presents more than one alternative for addressees to choose from. In other words, the addressee or the listener in a specific context has to pick only one of the alternatives in the question (see Schubiger, 1958 for English; Al Amayreh, 1991 for JA and SA; Leech & Svartvik, 2002; Beck & Kim, 2006; Hamzah, 2011 for Arabic and English; Bartels, 2013; Dayal, 2016; Biezma & Rawlins, 2017; Hazem & Kamil, 2019). Hence, in this kind of question, the descriptive generalisation, for English at least, is that speakers assume that only one of the alternatives *X*/*Y* is true (Quirk, Greenbaum, Leech & Svartvik, 1985).

The alternatives in English altqs are linked together by a disjunctive element in a disjunctive syntactic form (Beck & Kim, 2006; Ciardelli, Groenendijk, & Roelofsen, 2019). For example, both a laptop or a mobile in (3.3) and a pen or a pencil in (3.4) below are separated from each other by the disjunctive element *or*. It is the addressee's task to pick only one of them because of the function the disjunctive element plays. Suitable answers to (3.3) and (3.4) are presented below them.

(3.3) Do you have a laptop or a mobile?

a. A laptop (I have a laptop).

b. A mobile (I have a mobile).

(3.4) Is this a pen or a pencil?

a. A pen (this is a pen).

b. A pencil (this is a pencil).

Winans (2019) noted, in a short footnote, that *both* might also be used by some speakers of Egyptian Arabic (EA) as an answer to altqs. She reported that there is a debate in the literature on the acceptability of *both* as an answer to altqs, which, according to her, is also the case in English (see Aloni, Égré, & de Jager, 2013; Biezma & Rawlins, 2015 for more information).

Altqs in English and Arabic are somewhat similar to each other (El-Hassan, 1988; Hamzah, 2011). As shown in the next section, one type of yes-no questions, called dynqs in this thesis, is formed syntactically in exactly the same way as altqs, in both English and Arabic.

El-Hassan (1988) formed his examples of this type of question in MSA by introducing the question with a question particle, such as *ʔa* or *hal*. Then, the disjuncts were separated from each other by using the disjunctive element *ʔam* (*ʔa* or *hal… X ʔam Y*). Al Amayreh (1991) also introduced his example in MSA with *hal* and used the disjunctive element *ʔam* (*hal… X ʔam Y*).

Similarly, Fakih (2012) described how altqs in MSA are formed. He reported that altqs start with *ʔa* or *hal*, and the offered disjuncts are separated from each other using one of the available disjunctive elements in MSA, such as *ʔam* or *ʔaw*. He also referred to a preference in the usage of these particles which led to one being more common, such as the preference for *ʔa* more often than *hal* in altqs. However, this tendency was not observed in El-Hassan's examples that used both question particles in altqs, nor in Al Amayreh's example which only employed *hal* (see Chapter 4 (4.1) for more information about altqs in different dialects).

3.2.2 Types of Alternative Questions

This section reviews what is known from the literature on the types of altqs in English and Arabic. Altqs in English, actually, have three types though two of them are the most commonly discussed in the literature. For instance, Quirk et al. (1985) briefly mentioned two of them: altqs that are similar to wh-questions, and altqs that are similar, though not identical, to yes-no questions. Hamzah (2011) also referred to the same two types in Arabic and added that both English and Arabic have these two types. The third type of altqs (i.e., not-alternative questions) that was found in the corpus search (Chapter 4) will also be referred to.

3.2.2.1 Altqs that are 'Similar to Wh-Questions'

The first type of altqs is described as being 'similar to wh-questions' in the sense that it is a separate altq that comes after a wh-question (Quirk et al., 1985; Leech & Svartvik, 2002). That is, this question is divided into two clauses in Arabic: one with a wh-word and another clause containing the alternatives *X* and *Y* (Hamzah, 2011). The altq, in such a case, comes after the wh-question to make the question meaning clearer as (3.5) below shows (Quirk et al., 1985, p. 823):

(3.5) Which ice cream would you LIKE? Would you like /CHOclate, va/NILla, or \STRAWberry?[11]

3.2.2.2 Altqs that are Similar to Yes-No Questions

The second type of altqs that Quirk et al. (1985) and Leech and Svartvik (2002) referred to resembles yes-no questions in some ways but also differs from them in others. When discussing the intonation of open and closed lists in English, Wells (2006) reported that altqs can be seen as a list composed of a number of yes-no questions, and more precisely as a closed list of yes-no questions, requiring a falling contour on the *Y* disjunct.

Similarly, Bartels (2013, p. 83) reported that in English "Yes/no-questions and alternative questions are frequently grouped together, based on the widespread perception that every yes/no-question corresponds to a semantically equivalent alternative question". They are

[11] The original example in Quirk et al. (1985) has different symbols to transcribe intonation. For simplicity, the notations from the British School are used here. More specifically, the transcription system used here in this example is adopted from Wells (2006): / = rise; \ = fall (see Chapter 2, Section 2.6, for more information about how intonation is transcribed in this thesis).

similar to each other in terms of their syntax, through the presence of the *X or Y* phrase, but they are different when it comes to their phonology, especially intonation (Celce-Murcia & Larsen-Freeman, 1999). Nevertheless, it is worth noting for the present thesis that altqs resemble only one type of yes-no questions, in fact, which is the disjunctive yes-no questions (dynqs). More specifically, altqs are similar to yes-no questions that have a disjunctive element in the form of *X or Y*. Some researchers (see, for instance, Roelofsen & van Gool, 2010; Pruitt & Roelofsen, 2013, etc.) used the term *disjunctive questions* to refer to both altqs and yes-no questions that contain alternatives separated by a disjunctive element, such as *or* in English. This type of question is found in Arabic, for example, in SanՙSaani Arabic where a disjunctive element is used and the answer can be one of the alternatives or a yes or a no (see, for more information, Watson, 1993).[12]

One of the most important similarities shared by altqs and dynqs is how they are formed in English and Arabic as they are identically-worded (see, for more details, Bartels, 1997; Hamzah, 2011; Bartels, 2013). Given such similarities, it is not strange that they are subsumed under the umbrella term *disjunctive questions*.

However, there are differences between disjunctive questions. Several researchers (see Quirk et al., 1985; Aloni & van Rooy, 2002; Beck & Kim, 2006; Hamzah, 2011; Biezma & Rawlins, 2015 for more information) suggested that the main realisational difference between altqs and dynqs lies in their respective prosodic features, such as the accent on the disjuncts *X/Y*, the choice of contour shape, and the prosodic break between the disjuncts. More specifically, Quirk et al. (1985) expanded their proposal by explaining that both *X* and *Y* in altqs have to be accented with a rising tone on *X* and a falling one on *Y*. This final intonation pattern signals the completion of the options available. Although some types of yes-no questions offer more than one option *X or Y*, the crucial element in differentiating them from altqs is prosody, such as the choice of a final contour shape: rising for dynqs and falling for altqs (e.g., Quirk et al., 1985; Roelofsen & Gool, 2010; Hamzah, 2011; Biezma & Rawlins, 2012; Truckenbrodt, 2013; Pruitt & Roelofsen, 2013, etc.). The fall at the end of altqs gives an impression that there are no choices other than the ones presented in the *X or Y* phrase while the rise might give the impression that other choices might be available (Meertens, 2019). Bartels (2013) noted that altqs are more coherent than their dynq counterparts in terms

[12] More details of this point with more examples are provided in Chapter 4.

of displaying the obligatory fall, making them different from other question types, including dynqs.

In this respect, Quirk et al. (1985, p. 823) also provided the following examples, illustrating the differences between altqs and dynqs. They also stated that misunderstanding can result if the role of intonational patterns is ignored in distinguishing these questions. They reported that the answer to (3.6) below indicates that it is an altq. However, the same word order in (3.7) yields a dynq interpretation because of the rising shape of the final intonation contour.

(3.6) a. Shall we go by [/] BUS or [\] TRAIN? b. By [\] BUS

(3.7) b. Shall we go by bus or [/] TRAIN? b. No, let's take the [\] CAR.

Likewise, several researchers (e.g., Aloni & van Rooy, 2002; Beck & Kim, 2006; O'Mahony, 2014) referred to the importance of accent[13]on both constituents (i.e., disjuncts) in altqs. Beck & Kim (2006, p. 166) reported that a question like "Did Sally teach [syntax]$_F$ or [semantics]$_F$?" can only be interpreted as an altq, rather than as a dynq, due to the presence of the accent on both *X* and *Y*. The lack of such accents could lead to the possibility of having both readings of the string available, rendering the meaning ambiguous, according to them.

3.2.2.3 Not-alternative Questions

Some of the contextual differences between altqs and yes-no questions will now be introduced. Such differences are most easily shown by considering a third type of altqs, which is only briefly discussed in the literature. This is a type of question ending with negation (Winans, 2012; 2019), which is reported to be found in all languages (Edith, 1971). Winans provided examples of this type of question ending with *or what/ or not* in EA. In English, it ends with *or not* or with *or no* (see Winans, 2019; Ciardelli et al., 2019). This type of question is referred to as *not-alternative questions* throughout this thesis (see the operational definition in Chapter 1).

Biezma and Rawlins (2015) used the term '*or not*' while discussing this subtype of altqs in English. It is similar to yes-no questions that contain a disjunctive element in the (X *disjunctive element* Y) phrase, and that is why it might be subsumed under the second type of

[13] The words accent, focus, and stress are used interchangeably in the literature to refer to the accent on disjuncts.

altqs referred to above. Some researchers (e.g., Leech & Svartvik, 2002; Winans, 2019) reported that due to the expected affirmative or negative response to these questions, they are similar to yes-no questions. However, receiving such answers does not qualify them to be classified as yes-no questions because each of these answers is interpreted as an equivalent to one of the offered alternatives (Winans, 2019), so this type of question is not interpreted as a yes-no question, according to her. She used this point as evidence against classifying it as a yes-no question. Furthermore, she added that its intonational realisation in English (Winans, 2012; 2019) and Arabic, or in EA at least (Winans, 2019), is similar to that of altqs not of yes-no questions, providing further evidence that not-alternative questions cannot be taken as yes-no questions.

In terms of distribution, the not-alternative questions are not interchangeable with yes-no questions in all contexts as there are situations in which only one of them is suitable (Bolinger, 1978; Biezma, 2009; Hamzah, 2011; Biezma & Rawlins, 2012, etc.). Biezma (2009, p. 37) gave the following examples to demonstrate how not-alternative questions differ from yes-no questions:

(3.8) Would you marry me?

(3.9) Would you marry me or not?

She indicated that (3.8) and (3.9) have the same kind of answers though their intended meanings and contexts of use are different. To be precise, Biezma pointed out that (3.8) is suitable as a proposal to marry a girl whereas (3.9) is not. She attributed the realisational differences to the choice of contour shape, which is key to reaching the intended meanings of disjunctive questions.

To differentiate yes-no questions and not-alternative questions, several researchers have suggested contexts where yes-no questions are semantically and pragmatically appropriate while their not-alternative question counterparts are not (see, for more information, Bolinger, 1978; van Rooy & Šafářová, 2003; Biezma, 2009; Hamzah, 2011; Biezma & Rawlins, 2012; Biezma & Rawlins, 2015, etc.). Almost all of them followed Bolinger's (1978) taxonomy of these contexts, though some added their own contributions.

Bolinger's taxonomy goes to some lengths to make clear the differences between yes-no questions and not-alternative questions. He listed a wide range of contexts where only yes-no questions rather than not-alternative questions can appropriately be used. Unfortunately, his descriptions of these contexts remain somewhat unclear as he did not elaborate further on each point. For example, he referred only to general contexts, such as surprises, invitations, requests, etc. Following Bolinger (1978), van Rooy and Šafářová (2003) reported that yes-no questions rather than not-alternative questions can be used in some other situations, such as inviting people, inferring information, and starting a friendly dialogue.

3.2.3 Yes-no Questions in Arabic

In MSA, forming a yes-no question involves the insertion of one of a set of available interrogative particles at the beginning of a declarative sentence. This is true regardless of what word order follows the question particle, that is, whether it is followed by SVO or VSO (Fakih, 2012; Fakih & Al-Dera, 2014). In other words, to convert a sentence into a yes-no question, either *hal* or *ʔa* is needed in the initial position. The presence, therefore, of one of these obligatory particles, as well as a final rising intonation contour is of paramount importance for a sentence to be interpreted as a yes-no question in MSA. The situation is different in colloquial Arabic dialects as many of them do not employ question particles in yes-no questions (Almalki & Morrill, 2016).

El Zarka (2017) generalised the pattern of yes-no question formation to all Arabic dialects by reporting that there are two ways to form these questions: one uses a question particle and one does not. She also added that when there are no particles, it is intonation that differentiates identically-worded yes-no questions and declaratives.

For MSA, Ryding (2005) explained that *hal* and *ʔa* are broadly equivalent to each other except in some of their distributions. That is, *hal* has more freedom in its distribution while *ʔa* cannot occur before any word introduced by the definite article [*ʔal*] or before a word which has the Arabic letter ا [alif] with a glottal stop at the beginning (Ryding, 2005; Abu-Chacra, 2007). Ryding (2005), additionally, noted a third question particle [*ʔalaa*] to introduce negative questions.

Regarding the differences between the MSA interrogative particles, Fakih (2012) reported that the two question particles *hal*/*ʔa* differ in their usage. That is, he showed that *ʔa* can form questions whether they are negative or not while *hal* is restricted to ask about affirmation. This means that *ʔa* has more freedom than *hal*. He illustrated his argument with the following examples (p. 69):

(3.10) ʔa hija tˤaːlibatun ðakijjatun

Q she student.3FSG.NOM.INDF brilliant.3FSG.NOM.INDF

‘Is she a brilliant student?’

(3.11) ʔa maː ʔabuːka fi-d-daːr

Q NEG father.NOM.POSS.2MSG in-the-house

‘Is your father not in the house?’

(3.12) *hal lajsa tˤullaːbuka fi-l-fasˤl

Q NEG student.M.PL.NOM.POSS.2MSG in-the-classroom[14]

Fakih indicated that while (3.10) can be answered with *yes* if the questioner is asking about the affirmation and with *no* if asking about the negation, (3.11) is not the same. This is because if (3.11) is answered in the affirmative, this answer generates a negative meaning, whereas if it is answered with negation (i.e., *no*), the meaning conveyed is affirmative. In sum, he observed that *ʔ*a can be used with negation while *hal* cannot, rendering (3.12) ungrammatical as it contains *lajsa* ‘not’.

This analysis of yes-no questions in SVO word order restricts the use of *hal* in MSA to affirmative questions. However, *hal* in colloquial JA can be used in both negative and affirmative sentences, in contrast to MSA. Thus, the following examples provide evidence that *hal* can be used in negative questions in all syntactic structures, such as SVO and VSO in JA:

(3.13) (hal) ʕali miʃ fi-l-balad

(Q) Ali NEG in-the-country

‘Is not Ali home?’

(3.14) (hal) maː raːħ ʕali ʕala beːtu

(Q) NEG go.PST.3MSG Ali on house.POSS.3MSG

‘Didn’t Ali go to his house?’

(3.15) (hal) ʕali maː raːħ ʕala be:tu

(Q) Ali NEG go.PST.3MSG on house.POSS.3MSG

‘Didn’t Ali go to his house?’

[14] The author did not provide a translation of this example, but its translation would be *are your students not in the classroom?* Or *are not your students in the classroom?*

The use of parentheses with *hal* above indicates that it is optional in JA.[15] As shown in the above sentences, *hal* is used with negation without affecting the grammaticality of these questions in JA. The point that Fakih (2012) raised regarding the answer to the negation can also be applied to these examples. That is, if (3.13) is answered with *yes*, then the answer to the question proposition, in this case, means that Ali is not home. Similarly, a *no* answer results in an affirmative answer as it means that Ali is home. The same idea can be applied to (3.14) and (3.15) as well.

It is worth noting that the strategies employed in JA to form yes-no questions are different from those found in MSA in respect of the optionality of the question particle. Almalki and Morrill (2016) report that numerous Arabic dialects use sentences with the same structure as declaratives to make yes-no questions without any particle. In such cases, intonation plays the most important role in indicating that this is a yes-no question rather than a declarative sentence (Albirini, 2016; El Zarka, 2017). This is indeed true in many varieties of JA (see Al-Wer, 2007b; Al Huneety, 2015; Al-Hawamdeh, 2016) as the rising intonation confers an interrogative reading on the same string of words as a declarative. Thus, the fact that the particle is not obligatory in JA, and that prosody is employed to form yes-no questions, makes this dialect similar to many other Arabic dialects.

This way of forming yes-no questions in JA can also be applied to declaratives of both orders: SV(O) and VS(O). The following examples illustrate this point. Example (3.16) has the SV(O) order while (3.17) has VS(O) word order:

(3.16) a. sue raːħat ʕa-s-suːg ʔimbaːriħ [\]
Sue go.PST.3FSG on-the-market yesterday
'Sue went to the market (city centre) yesterday.'
b. (hal) sue raːħat ʕa-s-suːg ʔimbaːriħ [/]
(Q) Sue go.PST.3FSG on-the-market yesterday
'Did Sue go to the market (city centre) yesterday?'

(3.17) a. raːħat sue ʕa-s-suːg ʔimbaːriħ [\]
go.PST.3FSG Sue on-the-market yesterday
'Sue went to the market (city centre) yesterday.'

[15] The optionality of *hal* will be referred to later on when discussing yes-no question formation in JA.

b. (hal) raːħat sue ʕa-s-suːg ʔimbaːriħ [/]
(Q) go.PST.3FSG Sue on-the-market yesterday
'Did Sue go to the market (city centre) yesterday?'

These examples show that in JA, intonation plays an important role in marking yes-no questions as a syntactically declarative sentence can be realized as a yes-no question through the rising intonation[16](Al Huneety, 2015). Finally, yes-no question formation was referred to in this chapter to give general background on yes-no questions because this thesis studies one type of yes-no questions in JA, which is dynqs.

3.3 Background on JA

3.3.1 The Linguistic Situation in Jordan

JA, with all its different sub-dialects, belongs to the Levantine Arabic group, which is spoken, historically, in four Arab regions: the west and east of the River Jordan, Lebanon, and Syria. Prior studies (e.g., Cleveland, 1963; Palva, 1984; Suleiman, 1985; Al-Sughayer, 1990; Al-Khouri, 2010; Abu-Abbas, Zuraiq & Al-Tamimi, 2010; Almhairat, 2015; Abu Ain, 2016; Sa'aida, 2017; Alzoubi, 2020, etc.) reported that colloquial dialects in Jordan can be divided into three groups: rural (Fallaħi) which is spoken in the rural areas by farmers, Urban (Madini) which is used in cities, and Bedouin which is spoken by people who live in deserts or who are of Bedouin origin but no longer live in their original areas. Recent studies (e.g., Zuraiq & Zhang, 2006; Na'eem, Abudalbuh, & Jaber, 2020), however, added another dialect to those three, namely, the Ghorani dialect (in Jordan Valley). For all these dialects, the phonological differences appear to be related to consonants, whereas vowels are reported to be similar to each other (Al-Masri, 2009). In addition, some authors suggested that variation in Jordan is emerging along sectarian lines, i.e., in different faith communities (Al-Wer, Horesh, Herin, & Fanis, 2015).

All four dialects in Jordan are mutually intelligible by all Jordanians, and the differences are rarely noticed by non-linguists. This mutual intelligibility might be because more than one dialect is commonly used by the same speaker, which is a result of dialect contact. For

[16] More details on the intonation of questions are provided in Chapter 2 and Chapter 5. The intonation of altqs, dynqs, and yes-no questions in the dialects included in the perception experiments (JA, Egyptian Arabic (EA), Kuwaiti Arabic (KA), and Syrian Arabic (SA)) is described in Chapter 5, to pave the way to the experiments.

instance, Urban and Bedouin might be used interchangeably by some speakers in some urban centres (Almhairat, 2015). An example of contact-induced adaptation between dialects was reported by Sawaie (2007) who noted that some rural females may adopt urban linguistic features if they live in cities. Such adaptation was also reported by Lucas and Lash (2010) who observed that when there is contact between dialects, some linguistic features will be adopted by speakers of one of the dialects in contact.

The linguistic situation in Jordan gives rise to rich sociolinguistic variation in terms of using different variants of the same phoneme (see Zuraiq & Zhang, 2006; Al-Wer, 2007a, 2007b; Zawaydeh & De Jong, 2011; Al-Deaibes, 2016 for more information). Al-Deaibes, for example, showed that urban JA speakers use [ʔ] and [k] instead of the rural [q] and [tʃ], respectively. These sounds, according to the same researcher, are equivalent to the [q] and [k] in MSA cognate words. Nevertheless, some Urban JA speakers in Al-Zarqa, Amman, and Irbid cities, according to the same researcher's criteria, use [g] and [k]. Such differences are also clear in the description of Urban JA in Irbid City by Zuraiq and Zhang as they explained that [g] is used instead of [q]. Similarly, Al-Wer (2007a), when studying Ammani Urban dialect, referred to some cases where the same group of people might use both variants, depending on the context. For instance, she noticed that some male speakers who use [g] tend to use [ʔ] when in conversations with female speakers.

The JA dialect studied in this thesis is the urban one, which is mostly spoken in cities (see Almhairat, 2015; Al-Deaibes, 2016; Na'eem, Abudalbuh, Jaber, 2020, etc.), specifically Irbid (in the north), Amman (in the centre), and Al-Zarqa (in the centre). Other researchers stated that Urban JA is found in all cities without confining it to a particular city, and others confined to some other cities (see, for more details, Suleiman, 1985; Rakhieh, 2009; Jongman et al., 2011). Moreover, Jongman, Herd, Al-Masri, Sereno, and Combest (2011) reported that the majority of Jordanians, especially those in the main cities, use the urban dialect as their medium of communication, so it is the dialect prevalent in the largest Jordanian cities (Al-Deaibes & Rosen, 2019).

Urban JA was chosen to be studied in this thesis for many reasons. First, many of the linguistic features of this dialect, including some prosodic features, are referred to in the literature (see, for instance, Zuraiq & Zhang, 2006; Al-Wer, 2007a; Al-Wer, 2007b; Al-Masri, 2009; Abu-Abbas et al., 2010; Al Omar, 2011; Al-Shawashreh, 2016; Hellmuth, 2018;

Jaber, Omari, & Al-Jarrah, 2019; Al-Wer, 2020; Hellmuth, to appear). Second, it is the native dialect of the researcher. The consonant inventory of Urban JA is shown in Table 3.1:

Table 3.1 *The Consonant Inventory (Zuraiq & Zhang, 2006, p. 38)*[17]

	Labial	Labio-dental	Inter-dental	Alveolar	Palato-alveolar	Palatal	Velar	Pharyngeal	Glottal
Plosive	b			t d tˤ dˤ			k g		ʔ
Nasal	m			n					
Trill				r					
Fric.		f	θ ð ðˤ	s z sˤ	ʃ		x ɣ	ħ ʕ	h
Affric.					dʒ				
Approx.				l					
Glide	w					j			

Other researchers studying Urban JA reported the same inventory but added the palato-alveolar fricative [ʒ] (Al-Wer, 2007b; Ben-Meir, 2015) and the uvular plosive [q] (Ben-Meir, 2015; Abu Guba, 2016). Both [ʒ] and [q] are observed in the dialect under investigation, so they are adopted here. [q] is rarely used in JA as it may only be noticed in MSA loan words that cannot be or will sound funny or eccentric if pronounced with the colloquial [k] or [g] variants.

Sa'aida (2015) stated that the vowel inventory of this dialect consists of eight vowels: [i, u, a, iː, uː, aː, eː, oː]. Based on the author's intuitions as a native speaker, the vowels in Urban JA are only [i, u, a, iː, uː, aː]. The other two (i.e., [eː] and [oː]) are not phonemic.

3.3.2 Syllable Structure, Lexical Stress, and Word Order in JA

Studies on JA stress placement show that the structure and the position of syllables along with their weight determine where word stress falls (see Rammuny, 1989; de Jong & Zawaydeh, 1999; Al-Jarrah, 2002; Al Huneety, 2015; Al-Deaibes, 2016). Because, as noted above, syllable structure and weight play an important role in Arabic stress rules (Katamba, 1989; El-Hassan, 1994), it is relevant to briefly describe JA syllable structure before

[17] The same consonant inventory was also adopted in Al-Masri's (2009) PhD thesis on Urban JA. Al Omar (2011) also provided another table of the consonant inventory of the same dialect (as spoken in Zarqa, Amman, and Irbid), and his table has the same consonants as the ones provided here.

explaining how stress is assigned. Arabic dialects stipulate that syllables must have onsets, which is observed in all dialects across the Arab World (see El-Hassan, 1994; Hellmuth, 2013; Ali, 2014; Ali, 2017).

Irshied (1984)[18] reported that CVCC, CVVC, CVC, and CVV are heavy syllables. In JA a CVC syllable is considered light when it occurs in word-final position (Irshied, 1984; Al Omar, 2011). Likewise, for the purpose of this thesis, CVCC, CVVC, CVC, and CVV are considered heavy in Urban JA. CVC is light if it occurs at the end of a word.

In terms of stress assignment rules in JA, it seems from the literature that all JA dialects have the same stress rules. If the rules of Irshied (1984), Rammuny (1989), de Jong and Zawaydeh (1999), Al-Wer, (2007b); Rakhieh (2009),[19] Al Omar (2011),[20] Al Huneety (2015), Al Mashaqba (2015), Al-Deaibes (2016), and Jaradat (2018) are applied to the same words, the same result will be obtained. Clearly, the dialect of this thesis, which is Urban JA, will not be different in stress rules. The following is a representative explanation of these rules in JA

When de Jong and Zawaydeh (1999) listed the stress assignment rules in JA,[21] they reported that when penultimate syllables are heavy, they attract stress. They also added that if the penult syllable is not heavy, then the antepenultimate will be stressed, instead, as the following rules show (p. 4):

1. The following examples have heavy second-to-last syllables:[22]

a. ˈʃaːrak ‘he participated'

b. ˈʔurdun ‘Jordan’

c. makˈtabha ‘her desk/office’

d. binˈsaːmiħ ‘we forgive’

e. saːmaˈħatna ‘she pardoned us’

2. The penultimate syllables are light (CV) in the following examples, so stress goes to the antepenultimate:

[18] Irshied studied his tribe’s variety of JA which is Bani Hassan Arabic.
[19] He classified his dialect as Rural JA.
[20] He studied Urban JA, which is the same dialect of this thesis. He even studied the dialect of the cities studied in this thesis (Zarqa, Amman, and Irbid).
[21] They studied Amman dialect (i.e., the dialect of the capital city). This dialect is urban, so its rules apply to the dialect investigated in this thesis as it is urban.
[22] Some changes are made to the transcriptions of cited examples in order to make them consistent with the transcription system adopted in this thesis.

a. maːˈʕallamak ‘he didn't teach you'   b. faˈbarada ‘he got cold'

c. ʕalˈlamatak ‘she taught you'

3. They also referred to a third rule in which stress is placed on final syllables if their nuclei are long vowels or if their codas are double consonants. The following examples illustrate this point:

a. daˈrast ‘I studied'   b. fakaˈtabt ‘so I wrote'

c. ʕalˈlamt ‘I taught'   d. raːˈseːn ‘two heads'

e. ħammaːˈmeːn ‘two bathrooms'   f. kilmiˈteːn ‘two words'

As for word order, although both SVO and VSO are commonly observed in JA (Al-Wer, 2007b; Musabhien, 2008), SVO is reported to be the default (El-Yasin, 1985; Al-Wer, 2007b; Musabhien, 2008). Musabhien, however, reported that both SVO and VSO appear frequently in JA and many other spoken dialects, including EA. The dialect studied in this thesis, Urban JA, behaves similarly like the dialect Al-Wer (2007b) and Musabhien (2008) studied, namely, it has both SVO and VSO, though SVO is more common, which is also similar to Tunisian Arabic (Hellmuth, to appear).

3.4 Concluding Remarks

After reviewing the above studies, it can be concluded that the intonation of altqs and dynqs in Arabic and JA dialects have received relatively little attention. Even those studies that touched upon them described the intonational patterns of such questions in a general sense only (see, for instance, El-Hassan, 1988). It can also be noted that previous studies only referred to the formation of these questions without going into the details of comparing or contrasting them in terms of their prosody or in terms of which disjunctive element can be used in which type of disjunctive question. That is, it seems that there might not yet be a detailed investigation of their prosody in Arabic dialects and particularly in JA. Some studies (e.g., El-Hassan, 1988; Al Amayreh, 1991; Katanani, 2002; Al-Qadi, 2003, etc.) referred, in passing, to altqs and dynqs only in the context of a more general description of intonation of different utterance types. Additionally, most prior studies did not use modern speech analysis software, such as Praat, in their analysis as such advances in technology were not available.

Finally, all intonational studies that were reviewed in Chapter 2 and Chapter 3 provided no thorough description of what might disambiguate disjunctive questions in Arabic: theoretically and experimentally. It might be prosody alone (based on Dayal's generalisation), the choice of disjunctive elements, or the combination of both (based on Meertens' 2019 categories (Section 3.1)) that distinguishes altqs and dynqs. The Intonational Variation in Arabic (IVAr) Corpus (Hellmuth & Almbark, 2017) will be employed to examine disjunctive element distributions in the different dialects of the corpus in Chapter 4. Searching the corpus paves the way for the design of the perception study that might help explore which cue contributes more to the disambiguation. Some Arabic dialects will be chosen, based on their disjunctive element distribution in disjunctive questions. Then, the prosodic and lexical (i.e., disjunctive element) cues of altqs and dynqs will be explored in two prosodic production studies (Chapter 5) and used in perception studies (Chapter 6 & Chapter 7). The perception studies on the dialects to be selected will reveal the significance of each disambiguating cue and which of them is the most important in each dialect.

4 Distribution of Disjunctive Elements in Various Arabic Dialects

4.0. Outline and Aims of the Chapter

In English, string-identical questions such as alternative questions (altqs) and disjunctive yes-no questions (dynqs) as in (4.1) can be disambiguated by prosodic features including the choice of contour shape (see Pruitt & Roelofsen, 2013; O'Mahony, 2014; Heidenreich, 2019; Winans, 2019 for more details). That is, if the intonation is falling, the question is perceived as an altq, but if it is rising, then the question is considered a dynq:

(4.1) Do you want juice or Pepsi?

a. Do you want juice or Pepsi? [\]

b. Do you want juice or Pepsi? [/]

However, this way of distinguishing the two readings of the same string of words is not universal because different languages might use different disambiguating cues (Heidenreich, 2019; Meertens, 2019; Winans, 2019). The reason that altqs and dynqs can be disambiguated by their prosody in English may be that there is only one disjunctive element that can be used in both types of question (i.e., *or*). In contrast, Modern Standard Arabic (MSA) has two disjunctive elements, and the tendency reported in the literature is that MSA uses each disjunctive element in a different type of question (i.e., both disjunctive elements seem to be specialised to one reading), so each has its own distribution (see, for instance, Fakih, 2012). If this generalisation is correct, prosody is expected to play a secondary role, if any, in the disambiguation, as the difference is primarily lexical.

The general aim of this chapter is to investigate the distribution of all disjunctive elements in all types of utterances in different Arabic dialects. The more specific aim of this chapter is to find out whether the various dialects of Arabic are similar to English in having only one disjunctive element employed in both types of disjunctive question, or similar to MSA in having two elements with a preference to use a specific disjunctive element in each question type.

A parallel goal is to find out for which Arabic dialects it is also true that there are one or more disjunctive elements that can be used in both altqs and dynqs. Overall, the purpose of this corpus study is to find out the preferences dialects show for using disjunctive elements in altqs and dynqs in the corpus. These preferences will be compared with the types of dialects that were proposed based on the literature in the first section of this chapter, informing the decision of which dialects to choose, besides JA, to run perception studies in. The perception studies will then identify the disambiguating cues of disjunctive questions in Arabic, and which of them is most important, following Pruitt and Roelofsen's (2013) study on English.

Section 4.1 provides general background on disjunctive elements in Arabic. It reviews some prior work in the literature on disjunctive elements with particular focus on those disjunctive elements that can be used in disjunctive questions (altqs and dynqs). Section 4.2 briefly summarises the research questions that will be answered in this corpus study. Section 4.3 explains the methods used in the text corpus search, which depended only on the corpus transcripts. It also describes the IVAr Corpus (Hellmuth & Almbark, 2017) used in this study by referring to what it includes and how to get access to it. It also describes the number of speakers in the corpus text files used in this study. Section 4.4 reports the results of the corpus search. These results show that there are disjunctive elements that were not mentioned in the literature. The corpus search results also confirm Soraya's (1966) observation that *willa* can appear in altqs and dynqs in Egyptian Arabic (EA), which is different from Winans' (2012; 2019) study that restricted *willa* only to altqs. This section concludes with a summary of the results. Section 4.5 presents a discussion of the findings. It also refers to similarities and differences between what was found in the literature and what was found in the text corpus search. Section 4.6 is a summary of this chapter, explaining the implications of the findings in the thesis context and giving a brief context for the next chapter.

4.1 Background: What is Known about Disjunctive Elements in Arabic

The literature shows that there are differences in the distribution of disjunctive elements in different dialects of Arabic. These include different uses of otherwise identical disjunctive elements in MSA and other dialects of Arabic, including Egyptian Arabic (EA), Urban Hijazi Arabic, Sanʕaani Arabic, Syrian Arabic (SA), Gulf Arabic, Jordanian Arabic (JA), and Palestinian Arabic (Deristian, Yazouri, and Hebron dialects).

Many disjunctive elements in MSA were found in the literature, including *ʔaw, ʔam,* and *ʔimma*. All of them are equivalent to the English *or* (see Ryding, 2005; Abu-Chacra, 2007; Hamzah, 2011; Fakih, 2012 for more information). However, Arabic seems to have two mostly used disjunctive elements, and a first look at the literature, which either directly or indirectly referred to their distributions, seems to suggest three possible patterns or types that the dialects reviewed might fall under. These types come from the researcher's understanding and analysis of the uses of disjunctive elements in the examples from the studies reviewed, as will be shown later. Type 1 includes dialects in which the two disjunctive elements seem each to be specialised to a specific disjunctive question (to one meaning each). Type 2 comprises dialects in which there is an indication that one disjunctive element is specialised to one type of disjunctive question while the other is not (i.e., one disjunctive element is specialised, and one is general). This type of dialects is divided into Type 2A in which the specialised disjunctive element is related to altqs, and Type 2B in which the specialised disjunctive element is of dynqs. Type 3 includes dialects that might have no specialisation of disjunctive elements (i.e., both disjunctive elements might be general). Table 4.1 lists these types.

Table 4.1. *An Illustration of the Three Types of Dialects*

Type 1 (both disjunctive elements seem specialised)	Disjunctive element 1: altq (specialised) Disjunctive element 2: dynq (specialised)
Type 2 (one disjunctive element might be specialised and one seems general)	A. Disjunctive element 1: altq (specialised) Disjunctive element 2: altq/dynq (general) B. Disjunctive element 1: altq/dynq (general) Disjunctive element 2: dynq (specialised)
Type 3 (both disjunctive elements seem general)	Disjunctive element 1: altq/dynq (general) Disjunctive element 2: altq/dynq (general)

There are also some dialects for which the literature did not specifically give any indication or hint as to which type they belong to, such as dialects that mentioned one of the disjunctive elements, with no mention of the other.

The dialects reviewed, given that they are based on the researcher's understanding and analysis of various sources consulted such as papers, grammar books, etc., are not expected to neatly fall in these three types. However, an attempt to classify dialects reviewed into one of these three types will show the mapping of disjunctive elements to inclusive and exclusive readings in each dialect. If a dialect has a disjunctive element specialised to a particular reading, this could mean that prosody in that particular dialect might not be needed to disambiguate altqs and dynqs. In such a case, using one specific disjunctive element could be enough to indicate that a disjunctive question is an altq or a dynq.

This search for a pattern within each dialect from heterogeneous sources, as mentioned above, is not easy as some studies reported conflicting accounts of the same dialect, as will be shown later on. The review will start with MSA, a highly codified variety of Arabic. Then, EA will be discussed to show how complicated the situation is, as studies of EA provided different views. Then, there will be a summary of some dialects in which the patterns might not be clear due to the lack of studies on disjunctive elements in them.

4.1.1 Disjunctive Elements in MSA

The two most commonly used disjunctive elements in MSA are *ʔaw* and *ʔam*, and many studies referred to them either by explicitly stating their distributions or by briefly giving a few examples that have a disjunctive element in them, in the course of explaining other phenomena (see El-Hassan, 1988; Al Amayreh, 1991; Holes, 1995; Ryding, 2005; Fakih, 2012). The most comprehensive and persuasive study was Fakih's as he dedicated a whole book to Arabic questions, compared with the other studies, and as his descriptions of the distribution of disjunctive elements in MSA matched the researcher's intuition. Disjunctive elements in MSA according to Fakih's study fall in Type 1 above, as each disjunctive element seems to be specialised to one reading, as will be shown in detail later on.

In his book dedicated to questions in Arabic, Fakih (2012) reported that *ʔam* and *ʔaw* can be used to form disjunctive questions provided that they are preceded by one of the two MSA clause-initial question particles: *hal* and *ʔa*. The typical combination is to use *ʔa* with either of the two disjunctive elements.[23] Fakih used the term *alternative questions* to refer to both altqs and yes-no questions which have a disjunctive element (i.e., dynqs). He later explained that questions with *ʔam* have to be answered with one of the alternatives while questions with *ʔaw* have to be answered with a yes or a no, clearly indicating that each disjunctive element is specialised to a particular reading in this dialect. Fakih's description of the MSA disjunctive elements matches Ryding's (2005) description in terms of exclusivity and inclusivity. Ryding reported that *ʔaw* is inclusive in the sense that "it may include one, both, or all the elements" presented by the disjuncts[24] whereas *ʔam* is exclusive (p. 418). This is also the same description of *ʔam* given in Holes (1995).

---

[23] Readers interested in the detailed difference between these question particles are advised to consult Eid (1992) for information and examples, as such differences are beyond the scope of this thesis. In general, Eid reported that *ʔa* and *hal* are almost identical to each other. The only difference is observed in negative yes-no questions as they only take *ʔa*.

[24] The words *disjuncts* and *alternatives* are used interchangeably in this thesis to refer to the options presented in disjunctive questions (i.e., *X* and *Y*).

Fakih also referred to other uses of disjunctive elements in MSA by reporting that the disjunctive elements *ʔaw* and *ʔam* have various other differences in terms of their syntax and semantics:

i) The first difference lies in their distribution: *ʔaw* can be used in both declaratives and questions, while *ʔam* can only be found in questions. He gave the following examples (p. 82):

(4.2) ʔa qaraʔta ʃiʕran ʔam qisˤsˤatan
Q read.PST.2MSG poetry.ACC or story.ACC
'Did you read poetry or a story?'

(4.3) *qaraʔta ʃiʕran ʔam qisˤsˤatan
read.PST.2MSG poetry.ACC or story.ACC
'You read poetry or a story'

(4.4) ʔa ʔakalta tuffaːħatan ʔaw burtuqaːlatan
Q eat.PST.2MSG apple.ACC or orange.ACC
'Did you eat an apple or an orange?'

Fakih (2012, p. 82) illustrated that (4.2) is syntactically and semantically acceptable as is the case with (4.4). This is because both *ʔam* and *ʔaw* are used where they are permitted: *ʔam* in questions and *ʔaw* in questions or declaratives. On the other hand, (4.3) above is syntactically unacceptable due to the restriction on the use of *ʔam* in declaratives. If *ʔam* in (4.3) is substituted for *ʔaw*, the sentence would be syntactically acceptable.

ii) Another difference between the two MSA disjunctive elements that Fakih pointed to is in terms of the knowledge a speaker has in advance. That is, if a speaker uses the disjunctive element *ʔam*, then he already knows that one of the disjuncts must be true but without knowing exactly which one. Hence, an answerer must present either *X* or *Y* as an answer to the question. In other words, yes-no question readings are not possible for altqs with *ʔam* in MSA. However, if a speaker uses *ʔaw*, he does not expect that one of the alternatives holds true. This means that a question with *ʔaw* can only be considered a yes-no question, because the felicitous response can only be *yes* or *no*. To illustrate this idea, he provided the following example (p. 84):

(4.5) ʔa muːsaː fiː daːrika ʔaw ʕiːsaː
Q Musa in house.POSS.2MSG or Eisa
'Is Musa or Eisa in your house?'

In other words, Fakih reported that one can safely answer this question with a yes or a no rather than an *X* or a *Y*. The same question was also posed by him but with *ʔam* instead of *ʔaw* as in (4.6) below (p. 85). He affirmed that after replacing *ʔaw* with *ʔam*, the addressee cannot answer the question with a yes or a no but with either *X* or *Y*:

(4.6)	ʔa	muːsaː	fiː	daːrika	ʔam	ʕiːsaː
	Q	Musa	in	house.POSS.2MSG	or	Eisa

‘Is Musa or Eisa in your house?’

The above examples show that the difference between altqs and dynqs is related to the choice of disjunctive element, indicating the key difference is lexical, not intonational, as each disjunctive element is restricted to one utterance type.

iii) Another difference concerned the possibility of being used in sentence-initial position. Whereas *ʔam* can be used to introduce a question, *ʔaw* can never be used in this position. Fakih also argued that, in this case, *ʔam* links what was said before to what will follow, when used in an initial position, which might serve a rhetorical function. Fakih concluded his discussion by proposing the following disjunctive element “parameter”, which stipulates (p. 86):

> **“ʔam /ʔaw parameter**
>
> a) *ʔam* c-selects an interrogative sentence only, whereas *ʔaw* c-selects both interrogative and declarative sentences.[25]
> b) *ʔam* presupposes previous knowledge of the questioner whereas *ʔaw* does not.
> c) *ʔaw* asserts one of two or more ambiguous things/entities while *ʔam* requests clarifying that ambiguity.”

Other studies of MSA were not as clear as Fakih’s (2012) in terms of explaining, in detail, how and where each disjunctive element is used. They mentioned, in passing, one or two examples of one or two disjunctive elements with a short explanation (e.g., El-Hassan 1988; Holes, 1995; Ryding, 2005). Such studies did not help decide whether the disjunctive elements they mentioned are specialised for one question type or not. In the oldest of these studies, El-Hassan provided examples only of altqs, in the context of explaining their intonational patterns in English and Arabic. Only *ʔam* appeared in all of his examples. He did not refer to any other element that can be employed grammatically in altqs in MSA. In

[25] Fakih uses the term *c-select* to denote the type of sentences in which disjunctive elements occur. So, *ʔam* is used only in questions while *ʔaw* can be used in questions as well as in declaratives.

addition, he did not refer to yes-no questions that employ disjunctive elements (i.e., dynqs) when he, in general, discussed yes-no questions. When explaining altqs, he included an example of what is called in this thesis not-alternative questions, using the same disjunctive element (i.e., *ʔam*). Similarly, other researchers reported *ʔam* in altqs and dynqs. Al Amayreh, for instance, used the same disjunctive element (i.e., *ʔam*) in both altqs and dynqs[26] in MSA, as shown in the following examples (pp. 87-88).[27]

(4.7) hal satusaːfiru l-joːm (HR) // ʔam ɣadan (MF)
Q travel.FUT.2MSG the-today or tomorrow
'Are you leaving today or tomorrow?'

(4.8) hal turiːdu ʃaːj (HR) // ʔam qahwa (HR)
Q want.PRS.2MSG tea or coffee
'Would you like tea or coffee (or something else)?'

From my intuitions as a native speaker, restricting *ʔam* to altqs and *ʔaw* to dynqs, as some studies reviewed above reported, might hold true in MSA. However, given the lack of experimental evidence (e.g., a perception experiment) that might confirm this distribution, this area might be suitable for future research to find out whether or not *ʔam* and *ʔaw* can be accepted in both altqs and dynqs. In the present thesis, the most reliable source is taken to be Fakih's book, for the reasons mentioned earlier.

4.1.2 Disjunctive Elements in EA

The situation in EA appears to be more complicated than it is in the other Arabic dialects because there are multiple accounts of which disjunctive element is used or which is restricted to which disjunctive question. The two most commonly used disjunctive elements in this dialect are *ʔaw* and *willa*. Through reading the EA literature on this topic, a conclusion could be that the evidence as to which type of dialects EA belongs to is conflicting, as will be explained later on. Both disjunctive elements might be specialised (following Eid, 1974; Gary & Gamal-Eldin, 1982; Winans, 2012; Winans, 2019), so this dialect might belong to Type 1. For Gary and Gamal-Eldin, *willa*[28] seems to be restricted to altqs and *ʔaw* to statements (i.e., not used in altqs). However, Soraya's (1966) study did not restrict *willa* to any type of

[26] Al Amayreh called them *list questions*.
[27] HR, MF, and // refer to high rising, mid falling, and a boundary, respectively.
[28] They transcribed it as *walla*.

disjunctive question.[29] The above studies on whether disjunctive elements are specialised or not in EA will be reviewed in detail below.

Soraya (1966) reported that the disjunctive element *willa*[30] is used in questions that provide the addressee with options to choose from (i.e., in altqs). He also used the same disjunctive element in examples of questions that can be answered with a yes or a no (i.e., in dynqs)[31] and indicated that such questions express open choice as in the following example (p. 199):

(4.9) //tiħibb tigarrab dij / willa dij//

like.PRS.2SG try.PRS.2SG this or this[32]

'would you like to try this one? Or this one?'

Eid (1974) referred to *willa* and to two other disjunctive elements used in the variety of EA that is spoken in Cairo: *ʔaw*[33] and *yaː…yaː*. She attributed the differences between these three disjunctive elements to their syntax and semantics. In terms of syntax, the type of utterances in which they occur differs: some can be found in questions, for instance, whereas others in declaratives. Eid reported that *willa* can only be used in questions while the other two appear in declaratives and questions. Eid reported that *willa* can appear in both altqs and not-alternative questions,[34] implying that this disjunctive element is specialised to altqs. However, Eid did not refer to the contours that might differentiate altqs and dynqs. It might be worth drawing attention to differences in terminology in the studies on EA. Eid's examples of yes-no questions are of the same type of question that Winans (to be discussed

[29] Another study was by Mitchell (1993) who referred only to one disjunctive element (*willa*) in his examples of altqs, with no mention of *ʔaw* in disjunctive questions.
[30] The original transliteration in his thesis was *walla*. For consistency, *willa* and *ʔaw* will be used when reporting all Arabic studies that discuss them except in some quotations. This also helps unify the transliterations across all the other dialects. However, the original transliterations of *willa* and *ʔaw* for each study will be mentioned in footnotes.
[31] Soraya did not use the terms *altqs* and *dynqs* when describing the use of *willa*, but it is clear from the descriptions he provided next to each of his examples that they were the intended types of question. That is, describing a question with *willa* as a question providing addressees with alternatives to select from is clearly a description of an altq. Similarly, questions answerable with a yes or a no, such as his example above, are also dynqs.
[32] It was not clear from Soraya's thesis whether this question was addressed to a male or a female. Therefore, there is no reference to any gender in the gloss. Unless otherwise noted, quoted examples are cited with their original translations, but there might be slight changes to the way they are transliterated. Glosses will also be provided to all examples that lack them. The symbol / in Soraya's notations indicates a pause. He also used //_ instead of // to refer to the beginning and the end of an utterance.
[33] Eid used the transliteration *walla* and *ʾaw* to refer to *willa* and *ʔaw*, respectively.
[34] Eid called this type of questions *yes-no questions*.

later on) called *polar-alternative questions*. That is, they are the same type of question that is called *not-alternative questions* in this thesis. Example (4.10) below shows *willa* in a not-alternative question (Eid, 1974, p. 1):

(4.10)	ʔalˤlˤah	l-walad	ħajiiːgi	willa	laʔ
	by God	the-boy	come.FUT.3MSG	or	NEG

‘Will the boy come or not?’

Furthermore, Eid added that *ʔaw* and *yaː…yaː* are used in declarative sentences. Although *ʔaw*, according to Eid, can be used like *yaː…yaː* in linking phrases, it cannot appear between two full sentences. In other words, the difference between these two disjunctive elements lies in their syntactic distribution: *yaː…yaː* can be used as a connector between two sentences whereas *ʔaw* cannot.[35]

In terms of semantics, however, Eid explained that the semantic difference is related to the inclusive and exclusive readings: *ʔaw* is inclusive while *yaː…yaː* and *willa* are exclusive. This might imply that EA belongs to Type 1. Specifically, she reported that in sentences with *ʔaw* both disjuncts might hold true at the same time, so this disjunctive element is inclusive while in utterances with either *yaː…yaː* or *willa*, there must be only one disjunct that holds true (either *X* or *Y*), so such disjunctive elements are described as exclusive. Note that using *willa* in yes-no questions, in Eid’s terminology, is treated as an exclusive reading here as yes-no questions for Eid’s study (see the example above) are in fact not-alternative questions as defined in this thesis.

Likewise, Winans (2012; 2019) clearly stated that both of the disjunctive elements in EA are specialised to one disjunctive question type (as well as to other utterance types), so this implies that EA might belong to Type 1. Hence, altqs and dynqs in her data from Urban EA[36] are lexically distinct: each of them has its own disjunctive element. More specifically, she focused on the distribution of *ʔaw* and *willa* in EA.[37] In both studies, she explained that each

[35] The disjunctive element *ya…ya* is similar to English *either…or*, which is beyond the scope of this thesis.
[36] In her 2012 paper, Winans does not state exactly where her participants are from, but she only reported that they are urban speakers from northern Egypt. It might also be the same dialect that she studied in her 2019 paper.
[37] Winans used the transliterations *aw* and *wallaa* in her 2012 thesis and *walla* in her 2019 study.

of them is used differently:[38] ʔaw can be used in declarative sentences, yes-no questions (henceforth dynqs)[39] and wh-questions (Winans, 2012), but *willa* can only appear in altqs and not-alternative questions (*polar-alternative questions*).[40] Restricting *willa* in Winans' studies to altqs seems to contradict Soraya's study (reviewed above) because Soraya allowed *willa* to appear in both types of disjunctive questions. The availability of question particles and the choice of contour shape are the deciding factors in determining whether an utterance with *ʔaw* is a yes-no question or a declarative (Winans 2019). According to Winans (2012), the following example with *willa* can never be a dynq (p. 12):

(4.11) ʕindik kalb willa ʔutˤtˤa
have.PRS.2MSG dog or cat[41]
'Do you have a dog or a cat?'
a. # ʔajwa (yes)
b. # laʔ (no) *meaning neither*
c. ✓ kalb (dog)
d. ✓ l-ʔitnajn (both)

Although Winans asserted, in both studies, that *willa* cannot appear in any declarative utterance, she mentioned two exceptions: counterfactual utterances (Winans, 2019) and a negative reply to a clause containing the other disjunctive element *ʔaw* (Winans, 2012). In the latter, it is considered as a negation of *ʔaw* as shown in the following example (p. 19):

(4.12)
a. omar ʕindik ʕarabijja ʔaw/*willa be:t
Omar have.PRS.2MSG car or house
'Omar has a car or a house.'

[38] When comparing *ʔaw* and *willa* to *or*, in her 2012 paper, Winans noted that *ʔaw* equates the normal English *or* while *willa* is equivalent to the stressed version of the English disjunctive element.
[39] *Polar questions* and *yes-no questions* are used interchangeably in this thesis. In addition, for consistency, yes-no questions with a disjunctive element in any study to be reviewed will be called *dynqs* in this thesis even if the source used the terms *yes-no questions*.
[40] This type of question is discussed in detail in chapter 3 as one type of altqs, and I called it the *not-alternative question* (see the operational definition in Section 1.3). Winans (2019) reported that it is similar to altqs in its intonation (in English and EA at least) but differs from them in its possible answers. Its answers should be like yes-no question answers. However, as seen earlier, Eid referred to this type of question as a yes-no question. This might be because it is answered with a yes or a no.
[41] As noted earlier, there will be slight changes to the original transcriptions so that they fit the IPA system provided in a table at the beginning of the thesis. Her transcription of *willa* was *wallaa*.

Omar replied with (b) below using *willa* to negate *ʔaw* in (a) above:

b.	ma	ʕindiːʃ	ʕarabijja	willa/*ʔaw	beːt,	ʕindi	l-ʔitnajn
	NEG	have.PRS.1SG.NEG	car	or	house,	have.PRS.1SG	the-two

‘I do not have a car or a house; I have both’

Regarding *ʔaw* in altqs and dynqs, and even though Winans (2012; 2019) stressed that *ʔaw* is restricted to dynqs (when considering disjunctive questions), the following example can be interpreted both as an altq and a dynq, based on the answers Winans (2012) reports that they are possible (p. 11):

(4.13)	ʕindik	kalb	ʔaw	ʔutˤtˤa
	have.PRS.2MSG	dog	or	cat[42]

‘Do you have a dog or a cat?’

Winans reported that the above example can be answered with a yes or a no or with any of the alternatives: *X* or *Y*. She listed the following possible answers (p. 11):

a. ✓ ʔajwa (yes)

b. ✓ laʔ (no) *meaning neither*

c. ✓ kalb (dog)

d. ✓ l-ʔitnajn (both)

She added that some people might interpret the example above as an altq even though it has *ʔaw*, but only when this disjunctive element is strongly accented. The answer (c) above clearly indicates that the hearer interpreted that utterance as an altq, not as a dynq. So, based on the exception that *ʔaw*, which Winans restricted to dynqs, can be used in altqs when stressed, *ʔaw* might be the general disjunctive element in EA and *willa* might be the specialised one. That is, using *ʔaw* in both altqs and dynqs and restricting *willa* only to altqs might hint that EA might belong to Type 2, instead of Type 1. So, the current pieces of evidence as to which type of dialects EA might belong are conflicting. There are no more data to determine the specific type (i.e., the tendency) as yet. The perception study on EA (Chapter 7) will test the acceptability of both disjunctive elements in both question types, leading to confirming the type of dialects EA belongs to.

[42] Winans transcribed *ʔaw* as *aw*.

In sum, therefore, Winans' (2012; 2019) observation that *ʔaw* in EA is used in dynqs and that *willa* is used in altqs (and not in yes-no questions) appears, on the face of it, to contrast with Eid's observation that *ʔaw* can never occur in yes-no questions and that *willa* can. However, the difference between Eid and Winans is due to the different uses of terminology (what Winans calls a *polar-alternative question* is for Eid a yes-no question), so they don't contradict each other. In other words, *willa* can appear in Winans' *polar-alternative questions* and in Eid's yes-no questions, which both refer to the same question type i.e., to what is called not-alternative questions in this thesis, and which have an exclusive reading (as in 4.10).

What both Winans' and Eid's studies showed, therefore, is that each disjunctive element in EA might be specialised. If this turns out to be right, this means that the role of disjunctive elements in this dialect might be strong enough to disambiguate the two types of disjunctive question. Thus, the disambiguating role of intonation in EA, if any, might be weaker than the disambiguating role of intonation in other dialects that use the same disjunctive element in both types of disjunctive question.

4.1.3 Disjunctive Elements in Other Arabic Dialects

An example of a dialect that might have one specialised and one general disjunctive element (i.e., Type 2) is SanʕaaniArabic. Watson (1993, p. 292) indicated that "The alternative conjunction has three non-contextually-dependent allomorphs- *aw*, *awlā* and *wallā*".[43] She reported that in declarative sentences *ʔaw* is the most commonly used particle while *willa* appears most commonly in interrogatives. Sanʕaani Arabic employs *ʔaw* in altqs as observed in some of Watson's examples that, as she reports, cannot be answered with a yes or a no, and thus this disjunctive element has an exclusive reading. Hence, it seems that *ʔaw* might be specialised to altqs in Sanʕaani Arabic, as can be seen in (4.14) below (p. 293):

(4.14) laħim l-ʔasad ħalaːl ʔaw ħaraːm
meat the-lion permissible or impermissible
'Is lion meat permissible or impermissible?'

Watson also provided examples of questions like (4.15) below in which *willa* is used: in this example, the speaker does not presuppose that one of the alternatives holds, making an

[43] *Wallā* and *aw* are the same as *willa* and *ʔaw*.

answer with either a yes or a no possible. Although Watson did not call this example a dynq, it is a clear case of a dynq because its answer can be a yes or a no, as she reported. Example (4.16) below also uses *willa*, and its answer, as noted by the author, has to be one of the provided disjuncts: either *X* or *Y*. Given (4.15) and (4.16) below (Watson, 1993, p. 293) and their acceptable answers as shown above, one can notice that *willa* is used in both altqs and dynqs in this dialect. Hence *willa* in this dialect seems to be a general disjunctive element:

(4.15) ʃiː bih gahwih willa bun
Q there gišr[44] or coffee
'Is there gišr or coffee?'

(4.16) ʔajjaħiːn ʕa tiʒaj ʃarag willa bħiːn
when will come.FUT.2FSG late or early
'When will you come, late or early?'[45]

It is worth noting that even in declarative sentences, there were examples with all of the three disjunctive elements. This suggests that they can be used in parallel in declarative sentences. Watson (1993) did not refer to the role of the choice of intonational contour shape in disambiguating the two readings of a question containing *willa* as an altq or a dynq. This might be because her discussion was related to the disjunctive elements themselves, not to how the contour shapes may differentiate altqs and dynqs.

The situation in Syrian Arabic (SA) is complicated by the lack of detailed examples in the literature. Ferguson and Ani (1961) noted that disjunctive questions[46] use *ʔaw*, *willa*,[47] or *yaː*. They might also use one or more other disjunctive elements, given their usage of *etc*. after the three disjunctive elements above. Cowell (2005), similarly, reported that this dialect has many disjunctive elements that can be translated as *or*, and they are *willa, ʔaw, yaː*, and *yamma* (a different transliteration is y*əmma)*.[48] He maintained that *willa, ʔaw, yaː*, and *yamma* are somewhat synonymous, though *willa* and *yamma* "are used most commonly in ALTERNATIVE QUESTIONS" (p. 395). Although no example is given to show whether or not they are also used in dynqs, nothing in Cowell's study excludes this possibility. Based on

[44] Watson translated gišr, in another example, as "spicey coffee" (p. 355). This term refers to a hot drink made with coffee husks.
[45] Slight changes are made to the translation of examples.
[46] From their prosodic descriptions (see Chapter 6), the intended type of disjunctive questions might be altqs. They used the term "Either-or questions" (p. 184).
[47] Transliterations were *wəlla* and *yaa*.
[48] He used the transliterations *wəlla* and *yā*.

the above studies on SA, it might be assumed that this dialect belongs to Type 3, which includes dialects with general disjunctive elements. However, this classification is tentative as there is not enough information to decide on the type.

Gulf Arabic might also be another example of a dialect with no specialised disjunctive elements (i.e., Type 3), though this was inferred from but was not directly stated in the following studies. In Qafisheh's (1977) study of Gulf Arabic,[49] for example, *ʔaw* and *willa*[50] were reported to be synonymous and to be used in declaratives. *Willa* also appeared in a question example, but it is not possible to tell whether it is an altq or a dynq, making the picture unclear. Similarly, Holes (1990) briefly referred to *loː*, *ʔaw*, and *willa*[51] in the same dialect and reported that they can be used in questions and sentences. Holes noted that "*walla* and *l*o are the most common means of conjoining, and precede the second clause" (p. 64). Most interestingly, he indicated that *ʔaw* can be used like *willa* and *lo*, meaning that they may be interchangeable. However, he did not allocate a certain disjunctive element to a specific type of question. He only generalized that they are interchangeable but without referring to any specific context in which this interchangeability is acceptable or not. Example (4.17) below has *ʔaw*, but the author did not indicate whether it is interpreted as an altq or a dynq. If the disjunctive elements are indeed interchangeable or synonymous as both researchers (Qafisheh, 1977; Holes, 1990) reported, this suggests that all of the disjunctive elements referred to may be used in both altqs and dynqs, but nothing in the studies explicitly refers to this conclusion although it might follow from the statement that these disjunctive elements "can be used in the same way" (Holes, 1990, p. 64). If this conclusion is true, then it is expected that this dialect might have no specialised disjunctive elements (i.e., Type 3):

(4.17)	biʕit	s-sajjaːra	ʔaw	ɣajjart	baːlak
	sell.PST.2MSG	the-car	or	change.PST.2MSG	mind.POSS.2MSG
	'Did you sell the car or change your mind?'				

In Palestinian Arabic, *willa* is reported in altqs only (Ghrefat, 2007 for Hebron dialect) or in altqs and dynqs[52] (Katanani, 2002 for Yazouri dialect; Al-Qadi, 2003 for Deristian dialect). In all of these studies, there was no clear mention of *ʔaw* in disjunctive questions. Thus, the

[49] Qafisheh studied Emirati Arabic, spoken in Abu Dhabi.
[50] He transliterated them as *'aw* and *walla*.
[51] The original transliterations in his study were *walla* and *aw*.
[52] Katanani used the term incomplete questions, which might be dynqs in this thesis.

pattern in this dialect is still unclear. The following is an example of an altq in this dialect (Ghrefat, 2007, p. 74):

(4.18) truːħ haʔʔeːt willa baʕdeːn
go.PRS.2MSG now or later.on[53]
'Do you want to go now or later?'

The literature on JA reports only one disjunctive element (*willa*) used in both altqs and dynqs, making the pattern in this dialect difficult to explore. As a native speaker, my intuition is that JA has two commonly used disjunctive elements: *ʔaw* and *willa*. It seems that no study has investigated their proper distributions so far. My intuition for JA is that *ʔaw* and *willa* can be used in both types of disjunctive question, but with a strong preference for *willa* in altqs, so it might belong to Type 2A. Although there was no prior study that particularly explored the distribution of disjunctive elements in JA, Al Amayreh (1991)[54] provided a few examples of some questions in the course of a general description of the intonation of this dialect. The disjunctive element *willa* can be seen in altqs, and in dynqs (which he called *list questions*), providing evidence of its acceptability in both types of question as the following examples show (pp. 87-88):

(4.19) //biddak ʔitsaːfir l-joːm (HR) // // willa bukra (MF)//
want.PRS.2MSG travel.FUT.2MSG the-today or tomorrow[55]
'Are you leaving today or tomorrow?'

(4.20) // biddak ʃaːj (HR) // willa gahwa (HR) //
want.PRS.2MSG tea or coffee
'Would you like tea or coffee (or something else)?'

As for Urban Hijazi Arabic, it seems that it is still unclear as to which type this dialect belongs as there was only one study. Omar (1975) briefly mentioned that *ʔaw* can appear in positive declaratives while *willa*[56] can appear in questions. She added that some people in this

[53] Ghrefat used the transliteration w*ala*.
[54] Al Amayreh analysed data from radio shows, so it is not clear which variety of JA his data belong to. However, he stated that he also used his own production in some parts of his thesis. In Jordan, specific varieties can be identified based on clans' names. So, if Al Amayreh used his own production, a conclusion could be drawn, based on his clan's name, that he analysed Urban JA. This conclusion is based on the fact that the Al Amayreh Clan mostly reside in Irbid and Amman cities, which are both urban.
[55] HR, MF, and // refer to high rising, mid falling, and a boundary, respectively.
[56] *Walla*, in her transliteration

dialect might use them interchangeably, meaning that *ʔaw* and *willa*, at least for some people, can be used in questions. However, she did not clarify what type of question they can appear in, so it is not clear whether they are allowed in both altqs and dynqs, or only in one of them. The example that she used *willa* in was not called either an altq or a dynq and had no accompanying answers that might help guess its type. As a result, the picture in this dialect is still unclear.

Finally, it was not easy to decide on which type each dialect belongs to given the lack of studies that are particularly dedicated to investigating disjunctive elements in disjunctive questions. Additionally, there were no other reports on the use of disjunctive elements for other dialects.

4.1.4 Interim Summary

Dialects above were classified based on three types: dialects that seem to have each disjunctive element specialised to one question type (Type 1), dialects in which there is an indication of one specialised and one general disjunctive element (Type 2), and dialects that might have no specialisation of disjunctive elements (i.e., both disjunctive elements might be general) (Type 3). There were also some dialects that were difficult to assign to one of these types, such as dialects that had studies mentioning the distribution of only one disjunctive element (e.g., Palestinian Arabic and JA). These types might turn out to be true, or wrong, after searching the corpus in the next part of this chapter. In case some dialects specify one disjunctive element to each question type, then prosody might play a weak role, if any, in the disambiguation. In case there are dialects that have both disjunctive elements completely interchangeable, as is hinted at for SA above, then it is expected that only prosody will be responsible for the disambiguation. Searching the text corpus in the next section and running production and perception studies will provide evidence to support or reject these predictions.

The review of the literature on all Arabic dialects above reveals differences in the behaviour of disjunctive elements across dialects. It also shows that the issue of which dialect employs which disjunctive element in altqs and dynqs was rarely discussed in a direct way or in depth in the literature. That is, most of the uses of disjunctive elements referred to above are based on the researcher’s interpretation of the examples provided in those sources. Even those studies that directly referred to disjunctive questions did not directly refer to the use of disjunctive elements in these types of question, and the examples provided of each type of question were very few.

Whether or not the same disjunctive element can be used in one or both altqs and dynqs is different from one language or dialect into another. Based on the above studies, it is clear that even the same dialect might have different uses of the same disjunctive elements as indicated for Palestinian Arabic, for instance. This might be attributed to differences between varieties of a specific spoken dialect, or to the time gap between some of these studies.

In general, many of these studies provide very few examples, such as Al Amayreh's study, making it difficult to reach a definite conclusion for some dialects. Additionally, it is difficult to reach clear conclusions about the behaviour of other dialects, such as Palestinian and Hijazi Arabic, because of conflicting reports or because only one disjunctive element was mentioned in some studies.

Table 4.2. *A Preliminary Classification (After Literature Review) of Dialects Under the Three Types*[57]

Type 1	- Modern Standard Arabic - ? Egyptian Arabic[58]
Type 2	**<u>Type 2A:</u>** - Sanՙaani Arabic
Type 3	- Syrian Arabic - Gulf Arabic

Table 4.2 below summarises tentatively which dialect belongs to which type.[59] Some dialects are not mentioned in the table to avoid making wrong generalisations. Even the dialects in the table below might turn out to behave differently in future research, due to the lack of the current studies on their behaviours. As for EA and SA, the next chapters will show whether their position in the summary table is true or not. This uncertainty motivates the decision to

[57] JA is not in the table because there is was no study referring to more than one disjunctive element in the literature. The behaviour of JA will be studied in the next chapters.

[58] As discussed in the literature review above, EA might belong to Type 2, due to the different description Winans (2012) provided on the acceptability of *ʔaw* in altqs in case it is stressed. The final classification might be confirmed in Chapter 7, when testing EA listeners' perception.

[59] This table is a tentative summary as some dialects have different accounts of the distribution of their disjunctive elements. Readers are advised to read the literature review for each dialect above for a complete understanding of how disjunctive elements behave in each dialect. Based on the above review of the uses of disjunctive elements in various Arabic dialects, a summary of these uses with a special focus on their use in altqs and dynqs is provided in Table A.6 (in Appendix A (A.6)).

perform a search of the IVAr Corpus (Hellmuth & Almbark, 2017) in order to find the general patterns or tendencies in the Arabic dialects found in this corpus (Section 2.4).

4.2 The Corpus Study: Research Questions

This corpus search aims to find answers to the following two questions:

i) How do disjunctive elements work in Arabic? That is, what is the general distribution of Arabic disjunctive elements in the 11 datasets (8 dialects) in the IVAr Corpus?

ii) What are the overall tendencies or preferences dialects show for using disjunctive elements in altqs and dynqs in the 11 datasets (8 dialects) in the IVAr Corpus?

The first question was raised because some studies (e.g., Gary & Gamal-Eldin, 1982; Winans, 2012; 2019) report restricted use of some disjunctive elements to some utterance types, such as the possibility of being used in either altqs or dynqs but not in both, so one possible classification of EA was Type 1 (see Section 4.1.2 as this dialect might, instead, be Type 2).

The general tendencies sought in the second question will help establish whether or not some Arabic dialects behave 'like English' in having one disjunctive element that can be used in altqs and dynqs. They will also reveal whether there are Arabic dialects that are 'like MSA' in showing a tendency to use one disjunctive element more often in a specific type of disjunctive question than in the other. Additionally, the results of the corpus search will also help check the preliminary classification of the dialects, in the previous section, into three types, in terms of disjunctive element uses in disjunctive questions. The three tentative types are Type 1 (a tendency in which both disjunctive elements might be specialised to one question type), Type 2 (a tendency in which one disjunctive element might be specialised and one might be general), and Type 3 (a tendency in which both disjunctive elements might be general). Some dialects were difficult to tell which type they belong to.

In other words, this corpus search aims to investigate the distribution of disjunctive elements in Arabic. Then, what is found in the corpus will be compared with what is already known from previous studies reviewed above. Corpus results that will be compared with what is found in the literature are only those related to the dialects that are available both in the literature and in the corpus, checking the literature descriptions of the distribution of disjunctive elements. All disjunctive elements in each dialect in the IVAr Corpus were searched for as will be shown below.

4.3 Methods

4.3.1 Materials

The text transcriptions searched in this study were downloaded in .txt format from the Intonational Variation in Arabic Corpus IVAr (Hellmuth & Almbark, 2017), which is available online. This open-access corpus comprises map tasks, free conversations, folktales (some of them were read while some were retold from memory), and scripted dialogues. Some of the data are scripted while others are not. The parts of the corpus used in this study were only the transcribed texts of spontaneous speech. Because this study is a corpus search, it is concerned primarily with the transcribed texts. The corpus includes eight dialects of Arabic in eleven datasets. The Iraqi and the SA dialects were recorded in Jordan. The remaining dialects were recorded in their own countries. There were three datasets (moca, mobi, and moco) that belong to the same dialect, which is Moroccan Arabic. Similarly, two datasets represent JA (joka and joam). The age range for all dialects was unified (18 to 30 years old) except for moca (40 to 60 years old). All participants are monolingual except for mobi participants who speak Tamazight.

Each dialect in the corpus has 12 speakers. However, not all of the spontaneous recordings were transcribed. For the purpose of this study, the total number of samples analysed in this chapter is 338 (110 samples from free conversation tasks (fco), 110 samples from map tasks (map), and 118 samples from folktale memory-retelling tasks (ret)). More details are shown in Table 4.3.

Table 4.3 *Count of the Samples from the IVAr Included in the Corpus Search (Total Number = 338)*

Dialect	Task	N	N/dialect	Dialect	Task	N	N/dialect
egca (Egypt, Cairo)	fco	8	24	**moca (Morocco, Casablanca/Young speakers)**	fco	12	36
	map	6			map	12	
	ret	10			ret	12	
irba (Iraq, Baghdad)	fco	12	36	**moco (Morocco, Casablanca/Older speakers)**	fco	12	36
	map	12			map	12	
	ret	12			ret	12	
joka (Jordan, Karak)	fco	6	26	**ombu (Oman, Buraimi)**	fco	12	36
	map	8			map	12	
	ret	12			ret	12	
joam (Jordan, Amman)	fco	6	18	**syda (Syria. Damascus)**	fco	6	18
	map	6			map	6	
	ret	6			ret	6	
kwur (Kuwait, Urban)	fco	12	36	**tuns (Tunisia, Tunis)**	fco	12	36
	map	12			map	12	
	ret	12			ret	12	
mobi Morocco, Bilingual Casablanca/Young bilingual speakers)	fco	12	36				
	map	12					
	ret	12					

4.3.2 Corpus Search Procedures

The transcriptions were searched by typing the English word *or* in the search box of the corpus .txt files. By doing so, this showed how Arabic disjunctive elements were realized in the corresponding Arabic transcripts. In other words, the criterion adopted in the search was extracting all examples containing some version of *or* in English or Arabic. When an example was found, the whole line of that example (including the time stamp, the text, and translation, if available) was copied into a spreadsheet.

If an example extended over more than one line, then the whole example was copied as one line in the spreadsheet with the start time of the first line and the end time of the last line in the corpus. For example, the utterance in (4.21) from egca-fco-f6f7 lies on four lines (with four time stamps) in the transcript. However, it was copied into the spreadsheet as one line, i.e., (*egca-fco-f6f7*; *29.964-34.917*; *ah l-ʔakil l-masˤri ʔaktar ħaːga willa masalan mumkin taːkli ʔakil ʔitˤaːli*).[60] The times of silent gaps were not included in the spreadsheet:[61]

(4.21)

29.964	32.554	ah l-ʔakil	l-masˤri	ʔaktar	ħaːga	willa
		ah the-food	the-Egyptian	more	thing	or
		eh mostly the Egyptian food or				
32.366	33.158					
32.554	32.804					
32.804	34.917	masalan	mumkin taːkli	ʔakil	ʔitˤaːli	
		for.example	possible eat.PRS.2FSG	food	Italian	
		for example, you can eat Italian food				

Similarly, a line in the transcripts sometimes contains more than one utterance: one with a disjunctive element and another without. In such a case, only the utterance that had a disjunctive element was copied into the spreadsheet. For instance, in the following example from *moca-fco-m1m2*, only *u- wla walmas* was copied into the spreadsheet (i.e., without *walmas mizjana*) though it was in the same line as it was a different utterance that had no disjunctive element:

(4.22)

125.924	128.062	u wla	walmas	walmas	mizjana
		or	Oulmes	Oulmes	good
		Or Oulmes. Oulmes is good.			

Although searching for the English disjunctive element *or* should be enough to get all examples of disjunctive elements in the corpus, disjunctive elements were searched for using their Arabic spellings also. The motivation for this additional step was that it was found that a few utterances in the corpus had no English translation, such as *mubaːraːt ʔabtˤaːl d-dawri willa ʔabtˤaːl ʔuroːbba* from *joka-fco-m3m4* (time: 169.615-171.774). In such cases, if the search was restricted only to the English word *or*, such an example which had no translation in the corpus would not appear, so it would have been mistakenly excluded. In addition, some transcripts had no English translation at all (e.g., *joka-ret-m5*). It, therefore, would be prudent

[60] IVAr examples are reproduced in this thesis using IPA symbols.
[61] Glosses are provided for the purpose of this thesis.

to search in Arabic along with English. Another motivation for searching in both English and Arabic was that there were few examples that were translated into English but without translating their disjunctive elements. For instance, *ʔinta rijaːl willa madriːd ʔinta* ‘you Real or Madrid you?’ from *joka-fco-m3m4* (time: 174.785-176.096) was translated in the corpus as ‘which one is your favourite team?’ Such an example would have been missed if the search with *willa* had not been conducted.

It is also worth noting that the Arabic search was conducted using different spellings of each disjunctive element. For example, various spellings (e.g., *willa*, *walla*, *wella*, *wila*, *wala*, *wela*, *willaa*, *wallaa*, *wellaa*, *wilaa*, *walaa*, *welaa*, *wla*, *aw*, *ʔaw*, 2aw, and *‘aw*) were searched for in JA dialects and, of course, in other dialects. Likewise, *lo*, *loː*, *lu*, and *luː* in Iraqi dialect were all tried in the searching process as many spelling variations were observed in the transcripts. The IVAr corpus is accompanied by a manual orthographic transliteration using a romanised transliteration system (similar to that used in online communications), and does not claim to be consistent. Therefore, there was a need to search for different variants of the same disjunctive elements.[62]

Furthermore, the spellings found in the literature on each dialect were also used in the searching process and were varied in order to find as many examples as possible in the corpus. The rationale for this was that this might help avoid missing any occurrence of a disjunctive element in case it was transcribed differently in the corpus.

All spelling variations were unified at the end of the searching process in the spreadsheet, and only one form was used in the coding process. That is, all spelling differences like *willa*, *walla*, *wella*, *wila*, *wala*, *wela*, *willaa*, *wallaa*, etc. were unified and coded as *willa* because there is no difference in their meanings, and all of them are equivalent to the English *or*. A similar procedure of coding consistency was followed with the other disjunctive elements. For instance, *aw*, *‘aw*, and *2aw* were coded as *ʔaw*.

[62] The disclaimer on the website explained the transcriptions used in the corpus, stating that “The text transcriptions provided with this corpus were generated to facilitate word-by-word analysis of the data in support of analysis of intonation patterns, and are not intended to be interpreted as a detailed phonetic transcription. While we have corrected all errors that we have found in the transcriptions, the University of York assumes no responsibility for any errors, omissions or inconsistencies that may remain” (see the ‘readme’ file: https://reshare.ukdataservice.ac.uk/852878/). Symbols such as 2 and 3 are used to stand for IPA symbols (such as [ʔ ʕ]).

There were a few words which had the same spelling as disjunctive elements but were not real disjunctive elements. These were words that had the same form as disjunctive elements but were not disjunctive elements. In such cases, they were excluded as in *ʔana walla l-kabsa baħibha* ‘I like Kabsah’ from *joka-fco-f5f6* (time: 14.804-16.415). The word *walla* in this example means *walˤlˤah* ‘by God’ which is not a disjunctive element, so it was excluded from the analysis. It is also worth mentioning that whenever the search was performed using the English word *or*, there was a check for its Arabic equivalent to ensure that it was a real disjunctive element before including it in this study.

Some occurrences of other words that had the same spelling as the disjunctive elements were excluded. For instance, the second part of *laː…wala* in *ʔana ʔana laː laːgiːtu bi-ʃ-ʃaːriʕ wala saragtu*[63] from *joka-ret-m1* (time: 56.179-58.598) is not a disjunctive element as the whole expression *laː…wala* means *neither…nor*, which is beyond the scope of this study. Likewise, this expression was excluded from Watson’s (1993) study of alternation because its first part is not a conjunctive element as it is negative.[64]

Arabic text was relied on when there were differences between the Arabic text and its translation as it is the source language. For example, some words were translated as *or* though they were not disjunctive elements, showing the importance of checking utterances against their Arabic source texts. Utterances that posed such problems were also listened to in the recordings to check whether the words were real disjunctive elements or not. For instance, *bi-ʔe:ʃ ʔaruːħ ʕa-l-jamiːn w ʕa-l-jasaːr* ‘how should I go? to the right or to the left’ from *joam-mp1-f9f10* (time: 52.631-55.417) had *or* in the translation to convey the meaning of the utterance, but there was no disjunctive element in the text nor in the recording. This instance was, therefore, excluded. Whenever the researcher found specific Arabic words difficult to understand or interpret because of the differences between some Arabic dialects, their English translation was then used to decide whether a certain word was a disjunctive element or not.

Labelling of categories of utterances in the spreadsheet depended on the following four criteria:

[63] The translation of this example was not provided above as it was not translated in the corpus. However, it could be translated as ‘I did not find it in the street nor did I steal it’.
[64] Watson’s transliteration of this element was *lā ... wa-lā*.

i) If an utterance was a question that was followed by an answer, then the answer was relied on to decide the utterance type. For example, if a question was followed by a yes or a no as an answer, then it was coded as a dynq. Similarly, it was noted in the corpus that some questions were answered with negative particles other than *no*, so based on such answers, these questions were also coded as dynqs. On the other hand, an utterance followed by one of the alternatives or a paraphrase of any of the alternatives mentioned in the question was coded as an altq.

ii) Utterances that were answered with negation in addition to one of the alternatives following that negation were coded as *mixed-qs*, i.e., treating this as a mixed type of question which was not found in the literature on English or at least which was not accepted to be grammatical in English (Chapter 1, Section 1.3). That is, examples from the semantic studies on altqs and dynqs in English described answers to dynqs that were answered with *no* followed by one of the alternatives as unacceptable or ungrammatical. This is because the negation of dynqs is intended to negate all of the alternatives in the question, meaning that neither of the alternatives holds, so the negation cannot be followed by one of the alternatives while the affirmative answers can (see, for more examples, Dayal, 2016). So, an answer to an English question like *do you want water or juice [/]?* would not be logical if it was *no, water*. The answerer seems to give opposite answers by responding with *no* followed by one of the alternatives like water, for instance. However, such answers turn out to be frequent in Arabic. The corpus generously provided many of them in the naturally occurring speech. For example, the question *ʒaːmiʕ bilaːl willa ʒaːmiʕ hilaːl* ‘Bilal mosque, or Hilal mosque?’ was answered with *laː laʔʔa bilaːl ʒaːmiʕ bilaːl* ‘no no Bilal, Bilal mosque’ from *ombu-mp1-f5f6* (time: 61.928-67.25).

So, these hybrid examples were coded as *mixed-qs* because they could be either altqs as their answers had one of the alternatives or dynqs as their answers had a negative particle, too. It is worth noting that what applies to negative answers does not apply to affirmative ones in this type of question. That is, prior work accepted cases where affirmative answers were followed by one or even all of the alternatives as the answer with *yes* presupposes that at least one of the alternatives holds, but the answer with *no* suggests that neither holds (see examples from Roelofsen & van Gool, 2010; Dayal, 2016, for instance). So, utterances having positive answers followed by one of the alternatives mentioned in the question were coded as dynqs.

iii) There is a sub-type of altqs, such as the English question *do you want pasta or not?*, which can be answered with a yes or a no even though such a question is typically classified as an altq in the literature.[65] Winans (2012) reported that this type is similar to altqs in its intonation (in English at least) but differs from them in its possible answers. Its answers are yes-no question answers. She gave examples of this type of question in EA, and her examples ended with one of the equivalents of the English *or what/ or not* (e.g., *willa e:h* or *willa laʔ*).

Winans' classification of these questions in EA was adopted. All questions that ended with a negative particle or with the equivalents of *willa e:h* or *willa laʔ* in all of the eleven datasets (8 dialects) were labelled as *not-alternative questions*. This criterion was adopted unless a question ending with either of them was explicitly answered with one of the alternatives presented in the question. In this case, the question is a normal altq rather than a not-alternative question. As for other utterance types, the Arabic text was considered as a reference point of the English translations of this question type as it is the source text. So, English translations were checked against the Arabic text as there were a few utterances that were translated as *or not* and *or what* in order to convey the meaning of the Arabic text even though it contained nothing equivalent to these translations.

iv) If a question had no answer, then the researcher used the context of the utterance and its recording to decide on its type.

This method of depending on question answers to decide the types of questions, or to determine the interpretation of an utterance, was also followed by other researchers (see, for instance, Hutchby & Wooffitt, 2008; Winans, 2012; Winans, 2019; Chahal & Hellmuth, 2014; Hellmuth, to appear). Hutchby and Wooffitt (2008) explicated the benefit of relying on interlocutor's interpretation, which is referred to as "next-turn proof procedure" (p.14), by reporting that it helps in the analysis; this method provides independent evidence of the question type.

Although this study mainly concerned itself with disjunctive questions, the corpus search included all examples in which disjunctive elements equivalent to the English *or* were used in other types of utterances. So, declaratives, wh-questions, imperatives, etc. that have

[65] This type of question is discussed in Chapter 3 (3.2.2.3) as one type of altqs.

disjunctive elements were included. The frequencies of each disjunctive element across utterance types were, then, counted and tabulated for each dialect.

In addition, some utterances had two identical or not identical disjunctive elements used next to each other as a case of disfluency or hesitation like the words *lu* and *walla* in *qasˤir l-baladi lu walla l-mabna l-baladi* ‘is it Albaladi palace or Albaladi building?’ in *ombu-mp2-f5f6* (time: 61.007-63.474). In such cases, each element was counted in its own category. That is, *lu* was counted and added to the occurrences of *lu*, and *walla* was added to the occurrences of *willa* as well. The whole utterance was copied twice in the spreadsheet: once with *lu* and once with *willa* in the disjunctive element column.

4.4 Results

4.4.1 The General Distribution of Disjunctive Elements

The first research question in this corpus search sought to explore the general distribution of disjunctive elements in all utterance types in the 11 datasets (8 dialects) found in the IVAr Corpus (Hellmuth & Almbark, 2017). The total number of tokens found was 383. Every occurrence of each disjunctive element was counted and tabulated. This section presents the results across dialects (Table 4.4), making it easier to compare and understand the overall patterns.

Table 4.4 *Frequency and Distribution of All disjunctive elements in the IVAr Corpus*

Dialects	**disjunctive element**	**Dynqs**	**Altqs**	**Not-alternative questions**	**Declaratives**	**Mixed-qs**	**Imperatives**	**N.**	**Total/dialect**
egca	*willa*	4	9	5	0	4	0	22	23
	ʔaw	0	0	0	1	0	0	1	
irba	*willa*	0	1	0	0	0	0	1	17
	ʔaw	0	1	0	7	0	0	8	
	loː	1	3	3	0	1	0	8	
joka	*willa*	2	5	4	4	2	0	17	19
	ʔaw	0	0	0	0	0	1	1	
	yaː…yaː	0	0	0	1	0	0	1	
joam	*willa*	0	11	2	1	0	0	14	18
	ʔaw	0	0	0	3	0	1	4	
kwur	*willa*	4	13	2	8	3	0	30	45
	ʔaw	5	1	0	9	0	0	15	
mobi	*willa*	8	24	8	21	2	1	64	65
	yaː…yaː	0	0	0	1	0	0	1	
moca	*willa*	8	25	2	15	3	1	54	55
	ʔaw	1	0	0	0	0	0	1	
moco	*willa*	2	13	1	17	1	5	39	40
	ʔaw	0	0	0	1	0	0	1	
ombu	*willa*	0	9	2	1	2	0	14	23
	ʔaw	2	1	0	3	1	0	7	
	loː	1	1	0	0	0	0	2	
syda	*willa*	1	8	1	2	2	0	14	27
	ʔaw	2	2	0	6	0	1	11	
	yaː	0	0	0	2	0	0	2	
tuns	*willa*	9	13	15	10	3	0	50	51
	yaː…yaː	0	0	0	1	0	0	1	
Total									383

The pattern that seems clear from Table 4.4 is that seven out of eleven datasets (i.e., joka, kwur, mobi, moca, moco, syda, and tuns) used *willa* in dynqs, altqs, and declaratives. Another pattern that can be seen from the table is that *willa* was used in declarative utterances in nine out of eleven datasets: only egca and irba did not yield examples of *willa* in declarative utterances. In imperative structures, *willa* was found to be used only in Moroccan Arabic (mobi, moca, and moco). Finally, *willa* was used in altqs in all of the dialects, but it was used in dynqs only in eight out of eleven datasets.

Three out of nine datasets that had *ʔaw* used it in dynqs, altqs, and declaratives (i.e., in kwur, ombu, and syda). Setting aside mobi and tuns in which *ʔaw* did not appear at all, seven out of the remaining eight dialects employed *ʔaw* in declarative utterances (i.e., in egca, irba, joam, kwur, moco, ombu, and syda), but joka and moca did not. In imperative structures, *ʔaw* was only found to occur in three datasets (two dialects): joka, joam, and syda.

Moreover, *ʔaw* was used in nine out of eleven datasets; it was not found at all in mobi and tuns. It was used in dynqs in four out of nine datasets that have *ʔaw* (i.e., in kwur, moca, ombu, and syda) while it was used to create altqs in four out of these nine datasets (i.e., in irba, kwur, ombu, and syda).

The remaining three disjunctive elements (i.e., *lo:*, *ya:…ya:*, and *ya:*) were rarely used. That is, *lo:* was used in two dialects (i.e., irba and ombu), *ya:…ya:* was used in three dialects (i.e., joka, mobi, and tuns), and *ya:* occurred only in one dialect: syda. The general distribution of all disjunctive elements per dialect is shown in Figure 4.1.

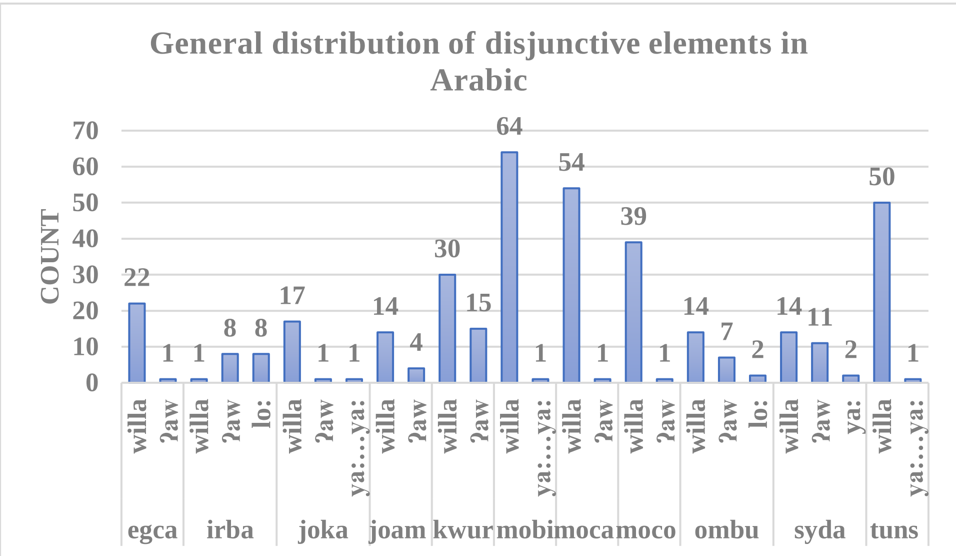


Figure 4.1. The general distribution of disjunctive elements observed in the corpus search, by dialect.

4.4.2 Observed Tendencies for Choice of Disjunctive Element in Disjunctive Questions

The second research question sought to reveal any preferences that dialects may show in terms of using one disjunctive element rather than another in altqs or dynqs. These preferences will be compared with the types of dialects from Section 4.1, which might help decide on the dialects to be included in the perception study, replicating Pruitt and Roelofsen’s study on English. To answer this question, each disjunctive element that occurred in altqs and/or dynqs was counted and tabulated (Table 4.5).

Table 4.5 *Frequency of Disjunctive elements Used in altqs and dynqs in All eight Dialects (11 datasets)*

	Choice of Disjunctive Elements					
	willa		***ʔaw***		***lo:***	
Dialects	**dynqs**	**altqs**	**dynqs**	**altqs**	**dynqs**	**altqs**
egca	4	9	0	0		
irba	0	1	0	1	1	3
joka	2	5	0	0	0	0
joam	0	11	0	0	0	0
kwur	4	13	5	1	0	0
mobi	8	24	0	0	0	0
moca	8	25	1	0	0	0
moco	2	13	0	0	0	0
ombu	0	9	2	1	1	1
syda	1	8	2	2	0	0
tuns	9	13	0	0	0	0
Total	38	120	10	5	2	4

The figures in Table 4.5 indicate that *willa* was used in both altqs and dynqs in 8 out of 11 datasets. More specifically, all dialects employing *willa* in altqs also used it in dynqs except for irba, joam, and ombu which used it only in altqs. In contrast, *ʔaw* was used in both types of question in only three dialects (i.e., kwur, ombu, and syda) while *lo:* occurred in only two dialects (i.e., irba and ombu). The general distributions of these results are illustrated in Figure 4.2.

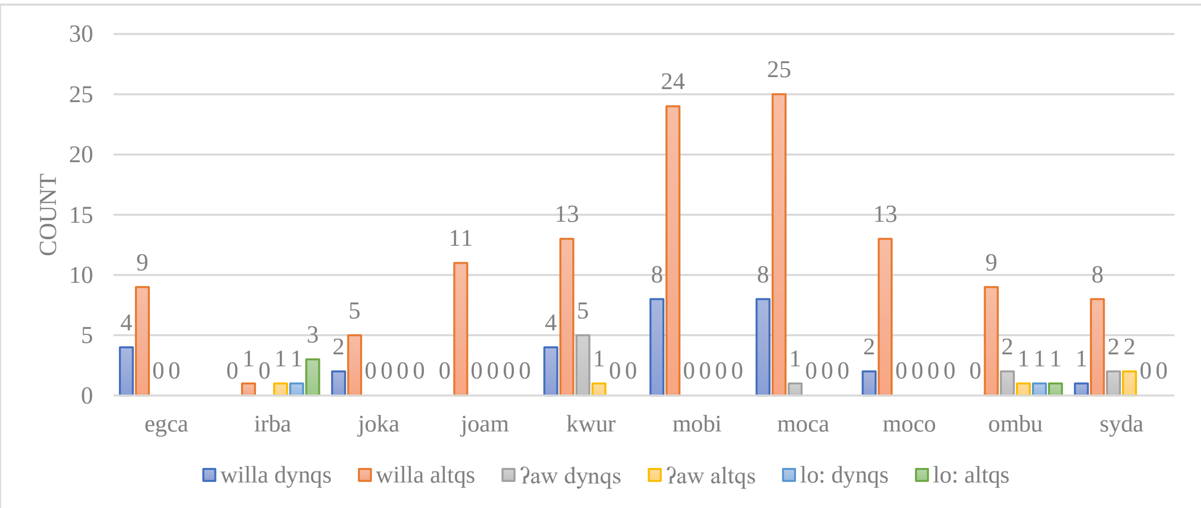
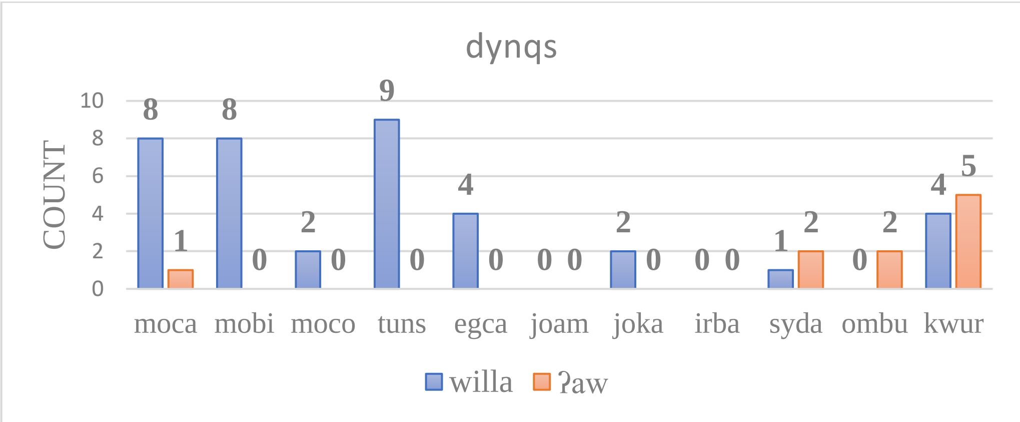


Figure 4.2. The general distribution of disjunctive elements occurring in disjunctive questions in the corpus.

The distribution of the two most commonly used disjunctive elements (*ʔaw* and *willa*) in all datasets that employ them in disjunctive questions are shown in Figure 4.3. This figure displays the relative use of *ʔaw* versus *willa* in each question type, so it can be seen which is preferred.

a)



b)

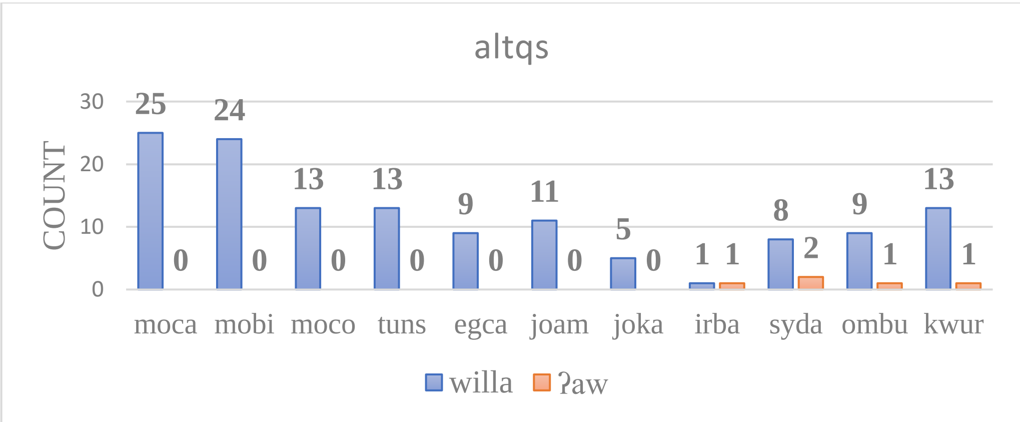


Figure 4.3. The relative distribution for *willa* vs. *ʔaw* in the dialects that use them in disjunctive questions.

Figure 4.3 arranges dialects in an order that shows the general preferences in the data. The dialects grouped on the left are those which only use *willa* while those grouped on the right are the ones that show a tendency towards an alternation between *willa*/*ʔaw*. The dialects that are difficult to group are placed in the middle, so it can be seen why they are not easy to classify (e.g., not many data points, for example, in the case of irba).

4.4.3 Summary of the Corpus Search Results

Results indicated that the distribution of disjunctive elements differs from one dialect to another. It is interesting to find that *willa* was used in all of the eleven datasets in the corpus.

It was also found in all of the nine of dialects reviewed in the literature (i.e., in all colloquial dialects). On the other hand, six out of nine dialects reviewed in the literature referred to *ʔaw*, and it was also found in nine out of the eleven datasets in the corpus. Nevertheless, the lack of this disjunctive element from some dialects does not mean that it is not a word in those dialects. This lack could be because the studies reviewed were not dedicated specifically to disjunctive elements or because the corpus was not specifically designed to elicit disjunctive questions, so the absence of one disjunctive element might be an accidental gap.

Results also revealed which dialects prefer which disjunctive element in which type of disjunctive question. This finding is particularly of paramount importance as it indicates which disjunctive element and dialect can be used in a perception study on the choice of contour shape and the choice of disjunctive element in disambiguating altqs and dynqs.

4.5 Discussion

4.5.1 Discussion of the General Distribution of Disjunctive Elements

When comparing what is already mentioned in the literature with the findings of the corpus, many points seem worth noting. The corpus has only three dialects that are from the same countries of the dialects reviewed in the literature in Section 4.1. They are EA, JA, and SA dialects. Although the literature may have been centred around specific dialects of those countries (e.g., urban dialects), such classifications will be ignored in the comparison between what is in the literature and what is found in the corpus.

The findings indicated that disjunctive elements can be used in different utterance types. The first research question sought to explore the general distribution of disjunctive elements in the corpus. For EA, there are some similarities and differences between what is reviewed in the literature (Section 4.1) and what is found in the corpus (Table 4.4). For example, no example of *willa* was found in declaratives, which is in keeping with Winans. *ʔaw* was also reported in prior work (Winans, 2012) to occur in wh-questions and declaratives, and the findings from the corpus partly support this observation. That is, *ʔaw* was found in one declarative example but was not found in wh-questions. Hence, the fact that *ʔaw* was only found in declarative sentences in the corpus is also similar to this usage in Eid (1974) and Winans (2012) and to what Gary and Gamal-Eldin (1982) observed in this dialect.[66]

[66] It might be worth noting that there was only one token of *ʔaw* in the corpus search for EA, suggesting that it is rarely used.

Some utterance types mentioned in the literature were not found in the EA corpus data, such as wh-questions and tag questions. However, the corpus lends support to Eid's (1974) and Winans' (2012; 2019) suggestions that not-alternative questions (as labelled in this thesis) use only *willa*. Otherwise, this type of question would not be well-formed, according to them. There were five instances of this type of question in the corpus, and all used this disjunctive element.

Although Eid's and Winans' observation about not-alternative questions was restricted to EA, it can, as the corpus findings indicated, be applied to the other Arabic dialects. That is, ten out of eleven datasets in the corpus used only *willa* in not-alternative questions. The only exception was Iraqi Arabic which employed *loː* instead of *willa*. In addition, *yaː…yaː* that was reported by Eid to be used in declaratives was not found in the corpus. The findings and the comparison of both the literature and the corpus may help to better understand how these disjunctive elements work in EA by exploring their distribution.

The similarities and differences between the literature and the corpus might be because the corpus has different kinds of data, such as free conversations, map tasks, and monologue narratives. So, the corpus has more variation, allowing participants to speak naturally without limits. For example, narrative folktales in the corpus were of two kinds: some were read, and some were retold without reading (i.e., from memory). Conversely, most of the studies reviewed depended solely on the intuitions of those who wrote them.

For JA, some disjunctive elements were found in the corpus but were not referred to in the literature (e.g., *ʔaw* and *yaː...yaː*). That is, Al Amayreh (1991) reported only *willa*, with no mention of any example of *ʔaw*; however, *ʔaw* was found in imperatives in both datasets of JA (i.e., joka and joam) though its occurrence was just once in each dataset. Similarly, the literature did not mention the use of *willa* in declaratives. Nonetheless, it appeared in this type of utterances.

Furthermore, the corpus results for joka also had a third disjunctive element (i.e., *yaː...yaː*) which was used only once in declaratives but was not found in the literature nor in the joam dataset. The fact that it has not been mentioned in the literature could be attributed to the lack of prior studies specifically dedicated to disjunctive elements in JA. In addition, the differences between the literature and the corpus may also be attributed to the fact that the information obtained from the literature on JA comes from only one study which is Al Amayreh's.

Turning to SA, three out of four disjunctive elements (i.e., *willa*, *ʔaw,* and *yaː*) referred to in Cowell's (2005) study were found in the corpus. Cowell also reported use of *yamma*, but it was not found in the corpus. The corpus confirmed Cowell's comment that the typical tendency for *willa* is to appear in altqs. Although the literature referred to a preference for using *willa* in altqs, it was also used in declaratives in the corpus. This might be because Cowell indicated that *willa* is synonymous with the other disjunctive elements, so it follows that it might be used in positions where other disjunctive elements may be used.

While Cowell also exemplified the usage of *willa* in command-consequence clauses, there was no instance of this usage in the corpus. However, his examples of this point might be subsumed under declaratives, and examples of *willa* in declaratives were found in the corpus for this dialect. *ʔaw* was found in altqs, dynqs, declaratives, and imperatives in the corpus. Y*a* was noticed only in declaratives. The fact that *yaː* and *ʔaw* were found in declaratives in the corpus is similar to Cowell's declarative examples using these disjunctive elements.

4.5.2 Discussion of Tendencies for Choice of Disjunctive Element in Disjunctive Questions

The second research question sought to find out the preferences dialects show in employing disjunctive elements in the corpus. The findings will also be compared with the three types of dialects found in the literature review (Section 4.1). The findings showed what each dialect prefers in each type of disjunctive question. Because the data points for most dialects in the corpus are relatively small, the preferences dependent on the corpus search are provisional.

For EA, the literature summarized in Section 4.1.2 referred to some differences among researchers in this dialect, especially when it comes to the disjunctive elements that can be used in altqs and dynqs. Some of these studies allowed *willa* in both altqs and dynqs (e.g., Soraya, 1966), and some did not permit it to be used in dynqs (e.g., Winans 2012; 2019). This dialect was also preliminarily classified as belonging to Type 1 (the two disjunctive elements seem each to be specialised to a specific disjunctive question (to one meaning each). It was also noted that this dialect might, instead, belong to Type 2 (see Section 4.1.2 for more details).

The corpus findings showed that *willa* in this dialect was used in both altqs and dynqs. This finding is in line with Soraya's (1966) examples that used it in the two types of question. However, it contradicts Winans' (2012; 2019) observation that *willa* cannot appear in dynqs.

Eid's (1974) usage of *willa* in what she called *yes-no questions* made her study seem to contradict Winans' (2012; 2019). However, there is no contradiction because it is only a difference in the terminology used. That is, the two researchers used different terms to refer to what is called not-alternative questions in this thesis. So, observation of *willa* in not-alternative questions in the corpus is in line with both Eid's (1974) and Winans' generalisations about using this disjunctive element in this type of question.

Furthermore, *ʔaw* was reported in prior work to occur in EA dynqs (Winans, 2012; 2019), but not allowed to appear in altqs (Gary & Gamal-Eldin, 1982; Winans, 2012; 2019) unless it is strongly stressed (Winans, 2012). The findings from the corpus contradict this observation because *ʔaw* was not found in dynqs, which supports Eid's note that it may not do so though there was only one token of *ʔaw* in the EA corpus. The findings are also in line with this observation as there were no altqs with *ʔaw* in the corpus search. Based on Soraya's study and on what was found in the corpus, the tentative conclusion that can be drawn on EA is that it might be an 'English-like' dialect in that it employs one disjunctive element (*willa*) in both altqs and dynqs. However, the caveat is that the number of tokens in the corpus data is small (N = 24), making this classification preliminary. It should be noted that there is a contradiction beween the literature and the corpus results in case EA is classified as an 'English-like' dialect because the literature (Section 4.1.2) reported the use of *ʔaw* in dynqs, but *ʔaw* did not appear in the EA corpus (specifically in altqs and dynqs). Thus, it might not be safe to classify EA as an 'English-like' dialect, based only on a small number of tokens from the corpus because the lack of *ʔaw* in dynqs does not mean that this language lacks this disjunctive element (i.e., an accidental gap).

The finding that *willa* appeared in both altqs and dynqs in the corpus is also different from the preliminary classification of this dialect as belonging to either Type 1 or Type 2 (Section 4.1.2). This contradiction is not surprising for the same reason mentioned above (i.e., because the EA sample in the corpus is relatively small (24 data points)). Therefore, accepting or rejecting the position of EA within either Type 1 or Type 2 cannot be determined here based on the corpus. In other words, the literature showed that there are more than one disjunctive element that might appear in altqs and dynqs in EA, but the corpus showed only *willa* in both types of question. Consequently, given that this dialect has different descriptions of the usage of disjunctive elements in the literature and given the uncertainty about its type, it will be chosen as one of the dialects to be tested in the perception study (Chapter 7), which might reveal the type of dialects EA belongs to.

Urban JA from two cities was searched in the corpus: joka and joam. Prior work provided an answer only concerning *willa* as it is the only disjunctive element reported in Al Amayreh's (1991) study in disjunctive questions, making its type difficult to decide on (see Section 4.1). In Al Amayreh's study, it was exemplified that this disjunctive element can be used in altqs and dynqs.

In the corpus search, the two JA datasets, interestingly, exhibited different behaviours, making the picture unclear. Findings from joka confirmed what was reported in Al Amayreh's study. That is, the corpus for joka showed that *willa* occurred in both types of disjunctive question (5 in altqs vs. 2 in dynqs). On the other hand, *willa* in joam was not observed in dynqs, which is contrary to Al Amayreh's sole example employing it in dynqs. Such differences between the corpus for joam and Al Amayreh's study might be attributed to the fact that Al Amayreh's study that referred to altqs and dynqs employing *willa* was mainly meant to investigate the intonation of MSA and JA rather than their disjunctive elements.

Based on Al Amayreh's examples of disjunctive questions and on the corpus findings of joka, one can conclude that *willa* might be used in the JA perception study. This conclusion is tentative because the number of tokens in the corpus is small (joka = 19; joam = 18) and perhaps not enough to support Al Amayreh's study. The observed slight differences between joka and joam, though they both belong to Urban JA, might be due to the small number of data points in the corpus or because the corpus was not specifically intended to elicit disjunctive questions. Thus, further investigation of this dialect is needed to make the picture clearer (next chapter). The researcher's intuition, as a native speaker of JA, is that both *ʔaw* and *willa* can be used in both altqs and dynqs, but that there might be a strong preference for using *willa* less often in dynqs and more often in altqs. Hence, such a strong tendency might indicate that JA belongs to Type 2A, as it seems that *ʔaw* might be general and *willa* might be specialised. However, the definite classification of JA is difficult to determine only based on the literature and the corpus search. Thus, reliable evidence might be needed using, for example, a production and a perception study, as will be shown in Chapter 5 and Chapter 6.

The production and perception studies might confirm or reject the researcher's intuition that JA might belong to Type 2A.

In SA, although the literature did not refer to the possibility of using any of the disjunctive elements in dynqs, the corpus revealed that both *ʔaw* and *willa* occurred in disjunctive questions. More specifically, the corpus suggests that both disjunctive elements are possible in both types of disjunctive question, but the preference is to use *willa* in altqs. Hence, *willa* might be specialised, but the corpus is inconclusive due to the small number of data and because it was not designed to elicit altqs and dynqs. However, based on the literature review, the thesis assumes that SA might be of Type 3 (see Section 4.1.3). The picture for SA is not yet clear solely from the corpus, so the perception study (Chapter 7) might give an indication as to which type SA belongs by either confirming or rejecting the preliminary classification as Type 3.

In conclusion, the comparison of findings obtained from the studies reviewed above and the corpus search results provides insight into which dialects to include in perception studies which aim to explore the role of different cues that might disambiguate the two types of similarly-worded disjunctive questions in Arabic. There were examples of using *willa* in altqs and dynqs in five out of nine dialects in the literature. On the other hand, three dialects in the corpus also employed *ʔaw* in altqs and dynqs. So, it seems that both disjunctive elements can be used in these question types, with possible different preferences from dialect to dialect. Some dialects prefer to use *willa* or *ʔaw* more in a certain type of disjunctive question, which will be explained in the next section. A key implication of this chapter therefore is that choice of disjunctive element is a variable that should be included in the design of a perception study on disjunctive question interpretation in Arabic.

4.6 General Summary

At the beginning of this chapter, it was highlighted that English has one disjunctive element in altqs and dynqs while MSA has two, and most authors in the literature reported that in MSA each disjunctive element is used in a different type of question (*ʔam* in altqs and *ʔaw* in dynqs). The main aim of this chapter was to find out which Arabic dialect(s), besides JA, should be selected for inclusion in a perception study based on which disjunctive element can be used in which disjunctive question. As a result, the chapter started with reviewing related studies. Dialects, based on the literature review, were preliminarily assigned into three types in terms of uses of their disjunctive elements in disjunctive questions: Type 1 (a tendency in which both disjunctive elements might be specialised to one question type), Type 2 (a tendency in which one disjunctive element might be specialised and one might be general), and Type 3 (a tendency in which both disjunctive elements might be general). Some dialects were difficult to tell which type they belong to. After this literature review, a comprehensive investigation of disjunctive elements in the 11 IVAr datasets (8 dialects) was conducted.

Two interesting results were found in the corpus search which will not, however, be explored further. The first is that Arabic allows Mixed-qs (answer: *no, X* or *no, Y*) while English does not (see examples from Roelofsen & van Gool, 2010; Dayal, 2016, for instance). The second is also made based on the corpus data with respect to the suitable disjunctive element in not-alternative questions. It was found that *willa* is the only acceptable disjunctive element in this type of question in all dialects, except for Iraqi Arabic, which extends Eid's (1974) and Winans' (2012; 2019) observation on EA to all of these dialects.

Returning to our main focus, namely the usage of disjunctive elements in disjunctive questions, after investigating the data from the corpus, the researcher found two preliminary usage preferences emerged. They are 1) 'English-like' dialects: only one disjunctive element is used in both altqs and dynqs (e.g., EA, Moroccan (moca), and Tunisian) and 2) 'MSA-like' dialects: two disjunctive elements are used with a preference to use each in a specific type of disjunctive question more than in the other (e.g., Kuwaiti and Omani). It is worth noting that *ʔaw* was available in the literature of EA, so its preliminary preference as 'English-like' might be due to the small number of data points in its corpus. This means that its 'English-like' preference cannot be generalised to any data beyond the scope of the corpus. EA was also preliminarily classified as belonging to either Type 1 or Type 2 based on the literature review because some researchers reported that *willa* and *ʔaw* might be specialised to one question type, and some allowed *ʔaw* to appear in altqs if it is stressed (see Section 4.1.2 for more details). If the corpus had more EA data points that include *ʔaw*, it would clearly reveal the pattern in EA. A perception study might give an indication as to which disjunctive element is acceptable in which disjunctive question in this dialect. The picture in SA was not clear as *willa* was preferred in altqs (8 in altqs vs. 1 in dynqs), but *ʔaw* was used equally in both (2 in altqs vs. 2 in dynqs).

An example of the 'MSA-like' dialects, namely the preference to use one disjunctive element in one type rather than the other type of disjunctive question, might be Kuwaiti Arabic (KA) which uses *willa* and *ʔaw* in both types of question, but has a tendency to use *willa* more in altqs and to use *ʔaw* more in dynqs (*willa*: 13 in altqs vs. 4 in dynqs; *ʔaw*: 1 in altqs vs. 5 in dynqs). Hence, a description of KA might be that it might belong to Type 1 (both disjunctive elements might be specialised). This is similar to MSA as most authors reported that in MSA each disjunctive element is used in a specific type of disjunctive question, though one researcher (Al Amayreh, 1991), albeit in one example only for each, used *ʔam* in both types of disjunctive question in MSA. So, the tendency or the preference in MSA is to use each disjunctive element in a specific question type, and KA appears to pattern similarly. However, given that the corpus was not designed to elicit disjunctive questions and given the small number of data points, this classification is still tentative. The perception study on this dialect (Chapter 7) will reveal, for sure, which type this dialect belongs to.

With JA, the situation is more complex and thus inconclusive. As with the other dialects above, there were not enough tokens in the corpus to decide which pattern this dialect belongs to. In other words, the results from two JA datasets (joka and joam) may indicate a preference for using *willa* in altqs more than in dynqs. However, there are only two examples of dynqs in one of the two datasets (i.e., joka), and both show *willa* in dynqs. This difficulty of classifying JA into either preference is also similar to the same complexity of classifying it into any type of the three types of dialects, based on the literature review in Section (4.1). It is also difficult here to tell which type JA belongs to, based only on the corpus search results, because *ʔaw* did not appear in altqs and dynqs in the corpus. So, the picture for JA is not yet complete.

Based on the corpus findings and based on the fact that JA is to be investigated in this thesis, there is a need for additional evidence to show which disjunctive element is used in altqs and dynqs in JA. Such evidence will be a production study that can also explore the prosody of disjunctive questions to shed light on what the design of the eventual perception study should be in JA.

The next chapter (Chapter 5), therefore, pursues the investigation of disjunctive questions in two production studies. The first one aims to explore the prosody of disjunctive questions in JA, EA, KA, and SA. The dialects selected might represent different types of dialects. EA was thought to belong to either Type 1 or Type 2. KA might belong to Type 1. JA is difficult to classify as to which dialect type it belongs, but the researcher's intuition as a native speaker of this dialect is that it might belong to Type 2A. SA was preliminarily thought to belong to Type 3. Further investigation of these dialects in the next chapters will either confirm or reject these initial classifications. The first production study (Chapter 5) will examine the prosody of a selected target utterance from the IVAr read speech narrative corpus, which has potential to be realised as an altq or a dynq. Each dialect has 12 tokens (one per speaker) of this utterance. The second production study will focus on JA and will experimentally investigate participants' prosody of the *X or Y* phrase and the choice of disjunctive element in newly collected semi-spontaneous speech data. Based on the production findings, the possible disambiguation cues for disjunctive questions (i.e., the independent variables) will then be tested in a perception study (Chapter 6), replicating Pruitt and Roelofsen's (2013) experiment on English with JA speakers (Experiment 1). This perception study will also be carried out in the other dialects in Experiment 2 (Chapter 7). JA is chosen as it is the main dialect this thesis studies and because it is the native dialect of the researcher. EA, SA, and KA are also selected because their pictures of disjunctive questions and disjunctive elements are similarly unclear, as shown in their tentative types whether in the literature review (Section 4.1) or the corpus search.

5 Prosodic Investigation of Production Data

5.0 Aim and Outline of the Chapter

Extensive research on the prosody of disjunctive questions (alternative questions (altqs) and disjunctive yes-no questions (dynqs)) in English has been conducted (see, for instance, Pruitt, 2007; Pruitt, 2008a; Pruitt, 2008b; Pruitt & Roelofsen, 2013; O'Mahony, 2014; Heidenreich, 2019, etc. for detailed prosodic descriptions of English disjunctive questions). However, in Arabic, only a few researchers referred specifically to the prosodic realisations of these questions. What added to this paucity was that those few studies were all general intonational studies, dedicating only a few examples to disjunctive questions (Soraya, 1966; El-Hassan, 1988; Al Amayreh, 1991, etc.). Some of these old studies (e.g., El-Hassan's and Al Amayreh's) also extended, in one way or another, what is found in the literature on English to Arabic. For example, El-Hassan drew his description from English sources, then described his examples based on what is understood from the English examples as if what applies to English can always apply to Arabic.

Other researchers went further in such generalisations by speculating that the prosody of Arabic and English, in general, is the same (Ferguson & Ani, 1961; Catford, Palmer, McCarus, Moray, & Snider, 1974). Although Ferguson and Ani mitigated this generalisation by referring to intonational differences between the two languages in interrogatives, Catford et al. (1974, p. 6) contended that "Arabic prosodic features can be described much the same way as English". Catford et al. did admit that some differences between the two languages are inevitable, confirming that this makes English prosody somehow not easy for Arabs. Moreover, the descriptions of those prior Arabic studies date from times when there were no readily available technological tools that could help provide accurate prosodic descriptions of disjunctive questions (see Section 2.3 & Section 2.4).

Even the recent studies on Arabic either referred to one kind of disjunctive questions (Kulk, Odé, & Woidich, 2003; Hellmuth, 2018; Hellmuth, to appear) or investigated these questions in terms of formal semantics with only a small amount of space dedicated to prosody (see Eid, 1974; Winans, 2012; Winans, 2019). Interestingly, some of the recent studies (e.g., Hellmuth, 2018; Hellmuth, to appear) are unique in investigating the intonational patterns of altqs and normal yes-no questions in eight dialects of Arabic using new technological tools. Nevertheless, recent work did not offer detailed phonological descriptions (i.e., prosodic annotation) of the disjunctive phrase *X or Y* in disjunctive questions except for one most recent study (Hellmuth, to appear).

This chapter sets out to build on what was found in the previous one. That is, given that Chapter 4 established which dialect employs which disjunctive element in altqs and dynqs, the prosodic details that might distinguish these questions also need to be explored. So, knowing the prosodic description of each of these questions (in the current chapter) can finally lead to finding out which prosodic cues should be the independent variables, to be included in the perception studies in the following chapters.

Chapter 4 proposed three provisional types of dialects: Type 1 (a tendency in which both disjunctive elements might be specialised to one question type), Type 2 (a tendency in which one disjunctive element might be specialised and one might be general), and Type 3 (a tendency in which both disjunctive elements might be general). The dialects that were selected to study in the first production study in this chapter and in the perception study (Chapter 7) might represent the different types of dialects: Egyptian Arabic (EA) might be Type 1 or Type 2, Kuwaiti Arabic (KA) seem to be Type 1, and Syrian Arabic could be Type 3. However, the chapter emphasised that these classifications are tentative and the picture in all these dialects might not be clear, based only on the literature review and the corpus search (see Section 4.1 and Section 4.5 for more details). As for Jordanian Arabic (JA), the researcher's intuition as a native speaker of this dialect is that it might be Type 2A (see Section 4.1), but its picture is still unclear.

Hence, these four dialects were selected to review studies on and to investigate the prosodic details of their disjunctive questions. Exploring these prosodic details can show whether or not altqs and dynqs in JA, EA, KA, and SA display differences in their prosody, informing the decision to select EA and KA, alongside JA and SA, to include in the perception studies, replicating Pruitt and Roelofsen's (2013) perception experiment. The perception studies will, eventually, reveal whether the difference between altqs and dynqs is primarily intonational, lexical, or perhaps both. This finding might also help decide on the exact type each dialect belongs to. The perception studies will also make it clear whether the prosodic differences to be investigated in this chapter contribute to differentiating these questions when people hear them. The cross-dialectal perception study (Experiment 2, Chapter 7) will also reveal any similarities and differences in which cues disambiguate disjunctive questions in these four dialects.

Section 5.1 offers a brief discussion of some general issues related to the intonation of normal yes-no questions. Section 5.2 briefly reviews prior studies which discuss, though briefly, the prosodic realisation of altqs and yes-no questions (dynqs and normal yes-no questions) in the four Arabic dialects of interest (JA, EA, KA, and SA) and in English. Section 5.3 sets out the rationale of the two studies in this chapter. Section 5.4 presents the corpus production study (a prosodic investigation of 60 tokens of a read speech disjunctive utterance in the IVAr Corpus: 24 in JA, 12 in EA, 12 in KA, and 12 in SA). Section 5.5 reports the methods and results of the JA production study. Section 5.6 provides a general summary and conclusion.

5.1 Issues Related to the Intonation of Normal Yes-no Questions

Eid (1992) alleged that yes-no questions in all spoken dialects of Arabic may be indicated only by means of their final rising intonational contour. That is, no need exists for question particles in the presence of the rising contour in all dialects. This generalization, in fact, failed to account for the fact that yes-no questions in Moroccan Arabic exhibited a different contour, which is a rising-falling one (see, for more details, Benkirane, 1998; Hellmuth, 2018).

Hellmuth (2006) also referred to the importance of intonation in yes-no questions and noted that they are identically-worded to declaratives and that it is the intonation which indicates these to be questions in EA. This implies that intonation is the cue that differentiates identically-worded declaratives and questions. This role of intonation had also been observed by other researchers for EA (e.g., Gary & Gamal-Eldin, 1982; Norlin, 1989) and for other Arabic dialects that do not employ question markers (e.g., Al-Khalifa, 1984 on Bedouin KA; Ghrefat, 2007 on Hebron Arabic; Al Huneety, 2015 on JA (a variety spoken in Wadi Mousa);[67] Almalki & Morrill, 2016 on Saudi Arabic of the capital city Riyadh; Sulaiman, 2016 on SA). Generally, the same disambiguating role of intonation holds in the majority of Arabic dialects (Albirini, 2016).

Interestingly, the role intonation plays in disambiguating string-identical utterances is also supported in the literature on other languages which do not use question markers (see Truckenbrodt, 2012). In his study on 79 languages, Ultan (1969) reported that this role of intonation in signalling questions might also be universal, asserting that intonation comes as

[67] All varieties of JA in the thesis are referred to as JA, and the specific variety will be referred to in footnotes.

the first choice as a question-forming strategy and question words as the second choice. However, even with this large number of languages explored, it is not possible to generalize any phenomenon across all or most of the world languages as there are hundreds of languages not studied yet.

In reality, yes-no questions sometimes show similar and different intonational patterns in Arabic to those in English. For example, English yes-no questions are typically reported to have a rising contour shape (see, Beck & Kim, 2006; Pruitt & Roelofsen, 2013, etc.). Several studies on different Arabic dialects also observed that those dialects typically have a final rising intonational contour in yes-no questions (see, El-Hassan, 1988 on MSA; El-Hassan, 1990; Al Amayreh, 1991; Alharbi, 1991; Eid, 1992; Chahal, 1999; Katanani, 2002; Kulk, Odé, & Woidich, 2003; Hellmuth, 2006; Aloufi, 2011;[68] Almalki & Morrill, 2016;[69] Hellmuth, 2018; Winans, 2019 on EA).

Although there seems to be broad agreement in the literature on the contour shape of normal yes-no questions in Arabic, a different contour is reported in certain dialects (e.g., Benkirane, 1998; Aloufi, 2011; Al Mashaqba, 2015; Al-Zamil & Hellmuth, 2019; Hellmuth, to appear). For example, the rise-fall contour of declaratives in Moroccan Arabic was reported to be the same as that of normal yes-no questions (Benkirane, 1998; Hellmuth, 2018). This contour was also noticed in one example of SanƐaani Arabic normal yes-no questions (see Hellmuth, 2014 for more details). A rise-plateau final intonational pattern (Hellmuth, 2018; Bouchhioua, Hellmuth, & Almbark, 2019; Hellmuth, to appear) and a rise-fall pattern (Bouchhioua, Hellmuth, & Almbark, 2019) were also observed in normal yes-no questions in different regions in Tunisia.

In addition, the second dialect investigated in Aloufi’s study, which was Bedouin Hijazi Arabic, was reported to have a falling intonational contour though the pitch trace of one of her examples showed a rise-plateau which she considered as a lengthening contour, not as a rise. Similarly, some Hijaz participants in Al-Zamil and Hellmuth (2019) used a rise while others used a fall when forming yes-no questions. Hijaz participants and females KA participants were also reported to produce yes-no questions with a rise while male KA Bedouins and Jizani participants were reported to mark yes-no questions with a rise fall

[68] The variety Aloufi referred to is mainly spoken in Al Hijaz region.
[69] The variety Almalki and Morrill studied is the one spoken in Najd region.

(Alzamil and Hellmuth, 2020). Interestingly, yes-no questions in one JA variety[70] was also reported to have a final fall (Al Mashaqba, 2015).

Few studies on Arabic dialects have investigated the intonational properties of altqs or yes-no questions (dynqs or normal yes-no questions) apart from including intonational details alongside other utterance types. Some studies have investigated only the intonation of one question type in Arabic without referring to the intonation of other utterance types. The reason for this might be that the majority of such studies focus on providing a comprehensive intonational description of a particular dialect.

Hence, altqs and yes-no questions (dynqs or normal yes-no questions) in the literature are usually referred to within a wider descriptive context. This made the task of finding descriptions of the intonation of altqs or yes-no questions harder, to some extent. Generally, it is rare to find studies on Arabic that are totally dedicated to altqs without referring to dynqs or vice versa. This might be because both types are subsumed under disjunctive questions. As a result, the two question types are reviewed together in the following subsections. Consequently, the following is a review of general intonational studies that may have parts dedicated to altqs or yes-no questions. Studies will be reviewed by dialect.

5.2 Review of Studies Involving Yes-no questions (Normal Yes-no questions and Dynqs) and Altqs

5.2.1 Jordanian Arabic (JA)

Many researchers, even if only briefly, referred to the contour shape of yes-no questions in different varieties of JA, and all of them reported that yes-no questions have a rise (El-Hassan, 1990; Al Amayreh, 1991; Mahadin & Jaradat, 2011; Al-Omyan, 2014; Al Huneety, 2015; Hellmuth, 2018; Hellmuth, to appear).

Al Amayreh (1991), for instance, comprehensively described the intonation of JA and MSA and set out three main aims for his study. The first was to explore the common contours. The second was to investigate their functions and uses. The functions in his study are semantic in the sense that they refer to the meanings that tones can convey. They are also syntactic, meaning that they will specify the syntactic type of utterances. The third aim was to compare these dialects with English. He depended on some of his utterances as a native speaker,

[70] Al Mashaqba studied JA spoken in Wadi Rum.

meaning that some of his examples were based on his own intuitions. Additionally, his data were collected from two thirty-minute portions of radio programs. He, thus, split his data into intonational phrases. Then, he split each intonational phrase into pretonic words and tonic ones.

Al Amayreh gave detailed information on normal yes-no questions, dynqs, and altqs.[71] He reported that the typical normal yes-no question contours in JA are the high-rise and the fall-rise, and the non-typical one is the fall. The fall-rise might be similar to the contour shape of normal yes-no questions in JA referred to by Hellmuth (2018), which will be discussed in detail later on. He showed that when normal yes-no questions are used to covey other pragmatic meanings, such as showing surprise or voicing other feelings, they might bear the non-typical contour shape. He annotated his examples of the non-typical contour with a mid fall. Moreover, the high-rise of normal yes-no questions in Al Amayreh's study was also observed in his example of dynqs, suggesting that normal yes-no questions and dynqs share the same contour shape in JA.

With regards to altqs, Al Amayreh annotated the only example in JA with a fall, specifically with a mid fall. Interestingly, the *X or Y* phrases in altq and dynq examples had the same prosodic features: both disjuncts were accented and separated by a prosodic boundary, and the disjunctive elements were not accented. This similarity suggests that the only difference between altqs and dynqs might lie in the choice of contour shape (i.e., a fall, or more precisely a mid-fall, in altqs and a rise in dynqs). The following examples (pp. 87-88) illustrate this point:

(5.1) // biddak ʔitsaːfir l-joːm (HR) // // willa bukra (MF)//
want.PRS.2MSG travel.FUT.2MSG the-today or tomorrow[72]
'Are you leaving today or tomorrow?'

(5.2) // biddak ʃaːj (HR) // willa gahwa (HR) //
want.PRS.2MSG tea or coffee
'Would you like tea or coffee (or something else)?'

[71] It was also referred to earlier in the previous chapter that Al Amayreh did not use the term dynqs but used, instead, *list questions*.
[72] HR, MF, and // refer to high rising, mid falling, and a boundary, respectively.

As can be seen from the above two examples, the only difference in the annotation lies in the choice of contour shape.

In a recent study within the AM framework, Mahadin and Jaradat (2011) investigated the intonation of JA[73] in order to find out the pragmatic functions of some intonational differences. The study explored the link between intonational patterns in JA and two kinds of speech acts: commissive (e.g., promises, threats, etc.) and directive (e.g., orders). The participants were two native speakers (only) whose production was recorded. The recorded utterances were of many grammatical forms (e.g., interrogatives, vocatives, etc.). The researchers briefly referred to normal yes-no questions, showing that they had a final intonational contour H-H%. They noted that this question type could have L-H% as a final intonational contour, but that this contour was observed only when examples were used as requests. Mahadin and Jaradat, however, did not refer to altqs and dynqs.

A more recent study on the intonation of JA was conducted by Al-Omyan (2014).[74] She aimed to describe the contour shapes employed in different types of utterances. She also aimed to find out whether JA and American English intonational patterns are analogous to one another, and further whether gender plays a role in the observed intonational patterns. In order to achieve the first aim, she recorded six Jordanians, majoring in English at the Hashemite University in Zarqa City, while reading the list of stimuli. They repeated each utterance three times. Their recordings were analysed in Praat with reference to the visualised pitch contours. The total number of target sentences in this experiment was 11. They were of different discourse functions, such as greetings and questions. All stimuli were ambiguous in that they can be realised as interrogative, declarative, or threatening utterances. Al-Omyan found that normal yes-no questions were realized in JA with a late rise[75] and statements with a fall. In the experimental comparison, her findings indicated that normal yes-no questions in JA and American English had the same contour shape (a rise), but the contour shape of other discourse functions, including greetings, are different in the two languages. She did not refer to altqs and dynqs in JA.

In a recent study on 8 dialects of Arabic, Hellmuth (2018) investigated the intonational variation of yes-no questions and altqs in these dialects. Her main aim was to find out if the

[73] Mahadin and Jaradat studied the dialect of Irbid city in Jordan.
[74] Al-Omyan did not specify whether the dialect she studied belongs to urban, rural or Bedouin.
[75] Al-Omyan used the term “Glide-up” (p. 32).

contours alone could be used to distinguish these dialects from each other. She used the section of the IVAr corpus which provides scripted conversations. Six normal yes-no questions and six altqs were elicited from conversations. There were 12 participants for each of the dialects in the corpus, and each pair of them was presented with scripted texts so that they can read them. All participants read all the scripted lexical sets in a role-play form and were recorded. She found that JA exhibited a final rising intonational contour in normal yes-no questions. More specifically, the visualization she provided showed the contour of this type of question displayed an elbow shape on the last word. Unfortunately, she did not refer to dynqs.

In terms of altqs, she reported that they had a rise fall realised over the whole *X or Y* phrase. Similar to the other dialects in her study, she reported that the first disjunct *X* had a higher pitch than the second disjunct *Y*. Furthermore, she added that JA, in terms of the altq contour, is worth further scrutiny; the peak of the rise-fall was realized later in the disjunctive phrase when compared with the other dialects. It appears from the visualizations she provided that the peak might be realized on the disjunctive element.

Although this study described the contour shapes of normal yes-no questions and altqs in a comprehensive and pioneering way, it did not provide phonological analyses of the disjunctive phrases *X or Y* in altqs. That is, a phonological analysis (i.e., prosodic annotations), such as where the pitch events occurred and what they were associated with in terms of ToBI (or IPrA), for instance, was not provided. She only referred to the shape of the curve in altqs. Therefore, it is still not known whether disjuncts and disjunctive elements used are accented or not.

The rise-fall contour shape that she described could have two scenarios in terms of a detailed phonological analysis. The first is that there are pitch accents on disjunctive elements, which is why there is a peak in the middle of the *X or Y* phrase. The second is that it is possible that there is H- phrase tone at the end of the first disjunct, giving the shape of a peak, which is observed in English (Pruitt & Roelofsen, 2013).

In fact, Hellmuth (to appear) completed the picture of these prosodic details for JA (as spoken in Karak City). This study phonologically described altqs in spontaneous and read speech. For the former, she explained that the whole disjunctive phrase *X or Y* is accented (i.e., each individual component is accented). This means that in all spontaneous tokens, and roughly half of read speech tokens, all disjuncts, as well as disjunctive elements, are accented. In read speech, therefore, disjunctive elements are sometimes accented and sometimes not. She justified such differences by reporting that this inconsistency in the read speech might be attributed to the contexts of utterances (i.e., because of the information structure) or to the way in which data were elicited.

The pitch accents on each disjunct in her examples were L+H* on the first and H+L* on the second. The disjunctive element had H*, convincingly explaining the presence of the peak in the middle of the *X or Y* phrase as shown in her previous study (Hellmuth, 2018). The boundary tone used in this type of question, according to her phonological analysis, was L%. She noted that she found some instances in which H!% appeared, too.

When linking Hellmuth's last study with the previously reviewed ones on JA, it can, generally, be concluded that all of these studies reported the same intonational pattern in yes-no questions (i.e., a rise). It can also be noticed that only one of these studies referred briefly to the intonation of dynqs in JA, which is Al Amayreh's; he annotated his unique example with a rise. Additionally, Al Amayreh's study along with Hellmuth's two studies (2018; to appear) are the only ones that referred to the intonation of altqs in this dialect. The last of these is the most innovative as it included detailed prosodic investigation of altqs, using two types of prosodic evidence: visualisation of the shape of the F0 contour and a phonological description. Thus, it is clear that there is a gap in the intonational description of dynqs in JA and in how altqs and dynqs can be differentiated. These gaps will be filled by investigating experimentally the intonational patterns of both altqs and dynqs in this dialect (in a production study) and by testing perceptually what might differentiate them (in a perception study).

5.2.2 Egyptian Arabic (EA)

When describing the intonational patterns of EA, Soraya (1966) referred to normal yes-no questions[76] and altqs. He explained that normal yes-no questions might be realized with two different contour shapes: rise and level. The rise contour was also affirmed by other studies

[76] He discussed normal yes-no questions under a different name called "not-particle interrogatives" (p. 196) and made it clear that what he meant by this term is a type of question answerable with a yes or a no, which is why they are referred to as normal yes-no questions in this thesis.

on the same dialect (e.g., Gary & Gamal-Eldin, 1982; Hellmuth, 2006; Hellmuth, 2018; Winans, 2019; Hellmuth, to appear).

Furthermore, Soraya gave an example of a question with a disjunctive element that could possibly be answered with a yes or a no. If (5.3) below indicates an open choice, then it might be answered with a yes or a no, implying that it is a dynq (p. 199):

(5.3) //tiħibb tigarrab dij / willa dij //

like.PRS.2SG try.PRS.2SG this or this[77]

'would you like to try this one? Or this one?'

Nevertheless, he did not refer to any intonational differences or similarities between these questions and altqs. He also gave an example indicating that when the second disjunct consists of negation,[78] then there might not be a break separating the two disjuncts in the *X or Y* phrase, and the contour shape is a rise fall.

In terms of altqs, Soraya focused on the disjunctive element *willa*.[79] His data were mainly based on his own productions as a native speaker and, sometimes, from some of his friends. Thus, he reported that this disjunctive element is used in questions giving the hearer the opportunity to choose from the options provided by it. He reported that the final contour of such questions is falling, specifically on the second disjunct; this is also similar to the intonational pattern reported in other studies on the same dialect (Gary & Gamal-Eldin, 1982; Hellmuth, 2018; Winans, 2019).

However, he used notation to show rising intonation for the example that might be answered with a yes or a no (see (5.3) above). He also referred to cases in which the second disjunct is deleted while keeping the disjunctive element. This deletion may be brought about if the second disjunct is expected from context, and in this case the question becomes a yes-no question (i.e., a dynq). Example (5.4) below illustrates this point (p. 200). He, interestingly,

[77] The glosses in (5.3-5.4) were not provided by Soraya. He only provided their translations. It was not clear from Soraya's thesis whether (5.3) was addressed to a male or a female. Therefore, there is no reference to any gender in the gloss. The symbol / in Soraya's notations indicates a pause. He also used //_ instead of // to refer to the beginning and the end of an utterance.

[78] This kind of question is the one referred to as not-alternative questions in this thesis and as polar-alternative questions in Winans' (2012; 2019) terms in the same dialect.

[79] The original transliteration in his work was *walla*.

added that the disjunctive element may become prominent when expressing strong emotions, such as threats.

(5.4) // hijjih // sˤiħħitak ʔaħsan willa //

it heath.POSS.2MSG better or

'are you feeling better or...?'

Gary and Gamal-Eldin (1982) did not refer to dynqs in this dialect, but they explored the prosody of the *X or Y* phrase in altqs. They reported that the first disjunct has a rise (on the X) followed by a prosodic break and a fall, suggesting that the overall nuclear contour is a rise fall.

Recently, Hellmuth (2018) found out that normal yes-no questions in EA had a final rising intonational contour, but she did not refer to dynqs. Altqs in EA were also shown to have a rise-fall contour shape over the *X or Y* phrase.

Winans (2019) also referred to the intonation of dynqs and normal yes-no questions in EA. She reported that they had parallel intonational patterns, but she added that this similarity between them is relevant for interpretation only when dynqs have *ʔaw* as a disjunctive element. She argued that because normal yes-no questions had the same intonational pattern as dynqs with *ʔaw*, one can infer that the latter can safely be regarded as yes-no questions. In other words, she reported that dynqs with *ʔaw* and normal yes-no questions have a rise in EA. She also described the prosodic features of altqs with *willa*. The first alternative was accented as it had a rising peak, then the whole contour fell to the end of the question. This matches Gary and Gamal-Eldin's (1982) and Hellmuth's (2018) descriptions of altqs.

Finally, the studies reviewed above on EA appear to be unanimous in stating that dynqs have a final rise, and altqs have a final rise-fall. Therefore, the contour shape might be a disambiguating cue of disjunctive questions in EA.

5.2.3 Kuwaiti Arabic (KA)

There are, unfortunately, fewer studies on the intonation of yes-no questions and altqs in KA. Four dealt with normal yes-no questions (Al-Khalifa, 1984; Alharbi, 1991; Hellmuth, 2018; Hellmuth, to appear) and one with altqs (Hellmuth, 2018). For example, Alharbi (1991) reported that normal yes-no questions have a final rising contour shape. He did not mention altqs or dynqs. Al-Khalifa (1984) reported the same rising contour shape for normal yes-no questions.[80]

Similarly, Hellmuth (2018) reported that normal yes-no questions had a late-rise contour in this dialect. However, she did not refer to dynqs in this study. For altqs, she showed that they had a rise-fall contour shape over the *X or Y* phrase. The Y in the *X or Y* had a lower pitch peak than the X. It can be concluded from the above-mentioned studies on KA that altqs have a rise-fall contour shape, and yes-no questions have a late rise. However, no study has explicitly referred to the contour shape of dynqs in this dialect, but given that they are a type of yes-no questions, they have a late-rise shape. Hence, the contour shape might distinguish altqs from dynqs. The first production study below will address this gap by investigating recordings from the IVAr Corpus. Then, what might disambiguate between altqs and dynqs will be tested in a perception study in Chapter 7.

5.2.4 Syrian Arabic (SA)

Little attention has been dedicated to the prosodic contour shapes of questions in SA. Among the few studies, some have dealt briefly with yes-no questions (Ferguson & Ani, 1961; Kulk, Odé, & Woidich, 2003; Cowell, 2005; Sulaiman, 2016; Hellmuth, 2018). Ferguson and Ani, Kulk et al., Sulaiman, and Hellmuth briefly addressed the intonation of normal yes-no questions, all suggesting that they had a rising final intonational contour. Kulk et al. (2003) concluded by noting the similarity of this contour shape to that of EA. However, their study provides only a first impression of the intonation of SA and EA[81] due to the limited number of participants (only four: two Syrians and two Egyptians), so it may not be representative of these dialects. None of these researchers addressed contour shapes in dynqs.

Ferguson and Ani (1961) referred to disjunctive questions in SA but did not specify which type of disjunctive question they were describing. Based on the prosodic descriptions they provided, it is inferred that altqs are the ones that were intended. They pointed out that the first disjunct *X* has yes-no question-like prosody (i.e., a rising pitch accent) and the disjunctive element may sometimes be accented. Kulk et al. and Hellmuth referred to altqs and noted that they end with a final fall. More specifically, Kulk et al.'s findings showed that these questions had the disjuncts accented with different pitch accent shapes: the first with a

[80] She called them "open questions" (p. 111).
[81] The varieties of SA and EA that they studied were those spoken in the capital cities of Syria and Egypt.

rise and the second with a fall, which matches Ferguson and Ani's descriptions above. They also briefly added that the accent on the second disjunct could also be level or raised. From their description, it can be concluded that altqs in SA have both *X* and *Y* in the *X or Y* phrase accented. They illustrated this by providing an example of an altq that has a final falling intonational contour shown in Figure 5.1 below (p. 19):

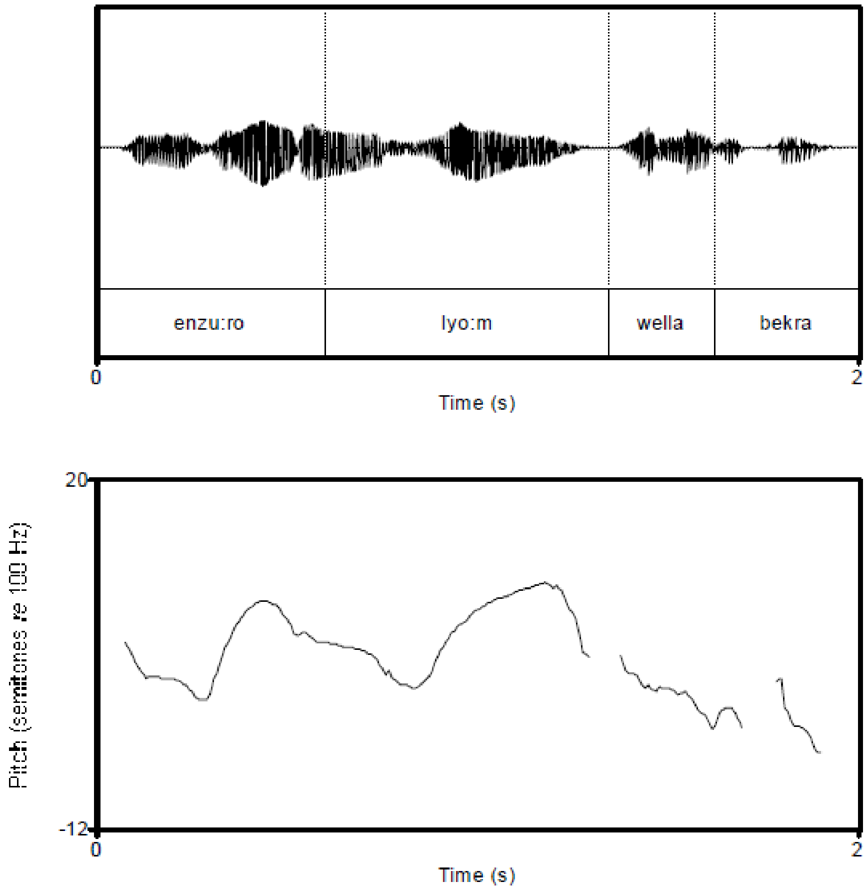


Figure 5.1. Kulk et al.'s *X or Y* pitch trace illustrating the contour shape of altqs, p. 19.

As the figure shows, altqs end with a rise fall in this dialect. The same prosodic description of SA altqs was given by Cowell (2005) who reported that pitch might be rising on the first disjunct of altqs whereas it might finally fall on the second. It might also be "a medium-low level" (p. 395).

Finally, from the above review of studies on JA, EA, KA, and SA, it can be concluded that altqs and yes-no questions (whether normal yes-no questions or dynqs) have a rise fall and a late rise, respectively. These two contour shapes in the four dialects are best illustrated in Figure 5.2 below (Hellmuth, 2018, p. 992) for JA (joka), EA (egca), KA (kwur), and SA (syda). Investigation of the contour shapes of recordings in the four dialects will be performed in the first production study in this chapter. The second production study will also investigate the lexical and prosodic features of these questions in JA, which will be followed by two perception studies on the relative contribution of the disambiguating cues in JA (Chapter 6) and in all four dialects (Chapter 7). Thus, any gaps related to how these questions can be disambiguated in the four dialects will be addressed.

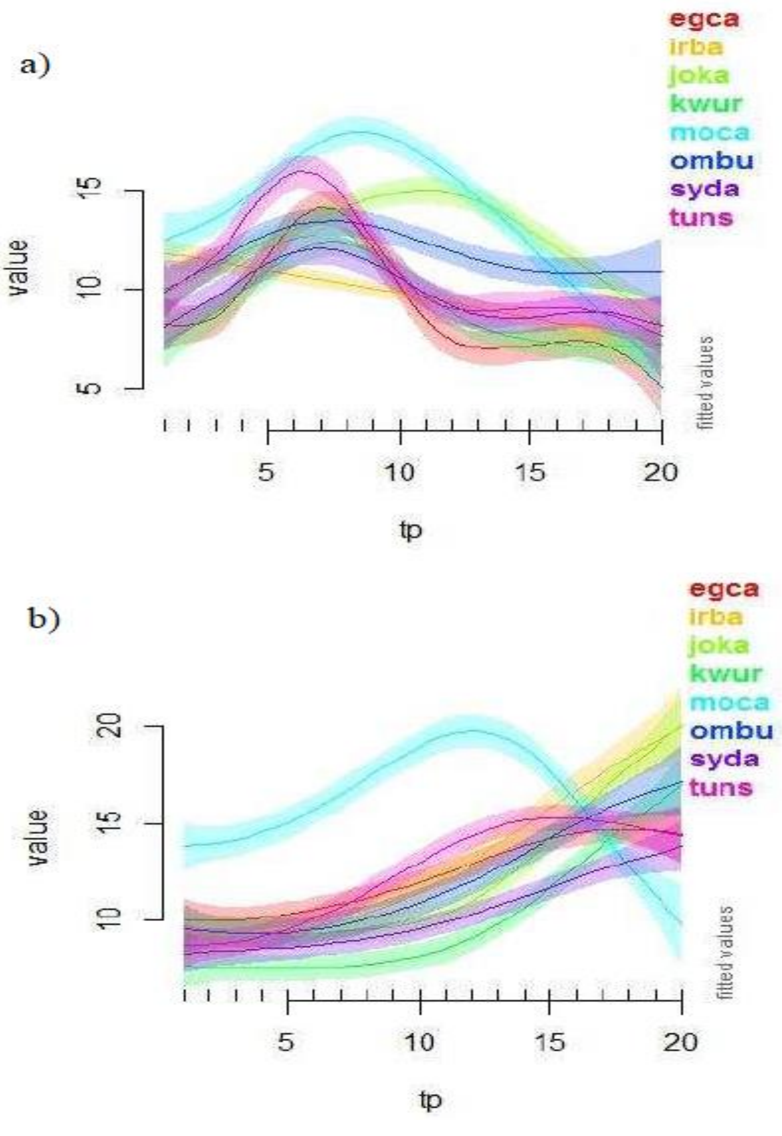


Figure 5.2. Model prediction visualisations of altqs (a) and yes-no questions (b) in eight dialects of Arabic. The codes of the dialects of interest are joka (JA), egca (EA), kwur (KA), and syda (SA), from Hellmuth (2018, p. 992).[82]

[82] The codes of the other dialects are irba (Iraqi Arabic), moca (Moroccan Arabic), ombu (Omani Arabic), and tuns (Tunisian Arabic), which are all beyond the scope of this thesis.

5.2.5 Studies Involving Yes-no Questions (Normal Yes-no Questions and Dynqs) and Altqs in English and Arabic

El-Hassan (1988) studied, among other utterance types, normal yes-no questions and altqs in MSA and compared them with their counterparts in English. Regarding normal yes-no questions, the rising contour was said to be available in both languages. Normal yes-no questions in MSA were reported to have a final rising contour shape as well as a question particle, too (Al Amayreh, 1991; Eid, 1992).

Nevertheless, El-Hassan added that English employs other subtle contours, so normal yes-no questions in English can convey some meaning nuances or trigger some interpretations that their MSA counterparts cannot. Consequently, he added that though there are similarities in the intonational systems of questions in both languages, they are not always the same. Such differences, he outlined, can manifest themselves in the intonational contours of normal yes-no questions when used to express rejoinders[83] in both languages. For example, English might use a falling contour in rejoinders while Arabic employs a rising normal yes-no question contour shape in the same context. He did not refer to the intonation of dynqs in either language.

El-Hassan also compared Arabic altqs with English altqs and reported that they share the same contour shape.[84] He stated that the first disjunct has a rising pitch accent while the second has a falling one. So, the general pattern he found is that the final contour shape in altqs in Arabic and English is a rise fall across the *X or Y* phrase, and both disjuncts are accented.

Al Amayreh (1991) illustrated that both languages (i.e., English and the two dialects of Arabic he investigated: JA and MSA) have almost similar intonational systems, at least in his data. He identified two kinds of shared tones: simple and compound ones. More specifically, the findings indicated that the tonal inventories of these languages consist of seven similar tones, which are parallel to Halliday's suggested tones for English, according to him. The findings also referred to the functions of these tones and the syntactic category of sentences that have these tones. For instance, the rising tone, or more specifically the high rising final

[83] Rejoinders in El-Hassan's paper refer to any reply to an utterance, which might show indifference or a lack of interest in the first speaker's provided information.

[84] El-Hassan (1988, p. 106) did not use the term *alternative questions* but used the term "a question entailing alternative options", instead.

tone, was reported to indicate yes-no questions and dynqs which he called *list questions* (i.e., dynqs). More precisely, English and MSA[85] both used the high rising intonational contour to mark yes-no questions. The contour shape of dynqs described in his study is similar to that of English dynqs (see, for more information, Pruitt, 2007, 2008a, 2008b; Pruitt & Roelofsen, 2011, 2013; O'Mahony, 2014, etc.).

Altqs in Al Amayreh's data for both dialects (MSA and JA), on the other hand, have a final falling contour with both disjuncts being accented, which is also similar to their prosodic patterns in English. The first disjuncts in altqs are usually pronounced with a high rising tone.

The only difference between El-Hassan's (1988) and Al Amayreh's (1991) studies was in terms of their prosodic description of altqs. El-Hassan did not refer to any prosodic break separating the disjuncts whereas Al Amayreh's notations in his example clearly showed a prosodic boundary between the disjuncts.

5.2.6 Summary of Review of Prior Prosodic Descriptions

Based on the literature reviewed above, normal yes-no questions were discussed in many studies on JA, EA, KA, and SA, but altqs and dynqs were rarely examined. Even those studies that mentioned altqs and dynqs were only descriptive in nature without experimentally explaining what might distinguish them. In general, normal yes-no questions and dynqs in the four dialects have a late-rise contour shape. Altqs tended to have a final falling contour shape (i.e., a rise fall over the whole *X or Y* phrase).

5.3 Rationale and Aims of the Two Production Studies

As a first step, and to build on the few prosodic descriptions of altqs and dynqs from prior studies, the first production study investigates the prosody of different versions of a disjunctive utterance in the IVAr Corpus. This read speech utterance could potentially be realised as a disjunctive question and was recorded as a part of a read speech narrative text in JA, EA, KA, and SA. The native speaker intuition suggests that this utterance could be realised and thus interpreted either as an altq or as a dynq.[86] Therefore, a detailed inspection of the prosody of these utterances will be carried out; their prosodic features will be

[85] The part of this study exploring JA was included in the section dedicated to JA above (Section 5.2.1).
[86] It should be noted that these disjunctive target utterances have no answers to be relied on to decide whether they are realised as altqs or dynqs. They all occur at the same point in the scripted narrative.

compared with what is known in the literature about the prosody of disjunctive questions in each of the four dialects. This will also be used to corroborate which type of disjunctive question each version may belong to and confirm or reject the researcher's initial classification of these questions, based on his intuition.

Then a second production study was run in JA to explore, in more detail, the different cues in participants' output. The advantage of this production study is that the prosodic details of the *X or Y* phrase as well as the choice of disjunctive element in altqs and dynqs are clarified, in newly collected speech data. Thus, the literature reviewed above along with the investigation of the disjunctive utterance tokens as well as the JA production study will all help establish the prosodic and lexical features of disjunctive questions in the four dialects, leading to using them appropriately in perception studies in the next chapters. The aim of the perception studies will be to test the perception of cues that might disambiguate altqs and dynqs in the four dialects, in line with what Pruitt and Roelofsen (2013) did for English.

5.4 The Corpus Production Study

5.4.1 Research Question

The different versions of the target disjunctive utterance will be prosodically investigated to find an answer to the following research question:

i) What is the prosodic design of the *X or Y* phrase in all versions of the target disjunctive utterance from the scripted narratives in JA, EA, KA, and SA?

5.4.2 The Data

The data to be analysed in the corpus production study are recordings of a specific utterance in the read speech narrative data taken from the IVAr Corpus (Hellmuth & Almbark, 2017). Table 5.1 is the text that participants were given to read from in the five datasets (four dialects) under investigation. The target sentence is a question addressed by a merchant to the protagonist of the story, whose name is Juha. Examples (5.5-5.8) then show how the target utterance was rendered in each dialect. Table 5.1 provides the immediate context of the target disjunctive utterance. The surrounding context is essentially the same in all dialects, so the context will not be repeated for each dialect below. The full story context is included in Appendix A (A.1).

Table 5.1 *The Context of the Target Disjunctive Utterance*[87]

Story Context
fa-l-bajjaːʕ ʔallu then-the-seller tell.PST.3MSG.NOM.3MSG.ACC so, the seller told him
jaxi ʔinta ʔulit min diʔiːʔa sitta rijaːl oh.man you say.PST.3MSG from minute six ryal oh man, you have just said six ryals a minute ago
guħa ʔallu Guha tell.PST.3MSG.NOM.3MSG.ACC Guha told him
talaːta rijaːl w ma fiːʃ ɣiːr kida three ryal and NEG available.NEG other.than this three ryals and nothing more
bajjaːʕ l-moːz ʔallu seller the-banana tell.PST.3MSG.NOM.3MSG.ACC the banana seller told him
ʔinta fakirni laʔiːtu fi-ʃ-ʃaːriʕ walla you think.PST.2MSG.NOM.1SG.ACC find.PST.1MSG.NOM.it.ACC in-the-street or **saraʔtu** steal.PST.1SG.NOM.it.ACC do you think I found it in the street, or I stole it?
hawzinlak kiːlu bi-sitta rijaːl will.weigh.FUT.1SG.NOM.for.you kilo with-six ryal I will weigh you a kilo for six ryals
jalˤlˤa ja-raːgil come.on O-man come on man
guħa ʔallu bi-talaːta rijaːl Guha tell.PST.3MSG.NOM.3MSG.ACC with-three ryal Guha told him, three ryals

The following are the dialectal versions of the question that was addressed by the merchant to Juha (the line in bold in Table 5.1 above):

(5.5) In EA, the banana merchant replied to Juha with:

ʔinta fakirni laʔiːtu fi-ʃ-ʃaːriʕ walla

you.2MSG think.PST.2MSG.NOM.1SG.ACC find.PST.1MSG.NOM.it.ACC in-the-street or
saraʔtu
steal.PST.1SG.NOM.it.ACC
'Do you think I found it in the street or stole it?'

[87] Transliterations were reproduced using IPA. Glosses were also provided by the researcher. Translations are directly taken from the text available on the corpus website.

(5.6) In JA, the merchant replied to Juha with:

ʔinta mfakkirni lagiːtu fi-ʃ-ʃaːriʕ willa
you.2MSG think.PST.2MSG.NOM.1SG.ACC find.PST.1MSG.NOM.it.ACC in-the-street or
saragtu
steal.PST.1SG.NOM.it.ACC
'Do you think I found it in the street or stole it?'

(5.7) In KA, the merchant replied to Juha with:

ʔinta ʃaːjifni laːgiː fi-ʃ-ʃaːriʕ willa
you.2MSG think.PST.2MSG.NOM.1SG.ACC find.PST.1MSG.NOM.it.ACC in-the-street or
baːjga
steal.PST.1SG.NOM.it.ACC
'Do you think I found it in the street or stole it?'

(5.8) In SA, the merchant replied to Juha with:

ʔinta mfakkirni mlaːʔiːun bi-ʃ-ʃaːriʕ
you.2MSG think.PST.2MSG.NOM.1SG.ACC find.PST.1MSG.NOM.them.ACC in-the-street
willa saraʔʔun
or steal.PST.1SG.NOM.them.ACC
'Do you think I found it in the street or stole it?'

Each speaker read the narrative without direction or a model to follow, so speakers were free to put their own interpretation on it, in context. They may or may not realize this utterance with altq or dynq prosodic cues known from the literature, therefore, and might also feel that this disjunctive utterance was intended as a rhetorical question that does not need any answer. Nevertheless, the analysis of these utterances could still help reach some conclusions about how their realisation relates to the literature, since the target utterance has a syntactic form which means it could be realised as an altq, dynq, or rhetorical question.

These utterances are also relevant to this study because, from the perspective of a native speaker of JA, it is felt that many of them do sound like altqs and dynqs, which is why they were included in this analysis. Nonetheless, the tokens have no answers that indicate which type of disjunctive question each of them is (as they were read as part of a narrative monologue). So, they were first classified as altqs or as dynqs based on the intuitions of the researcher, and then they were prosodically investigated. Those having prosodic features similar to the prosodic features of yes-no questions in the literature were classified as dynqs, and those having prosodic features similar to the prosody of altqs in the literature were considered altqs. This classification might be similar to or different from the researcher's intuition. Further analysis of them can help know more detail about the prosodic features of each type of disjunctive question.

The open-access IVAr corpus (Hellmuth & Almbark, 2017) comprises map tasks (coded as map), free conversations (coded as fco), and narrative folktales (some of them were read (coded as sto) while some were retold (coded as ret)). The data analysed here are taken from the read speech narrative (sto) recordings of five datasets: JA (Ammani and Karaki datasets), EA, KA, and SA.

The total number of samples analysed is 60 (12 from joam, 12 from joka, 12 from egca, 12 from KA, and 12 from SA). These are shown in Table 5.2.

Table 5.2 *Description of the Samples (Total Number = 60)*[88]

Dialect	**Gender**	**N**	**N/dialect**
joam (Jordan, Amman)	F	6	12
	M	6	
joka (Jordan, Karak)	F	6	12
	M	6	
egca (Egypt, Cairo)	F	6	12
	M	6	
kwur (Kuwait, Kuwait)	F	6	12
	M	6	
syda (Damascus, Syria)	F	6	12
	M	6	
Total			60

The choice of these dialects is informed by the results of the previous chapter. That is, all these dialects might represent the different types (e.g., Type 1, Type 2, etc.), and some of them received different descriptions of the use of disjunctive elements in the literature (e.g., EA). JA was chosen for the same reason and because it represents the researcher's and the sponsor's native dialect. For SA, like the other dialects, its picture was not clear from the corpus chapter and collecting data from this dialect for the perception experiment (Chapter 7) was possible given that there are Syrian refugees in Jordan, so it was included in this thesis.

[88] For consistency, egca, kwur, and syda will be replaced with EA, KA, and SA, respectively. Similarly, JA will be used instead of joam and joka unless there is a need to specify which one is being referred to.

5.4.3 Data Analysis

Hellmuth's (2018) methods for the analysis of the prosodic features of yes-no questions (specifically, normal yes-no questions) and altqs, from the same corpus, were adopted with some modifications. The recordings of each version of the target utterance in the four dialects (JA (joka and joam), EA, KA, and SA) were extracted using Praat (Boersma & Weenink, 2019).

The *X or Y* phrases in each of the 60 tokens were labelled as *X or Y* in a Praat textgrid. Then, the F0 contour in this section of each utterance was analysed and plotted to explore the contour shape. This is because this is the part of the utterances that the researcher is most interested in as it might have the prosodic features leading to disambiguating altqs and dynqs. This study is mainly concerned with disjunctive questions that have the *X or Y* phrase in the final position, in line with Pruitt and Roelofsen's (2013) perception experiment.

Pitch tracking errors were corrected by manually cleaning the F0 contours for all *X or Y* versions in all dialects. In order to get rid of any disturbances microprosody may create, smoothing of F0 was carried out at 15Hz, following Hellmuth (2018), before plotting the pitch traces.

In addition, all utterances were carefully listened to while examining their F0 tracks in order to decide whether there were accents or not on each part of the *X or Y* phrase and in order to decide on an appropriate label for their final contour shape. An additional point tier was created to label words with pitch accents and boundary tones using IPrA notation labels (see Section 2.6).

5.4.4 Results and Discussion

The research question sought to explore the prosody of the *X or Y* phrases in all versions of the disjunctive utterance in the scripted narratives of JA, EA, KA, and SA. More specifically, this prosodic investigation aimed to establish the detail of the prosodic cues of these utterances in each of the four dialects (five datasets), leading to finding out any prosodic differences between disjunctive questions. A summary showing the count for each contour type observed in each dialect is provided in Table (5.3):

Table 5.3 *A Summary of the Count for Each Contour Type by Dialect (Total Number = 60)*

Dialect	Late-rise	Rise-fall
JA	12	12
EA	1	11
KA	2	10
SA	0	12
Total	15	45

5.4.4.1 Jordanian Arabic (JA)

The corpus had two JA datasets from two cities: Karak (coded as joka) and Amman (coded as joam). Based on the researcher's intuition, 12 tokens might be altqs, and 12 might be dynqs. After analysing the 24 versions of Juha utterance in JA, two contours were observed: a rise fall and a late rise. Joka had six rise-fall and six late-rise utterances. Joam had six utterances with a rise fall and six with a late rise. Figure 5.3 shows an example of the rise-fall utterances, and Figure 5.4 shows an example of the late-rise utterances in JA. All disjuncts *X* and *Y* were accented in joka and joam, which is consistent with Hellmuth's (to appear) observation for the Karaki JA that disjuncts are all accented. This description is also similar to Al Amayreh's (1991) examples that had the *X* and *Y* accented in both altqs and dynqs in this dialect.

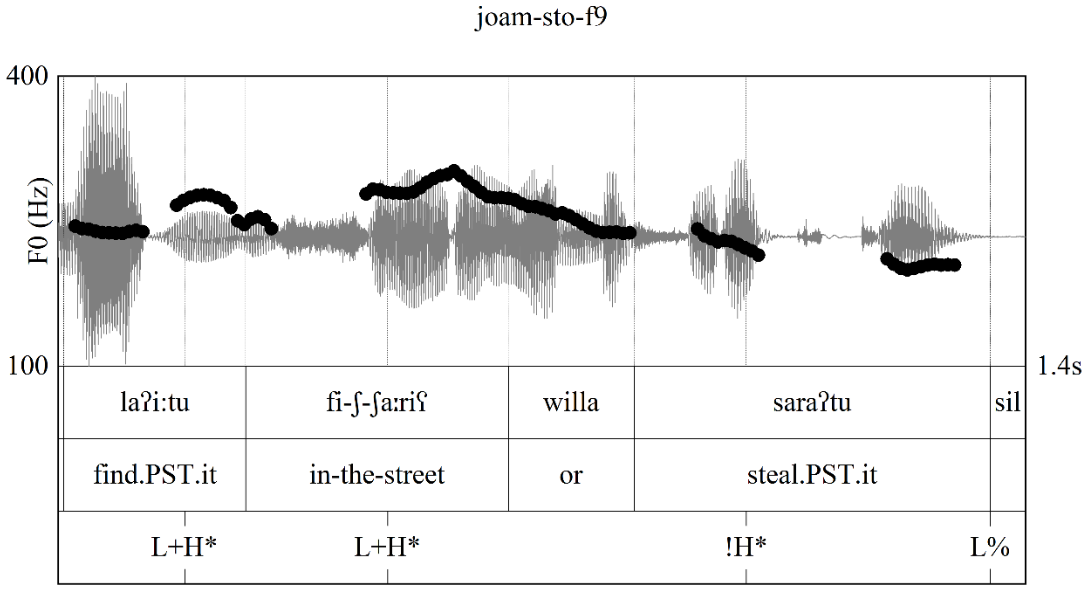


Figure 5.3. An example of the rise-fall contour [joam-sto-f9_70-72].[89]

[89] The pitch trace figures for all dialects have simplified glosses as the full glosses are too long to fit in the plots (see Example (5.6) for the full glosses).

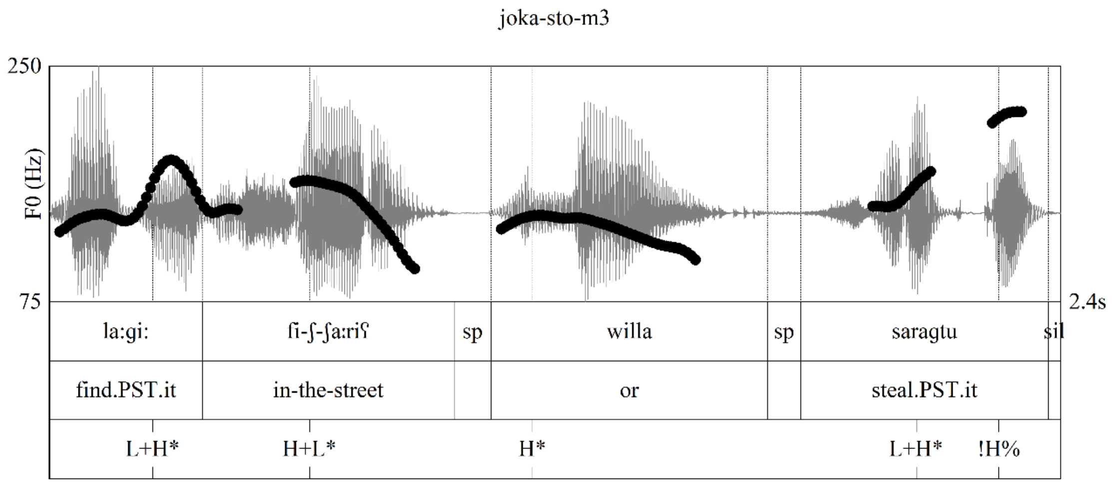


Figure 5.4. An example of the late-rise contour; there are two gaps before and after the disjunctive element [joka-sto-m3_78-80].

The rise-fall contour is similar to the contour described for altqs in Al Amayreh's (1991) study on JA, suggesting that these utterances might be altqs. What further supports this suggestion is the visualizations of F0 in the contours of altqs reported by Hellmuth (2018) on JA (see Figure 5.2) and the phonological analysis in Hellmuth (to appear). That is, the phonological analysis above is also similar to that of these questions in Hellmuth (to appear): all of them ended with L%. Consequently, it might be safe to argue that those with the rise-fall contour shape are altqs, which also matches the researcher's classification of these tokens based on intuition.

The disjunctive elements were accented in 3 out of the 12 rise-fall utterances (2 in joka and 1 in joam). This finding supports Hellmuth's (to appear) analysis of this type of question as she reported that disjunctive elements in JA might sometimes be accented and sometimes not in her data of read utterances. In addition, six of the rise-fall utterances had a gap before the disjunctive element (4 in joka and 2 in joam), which might be a prosodic break, as shown in Figures 5.5-5.7.

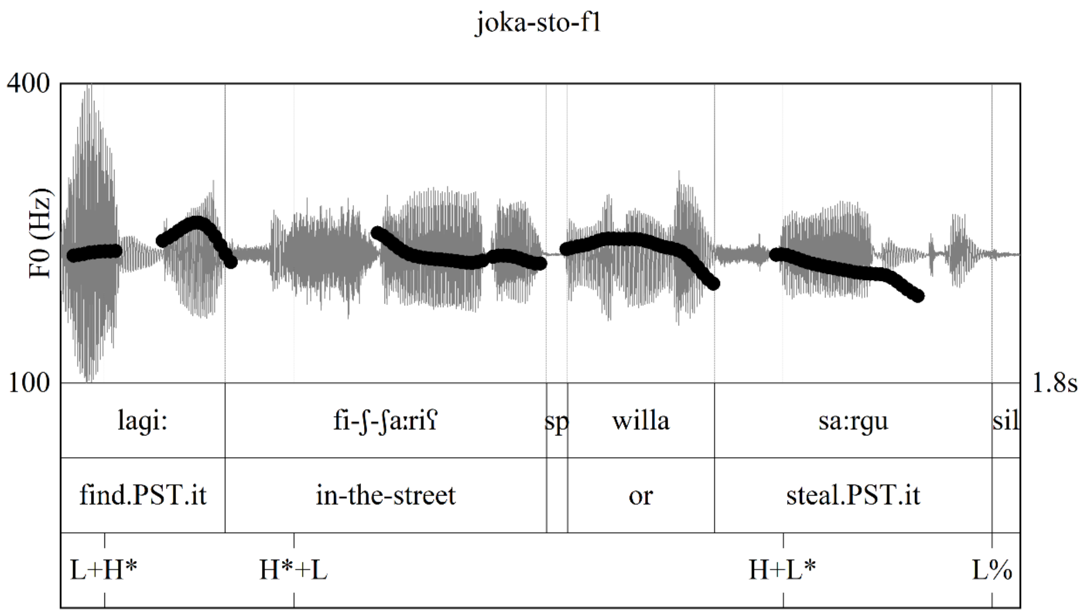


Figure 5.5. An example of the rise-fall contour with a gap before the disjunctive element [joka-sto-f1_80-82]

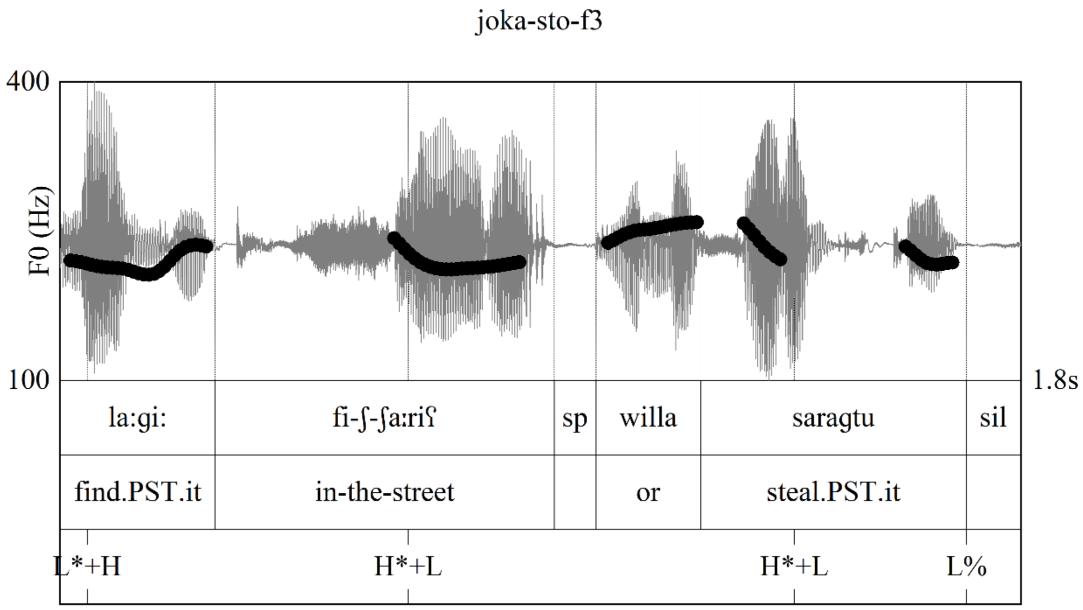


Figure 5.6. An example of a token with a gap before the disjunctive element [joka-sto-f3_57-59].

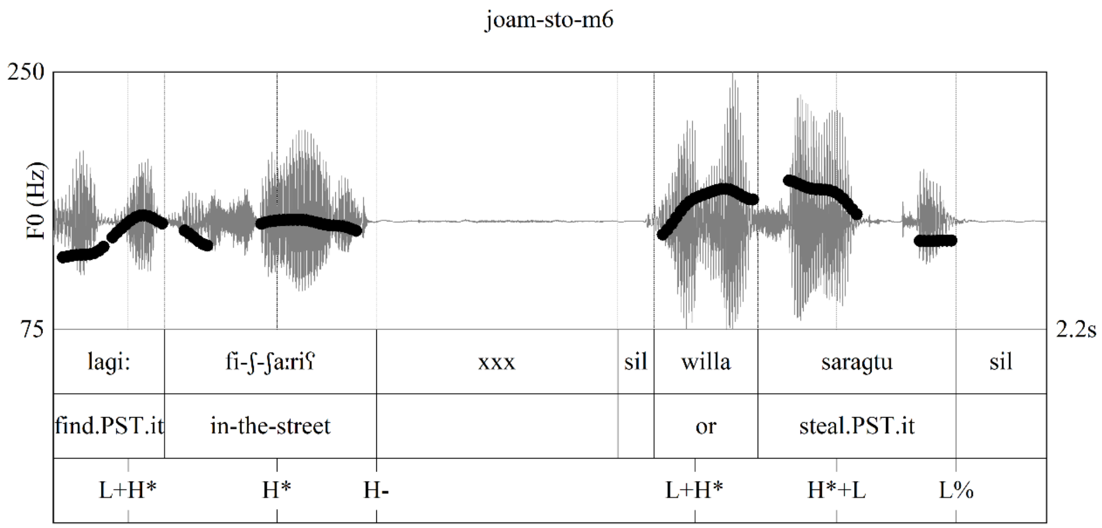


Figure 5.7. An example of a token with a gap before the disjunctive element. The disjunctive element in this example was accented [joam-sto-m6_68-71].

The utterances with the late-rise contour may safely be interpreted as dynqs, which is the same contour noticed in Al Amayreh's (1991) dynq example in JA. Many researchers also reported that yes-no questions end with a rise in this dialect (El-Hassan, 1990; Al Amayreh, 1991; Mahadin & Jaradat, 2011; Hellmuth, 2018), which matches the contour observed here. Even the shape of the late-rise contour in these utterances is similar to that of normal yes-no questions that Hellmuth (2018) reported for the joka data from the same corpus (see Figure 5.2). The researcher's first classification, before analysing the tokens prosodically, also classified these tokens as dynqs.

With regards to the presence of accents on disjunctive elements in the late-rise utterances, only one disjunctive element was accented (in joka). Having only one accented disjunctive element in joka and the lack of accents on the disjunctive elements in joam is in line with Al Amayreh's example of this type of question in JA as disjunctive elements were not accented.

Additionally, in joka, there were small silent gaps before the disjunctive elements in two out of the 6 utterances (Figure 5.8) and before and after the disjunctive element in one instance (see Figure 5.4 above). Such a gap might be a prosodic break. In joam, none of the 6 late-rise utterances had a gap.

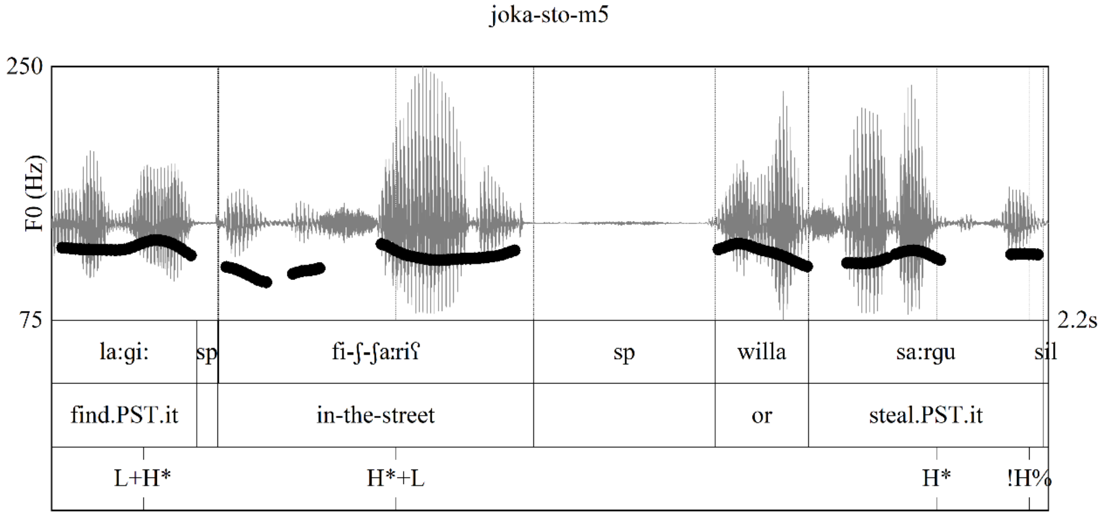


Figure 5.8. An example of a token with a gap before the disjunctive element [joka-sto-m5_70-72].

5.4.4.2 Egyptian Arabic (EA)

Based on the researcher's intuition, 11 tokens seem like altqs while only one looks a dynq. The phonological analysis of the prosody of these tokens showed that there were two patterns: a final rise-fall and a final late-rise. The former was found in 11 utterances with a boundary tone L% (Figure 5.9), and the latter was realized in one utterance with a boundary tone H!H% (Figure 5.10).

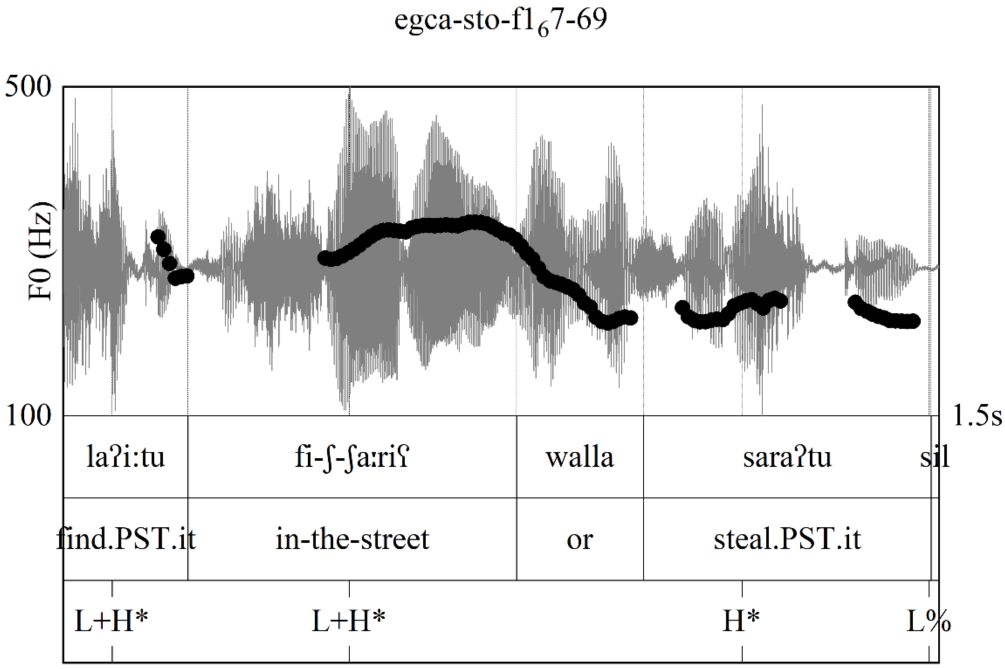


Figure 5.9. An example of the rise-fall contour [egca-sto-f1_76-69].[90]

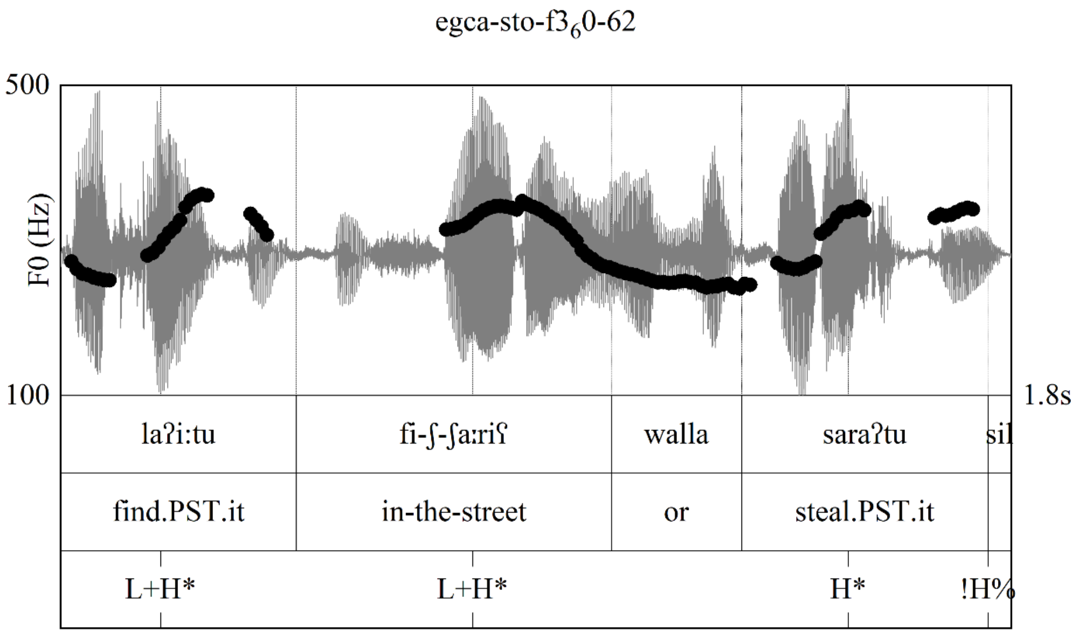


Figure 5.10. The one EA Juha utterance realised with a late rise [egca-sto-f3_60-62].

In EA, all disjuncts were accented in all 12 utterances. The fact that the 11 utterances had a rise fall is in keeping with the intonational pattern observed in altqs in this dialect (e.g.,

[90] The full glosses are too long to fit in the plots (see Example (5.5) for the full glosses).

Soraya, 1966; Gary & Gamal-Eldin, 1982; Hellmuth, 2018; Winans, 2019), which is also similar to the researcher's classification of these tokens as altqs, based on intuition. It might, therefore, be sensible to conclude that these disjunctive tokens might be altqs.

No occurrence of the disjunctive element was accented. Examining the altq pitch trace[91] in Winans' (2019) study shows that there might be no noticeable pitch movement on the disjunctive element. She reported that a rise appears on the *X* but did not discuss the details of the disjunctive element. This observation might also tie in with Soraya's (1966) study that accented only one occurrence of *willa* out of 11 examples that used *willa*. He noted that this disjunctive element might get accented in utterances expressing strong feelings, such as threats. Gary and Gamal-Eldin (1982) also did not refer to accenting disjunctive elements when explaining the detailed prosodic features of the *X or Y* phrase. In terms of the presence of prosodic breaks before disjunctive elements, only 3 instances were found (see Figure 5.11). Such a gap was mentioned by some researchers (see Gary & Gamal-Eldin, 1982) but was not by others (see Hellmuth, 2018; Winans, 2019).

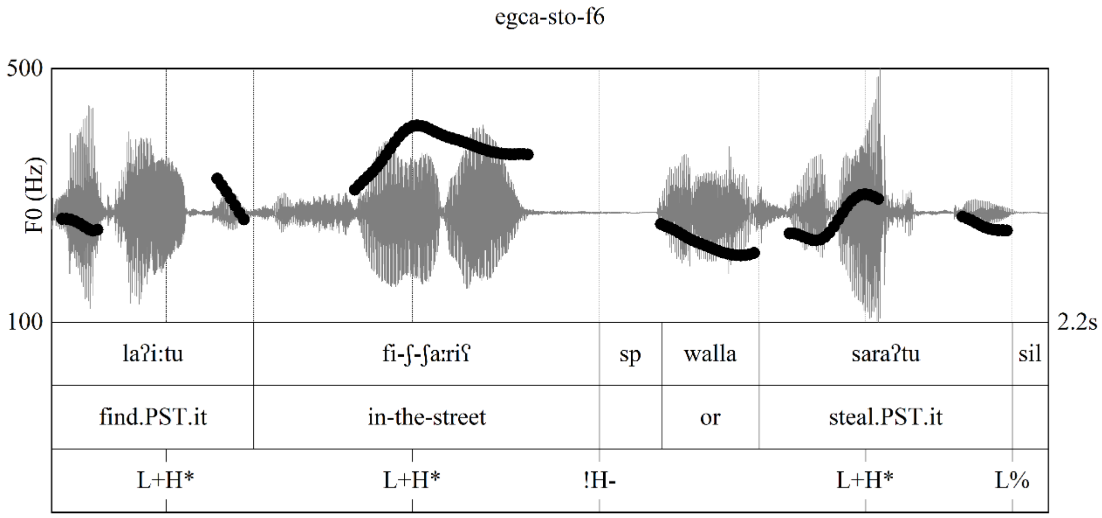


Figure 5.11. An example of a rise fall with a gap before the disjunctive element [egca-sto-f6_74-76].

The only utterance that had a final rising intonational contour (Figure 5.10 above) was first classified as a dynq before examining its prosody. Based on its prosody, the first intuition might be confirmed, so it might also be a dynq given that yes-no questions, generally, in this dialect have a final rise (Gary & Gamal-Eldin, 1982; Hellmuth, 2006; Hellmuth, 2018;

[91] This pitch trace is not cited here because it is cited in Chapter 7 (7.1, Figure (7.1 a)).

Winans, 2019, etc.). Winans also reported that dynqs having the other disjunctive element (i.e., *ʔaw*) have the same contour shape as normal yes-no questions since all of them are yes-no questions, after all. What supports the conclusion that this utterance might be a dynq is the fact that dynqs with the other disjunctive element (i.e., *ʔaw*) were reported to have a rise in the same dialect (Winans, 2019). The example reported in Winans had H-H%, which is somewhat similar to the example found in Juha story as it had L+H* H* H!H%. Moreover, the disjunctive utterance with a rise had no gap between disjuncts.

5.4.4.3 Kuwaiti Arabic (KA)

Similar to the other dialects above, the researcher's intuition classified 10 KA tokens as altqs and 2 as dynqs. An in-depth prosodic analysis followed and revealed that there are two contour shapes on these tokens: a final rise-fall and a final late-rise. There were 10 utterances with the rise-fall L% (see Figure 5.12) and 2 with the late-rise having !H% (see Figure 5.13). It should be noted that all disjuncts in all of the 12 utterances were accented.

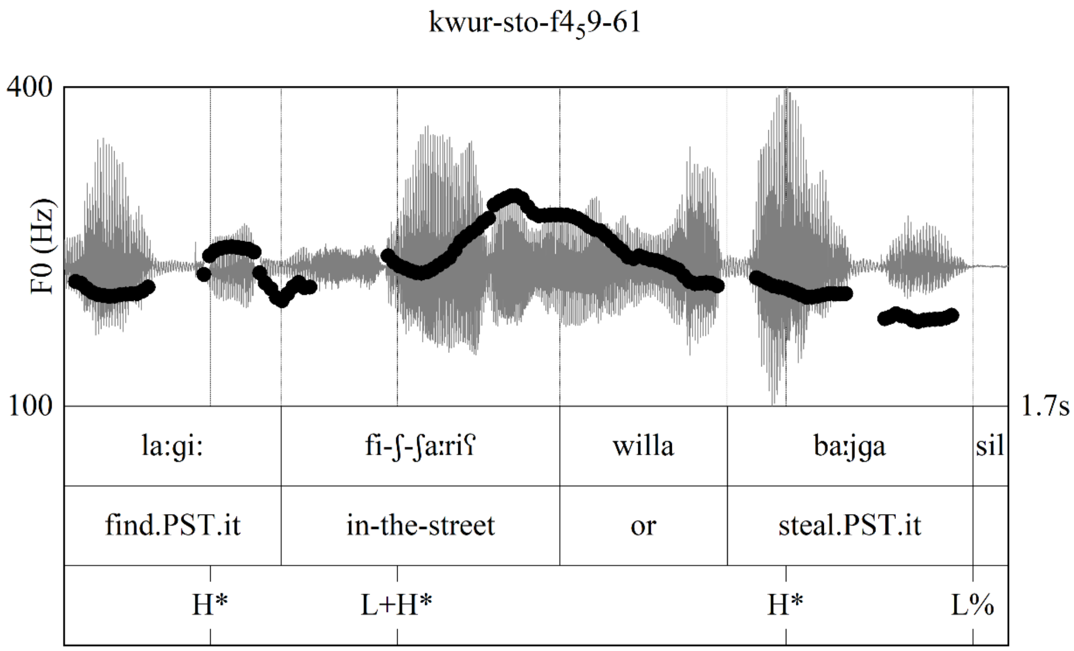


Figure 5.12. An example of the rise-fall contour [Kwur-sto-f4_59-61].[92]

[92] The full glosses are too long to fit in the plots (see Example (5.7) for the full glosses).

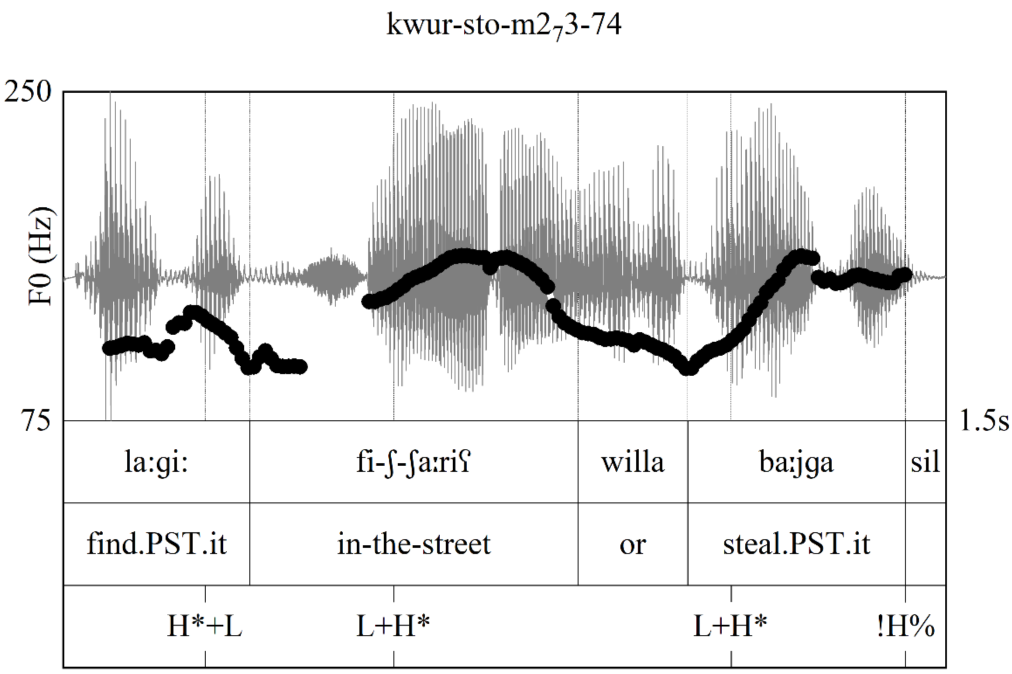


Figure 5.13. An example of the late-rise contour [Kwur-sto-m2_73-74].

It is also worth mentioning that there was only one utterance having a gap before the disjunctive element (Figure 5.14), which might be a prosodic break. There is also only one utterance with a gap in the middle of the first disjunct (Figure 5.15), which might be a case of disfluency.

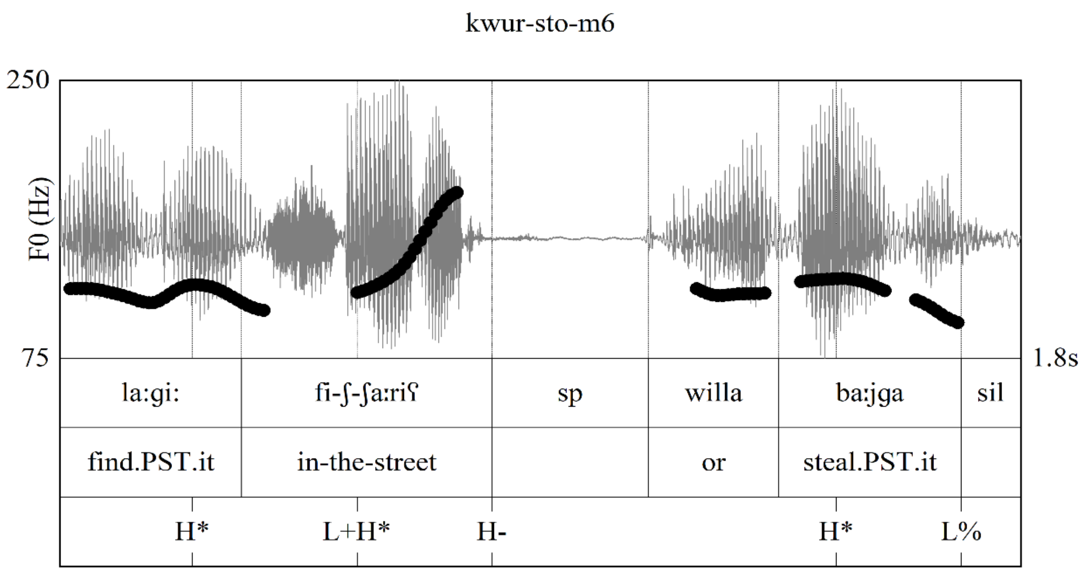


Figure 5.14. An example of a rise-fall token [kwur-sto-m6_70-72].

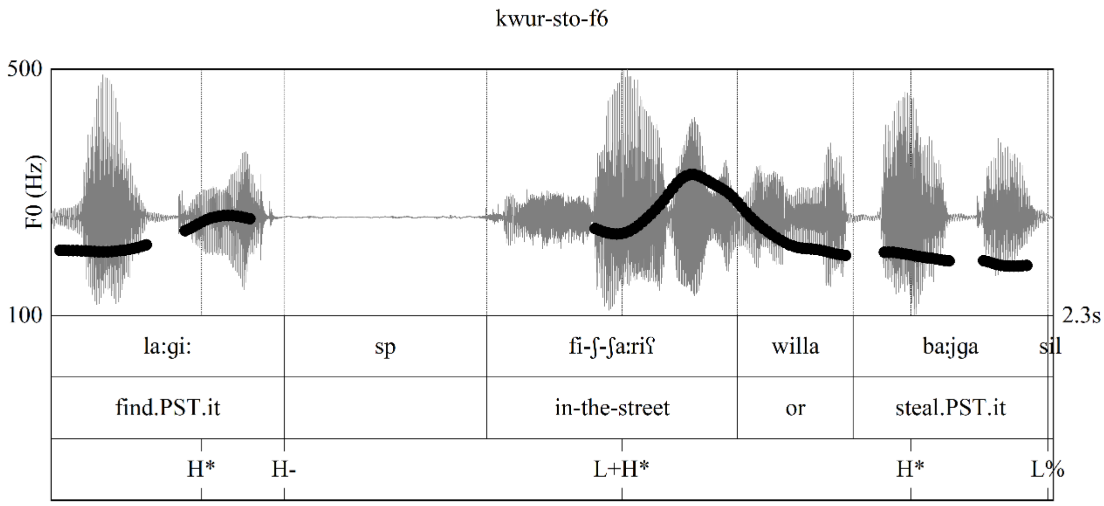


Figure 5.15. An example of a rise-fall token with a gap in the middle of the first disjunct [kwur-sto-f6_69-72].

It might be the case that the rise-fall tokens are altqs, which is consistent with what was reported by Hellmuth (2018) for the shape of the altq contour in KA (see Figure 5.2 which was cited from Hellmuth's study). This classification matches the researcher's intuition that they might be altqs. In addition, one out of the ten rise-fall utterances had its disjunctive element accented (Figure 5.16), but no example of accenting the disjunctive element was observed in any of the late-rise utterances. The first disjuncts in those tokens that might be altqs had higher rising F0 than the second ones, which is also in accordance with Hellmuth's (2018) results for the same dialect.

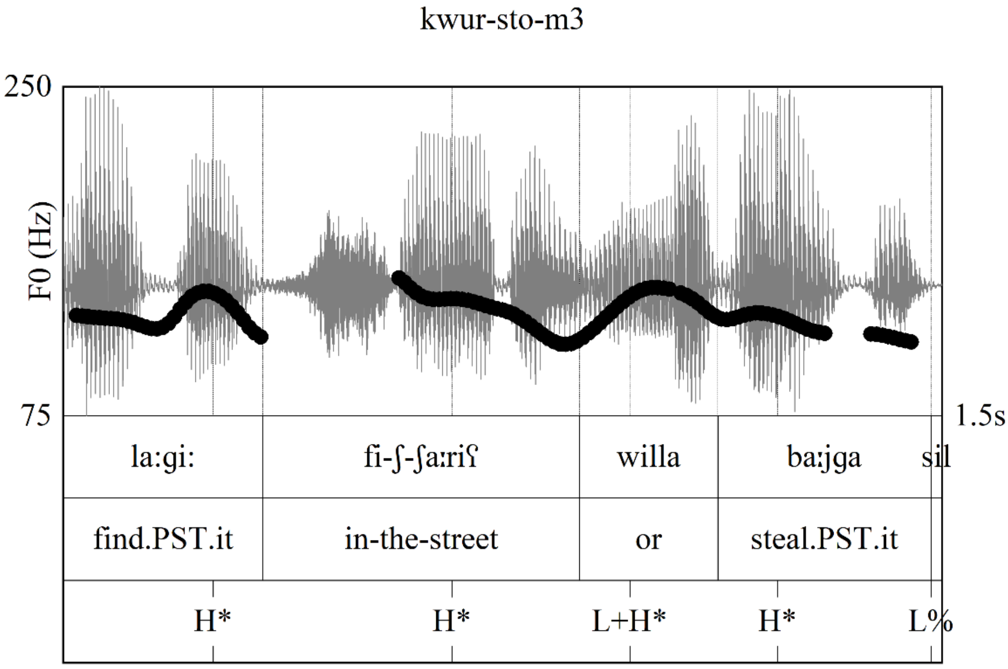


Figure 5.16. An example of a rise-fall token with an accented disjunctive element [kwur-sto-m3_63-64].

The utterances with the final late-rise might be interpreted as dynqs given the researcher's intuition and given that their prosody matches prior studies that have already reported that yes-no questions in this dialect have a final late-rise (see Al-Khalifa, 1984; Alharbi, 1991 (in the majority of his data); Hellmuth, 2018).

5.4.4.4 Syrian Arabic (SA)

All of the 12 SA disjunctive tokens seem to be altqs, based on the researcher's intuition. Their prosodic analysis might confirm or reject this intuition. All 12 SA tokens ended with a rise-fall or a low-level contour shape, as shown in Figure 5.17. All disjuncts were accented, and there were four utterances with a gap before the disjunctive element (e.g., Figure 5.18), which might be a prosodic break.

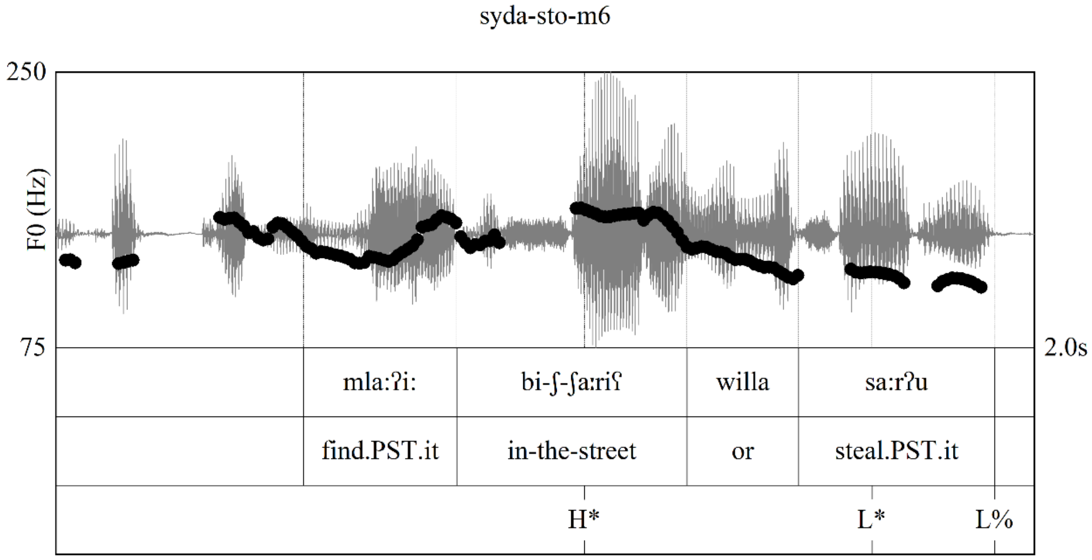


Figure 5.17. An example of the rise-fall contour [syda-sto-m6_156-158].[93]

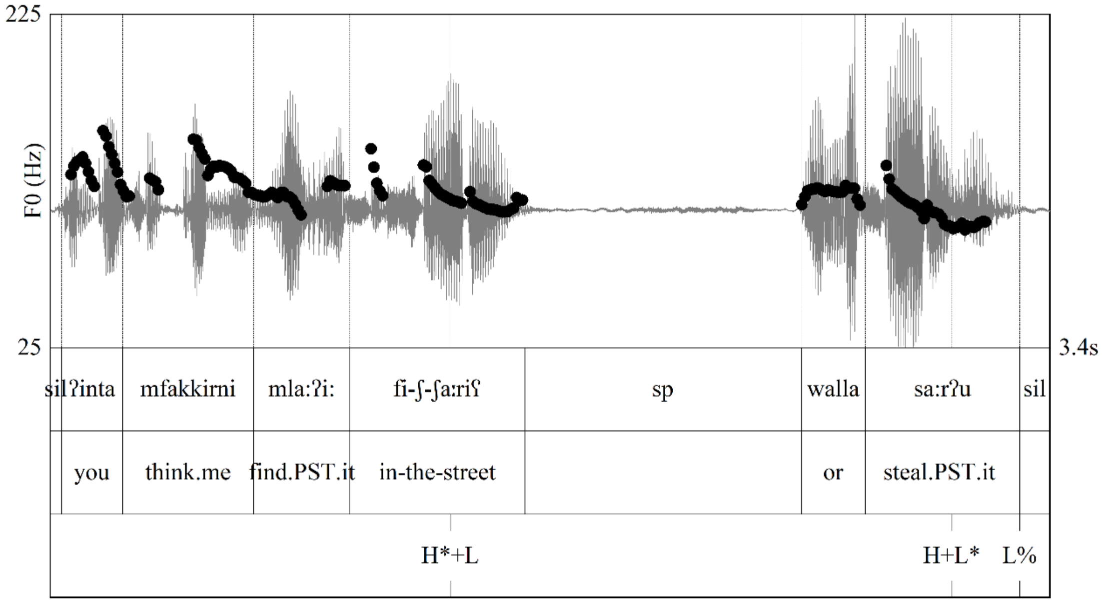


Figure 5.18. An example of a rise-fall token with a gap before the disjunctive element [syda-sto-m4_74-77].

Additionally, there was only one token with the disjunctive element accented (Figure 5.19), matching Ferguson and Ani's (1961) observation that the disjunctive element may sometimes be accented.

[93] The full glosses are too long to fit in the plots (see Example (5.8) for the full glosses).

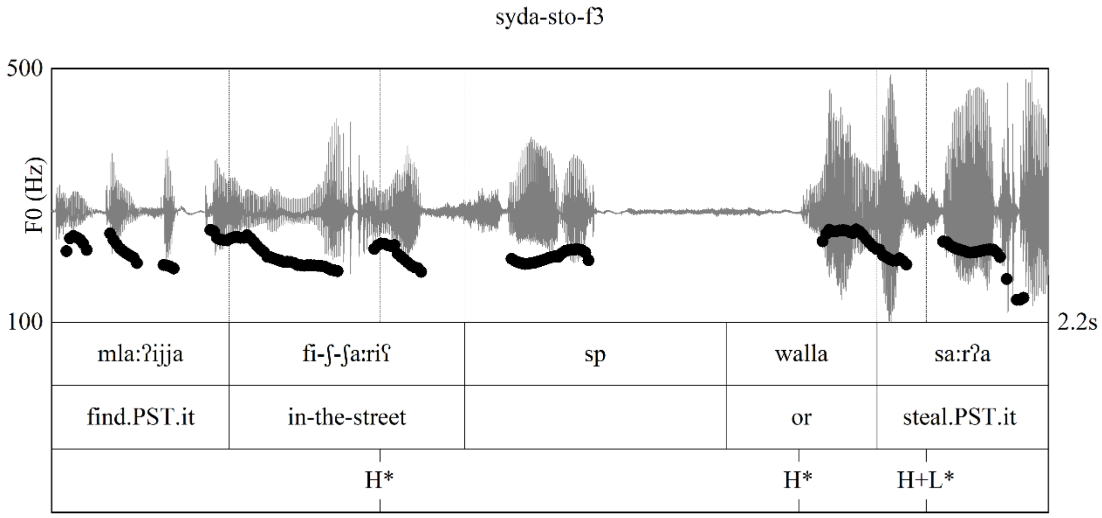


Figure 5.19. An example of a rise-fall token with an accented disjunctive element [syda-sto-f3_77-80].

All of these tokens might be categorised as altqs based on the same contour of altqs, which was reported in the literature (e.g., Ferguson & Ani, 1961; Kulk et al., 2003; Hellmuth, 2018). This was the researcher' first classification of them, which is supported by the fact that all their disjuncts were accented, which also matches the prosodic description of altqs in the literature (Ferguson & Ani, 1961; Kulk et al., 2003).

5.4.5 Conclusion of the Corpus Production Study

The main aim of analysing the *X or Y* phrases in all tokens of the disjunctive utterance was to establish the possible disambiguating prosodic cues of the different realisations of the same utterance in JA, EA, KA, and SA, after classifying them as altqs and dynqs based on the researcher's native speaker intuition.

In more detail, the prosodic results confirmed the researcher's classification of the tokens and also confirmed the results of the previous chapter in EA. The prosody of utterances with *willa* was mainly similar to the prosody of altqs reported in the literature (with only one example that was realized with the prosody of yes-no questions).

When comparing the prosody of Juha disjunctive utterance tokens with the prosody of altqs and yes-no questions already known from the literature on each dialect, it can be concluded that those versions realized with a late rise might be dynqs. One can also learn that those versions realized with a rise fall might be categorized as altqs, which matched the researcher's intuition before examining their prosody in detail.

Some Juha utterance tokens had slightly different prosody than others. That is, their contour shapes are not neat. This might be because these utterances were read or because they could be pronounced as rhetorical questions, rather than disjunctive questions.

On the whole, the following generalisations about the four dialects can be made:

1. All disjuncts in all versions of the disjunctive utterance were heard as accented whether they were classified as altqs or as dynqs, suggesting that there are no differences between both types of disjunctive question in accenting the *X* and *Y*.

2. disjunctive elements were rarely accented in the four dialects, in this context.

3. The main broad difference observed between the different tokens was in the choice of contour: late-rise vs. rise-fall. All versions with a late rise were classified as dynqs, because this matches the researcher's classification and the contour of yes-no questions in all dialects. Likewise, the versions with a rise-fall or level contour were labelled as altqs, for the same reason above. As in the previous chapter that concluded that the choice of disjunctive element should be included in the design of the perception study on disjunctive question interpretation in these four dialects, a key conclusion of the corpus production study is that the choice of contour should also be included as a variable in this perception study. Thus, both of the choice of disjunctive element and the choice of contour might be the disambiguating cues of disjunctive questions in these dialects. A perception study can test how participants perceive these cues and can also show the similarities and differences between the four dialects in which cues disambiguate disjunctive questions.

In the next section, a production study is reported eliciting definite examples of altqs and yes-no questions (both normal yes-no questions and dynqs) in JA. This production study can find out and describe the exact prosody of disjunctive questions when produced by JA native speakers, leading to employing these prosodic cues in the perception study on JA (Experiment 1). The production study will also experimentally seek to clarify which particular disjunctive elements are produced in altqs and dynqs in JA.

5.5 The JA Production Study

5.5.1 Research Questions

The JA production study aims to answer the following research questions:

i) What is the prosodic design of the nuclear portion of dynqs, normal yes-no questions, and altqs in a dialogue completion task (DCT)?

ii) Which disjunctive element do participants produce in which disjunctive question in data elicited using a dialogue completion task (DCT)? That is, can *ʔaw* and *willa* be used in both altqs and dynqs?

Data were collected in a production study in Jordan, aiming to give a complete picture of how the prosody of dynqs, normal yes-no questions, and altqs works in JA. Although there are a few instances of disjunctive questions in the corpus, eliciting more of them will give greater confidence about their prosody given that the prosodic patterns found in the 24 Juha disjunctive utterance tokens were interpreted based on the literature and the intuition of the researcher.

The researcher's intuition as a native speaker is that the two dynqs, which were found in joka in the previous corpus chapter, are altqs even though they were answered with *no*. One of them has a falling contour shape which is typical of altqs in this dialect (see, Al Amayreh, 1991; Hellmuth, 2018; Hellmuth, to appear for more details on the prosodic realisation of altqs in JA), and the other has a slight falling or level contour shape. Based on the researcher's intuition, they sound like altqs. So, one of the advantages of the production task is that it will help accurately investigate the prosody of dynqs with more examples, completing the whole picture for disjunctive questions in JA.

5.5.2 Materials

Participants were recorded in a recording-suitable room (i.e., free from noise). Such a room helped avoid any ambient noise distracting participants' attention or affecting the quality of the recordings. They were recorded using a high-quality headset microphone (Shure SM10A). Having a headset microphone fixed close to participants' mouths so that participants' mouths do not move away from this fixed microphone when they move their heads while speaking and having the recording sessions run in a suitable noiseless environment might help obtain more precise intensity values (Styler, 2017).

The recording device used was also high-quality (Marantz PMD661) and was set at the default sampling frequency 44100Hz 16 bit, to a single mono channel. Participants' recordings were directly saved on a removable SD card, and each recording was copied to a laptop (Sony VAIO), which was password-protected. Then, they were uploaded to Google Drive which was also password-protected. In order to minimize the risk of any possible power cut during recording sessions, high-quality batteries were inserted into the recording device.

The materials were 14 different scenarios in the form of a dialogue completion task (Blum-Kulka, House, & Kasper, 1989). These contextualized scenarios were carefully designed for this study to elicit examples of dynqs, normal yes-no questions, and altqs from each speaker. All scenarios used in the dialogue completion task are listed with their translations in Appendix A (A.2). Some examples of these scenarios are given below:[94]

SCENARIO ONE (dynq):

RESEARCHER: *tˤalabat minnak ʔummak tiʃtari ʃaɣla waːħda min haðawl wa maː ħaddadat ʔajj waːħda bidha (muː muhim ʔajj nawʕ), l-muhim burtuqaːl/manga. wa ʔinta waggafit s-sajjaːra ʕind maħal l-xudˤra, laːkin gabil maː tinzal min s-sajjaːra saʔalit min ʃ-ʃubbaːk ʔiða ʕinduh burtuqaːl/manga, wa ʔiða kaːn ʒawaːbuh aːh ʕindi, raːħ tinzal min s-sajjaːra wa tiʃtari, ʔinta bas biddak tisʔaluh ʔiða ʕinduh burtuqaːl /manga, ʔisʔaluh…* 'Your mother asked you to buy her only one of two things: orange/mango. She did not specify which one of them she wanted (i.e., the choice is not important). What is important is just to bring any one of them. You parked your car in front of the greengrocer's. Before you get out of your car, you looked out of your car window and wanted to ask him if there is Orange/mango. If he says yes, then you will get some. So, ask him…'

EXPECTED QUESTION: *ʕindak burtuqaːl ʔaw/willa manga* 'do you have orange or mango?'

SCENARIO TWO (dynq):

RESEARCHER: *sˤadiːgak bifakkir ʔinnuh ʔibnak maː biħib jitˤlaʕ maʃaːwjiːr maʕaːk wala ħatta maʕ ʔummu/ʔabuːh (maʕ l-baːba/ l-maːma), laːkin ʔinta bitiʕrif ʔinnuh ʔibnak biħib, liðaːlik raːħ tisʔal ʔibnak ʔiða biħib jitˤlaʕ maʕ l-baːba/ l-maːma, wa tixajjal ʔinnuh ʒawaːb ʔibnak raːħ jikuːn aːh baħib ʔatˤlaʕ - laːʔ maː baħib ʔatˤlaʕ maʕ l-baːba/l-maːma, ʔisʔaluh lʔaːn...* 'Your friend thinks that your son does not like going out of the house (for trips or so) with you and his mother/dad (with dad/mum). However, you think this is not true. That is, you know that your son likes this. So, you will ask your son if he likes to go out

[94] See Appendix A (A2) for a full version of all scenarios with glosses.

with dad/mum while thinking that his answer to your question is going to be yes, I like.../no, I do not like to go with dad/mum. Ask the question now …'

EXPECTED QUESTION: *bitħib titˤlaʕ maʕ l-baːba ʔaw/willa l-maːma* 'Do you like to go out with your dad or mum?'

SCENARIO THREE (normal yes-no question):[95]

RESEARCHER: *tixajjal ʔinnak daxalit subermaːrkit wa saʔalit l-bajjaʕ law bitlaːgi ʕinduh miranda, kajf saʔaltuh* 'Imagine you went to a shop and asked the shopkeeper whether he has Mirinda drink. How did you ask him?........'

EXPECTED QUESTION: *balaːgi ʕindak mirinda* 'Do you have Mirinda?'

SCENARIO FOUR (normal yes-no question):

RESEARCHER:kunt fiː riħlih wa l-ʒaw latˤiːf, laːkin ʔibnak ʔimgaʃʕir, ʔisʔaluh ʔiða bardaːn... 'You are on a day trip, and the weather is nice, but your son has got goose pimples. Ask him if he feels cold…'

EXPECTED QUESTION: *ʔinta bardaːn* 'Do you feel cold?'

SCENARIO FIVE (altq):

RESEARCHER: *tixajjal ʕindak dˤajf fi-l-be:t, wa l-maʃruːbaːt ʔilli ʕindak bi-l-beːt faqatˤ ʕasˤiːr moːz wa ʕasˤiːr ʒazar, wa ʔinta biddak tisʔaluh ʔajj waːħad biddu jiʃrab minhum moːz/ʒazar, ʔisʔaluh*.... 'Imagine you have a guest in your house. You only have banana juice and carrot juice to offer. You want to ask him/her which one he/she would like to drink, so ask him/her…'

EXPECTED QUESTION: *tiʃrab moːz ʔaw/willa ʒazar* 'would you like to drink banana (juice) or carrot (juice)?

SCENARIO SIX (altq):

RESEARCHER: *bitiʕraf ʔinnu ʔaxuːk xatˤab waħdih ʔisimha ʔimma daːnja ʔaw marjam, laːkin biddak tiʕrif miːn min hal ʔismajn huːwwa sˤ-sˤaħiːħ, ʔisʔal ʔaxuːk ʔisimha bildˤabitˤ daːnja/marjam*,... 'You know that the name of you brother's fiancée is either Dania or Mariam. You want to know which one of these is the right name. Ask your brother to specify the exact name from (Dania/Mariam)'

EXPECTED QUESTION: *ʔisim xatˤiːbtak daːnja ʔaw/willa marjam* 'Your fiancée's name is Dania or Mariam?'

[95] The scenarios eliciting normal yes-no questions are adapted from the ones used in the IVAr Corpus (Hellmuth & Almbark, 2017).

Although the intonational patterns of altqs and normal yes-no questions are already known to some extent from the literature, which is not the case for dynqs, they were included in this dialogue completion task to more thoroughly explore their contour shapes. Additionally, the motivation for eliciting normal yes-no questions, though their prosodic features are fully discussed in the JA literature, was that they might help distract speakers' attention from the purpose of the task (i.e., as distractors). In other words, if dynqs were only to be collected, repetition of dynq scenarios might make speakers aware of their production, which might affect their production, in a way or another. Another motivation for eliciting altqs and normal yes-no questions was that it was thought that this might facilitate comparing them with dynq contours produced by the same speakers.

The 14 dialogue completion task scenarios included 6 dynqs, 4 normal yes-no questions, and 4 altqs (recorded once by each speaker). The total number of questions that were elicited was 252: 108 dynqs, 72 normal yes-no questions, and 72 altqs (18 participants x 14 scenarios). The 4 scenarios eliciting normal yes-no questions were presented in the middle between the scenarios eliciting dynqs and altqs. That is, the disjunctive question scenarios did not follow each other. The order of presentation of the scenarios eliciting questions was dynqs, normal yes-no questions, and altqs, which was intended to distract participants' attention from disjunctive questions.

Whenever possible, most sounds in the lexical items used as disjuncts *X/Y* were controlled so that they were voiced, and specifically in the last syllable of the last word in each disjunct consisting of more than one word. The same holds true for the last word in normal yes-no questions. This was intended to reduce perturbation of F0 contours. This method was also followed by other researchers (e.g., Hellmuth, to appear). Similarly, some sounds, whenever possible, were controlled in order not to appear in the *X or Y* phrase or in the last word in normal yes-no questions. More specifically, the /ʕ/ may make inconsistencies such as pulling the F0 down (S. Hellmuth, personal communication, June 20, 2019), and the /ʔ/ may also make the same problems (see, for instance, Hellmuth, 2006 for an example in which she explained that /ʔ/ caused perturbation in the F0). As a result, these sounds were avoided, especially in the last syllables.

In addition, as seen from the scenarios above, using a specific disjunctive element as part of the eliciting scenarios was, whenever possible, avoided. This step allowed participants to produce the questions with the disjunctive element of their own choice given that there are two common disjunctive elements in JA, unlike English. By doing so, one can find out whether a specific disjunctive element is more commonly found in a particular type of question or not. Nevertheless, disjunctive elements that cannot appear in disjunctive questions (e.g., *either…or*) were parsimoniously used because creating scenarios without any disjunctive element was sometimes impossible, and because the *either…or* construction facilitated explaining scenarios to participants. The following example is a scenario using the Arabic disjunctive element equivalent to the English *either…or*:

SCENARIO SEVEN (dynq):

RESEARCHER: *ʃufit sˤaːħbak l-gadiːm, wa ʔinta btiʕraf ʔan huːwwa biħib jitɣadda ʔimma birjaːni ʔaw mandi, wa biddak tiʕzimuh ʕala beːtak ʕaʃaːn jakul ʕindak ʔimma birjaːni/mandi, laːkin biddak tisʔaluh bi-l-ʔawwal ʔiða ʕindu wagit bukra jiːʒi jaːkul birjaːni/mandi, ʔisʔaluh…* ‘You have just met an old friend. You know that he usually likes to have either Biryani or Mandi for his lunch, so you will invite him to your house tomorrow, but you first want to ask him if he has free time to come to eat Biryani/ Mandi; ask him ....’

EXPECTED QUESTION: *ʕindak wagit bukra tjiːʒi taːkul ʕindi birjaːni ʔaw/willa mandi* ‘Do you have free time tomorrow to come to my house to eat Biryani or Mandi?’

The researcher’s role was restricted to producing the scenarios without interfering with participants’ production. That is, participants were not given the utterances that the researcher intended to elicit. This was intended to avoid biasing what they said and how they said it. The scenarios were written and read to participants in colloquial JA. Only the researcher had access to the written text of the scenarios to minimize any potential risk of switching to MSA in case participants read them.

Gender-specific words, when read in the scenarios, were changed to fit the gender of participants. For example, the word ***ʔisʔaluh*** (ask.IMP.2MSG.NOM.3MSG.ACC ‘ask him’) was addressed to a male participant. However, it was slightly changed to ***ʔisʔaliːh(a)*** (ask.IMP.2FSG.NOM.3MSG.ACC ‘ask him’) when the participant was female. When a participant was a male, ***sˤaːħbak*** (friend.POSS.2MSG, ‘your friend’) was suitable to be read. However, when a participant was a female, a scenario containing this word was read with ***sˤaːħbiːtik*** (friend.POSS.2FSG, ‘your friend’), instead.

5.5.3 Participants

There were 18 Jordanian participants: 9 males and 9 females. All of them are speakers of Urban JA (henceforth JA). They were chosen from speakers of one JA dialect for homogeneity. All participants are of Irbidi JA, but some of them live in Zarqa city for work, study, or other purposes, and their accent is not different from that of Irbidi as they are originally from Irbid, and the two cities are Urban centres where this dialect is spoken (see the operational definition of Urban JA in Chapter 1). They were invited by the researcher or his acquaintances to participate in this study (i.e., by email, through social media or by word of mouth). None had any speech or hearing problems (see Appendix A (A.3) for the language background questionnaire).

5.5.4 Procedure

Each participant was informed of the purposes of the research and of how and where the obtained data would be stored and used. The researcher also explained how the experiment was going to be conducted, including what participants were required to do after they hear the scenarios. Ethical issues were considered in line with the ethics approval given by the university. Running the experiment was under the supervision of the researcher as the researcher is a native speaker of this dialect and in order to make sure that the environment was suitable enough for the experiment. The information sheet and the consent form were given to each participant who, in turn, was asked to read and sign them. The information sheet and the consent form along with their translations are provided in Appendix A (A.4-A.5).

Participants heard each scenario from the researcher, then they were asked to continue the dialogue that they had imagined themselves in. Then, their production was recorded. For example, they imagined that they wanted to ask a shopkeeper about the availability of any of the two items presented in the scenario in a way that elicited dynqs. Presenting participants with scenarios was on an individual basis, so each participant was recorded individually.

Other methods used in production studies by some researchers were considered but avoided. For example, the 2014 production study by Heidenreich, as summarised in Heidenreich (2019), elicited altqs and dynqs in English. She provided her participants with written altq, dynq, and declarative contexts which they were first instructed to read. Each context was designed in a way to elicit the intended utterance type. For instance, the focus in the altq context was to make participants understand that the context is intended to make the person to whom the disjunctive question is addressed choose one of the two items *X or Y*. Likewise, dynqs showed that the choice between *X* and *Y* is not important so no need to choose any of the disjuncts. Then, they were asked to read the target utterance after each context based on that context.

Heidenreich's method was not followed in this thesis for three reasons. First, JA, like other spoken Arabic dialects, has no agreed written form (Musabhien, 2008; Alzoubi, 2020) and the only written variety of Arabic is MSA. Consequently, if participants were asked to read contexts, instead of listening to them, they might tend to produce target utterances in MSA rather than in JA. The second reason for not adopting Heidenreich's method is that JA altqs and dynqs allow two disjunctive elements (i.e., *ʔaw* and *willa*), so choosing to present one of them in the written scenarios might prime participants to produce the same disjunctive element that they read. Third, given that JA is spoken and MSA is written, the difference between these varieties might also bias this study. This is because if contexts were to be presented in writing, only *ʔaw* would be chosen given that it is found in JA and MSA and given that its counterpart (i.e., *willa*) is only found in JA, not MSA. Thus, what worked for English in Heidenreich's study does not work for JA but might work for MSA, in future research.

Winans (2019) used a similar method to elicit altqs and dynqs and in order to find out which disjunctive element participants employ in EA disjunctive questions. The difference between Winans' method of collecting data and the method adopted here is that Winans presented the scenarios and then asked her participants to translate the target utterance into their dialect, which was EA in her study.

Unfortunately, Winans did not describe her methodology and participants in detail. Namely, the way in which she had presented her participants with scenarios was not explained. That is, it is unknown whether her scenarios were presented orally or in writing. Furthermore, it was not mentioned what source language the scenarios were presented in. They might have been presented in English or MSA, for instance.

Winans' methodology is not adopted here for three reasons. The first is that her methodology needs participants who master either English, if her scenarios were in English, or MSA, if scenarios were in MSA, in order to be able to translate the presented scenarios. The second is that there is a possibility that those participants might have been influenced by the source language prosodic features, leading to transferring some features into the target dialect (see Abu Helal, 1993). The third is that the dialogue completion task methodology used here was already adopted by other researchers (e.g., Frota & Prieto, 2015), so it can safely be used in this study.

5.5.4 Data Analysis

Each recorded question type was manually labelled and given a code in the long recording (‘dynq’ for a disjunctive yes-no question, ‘nynq’ for a normal yes-no question, and ‘altq’ for an alternative question). Then, individual questions were extracted from the long file using a Praat script, yielding 252 tokens. Pitch errors were all checked and corrected.

The parts of interest (i.e., the nuclear portions) of all tokens were then labelled in Praat textgrids. These are the portions of interest that bear the nuclear shape of the contour (Hellmuth, 2018). Thus, three tiers were created to label the relevant portions (i.e., *X or Y* phrase) in disjunctive questions and the last word in normal yes-no questions. The first tier was the ‘words’ tier that included the relevant words, the second tier was called ‘boundaries’ that included any possible boundary tones whether intermediate or intonational, and the last tier was called ‘prominences’ which included the letter ‘P’ on each accented word. Figures 5.20-5.22 below illustrate this point. IPrA notation labels (see Section 2.6) were used to phonologically annotate the boundaries of all elicited utterances.

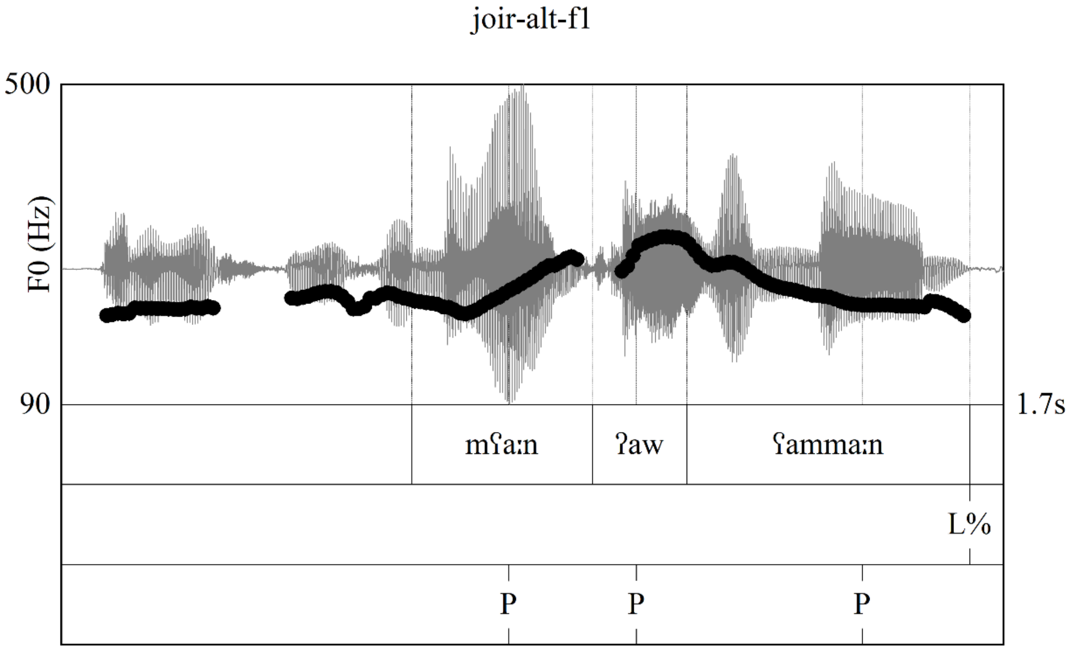


Figure 5.20. Manually corrected F0 of an altq illustrating the three tiers used in the analysis [joir-altq1-f1]. Only the *X or Y* phrase was labelled in the words tier. The question is *masmuːħli mʕaːn ʔaw ʕammaːn* 'which city am I allowed to visit: Maan or Amman?'

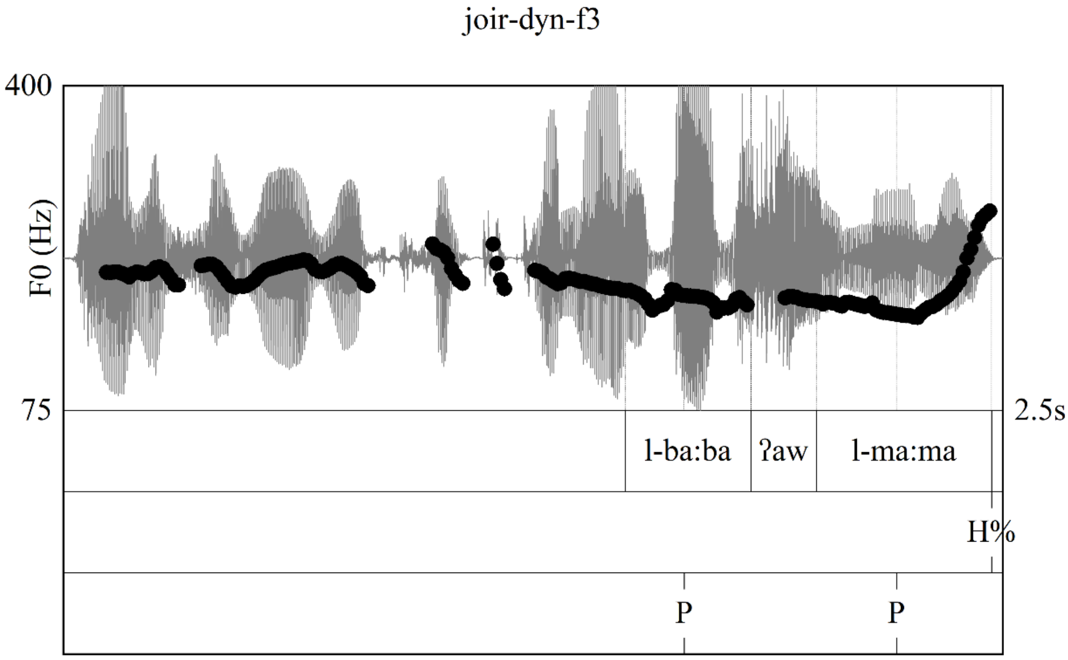


Figure 5.21. Manually corrected F0 of a dynq illustrating the three tiers used in the analysis [joir-dynq1-f3]. Only the *X or Y* phrase was labelled in the words tier. The question is *bitħib titˤlaʕ maʕ l-baːba ʔaw l-maːma* 'Do you like to go out with your dad or mum?'

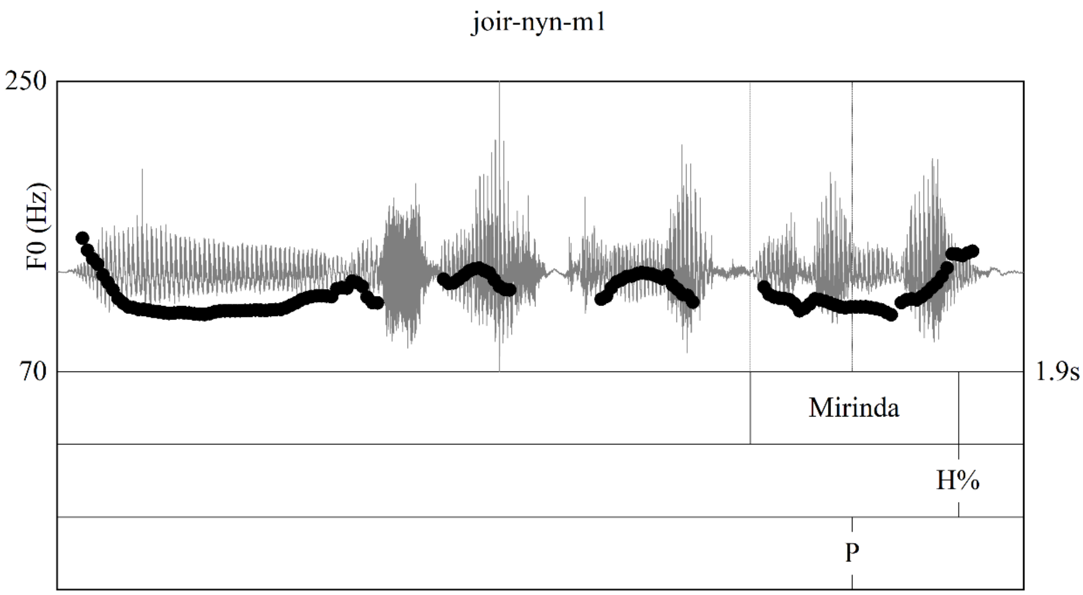


Figure 5.22. Manually corrected F0 of a normal yes-no question illustrating the three tiers used in the analysis [joir-nynq1-m1]. Only the last word was labelled in the words tier. The question is *ʕindak mirinda* ‘Do you sell Mirinda?’

In order to obtain the typical patterns in all contours of each question type, following Hellmuth (2018), all examples were plotted together after extracting the smoothed F0 points from the data using a Praat script. This, according to Hellmuth, supports "evaluation of how consistently speakers of a dialect produced similar contours for each type of question, that is, as an indication of typicality" (p. 990). These plots were generated using R software, and were plotted by question type and gender (as will be shown later).

Investigation of the prosody of the *X or Y* phrase in disjunctive questions serves three purposes. The first is to find out whether each disjunct is accented given that each disjunct was accented in altqs in JA (Al Amayreh, 1991; Hellmuth, to appear) and in MSA (El-Hassan, 1988; Al Amayreh, 1991). The disjuncts were also accented in the corpus production of this dialect. Deciding if disjuncts were accented or not was based on carefully listening to them and examining the phonetics of their F0 tracks, which was also followed by Hellmuth (to appear). If it turns out that altqs and dynqs differ in their accent distribution, then accent distribution will be included as an independent variable in the perception study as it was included in studies on English (Pruitt & Roelofsen, 2013; O’Mahony, 2014).

The second is to find out whether or not disjunctive elements are accented in altqs and dynqs based on listening to the disjunctive elements and examining their F0 tracks. They were reported to be accented in all tokens from spontaneous speech but only in half of tokens from read speech in altqs in JA (Hellmuth, to appear). They were not accented in Al Amayreh's examples of altqs and dynqs in JA. Some studies on Arabic dialects also reported that disjunctive elements may sometimes be accented (e.g., Ferguson & Ani, 1961 on SA; Soraya, 1966 on EA; Ghrefat, 2007 on Hebron Arabic). If it turns out that disjunctive questions clearly differ in accenting their disjunctive elements, then accenting of disjunctive elements could be a variable in the perception study. The third, and the most important, motivation for investigating the prosody of the disjunctive phrase in altqs and dynqs in detail is to decide on prosodic cues that should be used and manipulated in the perception study. Overall, then, the contours of the disjunctive phrases in altqs and dynqs were inspected and then compared with each other.

5.5.5 Results of the JA Production Study

The first research question in this study is about the prosodic design of the nuclear portions of dynqs, normal yes-no questions, and altqs in a dialogue completion task. The second research question is related to the choice of disjunctive element in disjunctive questions. In order to answer the questions, the *X or Y* phrases in altqs and dynqs were analysed in terms of the accent status on both disjuncts, the accent status on disjunctive elements, the presence of a boundary, the overall nuclear contour shape, and the choice of disjunctive element. For normal yes-no questions, the last words holding the nuclear contour (Hellmuth, 2018) were analysed. Table 5.4 shows that all disjuncts *X* and *Y* were accented in all tokens of disjunctive questions (N=180).

Table 5.4 *Counts and Percentages of Accented Disjuncts in all Disjunctive Questions*

	Number of accented disjuncts			
Disjunctive questions	X	%	Y	%
Altq	72	100%	72	100%
Dynq	108	100%	108	100%

Similarly, the general pattern of the accent status on disjunctive elements showed only a small difference between altqs and dynqs, as Table 5.5 illustrates.

Table 5.5 *Counts and Percentages of Accented Tokens of Disjunctive Elements*

	Accented disjunctive elements			
Disjunctive questions	*ʔaw*	%	*willa*	%
Altq	8	19%	10	34%
Dynq	7	7%	2	67%

In addition, the majority of speakers did not use boundaries, as shown in Table 5.6. The difference between the two question types is slight. Figure 5.23 shows the contour shape of tokens produced with one boundary and with two boundaries (one before the disjunctive element and one at the end of the utterance) by gender.

Table 5.6 *Counts and Percentages of Boundaries after X in X or Y*

Disjunctive questions	Number of boundaries/Disjunctive elements					
	ʔaw	%	*willa*	%	Total	%
Altq	5	7%	5	7%	10	14%
Dynq	7	7%	1	1%	8	8%

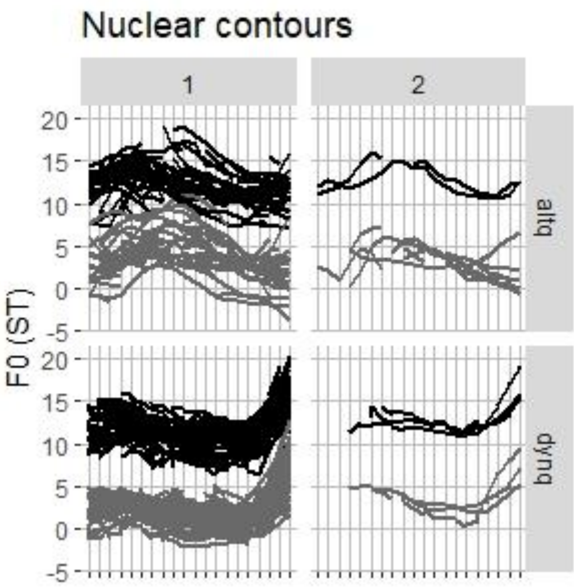


Figure 5.23. Smoothed and time-normalised F0 over the whole *X or Y* phrase in altqs and dynqs plotted by gender (grey: males; black: females), split by the number of boundaries after X: the vertical panel with number 1 refers to the last utterance boundary; the panel with 2 refers to tokens with 2 boundaries (one before the disjunctive element and one at the end of the utterance).

Figure 5.24 illustrates the general patterns observed in terms of the shape of the overall nuclear contour in dynqs, normal yes-no questions (nynqs), and altqs. Generally, the typical pattern of the overall nuclear contour shape is consistent across speakers and items for each question type.

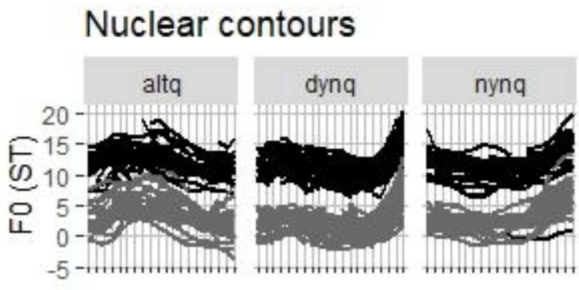


Figure 5.24. Smoothed and time-normalised F0 over the whole *X or Y* phrase in altqs and dynqs and over the last word in normal yes-no questions (nynqs) plotted by gender (grey: males; black: females).

The choice of disjunctive element shown in Table (5.7) and Figure (5.25) displays a preference for using *ʔaw* more than *willa* in both types of question. When it comes to questions with *willa*, the general tendency was to use it less frequently in dynqs. As far as questions with *ʔaw* are concerned, the clear tendency was to use *ʔaw* more in dynqs than in altqs. Thus, *ʔaw* and *willa* appeared to be used in both altqs and dynqs (though with some preferences), which answers the second research question. However, using *willa* only 3% in dynqs might suggest that this use is ungrammatical, or at least strongly dispreferred. The clear pattern here is that there seems to be a tendency to avoid *willa* in dynqs, so it might be specialised to altqs.

Table 5.7 *Counts and Percentages of the Choice of Different Disjunctive Elements*

Disjunctive questions	Choice of disjunctive elements				
	ʔaw	%	*willa*	%	Total
Altqs	43	60%	29	40%	72
Dynqs	105	97%	3	3%	108

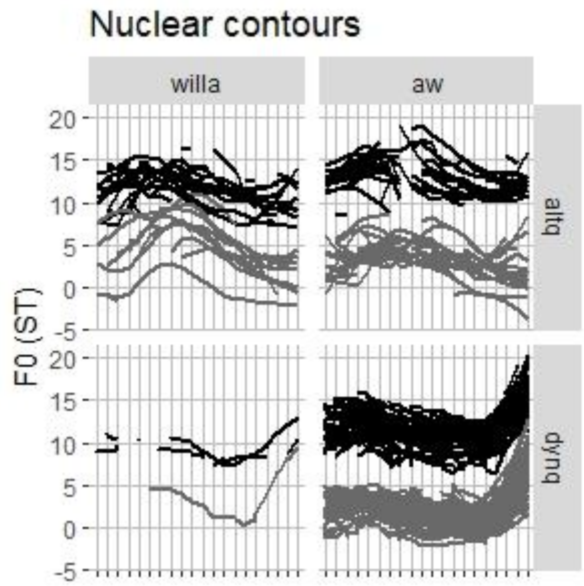


Figure 5.25. Smoothed and time-normalised F0 over the whole *X or Y* phrase in altqs and dynqs plotted by gender (grey: males; black: females), split by the choice of disjunctive element; *ʔaw* was written as *aw* because ggplot did not allow [ʔ] to appear in the plot.

In conclusion, five important general observations can be seen from the results above. First, there is no difference in the accentedness of disjuncts between disjunctive questions as all of them were accented. Second, there is very little difference in the accentedness status of disjunctive elements between the two types of disjunctive question. Third, the difference between disjunctive questions in terms of the number of boundaries after the first disjunct seems to be minor (10 in altqs and 8 in dynqs), and the majority of the tokens had no boundaries. Fourth, the typical nuclear contour shapes in dynqs, normal yes-no questions, and altqs were the late-rise, late-rise, and rise-fall, respectively in the nuclear portions. Fifth, regarding the choice of disjunctive element, *ʔaw* and *willa* were used in both types of question though there seems to be a tendency for having one of them (*ʔaw*) to be most commonly used in one type of disjunctive questions (dynqs), but there seems to be no difference in the choice of contours depending on the choice of disjunctive element. However, *willa* might be ungrammatical or at least strongly dispreferred in dynqs, given that it was used only 3% in dynqs, so JA looks like Type 2A, as will be shown in the next section.

5.5.6 Discussion of the JA Production Study

The main aim of the JA production study was to answer two research questions: one was concerned with the prosodic design of dynqs, normal yes-no questions, and altqs and one with the choice of disjunctive element in disjunctive questions. The disjunctive questions will first be discussed, and then normal yes-no questions will be referred to, as the main aim of the thesis is the description of disjunctive questions. Answering the questions necessitates exploring the *X or Y* phrases in terms of the accent status on both disjuncts, the accent status on disjunctive elements, the presence of a boundary, the overall nuclear contour shape, and the choice of disjunctive element. That is, in altqs and dynqs, the *X or Y* phrases were thoroughly investigated in order to reach solid conclusions on what might distinguish altqs and dynqs from each other. The cues that turn out to distinguish them will be the independent variables in the perception studies in the following chapters.

In terms of the presence or absence of pitch accents on disjuncts, the results (Table 5.4) clearly showed that both disjuncts were always accented in all tokens of altqs and dynqs. This similarity in accenting of disjuncts in both types of disjunctive question suggests that this variable might have no role in disambiguating altqs and dynqs, meaning that it should be excluded from the perception study. Accenting both disjuncts also does not guarantee an altq reading in other languages, such as English (Bartels, 2013).

The fact that the disjuncts were accented is similar to what Hellmuth (to appear) reported for JA and to the examples given by Al Amayreh (1991). This finding is also similar to the 60 tokens of the disjunctive utterance in the corpus-based production investigation (Section 5.4). This differs from other languages such as English and Hindi-Urdu as dynqs in those languages typically have a single accent which is the nucleus of the intonational phrase while altqs have both disjuncts accented (Pruitt & Roelofsen, 2013; Bhatt & Dayal, 2020, etc.).

The fact that altqs had multiple accents on each of the *X* and *Y* in English and Arabic (see, for more information, Al Amayreh, 1991; El-Hassan, 1988; Cowell, 2005; Pruitt & Roelofsen, 2013) might be because the relationship between the two alternatives is contrastive (Pruitt, 2008a).

As for accentuation of disjunctive elements, the results in Table 5.5 suggested that the difference between disjunctive questions is slight. The most frequently used disjunctive element in disjunctive questions (i.e., *ʔaw*) was accented only 8 times (19%) in altqs and 7 times (7%) in dynqs, suggesting that this factor is not worth including in the perception study as an independent variable. An apparent difference is found in the numbers of accented *willa* in disjunctive questions: 10 (34%) times and 2 (67%) times in altqs and dynqs, respectively. This difference is not considered important because *willa* was used only 3 times in dynqs overall.

The fact that the majority of altqs and dynqs had unaccented disjunctive elements is consistent with Al Amayreh's (1991) example of each type of these questions in JA. He had unaccented disjunctive elements in his example of altqs and dynqs. This is further support for the decision taken not to include this cue as an independent variable in the perception study. In addition, having some disjunctive elements accented and others unaccented in altqs matches Hellmuth's (to appear) observation for JA that some of the tokens had their disjunctive elements accented and some did not, in read speech data. However, this is not in line with her observation in spontaneous data where all tokens had their disjunctive elements accented. Overall, Hellmuth's observation supports the argument for excluding the accent status of disjunctive elements from the perception study because, as this observation and as the dialogue completion task suggested, altqs in JA had no fixed pattern regarding accenting their disjunctive elements. Therefore, this is not considered a reliable variable to be used in a study on which cues disambiguate altqs and dynqs. The result that the disjunctive elements might sometimes get accented and sometimes not is also in tune with Ferguson and Ani's (1961) explanation of disjunctive questions in SA.

The presence of boundaries in altqs and dynqs was also investigated as a possible disambiguating cue to be included in the perception experiment. Figure 5.23 and Table 5.6 showed that the majority of altqs and dynqs did not have boundaries after *X* (i.e., before disjunctive elements) in the *X or Y* phrase. There were only 10 in altqs and 8 in dynqs. In fact, 3 out of the 10 in altqs were produced by the same participant (m5), which might be a personal characteristic to have a tendency for using boundaries. Likewise, 2 out of the 10 in altqs were produced by a specific participant (m2) who also produced 2 out of the 8 in dynqs, so it might be related to his style of speech. Participant (f8) also produced 2 out of 8 occurrences of boundaries in dynqs. In general, the difference between the two question types was not large, so the presence or absence of boundaries after the first disjunct *X* might not be the crucial cue distinguishing the two question types. What further supports this conclusion is that Al Amayreh's (1991) examples of altqs and dynqs included boundaries after *X*, suggesting that the presence of such a boundary is not what distinguishes these questions. Additionally, other studies on altqs in JA (Hellmuth, 2018; Hellmuth, to appear) did not mention the presence or absence of boundaries in their data. Based on all of the above points, it might make sense not to include the boundary as an independent variable in the perception study (Chapter 6).

In terms of the overall contour, Figure 5.24 clearly showed that the overall contours used in each type of disjunctive question were parallel although there were some outlier contours. The majority of altqs were produced with a rise-fall contour over the *X or Y* phrase with some exceptions (N= 8) who produced the contour with a late rise. This contour shape is similar to that observed in Al Amayreh's examples, who used the mid-fall, and to that found in the disjunctive tokens classified as altqs in the corpus production of this dialect. This contour shape was also observed by Hellmuth (2018) who reported that altqs in JA had a rise fall. Those who produced the nuclear contour with a late rise may have misinterpreted the scenarios as dynqs or they might be affected by the other languages they master such as *f4* who speaks four languages: Arabic, English, German, and Japanese. The perception study in the next chapter will show whether or not it is possible to get an altq interpretation with a late rise or a rise fall.

For dynqs, the overall shape of their nuclear contour as shown in Figure 5.24 is a late rise, which is also in keeping with Al Amayreh's rising (HR) example of dynqs and with Hellmuth's observation of yes-no questions in the same dialect. It is also similar to the contour shape of the disjunctive tokens classified as dynqs in the corpus production of this dialect. The same contour was observed in many languages as reported by Edith (1971) who also noted that Hermann (1942) suggested that this contour is universal when exploring 100 languages. This contour shape suggests that the choice of contour is a key difference between altqs and dynqs, making contour choice one of the independent variables in the perception study in the next chapter.

With regards to the choice of disjunctive element in disjunctive questions, the findings (Table 5.7 and Figure 5.25) showed that *ʔaw* was used in the two question types more often than *willa*. As for disjunctive questions with *ʔaw*, *ʔaw* appeared more in dynqs (105 in dynqs vs. 43 in altqs). With respect to disjunctive questions with *willa*, this disjunctive element was used more in altqs than in dynqs (29 in altqs vs. 3 in dynqs). Given that *willa* is strongly dispreferred in dynqs (only 3%) and given that it shows a clear pattern of specialisation, this disjunctive element might be ungrammatical in dynqs. Therefore, a prediction might be that JA might belong to Type 2A, i.e., to dialects which might have a preference to have one general disjunctive element and one specialised. The general disjunctive element might be *ʔaw* (both altqs and dynqs) and the specialised one might be *willa* (only altqs). This classification, based on the experimental evidence, is in keeping with the researcher's preliminary classification of JA, based on native intuitions, as Type 2A in Chapter 4.

Although *willa* was rarely used in dynqs in the production study results, the fact that it appeared in the two types of disjunctive question is consistent with the examples of these questions in Al Amayreh (1991) and with the 24 JA tokens (and 60 tokens of four dialects) from the corpus production, which used *willa* in both types of disjunctive question. The interesting result is the appearance of *ʔaw* in both types of disjunctive question in the dialogue completion task data though it was not found in the text corpus search for JA (Chapter 4), especially in disjunctive questions. One explanation of this might be because the contexts in the dialogue completion task were carefully designed to elicit larger numbers of disjunctive questions with the equivalent to the English *or* while the corpus had more varied data designed to elicit different types of utterances. In other words, the corpus was not particularly designed to elicit disjunctive questions.

Normal yes-no questions were included in the dialogue completion task only to find out whether their contour shape is similar to that of dynqs and to serve as fillers when presenting scenarios. The results (Figure 5.24) clearly suggested that they had a late-rise contour shape, which typically, but not always, starts at or near the last syllable. This is in line with other studies on the shape of the contour of normal yes-no questions in JA (Rammuny, 1989; El-Hassan 1990; Al Amayreh, 1991; Al Huneety 2015; Hellmuth, 2018). This is also in keeping with other studies reporting the same typical intonational contours of normal yes-no questions in many languages, English, and Arabic (Ultan 1969; Edith, 1971; Quirk et al., 1985; El-Hassan, 1988; de Jong & Zawaydeh, 1999; Kulk et al., 2003; Pruitt, 2007; Pruitt, 2008a; Pruitt, 2008b; Pruitt & Roelofsen, 2013; Dayal, 2016, Almalki & Morrill, 2016; Hellmuth, 2018, Hellmuth, to appear, etc.) with some exceptions. Moroccan Arabic (Benkirane, 1998; Hellmuth, 2018), Sanʕaani Arabic (Hellmuth, 2014), Tunisian Arabic (in one specific region, see Bouchhioua, Hellmuth, & Almbark, 2019), and Jizani Arabic (for only some Jizani people, see Alzamil & Hellmuth, 2020) were reported to have a rise-fall intonational pattern. One JA variety spoken in Wadi Rum (Al Mashaqba, 2015) also exhibits a falling contour. Nevertheless, this contradiction is permitted because the dialect that Al Mashaqba referred to is not urban.

This study has thus provided evidence from newly collected production data that the overall nuclear contour of normal yes-no questions with a late rise at the end is similar to the contour of dynqs in this dialect, proving that dynqs are a type of yes-no questions. This finding matches the fact that Al Amayreh (1991) annotated intonationally normal yes-no questions and dynqs using the same notations, indicating that they bear the same contour shape. This finding is also consistent with Winans's (2019) observation for EA that dynqs with *ʔaw* are considered yes-no questions based on the similarity of intonational patterns of her dynqs with normal yes-no questions.

5.6 General Summary and Conclusion

In this chapter, the prosodic design of *X or Y* phrases in disjunctive questions was thoroughly explored in two production studies: 1) a corpus production study on JA, EA, KA, and SA and 2) a production study on JA. The corpus study showed that 48 disjunctive utterance tokens in the three dialects (JA, EA, and KA) displayed two patterns: late-rise vs. rise-fall. SA tokens had a rise fall. It was assumed that the versions with a late rise are dynqs, and those with a rise fall are altqs, which turned out to be similar to the researcher's first intuition. All 60 versions had both their *X* and *Y* disjuncts accented and used the same disjunctive element *willa*.

In the JA production study, the nuclear portions of dynqs, normal yes-no questions, and altqs were thoroughly explored using data elicited using a dialogue completion task. In disjunctive questions, the *X or Y* phrases were analysed with respect to the accent status on both disjuncts, the accent status on disjunctive elements, the presence of a boundary, the overall nuclear contour shape, and the choice of disjunctive element. There was no difference in terms of the accentuation of disjuncts between altqs and dynqs because all their disjuncts were accented. The same conclusion was drawn on the accentuation of disjunctive elements and the presence of boundaries as the difference between altqs and dynqs was slight. So, these cues will not be included in the next perception study.

The two remaining variables were the choice of contour shape and the choice of disjunctive element. It turned out that the effect for the choice of contour shape was clear; the majority of altqs had an overall rise-fall pattern while all dynqs had a late rise at the end, which is similar to the contours observed in the disjunctive utterance corpus data. The choice of disjunctive element might also have an effect on questions with *willa* as this disjunctive element was strongly dispreferred in dynqs, so it might or might not outweigh the choice of contour in those questions. Including *willa* in the perception study will also find out whether or not listeners will accept it in dynqs, as mixing *willa* with the intonation of yes-no questions will create a mismatch condition. Listeners' answers will also show whether this mismatch is grammatical or not.

As a result, it might be worth investigating both cues (the choice of contour shape and the choice of disjunctive element) in the JA perception study (Chapter 6). The perception study will test the relative contribution of these cues and will find out which of them is more important than the other or at least which of them increases the responses to one type of question over the other. It will also find out whether dynqs with *willa* are possible in this dialect because only a few examples of this question type were found in the dialogue completion task. The prediction is that *willa* may somewhat decrease dynq responses and sway the interpretation towards altqs.

Normal yes-no questions were included in the dialogue completion task as distractors to separate dynqs from altqs when presented. Participants produced them with a late rise, confirming their contour similarity to the dynq contour.

The perception study (Experiment 1) in the next chapter will be a near replication of Pruitt and Roelofsen's (2013) study on English given that Arabic and English, as the dialogue completion task showed, have different prosodic variables that might distinguish altqs and dynqs. Pruitt and Roelofsen manipulated the distribution of accents on both disjuncts as disjuncts in altqs in the literature are accented, but only a single disjunct is accented in dynqs in English. So, it was worth including this variable in their study. However, the literature for JA (e.g., Al Amayreh's examples), the 24 disjunctive utterance tokens from the corpus data, and the dialogue completion task results above all clearly showed that both disjuncts were equally accented in altqs and dynqs. This suggests that the distribution of accents on disjuncts is not an important one in Arabic. Hence, this variable will not be included in the perception study.

The fact that contrasted disjuncts in the dialogue completion task are all accented might be attributed to two reasons. Firstly, they are lexical words, which are often reported to be always accented in Arabic in general (Mitchell, 1993), and in Hijazi Arabic (Alzaidi, 2014), JA (Al-Shawashreh, Jarrah, Al-Omari, & Al-Deaibes, 2019), Yazouri Arabic (Katanani, 2002), EA (Hellmuth, 2006; Hellmuth, 2020), and Emirati Arabic (Blodgett, Owens, & Rockwood, 2007). Secondly, the relationship between *X* and *Y* is contrastive as it is in

English altqs (Pruitt, 2008a). Overall though, because there is no difference between altqs and dynqs in the distribution of accents, this cue is not worth including in the perception study (Experiment 1) next chapter.

The next chapter will build on the findings of the analysis of the *X or Y* phrases of disjunctive tokens (the corpus production) and the dialogue completion task (the JA production) by designing a perception study with two independent variables: the choice of overall nuclear contour shape (rise-fall vs. late-rise) and the choice of disjunctive element (*willa* vs. *ʔaw*). This perception study will be designed with the prediction that JA is a Type 2A dialect, based on the experimental evidence showing that *willa* might not be preferred in dynqs. This design means that a mismatch condition is expected to emerge when mixing the dynq contour (late-rise) with the disjunctive element that is not preferred in dynqs (*willa*). Thus, the experiment will show whether this mismatch condition is grammatical or not in JA. Another aim of the perception study (Experiment 1) is to confirm the relative contribution of the two cues (choice of contour and choice of disjunctive element) to the task of perceptually disambiguating altqs and dynqs in JA. This experiment will also be replicated in Experiment 2 (Chapter 7) on the other Arabic dialects reviewed in this chapter and from which the disjunctive tokens were analysed (i.e., JA, EA, KA, and SA). Both Experiment 1 and Experiment 2 in the next two chapters are replications of Pruitt and Roelofsen's (2013) English experiment but with two differences: the independent variables in Experiment 1 and Experiment 2 are those that are related to Arabic, based on the two production studies in this chapter, and the on-screen responses are only two, not three as they were in the English study (more details on this point will follow in the next chapter).

6 The First JA Perception Experiment (Experiment 1)

6.0 Aim and Outline of the Chapter

At the beginning of the previous chapter, it was explicitly indicated that the JA production study (i.e., the dialogue completion task) aimed to provide prosodic and lexical descriptions of alternative questions (altqs), normal yes-no questions, and disjunctive yes-no questions (dynqs) in JA and to find out which of these characteristics may disambiguate disjunctive questions (altqs and dynqs). Two differences between altqs and dynqs were found, from the two production studies in the previous chapter: the choice of contour and the choice of disjunctive element. The next step is to explore the relative contribution of each of these differences to the task of disambiguating these questions. The cues found in the previous chapter will be used as independent variables in a perception study (Experiment 1). Testing participants' interpretation can lead to solid conclusions about the extent to which these two cues might be decisive in distinguishing between these question types, deciding on the status as an altq or a dynq. Then, in the next chapter (Chapter 7) the perception experiment, with slight changes in the design, will be replicated (Experiment 2) on the four Arabic dialects of interest.

Section 6.1 revisits the debate for English about which prosodic cue is decisive in distinguishing altqs and dynqs and reviews studies that used perception experiments to contribute to this debate. Section 6.2 lists the research questions that will be addressed using this perception study, followed by some related hypotheses. Section 6.3 sets out the materials, participants, and procedures in the perception study. It also includes a section explaining the statistical analysis used. Sections 6.4 and 6.5 report and discuss the findings of the perception study. Section 6.6 presents a summary of the chapter.

6.1 The Situation in English and Review of English Perception Studies

The prosodic characteristics of altqs and dynqs in English have been known in the literature for some time. Although these characteristics were first based on researchers' intuitions, not on experimental studies (Heidenreich, 2019), they were used in some studies to better understand which of them may help disambiguate both types of disjunctive question (altqs and dynqs).

The issue of finding which prosodic cue might help resolve the ambiguity between the two types of disjunctive question provoked lively debate in the literature on these types of question in English. Most of the disagreement is centred on the prosodic features of the final disjunctive phrase *X or Y*. More precisely, some studies (e.g., Quirk, Greenbaum, Leech, & Svartvik, 1985; Aloni & van Rooy, 2002; Han & Romero, 2004; Beck & Kim, 2006; Truckenbrodt, 2013, etc.) suggested that both *X* and *Y* (i.e., the disjuncts or the constituents) are accented in altqs, and that is important in leading listeners or interlocutors to interpret what they hear as an altq, not as a dynq. That is, they highlighted the role of the distribution of accents.

However, other studies (see, for instance, Schubiger, 1958; Pruitt, 2008a; Pruitt, 2008b) placed more importance on the shape of the final nuclear contour. The role of the final contour was also insisted on in Pruitt and Roelofsen (2013) though they did not deny the role that the distribution of accents and the presence of a prosodic break might play. The distribution of accents alone, according to their study, will not make listeners interpret an utterance as an altq or a dynq. Similarly, Bartels (2013) referred to the free choice of either accenting or deaccenting the constituents *X* and *Y* in dynqs, suggesting that this is optional. Thus, accenting disjuncts is not per se sufficient to derive an altq reading instead of a dynq reading. Other researchers (e.g., Pruitt & Roelofsen, 2013; O'Mahony, 2014) stressed the importance of both prosodic features in English (final contour vs. distribution of accents).

The debate is still ongoing as which of the prosodic features is the most important. Dayal (2016), for instance, reported that there is an ongoing disagreement about the determining cues that help distinguish the two types of disjunctive questions. Consequently, she referred to three cues, namely, the distribution of accents on disjuncts, the break between the disjuncts, and the shape of final contours. She affirmed that all of them are cross-linguistically important. The remainder of this section presents, in detail, key studies that experimentally tested these prosodic features via perception studies.

Pruitt and Roelofsen (2013) reported that it is commonly known from the literature that the distribution of accents on the disjuncts in disjunctive questions is responsible for disambiguating these identically-formed questions. Nevertheless, they challenged this idea by designing a perception study to test the effects of both the distribution of accents and the final pitch contour on distinguishing these two types of disjunctive question. More specifically, they sought to point to the exact disambiguating prosodic cue. They employed the rather loose term “accentual characteristics” (p. 636) to refer to the presence or absence of accents on both *X* and *Y* in the *X or Y* phrase as well as to the prosodic break separating them.

Participants in their perception study were 37 Americans who were still in their undergraduate studies. They were divided into four groups. The first and the second groups had 9 participants each. The third had 11 and the fourth had 8 participants.

In addition, there were four sets of stimuli. Each set had 6 lexically distinct questions recorded in four conditions. Thus, there were 24 tokens in each set, but each group of participants listened only to one condition in each set (i.e., only to 6 tokens). Each group of participants was distributed to all four sets, so the total number of the target tokens each group listened to was 24 (6 tokens in each of the four sets). So, each group of participants listened to 6 tokens of the same condition in each of the four sets. No participant listened to more than one condition in one set, which is a Latin square design. The four conditions in their study were as follows:

1. A typical altq contour: final falling contour with accented *X* and *Y* as well as a break separating them[96]

2. A typical dynq contour: it is a final rising contour with a single accent on the final disjunct, and no prosodic break between the *X* and *Y*. This contour, they added, is the same as that of normal yes-no questions.

3. A manipulated altq contour: it is the final rising contour created by cutting the final words that have the final rising intonational contour on them from the typical dynq equivalent, splicing them into the file, in the place of the final words that have the final falling contour in the typical altqs. That is, as Pruitt and Roelofsen (2013) put it:

> “the group of words pronounced with the final fall (H* L-L%) was cut out of each alternative question recording and replaced with the equivalent word group of its yes/no question counterpart, which showed the opposite final contour (L* H-H%)”. (p. 638)

[96] Pruitt and Roelofsen used M↓ and M↑ to refer to the contours in 1 and 3 above, respectively. Here, **M** refers to the fact that accents on the disjuncts are multiple. They also used S↑ and S↓ to refer to 2 and 4 above. The **S** in these contours were used to refer to the nucleus (i.e., sentence accent).

This contour retains the doubly accented disjuncts, with a prosodic break between them.

4. A manipulated dynq contour: it is the final falling contour created in the same way as for the previous contour in (3). That is, the final words that have the final fall from the typical altqs were exchanged with the final words that have the final rising contour from the typical dynqs. So, this falling intonational contour is accompanied by a single accent which is the nucleus and without any pause of any kind separating the *X* and *Y* disjuncts.

Thus, the first two contours are referred to as the canonical ones of disjunctive questions while the others are not (Pruitt & Roelofsen, 2013).

Participants were asked to listen to four conditions: one in each of the four sets of stimuli. Each participant listened to the 24 tokens interspersed with 36 different types of fillers in a distraction-free (i.e., quiet) place using the laptop speakers. The total number of the items presented to each group of participants was 60.

The researchers provided each group of participants with paraphrases of each target token, so that they could directly select from. Two paraphrases were provided as well as the word *other* as a third option. Participants could suggest an alternative paraphrase of what they heard if they choose the *other* option as shown in (6.1) below (p. 640):

(6.1) a. Which of these things did Sally do: bring wine or bake a dessert?
b. Did Sally do any of these things: bring wine or bake a dessert?
c. Other____

In their example, (a) is a paraphrase of an altq reading while (b) is of a dynq reading. Option (c) was provided so participants could write their interpretation of what they listened to.

In the context of their study, if the distribution of disjunct accents was the most important prosodic cue for disambiguating altqs and dynqs, this could mean that M↑ tokens (i.e., with a rising contour and multiply accented disjuncts plus a break) would not be perceived as dynqs though they end with a rise. Similarly, the S↓ would most often be interpreted as dynqs given that they have only one accent. Their results indicated that the “M contours paraphrased as alternative questions significantly more often than the S contours (54% and 46%, respectively" (p. 643), meaning that accent distribution was important in disambiguating both types of question.

Pruitt and Roelofsen's results, therefore, suggest that the distribution of accents contributed to the disambiguation process but was not, alone, sufficient to derive an altq reading. This contradicts their hypothesis that multiply accented disjuncts alone would lead to an altq reading. They concluded that the final intonational patterns employed in their study were more important than any other prosodic patterns, such as accent distribution, as tokens with falling contours were most of the time chosen to represent listeners' understanding of altqs. However, this did not mean there was no effect of accent distribution. Indeed, their experiment contradicted Bartel's (1999) assertion that a final fall with unaccented disjuncts (i.e., the condition that Pruitt & Roelofsen referred to as S↓) cannot receive altq readings. In Pruitt and Roelofsen's study, this condition received 82% altq readings.

Both accent distribution and the choice of final contour, therefore, were important in their experiment. Thus, they criticized other theories that depended only on one prosodic cue to help disambiguate disjunctive questions, proposing instead a theory that stipulates that altq readings can be forced by two integral elements: accenting *X* and *Y* and a final falling intonational pattern.

A more persuasive study would not include accents on disjuncts as well as prosodic breaks separating them in one loose term which is 'accentual characteristics.' That is, the study might have been more accurate if a prosodic break had been treated as a separate variable.

There is a potential issue with the experimental stimuli in Pruitt and Roelofsen's study. When describing the accent distribution on disjuncts, they defined the terms *multiple* and *single*: *multiple* refers to the presence of two accents on both *X* and *Y* in the *X or Y* phrase in altqs whereas *single* refers to the presence of a single accent in the *X or Y* phrase in dynqs. The single accent is the sentence stress. However, they provided at least one example[97] of dynqs in which both *X* and *Y* were accented, so it is not warranted to report that dynqs have a single accent, when this case has two (i.e., *multiple*). They acknowledged that they had made every effort not to accent the *X* constituents in dynqs in a significant way, but they admitted that L* appeared in longer *X* constituents even though they described it as non-prominent. So, this indicates that in some of their dynqs, both the *X* and the *Y* were accented, whether

[97] Interested readers are referred to Example (8) in Pruitt and Roelofsen's paper (p. 638).

prominently or not, even though they described dynqs as having a single accent. Their dynqs were subsequently tested and manipulated based on the assumption that they had a single accent. Consequently, some of their stimuli might have two accents but might have been treated in their experiment as having a single accent, which might have influenced the results of their study.

Contrary to Pruitt and Roelofsen's findings, O'Mahony (2014) reached different conclusions when conducting a somewhat similar perception study. She referred, similarly, to the complexity of this phenomenon in English. Then, she sought to find out which prosodic features could disambiguate the two types of disjunctive question. She conducted a perception experiment in which participants were asked to identify the tokens they heard either as altqs or as dynqs. She presented tokens with and without pauses between disjuncts in order gauge the effect of prosodic phrasing in the disambiguation process, an effect which, according to O'Mahony, was ignored as a separate variable in Pruitt and Roelofsen's study.

O'Mahony had 20 English-speaking participants from various English-speaking countries: three from South Africa, seven from the US, eight from the UK, and two from Australia. She did not invite any participants from Scotland or Ireland because, as she noted, they use rising intonation in declarative sentences. Each participant was asked to listen to 65 tokens using headphones. The tokens included twenty distractors as well as five control disjunctive questions that were not manipulated. The remaining 40 were the target tokens. After each trial, the screen displayed two possible options for participants to select from. One of the choices was yes/no, and the other choice had the *X* and *Y* alternatives that they had heard, separated by slashes without mentioning the disjunctive element (e.g., *X*/*Y*). Thus, the answers represented the altq and dynq readings. The set of tokens was played again to each new listener, with randomisation.

O'Mahony indicated that the distribution of accents (accents on both disjuncts in altqs and dynqs) and the prosodic boundary between them were what disambiguated altqs from dynqs. Nevertheless, she stated that one cannot generalize as to which cue best disambiguated them. She suggested that the distribution of accents and the prosodic boundary might be deciding factors only when the disjuncts are not positioned at the end of the question. In cases when the disjuncts are placed at the end of questions, then it is the final intonational contour which removes this ambiguity. The findings also showed that the break insertion between disjuncts is an important factor that helped disambiguate the two types of question, as an altq reading is preferred with insertion. O'Mahony concluded that accent status, final intonational contours, and prosodic breaks are all of paramount importance, but she suggested contexts in which each factor plays a more significant role. Like Pruitt and Roelofsen (2013), she also criticized semantic approaches that refer only to one disambiguating factor, and she, further, added that semanticists studying these questions have tended to rely on their intuitions instead of providing experimental proof. Those approaches, according to her, may stem from a lack of phonetic knowledge. Finally, she referred to the likelihood of inter-participant differences, so she recommended that more studies taking such differences into account should be conducted.

Although O'Mahony's study might be the first that investigated disjunctive questions across different English dialects, its findings, unfortunately, cannot be generalized to all these English dialects. The findings also cannot be generalized to any individual dialect because the number of participants from each dialect was small. However, using slashes between disjuncts (e.g., *X*/*Y*) has informed the design of the perception studies in this thesis, so the dynq paraphrases in Experiment 1 will use slashes (see 6.3.3 for more details).

Another study which investigated perceptually disjunctive questions was by Heidenreich (2019) whose aim was to find out the effect of inserting *either* into a disjunctive question. Some semantic researchers, as she reported, thought that this insertion forces the disjunctive question to be interpreted as a dynq rather than as an altq. In other words, *either* is not allowed to occur in altqs. Another aim was to test the acceptability of some answers to both altqs and dynqs in light of what is already known in the literature. Ninety-three participants were recruited via Amazon Mechanical Turk, and they were asked to listen to seventy-two questions with their answers (48 target tokens and 24 fillers).

Two intonational patterns were used in the stimuli. The first was the altq intonational pattern with a high boundary (i.e., a rise) at the end of *X* and a low boundary at the end of *Y* in the *X or Y* phrase. The second was the dynq intonational pattern with a high rise at the end (i.e., H-H%). Thus, mixing the intonational patterns with and without *either* insertion resulted in four tokens of each target lexical item (i.e., dynqs (one with *either* and one without it) and altqs (one with *either* and one without it) as shown in example (6.2) below).

In order to test the acceptability of the disjunctive questions and their accompanying answers, participants judged this combination on a 7-point scale (from least acceptable to most acceptable). There were four experimental answer conditions: a falling *X* or a falling *Y* (6.2a), a rising *X* or a rising *Y* (6.2b),[98] a yes with a falling *X* or a falling *Y* (6.2c), and a cleft answer (6.2d). Only one of these answer condition appeared with each disjunctive question. The following is an example of one of the stimuli (p. 294):

(6.2) Did William send (either) an email or a letter?

a. He sent a letter (fall)
b. He sent a letter (rise)
c. Yes, he sent a letter
d. It was a letter.

There were 72 tokens (48 target tokens and 24 distractors) participants heard. The position of the *X or Y* phrases was varied across three different locations: beginning, middle, and final in the disjunctive question. This was to investigate the influence of the position of the *X or Y* phrase on the acceptability of the stimuli, if any.

Heidenreich's findings showed that the assumption that *either* can never be acceptable in altqs is incorrect, as altq stimuli (i.e., having the intonational pattern of altqs) containing this word were judged as acceptable by participants. So, Heidenreich found that *either* was acceptable in both types of disjunctive question, and that intonation was what disambiguated them semantically. Thus, the only difference that *either* may have brought about was widening the array of acceptable answers to both altqs and dynqs. That is, a disjunctive question with an altq intonation and with *either* made answers like (b) and (c) in the example above acceptable, and a disjunctive question with a dynq contour and with *either* also made an answer like (d) above more acceptable.

The findings also showed that the acceptability judgment of stimuli (disjunctive questions along with their answers) was influenced by the position of the *X or Y*. The least acceptable combination of disjunctive questions and their answers was in places where the phrase was in medial position. Findings indicated a preference for having the phrase in disjunctive question-final position, implying that perception studies placing the *X or Y* phrases in sentence-final positions might be more acceptable. This provides support for having the *X or*

[98] This is a continuation rise, according to Heidenreich.

Y phrases in this thesis placed in the final position, which was also followed in Pruitt and Roelofsen's (2013) study replicated here.

In terms of the prosody used in disjunctive questions and the answers, no detailed prosodic descriptions were provided. That is, it might have been better if the methods had included more prosodic details like providing some contour plots of the stimuli recorded.

Finally, reviewing the English perception studies in this section has contributed to the design of the Arabic perception studies (Chapter 6 & Chapter 7). This review helped explore the different methods other researchers used in investigating the relative contribution of the disambiguating cues of altqs and dynqs. In addition, as shown in the previous chapter, there were no perception studies on what disambiguates altqs and dynqs in Arabic. Thus, the literature reviewed here helped the researcher make informed decisions in the design of the perception studies. One of these decisions is to replicate Pruitt and Roelofsen's (2013) English study on Arabic but using only two responses, which was observed in O'Mahony's (2014) study. Another decision is to separate the *X* and *Y* disjuncts with slashes, as is the case in O'Mahony's study. Such decisions will be further justified later on.

6.2 Research Question

Chapter 4 (Section 4.1), based on the literature review, suggested that Arabic dialects might fall into three types: Type 1 (a tendency in which both disjunctive elements might be specialised to one question type), Type 2 (a tendency in which one disjunctive element might be specialised and one might be general), and Type 3 (a tendency in which both disjunctive elements might be general). However, it showed that it is difficult to fit all dialects (e.g., JA) into these types based only on a few available studies. Hence, the second part of that chapter was a corpus search. The search concluded by suggesting that the JA, EA, KA, and SA pictures are complex and still unclear due to the small data points available in the corpus and due to some conflicting descriptions of the use of disjunctive elements in some dialects (e.g., EA). However, the corpus search showed that the general pattern in JA is a tendency to use *willa* less frequently in dynqs and more frequently in altqs. The researcher's native intuition in Chapter 4 was that JA might be a Type 2A dialect. Therefore, more experimental evidence needs to be provided so that the full picture for JA can be understood, especially in terms of the prosody of spoken data as the corpus data analysed were only written data.

Based on this, one of the findings shown in Chapter 5 (the JA production study) confirmed what was expected from the corpus chapter by showing that the tendency in JA was to use *willa* more in altqs than in dynqs. The findings also showed that JA used *ʔaw* in both types of question, suggesting that JA belongs to Type 2A.

Based on the results of the JA production study (the dialogue completion task) in Chapter 5, one variable that might be a key determiner of the status as an altq or a dynq might be the contour shape. The results of the JA production study also showed that one of the disjunctive elements (i.e., *willa*) was used most of the time in one type of question (i.e., in altqs), suggesting that the choice of disjunctive element might also contribute to deciding the type of question. Hence, the perception study will be an attempt to answer the following main research question:

i) What is the relative contribution of the two cues: the choice of contour (late-rise vs. rise-fall) and the choice of disjunctive element (*ʔaw* vs. *willa*) to the disambiguation of altqs and dynqs in JA?

This study will test the following hypotheses:

1. Based on the JA production study results, it is expected that the choice of the overall nuclear contour shapes will contribute to the disambiguation of disjunctive questions in JA by changing the interpretation of a disjunctive question from an altq into a dynq or vice versa. This hypothesis is divided into the following:

a. It is expected that tokens with a late-rise nuclear contour will receive more dynq responses than tokens with a rise-fall nuclear contour.

b. It is expected that tokens with a rise-fall nuclear contour will receive more altq responses than tokens with a late-rise nuclear contour.

2. Based on the occurrences of disjunctive elements in disjunctive questions produced in the JA production study, it is hypothesised that the choice of disjunctive element will also play a role in determining the status either as an altq or as a dynq. That is, it is more likely that questions with *willa* may be interpreted as dynqs less frequently than questions with *ʔaw*.

3. It is hypothesized that the contour shape will be the deciding, hence the most important, cue in disambiguating disjunctive questions in JA as altqs and yes-no questions were reported in the literature to have two different contour shapes: rise-fall and late-rise, respectively.

The findings from the text corpus chapter (Chapter 4) and the findings from the JA production study (Chapter 5) contained very few examples of *willa* employed in dynqs. Hence, it is expected that there might be a conflict (i.e., a mismatch condition) between the shape of the contour and the choice of disjunctive element in tokens with *willa* in dynqs. The mismatch condition is, thus, *willa* with late-rise. That is, it is expected that the use of *willa* will push listeners to interpret tokens with a late rise more as altqs whereas the late-rise contour will push them to interpret the same tokens more as dynqs. Which of these readings is most probable is not yet experimentally known as examples of *willa* in dynqs were few in both the corpus search (only 2) and the JA production study (only 3). Table 6.1 displays the expected answers to each experimental condition and to the mismatch condition.

Table 6.1 *Expected Answers Based on the Two Cues in Experiment 1*

Choice of Contours	**Choice of Disjunctive Elements**	
	ʔaw	***Willa***
Late-rise	**dynqs**	**?**
Rise-fall	**altqs**	**Altqs**

6.3 Materials, Participants, Procedures, and Statistical Analysis

6.3.1 Materials

The design of this study was first inspired by Pruitt and Roelofsen's (2013) study which investigated which cues contribute to the disambiguation of disjunctive questions in English (the choice of contours vs. accent distributions). Modifications are needed in some aspects of the methodology, building on the results of the production studies (Chapter 5). In other words, Experiment 1 is a near replication of Pruitt and Roelofsen's study, using the cues that are relevant to JA: the choice of overall contours vs. the choice of disjunctive element. Another difference from Pruitt and Roelofsen's study is the use of only two on-screen options, instead of using 'other' as a third option. This methodological decision will be justified later on.

The researcher recorded his own production of 24 disjunctive questions (altqs and dynqs) whose disjunctive phrases, composed only of two constituents, are in final position (following Pruitt & Roelofsen, 2013). They were recorded using a high-quality recorder (Marantz/PMD660) with the default sampling frequency 44100Hz 16 bit, as is common in perception studies. It was also set to a single mono channel. A high-quality headphone (brand: Shure) was also used while recording. The researcher's recorded long file was directly pasted from the memory card into the laptop (Sony VAIO), which is password-protected.

36 filler sentences were also recorded using the same equipment and the same settings. Each filler was recorded once, but each target lexical item was recorded four times (one after the other) in each of the four conditions. A Praat textgrid of the whole long sound file was created and the best version of the repeated utterances was selected by the researcher, based on the shape of its contour. Then, the selected short utterances were cut from the long file using a Praat script.

There were 96 target tokens because each utterance question was recorded four times, i.e., in each of the four conditions, for the two cues to be manipulated in this study (24 x 4 = 96). Two are with *ʔaw* (one with a late rise (henceforth 2lr) as shown in Figure 6.1 and Example (6.3a) and one with a rise fall (henceforth 2rf) as shown in Figure 6.1 and Example (6.4a) below), and two are with *willa* (one with a late rise (henceforth wlr) illustrated in Figures 6.1 and Example (6.3b) and one with a rise fall (henceforth wrf) as in Figure 6.1 and Example (6.4b)). Both 2lr and wlr represent the typical shape of the overall contour of dynqs which is usually low followed by a late rise at the end of the contour. Similarly, 2rf and wrf represent the typical shape of the overall contour of altqs which is a rise fall over the *X or Y* phrase as shown in the previous chapter and the literature.

The following examples (the same as the ones in Figure 6.1) illustrate how one utterance was recorded with the four conditions of contour choice (late-rise vs. rise-fall) and choice of disjunctive element (*ʔaw* vs. *willa*); they are 2lr, wlr, 2rf, and wrf:

(6.3) The *typical* intonational pattern of dynqs with *ʔaw* (2lr) and with *willa* (wlr) in (a) and (b) below:[99]

[99] As was explained in Section 2.6, [/] is a rise and [\] is a fall.

a. l-joːm ʕazmatak ʔaːja ʕa-l-iftˤuːr ʔaw ʕa-l-ɣada [/]

the-today invite.PST.3FSG.NOM.2MSG.ACC Aya on-the-breakfast or on-the-lunch
'Did Aya invite you to breakfast or lunch (to have breakfast or lunch)?'

b. l-joːm ʕazmatak ʔaːja ʕa-l-iftˤuːr willa ʕa-l-ɣada [/]

the-today invite.PST.3FSG.NOM.2MSG.ACC Aya on-the-breakfast or on-the-lunch
'Did Aya invite you to breakfast or lunch (to have breakfast or lunch)?'

(6.4) The *typical* intonational pattern of altqs with *ʔaw* (2rf) and with *willa* (wrf) in (a) and (b) below:

a. l-joːm ʕazmatak ʔaːja ʕa-l-iftˤuːr ʔaw ʕa-l-ɣada [\]

the-today invite.PST.3FSG.NOM.2MSG.ACC Aya on-the-breakfast or on-the-lunch
'Did Aya invite you to breakfast or lunch (to have breakfast or lunch)?'

b. l-joːm ʕazmatak ʔaːja ʕa-l-iftˤuːr willa ʕa-l-ɣada [\]

the-today invite.PST.3FSG.NOM.2MSG.ACC Aya on-the-breakfast or on-the-lunch
'Did Aya invite you to breakfast or lunch (to have breakfast or lunch)?'

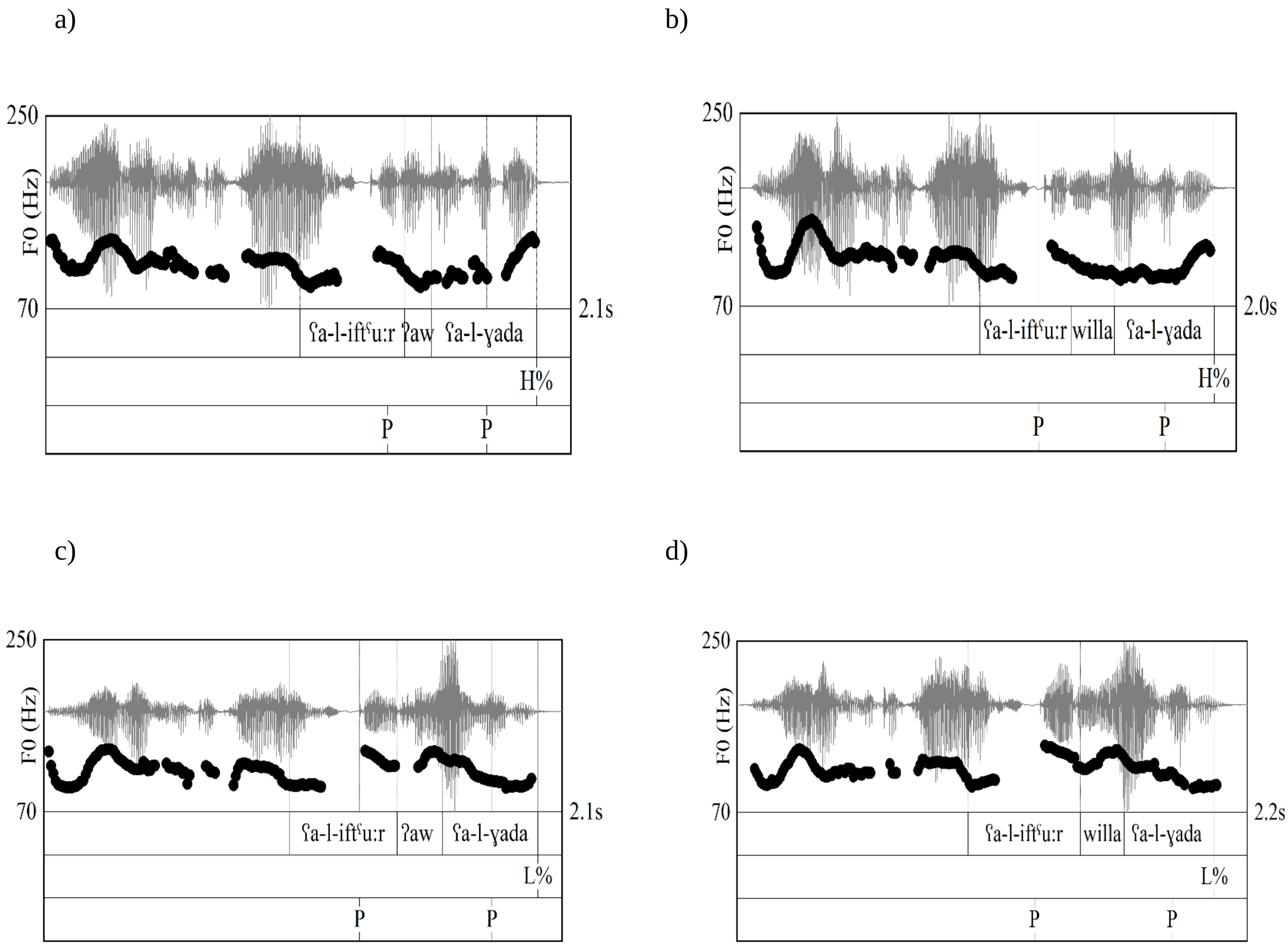


Figure 6.1 Illustrations of the four conditions that each utterance was recorded in: (a) refers to 2lr, (b) refers to wlr, (c) refers to 2rf, and (d) refers to wrf. Praat (Boersma & Weenink, 2020) was used to create these pitch traces.

The average intensity (loudness) of all of the tokens was normalised to the standard average level 70db using Praat, which is good practice in making sound files ready to be used in perception tasks (Styler, 2017).

The following figures provide evidence that the sample contours in Figure 6.1 are indeed representative of the contours across all the stimuli in all blocks. All wrf and 2rf tokens were plotted on top of each other for the *Y* constituent of the *X or Y* phrase (Figure 6.2), and the wlr and 2lr tokens were also plotted on top of each other for the *Y* constituent of the *X or Y* (Figure 6.3).

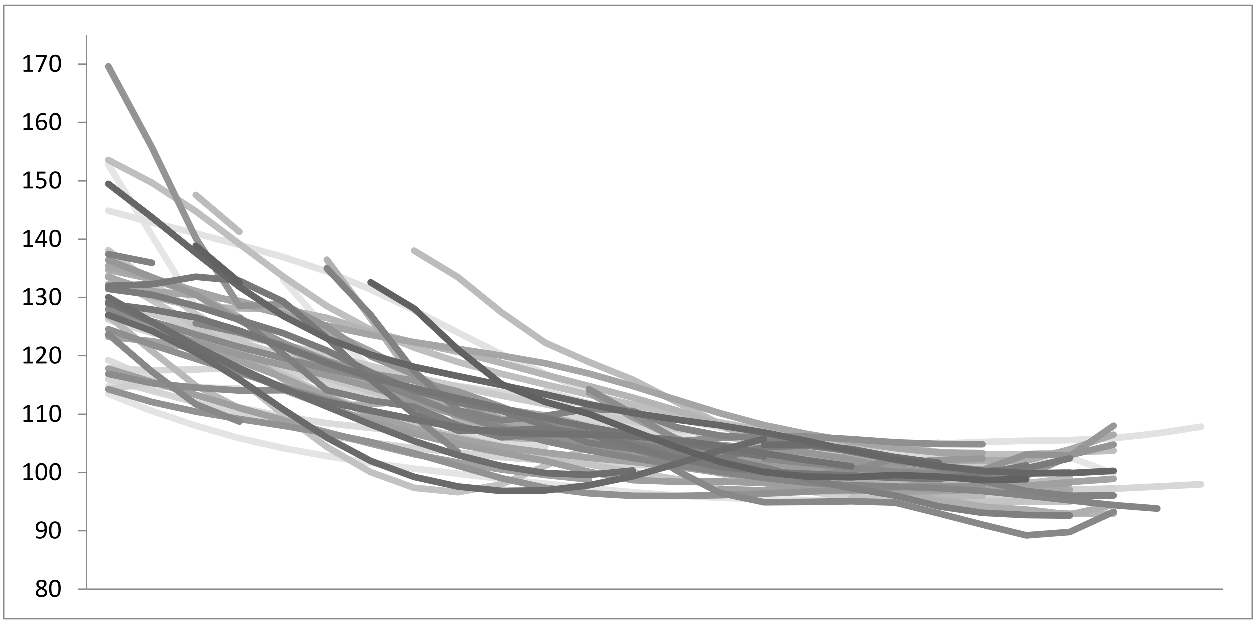


Figure 6.2 Time-normalised F0 of all 48 rise-fall tokens plotted on top of each other in Hertz. Their F0 values were smoothed and plotted with 30 F0 measurements across the *Y* in the *X or Y*.

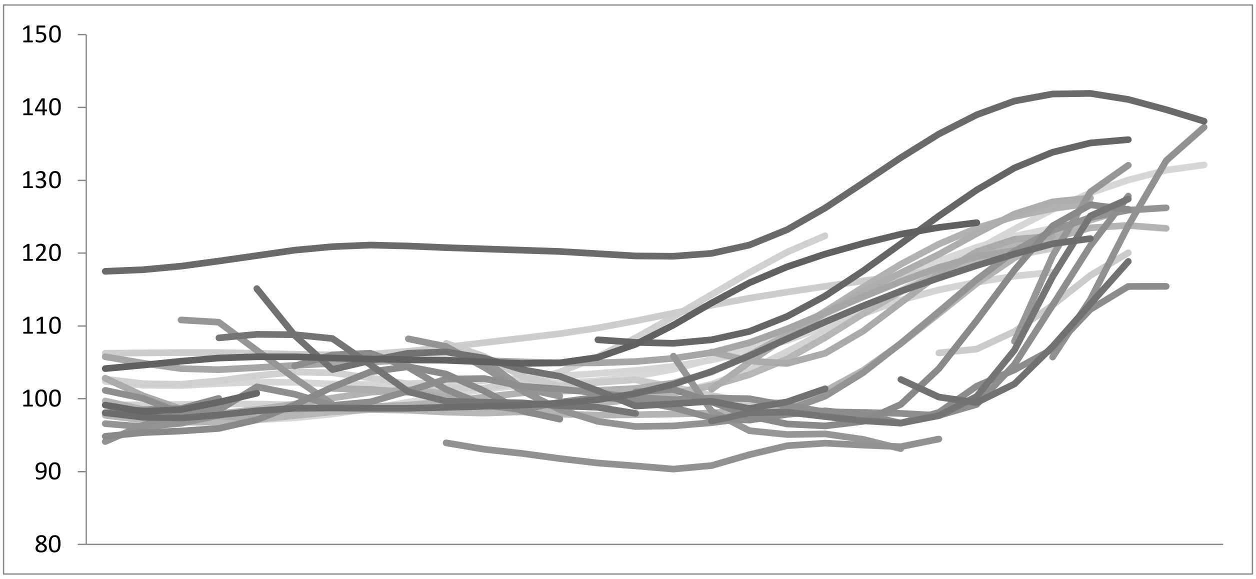


Figure 6.3 Time-normalised F0 of all 48 late-rise tokens plotted on top of each other in Hertz. Their F0 values were smoothed and plotted with 30 F0 measurements across the *Y* in the *X or Y*.

Additionally, the average F0 of the 24 2lr tokens and the 24 wlr tokens was plotted to ensure that they have a similar overall contour in the two disjunctive element conditions before including them in the experiment (Figure 6.4). Similarly, the average F0 of the 24 2rf and the 24 wrf tokens was plotted (Figure 6.5).

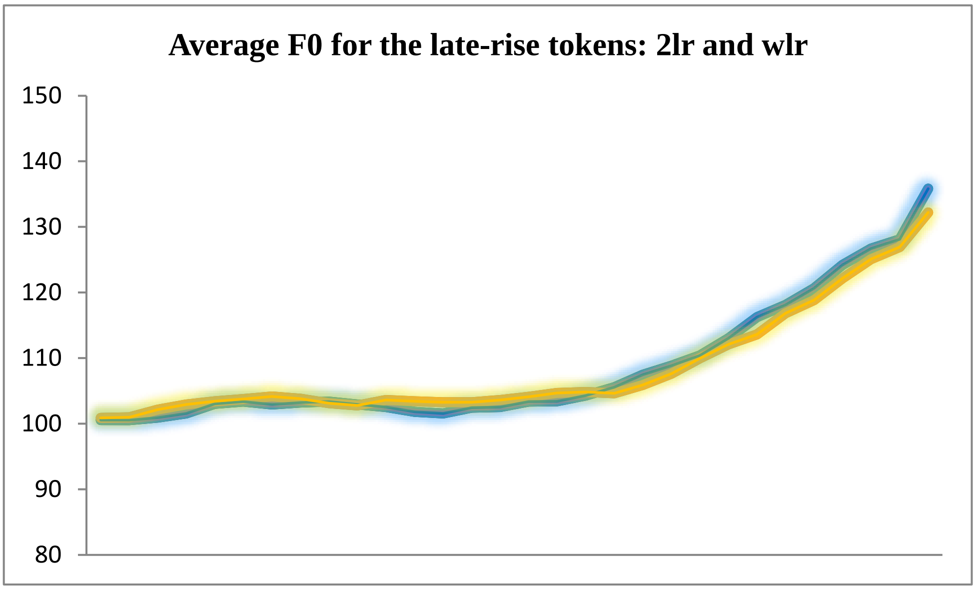


Figure 6.4 Time-normalised average F0 of the 24 2lr tokens (orange line) and the 24 wlr tokens (blue). They were smoothed and plotted with 30 F0 measurements across the *Y* in the *X or Y* phrase.

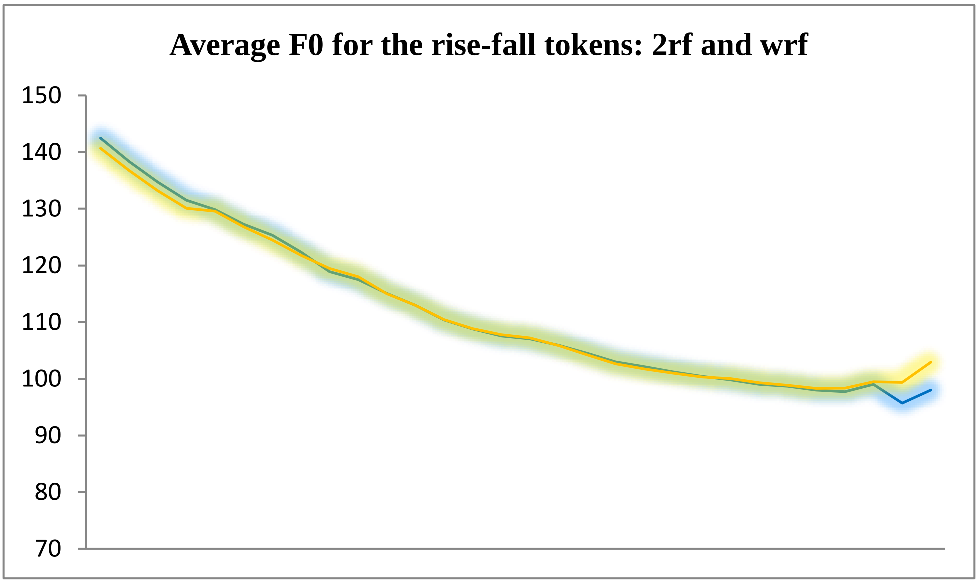


Figure 6.5 Time-normalised average F0 of the 24 2rf tokens (orange) and the 24 wrf tokens (blue). They were smoothed and plotted with 30 F0 measurements across the *Y* in the *X or Y* phrase.

Figures 6.4 and 6.5 clearly show the similarity in the contour of the late-rise tokens with *ʔaw* and *willa*, and in the contour of the rise-fall tokens with *ʔaw* and *willa*.

Each participant listened to 24 target tokens as well as 36 fillers (total 60 stimuli) as will be explained in detail in the procedures (6.3.3). The 36 fillers were of many different grammatical types like statements, questions and orders. Some fillers had rising intonational contours and others had falling ones, to make the fillers similar to the target items.

Pruitt and Roelofsen's lexical sets were comprised of 17 VPs, 5 NPs, 1 PP, and 1 gerund. The different types of lexical sets in this perception study were balanced to include equal numbers of VPs, NPs, and PPs with 8 lexical items each. The different structures generate *X or Y* phrases of different lengths, which was clear in Pruitt and Roelofsen's lexical sets. Some researchers (e.g., Selkirk, 2000; Hellmuth, 2004) pointed out that phrase length is known to affect phrasing and prosody, so it is important to control and balance the length of the tokens. The full list of the 24 distinct lexical sets and the 36 fillers are provided in Appendix B (B.1-B.2).

Following O'Mahony (2014), another criterion was used in selecting the stimuli, which, as she explained, was not controlled for in Pruitt and Roelofsen's study. This criterion stipulates that all chosen stimuli should permit answers with either of the constituents (i.e., *X* or *Y*) and also both or neither of them. For instance, the utterance *maʕaːh sukkari ʔaw daˤɣitˤ* 'Does he have diabetes or blood pressure?', without deciding on its intonational pattern, can be answered with: *sukkari* 'diabetes', *dˤaɣitˤ* 'blood pressure', both (*sukkari* 'diabetes' and *dˤaɣitˤ* 'blood pressure'), or neither (neither *sukkari* 'diabetes' nor *dˤaɣitˤ* 'blood pressure'). She referred to the possibility of having both *X* and *Y* as simultaneously felicitous answers as "simultaneous plausibility" (p. 24). Ignoring this criterion, as she affirmed, could lead to not fully controlling the semantic effects. That is, she made it clear that it might be that a semantic effect is what causes one answer to be chosen regardless of any other phonetic manipulations. She commented on Beck and Kim's (2006, p. 165) example "Is Ning's baby a girl or a boy?" and reported that this example cannot be answered in line with *simultaneous plausibility*. That is, Beck and Kim's example can only be interpreted as an altq not as a dynq because the baby has to be either a boy or a girl but typically cannot be both at the same time. Beck and Kim also convincingly argued that such an example in which there is no ambiguity between altqs and dynqs is unusual as the normal case, in English, tolerates this kind of ambiguity.

6.3.2 Participants

The experiment link was sent to 64 participants (32 males and 32 females), aged between 18 and 40. They are all native speakers of Urban JA. They were invited by the researcher or his acquaintances to participate in this study (i.e., by email or mobile, through social media, or by word of mouth). None of their parents is non-Jordanian; this selection process was also followed by other researchers e.g., Bouchhioua, Hellmuth, and Almbark (2019) on Tunisian Arabic, who excluded participants whose parents were non-Tunisians. Participants were randomly assigned to one of the four blocks, ending up with two blocks of 17 and two of 15. Only 60 of them accepted to be monetarily compensated for the efforts exerted and the time spent on the experiment; no one reported any hearing or speech difficulties.

The native language and dialect of participants were controlled so that their dialect should not be affected by other non-Jordanian Arabic dialects. There is an increased possibility of dialect contact effects because of the large number of Syrians in Jordan at the time of data collection, which is estimated to be about 13.2% of the whole population (Ghazal, 2016). Official statistics indicate that 80% of the refugees live in urban areas (Dupire, 2017). Such huge numbers of refugees might affect the urban local dialect of JA, so it was important to control language background in this study as shown in Appendix B (B.5).[100]

Recruiting female participants proved to be challenging. This might be because some sectors of Jordanian society are conservative about a situation where a male talks to a female who is not a relative (Shoup, 2007; AbuSeileek & Rabab'ah, 2013; Al Huneety, 2015). The researcher's wife and sisters, therefore, helped by trying to recruit female participants, by reassuring them that the study is for research and academic purposes, with some degree of success. For those females that were more conservative, they agreed to participate provided that the researcher's wife or one of his sisters was available with the researcher at the time of the experiment. Asking a female (i.e., the researcher's wife or any of his sisters) to help approach and speak to other females was also followed by other researchers in Jordan (e.g., Al Huneety, 2015). Such a conservative characteristic of some Jordanian families forced some researchers to exclude female participants from their samples (e.g., Al Mashaqba, 2015). To secure a balanced sample, some of the researcher's friends helped by asking their female relatives to remotely complete the experiment via the online survey link.

[100] Experiment 2 includes speakers from a wider range of Urban JA (i.e., from more cities).

6.3.3 Procedures

Qualtrics software was used to run the study. There was a two-option forced task as will be illustrated in detail later on. The Materials Section (6.3.1) indicated that the total number of the tokens was 96 (i.e., 24 for each of the four different conditions of the two cues). These 96 tokens were divided into four blocks in Qualtrics. Each block had 24 trials divided as follows:

1. 6 tokens of 2lr
2. 6 tokens of 2rf
3. 6 tokens of wlr
4. 6 tokens of wrf

These were distributed into four blocks along with the same 36 fillers in each block, so each block had a total of 60 items. All trials were randomized in each block so that each participant did not hear a sequence of many tokens of the same condition in a row. Then, Qualtrics randomly allocated participants to one of the four blocks. A Latin Square design was used. In other words, each participant heard 24 unique lexical items, distributed across the four conditions as explained above. As a result, participants did not hear the same string of words in more than one condition in the same block. Every participant heard every lexical set and every participant heard an equal number of trials in each condition. Overall, participants, by the end of the survey, had listened to 60 items in the block that they had been randomly assigned to (24 target tokens and 36 fillers).

The mean time that all participants took to complete the survey was about 28 minutes, with only two participants who took more than an hour and one who took about 8 hours and 53 minutes.[101] The one taking the long time was excluded when calculating the mean time participants took to complete the survey.

Participants were asked to listen to the recordings using headphones in a quiet room, free from noise. The quiet room helped avoid any ambient noise distracting their attention. The majority of participants used headphones and others did not, and it was not possible to control this during data collection. Each participant was informed of the research purposes in general terms and of how and where the collected data will be stored and used. Details of how the

[101] The long duration of the survey of this participant is not a problem because he paused it and returned to it later, but the time in Qualtrics keeps running once the survey is first opened.

experiment was going to be run were fully clarified to each participant. This included explaining what participants would be required to do when they begin listening to the recordings.

Before running the experiment, it was made sure that there was good internet access by trying to connect to the Internet. There was a spare mobile internet device for use in case there was no WIFI connection or in case the WIFI access was found to be weak. So, all measures to minimize such risks were taken.

Participants were asked to use the researcher's laptops or any other laptop to access the experiment. Seven participants used their mobile phones as Qualtrics makes its surveys available in and compatible with both mobiles and laptops. They had received the link of the experiment, but they did not own laptops. After clicking on the link, the information sheet and the consent form, which were approved by the University of York, appeared. Participants were asked to read and sign them and were also asked to tick the boxes in the consent form on the screen. After doing so, the language background questionnaire appeared to them, and they were asked to fill it in (see Appendix B (B.5) for the language background questionnaire). In this questionnaire, they were also asked to indicate whether they suffer from any speech or hearing problems.

Following the questionnaire, participants were familiarized with what they were required to do in this task in the instructions on a separate page, and they were encouraged to ask any questions if they wanted anything to be clarified. Any questions raised were satisfactorily answered to check their understanding of the tasks.

After responding to all on-screen questions, participants then clicked on the *next* arrow at the bottom of that page, and they were randomly assigned to one of the four stimuli blocks. There were 6 questions per page. They listened to each one of the tokens and chose from two different multiple-choice options for each recording: each choice was a paraphrase of the question they heard. In other words, they were asked to first listen to each audio recording by pressing the *play* arrow and think about what it means to them or to think about the intended meaning of the speaker asking that question before looking at the multiple-choice options. Following this, they selected the one that best suited their own interpretation of the token that they had just heard, which is similar to what Pruitt and Roelofsen (2013) did in their experiment on English. That is, participants chose the paraphrase that represented their own understanding of the token. Using a two-alternative forced-choice task (2AFC) in perception studies was also followed by other researchers (O'Mahony, 2014; Chládková, Hamann, Williams & Hellmuth, 2017; Almbark, Bouchhioua, & Hellmuth, 2019). The experiment is a replication of Pruitt and Roelofsen's (2013) English perception study with slight changes in terms of using the variables from the production studies (Chapter 5) and in terms of providing participants with only two paraphrases, instead of three. In other words, forcing participants to choose one paraphrase from only two in the mismatch condition might have forced them to choose any paraphrase at random, which might be a potential weakness of the study. This has consequences for how the results of the mismatch condition can be interpreted. This issue will be addressed in more detail in the results section by considering alternative ways of analysing the mismatch condition. Providing listeners with only two paraphrases was to avoid making the task longer and boring, given that there are 60 tokens to be heard (in addition to the consent and information forms), and because the mixed-effects logistic regression needs a binary dependent variable (see Section 6.4.1 for more reasons for having only two paraphrases, i.e., the reasons for not having 'other' as an option).

Participants were informed that they can replay the sound file again by clicking the *play* arrow, but they were, in fact, encouraged not to do so and to answer the token with their first impression. Allowing participants to replay the recordings was also noticed in other perception studies (see, for instance, Almbark, 2012; Stewart, 2015; Heidenreich, 2019; Genzel & Kügler, 2020; Almalki, 2020)

The altq and dynq paraphrases appeared either as the first or the second option, so their order of appearance was randomized for each trial, which is somewhat analogous to Pruitt and Roelofsen's counterbalanced paraphrases. Example (6.5) below shows one token with its paraphrases.[102] Participants listened to (6.5), and the choices appeared as (a) and (b), presented in Arabic script using JA spelling conventions. Figure 6.6 is a screenshot showing how this example appeared on-screen.

(6.5)	l-ħaʒ	maʕaːh	sukkari	ʔaw	dˤaɣitˤ
	AlHaj	with.him.3MSG	diabetes	or	blood.pressure

'Does AlHaj (the gentleman) have diabetes or blood pressure (hypertension and/or hypotension)?'

[102] It is worth mentioning that the tokens themselves did not appear in writing because they were recorded. Furthermore, choices (a) and (b) appeared only in JA.

a. hal hu:wwa juʕa:ni min ʔamra:dˤ miθil s-sukkari / dˤ-dˤaɣitˤ)

Q he suffer.PRS.3MSG from disease.PL like the-diabetes/ the-blood.pressure

‘Does he have diabetes or blood pressure disease (hypertension/hypotension)?’

b. ʔajja min l-maradˤajn ʕindu(h) s-sukkari ʔaw dˤ-dˤaɣitˤ

which from the-disease.PL.two. have.PRS.3MSG the-diabetes or the-blood.pressure

‘Which disease, in particular, does he suffer from: diabetes or blood pressure?’

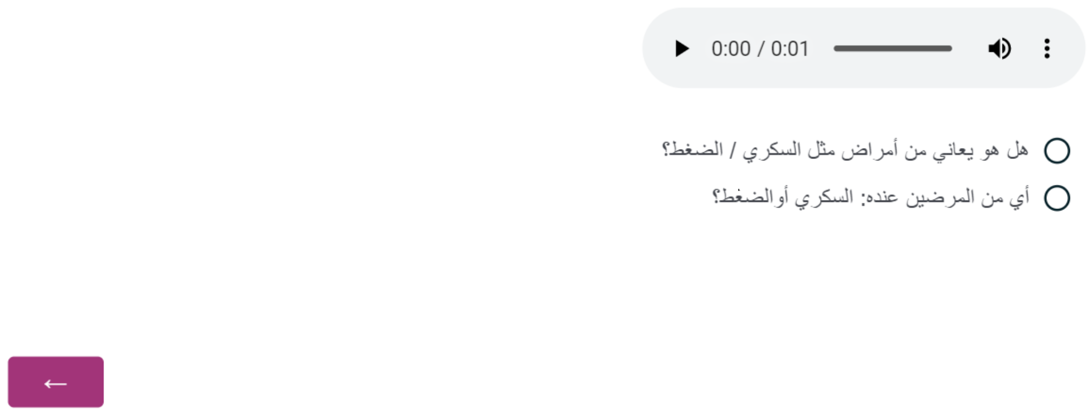


Figure 6.6 An example of one trial in Qualtrics (the same as in Example (6.5) above). The first option is a dynq paraphrase; the second is an altq paraphrase.

Both (6.5a) and (6.5b) were the options that appeared to participants to select only one of them as shown in Figure 6.6 above. The fillers were also treated similarly in terms of being followed by two multiple-choice options. As for the target tokens, the order in which options (a) and (b) appeared was alternated. So, participants listened to the fillers and were asked to choose the best paraphrase of the fillers from the provided choices (a and b) in the same way as what they did with the target items.

In order to avoid any unintended effects that might result from including *willa* in paraphrases of dynqs (given that it was rarely used in dynqs in the IVAr corpus search (Chapter 4) and in the JA production study (Chapter 5) and given the researcher’s strong intuition that it was almost impossible to make paraphrases of dynqs with *willa*), the paraphrases corresponding to dynqs in *willa*-tokens had a slash between disjuncts instead of *willa*. That is, the researcher’s intuition was that if a declarative paraphrase of a dynq used *willa*, this paraphrase might bias towards an altq interpretation. Consequently, slashes were used in such paraphrases to avoid imposing an altq reading on dynq paraphrases in *willa*-tokens (i.e., *X*/*Y*).

In order to be consistent, slashes were also used in dynq paraphrases in *ʔaw*-tokens (as in (6.5a) above).

In other words, paraphrases for a target with *ʔaw* had *ʔaw* in them only in the choices that corresponded to altq readings, and paraphrases for a target with *willa* had *willa* in them only in the choices that corresponded to altq readings. However, paraphrases of the same targets that corresponded to dynq readings had slashes separating the *X* and *Y* as shown in (6.5) and Figure 6.6. In this case, paraphrases with slashes were expected not to force altq interpretations as they would if they included *willa*. Slashes separating the *X* or *Y*, such as *X*/*Y*, were also used in another study investigating the same issue in English (O'Mahony, 2014).

It is worth noting that O'Mahony's method of providing yes-no and the disjuncts as choices, instead of paraphrases, was avoided here because this might confuse participants. This is based on the experience that such answers confused participants in an informal grammaticality judgment task run in the first PhD year. Participants kept telling the researcher that they, for example, do not like any of the disjuncts in a question. More precisely, some said that they like Pepsi, not coffee or tea. Some said that they do not, for instance, know if the person whose name is mentioned in a question prefers the *X* or *Y* options. Others reported that the question asks for their personal preferences which they prefer not to disclose. Some of them took the question as if it were personally addressed to them. It was, therefore, decided to put multiple-choice paraphrases in the main study, instead. This method is less confusing and was also followed by other researchers, such as Pruitt and Roelofsen (2013).

6.3.4 Statistical Analysis

Participants' responses in each of the four blocks were exported to a spreadsheet file. Responses in each of the four conditions (*ʔaw* with a late rise (2lr), *willa* with a late rise (wlr), *ʔaw* with a rise fall (2rf), and *willa* with a rise fall (wrf)) in all blocks were counted. The independent variables were the shape of overall nuclear contour (late-rise vs. rise-fall) and the choice of disjunctive element (*ʔaw* vs. *willa*). The dependent variable was taken to be the participants' responses in the perception experiment. Responses were coded as 1 for the dynq paraphrases and as 0 for the altq paraphrases in the .csv file.

Mixed-effects logistic regression in R (R Core Team, 2019) was used to explore the results. The choice of this statistical model was because the dependent variable was categorical (a 2AFC task) as paraphrases represented either altqs or dynqs (i.e., binary choices) (Winter, 2020). This method of statistical analysis was also adopted, given that there are some random, control, and fixed variables to be included. When fixed and random variables are contained in a model, this is usually referred to as a mixed-effects model (e.g., Bates, 2005; Baayen, 2008; Winter, 2013; Winter, 2020).

In addition, Winter (2013; 2020) reported that the mixed-effects model is suitable when there is a dependency between responses i.e., when many answers come from the same participant as is the case here. Another motivation for using the mixed-effects logistic regression is that it was used by other researchers similarly studying the disambiguating cues of altqs and dynqs (see, for instance, Pruitt, 2007; Pruitt, 2008a; Pruitt, 2008b; Pruitt & Roelofsen 2013; O'Mahony, 2014; Heidenreich, 2019). The glmer function in the lme4 package (Bates et al., 2015) was used.

There are two fixed effects: intonation (late-rise vs. rise-fall) and disjunctive element (*willa* vs. *ʔaw*). There are also other random and control variables to be considered. The factors *listener* and *stimulus* were included in the model as random variables, which is similar to Pruitt and Roelofsen's model structure. Baayen, Davidson, Bates (2008) justified the inclusion of random effects in mixed-effects models by reporting that the main focus of research typically does not lie in the effects observed in those specific participants taking part in the research but, generally, lies in the effects observed in all people speaking the language. Similarly, they clarified that using specific materials in a specific experiment does not mean that these specific materials are all the materials available in any language (see Baayen et al., 2008 for more details on using subjects and items as random variables).

Random effects thus usually refer to some listeners or items that are sampled from the larger population and do not refer to all of the population that they are taken from as there will still be other listeners and items in the bigger population (see Baayen, 2008; Winter, 2013; Agresti, 2019). In addition, Winter (2013) explained that random effects in mixed models usually refer to the parts of the model that might be unsystematic or might have idiosyncratic characteristics. It is usually the case that people and their productions have such idiosyncratic features, so these are random effects that generalized over their listener-specific and item-specific features (Winter, 2013).

On the other hand, Winter reported that fixed effects include all possibilities available in the population by exhausting all possibilities. Thus, for example, gender as a fixed effect exhausts all the possibilities available in an experiment if the experiment takes in both males and females (Winter, 2013). Based on this logic, the fixed effects, in this experiment, are intonation and choice of disjunctive element as each of them exhausts the possibilities included in this experiment; intonation exhausts the two possibilities (late-rise vs. rise-fall) and choice of disjunctive element does the same (*ʔaw* vs. *willa*). Contrary to the unsystematic effect that random variables might have, the effect that fixed effects might show on datasets is predictable and thus systematic (Winter, 2013).

Another motivation for introducing random effects into the model is to correct for possible variations between participants and for possible variations between stimuli (see Baayen, 2008; Winter, 2013). That is, the model used here had a random intercept and slope for listeners (1 + intonation | listener) and a random intercept for each stimulus (1 | stimulus) (i.e., by listener varying intercept and by stimulus varying intercept). The addition of the random slope (i.e., intonation) was because participants' sensitivity to intonation (late-rise vs. rise-fall) may vary (i.e., by listener varying slope). This effect needs to be accounted for in the model.

Two models: Md1[103] and Md2[104] were explored but the second was a singular fit. So, Md1 was adopted. Hence, ANOVA was not run because the help menu in R states that singular fit models might obtain inaccurate numbers and proposes avoiding complex models as a way to avoid singular models.

The adopted model was run with gender, researcher presence, device, age, and education as control variables, which are a feature of mixed-effects models that allow consideration of effects that might exist or turn out to exist in an experiment (Baayen et al., 2008). These predictors were all sum coded (intonation: rise 1 and fall -1, disjunctive element: *ʔaw* 1 and *willa* -1, gender: female 1 and male -1, respresence: yes 1 and no -1, and device: laptop 1 and mobile -1). As for education, which had seven levels (ordered from 1 to 7: primary,

[103] Md1 <- glmer(resp_numeric ~ intonation * disjunctive_element + gender + respresence + device + age + Education + (1 + intonation | listener) + (1 | stimulus), data = data2, family = binomial, control = glmerControl(optimizer = "bobyqa"))
[104] Md2 <- glmer(resp_numeric ~ intonation * disjunctive_element + gender + respresence + device + age + Education + (1 + intonation | listener) + (1 + disjunctive_element | listener) + (1 | stimulus), data = data2, family = binomial, control = glmerControl(optimizer = "bobyqa"))

secondary, college diploma, bachelor's degree, higher diploma, master's degree, and doctorate), this variable is numeric and need not be sum coded. Age also was not sum coded as it is numeric. Including these control variables in the model was to check if they make a difference, helping control for any effect these variables may have.

6.4 Results

The perception study (Experiment 1) addresses the research question by showing the strength of the relative contribution of each cue. The results also indicate whether or not the two cues have a significant effect in disambiguating altqs and dynqs by increasing the likelihood of interpreting a token either as an altq or a dynq, which in turn indicates which cues disambiguate disjunctive questions in JA. The results will clarify whether or not the choice of *willa* causes listeners to interpret what they hear as dynqs less or more often, regardless of the shape of the contour accompanying it. If it is the choice of contour shape that is the most important disambiguating cue, then the 2lr and wlr conditions will receive more dynq paraphrases while the 2rf and wrf conditions will dominantly be paraphrased as altqs regardless of the choice of disjunctive element. On the contrary, if the choice of disjunctive element proves to be more important than the choice of contours, then 2lr and wlr conditions might arguably be interpreted by listeners as altqs most of the time regardless of the late-rise contour, which is the typical contour shape of dynqs in this dialect as reported in the literature and as shown in the JA production study.

To address the research question exploring the relative contribution of the cues to the disambiguation of disjunctive questions, responses to each token were counted. The total number of responses to all conditions was 1536 (64 participants x 24 tokens): each of the four conditions has 384 tokens. Table 6.2 presents the four conditions along with the number of responses they received.

Table 6.2 *Counts of the Responses to Each of the four Conditions*[105]

Conditions	dynqs	%	altqs	%	Total
aw-rise	287	75	97	25	384
willa-rise	234	61	150	39	384
aw-fall	100	26	284	74	384
willa-fall	90	23	294	77	384
Total	711		825		1536

Overall, 68% of the late-rise tokens (with both *ʔaw* and *willa*) were interpreted as dynqs by participants (521 out of 768). Similarly, 75% of the rise-fall tokens (both *ʔaw* and *willa*) were perceived by participants as altqs (578 out of 768), highlighting the important contribution of the contour choice in disambiguating altqs and dynqs, by increasing the number of responses to one question type or the other. Figure 6.7 illustrates the general pattern found in the data, showing the mean of tokens interpreted as dynqs in each of the four conditions.

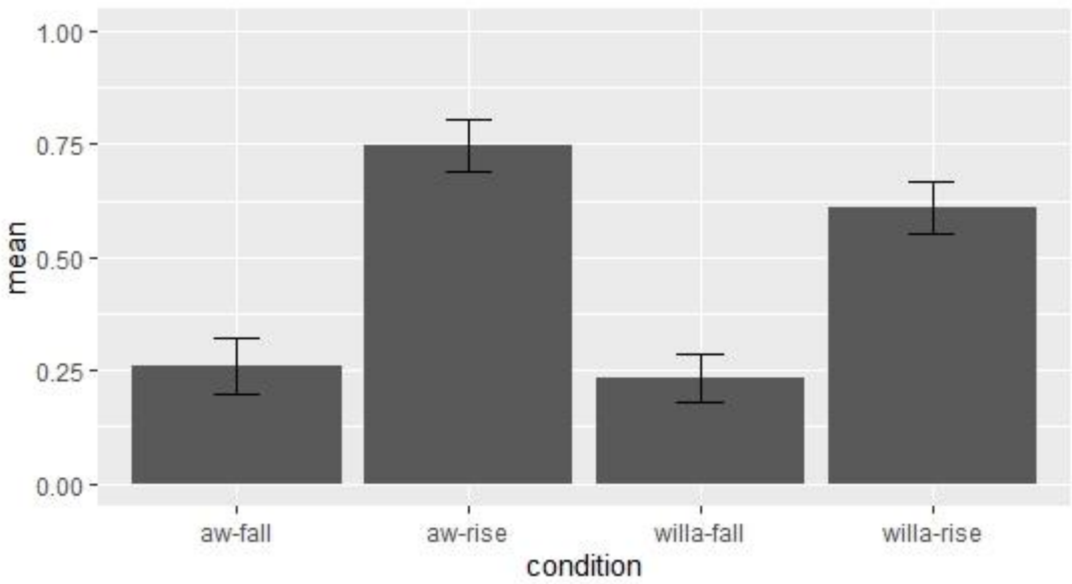


Figure 6.7 Proportions of dynq responses from JA listeners across the four conditions (with error bars showing 95% confidence intervals). *ʔaw* was written as *aw* because ggplot did not allow [*ʔ*] to appear in the plot.

As seen in Figure 6.7, the differences in the mean between the late-rise conditions (aw-rise and willa-rise) and the rise-fall conditions (aw-fall and willa-fall) suggest an important role of intonation in distinguishing altqs from dynqs. The coefficients of the adopted model are presented in Table 6.3.

---

[105] Please note that *ʔaw* in the table is written as *aw* in order to make the variable names consistent with the plots, given that the plots do not accept [ʔ] in *ʔaw*. Similarly, *late-rise* and *rise-fall* are written simply as *rise* and *fall*, for the same reason.

Table 6.3 *Estimates of Coefficients of the Parameters in the Mixed-effects Model*

Fixed effects	Estimate	SE	z value	p-value	
Intercept	-0.396938	0.474954	-0.836	0.40330	
intonation1	1.158825	0.128953	8.986	< 2e-16	***
disjunctive_element1	0.229863	0.076891	2.989	0.00279	**
gender1	0.032286	0.095611	0.338	0.73561	
respresence1	0.100215	0.219541	0.456	0.64805	
device1	-0.035582	0.261813	-0.136	0.89189	
age	-0.001736	0.013507	-0.129	0.89775	
Education	0.036331	0.076218	0.477	0.63360	
intonation1:disjunctive_element1	0.139873	0.076797	1.821	0.06856	.

In Table 6.3 the intercept is negative but non-significant ($\beta = -0.396938$, SE = 0.474954, z value = -0.836, and $p > 0.05$), displaying a bias towards the altq interpretation (i.e., as a preference) though in a non-significant way. A negative intercept also means that participants were, overall, more likely to perceive tokens as altqs, but this number is not significantly different from zero. None of the control predictors (gender, researcher presence, device, age, and education) reached the significance level.

Intonation1 (i.e., a late- rise) had a significant and positive value ($\beta = 1.158825$, SE = 0.128953, z value = 8.986, and $p < 0.001$), showing that there is a main effect of intonation. Participants were more likely to choose the dynq paraphrases when they heard an utterance with late-rise intonation.

As shown in Table 6.2 and Figure 6.7, 2rf and wrf receive a similar, though not identical, percentage of dynq responses regardless of the disjunctive element used. On the other hand, 2lr and wlr show a clear difference in the percentage of dynq responses, indicating that the choice of disjunctive element played a role in the interpretation.

Specifically, the fact that only 61% of wlr tokens were interpreted as dynqs compared with 75% for 2lr may well point to a possible role of disjunctive elements in shifting the interpretation of tokens having *willa* towards altqs despite having a late-rise contour. In other words, using *willa* in dynqs led to decreasing the possibility of an utterance being interpreted as a dynq. This is clear because using *ʔaw* in the same utterances led to increasing the likelihood of dynq responses by the corresponding 14%. Thus, there might be a role of *willa* as a disjunctive element in this pattern. The possible role of disjunctive element was statistically tested in the mixed-effects logistic model (Table 6.3) which showed that disjunctive_element1 (i.e., *ʔaw*) was significant ($\beta = 0.229863$, SE = 0.076891, z value =

2.989, and $p < 0.01$) with a positive coefficient. This indicates a main effect of choice of disjunctive element and that participants tended to select dynq paraphrases more than altq paraphrases when they heard utterances with *ʔaw*, regardless of intonation contour.

Thus, the findings, so far, revealed that choice of contour and choice of disjunctive element increased significantly the likelihood of selecting dynq responses. They also showed that *willa* with a late rise decreased the likelihood of interpreting a token as a dynq by - 0.139873 (-1 x 0.139873). However, this interaction between intonation and choice of disjunctive element was non-significant ($\beta = 0.139873$, SE = 0.076797, z value = 1.821, and $p = 0.06856$).

The relationship between the two main effects can best be explained when comparing the estimates for these effects provided in Table 6.3. The late-rise and *ʔaw* both reached significance in maximising the likelihood of dynq responses, but the coefficient and z values associated with the late-rise ($\beta = 1.158825$, SE = 0.128953, z value = 8.986, and $p < 0.001$) were higher than those associated with *ʔaw* ($\beta = 0.229863$, SE = 0.076891, z value = 2.989, and $p < 0.01$). The magnitude of the intonation coefficient is approximately five times higher than that of the disjunctive element.

In general terms, then, the contribution of intonation in obtaining dynq responses was more important than that of the disjunctive element. The late-rise tokens (2lr/wlr) were interpreted as dynqs in 73% of all dynq responses whereas the rise-fall ones (2rf/wrf) received a dynq interpretation only in 27% of all dynq responses (Table 6.2). In the same vein, tokens with *ʔaw* as a disjunctive element (2lr/2rf) received dynq responses 54% of all dynq responses while tokens with *willa* as a disjunctive element (wlr/wrf) were perceived as dynqs in 46% of the dynq responses. These percentages show that intonation as a disambiguating cue contributed more than choice of disjunctive element in obtaining more dynq responses. Figure 6.8 shows the average count of tokens interpreted as dynqs across all participants for all cues.

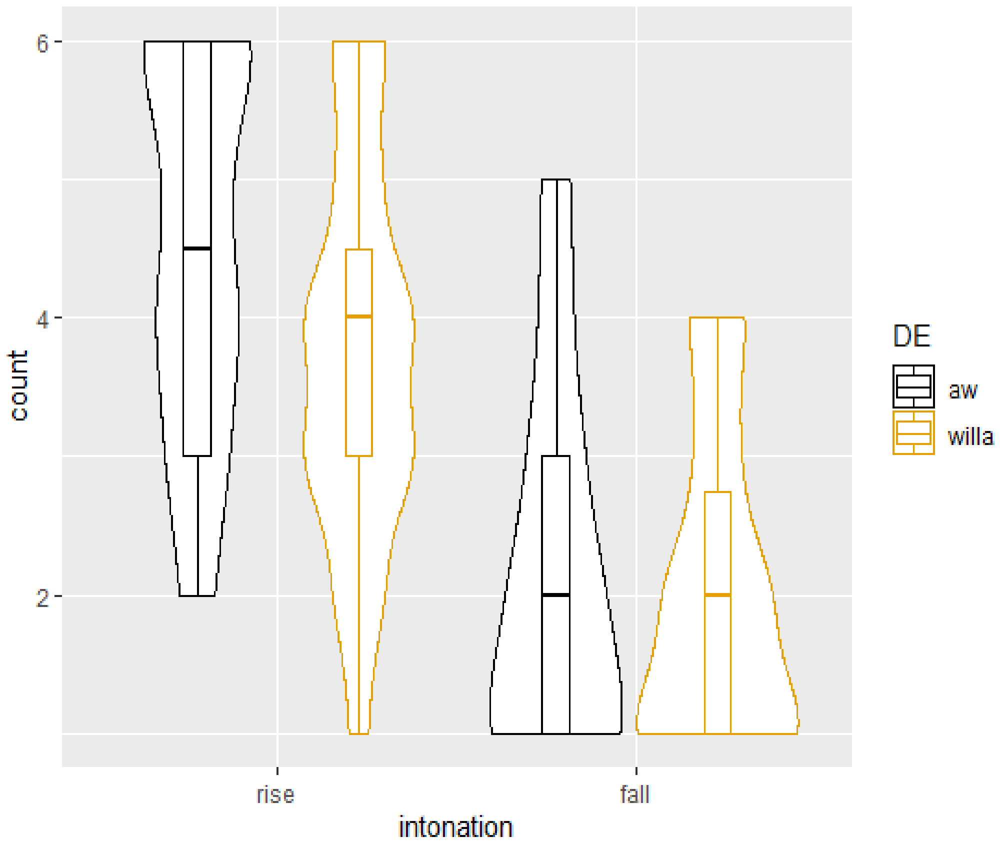


Figure 6.8 Median, interquartile range, and distribution of average counts across participants of dynq responses from JA listeners.

As the figure reveals, intonation is doing most of the disambiguation process. With the rise-fall, it was difficult to obtain a dynq interpretation though not impossible whereas, with the late-rise, it was very likely to have a dynq interpretation. The effect of rise-fall intonation was almost parallel between *ʔaw* and *willa*, but when there was a late rise with *ʔaw* (2lr), participants were more likely to interpret what they had heard as dynqs. However, when there was a late rise with *willa* (wlr), participants were hesitant to interpret what they had heard as dynqs, confirming this to be the mismatch condition, as expected from the JA production study (Chapter 5).

To conclude, the findings showed that both cues (the choice of contour and the choice of disjunctive element) contributed significantly to the interpretation and, most importantly, to the disambiguation of altqs and dynqs in JA, which answers the research question. The late-rise, compared with the rise-fall, significantly increased the likelihood of a token to be interpreted as a dynq. Similarly, *ʔaw*, compared with *willa*, made participants more likely to choose dynq responses than altq ones. However, the relative importance of the two cues differed. The choice of contour was more important than the choice of disjunctive element as was shown in Table 6.3.

6.4.1 Reflection on Providing Only Two Answer Options in the Experiment

There are two ways of interpreting the results of the mismatch condition. The first is that *willa* is accepted in both altqs and dynqs, based only on the fact that *wlr* tokens were interpreted 61% as dynqs and 39% as altqs (Table 6.2). However, this conclusion might have some problems given that the design of this experiment and Experiment 2 (Chapter 7) has only two answer options from which participants were allowed to choose. This design leads to thinking about a second way of interpreting the results, which is that participants might have resorted to guessing the answer in this mismatch condition. Checking for evidence of randomness in participants' answers needs to be confirmed or disconfirmed using a statistical test.

It might indeed have been better to provide participants with three options, instead of only two. The first two answers could have been paraphrases of what participants heard, and the third option could have been 'other', as Pruitt and Roelofsen (2013) did. Alternatively, the third option could have been an option that allowed participants to state whether or not they were confident about their answers or about the grammaticality of the trial that they heard. Additionally, the response time to each trial could have been set to be recorded when designing the experiment, which is not possible now given that Qualtrics can give the response time only in case each trial was presented on a separate page. However, the design of this study had six questions on each page, which excludes the possibility of obtaining the response time for each single trial retrospectively.

The proposed third option could have been useful in the mismatch condition (*willa* + late-rise (wlr)) as it would avoid forcing participants to choose only from the provided two options. This is because the JA production study (Chapter 5) showed that *willa* was only rarely used in dynqs (3%). Hence, *willa* in dynqs might be ungrammatical, or at least strongly dispreferred in them. So, providing a third option in the perception study might have prevented participants from guessing how to respond to wlr trials when they were not confident. Hence, using only two options might have affected participants' responses, which will need to be statistically explored below. It will not be possible to make generalisations about the acceptability of *willa* in the mismatch condition (wlr), that is, in dynqs, before making sure that participants' responses to wlr trials were different from chance.

Nevertheless, the decision to provide participants with only two paraphrases in the perception study was made, when the perception experiments (in this chapter and in Chapter 7) were designed, for the following reasons:

1. The planned statistical analysis, as shown in the previous section, requires having a dependent variable with only two categorical levels (i.e., binary).

2. One of the motivations for designing the perception study with only two options appeared after reflecting on the way the study replicated in this thesis (Pruitt & Roelofsen, 2013) dealt with their third option (the 'other' option) in their statistical analysis. Pruitt and Roelofsen struggled with their third option, given the statistical model they used (mixed-effects logistic regression model which is also used in this thesis). They reported that some of their participants chose 'other' but did not write anything in the blank corresponding to this option. One of the participants who chose 'other' rephrased what was heard (i.e., the question); there were also verbatim repetitions of the questions heard. Thus, their methodological decision was to attach their third option with one of the other two paraphrases when coding the dependent variable in the statistical model. They ended up merging all 'other' responses with the dynq paraphrases. Therefore, it was deemed prudent, when designing the perception studies in this chapter and in Chapter 7, to avoid any similar problems of interpretation that might arise with a third option.

3. Another reason for adapting Pruitt and Roelofsen's (2013) study with only two options was the fact that this type of experiment (2AFC), as was previously shown in the Procedures Section, was also used by another study which, itself, replicated Pruitt and Roelofsen's (2013) study with slight changes (O'Mahony, 2014).

4. Given that the task was long (an information sheet, a consent form, an instruction page, and 60 trials), there had to be a trade-off between providing a third option or not, as it was thought this could make the task longer. It was also thought that if the task lasts longer, there is a risk of participants randomly and quickly choosing any of the provided responses, due to the possible fatigue and boredom.

For the above reasons, it was thought that it might be safer to use only two options. However, as explained above, having only two options might have forced participants to guess, when faced with a mismatch condition. A possible way to overcome this challenge is to statistically test participants' responses for evidence of a chance performance in the mismatch condition. This is because there is a possibility of a guess strategy when participants were provided with a stimulus with a rise, which favours a dynq response, and *willa*, which is dispreferred in dynqs as shown in the production study in the previous chapter. That is, when participants were provided with a stimulus that they were not sure of due to the conflicting cues, in the mismatch condition, there was a possibility that they chose their answer at random.

A way to find out whether participants' responses were due to chance or not is to use the Exact Binomial test in R.[106] An advantage of using this test is that it will show whether or not *willa* is ungrammatical in dynqs: if it is ungrammatical, then we expect a chance performance in participants' behaviour. The researcher's intuition as a native speaker, from the beginning of the PhD till today, was that *willa* is accepted in dynqs, but that it is not preferred in this type of question. This was supported by the JA production study in which *willa* was used, though with only 3%, so was strongly dispreferred in dynqs. This intuition was also supported by the statistical results (Table 6.3), which showed that *ʔaw* was preferred in dynqs but *willa* was not.

The Exact Binomial test was run given the number of observations and the number of dynq responses in the mismatch condition, assuming 50% chance of choosing a dynq response. The results of the test showed that the observed proportion of dynq responses of .61 was higher than the expected .5 if responses were made at random ($p < 0.001$ (two-sided)). This result does not contradict the JA production study results because *willa* was used in the JA production study, though only 3%, but it showed a tendency for not being used in dynqs. Thus, the results of the JA production study do not contradict the results of the perception study, given that the perception results showed that *willa* was significantly dispreferred in dynqs; this result is also in line with the researcher's intuition that *willa* is not preferred in dynqs. The effect size for intonation in the results of the perception study above is much larger than that for choice of disjunctive element; this is borne out in the non-chance responses in the mismatch condition in the Binomial test because when participants were

[106] binom.test(x, n, p = 0.5, alternative = c("two.sided", "less", "greater"), conf.level = 0.95)

given two conflicting cues, they tended to depend somewhat more on intonation, compared to chance.

In conclusion, the significant result obtained from the Binomial test shows that participants did not resort to guessing when presented with *willa* with a late rise. This might lead to the conclusion that *willa* was accepted (at least by some listeners) in this mismatch condition, even if it was strongly dispreferred, as the results from the mixed-effects logistic regression indicated. It might also be worth noting that although the test was mainly intended in this thesis to test the responses to the mismatch condition, all participants' reponses to the other conditions were also tested using the Exact Binomial test, and all results were highly significant.

6.5 Discussion

The reason why this perception study was first envisaged was to find out which cues may reliably distinguish between the two types of disjunctive question and what their relative contribution to the disambiguation is.

Table 6.2 and Figure 6.7 clearly showed that the choice of contour had an important role in deciding on the status of a question either as an altq or a dynq. This result is clear as 68% of the late-rise tokens were interpreted by listeners as dynqs, and 75% of the rise-fall were taken as altqs. Additionally, the model results confirmed that the choice of contour was a significant determiner of the status as an altq or a dynq. Consequently, the results indicated that tokens with a late rise were most of the time interpreted as dynqs compared with tokens with a rise fall, indicating that contour shape changes the status of a disjunctive question from an altq to a dynq or vice versa.

However, the result that 25% of the 2lr and 39% of the wlr tokens were interpreted as altqs despite their late-rise contour is perhaps not surprising, as yes-no questions in prior work in Jordan (Abu Helal, 1993) were identified as yes-no questions only 53% of the time when participants listened to English stimuli and only 61% of the time when they listened to Arabic stimuli. So, having some incorrect responses here to the stimuli bearing the typical yes-no question contour could reflect a more general issue with the interpretation of prosodic contours.

Nevertheless, the 25% and 39% percentages could also be explained by assuming that participants might have focused their attention more on the meaning of disjunctive elements than on intonation, some of the time. That is, it was expected that some participants will ignore the role of intonation once they notice the presence of a disjunctive element; they might have supposed that as long as there was a disjunctive element in the recording, they had to choose an option from the *X* or *Y*. What supports this interpretation is that altqs and dynqs are not taught in grammar books, so participants might have been unaware of the existence of these two types of question in their dialect. As a result, when they heard a disjunctive element, this might have made them suppose that they should specify an option from the provided disjuncts. Another explanation of these percentages (25% and 39%) might be that the task may not be an easy one, leading to some unexpected answers.

The finding that the mismatch condition wlr had more altq responses than 2lr, even though they have the same contour shape (a late rise), is also similar to Abu Helal's (1993) observation that her JA participants in the perception experiment ignored intonational cues in the presence of syntactic or lexical cues, which is, somewhat, similar to Tench's (2015) observation (see Section 2.2). This would explain the difference in altq responses between wlr and 2lr, i.e., that some participants ignored the role of the contour shape in the presence of *willa*. Abu Helal provided an example in which intonation was ignored when some of her declarative yes-no questions did not receive yes-no question responses because the question particles in her trials were omitted, suggesting that the syntactic or lexical structure outweighed the choice of contour.

In the overall context of the thesis, the fact that the choice of contour proved to be of paramount importance is consistent with the JA production study results in which participants realised altqs and dynqs with different contours. Altqs were produced with a rise fall whereas dynqs were produced with a late rise.

Moreover, the findings supported the first hypothesis with its sub-hypotheses. Tokens with a late-rise nuclear contour received more dynq responses than tokens with a rise-fall nuclear contour, and tokens with a rise-fall nuclear contour received more altq responses than tokens with a late-rise nuclear contour. The reason why participants interpreted tokens with a late-rise nuclear contour as dynqs might be because they understood them as yes-no questions. What supports this interpretation is that normal yes-no questions in this dialect have similar contours, as shown in the literature review and in the JA production study, and there is, certainly, no reason for assuming that dynq and normal yes-no question contours are different from each other given that both are, after all, yes-no questions. Other researchers also reported that they have a similar contour in English (see, for instance, Pruitt & Roelofsen, 2013; Meertens, Egger, & Romero, 2019). So, the fact that tokens with a late rise were most often taken by participants as dynqs is consistent with Winans's (2019) observation for Egyptian Arabic that the contour of *ʔaw*-dynqs is similar to the contour of normal yes-no questions. The finding that the contour shape played a significant role in disambiguating the two types of question is also in line with what Pruitt and Roelofsen (2013) reported for English.

The experimental findings, thus, match what was found in the literature for JA (see Al Amayreh, 1991) and for English (see Pruitt & Roelofsen, 2013) regarding the semantic contribution of the choice of contour. Namely, these studies suggested that a speaker, using a falling contour, indicates that only one of the alternatives in the *X or Y* phrase should be selected as a suitable answer. However, by using a rising contour in JA (see Al Amayreh, 1991) and English (see Pruitt & Roelofsen, 2013), a speaker does not expect that a listener has to choose one of the alternatives in the *X or Y* phrase.

The findings in Table 6.3 also revealed that choice of disjunctive element contributed significantly to determining the status of a disjunctive question either as an altq or as a dynq. The disjunctive_element1 (i.e., *ʔaw*) increased the likelihood of selecting a dynq response, which is similar to the JA production study results (Chapter 5) showing that 97% of dynqs used *ʔaw* while 60% of altqs used it, suggesting that dynqs prefer *ʔaw*. The findings also mean that *willa* decreased the possibility of selecting dynq responses.

Moreover, the choice of disjunctive element was shown (Table 6.2) to increase the percentage of dynq responses to *ʔaw* (54%) compared with the percentage of dynq responses to *willa* (46%). This finding provides support for the previous findings of the corpus search and the JA production study in which JA speakers rarely used *willa* in dynqs (two in the corpus search and three in the JA production study), suggesting that dynqs in JA strongly disprefer *willa* but prefer *ʔaw*, instead. This finding was also found to be different from chance in the Binomial test, in the mismatch condition. This finding supports the hypothesis that questions with *willa* (wlr) will be interpreted as dynqs less frequently than questions with *ʔaw* (2lr), so it seems that *willa* is specialised to altqs whereas *ʔaw* is not (i.e., general) in the data.

The difference between *ʔaw* and *willa* in increasing or decreasing the likelihood of listeners' interpretation of what they heard as a dynq might also be explained in terms of pragmatics, and specifically Grice's (1975) maxims of cooperatively guided communication. That is, in terms of Gricean reasoning, it can be explained that there are two disjunctive elements (*ʔaw* vs. *willa*), and the speaker (in the recorded tokens) used *willa* in a particular token while *ʔaw* could have used in that token. The addressee (a listener in this case) has a slight preference for believing that *willa* is less likely to be interpreted as a dynq, and *ʔaw* is more likely to occur in dynqs. Therefore, the addressee believes that if the speaker intends to produce a dynq, *ʔaw* should be used, and given that the speaker used *willa*, the addressee might have thought that the speaker did not mean a dynq.

Apart from pragmatics, the preference to use *willa* less frequently in dynqs and more frequently in altqs in JA is consistent with the findings of the corpus search in JA (joka) in which *willa* was used five times in altqs and two times in dynqs. This preference was also attested in Syrian Arabic (SA) in which *willa* is one of the disjunctive elements that appear most frequently in altqs as reported by Cowell (2005) and as was observed in the corpus (1 in dynqs vs. 8 in altqs).

Generally, this finding is also supported by the fact that *willa* appeared in altqs more than in dynqs in all of the corpus datasets (Chapter 4). More specifically, eleven datasets used *willa* in altqs whereas eight used it in dynqs, meaning that *willa* is less common in dynqs across the eight dialects and the eleven datasets in the IVAr Corpus. For example, this preference was seen in the three datasets from Moroccan Arabic and Kuwaiti Arabic (KA) in the corpus search. The corpus also showed that *willa* was never used in dynqs in ombu (Omani): 0 in dynqs vs. 9 in altqs, irba (Iraqi): 0 in dynqs vs. 1 in altqs, and joam (one JA dataset): 0 in dynqs vs. 11 in altqs.[107] EA was also reported to have this preference as *willa* was reported to be an altq-specific disjunctive element (see Gary & Gamal-Eldin, 1982; Winans, 2012, 2019) though it appeared in both types of disjunctive question with a slight preference to altqs in the corpus (4 in dynqs vs. 9 in altqs). The Ombu data showed a slight preference also to use *ʔaw* in dynqs more than in altqs (2 in dynqs vs. 1 in altqs).

[107] As was already pointed out in Chapter 4, the corpus was not specifically designed to elicit altqs and dynqs. Thus, the zero occurrence of a disjunctive element in one type of question does not mean that a dialect does not allow the use of that disjunctive element in that place.

Given this preference in JA, a mismatch condition arises when using *willa* with a late rise. The late rise pushes participants to interpret a token as a dynq whereas *willa* pushes them to interpret the same token as an altq. It is clear that the late rise won in this conflict, which explains why the choice of contour had a higher coefficient estimate in the statistical analysis. Participants' tendency for interpreting the mismatch condition as a dynq was shown, using the Binomial test, to be different from chance, even though participants were forced to choose from only two on-screen paraphrases (Section 6.4.1). This tendency may be attributed to the fact that yes-no questions in this dialect have a late rise. Pruitt and Roelofsen (2013) also reported that they had a similar mismatch condition when a final fall was mixed with a single accent on one disjunct.[108] The choice of contour also outweighed the other cue in their case.

In addition, the findings have revealed that both contour shape and choice of disjunctive element were important in disambiguating altqs and dynqs. Nevertheless, the effect of contour shape was larger than that of choice of disjunctive element. This finding suggests that choice of contour played the primary role, and choice of disjunctive element the supporting role, in this dialect. Thus, a yes-no question (i.e. polar) interpretation can arise in response to a late-rise contour, with *willa* (in wlr) or without *willa* (in normal yes-no questions). Equally, it can be obtained in response to a late-rise contour, with *ʔaw* (in 2lr) or without *ʔaw* (in normal yes-no questions). In contrast, the dynq interpretation is less likely to arise in response to *willa* without a late rise (wrf) and in response to *ʔaw* without a late rise (2rf). The finding that the choice of contour outweighs the choice of disjunctive element provides support for the third hypothesis and is consistent with the JA examples of altqs and dynqs that Al Amayreh (1991) provided. These examples used the same disjunctive element but different contour shapes, indicating that what disambiguated them was the choice of contour, not the choice of disjunctive element.

Although the interaction between the two main effects was non-significant, it sheds light on the relationship between these two cues. The coefficient estimate for the interaction is positive, meaning that tokens having *ʔaw* with a late rise (2lr) were somewhat more likely to be understood as dynqs compared with tokens having *willa* with a late rise (wlr). This finding also refers to the above-mentioned preferences found in the corpus search and the JA production study. Furthermore, this finding helps understand the nature of disjunctive

[108] According to their study, a single accent on one of the disjuncts should give rise to a dynq response while a final fall to an altq response.

questions and their formation in JA. Using *willa* with a late rise (the mismatch condition, wlr) was dispreferred in the corpus search, the JA production study, and the perception study; all of which experimentally confirmed the intuitions of the researcher, suggesting that there is no contradiction between them. The researcher's intuition in Chapter 4 was that *willa* is not preferred in dynqs, so it might be specialised to altqs; *ʔaw* might be the general disjunctive element. Hence, JA belongs to Type 2A, which is now supported in both Chapter 5 (the production study) and Chapter 6 (the perception study).

6.6 Summary of the Chapter

The main aim of the chapter was to find out which of the two cues found in the JA production study (the choice of contour and the choice of disjunctive element) disambiguates altqs and dynqs and what the relative contribution of each is in the disambiguation and interpretation of these questions. The findings showed that both cues contributed significantly to the disambiguation of disjunctive questions though choice of contour was more important than choice of disjunctive element. The fact that choice of contour proved more influential than choice of disjunctive element does not undermine the role of choice of disjunctive element as the two cues were shown to independently increase the likelihood of dynq responses.

The *willa* tokens were rarely used in dynqs in the corpus search (for JA) and in the JA production study, as shown in the previous two chapters. Therefore, a mismatch or a conflict was expected to arise when the late rise is produced along with *willa* (wlr), and this was observed in the interaction between the two cues in the statistical analysis. As was explained in the previous chapter, the contour (late-rise in this case) was expected to sway the interpretation of wlr tokens to be dynqs while the disjunctive element (*willa* in this case) was expected to behave in the opposite direction, shifting the interpretation to be altqs. Thus, when both of these cues were tested in combination in the perception study, wlr tokens were interpreted somewhat less frequently as dynqs, though not to a significant extent. The fact that there were only two on-screen paraphrases for participants to choose from could have affected listeners' responses in the mismatch condition (wlr), but the Binomial test results indicated that listeners' responses are different from chance (Section 6.4.1).

The first part of Chapter 4 showed that, based on the literature, there are three types of dialects. Type 1 includes dialects in which the two disjunctive elements seem each to be specialised to a specific disjunctive question (to one meaning each). Type 2 comprises dialects in which there is an indication that one disjunctive element is specialised to one type of disjunctive question while the other is not (i.e., one disjunctive element may be specialised, and one may be general). This type of dialects is divided into Type 2A in which the specialised disjunctive element is related to altqs, and Type 2b in which the specialised disjunctive element is of dynqs (see Chapter 4). Type 3 includes dialects that might have no specialisation of disjunctive elements (i.e., both disjunctive elements might be general). It was also stated, in that chapter, that it is difficult to decide on the type for JA, due to the lack of prior studies on the distribution of its disjunctive elements. In Chapter 5, it was suggested that it might be the case that JA belongs to Type 2A dialects, based on the production study results. It was also hinted that further evidence is needed to confirm the type of dialects that JA fits in by exploring how JA listeners interpret disjunctive questions with both disjunctive elements in a perception study. Now, given the results from the mixed-effects logistic regression, supported by the non-chance results from the Binomial test, it might be safe to suggest that JA belongs to Type 2A. Replicating the perception study with more data from JA (Chapter 7) might confirm or disconfirm JA's position in Type 2A.

The present findings contribute to the literature as there were no prior experimental studies that investigated which cues disambiguate disjunctive questions nor their relative contribution to the interpretation of these questions in JA. There were also no studies that experimentally tested the type JA falls in.

A potential limitation of this experiment emerges when considering an issue raised in Pruitt and Roelofsen's (2013) study on English. They referred to the possibility of whether it is the overall nuclear contour or some part of it that causes the difference between altqs and dynqs. In other words, it might be possible that one component of the contour is responsible for the contrast, not the whole contour. For example, in a contour such as H* L-L%, which was taken to be the altq contour in Pruitt and Roelofsen's study, they referred to Bartels' (1999) comment that the (L-) might be the part that causes the contrast between altqs and dynqs. However, they reported that their experiment was not designed to test this hypothesis. They stressed that "previous work on intonational meaning does not make it clear whether such an analysis is to be pursued in general" (p. 645). Therefore, this was not addressed here and was left for future studies which will build on the contributions of this thesis.

An empirical limitation of this experiment is that it recruited only Urban JA participants of Irbidi origin, so its findings cannot be generalized to other cities in Jordan.[109] Therefore, similar experiments on Urban JA from other cities, on other varieties of JA (Bedouin and rural), and on other Arabic dialects might be worth considering in the future.

This chapter has established which cues disambiguate altqs and dynqs in JA, and the next chapter will replicate this perception study on other Arabic dialects representing the types proposed in Chapter 4 (i.e., on EA, KA, and SA). The aim of the new perception study (Experiment 2) will be to find out whether the dialects differ in how they disambiguate disjunctive questions. The purpose of this comparison will be to explore the role of each cue in disambiguating altqs and dynqs, to find out which cue is the most important within each dialect, and to discover whether the other dialects also display any mismatch conditions. A possible advantage of Experiment 2 will be that it will either confirm or reject the provisional allocation of the dialects to their three types in Chapter 4: EA (either Type 1 or Type 2), KA (Type 1), and SA (Type 3). It will also confirm or reject JA's type that was based on experimental evidence from Chapter 5 and Chapter 6 (i.e., as a Type 2A dialect).

[109] This is only a possible limitation though, from the perspective of a native speaker, all JA dialects might behave similarly.

7 Experiment 2: A Replication of Experiment 1 on JA, EA, KA, and SA

7.0. Aim and Outline of the Chapter

In Chapter 4, dialects were provisionally classified into three types, based on the conclusions drawn from prior studies and from the corpus search. Type 1: a tendency to have specialised disjunctive elements (e.g., Modern Standard Arabic (MSA)), Type 2: a tendency to have one specialised and one general disjunctive element (e.g., Sanʕaani Arabic), and Type 3: a preference to have general disjunctive elements (e.g., Gulf Arabic). It was also hinted that Jordanian Arabic (JA), Egyptian Arabic (EA), Kuwaiti Arabic (KA), and Syrian Arabic (SA) might be Type 2A, Type 1 or Type 2, Type 1, and Type 3, respectively. The chapter, thus, concluded by implying that these proposed classifications are only tentative. Two production studies (Chapter 5) followed on the four dialects. The aim of the two production studies was to explore the possible disambiguating cues of disjunctive questions. Additionally, the JA production study was conducted to complete the JA picture in terms of which disjunctive element can be used in each type of disjunctive question and the prosodic features of these questions. The results of the production studies served as input to the perception study on JA (Chapter 6).

The results of the JA production study (the dialogue completion task, DCT) showed that both *ʔaw* and *willa* were used by participants in the two types of disjunctive question, but *willa* was used much less frequently than *ʔaw* in dynqs (3%). This result hints that JA might belong to Type 2A dialects observed in Chapter 4 (there is a strong indication that *willa* could be specialised, and that *ʔaw* might be general). However, further evidence is needed to decide on JA's position, given the small number of *willa* in dynqs. The production results also highlighted that there were two differences between altqs and dynqs in the data: prosodic and lexical cues. The prosodic cues were related to the choice of contour shape (late-rise vs. rise-fall), and the lexical cues were related to the choice of disjunctive element (*ʔaw* vs. *willa*). At the end of Chapter 5, it was suggested that the JA perception study in Chapter 6 (Experiment 1) will be designed preliminarily assuming that JA belongs to Type 2A (as a baseline), based on the researcher's intuition and on the experimental evidence (the production results). Hence, a possible mismatch condition could arise when mixing *willa* with a late rise in a perception study. It is worth noting that dialects belonging to Type 1 might have two mismatch conditions: *willa* with a late rise (wlr) and *ʔaw* with a rise fall (2rf) (this is left for future research as it is beyond the scope of this thesis).

However, it is still unknown which of the cues (choice of contour vs. choice of disjunctive element) can reliably disambiguate disjunctive questions in a perception study, replicating Pruitt and Roelofsen's (2013) English experiment. Hence, in Chapter 6, the question of which of these two cues disambiguate altqs from dynqs or which of them contribute more to the disambiguation in JA was addressed for the first time. In the perception study, both cues turned out to be highly significant, though choice of contour contributed more to the disambiguation as the late rise increased dynq responses. The results also indicated that *willa* swayed the interpretation significantly towards altqs by decreasing the likelihood of dynq responses. The strong tendency, thus, was that *willa* is specialised while *ʔaw* is not, which is consistent with Jordan's position in Type 2A, completing the gap referred to in Chapter 4 as the picture for JA was not clear in that chapter. In order to test the ungrammaticality of *willa* in dynqs (i.e., in the mismatch condition), given that participants were provided only with two on-screen paraphrases and given that it appeared only 3% in dynqs in the production study, the Exact Binomial test was run. Its results showed that participants' responses were different from chance, despite the strong tendency to avoid it in dynqs as shown in the production study and in the statistical analysis of the perception study (see Section 6.4.1 for more details).

This chapter, building on the findings of the previous chapter, sets out to establish any similarities and differences between JA, EA, KA, and SA in which cues disambiguate the two types of disjunctive question. Based on the literature and the corpus, there might be slight differences between these dialects. One of the points to be addressed in the four dialects is to find out whether the dialects are similar or different in their treatment of the mismatch condition. A cross-dialectal perception study (Experiment 2) was run separately in four dialects: JA, EA, KA, and SA. JA is the researcher's native dialect whose picture needs to be clear. The EA, KA, and SA represent the possible types found in Chapter 4, and their pictures also need to be clear in terms of which disjunctive elements are used in which disjunctive question. The cross-dialectal perception experiment, including all these dialects, could reveal whether or not the preliminary classifications of dialects into three types in Chapter 4 hold.

Furthermore, there was a need to include JA in Experiment 2 again for various reasons. First, the main aim of the new experiment was to make comparisons across the four dialects, but the responses that would appear to EA, KA, and SA participants would be expressed in MSA. However, the responses in Experiment 1 (Chapter 6) were written in JA, making a direct comparison of the results of Experiment 1 for JA and Experiment 2 for EA, KA, and SA not advisable. It is, therefore, prudent to recruit another set of JA participants to facilitate comparison among dialects. By running one cross-dialectal experiment with four versions of the same design (JA version, EA version, KA version, and SA version), the results can safely be compared and contrasted with each other. Second, one of the recommendations from the previous chapter was to recruit more JA participants to explore, after having more data, which type JA belongs to, as it was assumed to be Type 2A, based on the results of Experiment 1.

Third, in Experiment 1, slashes were used in the on-screen answers to represent disjunctive elements in dynqs, avoiding forcing altq interpretations (Chapter 6, Section 6.3.3). There were slashes for dynq tokens but spelt-out disjunctive elements for altq tokens, which might have made participants interpret tokens more as altqs (though the intercept was non-significant) given they had a spelt-out disjunctive element that they had heard. It might, therefore, be sensible to either spell out the disjunctive elements in dynq responses in the JA replication (i.e., in Experiment 2), making all responses (altq and dynq responses) contain disjunctive elements, or use slashes in all responses. The former is impossible due to the potential bias that was referred to above and in the design of Experiment 1 (Chapter 6, Section 6.3.3) and also due to the lack of *willa* in MSA.[110] Consequently, the only available option was to use slashes in all responses in the JA replication that has MSA responses.

Given that the EA, KA, and SA versions of Experiment 2 had two slight differences from Experiment 1 (i.e., in the MSA responses and the slash-only responses), it was deemed necessary to replicate Experiment 1 with the same design as that of the EA, KA, and SA versions, making four versions of Experiment 2. This replication will also show whether or not the use of slash-only paraphrases here changes the results in JA.

Section 7.1 presents the rationale for choosing EA, KA, and SA dialects, in particular. It also reflects on the use of the JA stimuli in Experiment 2 and on the possible effects of this decision. Section 7.2 provides the overarching research question of the four versions of Experiment 2. Sections 7.3 lists the hypotheses. Section 7.4 explains the methods. Section 7.5 provides the findings and reflects on having only two responses in the design of the experiment. Section 7.6 discusses the findings.

[110] MSA only has *ʔam* and *ʔaw* as shown in Chapter 4 (4.1).

7.1 Rationale and Reflection on the Usage of JA Stimuli in Experiment 2

The EA, KA, and SA versions of the experiment were conducted for several reasons. First, EA, KA, and SA are preliminarily thought to belong to different types of dialects proposed in Chapter 4. EA was assumed to belong to Type 1 or Type 2, based on the literature review (Section 4.1). KA was not mentioned in the literature review (Section 4.1), but based on the corpus search (*willa*: 13 in altqs vs. 4 in dynqs; *ʔaw*: 1 in altqs vs. 5 in dynqs) it might belong to Type 1 because *willa* was used more often in altqs whereas *ʔaw* in dynqs. SA was also preliminarily described, based on the literature review (Section 4.1), as belonging to Type 3. Thus, including all these dialects in Experiment 2 might help check these different types observed in both the literature and the corpus and will also increase the contribution of this study. No prior study has experimentally investigated the disambiguation of disjunctive questions in any of these dialects, too.

Second, the literature on EA, KA, and SA encourages selecting these particular dialects. That is, disjunctive questions have received contradicting accounts in EA, and they have not been studied in KA and SA. A closer look at the EA studies (see Section 4.1.2) revealed that there were still slight differences in the descriptions of disjunctive elements; the perception study on EA will experimentally contribute to this debate about which disjunctive element is used in the two types of disjunctive question. Soraya's (1966) study, reviewed previously (Chapter 4), stated that *willa* can appear in both types of question. Eid also reported that *ʔaw* cannot occur in yes-no questions. Winans (2012; 2019), on the other hand, reported that *willa* can only appear in altqs and *ʔaw* only in yes-no questions (i.e., dynqs as shown in the top panel of Figure 7.1). So, EA might belong to Type 1, but Winans (2012) also reported that *ʔaw* can appear in altqs if it is strongly accented (see Chapter 4). This use of *ʔaw* in altqs could also make EA belong to Type 2, instead of Type 1. So, these different descriptions will be empirically examined by finding out whether or not *ʔaw* and *willa* can perceptually be tolerated in disjunctive questions. Thus, the findings of the experiment will show which of these conflicting reports can be supported by the degree of their acceptability by participants. It seems that no perception study was conducted to find out more about which disjunctive element is acceptable in each type of disjunctive question and what disambiguates them in EA.

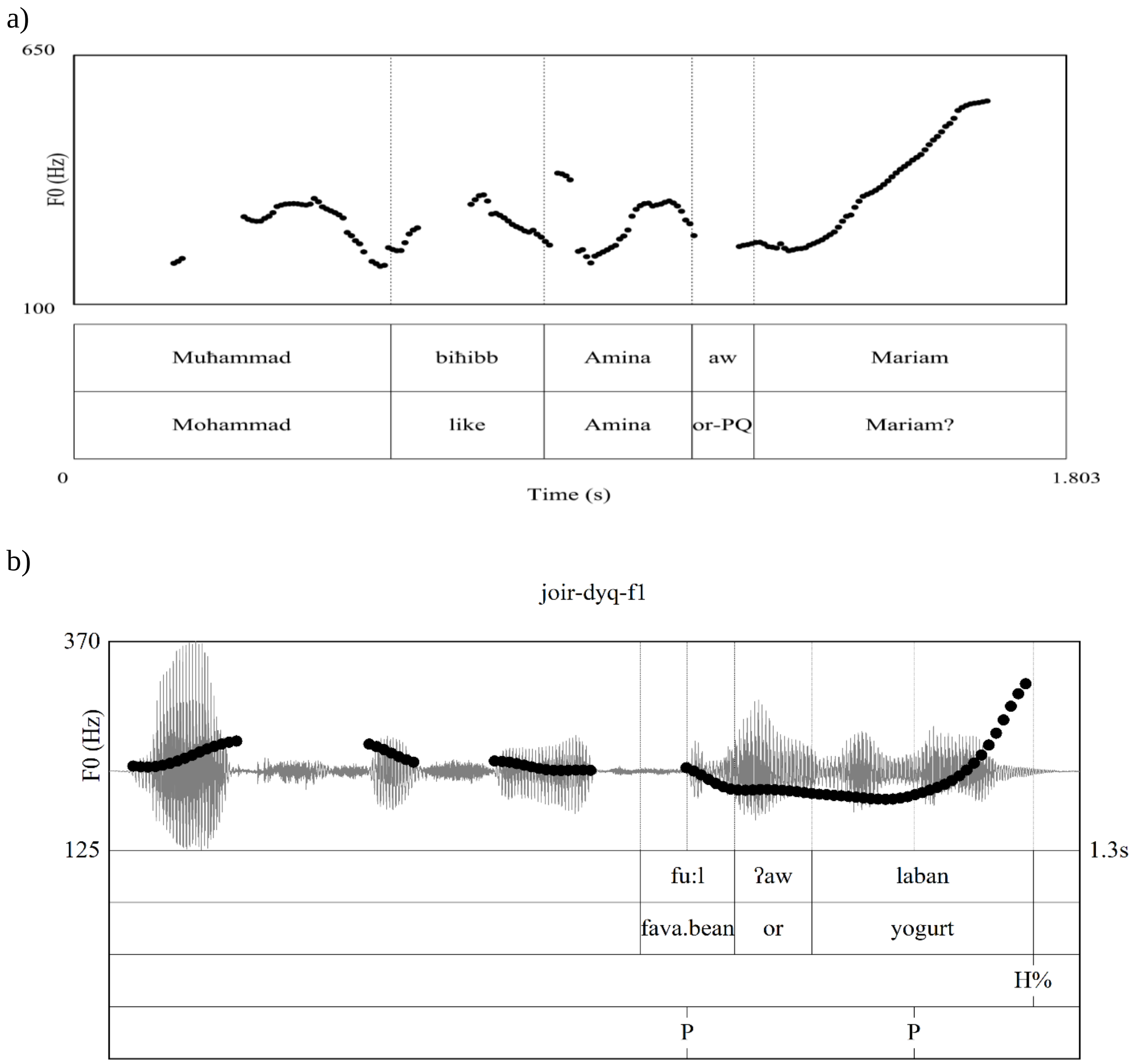


Figure 7.1 A pitch trace showing the overall typical contour shape of dynqs with *ʔaw* in EA (from Winans, 2019, p. 245 at the top) and in JA (from the production study (joir-dynq6-f1) at the bottom). The IPA transcription and the translation of the cited example in (a) is *muhammad biħib ˈamina ʔaw ˈmariam* ‘Does Muhammad like Amina or Mariam?’

Figure 7.1 shows that dynqs in EA (at the top) have an overall final rise, which is similar, though not identical, to the overall final rise in JA (at the bottom).

Consequently, conducting a perception study on EA, KA, and SA addresses the gaps in the literature of these dialects by experimentally confirming their types and opening the door to the investigation of disjunctive questions in these dialects in the future. The only study that has explicitly referred to altq in KA was Hellmuth (2018) who reported that altqs have a final fall. No earlier studies referred to dynqs in KA and SA, but a few researchers observed that normal yes-no questions have a final rise in both dialects (Ferguson & Ani, 1961; Al-Khalifa, 1984; Alharbi, 1991; Kulk, Odé, & Woidich, 2003; Sulaiman, 2016; Hellmuth, 2018). This overall rise shape is somewhat similar to the rise found in JA yes-no questions (Hellmuth, 2018). There is no a priori reason to assume that the contour shapes of dynqs in KA and SA are different from those of normal yes-no questions given that all of them are yes-no questions. The reasoning that normal yes-no questions and dynqs have a similar contour shape was also assumed by other researchers in English (e.g., Pruitt & Roelofsen, 2013; Meertens et al., 2019) and in EA (Winans, 2019). The JA examples of normal yes-no questions and dynqs that Al Amayreh (1991) provided used the same intonational annotations, indicating that they bear the same contour shape. The similarity of these contours was also argued for in the JA production study (Chapter 5, Section 5.5). Furthermore, Hellmuth's (2018) observation that the shape of the contour of yes-no questions in KA is similar to that of yes-no questions in JA in having a final elbow rise might also make this dialect suitable to run a perception study in using the recorded JA stimuli that were used for Experiment 1.

The third motivation for including EA, KA and SA in Experiment 2 is mutual intelligibility. Speakers of JA, EA, KA, and SA are intelligible to each other, as speakers of most of the Arabic dialects, in general, can mutually understand each other (Amer, Buragohain, & Suryani, 2020).[111] Similarly, Yasin (2012) noted that JA and EA are mutually intelligible because they belong to one language. Al-Qenaie (2011), a Kuwaiti researcher, also implied that there would be mutual understanding if he had conversations with Jordanians, Lebanese, Egyptians, and Syrians, suggesting that these dialects are mutually intelligible.

Stowasser and Ani (1964) explicitly indicated that JA and SA, among other dialects related to the same region – the Levantine –, are almost identical phonologically, syntactically, etc. They even described these dialects as forming one linguistic unit. They also explicitly indicated that speakers of these dialects can understand each other and a Syrian cannot find difficulties in understanding the dialects of the historic Levantine dialects. The linguistic similarity in many linguistic phenomena between JA and SA was also referred to by Al Omar

[111] Such mutual intelligibility is not surprising because in the recent past there was only one state for all Arabs in the so-called Ottoman Empire. Arabs started to call for establishing their own independent countries that are present nowadays. For example, Jordan was established by King Abdullah I in 1921.

(2011) who attributed such similarities to the geographical closeness as both countries have borders with each other.

The intelligibility among JA, EA, KA, and SA referred to by numerous studies above might be because the vast majority of Arabs understand JA (Al-Momani & Al-Saidat, 2010). Al-Qenaie also attributed such intelligibility to the advancement in technological tools, media, and the Internet as TV shows and programs of all dialects are nowadays watched or can be accessed by all Arabs of different dialects. He, however, admitted that there are some slight lexical differences among the dialects.[112] JA is one of the other Arabic dialects that are spoken in Kuwait (Alqattan, 2015), which might also facilitate mutual intelligibility. Additionally, SA participants chosen here are those living in Jordan as they are refugees, which ensures that they fully understand JA. Other researchers also collected data from Syrian refugees in Jordan, such as (Hellmuth & Almbark, 2017) in their cross-dialectal IVAr Corpus.

This mutual intelligibility between JA, EA, KA, and SA might stem from the geographical closeness and social interactions between the people of these countries.[113] So, the mutual intelligibility between Arabic dialects was also reported to increase or decrease depending on the geographical closeness of the speakers of dialects (Froud & Khamis-Dakwar, 2018). It might also be because JA, EA, KA, and SA belong to the Eastern dialects of Arabic compared with the Western dialects that include Moroccan Arabic as well as the dialects of the countries around Morocco in North Africa.

The Western and the Eastern dialects have different features to the degree that some researchers classified them as different languages (Benkirane, 1998). This might make them unintelligible to each other, which leads to excluding the Western Arabic dialects from Experiment 2 given that the stimuli used, which are in JA, must be intelligible to participants. The fact that JA and Moroccan Arabic are not mutually intelligible was also referred to by other researchers (see Altakhaineh, 2016; Mousa, 2019; Amer, Buragohain, & Suryani, 2020).

[112] In order to avoid any confusion that differences in lexical items might make, they were carefully selected to be included in the recordings and were regularly checked with Egyptian, Kuwaiti, and Syrian friends. All of them confirmed the intelligibility of these words and that they are available in their dialects.
[113] Jordan has borders with Egypt (sea borders) and Syria but not with Kuwait.

Moreover, JA and other Arabic dialects, including those spoken in the Gulf states which include Saudi Arabia and Kuwait, were reported to share similar linguistic features (Abd-El-Jawad, 1987; Al Omar, 2011; Amer et al., 2020).[114] The fact that JA is similar to Gulf Arabic dialects, such as Hijazi Hadari, was also attributed to the geographical closeness of Jordan and the Gulf states, such as Saudi Arabia (Alhazmi, 2018).

Given the reasons mentioned above and the similarities in terms of the shape of the overall nuclear contours of yes-no questions and disjunctive questions in JA, EA, KA, and SA, it might be plausible and safe to use the JA stimuli in Experiment 2. This similarity in terms of having a final rise between JA and other Arabic dialects in yes-no questions is not surprising as Hellmuth (2018) also reported that differences between JA and other Arabic dialects in the contour of this type of question are not huge. Using the same perception stimuli in different dialects of the same language was also observed in the literature as O'Mahony (2014) ran her perception experiment on participants from four English speaking countries, as shown in the literature review of the previous chapter.

Given that there seem to be no prior studies that have experimentally investigated the disambiguating cues of altqs and dynqs in EA, KA, and SA and how these dialects are similar or different in these cues, they were selected to be parts of Experiment 2. Although there might be slight phonetic differences in yes-no questions between JA and KA (Hellmuth, 2018), the overall shapes of rises across the four dialects were also reported by the same researcher to be similar, so it is acceptable to run the experiment with EA, KA, and SA listeners using JA stimuli. Using the same JA stimuli might be a useful first step which might pave the way for more ideal experimental studies using stimuli recorded specifically for each dialect.

Building on the above discussion, it is clear that the stimuli to be used in Experiment 2 are the ones that were recorded by the researcher, so they are in JA. The intended JA stimuli were used because it was not possible to record new stimuli due to the ethics ban on human subject data recording due to COVD-19 and due to many other reasons mentioned in the

[114] The similarity between JA and the Gulf Arabic dialects is not surprising because Jordanian clans are mostly descendants from the same clans in the Arabian Peninsula since there were no borders separating the Arab countries. This is clear nowadays with the same clan names that exist in those countries and in the mutual visits. Till now, relatives having the same clan name are still visiting each other across the Arab World. For this reason and for other reasons, including the geographical closeness, the Gulf states in 2011 invited Jordan to join their Council.

limitations of the thesis (Chapter 8, Section 8.5). However, using the JA stimuli should not pose any problems, as was explained above. Using the same stimuli in a cross-dialectal experiment was also observed in the literature (see, for instance, O'Mahony, 2014 on English).

Although JA, EA, KA and SA all belong to the same language and belong to the same subcategory of dialects (Eastern Arabic), some consequences of playing the JA recordings to listeners from other dialects are worth acknowledging. First, there might still be a possibility of a slight difference related to the phonetics of the contour, which could be in scaling (pitch register) or alignment (see Hellmuth, 2018). However, this thesis is concerned with the overall broad categories of contour, which are similar for yes-no questions and altqs in the four dialects (see, Hellmuth, 2018). Future research that employs production and perception studies in EA, KA, and SA might confirm or reject the results of Experiment 2. What is known from the first production study (Chapter 5) and from the literature on the overall shape of the intonational contours in these dialects is that altqs end with a rise fall, and yes-no questions end with a late rise (see, Ferguson & Ani, 1961; Al-Khalifa, 1984; Alharbi, 1991; Kulk, Odé, & Woidich, 2003; Hellmuth, 2018), suggesting that they have the same overall contour shape as JA does.

Second, because the stimuli were recorded in JA, it should be pointed out that listeners from EA, KA, and SA might have interpreted the stimuli in one of two ways. They might have tried to use their intuitions as native speakers of EA, KA, and SA to interpret the JA stimuli, or they might have tried to guess how Jordanian listeners might interpret these stimuli. In the first scenario, the results can safely be generalised to those dialects, and future research might follow the steps outlined in this thesis (a production study and a perception study) to either accept or reject the results of Experiment 2. In the second scenario, the results instead show how speakers of other dialects were able to distinguish between altqs and dynqs when they heard them produced by a speaker of a dialect other than their own.

In either scenario, the results will still count as original contributions to our knowledge of kinds of questions that were not experimentally described before. In addition, if a future study on one of these dialects uses stimuli recorded by a native speaker, then a comparison between its results and the results of Experiment 2 could confirm or exclude the possibility of confusion of altqs and dynqs that a listener might have had when presented with the JA stimuli (i.e., stimuli produced by a speaker of another dialect).

Nevertheless, the scenario expected in this thesis, before running Experiment 2, was that listeners will use their knowledge of their own dialects when answering the questions, for five main reasons. First, as was explained above, these dialects were carefully selected to run the perception study in because they are ‘nearby dialects’, as justified in the rationale above. So, it was thought that listeners will safely interpret the JA stimuli given the mutual intelligibility that was emphasised in the literature above. Second, the on-screen task instructions clearly stated that listeners need to choose the paraphrase that they think represents what was meant in the recording. This means that they were asked to indicate how they themselves interpret the question, based on their understanding, which means that they were expected to use their own intuitive judgment. Third, to avoid any dialectal issues that might arise, such as this issue of how they perceived the utterances, all lexical items were carefully selected and checked with native speakers of each of these dialects. This is because if they hear JA-specific lexical items, they might not understand them, or they might guess how Jordanian people might interpret these words.

Fourth, and most importantly, nothing in the information sheet or in the consent form referred to the citizenship of, or any ethnic information related to, the researcher. It was not mentioned that the stimuli were recorded by a Jordanian researcher. It was only mentioned that this experiment is designed to explore how different utterance types are interpreted in Arabic, and then participants were asked to choose the paraphrase that matches what they thought the question meant, i.e., to provide their own interpretation of what they heard. Hence, there was no way of knowing for sure that the stimuli were recorded by a Jordanian. Furthermore, given the online method of running the experiment, participants were sent the link by the researcher’s native friends or friends of their friends, so the Jordanian identity of the researcher was completely anonymous to participants. This might have minimised the risk that they might guess how a Jordanian might interpret the stimuli. Fifth, it is not thought that all participants might know how a Jordanian participant interprets the questions under study.

To sum up, given the reasons above, it was thought that participants from other dialects would use their own interpretation that represented their understanding of their own dialects when interpreting the recordings. As mentioned above, results from future studies using stimuli recorded by native speakers in each of the other three dialects might be compared with the results from Experiment 2, which is the first experiment that tests the perception of listeners from different dialects.

7.2 Research Question

The four versions of Experiment 2 will attempt to answer the following overarching research question:

i) Are there similarities and differences between JA, EA, KA, and SA in which cues disambiguate the two types of disjunctive question (altqs and dynqs), and how do these similarities and differences map on to the Types proposed in Chapter 4?

The literature on disjunctive element use in Chapter 4 (4.1) showed contradicting accounts from different studies on EA. As a result, the answer to the current research question will experimentally resolve the ambiguity in the EA literature. That is, the question will show whether *willa* can only be used in altqs (i.e., specialised), which supports what was noted by some researchers (e.g., Gary & Gamal-Eldin, 1982; Winans, 2012, 2019), or whether it can appear in both types of disjunctive question, which is in keeping with Soraya's (1966) study. The results will also check whether *ʔaw* is restricted only to dynqs as Winans asserted, and whether it is acceptable in altqs and dynqs, which is a matter of debate in the EA literature (see Section 4.1.2). Thus, the results of the experiment are expected to reveal the type that EA belongs to, from those types set out in Chapter 4.

Similarly, there was only one study with two examples of disjunctive questions using the same disjunctive element in JA, and there was only one study discussing altqs in KA. Answering the research question will also experimentally add to the unique JA study and will explore the acceptable disjunctive elements in KA, which has no studies about its disjunctive elements.

As for SA, the disjunctive elements were reported to be synonymous with a preference for using *willa* and *yamma* in altqs (Cowell, 2005). The answer will also show whether the disjunctive elements used in the SA version of Experiment 2 show any preference for a specific disjunctive question type, revealing the type to which SA belongs.

In addition, answering this main research question links Experiment 1 (Chapter 6) with Experiment 2. In chapter 6, the aim was to find out which cues disambiguate disjunctive questions in JA. These cues were, thus, established in that chapter, so the current chapter seeks to find out whether there are any similarities or differences between the dialects when such cues are perceived.

The overarching research question will also help explore the role of the contour shape in disambiguating the two disjunctive question types given that the literature (Chapter 5, Section 5.2) showed that altqs in the four dialects end with a rise fall and yes-no questions with a late rise. In EA, for example, dynqs with *ʔaw* were also reported to have the same contour shape as non-dynqs, emphasising that they are all yes-no questions (Winans, 2019).

7.3 Hypotheses of Experiment 2

The following hypotheses will be tested:

1. It is hypothesized that disjunctive questions will be disambiguated by the overall nuclear contours, such that the late-rise tokens receive more dynq responses than the rise-fall ones.

2. It is expected that the choice of disjunctive element will affect the status either as an altq or as a dynq, such that *willa* will decrease dynq responses and will increase altq responses.

3. The choice of contour is hypothesized to have a larger effect than the choice of disjunctive element.

The following is the rationale for these hypotheses across the four dialects. For the JA version of Experiment 2, the above three hypotheses are based on the literature, the findings of the JA production study, and the findings of the first perception experiment (Experiment 1) on the same dialect.

For EA, the first hypothesis draws on prior studies reporting that normal yes-no questions in this dialect have a final rise and altqs have a final fall. It also builds on Winans' (2019) observation that the contour of *ʔaw*-dynqs is similar to that of normal yes-no questions and on the studies that provided examples of pitch traces showing that altqs in this dialect end with a rise fall (Hellmuth, 2018; Winans, 2019). In addition, given the contradiction in the literature on the use of disjunctive elements in disjunctive questions in EA, it is difficult to formulate hypotheses on the role of disjunctive elements, but the corpus showed that *willa* was used in dynqs less than in altqs (4 in dynqs and 9 in altqs), leading to the second hypothesis above. The third hypothesis for EA was based on the corpus results that showed that *willa* appeared in both altqs and dynqs, suggesting that contour is needed to disambiguate these questions, in case one disjunctive element is used in both question types.

Regarding KA, it was shown, in the corpus search, to employ *ʔaw* and *willa* in altqs and in dynqs, but the tendency was to prefer one disjunctive element in each type of question (*Willa*: 4 in dynqs and 13 in altqs; *ʔaw*: 5 in dynqs and 1 in altqs). Based on this preference, it was preliminarily classified as Type 1. However, given that both disjunctive elements appeared in altqs and dynqs and given that KA was described to use two different contours in altqs and dynqs in the first production study (Section 5.4.4.3), the first hypothesis above was formulated for this dialect. The second hypothesis was also formed given the preliminary type referred to above for this dialect. More specifically, it is expected, based on the corpus, that *ʔaw* will increase the likelihood of dynq responses compared with *willa* which might increase the likelihood of altq responses. Similarly, given that yes-no questions in this dialect were reported to have a final rise (Al-Khalifa, 1984; Alharbi, 1991; Hellmuth, 2018; Hellmuth, to appear) and altqs to have a final fall (Hellmuth, 2018), the third hypothesis was formulated.

Turning to SA, the first hypothesis is expected to hold given the literature reviewed in Chapter 5 (5.2.4). The second hypothesis is based on the corpus search of this dialect, showing that *willa* was used more in altqs than in dynqs. However, the corpus also showed that *ʔaw* was equally used in both types of question. Just like the other dialects, the literature showed that normal yes-no questions have a rise and altqs have a rise fall, so the third hypothesis is justified.

7.4 Materials, Participants, and Procedures

In order to avoid repetition of what was written in the Materials, Participants, and Procedures sections in Experiment 1 (Section 6.3), only the differences in the methodology between both experiments and the necessary details will be highlighted below.

7.4.1 Materials

The design and materials of Experiment 2 are similar to those of the first JA experiment (Experiment 1) in Chapter 6 (6.3.1), which was inspired by Pruitt and Roelofsen's (2013) similar study on English. Participants listened to 60 stimuli: 24 target tokens and 36 fillers in the same way participants did in Experiment 1. Table 7.1 shows the conditions in the target stimuli.

Table 7.1 *Description of the Two Cues (4 Conditions) in Experiment 2*

Overall Contour	**Disjunctive Element**	
	ʔaw	***willa***
Rise-fall	**2rf**	**wrf**
Late-rise	**2lr**	**wlr**

Only two slight differences between Experiment 1 and Experiment 2 might be worth noting:

1. The on-screen response choices in Experiment 2 are now written in MSA, instead of JA. More specifically, in order to ensure that participants of the other dialects (EA, KA, and SA) do not find difficulties in interpreting utterances, all responses were provided in the written form of MSA, which is the same across all Arab countries as all Arabs of all dialects can understand (McLoughlin, 1982; Froud & Khamis-Dakwar, 2018; Alzoubi, 2020).

2. MSA has no *willa,* making slashes between disjuncts of altqs and dynqs (i.e., *X*/*Y*) inevitable, which was also followed in O'Mahony (2014) on English.

7.4.2 Participants

The questionnaire was distributed to JA, EA, KA, and SA participants. The total number of participants across the four dialects was 244. The JA participants were 74 (37 males and 37 females) Urban listeners. Their age ranges were from 19 to 53 years old. They were not restricted to those of Irbidi origin, which is different from Experiment 1. There were also 52 (24 males and 28 females) EA participants. They were 18 to 48 years old. All of them used mobiles in the experiment except for three listeners who used their PCs.[115] KA participants were 70 (39 males and 31 females). Their age ranged from 18 to 47 years old. There were 48 SA participants (29 males and 19 females). Their ages ranged from 18 to 45 years. Qualtrics randomly allocated participants into the four blocks in each version of the experiment as shown in Table 7.2

[115] Thanks to a feature in Qualtrics that shows the device the experiment was completed in.

Table 7.2 *Description of the Number of Participants Each Block Received by Dialect (Total = 244)*

Dialect	Block 1	Block 2	Block 3	Block 4	Total
Jordanian Arabic	19	18	18	19	74
Egyptian Arabic	14	12	13	13	52
Kuwaiti Arabic	18	18	17	17	70
Syrian Arabic	13	12	12	11	48
Total number of all participants in Experiment 2					244

Participants in Experiment 2 were invited to partake in the experiment in the same way as in Experiment 1 (by the researcher or his acquaintances using any possible technological tool, including emails or social media). Then, those who agreed to participate were sent the link.

Extensive efforts were made to secure appropriate numbers of participants from EA, KA, and SA and maintain equal numbers of males and females in each dialect. However, this was not without problems given that the researcher was not present in Egypt and Kuwait. The same problem was faced when collecting data from the Syrian refugees in Jordan, given that the experiment was online.

7.4.3 Procedures

The same procedure of Experiment 1 in Chapter 6 (6.3.3) was followed in this experiment. The questionnaire was administered in Qualtrics in a two-option forced task. As each utterance was recorded four times (see Chapter 6, Section 6.3.1 for more details), there were 96 target tokens but only 24 unique ones appeared in each of the four blocks in Qualtrics. In such a case, no utterance was heard in more than one condition as all utterances were presented in a Latin-Square design. The 24 target tokens were divided into the four conditions (see Table 7.1 above) in each block: 6 *ʔaw*+late-rise (2lr), 6 *ʔaw*+rise-fall (2rf), 6 *willa*+late-rise (wlr), and 6 *willa*+rise-fall (wrf) tokens.

The only difference between Experiment 1 (Chapter 6) and Experiment 2 was that the latter was run while the researcher was not present with participants. Four copies of Experiment 2 were created: JA, EA, KA, and SA. Each copy had its own access link. Then, participants of each dialect were sent the experiment link, and then they had access to the experiment once they had clicked on that link.

Participants were asked to wear earphones or headphones and to listen to the recordings via their laptops/mobiles (the device that might be available to them) in a quiet room, free from noise. They were informed of the research purposes by reading the information sheet and the consent form. Moreover, they were told about how their data will be stored, dealt with, and used in the future.

Participants were asked to indicate their gender. Then, they read the information sheet, ticked the boxes in the consent form, and filled in the language background questionnaire (Appendix A (A.3)). Then, the task requirements and instructions appeared on-screen, explaining all details as to avoid any confusion. Following this, they clicked on the *next* arrow at the bottom of that page. By doing so, they were randomly assigned to one of the four blocks containing 60 tokens (24 unique target utterances and 36 fillers). After they had listened to each token, they selected the paraphrase that they thought was the best one of what they had heard in the recording. Two paraphrases appeared below each recording, so participants ticked one of them. Paraphrases and recordings were randomly ordered for each participant.

7.5 Findings

The variables included in the current experiment are the same as the ones in Experiment 1. The independent variables are the choice of contour (late-rise vs. rise-fall) and the choice of disjunctive element (*ʔaw* vs. *willa*); the dependent variable is participants' responses which were coded as 1 for dynq paraphrases and 0 for altq paraphrases.[116]

This section will first present the raw results of the four dialects in tables and figures followed by the inferential statistical analyses. The four models for the four dialects were run separately to explore the system within each dialect (i.e., how each independent variable behaves within each dialect). Running an individual model for each dialect will help show if intonation and disjunctive element choices are significant within each dialect, which is suitable for the research question and the hypotheses in this chapter. Then, two versions of a grand model with 'dialect' as a factor were run to explore the general patterns across dialects: one holding out KA as reference and one holding out SA. In other words, the grand model will show whether or not there are inter-dialect differences in the degree of sensitivity to intonation and disjunctive element choice. To avoid any confusion the grand model might cause, given that it is not related to the hypotheses, it will be presented after providing the results and the figures related to the four individual models. By doing so, this will prevent mixing the results of the individual models with the grand one. As in Experiment 1,

[116] See the Statistical Analysis Section in Chapter 6 (6.3.4) for more details.

participants' responses to each condition (i.e., to 2lr, wlr, 2rf, and wrf) in the four dialects were counted and tabulated as shown in tables 7.3-7.6.

Table 7.3 *Counts of Responses to Each of the Four Conditions in JA*[117]

Conditions	dynqs	%	altqs	%	Total
aw-rise	327	74	117	26	444
willa-rise	245	55	199	45	444
aw-fall	140	32	304	68	444
willa-fall	109	25	335	75	444
Total	821		955		1776

Table 7.4 *Counts of Responses to Each of the Four Conditions in EA*

Conditions	dynqs	%	altqs	%	Total
aw-rise	209	67	103	33	312
willa-rise	139	45	173	55	312
aw-fall	126	40	186	60	312
willa-fall	97	31	215	69	312
Total	571		677		1248

Table 7.5 *Counts of Responses to Each of the Four Conditions in KA*

Conditions	dynqs	%	altqs	%	Total
aw-rise	272	65	148	35	420
willa-rise	233	55	187	45	420
aw-fall	150	36	270	64	420
willa-fall	136	32	284	68	420
Total	791		889		1680

Table 7.6 *Counts of Responses to Each of the Four Conditions in SA*

Conditions	dynqs	%	altqs	%	Total
aw-rise	183	64	105	36	288
willa-rise	171	59	117	41	288
aw-fall	112	39	176	61	288
willa-fall	107	37	181	63	288
Total	573		579		1152

Table 7.3, 7.4, 7.5, and 7.6 above present the counts of the responses each of the four conditions received across altqs and dynqs. The total number of responses is 1776 (74 participants x 24 tokens), 1248 (52 participants x 24 tokens), 1680 (70 participants x 24 tokens), and 1152 (48 participants x 24 tokens) in JA, EA, KA, and SA, respectively.

[117] Please note that *ʔaw* in the tables is written as *aw* in order to make the variable names consistent with the variable names in the plots, given that the plots do not accept *ʔ* in *ʔaw*. Similarly, *late-rise* and *rise-fall* are written simply as *rise* and *fall*, for the same reason.

The tables show late-rise tokens (2lr and wlr) were 64% (572 out of 888), 56% (348 out of 624), 60% (505 out of 840), and 61% (354 out of 576) interpreted as dynqs in JA, EA, KA, and SA, respectively. Similarly, 72%, 64%, 66%, and 62% of the tokens with rise-fall (2rf and wrf) were interpreted as altqs in the four dialects, suggesting that contour might be of paramount importance in disambiguating altqs and dynqs and in deciding on the status of a question either as an altq or a dynq. This finding is clear as the late-rise tokens increased the dynq responses while the rise-fall ones increased the altq responses. Figures 7.2-7.5 display the tendencies for participants to interpret the four conditions as dynqs and also present the means of all responses across all four conditions (2lr: *ʔaw* + late-rise; wlr: *willa* + late-rise; 2rf: *ʔaw* + rise-fall; wrf: *willa* + rise-fall).

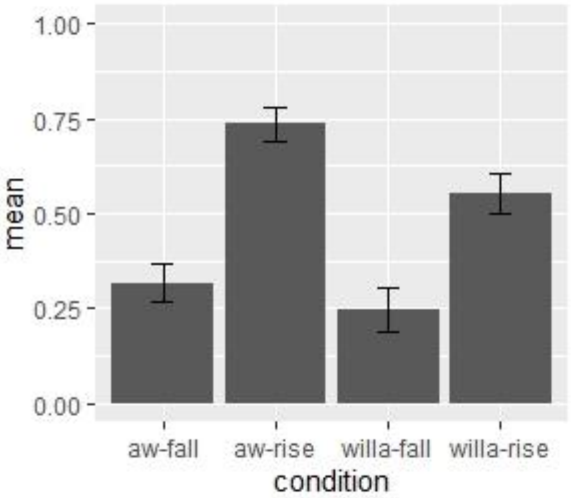


Figure 7.2 Proportions of dynq responses across the four conditions: JA (with error bars showing 95% confidence intervals).

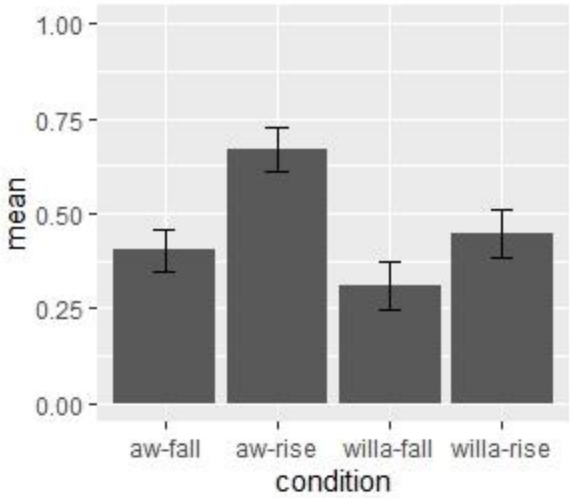


Figure 7.3 Proportions of dynq responses across the four conditions: EA (with error bars showing 95% confidence intervals).

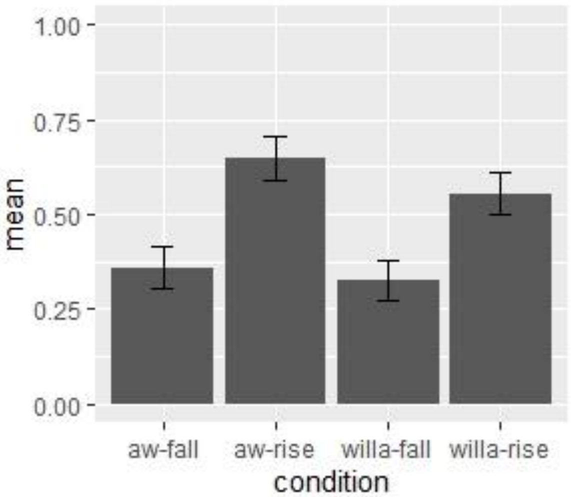


Figure 7.4 Proportions of dynq responses across the four conditions: KA (with error bars showing 95% confidence intervals).

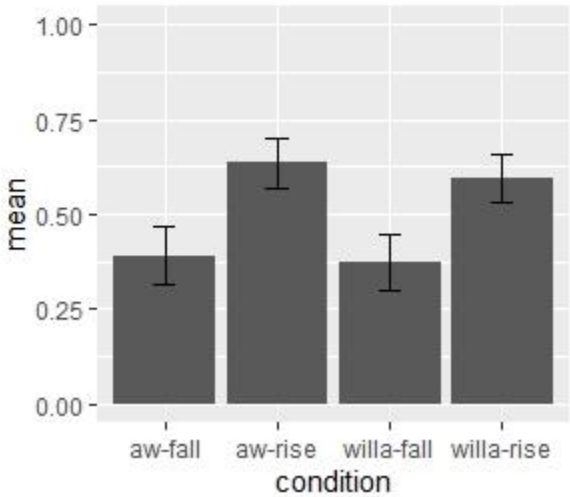


Figure 7.5 Proportions of dynq responses across the four conditions: SA (with error bars showing 95% confidence intervals).

Visually, the four figures are revealing in displaying a shared pattern across the four dialects; the late-rise tokens obtained more dynq responses than the rise-fall ones as reflected in the height of the late-rise bars, suggesting that there is an important role of the contour shape. In other words, the aw-rise and willa-rise bars are bigger than the aw-fall and willa-fall bars in all four dialects, but the height of the aw-rise bars is different as it is highest in JA. On the other hand, the strength of the effect for the contour shape seems to be different in the four dialects. When comparing EA from one hand with JA, KA and SA, the relative height of the mismatch condition (willa-rise) in EA is different. When comparing *willa* (willa-rise) with

ʔaw (aw-rise), another visual pattern appears as *willa* seems to have decreased dynq responses. This suggests that the choice of disjunctive element might also have a main effect across the four dialects. However, the relative strength of this effect might be different as shown in the figures.

These raw results were explored in four separate mixed-effects logistic regression models in R (R Core Team, 2019). The models were used to answer the research question (see Chapter 6 (6.3.4) for the motivations for using the mixed-effects logistic regression analysis). The fixed-effects were intonation and disjunctive element, and the random effects were *listener* and *stimulus*, which is common practice in linguistic research (Chapter 6, 6.3.4).

All categorical variables that were included in the model were contrast coded (with sum coding): intonation: rise 1 and fall -1, disjunctive element: *ʔaw* 1 and *willa* -1, gender: female 1 and male -1, and device:[118] PC 1 and mobile -1. Education, given it had 5 levels in JA, EA, and KA (unknown, secondary, Bachelor's, Master's, and doctorate), was ordered from the lowest to the highest education level (1 to 5) in the three spreadsheets. Education in the SA version of the experiment was of two levels, so it was sum coded in R: -1 for school and 1 for university levels. Age is numeric, so there was no need to sum code it.

In order to reach a unified model suitable for all four dialects, two models were explored: Md1[119] and Md2.[120] The only difference between the two models was that Md2 had an additional random intercept and a slope for disjunctive elements. Md2 was excluded as it was a *singular fit*. Hence, the simpler model (Md1) was adopted, which makes the model structures parallel across all dialects. Although Md2 was *singular*, the likelihood ratio tests using ANOVA (see Bates, 2005; Baayen, Davidson, & Bates, 2008; Winter, 2013; Winter, 2020)[121] to test any differences between the two models were run.

---

[118] This variable could have been ignored given that there were only two JA, three EA, one KA, and two SA participants who used PCs while the rest used mobiles. However, it was included to ensure that it does not affect the results and also to be consistent across all four versions of Experiment 2 in the thesis.

[119] Md1 <- glmer(resp_numeric ~ intonation * disjunctive_element + gender + age + Education+ device + (1 + intonation | listener) + (1 | stimulus), data = data, family = binomial, control = glmerControl(optimizer = "bobyqa"))

[120] Md2 <- glmer(resp_numeric ~ intonation * disjunctive_element + gender + age + Education + device + (1 + intonation | listener) + (1 + disjunctive_element | listener) + (1 | stimulus), data = data, family = binomial, control = glmerControl(optimizer = "bobyqa"))

[121] This kind of significance tests usually “compares the likelihood of one model to the likelihood of another model” (Winter, 2020, p. 260).

ANOVA results in the four dialects were the same ($p > 0.05$), indicating that there was no difference between the two models. Md1 had slightly lower AIC and BIC values than the other model in all dialects. The likelihood ratio tests were also used by other researchers to test the justifiability of removing or keeping some fixed and random variables from such statistical models (Baayen et al., 2008; Pruitt & Roelofsen 2013, Winter, 2013). The selected model was run across the four dialects, as shown in tables 7.7-7.10.

Table 7.7 *Estimates of Coefficients of the Parameters in the Mixed-effects Model JA*

Fixed effects	Estimate	SE	z value	p-value	
Intercept	-0.53423	0.52680	-1.014	0.311	
intonation1	0.95554	0.11590	8.244	< 2e-16	***
disjunctive_element1	0.34167	0.08524	4.009	6.11e-05	***
gender1	0.08515	0.07908	1.077	0.282	
age	0.01164	0.01126	1.034	0.301	
Education	0.08257	0.08742	0.945	0.345	
device1	0.29044	0.26512	1.096	0.273	
intonation1:disjunctive_element1	0.12901	0.08517	1.515	0.130	

Table 7.8 *Estimates of Coefficients of the Parameters in the Mixed-effects Model of EA*

Fixed effects	Estimate	SE	z value	p-value
Intercept	-0.2955836	0.4127871	-0.716	0.4739
intonation1	0.4677226	0.1001999	4.668	3.04e-06 ***
disjunctive_element1	0.3723088	0.0872576	4.267	1.98e-05 ***
gender1	-0.0699437	0.0880082	-0.795	0.4268
age	0.0006329	0.0114170	0.055	0.9558
Education	-0.0119134	0.0771164	-0.154	0.8772
device1	-0.1377045	0.1728156	-0.797	0.4256
intonation1:disjunctive_element1	0.1470266	0.0871239	1.688	0.0915 .

Table 7.9 *Estimates of Coefficients of the Parameters in the Mixed-effects Model of KA*

Fixed effects	Estimate	SE	z value	p-value
Intercept	-0.225396	0.436883	-0.516	0.6059
intonation1	0.602045	0.089545	6.723	1.78e-11 ***
disjunctive_element1	0.147364	0.066593	2.213	0.0269 *
gender1	-0.068728	0.068547	-1.003	0.3160
age	0.002872	0.009041	0.318	0.7507
Education	0.076616	0.064631	1.185	0.2358
device1	0.195586	0.339461	0.576	0.5645
intonation1:disjunctive_element1	0.065525	0.066591	0.984	0.3251

Table 7.10 *Estimates of Coefficients of the Parameters in the Mixed-effects Model of SA*

Fixed effects	Estimate	SE	z value	p-value
Intercept	-0.084071	0.495589	-0.170	0.865
intonation1	0.559427	0.115084	4.861	1.17e-06 ***
disjunctive_element1	0.069771	0.081131	0.860	0.390
gender1	0.093312	0.099299	0.940	0.347
age	0.007999	0.014066	0.569	0.570
Education	0.098057	0.105887	0.926	0.354
device1	0.209605	0.236315	0.887	0.375
intonation1:disjunctive_element1	0.023892	0.081131	0.294	0.768

As can be seen, there was a main effect of intonation in all dialects and a separate main effect for choice of disjunctive element in JA, EA, and KA. There was no interaction between the two cues, suggesting that the general system of how the two cues behave was basically the same across the four dialects. However, the relative strength of the disjunctive element compared with the intonation seemed to be subtly different.

As tables 7.7-7.10 indicate, the intercept values across the four dialects were non-significant with negative values (JA: $\beta = -0.53423$, SE = 0.52680, z value = -1.014, and $p > 0.05$; EA: $\beta = -0.2955836$, SE = 0.4127871, z value = -0.716, and $p > 0.05$; KA: $\beta = -0.225396$, SE = 0.436883, z value = -0.516, and $p > 0.05$; SA: $\beta = -0.084071$, SE = 0.495589, z value = -0.170, and $p > 0.05$). However, the bias towards choosing altq responses that participants showed was non-significant. The other control predictors (gender, age, education, and device) did not the reach significance level.

As for the role of intonation in the disambiguation of altqs and dynqs, intonation1 (a late rise) turned out to be significant with a positive coefficient across all dialects (JA: $\beta = 0.95554$, SE = 0.11590, z value = 8.244, and $p < 0.001$; EA: $\beta = 0.4677226$, SE = 0.1001999, z value = 4.668, and $p < 0.001$; KA: $\beta = 0.602045$, SE = 0.089545, z value = 6.723, and $p < 0.001$; SA: $\beta = 0.559427$, SE = 0.115084, z value = 4.861, and $p < 0.001$), indicating that a late rise led to more dynq responses. This finding also showed that there was a main effect of intonation in the four dialects, suggesting that the overall nuclear contour shapes contributed to transforming a question from an altq into a dynq or vice versa by increasing the responses to one disjunctive question type rather than the other.

Tables 7.3-7.6 and figures 7.2-7.5 above showed that the rise-fall conditions with different disjunctive elements (2rf and wrf), across the four dialects, had close percentages of dynq responses while the late-rise conditions (2lr and wlr) showed huge differences (JA: 19%, EA: 22%, KA: 10%), reflecting a clear role of the choice of disjunctive element in deciding on the status of a question either as an altq or as a dynq. This difference, however, was only 5% in SA (Table 7.6), indicating that the role of choice of disjunctive element in this dialect is the weakest of all dialects. The weakness is reflected by its non-significant effect size.

The role of the choice of disjunctive element in three dialects (JA, EA, and KA) becomes even clearer in the late-rise contour where 2lr tokens obtained more dynq responses than wlr tokens across the dialects, showing that *willa* had a negative effect on perceiving tokens as dynqs by shifting the interpretation of wlr tokens towards altqs. The results in tables 7.7-7.10 statistically confirmed this finding in three dialects as disjunctive_element1 (i.e., *ʔaw*) reached significance level (JA: $\beta = 0.34167$, $SE = 0.08524$, z value = 4.009, and $p < 0.001$; EA: $\beta = 0.3723088$, $SE = 0.0872576$, z value = 4.267, and $p < 0.001$; KA: $\beta = 0.147364$, $SE = 0.066593$, z value = 2.213, and $p < 0.05$) with a positive coefficient, suggesting that tokens with *ʔaw* were more likely to obtain dynq responses than tokens with *willa*. Thus, the statistical analysis disclosed that the dialects (JA, EA, and KA) were similar in having a main effect of choice of disjunctive element, which helps decide on the status of disjunctive questions either as an altq or as a dynq.

The findings, so far, revealed that JA, EA, and KA are similar as both the choice of contour and the choice of disjunctive element significantly increased the likelihood of interpreting tokens as dynqs in all of these dialects. SA has the same importance of the choice of contour, but the choice of disjunctive element was non-significant. Likewise, it seems that the contour shape was more important than the choice of disjunctive element in increasing the likelihood of dynq responses in the four dialects because the coefficient and z values of the intonation (JA: $\beta = 0.95554$, $SE = 0.11590$, z value = 8.244, and $p < 0.001$; EA: $\beta = 0.4677226$, $SE = 0.1001999$, z value = 4.668, and $p < 0.001$; and KA: $\beta = 0.602045$, $SE = 0.089545$, z value = 6.723, and $p < 0.001$; SA: $\beta = 0.559427$, $SE = 0.115084$, z value = 4.861, and $p < 0.001$) were higher than those of choice of disjunctive element (JA: $\beta = 0.34167$, $SE = 0.08524$, z value = 4.009, and $p < 0.001$; EA: $\beta = 0.3723088$, $SE = 0.0872576$, z value = 4.267, and $p < 0.001$; and KA: $\beta = 0.147364$, $SE = 0.066593$, z value = 2.213, and $p < 0.05$; SA: $\beta = 0.069771$, $SE = 0.081131$, z value = 0.860, and $p > 0.05$).

Although all dialects were shown to be similar in having the two cues important (though non-significant in SA), they turned out to be different in the relative strength of effect size for both cues when compared with each other, in an intra-dialectal comparison. The magnitude of the intonation coefficient was approximately triple that of the disjunctive element coefficient in JA and was about four times that of the disjunctive element coefficient in KA. In EA, however, the effect size for intonation was slightly larger than that for choice of disjunctive element. In SA, because the effect size for choice of disjunctive element was non-significant, the effect size for intonation was about eight times higher than that for choice of disjunctive element. Despite these differences between the four dialects, the role of intonation was proved to be more essential than that of the disjunctive element in disambiguating disjunctive questions in these dialects.

More specifically, the late-rise tokens (2lr/wlr) were interpreted as dynqs in 70%, 61%, 64%, and 62% of all dynq responses whereas the rise-fall tokens (2rf/wrf) received a dynq interpretation only in 30%, 39%, 36%, and 38% of dynq responses in JA, EA, KA, and SA, respectively (see tables 7.3-7.6). Similarly, *ʔaw*-tokens (2lr/2rf) received dynq responses 57%, 59%, 53%, and 51% of all dynq responses while *willa*-tokens (wlr/wrf) were perceived as dynqs in 43%, 41%, 47%, and 49% of the dynq responses. This comparison of percentages confirms that the effect sizes for intonation role outweigh those for choice of disjunctive element by increasing the likelihood of dynq responses in all four dialects. Figure 7.6 displays the average count of tokens interpreted as dynqs in the four dialects using boxplots and violin plots.

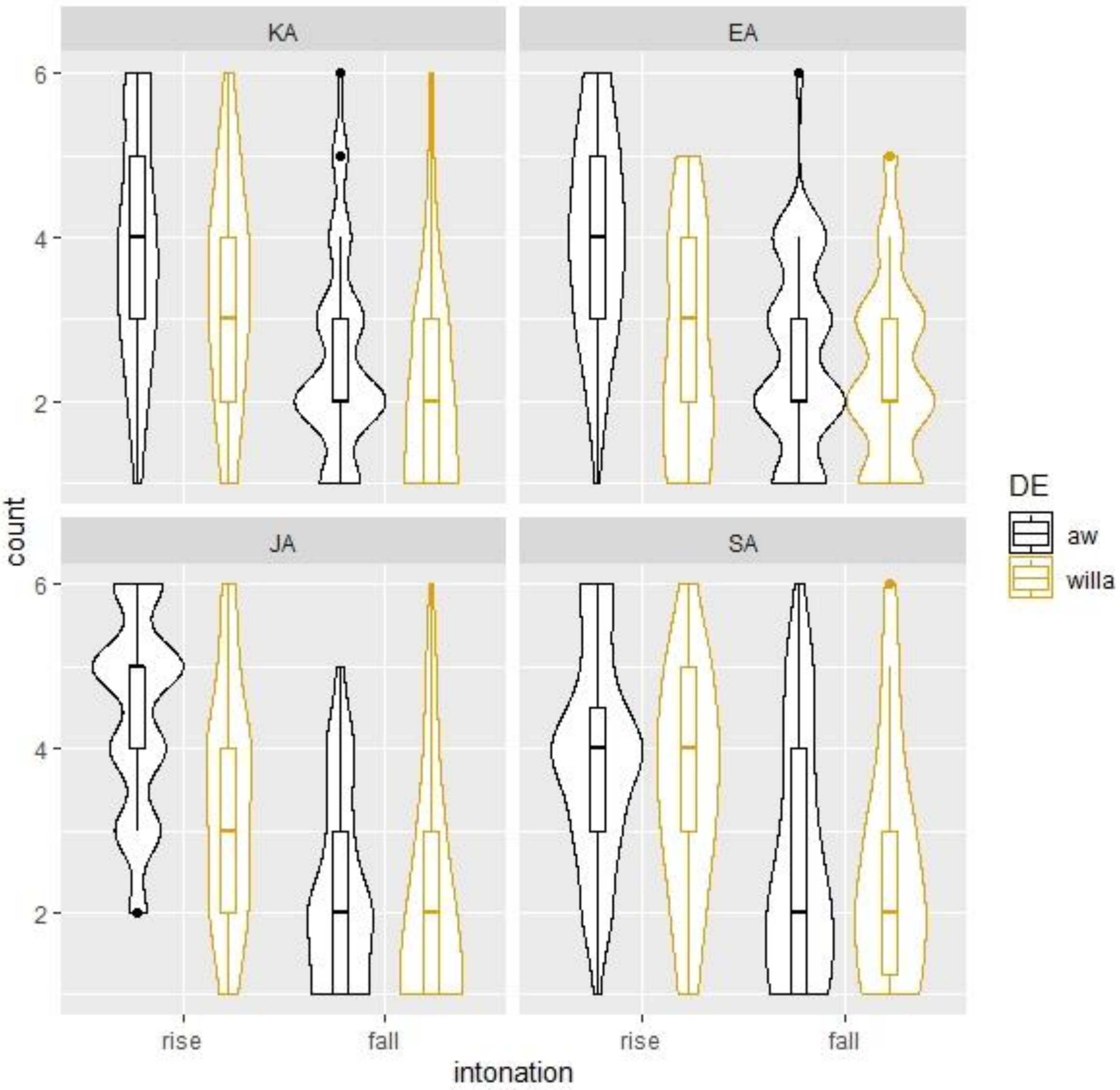


Figure 7.6 Median, interquartile range, and distribution of average counts across participants of dynq responses from JA, EA, KA, and SA listeners.

Figure 7.6 shows that intonation was of paramount importance in deciding on the status of a question either as an altq or a dynq as tokens with the late-rise received more dynq responses than tokens with the rise-fall. Hence, the importance of choice of contour shape outweighed the importance of choice of disjunctive element across the four dialects. The effect for the choice of disjunctive element was also clear as *ʔaw*-tokens with a late rise (2lr) increased the likelihood of dynqs compared with *willa*-tokens with a late rise (wlr) in JA, EA, and KA. The same conclusion can be drawn on SA though the difference between 2lr and wlr is not huge (5% in favour of 2lr, as shown in Table 7.6). As in Experiment 1, the mismatch condition appeared in the late-rise condition across the dialects, specifically in the wlr tokens, where this condition made participants less likely to choose dynq responses compared with 2lr tokens (though to a non-significant extent in SA). However, given the current design of the experiment in which participants did not have a third option such as ‘other’, participants’ responses to the tokens in the mismatch condition will be carefully tested (see Section 7.5.1) to see if their responses differ from chance or not. In the rise-fall conditions, disjunctive elements had a slight difference between 2rf and wrf.

Examining boxplots alone for the rise-fall conditions in either JA or EA can show that they are similar. However, violin plots show that there is a difference between this condition in each dialect.

Thus, the results of the four individual models showed that the late-rise nuclear contour was statistically significant in increasing the number of dynq responses across the four dialects. The disjunctive element *ʔaw* was also significant in making participants more willing to interpret what they heard as dynqs rather than as altqs in all dialects (though to a non-significant extent in SA). Utterances with *willa* significantly received less dynq responses than utterances with *ʔaw* in JA, EA, and KA. Although both the choice of contour and the choice of disjunctive element were significant in JA, EA, and KA, the former had a larger effect than the latter in all dialects (though with a slight difference between the two cues in EA), including SA.

In addition, ‘dialect’ was included in a three-way interaction grand model[122] that was run twice: one holding out SA as reference and one holding out KA. The benefit of this model is to compare the dialects to each other, regardless of their internal behaviour in respect of intonation and disjunctive element choice, as will be shown below. The variables were coded in the same way as they were in the individual models above. In Table 7.11, SA is the held-out dialect in the deviation coding. In this table, KA is coded as 1, EA is given 2, and JA is coded as 3. In Table 7.12, the held-out dialect is KA. The codes are SA 1, EA 2, and JA 3. To avoid any confusion the dialect codes may make in the two tables, dialect names are used instead of their codes.

[122] glmer(resp_numeric ~ intonation * disjunctive_element * dialect + gender + age + Educationtidy + device + (0+intonation|listener) + (1 | stimulus), data = cross_dialect, family = binomial, control = glmerControl(optimizer = "bobyqa"))

Table 7.11 *Estimates of Coefficients of the Parameters in the Grand Mixed-effects Model of All dialects (SA is held-out)*

Fixed effects	Estimate	SE	z value	p-value
Intercept	-0.341545	0.172623	-1.979	0.047865 *
intonation1	0.618582	0.071730	8.624	< 2e-16 ***
disjunctive_element1	0.224118	0.063167	3.548	0.000388 ***
KA	-0.011064	0.048552	-0.228	0.819744
EA	-0.067782	0.054975	-1.233	0.217591
JA	-0.075912	0.052895	-1.435	0.151244
gender1	0.015350	0.030308	0.506	0.612538
age	0.005714	0.004056	1.409	0.158918
Education	0.050858	0.032236	1.578	0.114633
device1	0.077883	0.085291	0.913	0.361166
intonation1:disjunctive_element1	0.091654	0.063148	1.451	0.146661
intonation1:KA	-0.014841	0.073091	-0.203	0.839102
intonation1:EA	-0.162813	0.080539	-2.022	0.043222 *
intonation1:JA	0.259158	0.072919	3.554	0.000379 ***
disjunctive_element1:KA	-0.076912	0.047981	-1.603	0.108939
disjunctive_element1:EA	0.142599	0.052851	2.698	0.006973 **
disjunctive_element1:JA	0.093805	0.048648	1.928	0.053824 .
intonation1:disjunctive_element1:KA	-0.028289	0.047966	-0.590	0.555349
intonation1:disjunctive_element1:EA	0.055013	0.052810	1.042	0.297541
intonation1:disjunctive_element1:JA	0.039838	0.048620	0.819	0.412566

Table 7.12 *Estimates of Coefficients of the Parameters in the Grand Mixed-effects Model of All dialects (KA is held-out)*

Fixed effects	Estimate	SE	z value	p-value
Intercept	-0.341432	0.172627	-1.978	0.047945 *
intonation1	0.618583	0.071730	8.624	< 2e-16 ***
disjunctive_element1	0.224118	0.063167	3.548	0.000388 ***
SA	0.154751	0.062500	2.476	0.013286 *
EA	-0.067783	0.054975	-1.233	0.217586
JA	-0.075904	0.052895	-1.435	0.151290
gender1	0.015347	0.030308	0.506	0.612592
age	0.005713	0.004056	1.408	0.159043
Education	0.050848	0.032236	1.577	0.114707
device1	0.077910	0.085291	0.913	0.361000
intonation1:disjunctive_element1	0.091648	0.063148	1.451	0.146686
intonation1:SA	-0.081497	0.082676	-0.986	0.324261
intonation1:EA	-0.162819	0.080538	-2.022	0.043215 *
intonation1:JA	0.259158	0.072919	3.554	0.000379 ***
disjunctive_element1:SA	-0.159492	0.054063	-2.950	0.003177 **
disjunctive_element1:EA	0.142595	0.052851	2.698	0.006975 **
disjunctive_element1:JA	0.093811	0.048648	1.928	0.053809 .
intonation1:disjunctive_element1:SA	-0.066560	0.054047	-1.232	0.218124
intonation1:disjunctive_element1:EA	0.055012	0.052809	1.042	0.297543
intonation1:disjunctive_element1:JA	0.039835	0.048620	0.819	0.412606

The two tables above show that the inter-dialect intercept is significant and negative, showing a bias across dialects in favour of altq interpretations. This bias means that participants were more likely to interpret tokens as altqs. The fact that listeners favoured altqs might be because altqs could be more frequent than dynqs in everyday life. All control variables in the model turn out to be non-significant.

The tables also show that both intonation (late-rise) and choice of disjunctive element (*ʔaw*) in the data as a whole, regardless of which dialect, had positive and significant values ($p < 0.001$), suggesting that both the late-rise and *ʔaw* increased the likelihood of dynqs. This result is similar to the results obtained from the individual models. In terms of the interaction between intonation and dialect, the tables show that this interaction was significant only in EA ($p < 0.05$) and JA ($p < 0.001$). However, the estimate was negative in EA and positive in JA. Although intonation was significant in those dialects (relative to the other dialects, i.e., an inter-dialect comparison), these two dialects behaved in an opposite way. In other words, EA and JA are different from the other dialects on average: JA relies on intonation more than the other dialects; EA relies on it less than the other dialects.

As for the interaction between choice of disjunctive element and dialect, the tables indicate that this interaction was significant in EA ($p < 0.01$) and SA ($p < 0.01$). In EA it had a positive value, but in SA it had a negative one. This positive value suggests that, relative to all dialects, the effect of disjunctive element choice was strongest in EA as it increased the likelihood of dynq responses more than it did in the other dialects. On the other hand, the negative value in SA suggests that, relative to all dialects, the effect of disjunctive element choice was weakest in this dialect as it reduced the likelihood of dynq responses more than it did in the other dialects. In the individual SA model, this was reflected by the non-significant effect of disjunctive element.

All three-way interactions (intonation:disjunctive_element:dialect) were non-significant, meaning that it is not the case that the interactions between intonation, disjunctive element, and dialect are different across dialects. Finally, the fact that intonation estimates in SA and KA and the fact that disjunctive element estimates in JA and KA are non-significant show the importance of running individual models to answer the research question and to test the hypotheses. These estimates were significant for both intonation and disjunctive element choice in the individual models, revealing the within-dialect behaviour of the two cues in each dialect.

7.5.1 Reflection on Providing Only Two Options in Experiment 2

In order to avoid repetition, motivations for replicating Pruitt and Roelofsen's (2013) English study with only two on-screen paraphrases will not be mentioned again in this section given that Experiment 2 is a replication of Experiment 1 (see Chapter 6, Section 6.4.1, for the motivations and for the possible alternative ways of analysing the results of the mismatch condition).

In order to test whether the results obtained from the mismatch condition in the four dialects in Experiment 2 were due to chance or not, the Exact Binomial test in R[123] was run. If it turns out that participants were providing their answers randomly when presented with the mismatch condition, this would weaken the argument that *willa* is accepted in altqs and also dynqs in any of the four dialects. However, if it turns out that participants' responses were different from chance, this means that *willa* might be accepted in both altqs and dynqs even though the results from the statistical models above show that it is dispreferred in dynqs in all dialects (albeit to a non-significant extent in SA).

Although the Exact Binomial test is needed only in the mismatch condition, it was run in all conditions, for completeness. Running the test in all conditions is also advantageous because this helps find out whether or not participants guessed answers in conditions other than the mismatch condition. If they guessed answers, this might mean that the disjunctive element used in that condition might be ungrammatical. Tables 13-16 present the results:

[123] binom.test(x, n, p = 0.5, alternative = c("two.sided", "less", "greater"), conf.level = 0.95)

Table 7.13 *Results of Exact Binomial Tests for All Dialects in Experiment 2 in wlr Condition*

Dialect	Proportion of dynq responses to wlr	P-value
Jordanian Arabic	.55	0.03259
Egyptian Arabic	.45	0.06155
Kuwaiti Arabic	.55	0.02799
Syrian Arabic	.59	0.001742

Table 7.14 *Results of Exact Binomial Tests for All Dialects in Experiment 2 in 2lr Condition*

Dialect	Proportion of dynq responses to 2lr	P-value
Jordanian Arabic	.74	2.2e-16
Egyptian Arabic	.67	1.957e-09
Kuwaiti Arabic	.65	1.496e-09
Syrian Arabic	.64	5.027e-06

Table 7.15 *Results of Exact Binomial Tests for All Dialects in Experiment 2 in wrf Condition*

Dialect	Proportion of dynq responses to wrf	P-value
Jordanian Arabic	.25	2.2e-16
Egyptian Arabic	.31	2.03e-11
Kuwaiti Arabic	.32	4.228e-13
Syrian Arabic	.37	1.533e-05

Table 7.16 *Results of Exact Binomial Tests for All Dialects in Experiment 2 in 2rf Condition*

Dialect	Proportion of dynq responses to 2rf	P-value
Jordanian Arabic	.32	5.055e -15
Egyptian Arabic	.40	0.0008099
Kuwaiti Arabic	.36	5.052e-09
Syrian Arabic	.39	0.0001943

The results of the binomial tests in the mismatch condition (Table 7.13) performed on JA, KA, and SA showed that participants' responses differ significantly from chance. Table 7.13 showed that the observed proportions of dynq responses of .55 (JA), .55 (KA), and .59 (SA) were higher than the expected .5 if responses were selected at random (JA: $p = .033$, KA: $p = .028$, and SA: $p = .002$ (two-sided)), showing that listeners in the JA, KA, and SA versions of Experiment 2 did not provide their answers in wlr condition based on chance. As for EA, the observed proportion of dynq responses of .45 was lower than the expected .5 if responses were selected at random ($p = .061$ (two-sided)), suggesting that EA responses in the wlr mismatch condition are no better than chance.

As for SA, there was no effect of disjunctive element choice in its individual model, and it had the least effect of disjunctive element choice in the grand model. These findings support the initial classification of SA as belonging to Type 3 (with both disjunctive elements being general). That is, the weak effect of disjunctive element choice might be the reason for having no preference for using one disjunctive element in a specific question type.

As for KA, there were no studies in Chapter 4 that clearly show which type it belongs to, but it was hinted, in Chapter 4, that this dialect might belong to Type 1. However, given the results from the mixed-effects logistic regression models (Table 7.9) and the results from this Binomial test (Table 7.13), it seems that KA belongs to Type 2 (albeit with some preferences). In other words, *willa* might be specialised to altqs, as shown in Figure 7.6 and in the main effect of disjunctive element choice.

To sum up, Table 7.14, Table 7. 15, and Table 7. 16 all showed significant p-values in the other conditions (i.e., in 2lr, wrf, and 2rf) in all dialects, suggesting that even though participants were provided with only two options to choose from, their responses were different from chance in all dialects. Being different from chance is also true in responses to the wlr condition except for EA. The results of the interactions of disjunctive element choice with dialects in the grand model (Table 7.11 and Table 7.12), showing no effect of disjunctive element choice in JA and KA and showing that this effect is the weakest in SA, are borne out in the non-chance responses in the mismatch condition. Participants tended to depend somewhat more on intonation, compared to chance, in the mismatch condition. The results are discussed further in the next section.

7.6 Discussion

The main aim of Experiment 2 was to explore the similarities and differences between the four dialects in which cues (choice of contour vs. choice of disjunctive element) disambiguate altqs and dynqs. The cues might distinguish between altqs and dynqs by increasing the likelihood of responses to one type of question. Another aim was to determine how these similarities and differences map on to the dialect types proposed in Chapter 4 (Section 4.1). The structure of this section will be to discuss similarities and differences between dialects in the cues without referring to types of dialects. Then, how these similarities and differences map on to types will be explained.

7.6.1 Similarities and Differences in the Disambiguating Cues

The results displayed in Table 7.3, Table 7.4, Table 7.5, and Table 7.6 revealed that the choice of contour shape played a vital role in the disambiguation of questions across the four dialects. 64% (in JA), 56% (in EA), 60% (in KA), and 61% (in SA) of late-rise tokens (2lr and wlr) received dynq responses, and 72% (in JA), 64% (in EA), 66% (in KA), and 62% (in SA) of rise-fall tokens (2rf and wrf) received altq responses, displaying a similar overall role of contour shapes in the interpretation across these dialects. The results of the four individual models confirmed that the overall nuclear contour was a significant deciding cue of the status of a question either as an altq or a dynq ($p < 0.001$). This finding is in line with the same finding in Experiment 1 (Chapter 6). It is also consistent with the JA production study results that showed that the typical contour of altqs is the rise fall and of dynqs is the late rise. In addition, this finding matches what was reported in prior studies on the contour shapes of altqs and yes-no questions in JA, EA, KA, and SA (e.g., Ferguson & Ani, 1961; Gary & Gamal-Eldin, 1982; Al-Khalifa, 1984; Rammuny, 1989; El-Hassan, 1990; Al Amayreh, 1991; Alharbi, 1991; Kulk, Odé, & Woidich, 2003; Hellmuth, 2006; Al Huneety, 2015; Sulaiman, 2016; Hellmuth, 2018; Winans, 2019; Hellmuth, to appear), which explains why this cue is statistically significant across the four dialects.

Furthermore, this finding corroborates the fact that the contour of dynqs is the same as that of yes-no questions, a finding that was experimentally proved in the JA production study (Chapter 5) and was reported for EA *ʔaw*-dynqs (Winans, 2019). In other words, the fact that tokens with a late rise significantly received dynq responses more than altq responses is also in tune with Winans' (2019) assertion that *ʔaw*-dynqs have the same contour as yes-no questions in EA, and she justified this similarity with the fact that both are yes-no questions. So, this similarity in the contour of dynqs and yes-no questions might explain listeners' tendency to interpret late-rise tokens more as dynqs in Experiment 2. Consequently, interpreting tokens with a late rise as dynqs is of no surprise.

The findings also lend further support to the first hypothesis stating that disjunctive questions will be disambiguated by the overall nuclear contours, such that the late-rise tokens receive more dynq responses than the rise-fall ones. Namely, the late-rise tokens increased the likelihood of dynqs, and the rise-fall tokens decreased dynq responses (i.e., significantly increased the likelihood of altq responses). The fact that intonation played a significant role in disjunctive questions was also asserted for English (Pruitt & Roelofsen, 2013; O'Mahony, 2014, etc.).

However, the fact that the grand model showed that the effect of intonation was strongest in JA and weakest in EA might be attributed to the fact that JA participants were more sensitive to intonation than participants from the other dialects, which might be because they were listening to stimuli produced in their own dialect. The behaviour of EA participants might be because the effect of disjunctive element was strongest in this dialect, which made it very close in size to the effect size of intonation; this might have reduced the disambiguating effect of intonation.

One of the interesting observations across the four dialects is that some of the *ʔaw*+late-rise tokens (2lr), which are expected to be unambiguously interpreted as dynqs, received altqs responses (JA: 26%; EA: 33%; KA: 35%; SA: 36%). This is expected as some listeners might have chosen to pay more attention to the disjunctive element meaning at the expense of intonation in some tokens. In other words, if a person, in everyday conversations, pays attention to the presence of a disjunctive element then that person might think that the question is meant to force an answer from *X* or *Y* even in the presence of a yes-no question intonation, which matches Abu Helal's (1993) note that the contour shape (the late-rise in this case) was ignored in the presence of lexical, semantic, etc. cues (the disjunctive element in this context).

One of the similarities and differences between the four dialects is related to how participants responded to the mismatch condition: wlr. Listeners were expected to choose dynq responses when hearing late-rise tokens given that yes-no questions in all dialects had been reported to end with a rise, but *willa* was expected to shift the interpretation towards altqs if there is specialisation of *willa* to altq readings. This mismatch condition received a lower percentage of dynq responses than its counterpart, 2lr, across JA, KA, and SA. Participants in these dialects behaved similarly to each other in this condition as the late rise outweighed the effect of *willa*, leading to more dynq responses (JA: 55%, KA: 55%, and SA: 59%) than altq responses (see Tables 7.3, 7.5, and 7.6). The Exact Binomial test confirmed that this result in the three dialects was significantly different from chance, so wlr is not ungrammatical (types of dialects will be discussed later on).

The behaviour of EA participants in the mismatch condition was different from the other three dialects. EA participants chose more altq responses (55%) than dynq responses in the wlr condition (Table 7.4). This might be because EA listeners might have been more confused than KA and SA listeners when they listened to the mismatch trials recorded in another dialect (i.e., JA stimuli). Hence, replication of this experiment using stimuli recorded by a native speaker of each dialect is needed. Thus, the first hypothesis that the late-rise tokens will receive more dynq responses than the rise-fall ones, which was supported across all four conditions (2lr, wlr, 2rf, and wrf) in the four dialects, was not proved in this particular condition (wlr) in EA, making EA different from JA, KA, and SA.

Another similarity between the dialects is that the role of choice of disjunctive element was significant across JA, EA, and KA but non-significant in SA. The lack of effect of disjunctive element in the individual SA model was also confirmed by the grand model that showed that the choice of disjunctive element in this dialect was the weakest, relative to the other dialects. Thus, the second hypothesis that the choice of disjunctive element will affect the status either as an altq or as a dynq, such that *willa* will decrease dynq responses and will increase altq responses is supported in JA, EA, and KA. In contrast, the hypothesis does not hold in SA, making this dialect stand out from the other. A possible reason for not having a statistically significant preference for one disjunctive element in disjunctive questions in SA might be because the disjunctive elements could be completely synonymous in SA, which is similar to Cowell's (2005) point that they are synonymous in this dialect. The SA disjunctive elements above, supported by their non-significant effect size, might be a case of synonymy.

Another similarity between the dialects is that the intra- and inter- dialectal statistical results (tables 7.7-7.12) showed that the choice of contour had a larger effect than the choice of disjunctive element across the four dialects when the effect sizes for the two fixed effects were compared with each other. As a result, the primary role in the disambiguation is attributed to contour shapes, and the supporting role is credited to the choice of disjunctive element (though to a non-significant extent in SA). This means that the dynq reading (i.e. a polar interpretation) is activated regardless of the presence or the absence of disjunctive elements when a token has late-rise intonation. However, having *willa* alone without a late rise (i.e., wrf) is less likely to yield a dynq interpretation.

Although the two cues were important in the dialects studied here, some slight differences between these dialects were noticed in the effect sizes for the cues. The relative strength of the coefficient estimates for intonation and choice of disjunctive element was different from dialect to dialect. For example, the coefficient estimate for intonation was about eight times higher than that for choice of disjunctive element in SA, three times higher than that for choice of disjunctive element in JA, and four times higher than that for choice of disjunctive element in KA, making these three dialects similar to each other in this respect. Nonetheless, the effects for choice of disjunctive element in KA and SA were much smaller than the effect for choice of disjunctive element in JA, suggesting that they are different from JA, too.

Additionally, the coefficient estimates for choice of contour and choice of disjunctive element in EA were close to each other. This finding implies that choice of disjunctive element in this dialect was the strongest when compared with choice of disjunctive element in all other dialects. The same conclusion can be drawn from the grand model that showed that choice of disjunctive element was strongest in EA but weakest in SA, and that choice of contour was strongest in JA but weakest in EA.

Based on the above discussion, the cross-dialectal hypothesis that the choice of contour is hypothesised to have a larger effect than the choice of disjunctive element was supported in JA, KA, and SA but not in EA. The close estimate size of the two cues in EA created a more complex situation which was clear when considering percentages in Table 7.4. The percentages showed that intonation was doing most of the disambiguation only in three conditions (2lr, 2rf, and wrf) but not in the mismatch condition (wlr), which was also shown by the ungrammaticality of *willa* in dynqs in EA, as the results from the Binomial test suggested. That is, when there were two conflicting cues (a late rise vs. *willa*), the choice of disjunctive element won, which seems contrary to JA, KA, and SA in which the choice of contour won in all four conditions, even in the mismatch condition as shown by the non-chance results of the Binomial tests. Thus, the ungrammaticality of *willa* in dynqs in EA might be the reason for obtaining more altq responses in the wlr condition.

Overall, and across the dialects, the finding that choice of contour proved more significant than choice of disjunctive element may be explained from the literature on these dialects. That is, yes-no questions were reported to have a final rise and altqs to have a final fall (e.g., Ferguson & Ani, 1961; Gary & Gamal-Eldin, 1982; Al-Khalifa, 1984; Rammuny, 1989; El-Hassan, 1990; Al Amayreh, 1991; Alharbi, 1991; Kulk, Odé, & Woidich, 2003; Hellmuth, 2006; Al Huneety, 2015; Sulaiman, 2016; Hellmuth, 2018; Winans, 2019; Hellmuth, to appear), making intonation the deciding cue.

7.6.2 Mapping the above Similarities and Differences on to Chapter 4 Types

The previous section has outlined the main similarities and differences between the dialects of interest in which cues disambiguate altqs and dynqs in general terms, answering the first part of the research question and testing the hypotheses. The second part concerning how these similarities and differences are reflected in the types proposed in Chapter 4 will now be addressed. Thus, the following will repeat some of the relevant similarities and differences to establish how they map on to types.

Figure 7.6 (Section 7.5, p. 223) provides a full picture of the similarities and differences between the dialects in how they map on to the types proposed in Chapter 4. For example, it can be concluded that SA is different from the other dialects because the comparison in each contour (late rise and rise fall) shows that there is almost no difference between *ʔaw* and *willa* in the late rise (the two left-hand violin plots) and *ʔaw* and *willa* in the rise fall (the two right-hand violin plots). Their median lines are almost the same. This similarity between 2lr and wlr and between 2rf and wrf was the first indication that SA might have no effect of disjunctive element and might have a strong effect of intonation, which was also confirmed by the individual SA model (Table 7.10). This result was also reflected by the weakest effect of disjunctive element in the grand model (Table 7.12). Hence, there is an indication that SA maps on to Type 3 in which there seem to be no specialised disjunctive elements. This classification matches the preliminary classification of this dialect in Chapter 4, but this classification needs more research using stimuli recorded by a native Syrian speaker.

Contrary to SA, there seems to be a pattern across the other three dialects (JA, EA, and KA), as seen in the same figure. In all of these dialects, it is true that there might not be a difference between 2rf and wrf (the right-hand violin plots), but it is obvious that there is a difference between 2lr and wlr, suggesting that there might be an effect of disjunctive elements in these dialects. The figure also showed that there might be an effect of intonation across the three dialects. Thus, there might be a main effect of both intonation and disjunctive element, which was confirmed in the individual models. The three dialects, thus, might map on to Type 2A because there seems to be a small effect, if any, of disjunctive element with a rise fall, but there seems to be a larger effect of disjunctive element with a late rise. What further supports the conclusion that JA, EA, and KA belong to Type 2A is the non-chance behaviour in 2rf and wrf, suggesting that *ʔaw* and *willa* are also not ungrammatical in these conditions. If they belong to Type 1, then it is expected that the boxplots will vary in both the late rise and the rise fall for both *ʔaw* and *willa*, which is not the case here. If they belong to Type 3, then it is expected that the boxplots of *ʔaw* and *willa* will be similar to each other (e.g., as in SA), which is not the case here in the late rise of the other three dialects. Therefore, there is a strong indication that these three dialects are Type 2A.

These classifications of the dialects might support or contradict the preliminary classifications of the same dialects in the earlier chapters. JA, in Chapter 4, 5, and 6, was thought to belong to Type 2A, which is supported here. Thus, the researcher's intuitions and experimental evidence are in keeping with each other. EA, in Chapter 4, was suggested that it might belong to Type 1 or Type 2, but the experimental evidence showed that it belongs to Type 2A. Although KA was thought to belong to Type 1 in Chapter 4, the experimental results discussed above showed that it might belong to Type 2A, which might be similar to its behaviour in the corpus search as *willa* showed a preference for appearing in altqs more than in dynqs. Although JA, EA, and KA seem to belong to the same type, the clear pattern in Figure 7.6 is that there is variation in the size of the effect of the disjunctive element choice in the late-rise contour between them, as shown in the sizes of the boxplots of *ʔaw* and *willa* in the late-rise. This variation was also clear in the individual statistical models (see Section 7.6.1 for the details about this variation in the models of the three dialects).

The behaviour in EA is more complicated than that in the other dialects in its mapping on to the types. That is, although it might belong to Type 2A, an alternative classification of EA could be that it might belong to Type 1 due to the strong effect of disjunctive element in the individual and grand model and the weakest effect of intonation, relative to the other dialects, in the grand model. In other words, the strong effect of disjunctive element choice in the individual model might suggest that *ʔaw* is strongly preferred in dynqs, and that *willa* is strongly preferred in altqs, meaning that both disjunctive elements could be specialised. What might also hint that EA might belong to Type 1 is that EA participants behaved differently from JA and KA participants whose dialects also belong to Type 2A. However, what might weaken this evidence is the fact that EA participants' responses were different from chance in the Exact Binomial tests in all conditions except for the mismatch condition. In other words, EA participants did not guess the answers when presented with *ʔaw* both in altqs and dynqs, so it might be the general disjunctive element. EA participants only guessed the answers when presented with *willa* with a late rise. Hence, *ʔaw* was safely accepted by EA participants in both altqs and dynqs, but *willa* was only accepted in altqs, making the first expectation that EA might be Type 2A more likely than the second classification.

Further evidence supporting classifying EA as belonging to Type 2A is Winans' (2012) exception that *ʔaw* might appear in altqs if stressed, so it might be the general disjunctive element in EA and *willa* might be the specialised one (see Gary & Gamal-Eldin, 1982; Winans, 2012, 2019)). Thus, this thesis has empirically contributed to EA, by supporting Winans' observation on the acceptability of *willa* in which type of disjunctive question. However, apart from Winans' exception, classifying EA as belonging to Type 2A might be against Winans' (2012; 2019) main generalisation that each disjunctive element in EA is specialised (*ʔaw* to dynqs and *willa* to altqs). This classification is also not in line with the observation that *ʔaw* may not appear in dynqs (Eid, 1974). This uncertainty might show that there is a need for future research using native stimuli to test what question type each disjunctive element maps on to and the role of disjunctive elements in the disambiguation. Nevertheless, based on the current evidence and the current data, the stance adopted in this thesis is that EA, like JA and KA, belongs to Type 2A, and SA belongs to Type 3.

What this thesis showed is that there is evidence for the existence of the three types proposed in Chapter 4, when considering the possible and preliminary classifications of the dialects investigated. As a result, the literature should take account of the relative mappings of disjunctive elements to readings (e.g., specialised or general) alongside prosody as a disambiguating cue. In addition, the literature should not ignore the possible variation in each disambiguating cue. In other words, a key implication is that although Dayal (2016) allowed only prosodic cues to disambiguate altqs and dynqs, and Meertens (2019) allowed for prosody, disjunctive element, or both (Section 3.1), this thesis has experimentally shown that there is also a need to allow for variation within the disjunctive elements and their mapping to exclusive (specialised) and inclusive (general) readings (in Arabic at least). This is because the data from all four dialects showed a huge variation in the size of the effect of disjunctive element choice (see Section 7.6.1 to avoid repetition here).

7.7 Summary

The main aim of the four versions of Experiment 2 was to find out whether there are similarities and differences between the dialects in which cues disambiguate altqs and dynqs. There are two clear patterns of the similarity between the dialects shown in the data. First, they all had a main effect for choice of contour (late-rise vs. rise-fall); three dialects (JA, EA, and KA) had a main effect for choice of disjunctive element (*ʔaw* vs. *willa*). More specifically, the findings revealed that the four dialects are all similar as the late-rise contour and *ʔaw* both contributed to the disambiguation of string-identical disjunctive questions by increasing the likelihood of dynq responses (though to a non-significant extent in SA). Second, the role of choice of contour was the most important across the four dialects, which was clear in both the individual and the grand models. The confidence in the findings of this experiment is boosted as they are similar to those of Experiment 1 (Chapter 6).

The differences between the dialects became visible when comparing the coefficient estimates for the choice of contour and the choice of disjunctive element. The effect size for the former was bigger than that for the latter in all of them, suggesting that the choice of contour was doing most of the work in all of the four experimental conditions (2lr, wlr, 2rf, and wrf). Looking at the figures across the four dialects in an intra-dialectal examination of the models shows that the effect size for the choice of contour was the biggest in JA, followed by KA, SA and EA, respectively. This order was also reflected in the inter-dialectal grand model, which showed that choice of contour was strongest in JA and weakest in EA. However, when comparing the choice of contour with the choice of disjunctive element within each dialect (intra-dialectal comparison), the order will be different. The effect size for the choice of contour was the biggest in SA as it was about eight times higher than that for choice of disjunctive element. It was also approximately four times and three times higher than that for choice of disjunctive element in KA and JA, respectively, but it was slightly higher than that for choice of disjunctive element in EA. Thus, the effect size for choice of disjunctive element in EA was the highest. Therefore, the contour is playing an important role only in three conditions (2lr, 2rf, and wrf) in EA. The fact that the effect size for choice of disjunctive element was the highest in EA was also noticed in the inter-dialectal grand model.

Another difference between the dialects was in their behaviour in the wlr mismatch condition. It turned out that JA, KA, and SA, taken together, are different from EA. In JA, KA, and SA, the use of *willa* in dynqs was different from chance, but it was no better than chance in EA, as the results from the Exact Binomial tests showed. That is, the occurrence of *willa* with a late rise in dynqs in JA, KA, and SA is not ungrammatical, but it is ungrammatical in EA.

At the beginning of this chapter, it was briefly noted that using slashes in the on-screen dynq paraphrases in Experiment 1 might have shifted the interpretation towards altqs, though the negative intercept was non-significant. It was also noted that using slashes in altq and dynq paraphrases in the JA version of Experiment 2 might show that the non-significant bias was really due to slashes or not. However, given that the model results obtained from the JA version of Experiment 2 were similar to those obtained from Experiment 1, it is now confirmed that there was no bias introduced by slashes in Experiment 1.

There are several limitations of Experiment 2. Although the JA replication in this chapter addressed the limitations mentioned in Experiment 1 (Chapter 6) by including Urban JA participants from several cities, one of the limitations is that it is still restricted to Urban JA. Further research might replicate this experiment on other JA dialects in the future to come up with a complete picture of all JA dialects.

The chapter provided an answer to the research question by showing the similarities and differences between the four dialects and by indicating how these similarities and differences led to the classification of the four dialects into the types proposed in Chapter 4. The differences between all dialects were subtle. All dialects share the property of having a significant main effect of the choice of contour. Three of them had the choice of disjunctive element significant. Nevertheless, the size of the effect for each cue seems slightly different in different dialects. Such a difference between dialects might be of interest for future research.

8 General Discussion

8.0 Aim and Outline of the Chapter

The general discussion draws on all chapters of the thesis with primary focus on the main chapters (chapters 4, 5, 6, and 7). Section 8.1 briefly summarises what was achieved in each chapter. Then, the chapter discusses, in turn, three areas of interest that arise from the results of the previous chapters, and their implications: Section 8.2 identifies the resulting empirical contributions of the thesis; Section 8.3 discusses the mismatch conditions and shows how this thesis revised Meertens' (2019) simple three-way typology to accommodate the Arabic dialects; Section 8.4 provides a brief discussion of disjunctive elements in other languages and assigns them to the types of dialects proposed in Chapter 4. Section 8.5 addresses the limitations of the thesis and highlights ideas for further investigation. Section 8.6 then concludes the thesis.

8.1 Summary of the Thesis

The thesis is divided into eight chapters. Chapter 1 outlined the purpose and significance of the thesis and provided operational definitions of some key terms. It also briefly sketched the outline of the thesis.

Chapter 2 began with background information on intonation, including the functions of and approaches to intonation. It, then, gave background information about the Autosegmental-Metrical Theory (AM). It described some intonational patterns in some utterance types in Arabic. The chapter presented information about the notation for the transcription of intonation, which was used in this thesis, and concluded with a closing summary.

Chapter 3 sets out the context of the thesis. First, it provided a brief overview of Dayal's (2016) generalisation that altqs and dynqs are disambiguated solely through prosody. However, it showed that some languages, including Arabic, have more than one disjunctive element, so there might be a role of choice of disjunctive element in the disambiguation in such languages. This means that Dayal's generalisation might not be applicable to languages having more than one disjunctive element. In contrast, the chapter explained that Meertens (2019) sketched three universal categories languages use to disambiguate disjunctive questions: prosody-only, disjunction-only, or a combination of both. The chapter then suggested an investigation of how disjunctive questions are disambiguated in Arabic to find out whether these categories fit Arabic or not. The chapter also gave background information about altqs and yes-no questions. It referred to the types of altqs in English and Arabic. It also explored the linguistic situation in Jordan by reviewing classifications of Jordanian Arabic (JA) as well as its syllable structure, lexical stress, and word order. The chapter concluded with some concluding remarks.

In Chapter 4, the main aim was to establish the distribution of disjunctive elements in Arabic with a special emphasis on the disjunctive elements used in disjunctive questions. The chapter began by reviewing studies that provided accounts or examples of disjunctive elements in disjunctive questions. Based on this review, dialects were preliminarily classified into three types: Type 1 (a tendency in which both disjunctive elements might be specialised to one question type), Type 2 (a tendency in which one disjunctive element might be specialised and one might be general), and Type 3 (a tendency in which both disjunctive elements might be general). This classification was tentative because there were no studies specifically designed to investigate the distribution of disjunctive elements and because there were different descriptions of some dialects. Egyptian Arabic (EA) was thought to belong to either Type 1 or Type 2, and Syrian Arabic (SA) to Type 3. It was difficult to decide on JA's position due to the lack of studies containing both disjunctive elements in JA, but based on the researcher's intuition, it was preliminarily classified under Type 2. Then, a corpus search was performed to explore the behaviour of disjunctive elements. The corpus search helped classify Kuwaiti Arabic (KA) as belonging to Type 1. Hence, a dialect representing each type was selected to replicate Pruitt and Roelofsen's (2013) study on.

In Chapter 5, the prosodic realisations of disjunctive questions, and which disjunctive element can be used in them, were established from production data. The chapter started with a literature review on the prosody of disjunctive questions in the four dialects. Then, a detailed prosodic investigation of target tokens that might be disjunctive questions in read speech corpus data in JA, EA, KA, and SA was performed (corpus production study). Tokens were first classified as altqs and dynqs before examining their prosody, based on the researcher's intuition. Then, their prosody was examined and compared with the prosody of altqs and dynqs from the literature. The prosody of those that were classified as altqs matched the prosody of altqs in the literature, and the prosody of those classified as dynqs matched the prosody of yes-no questions, providing further evidence that they might safely be considered altqs and dynqs. The second part of the chapter explored the prosodic features and choice of disjunctive elements in production data collected expressly to investigate JA disjunctive questions (JA production study). The aim was to find out how these questions are produced in JA and what might distinguish them, completing the picture for JA, which was not clear from the previous chapter. The results showed that *willa* might be specialised to altqs whereas *ʔaw* is not, which suggests that JA belongs to Type 2. The chapter also noted that this initial classification needs further evidence, which will follow in the next chapter (Chapter 6). As for the cues that might distinguish disjunctive questions in JA, and thus serve as independent variables in the perception experiment (Chapter 6), the JA production study results showed that the two cues of interest are: choice of prosodic contour (late-rise vs. rise-fall) and choice of disjunctive element (*ʔaw* vs. *willa*).

In Chapter 6, the aim was to find out which of the two cues found in the previous chapter disambiguate disjunctive questions in JA, as well as their relative contribution to the interpretation of these questions in JA. The findings showed a main effect of both cues, though the effect size for the choice of contour was much larger than that for the choice of disjunctive element. Experiment 1 thus completed the picture for JA by confirming its type (i.e., Type 2): *willa* was strongly dispreferred in dynqs. Although *willa* was not preferred in dynqs (i.e., in the mismatch condition), use of *willa* with a late-rise contour did not result in participants guessing how to respond to trials, as shown in the Exact Binomial test (see Section 6.4.1). Thus, the Exact Binomial test showed that *willa* is not ungrammatical in the mismatch condition, but that it is still dispreferred in it. More data from JA in the next chapter might also confirm or reject this classification.

Chapter 7 expanded the scope of the investigation to explore across dialects, and specifically the similarities and differences among JA, EA, KA, and SA in which cues contribute to the disambiguation of disjunctive questions. The chapter concluded by showing that the dialects were similar to each other in two respects. First, they all showed a main effect of both choice of contour and choice of disjunctive element (except for SA because it lacks an effect of disjunctive element choice); the rise (in the four dialects) and *ʔaw* (in the three dialects: JA, EA, and KA) significantly increased the likelihood of dynq responses. Second, the effect of intonation was larger than that of choice of disjunctive element in all dialects (as reflected in coefficient estimates), suggesting that whenever a particular disjunctive element can be used in both altqs and dynqs, the contour plays the primary role in disambiguating them.

However, the four dialects were different in the relative size of the effect for the two cues. In EA, for example, there was a smaller difference in effect size between the coefficient estimates for choice of contour and choice of disjunctive element, suggesting that EA listeners depended on choice of disjunctive element in the disambiguation more than listeners in the other dialects (JA, KA, and SA). The strength of effect size of disjunctive element choice in EA was also confirmed by the inter-dialectal model, which showed that the effect size of disjunctive element choice was strongest in EA and weakest in SA. In other words, the individual models, the grand model, and the Exact Binomial test revealed that, overall, the role of the choice of disjunctive element varied across the four dialects and was strongest in EA and weakest in SA. It can be concluded that altqs and dynqs are disambiguated by both cues in three Arabic dialects (JA, EA, and KA) and by the choice of contour in all four dialects. However, the choice of contour is the primary cue, and the choice of disjunctive element is supportive, in all four dialects (though to a non-significant extent in SA). The chapter also showed that JA, EA, and KA belong to Type 2 while SA belongs to Type 3.

8.2 Empirical Contributions of the Thesis

The experimental findings contributed to our knowledge and understanding of the four dialects. There were no inter- or intra- dialectal prior experimental studies on what disambiguates altqs and dynqs in any of the four Arabic dialects whether in an intra-dialectal or an inter-dialectal studies, so this thesis might be the first in a series of similar future studies on other dialects. The intra-dialectal investigation was achieved using four individual statistical models while the inter-dialectal one was based on one grand statistical model, with *dialect* as a factor. In JA, this is the first study that examines disjunctive questions using corpus search, a production study (the dialogue completion task, DCT), and two perception studies, which adds to the literature on this dialect and to the literature on Arabic questions in general. Using different ways to explore the variables used in the perception studies made this thesis multifaceted.

Moreover, this thesis contributed to Arabic prosodic and lexical studies in many ways. First, it provided experimental descriptions of altqs and dynqs, which are under-researched. These descriptions began with a thorough review of the literature on the use of disjunctive elements (*ʔaw* and *willa*) in altqs and dynqs. The literature showed that there is not much known about which disjunctive element is used in which question type, such as the case in JA, KA, and SA, or that there are different accounts of the use of disjunctive elements in altqs and dynqs, such as the case in EA. Then, three types of dialects were proposed to explore the patterns of the distribution of disjunctive elements. These types divided disjunctive elements into specialised to one question reading and non-specialised (i.e., general). These three types were not explored before, which adds to the literature of Arabic. However, from this literature review, the pictures for some Arabic dialects remained unclear. The corpus search was, therefore, resorted to, which also contributed to the literature by describing the distribution of disjunctive elements in the eight Arabic dialects in the IVAr Corpus. Thus, the corpus search filled the gap in the literature about the distribution of disjunctive elements in all kinds of utterances, in general, and in disjunctive questions, in particular, which informed the choice of which dialects to include in the perception studies.

Second, one of the contributions that resulted from searching the IVAr Corpus was discovering the behaviour of disjunctive elements in not-alternative questions in eleven datasets (eight dialects), which has not been previously reported in the literature on most of these dialects. Some researchers (e.g., Eid, 1974; Winans, 2012) reported that not-alternative questions in EA use only *willa*. This was also observed in all of the dialects searched except for Iraqi which used *loː* in this place. There were differences between the dialects in the use of disjunctive elements except in not-alternative questions; this might mean that the semantics of not-alternative questions across all dialects in the corpus is the same, which might be of interest for future semantic studies.

Third, there seem to be no studies that empirically investigated the differences between altqs and dynqs in JA in the choice of contour and disjunctive element distributions. Therefore, a JA production study followed to investigate the prosodic differences between altqs and dynqs and to explore which disjunctive element is used in these questions. It added to the literature on the prosody of questions and might be the first to have empirically explored the uses of *ʔaw* and *willa* in altqs and dynqs. The findings were used as independent variables in the perception studies, adding to the literature on these under-studied questions in JA and Arabic as they were not perceptually studied in these dialects.

Fourth, the thesis also added to the literature on questions in EA, KA, and SA. This is because the prosody of altqs and dynqs was not experimentally and perceptually investigated in all these dialects. The contribution to the literature on these dialects was in searching the corpus for which disjunctive element is used in which disjunctive question type, classifying disjunctive elements into the three proposed types, and running perception experiments that helped to find out which prosodic cue and disjunctive element were the most important in disambiguating altqs and dynqs. The cross-dialectal perception study (Experiment 2) also helped compare the four dialects in which cues disambiguate disjunctive questions, which the literature on the four dialects lacks.

The EA version of Experiment 2, for example, has added new experimental evidence to the EA literature in terms of the distribution of disjunctive elements. The findings of Experiment 2 for EA showed that questions with *ʔaw* could grammatically be interpreted as altqs and as dynqs, which contradicts Winans' (2012; 2019) observation that *ʔaw* cannot appear in altqs. Winans also hypothesised that *willa*-utterances cannot be interpreted as dynqs, but she did not provide experimental evidence proving the ungrammaticality of *willa* in dynqs. Other EA researchers reported that *willa* can appear in dynqs in this dialect (e.g., Soraya, 1966). This thesis has experimentally tested *willa*-tokens with a late rise (the mismatch condition). The findings showed that participants' responses were not different from chance. This finding merits further investigation using stimuli recorded by a native speaker, but suggests that *willa* might be ungrammatical in EA dynqs, which is in line with Winans' observation above but contradicts Soraya's.

In general, the thesis was an attempt to address the evident gaps in the literature on the four dialects as which cue (the choice of contour vs. the choice of disjunctive element) can disambiguate altqs and dynqs and how these dialects are similar or different in which cues disambiguate these questions. Furthermore, it paved the way for investigating these questions in other Arabic dialects. Experiment 1 and Experiment 2 (with its four versions on four dialects) along with the corpus and the two production studies also added to the general intonational literature on languages.

8.3 Expanding Meertens' Third Category and Disjunctive Element Distribution

This section will begin by considering the behaviour of the Arabic dialects of interest in the mismatch condition (*willa* with a late rise, wlr). It will also assign each dialect to one type of the three types of dialects that were proposed in Chapter 4. Then, it will consider the Arabic dialects in terms of Meertens' (2019) typology as she sketched a simple three-way typology to interpret disjunctive questions: prosody-only, disjunction-only, or a combination of both (prosody+DE). Her prosody+DE category considers only congruent (i.e., typical) combinations of prosody and choice of disjunctive element. In other words, the prosody+DE category ignores the possibility of mismatch conditions and the possibility of specialisation versus non-specialisation of disjunctive elements, which the types proposed in Chapter 4 take into consideration. Thus, this section explores what is gained from the perception studies that examined both mismatch and congruent conditions in this thesis. More specifically, the implications gained from examining the mismatch condition (when the two conflicting cues (*willa* with a late rise) are used together) in the four Arabic dialects will be discussed. Then, the four Arabic dialects will be placed in an improved version of Meertens' categories. The way the prosody+DE category is improved will be discussed below.

There was a mismatch condition in each of the Arabic dialects. This mismatch condition arose when intonation was hypothesised to favour one answer while the disjunctive element was hypothesised to favour another. All four dialects had the same mismatch condition (i.e., wlr), since late-rise intonation generally favoured a dynq response whereas *willa* typically inhibited a dynq response, which was shown in the coefficient estimates from the statistical models and the p-values from Binomial tests (Chapter 7). The fact that the late-rise prefers a dynq reading was inferred from the literature (Chapter 5, Section 5.2) on all four dialects, which reported that yes-no questions end with a rise. The preference for an altq reading that *willa* shows was also observed in the corpus in all four dialects.

The experimental results showed that JA (in the two experiments), KA, and SA participants dealt with this mismatch condition in a similar way, but EA participants dealt with it in another way. Two differences were noticed between all these dialects and EA. The first was that the role of the late-rise outweighed that of *willa* in the three dialects as the wlr condition received dynq responses at a rate of 61%, 59%, 55%, and 55% of the time in JA (Experiment 1), SA, JA (Experiment 2), and KA, respectively. However, this balance in the mismatch condition was shifted in EA, as the late-rise did not outweigh *willa*. That is, the wlr condition in EA received fewer dynq responses than altq responses (45% as dynqs), as shown in Chapter 7. The second was in how different from chance participants' responses were in the mismatch condition. The use of *willa* with a late rise did not result in listeners guessing how to respond in JA, KA, and SA, though they were provided with only two on-screen responses to select from, whereas it did in EA, as was discussed in the previous chapter based on the Exact Binomial tests. Figure 8.1 shows the mean of dynq responses that the wlr condition received in the four dialects:

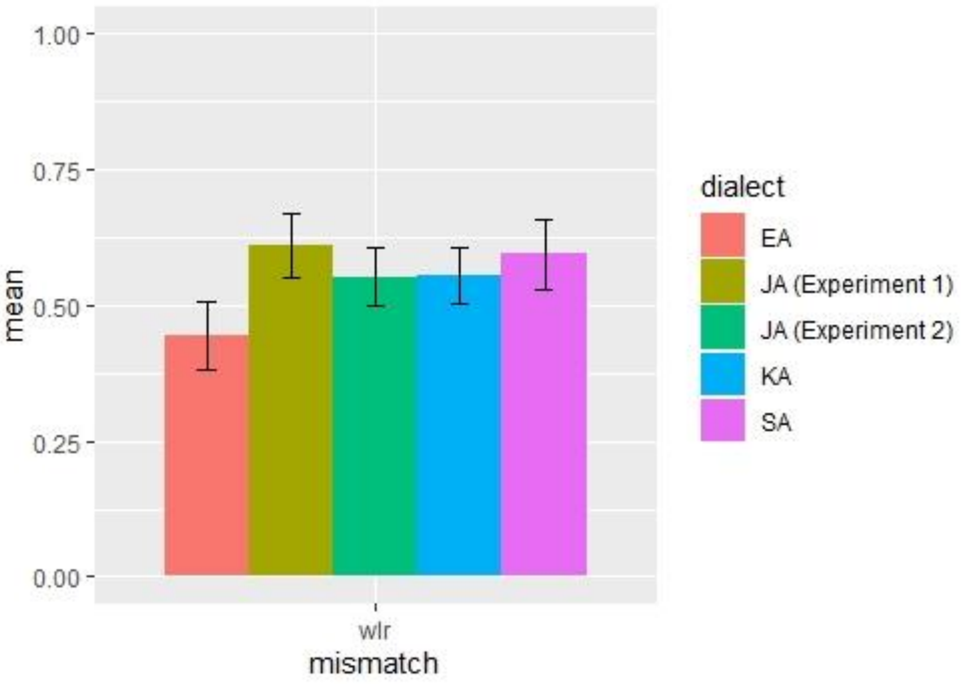


Figure 8.1 Mean % of dynq responses in the wlr condition across all four dialects (with error bars showing 95% confidence intervals).

As seen in the figure, the four dialects did not behave in the same way. Dynq responses to the wlr condition were the highest in JA (Experiment 1) and the lowest in EA (i.e., altq responses to wlr condition were the highest in EA). The reason for having fewer dynq responses to the wlr condition in EA might be because some of EA listeners guessed the answers, allowing the overall bias towards altq responses to emerge. This overall bias was seen in a negative significant intercept in the grand mean model in Chapter 7.

Although the general findings for three of the four dialects indicated that the choice of contour and the choice of disjunctive element each contribute to the disambiguation process, the relative strength of the effect of choice of disjunctive element varied across all dialects. In JA, for instance, the effect size for the choice of disjunctive element was five times (in Experiment 1) and three times (in Experiment 2) smaller than that for the choice of contour. Similarly, in KA, the effect size for the choice of disjunctive element was four times less important than that for the choice of contour. However, in EA, there was not much difference between the effect size for the choice of contour and for the choice of disjunctive element, though the coefficient estimate for intonation ($\beta = 0.4677226$) was only slightly higher than that for the disjunctive element ($\beta = 0.3723088$). In SA there was no significant effect for the choice of disjunctive element, making this dialect stand out from the other three dialects. These results were dependent on the individual dialectal models, but in an inter-dialectal comparison (from the grand model in Chapter 7), these results show that, relative to the other dialects, intonation was strongest in JA but weakest in EA, and that choice of disjunctive element was strongest in EA but weakest in SA (see Section 7.5 for more details).

Within each Arabic dialect (an intra-dialectal system), in general, the contour shape is expected to always be a disambiguating cue because, as the literature showed, the vast majority of Arabic dialects use intonation to mark yes-no questions, and this is supported in that it was significant across the four dialects. The main difference between dialects is expected to lie in the relative contribution of choice of disjunctive element compared with choice of contour, which was also shown in the inter-dialectal grand model that showed that the effect size for intonation was larger than the effect size for choice of disjunctive element. The effect of choice of disjunctive element was strongest in EA and weakest in SA, which is shown in both the intra- and inter- dialectal models.

The importance of choice of contour and choice of disjunctive element in Arabic partially supports Meertens' (2019) simple three-way typology, stating that languages can be assigned into three categories in the disambiguation of string-identical disjunctive questions: prosody-only, disjunction-only, or the combination of both (Table 8.1).

Table 8.1 *Assigning Languages that Meertens Referred to into the Three-way Typology*

Use of disjunctive element	Use of Prosody	
	Yes	No
Yes		Finnish ? Basque[124]
No	English	

As for the prosody+DE category (shaded), Meertens reported that for Basque when the fall is combined with a specific disjunctive element while both *X* and *Y* are accented, an altq reading is obtained. When the rise is combined with another disjunctive element and with only one accent on the *X or Y*, a dynq reading is obtained.

However, differences in the strength of the disambiguating cues across four Arabic dialects support expanding Meertens' (2019) simple three-way typology to accommodate these

[124] Meertens first, at the beginning of the paper, classified Basque as belonging to the prosody+DE category (the shaded cell). Then, at the end of the paper, she reported that it behaves like Finnish, so it belongs to the disjunction-only category. This contradiction might stem from mixing formal and spoken dialects together, as Saltarelli (1988) reported different behaviours for each of the formal and spoken Basque (this behaviour will be discussed later).

Arabic dialects. Currently, Meertens' typology captures the differences between languages in how they disambiguate disjunctive questions but needs to be more flexible with regard to languages in the prosody+DE category. When explaining the prosody+DE category, Meertens pointed out that it refers to cases in which each disjunctive element always and only combines with a specific contour shape (i.e., congruent conditions). For example, she explained her point about Basque by stating that "The combination of an accent on each disjunct and a final fall, and the disjunction *ala* results in an AltQ reading. Disjunctive questions with a block accent, final rise and the disjunction *edo* are interpreted as PolQs" (p. 299). She did not allow for or propose a category in which *edo* was replaced with *ala* but the contour was unchanged or vice versa (i.e., mismatch conditions). In other words, her description of the prosody+DE category is similar to Type 1 proposed in Chapter 4 (Section 4.1), as each disjunctive element seems to be specialised to one question type, but she used a different prosodic realisation with each disjunctive element. Expanding Meertens' typology to allow for mismatch conditions and for varying degrees of specialisation of disjunctive elements to inclusive and exclusive readings will allow it to accommodate dialects with no specialised disjunctive elements (e.g., Type 3) and dialects with one specialised and one general disjunctive element (e.g., Type 2). Meertens' current categories treat dialects of Type 2A, Type 2B, Type 3 as if they are the same by assigning them to the prosody+DE category, which ignores the possible variation in the strength of disjunctive element choice.

In other words, the present thesis shows that her prosody+DE category is correct but needs to be expanded to account for at least mismatch conditions (which result if choice of disjunctive element and choice of contour do not always co-vary), if not the strength of disjunctive element choice as well. Allowing for mismatch conditions means that JA, EA, and KA dialects would fall in the prosody+DE choice category. SA[125] fits Meertens' current Typology (in the prosody-only category) as it showed no effect of choice of disjunctive element. The newly expanded category will capture how JA, EA, and KA, in which both contour choice and choice of disjunctive element played a significant role in the disambiguation, but the relative contribution of both cues varies, can be accommodated. These three dialects fall in this prosody+DE category as the proposed expansion of the current category will include any prosody and disjunctive element mix, including mismatch conditions. Thus, this thesis expands the empirical scope by confirming Meertens' point that

[125] Please note that SA goes in the same category as English even though SA has more than one disjunctive element.

there are languages that use both prosody and disjunctive element in the disambiguation, but, at the same time, it shows that the empirical facts require expansion of the prosody+DE category. In addition to the proposed expansion of the prosody+DE category, this thesis (in Chapter 4) proposed three types of dialects that account for both mismatch conditions and variations in the strength of disjunctive element choice, which Meertens' typology lacks. What this thesis proposes, as Meertens' typology already pointed towards, is that not all languages make use of *only* prosody in the disambiguation of disjunctive questions, in contrast to Dayal's generalisation referred to in Chapter 3. Thus, this thesis is another voice showing that not only does prosody matter in the disambiguation, but also other cues and the varying strength of such cues (e.g., disjunctive element choice) matter, from new data and newly studied dialects. All Arabic dialects (at least those in this study) use prosody, but only one dialect uses *only* prosody (i.e., SA) because it lacks an effect of disjunctive element choice.

The proposed expansion provides solutions to the empirical gap in Meertens' typology (which three Arabic dialects fall in). Thus, the newly improved typology might now be applicable to Arabic or other languages. Languages or dialects employing prosody as the only disambiguating cue, such as English or SA (as it shows no effect of choice of disjunctive element), would fall in Meertens' prosody-only category. Languages that might depend only on the choice of disjunctive element will fall in the disjunction-only category. Languages that might combine prosody with any disjunctive element will lie in the newly expanded category. Even languages that use a combination strategy and have some significant preference towards one or other disambiguating cue, such as JA, EA, and KA in which the choice of contour was more important than the choice of disjunctive element, will still be accommodated in this newly expanded category (i.e., the prosody+DE category). In other words, for the purpose of this thesis, the prosody+DE category will include the Arabic dialects that show a main effect of both cues in the statistical analysis (see Chapter 7, Section 7.5). Thus, the improved overall typology is expected to be appropriate to a wider set of languages that show different behaviours, regardless of the relative contribution of contour choice or choice of disjunctive element to the disambiguation. The caveat, however, might be that the prosody+DE category still cannot tell which disjunctive element is specialised and which is general, a disadvantage which is now avoided by the three types proposed in Chapter 4.

In terms of the distribution of disjunctive elements in the four dialects, two further points are worth mentioning. First, a test of the combination of *willa* with a late rise (the expected mismatch condition) was also run in each dialect, given that the design of the experiment included only two on-screen paraphrases (see Section 6.4.1 and Section 7.5.1, for the reflection on providing two answer options in Experiment 1 and Experiment 2). The results showed that participants' responses were different from chance in all dialects except for EA, which is also the dialect in which the effect size for choice of disjunctive element was strongest. Thus, the results from the Exact Binomial test for all four conditions: *willa* with a late rise (wlr) and a rise fall (wrf) and *ʔaw* with a late rise (2lr) and a rise fall (2rf) (Section 7.5.1), along with the results from the mixed-effects logistic regression, indicated that JA, EA, and KA fall in Type 2A and that SA falls in Type 3. This classification of dialects is now somewhat definite because it was preliminary in Chapter 4. Table 8.2 provides the final classification of the four Arabic dialects to the three types of dialects, based on the literature review and the experimental evidence (corpus, production, and perception studies) from chapters 4, 5, 6, and 7.

Table 8.2. *A Final Classification of Arabic Dialects to the Types of Dialects from Chapter 4*

Type 1 (both disjunctive elements seem specialized)	- Modern Standard Arabic
Type 2 (one disjunctive element might be specialised and one seems general)	**<u>Type 2A:</u>** - Egyptian Arabic - Jordanian Arabic - Kuwaiti Arabic
Type 3 (both disjunctive elements seem general)	- Syrian Arabic

Second, it was suggested in Chapter 4 that describing EA as 'English-like' might not be accurate because the literature in this dialect used *ʔaw* and because the lack of *ʔaw* in altqs and dynqs in the corpus might be an accidental gap (corpus data points are small). Thus, classifying EA as 'English-like' and KA as 'MSA-like', based on the corpus search, was not experimentally supported because it turned out that they behaved in a hybrid way. That is, EA and KA (as well as the other dialects) behaved 'like MSA' in having two disjunctive elements, with each disjunctive element being somewhat preferred in one type of disjunctive question. At the same time, these dialects also behaved 'like English' in employing contour choice to disambiguate disjunctive questions in the case when one or both disjunctive elements are used in both altqs and dynqs though with a clear preference for one question type.

As for Arabic dialects beyond those examined here, it is also expected that choice of contour in some of them will be the most important cue in disambiguating altqs and dynqs because the results of the four dialects (Chapter 7) showed a strong effect of choice of contour regardless of the strength of choice of disjunctive element. Thus, most Arabic dialects are expected to belong to Type 2 or Type 3 and to Meertens' (2019) prosody-only or prosody+DE categories. The distribution of disjunctive elements is also expected to vary from dialect to dialect as shown above. There might be dialects, like EA, in which the effect size for the disjunctive element choice is so strong (as shown in both the individual and grand models) that it might be close to the effect size for the contour choice (as shown in the individual model). There might also be dialects, like JA, KA and SA, in which the effect size for the disjunctive element is much weaker than that for the contour choice (as shown in both the individual and grand models). It should be noted that this expectation about the other Arabic dialects remains to be tested in the future. Future studies could agree or disagree with this expectation, which is beyond the scope of this thesis.

8.4 Disjunctive Elements in Other Languages and the Proposed Types

In this section, the implications of what is known from the Arabic mismatch conditions above, in light of the three types of dialects proposed in Chapter 4 (Section 4.1), for the understanding of what might hold in other languages are discussed. The distribution of disjunctive elements in some languages, based on what is available in the literature, will be referred to.

There are two predictions or hypotheses: strong and weak. The strong hypothesis holds that all languages can be accommodated by the three proposed types, and the weak one states that there might be languages that use other cues, besides prosody or choice of disjunctive element (e.g., word order), which future research might find. The weak hypothesis might be true cross-linguistically, but the strong hypothesis might be true for all Arabic dialects, instead of all languages in the world. Other future research by other researchers can support either hypothesis or improve on the types. Thus, each language will also be assigned to one type of the three dialect types suggested in Chapter 4: Type 1 dialects have a tendency in which both disjunctive elements might be specialised to one question type. Type 2 dialects have a preference for one specialised and one general disjunctive element. This type is divided into Type 2A (the specialised disjunctive element is altq-restricted) and Type 2B (the specialised disjunctive element is dynq-restricted). Type 3 comprises dialects with a tendency for general disjunctive elements).

Little is known about how many languages employ disjunctive elements either interchangeably in altqs and dynqs (i.e., general), or individually in either of them (i.e., specialised). Some generalisations can be drawn based on studies that provided examples of altqs and dynqs that had either similar or different disjunctive elements.

The disjunctive elements *ʔaw* and *willa* in the four dialects of Arabic studied here were interpreted (at least by some listeners) as both altqs and dynqs, though *ʔaw* favours a dynq reading and *willa* favours an altq one and use of *willa* with a late rise in EA might be ungrammatical (i.e., listeners responded to it by guessing) (see Chapter 7). Thus, given that *ʔaw* was shown to be grammatical in altqs and dynqs (see the Exact Binomial test for all conditions, Chapter 7), this finding does not fit Haspelmath's (2007) classification of a semantic dichotomy of disjunctive elements in languages having more than one disjunctive element, which was described as cross-linguistic (Winans, 2019). Haspelmath assigns each disjunctive element to a different question type, which clearly does not work for the Arabic dialects of Type 2A (e.g., JA, EA, and KA). His proposed dichotomy for disjunctive elements was between "interrogative disjunction and standard disjunction" (p. 25). He pointed out that both kinds of disjunctive elements can be used in questions,[126] but the interrogative disjunctive element (*ala*) is altq-restricted. He illustrated this dichotomy using Saltarelli's (1988) examples of altqs and dynqs in Basque (p. 84):[127]

(8.1)	te-a	edo	kafe-a	nahi	d-u-zu?
	tea-ABS	or	coffee-ABS	want	3.ABS-AUX.TR-2SG.ERG[128]
	'Do you want tea or coffee?'				
(8.2)	te-a	ala	kafe-a	nahi	d-u-zu?
	tea-ABS	or.EXCL	coffee-ABS	want	3.ABS-AUX.TR-2SG.ERG
	'Do you want tea or coffee?'				

[126] He also gave an example in which the standard disjunctive element appeared in declaratives.
[127] These examples and their glosses are cited directly from the primary source, not from Haspelmath's chapter.
[128] As the researcher is not a native speaker of Basque, it cannot be made sure of how this transcription can appropriately be rendered in IPA. Therefore, transcriptions of examples from languages other than Arabic are cited as they appeared in the sources.

Haspelmath pointed out that (8.1) is a dynq, containing the standard disjunctive element (*edo*); this utterance cannot be interpreted as an altq, according to Haspelmath. The other disjunctive element (*ala*) in (8.2) is the interrogative one, forcing an altq reading. However, he did not take account of Saltarelli's original point, while discussing the same disjunctive elements in the same examples, that colloquially *edo* can be accepted in both types of disjunctive question. This might undermine Haspelmath's dichotomy, in the very language that he cited though he did not explicitly state that it is dynq-restricted in this language, but he used it in a dynq example and commented that this example using this disjunctive element "is not an alternative question, however, but a polar question that requires 'yes' or 'no' as its answer" (p. 26).

Based on Haspelmath's and Saltarelli's descriptions of disjunctive elements, then, Formal Basque would fall in Type 1 (Table 8.3), but spoken Basque will fit into Type 2A (Table 8.3) based Saltarelli's description, in the case *edo* is general, and *ala* is specialised to altqs. The same point about Basque was also stressed by Goenaga (2009) who reported that this language dedicates a specific disjunctive element to altqs (*ala*). In the same vein, Uegaki (2014) reported that one of the disjunctive elements in Basque (*edo*)[129] that can be used in yes-no questions can also be used in altqs (i.e., general).

The ungrammaticality of *willa* in dynqs, as indicated in the EA Exact Binomial test, and the grammaticality of *ʔaw* in both types of disjunctive questions in EA resembles patterns reported in other languages, such as Finnish. There are two disjunctive elements in Finnish: one can be used in altqs and dynqs (Kaiser, 2003), and one can only be used in altqs (Hakulinen & Karlsson, 1988, as cited in Kaiser, 2003). This distribution makes Finnish belong to Type 2A, as EA does (Table 8.3). Kaiser provided the following example (pp. 703-704):

(8.3)	a.	huomasi-ko	Pekka	miehen	**vai**	naisen?
		notice.PST.3SG-Q	Pekka.NOM	man.ACC	or	woman.ACC

'Did Pekka notice man or woman?'

[* yes/no answer]/[ok alternative answer]

b.	huomasi-ko	Pekka	miehen	**tai**	naisen?
	notice.PST.3SG-Q	Pekka.NOM	man.ACC	or	woman.ACC

'Did Pekka notice man or woman?'
[ok yes/no answer]/[ok alternative answer]

[129] Both Goenaga and Uegaki did not specify which variety of Basque they are referring to.

c. huomasi-ko Pekka miestä **tai** naista?
notice.PST.3SG-Q Pekka.NOM man.PARTIT or woman.PARTIT

'Did Pekka notice man or woman?'
[ok yes/no answer (preferred)]/[ok alternative answer]

In this language, it seems that case marking can also play a role in the disambiguation. More specifically, Kaiser affirmed that the disjunctive element *tai* that can be used in altqs and dynq in (b) above favours a dynq reading with certain kinds of syntactically case-marked objects. That is, the disjunctive element in (b) can occur in both altqs and dynqs, but when the object is case marked as partitive, instead of accusative, it favours the dynq reading as shown in (c). Thus, the pattern in Finnish is that (a) can only be an altq (i.e., specialised), (b) can be both an altq and a dynq without any preference as the object is case marked as accusative, and (c) can also be both with a dynq preference (i.e., general). The role case marking plays in this language might open the door to the possibility of having languages using cues other than choice of contour and choice of disjunctive element, which might be achieved by future research on this language. Future perception studies, for instance, can also test mismatch conditions in this language by including *vai*, which is altq-restricted, in an utterance with a partitively marked object, which might prefer a dynq reading. In this way, it can be explored whether or not a dynq reading can be obtained.

Likewise, Hindi-Urdu has two disjunctive elements: one may be used in both altqs and dynqs (i.e., general) whereas the other is altq-restricted (Bhatt & Dayal, 2020), making this dialect belong to Type 2A (Table 8.3). Consider the following examples (Bhatt & Dayal, 2020, "The singleton set requirement and disjunction" section, para 1):

(8.4) a. kya: tum ca:i ya:/*ki coffee pi-yoga? [/]
Q you tea or coffee drink-FUT.2MPL
'Will you drink tea or coffee?'

b. kya: tum [ca:i]$_F$ pi-yoge ya:/ki [coffee]$_F$?[130]
Q you [tea] drink-FUT.2MPL or.ALTQ [coffee]
'Will you drink tea or.ALTQ coffee?'

As can be seen, the disjunctive element *ya:* was acceptable in both dynqs and altqs (i.e., general). The other disjunctive element *ki* is altq-specific, and is accepted only in (b).

[130]The researchers noted that they did not provide the string-identical altq of (a) because some other researchers reported it is ungrammatical, but they also stressed that it is grammatical for them.

Although Bhatt and Dayal stressed that this language is similar to English in the role of prosody in the disambiguation, it should be acknowledged that the word order in this language might also be crucial in the disambiguation, as seen from the different word orders in the examples above. In case future studies reveal that what disambiguates these questions is only word order, this means that prosody might have been employed in these questions for reasons other than the disambiguation. The change of prosody might, for example, be a necessity because of the change in word order. Future studies might confirm whether or not other cues (e.g., word order or syntactic structure) play a role in the disambiguation in this language.

Furthermore, Mandarin Chinese has been reported to have two disjunctive elements: there is one disjunctive element for each question type (Erlewine, 2014), so it could belong to Type 1 (Table 8.3). Erlewine provided the following example in which *háishi* occurs in altqs (Erlewine, 2014, p. 221):

(8.5)	nǐ	xiǎng	hē	kāfēi	háishi	hóngchá	(ne)?
	you	want	drink	coffee	or	tea	(Q)

Alternative question: ‘Do you want to drink coffee or tea?’

Possible answers: ✓(I want) coffee; ✓(I want) tea; #Yes; #No

Furthermore, Beck and Kim (2006) noted that Korean has two disjunctive elements. One is specified for altqs and one for dynqs, making this language different from German and English, as they explained. This description means that Korean fits into Type 1 (see Table 8.3). However, it should be noted that *X* and *Y* in altqs contrast whole VPs while they contrast NPs in the dynq. The fact that (8.6) and (8.7) below (Beck & Kim, 2006, p. 171) have different syntactic structures might mean that this language might employ different syntactic structures, other than the different disjunctive elements, to distinguish both types of disjunctive question. Future research, by a native speaker, in Korean might confirm or reject this inference.

(8.6)	mina-ka	cha-na	coffee-lul	masi-ess-ni?
	Mina-NOM	tea-or	coffee-ACC	drink-PST-Q

‘Did Mina drink tea or coffee or not?’

[only disjunctive yes-no interpretation]

(8.7) mina-ka cha-lul masi-ess-ni animyen coffee-lul masi-ess-ni?
Mina-NOM tea-ACC drink-PST-Q if.not coffee-ACC drink-PST-Q
'Which of tea or coffee did Mina drink?'
[only alternative question interpretation]

Gračanin-Yuksek (2016) mentioned three disjunctive elements in Turkish. She stressed that one is dedicated to altqs and two are restricted to dynqs, so disjunctive elements in this language are specialised, which makes Turkish fall in Type 1 (Table 8.3). However, in the absence of any disjunctive element and a question particle, it turns out that the choice of contour can disambiguate the two question types as in (8.8) below (p. 43). She did not discuss the prosody of this question type, and noted that this example came from the reviewer's comments, and is mainly colloquial. Based on this note, the disambiguating cues of disjunctive questions in colloquial Turkish merit further investigation:

(8.8) çay, kahve?
tea coffee
'Tea, coffee?'

Meertens, Egger, and Romero (2019) provided the following two examples of disjunctive questions in Turkish when discussing question particles in this language. Their example used one disjunctive element (*yoksa*) in the altq and one (*veya*) in the dynq examples (p. 187), which is consistent with Gračanin-Yuksek's (2016) main generalisation:

(8.9) ʕali iskambil mi (oynadi) yoksa futbol mu oynadi?
Ali cards Q play.PST or.ALTQ football Q play.PST
'Did Ali play cards or football?'

(8.10) ʕali iskambil veya futbol oynadi mu?
Ali cards or.DECL/POL football play.PST Q
'Did Ali play cards or football?'

As is the case in Hindi-Urdu and Korean above, these two Turkish examples are not minimal pairs. They have different syntactic structures. The altq (8.9) repeats the verb, which is not the case in (8.10); the question particles appeared in different places, too. Therefore, there might be a disambiguating factor other than just using different disjunctive elements in this language (e.g., the syntactic structure). However, little is known, at least for the time being, about how altqs and dynqs are disambiguated in these three languages. Thus, a native researcher of each language might run experiments to test the effects of such possible cues on the disambiguation.

Taking all this evidence into account, the claim of this thesis is that not all languages depend only on prosody to disambiguate altqs and dynqs, which is somewhat similar to Meertens' (2019) typology that was enhanced in this thesis. Dayal's generalisation in Chapter 3 was partially supported in Arabic, which has more than one disjunctive element, as it turned out that there is still a dominant role of prosody. Her generalisation was found to hold for one out of the four dialects, i.e., SA, which shows a main effect of only choice of contour. However, Dayal's generalisation is incomplete for the other three dialects, as there is another cue that might and does disambiguate disjunctive questions, namely choice of disjunctive element. This thesis shows that prosody is indeed important in all Arabic dialects, but that the distribution of disjunctive elements in a language is also part and parcel of the disambiguation. The choice of disjunctive element plays a non-trivial role in the disambiguation of disjunctive questions in three of the four Arabic dialects studied here. The relative strength of disjunctive element varies across the Arabic dialects, which might have led to different mappings of dialects on to the different types of dialects. That is, the thesis shows that the literature either referred to the role of prosody, disjunction, or both, but did not refer to the possibility that variation in the relative strength of disjunction might also play a role in the disambiguation as shown in the Arabic dialects studied here.

The classification of the languages above into types is summarised in Table 8.3 below. This classification is still preliminary because it is based only on the literature review i.e., on a limited number of examples found in the literature.

Table 8.3. *A Classification of Languages According to the Three Types of Dialects*

Type 1	- Formal Basque - Mandarin Chinese - Korean - Turkish
Type 2	<u>**Type 2A:**</u> - Spoken Basque - Finnish - Hindi-Urdu
Type 3	

In conclusion, Chapter 6 (6.1) referred to the current debate in the semantic and prosodic literature about which prosodic cue can reliably disambiguate disjunctive questions in English. Some researchers contended that the choice of the final contour is the most important (e.g., Pruitt, 2008a; Pruitt, 2008b) while others agreed that the accent distribution on the *X* or *Y* is what resolves this ambiguity (Quirk, Greenbaum, Leech, & Svartvik, 1985; Aloni & van Rooy, 2002; Romero & Han, 2003; Han & Romero, 2004; Beck & Kim, 2006; Truckenbrodt, 2013, etc.). Conversely, Bartels (2013) questioned the importance of accent distribution, reporting that it is optional in dynqs. In addition, recent research emphasized the importance of both cues (e.g., Pruitt & Roelofsen, 2013; O'Mahony, 2014). All this debate revolves around prosodic cues, which were experimentally shown, in this thesis, to play a part in the disambiguation process in Arabic and other languages. All of these studies confirmed that prosody does indeed disambiguate disjunctive questions, but none of these studies referred to the crucial fact that other languages employ other ways to disambiguate disjunctive questions, other than Meertens (2019).

This thesis opens the door to think critically about other disambiguating cues, which might lead to a typology of universal disambiguating parameters across languages. The proposed modification to Meertens' typology above is a first step in this direction. Meertens' three categories referred to above, as well as the expansion outlined in this thesis (i.e., the combination of prosody with any disjunctive element), and the three types of dialects proposed in Chapter 4 might be the first step towards recognising a universal set of disambiguating cues. As shown in the above examples, there might be languages that might use disambiguating cues other than choice of contour and choice of disjunctive element (e.g., syntactic structure, word order, etc.). These possible disambiguating cues need further future investigation in those languages, by a native speaker.

8.5 Limitations and Further investigation

One possible fruitful study in the future would be to extend the range of dialects that are investigated to reach solid conclusions about the semantics and the distribution of disjunctive elements in Arabic. The intra- and inter- dialectal comparison of four Arabic dialects indicated that three of them (JA, EA, and KA) belonged to Meertens' (2019) prosody+DE category. SA, because of the lack of effect of choice of disjunctive element, was placed in the prosody-only category.

However, the individual models (intra-dialectal analysis) and the grand model (inter-dialectal analysis) showed that there were some differences between these dialects. There were dialects in which prosody was more important than choice of disjunctive element (e.g., JA, KA, and SA), and there was a dialect in which both cues were parallel, to some extent (i.e., EA). With these two general behaviours, other questions need to be answered with further research: do all Arabic dialects fall within these two observed behaviours or are there dialects behaving differently in a way that the choice of disjunctive element outweighs the choice of contour? Do all Arabic dialects fall in the three types of dialects observed in Chapter 4? If it turns out that there are Arabic dialects in which the relative strength of choice of disjunctive element is more important than that of choice of contour, then such dialects might fall in Type 1. Thus, future studies might test this possibility.

Another possible research area is to replicate the EA, KA, and SA experiments for the same dialects using stimuli recorded by a native speaker of each dialect. The results of the proposed studies could then be directly compared with the results obtained in this thesis. However, the proposed studies are expected to yield similar results because the experimental findings obtained in this thesis were consistent with the corpus results in terms of the distribution of disjunctive elements. For example, the EA finding that *willa*-tokens received fewer dynq responses is analogous to the corpus results that showed that *willa* was used less often in dynqs (4 in dynqs vs. 9 in altqs). The KA experimental findings that indicated that *willa*-tokens elicited fewer dynq responses (i.e., specialised) are also consistent with what was found in the corpus (*willa*: 4 in dynqs vs. 13 in altqs).

Moreover, given that this study investigated global prosodic differences between altqs and dynqs, future research might pay attention to finer phonetic details like the shape and the kind of pitch accents on the *X* and *Y*.[131] There might be a question such as: does the choice of pitch accent play any role in the disambiguation? Future studies could also look at the contribution of phonetic cues, rather than intonational or lexical cues, to the disambiguation of altqs and dynqs, such as duration and intensity: are there any differences in the duration and intensity of any constituent of the *X or Y* phrase between altqs and dynqs in Arabic? Another possible disambiguating cue that was observed from three examples above is the relative length of altqs and dynqs (i.e., the syntactic structure or word order). Languages that have different

[131] These ideas were considered but they are beyond the scope of this thesis as they are related to phonetic details and are not part of the methodology of the paper replicated here.

syntactic structures in altqs and dynqs might also investigate the contribution of such differences to the disambiguation.

Furthermore, an area that has not yet been investigated in Arabic is the phonological difference between the intonation of altqs, disjunctive declaratives, and non-disjunctive declaratives, which all typically have a final fall. This idea was not investigated in the past. Such a study might provide answers to questions such as: what is the disambiguating cue that makes listeners interpret an utterance as an altq rather than as a disjunctive declarative, even though they both end with a fall? Whatever the disambiguating cue might be, the improved typology would allow it to accommodate such results. There might be phonetic differences (e.g., in F0 slope) between the falls in both utterance types in JA and other Arabic dialects, as was found in French (see Delais-Roussarie & Turco, 2019 for more details). The same research idea can also be extended to include other Arabic dialects, replicating Delais-Roussarie and Turco's (2019) French study on the phonetic realisation of the shape of the contour. They studied the phonetic detail of the disambiguating cues of altqs and disjunctive declaratives as they both share the same global contour shape (a fall). Establishing the disambiguating cues of altqs and disjunctive declaratives in future, alongside the disambiguating cues of disjunctive questions that have been established in this thesis, will deepen the understanding of disjunctive utterances in Arabic and flesh out the improved typology.

This future research might also explore the use of disjunctive elements in altqs and disjunctive declaratives, answering questions such as: do both types of utterances (altqs and disjunctive declaratives) use the same disjunctive elements in a production study, and do they have the same prosodic features in the *X or Y* phrases? Or is there a specific disjunctive element that is restricted to one utterance type? This proposed study is theoretically interesting as it might lead to developing a disjunctive element typology based on experimental investigations, rather than solely on intuitions. For JA based on the researcher's intuitions, it is expected that both disjunctive elements can occur in altqs and disjunctive declaratives, and other Arabic dialects might also behave similarly because there are some dialects in the IVAr Corpus search (Chapter 4, Section 4.4.1) behaving in this way.

Another possible future study might be dedicated to investigating the disambiguating cues, if any, between altqs and not-alternative questions. Not-alternative questions, as shown in Chapter 3 (3.2.2.3), can be answered with a yes or a no but are not yes-no questions. Their intonational pattern is similar to that of altqs in EA (Winans, 2019). However, a future production study can explore whether there are any prosodic differences in the realisation of the *X or Y* phrase. Thus, are there any prosodic differences between altqs and not-alternative questions in Arabic? It is predicted that there might be slight phonetic differences in the contour shape of both question types, based on the fact that these questions elicit different responses. Again, investigating such differences can lead to a unified account of disjunctive utterances (altqs, dynqs, disjunctive utterances, and not-alternative questions) in a language. The differences between the first two (altqs and dynqs) were investigated here in this thesis.

It might also be a good idea to run a perception study on learners of English as a second language to see whether they perceive the disambiguating cues differently from native speakers. The same idea can be reversed by running a perception experiment recruiting speakers of a second language if, for instance, their L1 has one disjunctive element and L2 has two disjunctive elements or vice versa. In such proposed experiments, whether L1 affects L2 or vice versa, the improved typology can accommodate findings.

Another possible area of research is related to the acceptable answers to *mixed-qs* found in the corpus search (Chapter 4).[132] It was found that they can perfectly be answered with negation followed by any of the *X* or *Y* disjuncts in Arabic. In English, however, examples from different studies (e.g., Roelofsen & van Gool, 2010; Dayal, 2016) accepted only a positive answer (e.g., yes) followed by either *X* or *Y*. They did not accept the answer pattern which is perfect in Arabic. If an answer begins with *no* in English, it cannot be followed with any disjunct. Such a difference between the two languages might be further investigated in other languages to reach a conclusion about how languages answer such a type of question and which pattern might be more common across languages.

Based on the examples from the other languages that were cited in this thesis, an interesting possible research area might be exploring the behaviour of disjunctive elements in disjunctive questions. More specifically, although some examples showed that some languages used two disjunctive elements: one for both types of disjunctive questions (i.e., a general disjunctive element) and one for altqs (e.g., Finnish and Hindi-Urdu (Type 2A)), it is not yet clear whether or not there are languages that might behave oppositely. That is, there were no examples indicating if there is a language that employs one disjunctive element in both types

[132] The operational definition and an example of this question type can be found in Chapter 1 (Section 1.3).

of disjunctive question and specifies another to dynqs (i.e., Type 2B). In my samples, the specific disjunctive element was restricted to altqs (e.g., Finnish, Basque, and Hindi-Urdu, Type 2A). This lack of examples does not mean that such a language is not existent among world languages, as this thesis did not study all languages. What might explain the lack of Type 2B languages is the limited number of languages surveyed in this thesis. This observation is left for future research as it is beyond the scope of this Arabic intonational study because, as shown in some examples, there might be other factors independent of prosody or choice of disjunctive element affecting the interpretation of such questions. Therefore, there is a need for a native researcher of each language to explore such structures.

One of the limitations of the present study was the use of JA stimuli in Experiment 2. Although, as shown in Chapter 7, it is safe to use the JA stimuli in these 'nearby dialects', two possible consequences on the interpretation of the results might be worth mentioning. The first is that participants from the other dialects (EA, KA, and SA) might have interpreted the JA stimuli the way they think Jordanian listeners might do. In this case, the experiment will not test the participants' native performance. The second is that they might have interpreted the stimuli based on their own intuitions about their own dialects. Given that it was difficult to record stimuli in each of the other three countries, the researcher assumed that participants of each dialect would interpret the stimuli based on their own native dialects (see Section 7.1 for the reasons for assuming that the first possibility is excluded). This might also be justifiable given that it is impossible that all participants know how Jordanian listeners behave when interpreting these questions and given that other researchers (e.g., O'Mahony, 2014) tested the same English stimuli in different English dialects (see Section 7.1 for the reflection on using the JA stimuli in Experiment 2). Future research using native stimuli could reveal whether or not participants' answers to the EA, KA, and SA versions of Experiment 2 were based on participants' native dialects. Even though it is expected that the participants will interpret the stimuli based on their own intuitive linguistic knowledge for the above reasons, it is still possible that some of them might have tried to interpret them as Jordanians do. Thus, future research could confirm or reject the results of Experiment 2.

In fact, using JA stimuli was the only possible way of conducting Experiment 2 for several reasons. First, there is a general difficulty in finding a native linguist who is well-versed in intonation to help produce the stimuli with the correct fine-grained prosodic details (for each country). Second, there was a strict ethics ban on in-person data collection due to Covid-19, which further complicated the task. Third, and most importantly, the main interest of the study was primarily JA, which is the native language of the researcher and the sponsor. Thus, the decision was taken to run the first perception study only on JA. Once successful, it was expanded to include EA, KA, and SA to strengthen the contribution of this study and to pave the way for future research given that what can perceptually disambiguate disjunctive questions had not been experimentally addressed in any of these dialects. It is beyond the scope of this thesis to investigate all details of the other dialects as it is mainly on JA, but having discovered the potential differences in the preliminary types dialects belong to, the researcher included these dialects in Experiment 2 by sending the experiment link to participants from each dialect. Future studies on this topic in the other three countries should follow the same steps in this thesis (a production study and then a perception study) to reach stronger conclusions about which cues disambiguate disjunctive questions.

8.6 Conclusion

This study showed that *ʔaw* and *willa* were both interpreted by at least some participants as altqs and dynqs, but the tendency observed was to have *willa* specialised to altqs. In EA, however, *willa* was ungrammatical in dynqs. In other words, the use of *willa* in the mismatch condition (*willa* with late-rise) in all dialects did not result in listeners guessing how to respond to the mismatch trials, except for EA. In addition, the results are still different from chance in all other conditions (the congruent conditions) across all dialects, including EA; this conclusion was clear from the huge differences in the percentages of altq and dynq responses in the typical conditions and from the Exact Binomial tests (Section 7.5.1). Hence, the contour was needed to disambiguate these questions.

This thesis also showed that the disambiguation of disjunctive questions in Arabic must take into account that the late-rise is the most important cue that increases dynq readings and decreases altq readings. It also showed that *willa*, as opposed to *ʔaw*, decreases dynq readings. As a result, the thesis revised Meertens' typology that accounts for the roles of the disambiguating cues by expanding the prosody+DE category so that it can now accommodate JA, EA, and KA. This typology could also be extended to other languages having one or more than one disjunctive element as it turned out that it is not the number of disjunctive elements a language has that is crucial in the disambiguation, but it is how these disjunctive elements function.

The thesis also showed that English and Arabic use different disambiguating cues though both languages share the important role of the choice of contour. Arabic has two disjunctive elements that can be used in both question types. There is no evidence of a role for accent distribution in the disambiguation in Arabic. It is, instead, the choice of disjunctive element that played the secondary role in the disambiguation in three of the four dialects studied here. Furthermore, the thesis also showed that Arabic intonation is entirely independent of the three types proposed in Chapter 4. That is, there is an effect of intonation in all dialects regardless of their types and regardless of the strength of the effect of their disjunctive element choice. Thus, a conclusion could be that there is no trading relation between both cues in Arabic (choice of contour and choice of disjunctive element).

Appendices

Appendix A (for Chapter 4, Chapter 5, and Chapter 7)

(A.1) The EA context of the Juha disjunctive utterance

Originally, the story context appeared in the IVAr symbols, but it was reproduced here using the IPA transcription system (listed in a table at the beginning of the thesis). The use of IPA will make this thesis accessible to authors from outside the traditional Arabic dialectology or Arabic linguistics circle. Glosses were also added by the researcher, but translations were taken directly from the corpus.

Story
guħa ka:n tˤu:l ʕumru ʕa:jiʃ fi-l-ʔarja:f Guha be.PST.3MSG all life.POSS.3MSG live.PST.3MSG in-the-village Guha has always lived in the countryside
wa marra min l-marra:t fakkar jinzil ʕa-l-madi:na and one.time from the-time.PL think.PST.3MSG go.PST.3MSG on-the-city once upon a time, he wanted to go to the city
ʔasˤħa:bu ʔa:lu:lu friend.PL.POSS.3MSG tell.PST.3MPL.NOM.3MSG.ACC his friends told him
xalli ba:lak ja guħa min l-bajja:ʕi:n butu:ʕ l-madi:na keep self.POSS.2MSG oh Guha from the-seller.PL of the-city be careful Guha from the sellers in the city
du:l wiħʃi:n ʔawj they bad so they are very bad
ʔawwil ma jismaʕu: lahgitak once that hear.PRS.3MPL.NOM accent.POSS.2MSG when they hear your accent
wa jiʕrafu: ʔinnak min l-ʔarja:f and know.PRS.3MPL.NOM that.you.2MSG from the-countryside.PL and know that you are from the countryside
ha jɣallu: ʕa-li:k l-ħa:ga will raise.price.3MPL.NOM on-you the-thing they will increase the prices for you
jaʕni l-ħa:ga ʔilli tamanha ʕaʃra rija:l mean.PRS.1SG the-thing that price.it.3SG ten ryal this means if a thing is for 10 ryals
juʔu:lu:lak ʕa-le:ha bi-ʕiʃri:n rija:l tell.FUT.3MPL.NOM.2MSG.ACC about-it with-twenty ryal they will tell you it is for twenty ryals
ʔiza ħabbi:t tiʃtiri ħa:ga if like.FUT.2MSG buy.FUT.2MSG thing if you wanted to buy something
ʔullu:hum n-nusˤ ʕalatˤu:l tell.FUT.2MSG.NOM.3MPL.ACC the-half immediately give them half the price immediately

wa law waːħid gij jiddiːk ħaːga and if one want.FUT.3SG give.FUT.3SG.NOM.2MSG.ACC thing ʔullu dˤ-dˤiʕif tell.FUT.2MSG.NOM.3MSG.ACC the-double and if someone wants to give you something, ask for the double
guħa ʔalluːhum ma tixaːfuːʃ ʕa-lajja Guha tell.PST.3MSG.NOM.3MPL.ACC NEG be.frightened.NEG on-me Guha told them 'don't worry about me'
wa raːħ guħa l-l-madiːna and go.PST.3MSG Guha to-the-city and Guha went to the city
wa ʔaʕad fi ʔahwa min l-ʔahaːwi jiʃrab ʃaːj and sit.PST.3MSG in café from the-café.PL drink.PROG.3MSG tea and sat in one of the cafés drinking tea
faːt waːħid bajjaːʕ moːz enter.PST.3MSG one seller banana a banana seller came in
wa kaːn binaːdi wa jiʔuːl and be.PST.3MSG call.PROG.3MSG and say.PROG.3MSG he was calling and saying
l-moːz l-ħiluː l-moːz l-mumtaːz the-banana the-sweet the-banana the-excellent (high.quality) sweet bananas, excellent bananas
ʔallu guħa bi-kaːm kiːlu l-moːz tell.PST.3MSG.NOM.3MSG.ACC Guha in-how.much kilo the-banana Guha asked him, how much is the kilo of bananas?
ʔallu l-bajjaːʕ bi-tnaːʕʃar rijaːl tell.PST.3MSG.NOM.3MSG.ACC the-seller with-twelve ryal the seller told him, it is for twelve ryals
guħa ʔallu Guha tell.PST.3MSG.NOM.3MSG.ACC Guha told him
sitta rijaːl wa ma fiːʃ ɣiːr kida six ryal and NEG available.NEG other.than this six ryals, and no more
r-raːgil ʔallu the-man tell.PST.3MSG.NOM.3MSG.ACC the man told him
ʔana habiːʕlak kiːlu bi-sitta rijaːl I will.sell.FUT.1SG.NOM.for.you.ACC kilo with-six ryal I will sell you the kilo for six ryals
bass ʕaʃaːn xaːtˤrak just for yourself this is just for you
guħa ʔallu ʕalatˤuːl bi-talaːta rijaːl Guha tell.PST.3MSG.NOM.3MSG.ACC immediately with.three ryal Guha told him immediately, three ryals
fa-l-bajjaːʕ ʔallu

then-the-seller tell.PST.3MSG.NOM.3MSG.ACC so, the seller told him
jaxi ʔinta ʔulit min diʔiːʔa sitta rijaːl oh.man you say.PST.3MSG from minute six ryal oh man, you have just said six ryals a minute ago
guħa ʔallu Guha tell.PST.3MSG.NOM.3MSG.ACC Guha told him
talaːta rijaːl wa ma fiːʃ ɣiːr kida three ryal and NEG available.NEG other.than this three ryals and nothing more
bajjaːʕ l-moːz ʔallu seller the-banana tell.PST.3MSG.NOM.3MSG.ACC the banana seller told him
ʔinta fakirni laʔiːtu fi-ʃ-ʃaːriʕ walla you think.PST.2MSG.NOM.1SG.ACC find.PST.1MSG.NOM.it.ACC in-the-street or saraʔtu steal.PST.1SG.NOM.it.ACC do you think I found it in the street, or I stole it?
hawzinlak kiːlu bi-sitta rijaːl will.weigh.FUT.1SG.NOM.for.you kilo with-six ryal I will weigh you a kilo for six ryals
jalˤlˤa ja-raːgil come.on O-man come on man
guħa ʔallu bi-talaːta rijaːl Guha tell.PST.3MSG.NOM.3MSG.ACC with-three ryal Guha told him, three ryals
l-bajjaʕ basˤ l-guħa wa ʔallu the-seller look.PST.3MSG to-Guha and tell.PST.3MSG.NOM.3MSG.ACC the seller looked at Guha and told him
ʔih raʔjak ʔinta raːgil tˤajjib what opinion.POSS.2MSG you man nice look! you are a nice man
wa ʔana ħabbe:tak min ʔawwil maːʃuftak and 1 love.PST.1SG.NOM.2MSG.ACC from first that.see.PST.1SG.NOM.2MSG.ACC and I liked you when I saw you
ʔana ʕaːwiz ʔawzinlak kiːlu bi-balaːʃ I want. FUT.1SG.NOM. weigh.1SG.NOM.for.you kilo for-free I will weigh you a kilo for free
guħa natˤ min ʕa-l-kursi Guha jump.PST.3MSG from on-the-chair Guha jumped off his chair
ʔilli kaːn ʔaːʕid ʕa-le: that be.PST.3MSG sit.PROG.3MSG on-it the one he was sitting on
wa ʔallu and tell.PST.3MSG.NOM.3MSG.ACC and told him

ʔitniːn kiːlu ʔitniːn kiːlu two kilo.PL two kilo.PL two kilos, two kilos
ʔinta faːkir ʔinnak hatidħak ʕa-lajja you think.PST.2MSG.NOM that.you.2MSG will.deceive.2MSG.NOM on-me do you think you will deceive me!

(A.2) All scenarios participants heard in the dialogue completion task (DCT)

N.	Scenario	Translation
1	sˤadiːgak bifakkir ʔinnuh friend.POSS.2MSG think.PRS.3MSG that.he.3MSG ʔibnak maː biħib jitˤlaʕ son.POSS.2MSG NEG like.PRS.3MSG go.out.PRS.3MSG maʃaːwjiːr maʕaːk wala ħatta maʕ trip.PL with.you.2MSG nor even with ʔummu/ ʔabuːh mother.POSS.3MSG/ father.POSS.3MSG (maʕ l-baːba/ l-maːma) (with the-father/ the-mother) laːkin ʔinta bitiʕrif but you.2MSG know.PRS.2MSG ʔinnuh ʔibnak biħib liðaːlik that.he.3MSG son.POSS.2MSG like.PRS.3MSG so raːħ tisʔal ʔibnak ʔiða biħib will ask.PRS.2MSG son.POSS.2MSG if like.PRS.3MSG jitˤlaʕ maʕ l-baːba/ l-maːma go.out.PRS.3MSG with the-father/ the-mother wa tixajjal ʔinnuh ʒawaːb ʔibnak and imagine.PRS.2MSG that answer son.POSS.2MSG raːħ jikuːn aːh baħib ʔatˤlaʕ laːʔ maː will be yes like.PRS.1SG go.out.FUT.1SG no NEG baħib ʔatˤlaʕ maʕ l-baːba l-maːma like.PRS.1SG go.out.FUT.1SG with the-father/the-mother ʔisʔaluh lʔaːn ask.IMP.2MSG.NOM.3MSG.ACC now	Your friend thinks that your son does not like going out of the house (on a trip or so) with you and his mother (with dad/mum). However, you think this is not true. That is, you know that your son likes this. So, you will ask your son if he likes to go out with dad/mum while thinking that his answer to your question is going to be yes, I like.../no, I do not like to go with dad/mum. Ask him now.......
2	ʔirʒiʕit ʕala l-beːt wa go.back.PST.2MSG on the-house and lagajt daːr ʕammak find.PST.2MSG house (family) uncle.POSS.2MSG ʕindkum bi-l-be:t with.you.2MPL in-the-house	You went back to your house and found your uncle’s family visiting you, but you did not see his two daughters Lina and Rayan. Ask your uncle if he brought any of Lina/Rayan with him while keeping in mind

	laːkin maː lagajt liːna but NEG find.PST.2MSG Lina wa rajaːn ʕindkum and Rayan with.you.2MPL ʔisʔal ʕammak ʔiða ask.IMP.2MSG uncle.POSS.2MSG if ʒaːb maʕuh waħdih minhum bring.PST.3MSG with.him one from.them liːna/ rajaːn Lina/ Rayan biħajθ jikuːn ʒawaːbuh aːh/laʔ so.that be answer.POSS.3MSG yes/no	that his answer will be yes/no,.........
3	ʔinta bi-makaːn tiħtaːʒ fiːh you.2MSG in-place need.PRS.2MSG in.it ʔimma l-waraga ʔaw l-galam either to-paper or to-pen laːkin maː maʕaːk wala but NEG with.you.2MSG nor waːħdih minhin liðaːlik one from.them so raːħ tisʔal ʃ-ʃaxisˤ ʔilli will ask.FUT.2MSG the-person that ʒanbak ʔiða maʕu ʔimma next.to.you.2MSG if with.him either waraga ʔaw galam ʕaʃaːn paper or pen so tistaʕiːr minnuh ʔisʔaluh borrow.FUT.2MSG from.him ask.IMP.2MSG.NOM.3MSG.ACC	You are in a place where you need either a pen or a piece of paper, but you do not have either. So, you will ask the person next to you if he/she has either a pen or a piece of paper, ask him.............
4	ʃufit sˤaːħbak l-gadiːm see.PRS.2MSG friend.POSS.2MSG the-old wa ʔinta btiʕraf ʔan huːwwa and you.2MSG know.PRS.2MSG that he biħib jitɣadda ʔimma birjaːni like.PRS.3MSG have.lunch.PRS.3MSG either Biryani ʔaw mandi wa biddak	You have just met an old friend. You know that he usually likes Biryani/ Mandi (two types of food), so you will invite him to your house tomorrow, but you first want to ask him if he has free time to come to eat Biryani/ Mandi; ask him ....

	or Mandi and want.PST.2MSG tiʕzimuh ʕala be:tak invite.PST.2MSG.NOM.3MSG.ACC on house.POSS.2MSG ʕaʃaːn jakul ʕindak ʔimma so eat.FUT.3MSG near.you (with you) either birjaːni/mandi laːkin biddak Biryani/Mandi but want.PRS.2MSG tisʔaluh bi-l-ʔawwal ʔiða ask.PRS.2MSG.NOM.3MSG.ACC at-the-beginnig if ʕindu wagit bukra jiːʒi have.PRS.3MSG time tomorrow come.FUT.3MSG jaːkul birjaːni/mandi ʔisʔaluh… eat.FUT.3MSG Biryani/Mandi ask.IMP.2MSG.NOM.3MSG.ACC	
5	tˤalabat minnak ʔummak ask.PST.3FSG from.you mother.POSS.3MSG tiʃtari ʃaɣla waːħda min buy.PST.2MSG thing one from haðawl wa maː ħaddadat ʔajj these and NEG specify.PST.3FSG which waːħda bidha (muː muhim ʔajj nawʕ) one want.PST.3FSG (NEG important which type) l-muhim burtuqaːl/manga the-important orange /mango wa ʔinta waggafit s-sajjaːra and you.2MSG park.PST.2MSG the-car ʕind maħal l-xudˤra laːkin next.to shope the-vegetable but gabil maː tinzal min s-sajjaːra before that get.out.PST.2MSG from the-car saʔalit min ʃ-ʃubbaːk ʔiða ask.PST.2MSG from the-window if ʕinduh burtuqaːl/manga wa ʔiða have.PRS.3MSG orange /mango and if	Your mother asked you to buy her only one of two things: Orange/mango. She did not specify which one of them she wanted (i.e., the choice is not important). What is important is just to bring any one of them. You parked your car in front of the greengrocer's. Before you get out of your car, you looked out of your car window and wanted to ask him if there is Orange/mango. If he says yes, then you will get some. So, ask him………………

	kaːn ʒawaːbuh aːh ʕindi be.PST.3SG answer.POSS.3MSG yes have.PRS.1SG raːħ tinzal min s-sajjaːra wa will get.out.FUT.2MSG from the-car and tiʃtari ʔinta bas biddak buy.FUT.2MSG you.2MSG only want.PRS.2MSG tisʔaluh ʔiða ʕinduh ask.PRS.2MSG.NOM.3MSG.ACC if have.PRS.3MSG burtuqaːl /manga ʔisʔaluh orange / mango ask.IMP.2MSG.NOM.3MSG.ACC	
6	maʕaːk dawa faʕʕaːl kiθiːr with.you.2MSG medicine effective much ka-musakkin l-ʔaːlaːm r-raʔs as-pain.killer for-pain.PL the-head wa sˁadiːgak tˁalab minnak and friend.POSS.2MSG ask.PST.3MSG from.you jaːxuð ħabbih laːkin ʔinta take.PST.3MSG one.tablet but you.2MSG bitʕraf ʔinnu d-dawa know.PRS.2MSG that.it the-medicine raːħ judˁur sˁiħtu ʔiða will hurt.FUT.3SG health.POSS.3MSG if ʕindu ħasaːsiːjjih sawaːʔan have.PRS.3MSG allergy either l-l-fuːl ʔaw l-l-laban to-the-bean or to-the-yoghurt ʔisʔaluh gabil maː ask.IMP.2MSG.NOM.3MSG.ACC before that tiʕtˁiːh ħabbih ʔiða give.PRS.2MSG.NOM.3MSG.ACC one.tablet if ʕinduh ħasaːsiːjjih l-l-fuːl/ l-l-laban have.PRS.3MSG allergy to-the-bean/to-the-yoghurt	You have a good brand of tablets whose efficacy in relieving bad headache is great. Your friend asked you to give him one tablet, but you know this tablet would be detrimental to his health if he is allergic to either beans or yoghurt. So, ask him, before giving him a tablet, if he has an allergy to beans/yoghurt...
7	tixajjal ʔinnak daxalit subermaːrkit imagine.PRS.2MSG that.you enter.PST.2MSG supermarket	Imagine you went to a shop and asked the shopkeeper whether he

	wa saʔalit l-bajjaʕ law and ask.PST.2MSG the-seller if bitlaːgi ʕinduh miranda find.PST.2MSG have.PRS.3MSG Miranda kajf saʔaltuh how ask.PST.2MSG.NOM.3MSG.ACC	has Mirinda drink. How did you ask him?........
8	kunt fiː riħlih wa l-ʒaw latˤiːf be.PST.2MSG in trip and the-weather nice laːkin ʔibnak ʔimgaʃʕir but son.POSS.2MSG have.PST.3MSG.goose.pimples ʔisʔaluh ʔiða ask.IMP.2MSG.NOM.3MSG.ACC if bardaːn feel.cold.PST.3MSG	You are on a day trip, and the weather is nice, but your son has got goose pimples. Ask him if he feels cold…
9	ʔittasˤalt bi-sˤaːħbak laʔinnu call.PST.2MSG with-friend.POSS.2MSG because.he taʔaxxar ʕan l-ʔiʒtimaːʕ late for the-meeting wa ħakaːlak ʔinnu mariːdˤ and tell.PST.3MSG.NOM.2MSG.ACC that.he ill laːkinnak maː simiʕtu laʔin but.you NEG hear.PST.2MSG.NOM.3MSG.ACC because kaːn fiː ʔizʕaːʒ wa dˤaʒʒa be.PST.3SG in noise and annoyance laːkin biddak titʔakkad but want.PRS.2MSG check.PRS.2MSG lisaːtuh mariːdˤ ʔisʔaluh still.he ill ask.IMP.2MSG.NOM.3MSG.ACC	You called your friend as he was late for the meeting. He replied that he is still ill, but you did not hear him because of the noise around you. So, you want to check if he is still ill; ask him , ...
10	lageːt sˤaːħbak wa biddak find.PST.2MSG friend.POSS.2MSG and want.PRS.2MSG tisʔaluh ʔiða hiwajtuh ask.FUT.2MSG.NOM.3MSG.ACC if hobby.POSS.3MSG r-rakidˤ ʔisʔaluh the-running ask.IMP.2MSG.NOM.3MSG.ACC	You met your friend. You want to ask him if running is his hobby. Ask him........
11	tixajjal ʔabuːk kul ʔisbuːʕ imagine.PRS.2MSG father.POSS.2MSG every week	Imagine your father allows you to visit only

	jismaħlak bi-zjaːrat madiːna allow.PRS.3MSG.NOM.2MSG.ACC in-visiting city waħidih faqatˤ wa haːða one only and this l-ʔisbuːʕ raːħ jismaħlak ʔimma the-week will allow.PRS.3MSG.NOM.2MSG.ACC either mʕaːn ʔaw ʕammaːn biddak Maan or Amman want.PRS.2MSG titʔakkad ʔajjaha raːħ tizuːr check.PRS.2MSG which will visit.FUT.2MSG ʔisʔaluh ʔajjaha masmuːħ ask.IMP.2MSG.NOM.3MSG.ACC which permissible mʕaːn/ʕammaːn Maan/Amman	one city every week. This week he will allow you to visit either Maan or Amman, but you want to check which one. Ask him which one Maan/Amman you are allowed to visit.......
12	sˤaːħbak saʔalak suːʔaːl friend.POSS.2MSG ask.PST.3MSG.NOM.2MSG.ACC question laːkin min sˤawtˤ l-muːsiːqa but from sound the-music maː fihimit ʕalajh biddak NEG understand.PST.2MSG on.him want.PRS.2MSG tisʔaluh ʔiða ask.PRS.2MSG.NOM.3MSG.ACC if saʔalak ʃuː ask.PST.3MSG.NOM.2MSG.ACC what tiɣaddajt/ ʃuː ʔaftˤarit have.lunch.PST.2MSG/ what have.breakfast.PST.2MSG ʔisʔaluh ʕaʃaːn titʔakkad ask.IMP.2MSG.NOM.3MSG.ACC so check.PRS.2MSG	Your friend asked you a question, but you did not hear him well because of the ambient music. You want to ask him if he asked you what you had for lunch / what you had for breakfast. Ask him......
13	bitiʕraf ʔinnu ʔaxuːk know.PRS.2MSG that brother.POSS.2MSG xatˤab waħdih ʔisimha ʔimma get.engaged.to.PST.3MSG one name.POSS.3FSG either	You know that the name of your brother's fiancée is either Dania or Mariam. You want to know which of these is the right name. Ask your brother about her exact name (Dania/Mariam)........

	daːnja ʔaw marjam laːkin biddak Dania or Mariam but want.PRS.2MSG tiʕrif miːn min hal ʔismajn know.PRS.2MSG which from those name.DU huːwwa sˤ-sˤaħiːħ ʔisʔal it the-true ask.IMP.2MSG ʔaxuːk ʔisimha bildˤabitˤ brother.POSS.2MSG name.POSS.3FSG exactly daːnja/marjam Dania/Mariam	
14	tixajjal ʕindak dˤajf fi-l-beːt imagine.PRS.2MSG have.PRS.2MSG guest in-the-house wa l-maʃruːbaːt ʔilli ʕindak and the-drink.PL that have.PRS.2MSG bi-l-beːt faqatˤ ʕasˤiːr moːz wa in-the-house only juice banana and ʕasˤiːr ʒazar wa ʔinta biddak juice carrot and you.2MSG want.PRS.2MSG tisʔaluh ʔajj waːħad biddu ask.PRS.2MSG.NOM.3MSG.ACC which one want.PRS.3MSG jiʃrab minhum moːz/ʒazar drink.PRS.3MSG from.them banana/carrot ʔisʔaluh ask.PRS.2MSG.NOM.3MSG.ACC	Imagine you have a guest in your house. You only have banana juice and carrot juice to offer. You want to ask him/her which one of them he/she would like to drink, so ask him/her……………..

(A.3) The language background questionnaire for the production study and Experiment 2

(Adapted from Hellmuth & Almbark, 2017)

إستبيان

الهدف من هذا الاستبيان هو الحصول على معلومات عن تاريخك اللغوي. نود معرفة اللهجة العربية التي تتحدث بها ، وكذلك اللغات الأخرى التي تعرفها.

الجنس	
العمر	
بلد الولادة	
مدينة الولادة	
أماكن أخرى عشت فيها وكم المدة؟	
مكان ولادة الأب	
مكان ولادة الأم	
مكان ولادة الجد	
مكان ولادة الجدة	
هل تتحدث بلغات أخرى؟ إذا نعم فمنذ متى وأنت تتكلم كل لغة؟	
عدد سنين تعلم اللغة الإنجليزية.	
كيف تصنف لهجتك العربية؟ مدنية، بدوية أو فلاحية.	
كيف تصف لهجتك مع أهلك داخل البيت؟ مدنية، بدوية أو فلاحية.	
مستوى التعليم	
هل تود الحصول على معلومات حول تقدم مشروع البحث؟ إذا نعم فمن فضلك أكتب إيميلك.	
رجاءً أذكر لنا إن كان لديك أي اختلالات صوتية أو سمعية.	

Language Background Questionnaire

(Adapted from Hellmuth & Almbark, 2017)

This questionnaire aims at getting more information about your language history. I would like to know the dialect of Arabic and the other languages you speak.

Gender	
Age	
Country of birth	
City of birth	
Other places you lived in and how long?	
Father's place of birth	
Mother's place of birth	
Grandfather's place of birth	
Grandmother's place of birth	
Do you speak other languages? If so, how long so you speak each one?	
Years of learning English	
How do you classify your dialect? Urban, Bedouin, or rural?	
How do you describe the dialect you use inside your house with your family? Urban, Bedouin, or rural?	
Your level of education	
Do you want to get information about the progress of this research project? If yes, please provide your email.	
Do you have any speech or hearing problems? If so, please mention this.	

(A.4) The information sheet

(Arabic followed by the English translation)

ورقة المعلومات

الرجاء الاحتفاظ بورقة المعلومات هذه وبنسخة موقعة من نموذج الموافقة.

أنت مدعو للمشاركة في هذه الدراسة.

قبل أن تقرر المشاركة في هذه الدراسة، من المهم أن تفهم أسباب إجراء هذا البحث وما يتضمنه. الرجاء أن تأخذ الوقت الكافي لقراءة المعلومات التالية بعناية. وإذا لديك أي سؤال عن شيء لم تفهمه أو تود الحصول على معلومات أكثر، يرجى سؤال الباحث عن ذلك.

عنوان الدراسة: **دور التنغيم في تمييز الأسئلة ذات الصياغة نفسها في اللغة العربية (أسئلة البدائل وأسئلة نعم/لا)**

الباحث: محمد علي صلاح بني يونس

ما هو موضوع هذا البحث؟

هذا البحث عن العلاقة بين كيفية لفظ الجملة وكيفية تفسيرها في العربية.

من يجري هذا البحث؟

سيجري هذا البحث طالب دكتوراة في جامعة يورك وهو محمد علي صلاح بني يونس.

من يمكنه المشاركة؟

متحدثو اللغة العربية الأردنية.

ماذا تتضمن الدراسة؟

سوف تُجرى هذه الدراسة عن اللهجة الأردنية. وستكون تحت إشراف الباحث وذلك ليتأكد أن البيئة مناسبة لإجراء التجربة. لذلك سيقوم المشاركون بالدراسة بالكلام بناءً على السيناريو المقدم من الباحث.

هل يجب عليَّ المشاركة؟

لا يتوجب عليك المشاركة في هذه الدراسة إذا كنت لا ترغب بذلك. وإذا قررت المشاركة سيتم إعطاؤك ورقة تتضمن المعلومات لكي تحتفظ بها. وسيُطلب منك التوقيع على نسختين من نموذج الموافقة على المشاركة (نسخة لك لتحتفظ بها). وإذا قررت المشاركة في الدراسة، فسيكون بإمكانك الانسحاب منها دون بيان أسباب ذلك حتى خلال الجلسة نفسها. وإذا انسحبت من الدراسة، سيتم التخلص من بياناتك ولن نستخدمها بأي طريقة.

ما هي المخاطر المحتملة للمشاركة بالدراسة؟

لا توجد أيّة مخاطر لمشاركتك في الدراسة، فأنت ستقوم فقط بالتحدث ويتم تسجيل بعض الجمل من حديثك.

هل يوجد أي فوائد للمشاركة بالدراسة؟

ستساعد المشاركة بهذه الدراسة على زيادة معرفتنا باللّهجة الأردنية من خلال دراسة ظاهرة لغوية لم يتم دراستها من قبل.

ماذا سيحصل للبيانات التي أقدمها؟

ستستخدم البيانات التي تقدمها بالإضافة لبيانات المشاركين الآخرين ليتم تحليلها . سيتم تخزين بياناتك بشكل آمن في جوجل درايف الخاص بالباحث في جامعة يورك والمحمي برمز المرور وكلمة سر. وسيتم استخدام البيانات لأغراض بحثية وربما يتم استخدامها بأبحاث أو مؤتمرات أكاديمية علماً بأنه لن يتم استخدام أي معلومات شخصية في أي بحث.

ماذا عن السرية والخصوصية؟

لن يتم ذكر اسمك خلال التسجيل وكذلك لن يتم ربط اسمك بتسجيلك، لذلك لن يكون هنالك معلومات تدل على شخصيتك في التسجيل، وستبقى جميع المعلومات التي تقدّمها بسرية تامة. بالإضافة إلى ذلك، لن يتم الإشارة إلى أي معلومات شخصية في أي منشور أو بحث مستقبلا؛ أي أنها ستكون مجهولة المصدر وذلك لضمان سريتها وخصوصيتها.

هل سأعرف النتائج؟

لن يتم الكشف عن النتائج التي تتعلق بالأفراد المشاركين في الدراسة.

لقد راجعت لجنة أخلاقيات البحث العلمي في قسم علم اللغة واللغويات في جامعة يورك هذه الدراسة، ووافقت عليها. يمكنك الاتصال برئيس اللجنة، إيتان زويج، في حال كان لديك أي أسئلة تتعلق بذلك

(البريد الإلكتروني ; :*eytan.zweig@york.ac.uk* تلفون(: *(00441904) 322663*

إذا كان لديك أسئلة أخرى حول هذه الدراسة، فلا تتردد في الاتصال ب:

اسم الباحث: محمد علي صلاح بني يونس

قسم علم اللغة واللغويات،

جامعة يورك،

هسلنجتون، يورك،

YO10 5DD

رقم الجوال:

(+44) 7537800005

(+962) 789112122

البريد الإلكتروني maby500@york.ac.uk

UNIVERSITY *of York*

DEPARTMENT OF

LANGUAGE AND

LINGUISTIC SCIENCE

Heslington, York, YO10 5DD, UK

Email : Maby500@york.ac.uk

INFORMATION SHEET

PLEASE KEEP THIS INFORMATION SHEET AND A SIGNED COPY OF THE CONSENT FORM FOR YOUR RECORDS

You are invited to take part in a research study. Before you decide whether to participate it is important for you to understand why the research is being done and what it will involve. Please take the time to read the following information carefully. If there is anything you do not understand, or if you want more information, please ask the researcher.

Title of study: The Role of Intonation in Distinguishing Questions in Arabic (alternative questions and yes-no questions) that are Similarly Worded

Researcher: Mohammad Ali Salah Bani Younes

What is the research about?

This research investigates the relationship between how a sentence is pronounced and how it is interpreted in Arabic.

Who is carrying out the research?

The researcher who is a PhD student at the University of York will run this research. He is Mohammad Ali Salah Bani Younes.

Who can participate?

Speakers of Jordanian Arabic

What does the study involve?

The study will be about Jordanian Arabic. It will be under the supervision of the researcher in order to make sure that the environment is suitable enough for the experiment. Participants will produce some utterances based on some scenarios designed to elicit these utterances.

Do I have to take part?

You do not have to take part in the study if you do not want to. If you do decide to take part, you will be given this information sheet to keep and will be asked to sign two copies of the consent form (one copy is for you to keep).

If you decide to take part you will still be free to withdraw without giving a reason, even during the session itself. If you withdraw from the study, the researcher will destroy your data and will not use it in any way.

What are the possible risks of taking part?

There are no risks of participating in this study as you will only produce some utterances that will be recorded.

Are there any benefits to participating?

Participating in this study will help increasing our knowledge of Jordanian Arabic by studying a linguistic phenomenon that has not been studied so far.

What will happen to the data I provide?

The data you provide will be used alongside the data of other participants to be analysed. Your data will be stored securely at the University of York Google Drive that belongs to the researcher. It is protected by a username and password.

The data will also be used for research purposes and may be presented in academic papers or conferences given that any personal information will not be used in any research.

What about confidentiality?

Your names will not be mentioned in the recordings and will not be associated with your production, so there will be no identifying information in the recordings. All information you provide will be kept strictly confidential. In addition, any personal information in any future publication or research will be anonymised to ensure confidentiality.

Will I know the results?

No individual results will be disclosed.

This study has been reviewed and approved by the Departmental Ethics Committee of the Department of Language and Linguistic Science at the University of York. If you have any questions regarding this, you can contact the chair of the L&LS Ethics Committee, Eytan Zweig, (email: linguistics-ethics@york.ac.uk; Tel: (01904) 322663).

If you have further questions regarding this study, please feel free to contact:

Researcher name

Mohammad Ali Salah Bani Younes

Department of Language and Linguistic Science

University of York, Heslington, York, YO10 5DD

Mobile: (+44) 7537800005 (+962) 789112122

email: maby500@gmail.com

(A. 5) The consent form with its English translation

دور التنغيم في تمييز الأسئلة ذات الصياغة نفسها في اللغة العربية (أسئلة البدائل وأسئلة نعم/لا)

الباحث: محمد علي صلاح بني يونس

نموذج الموافقة

هذا النموذج لك، لتتمكن من إبداء الموافقة من عدمها على المشاركة في هذه الدراسة. الرجاء قراءة كل سؤال والإجابة عليه. إذا كان لديك أي شيء غير واضح ولا تفهمه، أو إذا أردت مزيدا من المعلومات، يرجى منك أن تسأل الباحث عن ذلك.

هل قرأت وفهمت الورقة التي تزودك بالمعلومات عن الدراسة؟	نعم ❒ لا❒
هل كانت لديك الفرصة لتوجيه أسئلة عن الدراسة؟ وهل تمت الإجابة على تلك الأسئلة بشكل تام ومرضٍ؟	نعم ❒ لا❒
هل فهمت بأن فريق البحث سيُبقي المعلومات التي تقدمها لهم بشكل سري وأن اسمك أو أي معلومات شخصية مثل المعلومات التعريفية بك لن تُذكر بأي بحث سيُنشَر لاحقاً؟	نعم ❒ لا❒
هل فهمت بأنه يجوز لك أن تنسحب من الدراسة في أي وقت قبل إنهاء جلسة جمع البيانات وذلك دون إبداء أي سبب لذلك وأنه في هذه الحالة سيتم حذف جميع بياناتك التي قدمتها؟	نعم ❒ لا❒
هل فهمت بأنه قد يتم الاحتفاظ بالمعلومات التي تقدمها وذلك لفترة تتجاوز مدة هذا المشروع وأنه قد يتم استخدامها في أبحاث لغوية اخرى بالمستقبل؟	نعم ❒ لا❒
هل توافق على المشاركة في هذه الدراسة؟	نعم ❒ لا❒
هل توافق على أن يقتبس الباحث بعضاً من إجاباتك لاستخدامها في إلقاء المحاضرات، (الشرح) او التدريس وذلك دون الإشارة إلى اسمك الحقيقي؟ (يمكنك المشاركة في الدراسة دون الموافقة على ذلك)	نعم ❒ لا❒
هل توافق على أن يقوم الباحث بالاحتفاظ بمعلومات الاتصال الخاصة بك بعد إنهاء هذا المشروع البحثي وذلك لكي يتمكن الباحث من الاتصال بك مستقبلاً حول إمكانية المشاركة بدراسات اخرى؟ (يمكنك المشاركة في الدراسة دون الموافقة على ذلك)	نعم ❒ لا❒

اسمك____

توقيعك____

اسم الباحث: محمد علي صلاح بني يونس

التاريخ____

The Role of Intonation in Distinguishing Questions in Arabic (alternative questions and yes-no questions) that are Similarly Worded.

Lead researcher: Mohammad Ali Salah Bani Younes

Consent form

This form is for you to state whether or not you agree to take part in the study. Please read and answer every question. If there is anything you do not understand, or if you want more information, please ask the researcher.

Have you read and understood the information leaflet about the study?	Yes ❒ No ❒
Have you had an opportunity to ask questions about the study and have these been answered satisfactorily?	Yes ❒ No ❒
Do you understand that the information you provide will be held in confidence by the research team, and your name or identifying information about you will not be mentioned in any publication?	Yes ❒ No ❒
Do you understand that you may withdraw from the study at any time before the end of the data collection session without giving any reason, and that in such a case all your data will be destroyed?	Yes ❒ No ❒
Do you understand that the information you provide may be kept after the duration of the current project, to be used in future research on language?	Yes ❒ No ❒
Do you agree to take part in the study	Yes ❒ No ❒
Do you agree to excerpts from your answer sheet to be used in presentations or in teaching by the researcher, without disclosing your real name? *(You may take part in the study without agreeing to this).*	Yes ❒ No ❒
Do you agree to the researcher's keeping your contact details after the end of the current project, in order that he may contact you in the future about possible participation in other studies? *(You may take part in the study without agreeing to this).*	Yes ❒ No ❒

Your name (in BLOCK letters):

____

Your signature:

____

Researcher's name: Mohammad Ali Salah Bani Younes

Date:

____

(A. 6) A detailed summary of Disjunctive Element Use in Ten Arabic Dialects with Some

Dialects	
Modern Standard Arabic	**El-Hassan (1988)** 1. *ʔam* only was used in altqs and in non-altqs. 2. No mention of any other disjunctive element in his study, specifically in altqs and dynqs. **Al Amayreh (1991)** 1. Only *ʔam* was used in examples of both altqs and dynqs. **Holes (1995)** 1. *ʔam* can only appear in questions. 2. *ʔaw* appears in affirmative declaratives and in questions. **Fakih's (2012)** 1. *ʔam* may only be used in altqs (no yes-no question reading with *ʔam*). 2. *ʔaw* may only be used in declaratives and questions that can be answered with a yes or a no (i.e., dynqs). 3. He called both types of question alternative questions and distinguished them in terms of their answers.
Egyptian Arabic	**Soraya (1966)** 1. *Willa* may be used in altqs and in dynqs. 2. There is no mention of any example in which *ʔaw* is used in these types of questions. **Eid (1974)** 1. *Willa* may be used in altqs, tag questions, and not-alternative questions. 2. *ʔaw* may not appear in yes-no questions and is used only in declarative sentences, such as *yaː…yaː*. **Gary and Gamal-Eldin (1982)** 1. They used *willa* in altq examples. 2. *ʔaw* can appear in statements but not in altqs. **Winans (2012)** 1. *Willa* is restricted to altqs (whether polar-alternative questions or not). 2. *Willa* is not used in declaratives. However, a special use in declaratives arises if it occurs in a negative reply to a clause containing the other disjunctive element *ʔaw*. 3. *Willa* is restricted only to interrogative embedded clauses. 4. *ʔaw* cannot appear in altqs unless it is strongly stressed (for some speakers) but can appear in yes-no questions, wh-questions, and declaratives. *ʔaw* might be used in all types of embedded clauses whether they are interrogative or declarative. **Winans (2019)** 1. *willa* is used in altqs. Some specific exceptions that allow it in declaratives include counterfactual sentences. 2. *willa* is used in not-alternative questions 3. *ʔaw* is used only in declaratives and dynq. The deciding factors are intonational patterns and the availability of question particles.

Urban Hijazi Arabic	**Omar (1975)** 1. *Willa* appears in questions, but there is no mention to which type of question. 2. *ʔaw* appears in affirmative declaratives. 3. Some Hijazi people might use them interchangeably.
Sanʕaani Arabic	**Watson's (1993)** 1. *willa* can be used in altqs, yes-no questions, and declaratives. 2. *ʔaw* is the preferred element in declaratives, and it can be used in altqs (no examples in which *ʔaw* is used in yes-no questions). 3. *ya:* is used in folk tales.
Syrian Arabic	**Ferguson and Ani (1961)** They did not specify a specific disjunctive question type in which *ya:*, *willa*, or *ʔaw* can be used. **Cowell (2005)** 1. *willa*, *ʔaw, ya:,* and *yamma* are somewhat synonymous, but *willa* and *yamma* "are used most commonly in ALTERNATIVE QUESTIONS" (p. 395). 2. No example was given to show whether or not the elements in the previous point are used in yes-no questions, so this is still unknown as his study was to describe the grammar of that dialect in general. 3. *Willa* was used in command-consequence clauses. 4. Examples in which *ʔaw* was used in declarative utterances were given. 5. *Ya* behaves like *ʔaw,* i.e., it can be used in declaratives. 6. Y*amma* appeared in a declarative clause.
Gulf Arabic	**Qafisheh (1977)** *ʔaw* and *willa* can be used in sentences. *Willa* also appeared in a question example (not known whether it is an altq or a dynq). **Holes (1990)** 1. *ʔaw* can be used like *willa* and *lo*, so they might be interchangeable, but he did not categorize them according to the types of questions in which they might be used.
Hebron Arabic	**Ghrefat (2007)** 1. *Willa* is used in altqs. 2. There is no mention of other disjunctive elements in disjunctive questions.
Jordanian Arabic	**Al Amayreh (1991)** 1. He used *willa* in examples of both types of question, i.e., altqs and dynqs. *2. ʔaw:* was not mentioned in his study in altqs and dynqs.
Deristian Arabic	**Al-Qadi (2003)** 1. She used *willa* in examples illustrating altqs and dynqs. 2. There is no mention of *ʔaw* in these questions.
Yazouri Arabic	**Katanani (2002)** 1. She used *willa* and *ya:* in examples illustrating altqs. 2. She used *willa* in what she referred to as incomplete questions that had responses that were similar to those of yes-no questions. 3. Some of her examples employed *willa* in not-alternative questions. 4. She used *ya:* in a declarative though she did not refer to it as a declarative sentence. 5. There is no mention of *ʔaw* in these questions.

Appendix B (Chapter 6 and Chapter 7)

(B.1) Lexical Sets that were used in the perception studies

They are 8 verb phrases, 8 noun phrases, and 8 prepositional phrases.

Number	The Target Items
1.	hijjih ʒaːbat maʕha rula ʔaw ʒaːbat maʕha ʕajda she bring.PST.3FSG with.her Rula or bring.PST.3FSG with.her Aida ‘Does she bring with her Rula or bring with her Aida?’
2.	ʔinta ʃufit tˤ-tˤifla wa hijjih btilʕab ʔaw you.2MSG see.PST.2MSG the-baby and she play.PROG.3FSG or bitɣanni sing.PROG ‘Did you see the girl while she was playing or singing?’
3.	ʕa-ħad ʕilmak rajaːn s-sana datitˤlaʕ to-limit knowledge.POSS.3MSG Rayan the-year go.FUT.3FSG ʕa-l-ħaʒ ʔaw datitˤlaʕ ʕa-l-ʕumra on-the-pilgrimage or go.FUT.3FSG on-the-Omra ‘Do you think Rayan will go on a pilgrimage or will go to do Omra?’
4.	ʕali raːħ jiʒiːbilna ʃawirma ʔaw raːħ Ali go.PST.3MSG bring.PST.3MSG.NOM.3MPL.ACC shawarma or go.PST.3MSG jiʒiːbilna maj bring.PST.3MSG.NOM.3MPL.ACC water ‘Will Ali buy us Shawarma or buy us water?’
5.	masmuːħ li-s-suːwaːħ jizuːruː waːdi muːsa ʔaw permitted for-the-tourist.PL to.visit.3MPL.NOM Wadi Mousa or jizuːruː waːdi rum to.visit.3MPL.NOM Wadi Rum ‘Are tourists permitted to visit Wadi Mousa or Wadi Rum?’
6.	moħammad kaːn raːjiħ jiɣassil s-sajjaːra ʔaw Mohammad be.PST.3MSG going.to wash.PST.3MSG the-car or jizuːr ʕammuh visit.PST.3MSG uncle.POSS.3MSG ‘Was Mohammad going to wash the car or visit his uncle?’
7.	rami ħidˤir l-ħaflih ʔaw ħidˤir l-mubaːraː Rami attend.PST.3MSG the-party or attend.PST.3MSG the-match ‘Did Rami attend the party or watch the football match?’
8.	ʔitsaːfir maʕi ʕala biritˤaːnija ʔaw travel.FUT.2MSG with.me on UK or ʔitsaːfir maʕi ʕala hingaːrija travel.FUT.2MSG with.me on Hungary ‘Do you want to travel with me to the UK or to travel with me to Hungary?’

9.	ʔilli nazˤzˤaf s-sajja:ra ʕa:lia ʔaw ʕali that clean.PST.3SG the-car Alia or Ali ‘Was the one who cleaned the car Alia or Ali?’
10.	maʕa:k galam ʔaw waraga with.you.2MSG pen or paper ‘Do you have a pen or a sheet of paper?’
11.	kunt biddak bebsi ʔaw ʕasˤi:r be.PST.2MSG want.PST.2MSG Pepsi or juice ‘Did you want Pepsi or juice?’
12.	bala:gi ʕindak burtuqa:l ʔaw manga find.1MSG have.PRS.2MSG orange or mango ‘Do you have orange or mango?’
13.	maʒd bidrus rija:dˤa ʔaw ʕulu:m Majd study.PRS.3MSG PE or science.PL ‘Is Majd studying PE or science?’
14.	ʒibit maʕa:k li:na ʔaw raja:n bring.PST.2MSG with.you.2MSG Lina or Rayan ‘Did you bring (with you) Lina or Rayan?’
15.	ʕindak wagit bukra tji:ʒi ta:kul have.PRS.2MSG time tomorrow come.FUT.2MSG eat.FUT.2MSG birja:ni ʔaw mandi Biryani or Mandi ‘Do you have free time tomorrow to come to my house to eat Biryani or Mandi?’
16.	l-ħaʒ maʕa:h sukkari ʔaw dˤaɣitˤ AlHaj with.him.3MSG diabetes or blood.pressure ‘Does AlHaj (the gentleman) have diabetes or blood pressure disease (hypertension and/or hypotension)?’
17.	karam zaʕla:n minnak ʔaw minni Karam angry from.you or from.me ‘Was Karam angry with you or with me?’
18.	ha:jj ʒ-ʒa:mʕa mixtˤasˤsˤa bi l-ʕulu:m ʔaw t-tiknulo:ʒia this the-university specialized in science.PL or the-technology ‘Is this university specialized in science or technology?’
19.	ʔabu:h tˤalab minnuh jiru:ħ ʕa-s-su:g father.POSS.3MSG ask.PST.3MSG from.him go.FUT.3MSG on-the-market ʔaw ʕa-l-mo:l or on-the-mall ‘Did his father ask him to go to the market (city centre) or to the mall?’
20.	l-jo:m ʕazmatak ʔa:ja ʕa-l-iftˤu:r ʔaw the-today invite.PST.3FSG.NOM.2MSG.ACC Aya on-the-breakfast or ʕa-l-ɣada on-the-lunch ‘Did Aya invite you to breakfast or lunch (to have breakfast or lunch)?’
21.	maʕa:k ħasa:si:jjih min l-fu:l ʔaw l-laban with.you.2MSG allergy from the-fava.bean or the-yoghurt ‘Do you have an allergy to fava bean or yoghurt?’

22.	saːliħ wasˤsˤa l-matˤʕam ʕa-zinʒar ʔaw koːrdin Saleh order.PST.3MSG the-restaurant on-Zinger or Korden 'Did Saleh order (from the restaurant) Zinger (fried chicken breasts) or Korden?'
23.	xibrak rana maː bidha truːħ knowledge.POSS.2MSG Rana NEG want.PRS.3FSG go.PRS.3FSG ʕa-l-beːt ʔaw ʕa-s-suːg on-the-house or on-the-market 'Do you think Rana does not want to go to the house or to the city centre?'
24.	bitħib ttˤlaʕ maʕ l-baːba ʔaw l-maːma like.2MSG go.out.2MSG with the-dad or the-mum 'Do you like to go out with your dad or mum?'

(B.2) The full list of fillers used in the experiments

The words in bold were pronounced with a focus.

Number	Fillers
1.	maʕu talifoːn with.him telephone 'Does he have a telephone?'
2.	faraħ ʔibtilʕab fi-l-beːt Farah play.PRS.3FSG in-the-houes 'Does Farah play in the house?'
3.	ħasan mawʒuːd Hassan available 'Is Hassan available?'
4.	rijadˤat s-sbaːħa mufiːdih sport the-swimming useful 'Is swimming good (i.e., healthy)?'
5.	maːrjiːa ʔibtiʃrab gahwa saːda Maria drink.PRS.3FSG coffee plain 'Does Maria drink black coffee (without sugar)?'
6.	l-ʒaːmʕa l-ʔurduniːah ʔafdˤal ʒaːmʕa fi-l-ʔurdun the-university the-Jordanian best university in-the-Jordan 'Is the University of Jordan the best in Jordan?'
7.	l-diraːsaːt l-ʕuliaː mumtaːzih the-studies the-higher excellent 'Are graduate studies excellent?'
8.	l-ʕasal mufiːd li waʒaʕ l-batˤin the-honey useful for pain the-belly 'Is honey good for stomach ache?'
9.	l-luɣa l-ʔingliːzijjah luɣat l-ʕaːlam the-language the-English language the-world 'Is English the world language?'
10.	ʒaːmiʕat joːrk bi-biriːtˤaːnjah university York in-UK 'Is the University of York in the UK?'
11.	r-rijaːdˤijjaːt maːddih sahlih the-maths subject easy 'Is maths an easy subject?'
12.	d-duktoːraːh bidha ʔarbaʕ sanawaːt the-PhD want.PRS.3SG four year.PL 'Does the PhD take four years?'
13.	**mohammad** sallam ʕa xaːlid miʃ ʕa ʔaħmad Mohammad shake.hands.PST.3MSG on Khalid NEG on Ahmad 'Mohammad shook hands with Khalid not with Ahmad.'
14.	ʃahim keːf niʒiħ fi-t-tawʒiːhi shahim how pass.PST.3MSG in-the-secondary.education 'How Shahim managed to pass in the Secondary Education Examination!'
15.	**suha** bitħib l-ʕasˤiːr ʔakθar min ʔaħmad Suha like.PRS.3FSG the-juice more than Ahmad 'Suha likes juice more than Ahmad.'

16.	ma:dit r-rija:dˤa bi-l-madrasih ʔashal min ma:dit l-ʕarabi suject the-sports in-the-school easier than suject the-Arabic 'Is the sports subject at school easier than that of Arabic?'
17.	l-wuzara:ʔ ʔistaqa:lu: the-minister.PL resign.PST.3MPL 'The ministers resigned!'
18.	ju:ju: biħib s-safar Yuyu like.PRS.3MSG the-travelling 'Does Yuyu like travelling?'
19.	mohammad ʃa:f **ʔaħmad** wu hu:wwa bilʕab Mohammad see.PST.3MSG Ahmad and he play.PRS.3MSG bi-l-malʕab in-the-pitch 'Mohammad saw Ahmad while he was playing in the pitch.'
20.	hu:wwa bistaxdim l-la:btub fi-d-dira:sih he use.PRS.3MSG the-laptop in-the-study 'Is he using the laptop in studying (in his studies)?'
21.	dandoon ra:ħat ʕa-l-ʒa:mʕa ʔimba:riħ Dandoon go.PST.3FSG on-the-university yesterday 'Did Dandoon go to the university yesterday?'
22.	d-dukto:ra:h ʔasˤab min l-ma:ʒistajr the-PhD more.difficult from the-masters 'Is the PhD more difficult than the master's degree?'
23.	ma:rji:a xabbarat ʔaħmad hijjih bidha ti:ʒi ʕa le:h Maria tell.PST.3FSG Ahmad she want.FUT.3FSG come.FUT.3FSG on him bas ʔana miʃ ʕa:rif le:ʃ but I NEG know.PRS.1SG why 'Maria told Ahmad that she intends to visit him, but I do not know why.'
24.	mohammad biddu(h) jirħal wa biddu(h) Mohammd want.FUT.3MSG move.house.FUT.3MSG and want.FUT.3MSG jisa:fir bas ʔana miʃ ʕa:rif la-we:n travel.FUT.3MSG but I NEG know.PRS.1SG to-where 'Mohammad wants to move to a new house and travel, but I do not know where.'
25.	ʔaħmad nazˤzˤif ʃ-ʃigga la l-izˤju:f Ahmad clean.IMP.3MSG the-flat for the-guests 'Clean the flat for the guests, Ahmad.'
26.	sˤaba:ħ l-xe:r ʔibin **ʕammi** l-ɣa:li morning the-good son uncle.POSS.1MSG the-dear 'Good morning, my dear cousin.'
27.	qara:r **ʔaħmad r-ra:ʔiʕ** ħal l-muʃkilih min ʒuðu:rha decision Ahmad the-great solve.PST.3MSG the-problem from root.PL.its 'Ahmad's wise decision has completely solved the problem.'
28.	tˤalab **ʔaħmad** min xa:lid ʔinnu(h) jiballiʃ ask.PST.3MSG Ahmad from Khalid that.he begin.PRS.3MSG bi-ħal ʔasʔilit l-imtiħa:n in-answering question.PL the-exam 'Ahmad asked Khalid to start answering the exam questions.'
29.	jana:l fataħ l-ba:b Yanal open.PST.3MSG the-door 'Yanal opened the door!'
30.	ʕali ʔiɣsil s-sajja:ra Ali wash.IMP.3MSG the-car 'Wash the car, Ali.'

31.	sˤalaːħ ɣasal s-sajjaːra Salah wash.PST.3MSG the-car 'Salah washed the car!'
32.	**raʒa**ːʔ ʔitfaːʒaʔat lamma ʃaːfat suːsuː wa hijjih btitsawwaq Rajaa surprise.PST.3FSG when see.PST.3FSG Susu and she shopping.PROG 'Rajaa was surprised when she saw Susu while she was shopping.'
33.	ʔaħmad zaːr **suha** ʔakθar min luːluː Ahmad visit.PST.3MSG Suha more than Lulu 'Ahmad visited Suha more than Lulu.'
34.	**mohammad** zaːr ʕali miʃ xaːlid Mohammad visit.PST.3MSG Ali NEG Khalid 'Mohammad visited Ali, but not Khalid.'
35.	ʒaːd zaːr **ma**ː**lik** miʃ saliːm Jaad visit.PST.3MSG Malik NEG Saleem 'Jaad visited Malik, but not Saleem.'
36.	huːwwa raːjiħ ʕa-l-moːl he go.PRS.3MSG on-the-mall 'He went to the mall!'

(B.3) The information sheet used in the perception experiments (Chapter 7)

ورقة المعلومات

الرجاء الاحتفاظ بورقة المعلومات هذه وبنسخة موقعة من نموذج الموافقة.

أنت مدعو للمشاركة في هذه الدراسة. قبل أن تقرر المشاركة في هذه الدراسة، من المهم أن تفهم أسباب إجراء هذا البحث وما يتضمنه. الرجاء أن تأخذ الوقت الكافي لقراءة المعلومات التالية بعناية. وإذا لديك أي سؤال عن شيء لم تفهمه أو تود الحصول على معلومات أكثر، يرجى سؤال الباحث عن ذلك.

عنوان الدراسة: **معنى وتفسير الجمل في اللغة العربية**

الباحث: محمد علي صلاح بني يونس

<u>ما هو موضوع هذا البحث؟</u>

هذا البحث عن كيف يتم تفسير أنواع مختلفة من الجمل في العربية.

<u>من يجري هذا البحث؟</u>

سيجري هذا البحث طالب دكتوراة في جامعة يورك وهو محمد علي صلاح بني يونس.

<u>من يمكنه المشاركة؟</u>

متحدثو عدة لهجات عربية .

<u>ماذا تتضمن الدراسة؟</u>

سوف تُجرى هذه الدراسة عن عدة لهجات عربية .لذلك سيقوم المشاركون بالاستماع للأسئلة واختيار الجواب المناسب.

<u>هل يجب عليَّ المشاركة؟</u>

لا يتوجب عليك المشاركة في هذه الدراسة إذا كنت لا ترغب بذلك. وإذا قررت المشاركة في الدراسة، فسيكون بإمكانك الانسحاب منها دون بيان أسباب ذلك حتى خلال الجلسة نفسها. وإذا انسحبت من الدراسة قبل إكمالك للتجربة، سيتم التخلص من بياناتك ولن نستخدمها بأي طريقة.

<u>ما هي المخاطر المحتملة للمشاركة بالدراسة؟</u>

لا توجد أيّة مخاطر لمشاركتك في الدراسة، فأنت ستقوم فقط بالاستماع للأسئلة واختيار الجواب الذي تراه مناسبا لك.

<u>هل يوجد أي فوائد للمشاركة بالدراسة؟</u>

ستساعد المشاركة بهذه الدراسة على زيادة معرفتنا باللهجات العربية من خلال دراسة ظاهرة لغوية لم يتم دراستها من قبل .

<u>ماذا سيحصل للبيانات التي أقدمها؟</u>

ستستخدم البيانات التي تقدمها بالإضافة لبيانات المشاركين الآخرين ليتم تحليلها . سيتم تخزين بياناتك بشكل آمن في جوجل درايف الخاص بالباحث في جامعة يورك والمحمي برمز المرور وكلمة سر. وسيتم استخدام البيانات لأغراض بحثية وربما يتم استخدامها بأبحاث أو مؤتمرات أكاديمية علماً بأنه لن يتم استخدام أي معلومات شخصية في أي بحث.

<u>ماذا عن السّرية والخصوصية؟</u>

لن يتم ذكر اسمك خلال التسجيل وكذلك لن يتم ربط اسمك بإجاباتك، لذلك لن يكون هنالك معلومات تدل على شخصيتك في إجاباتك، وستبقى جميع المعلومات التي تزودها بسرية تامة. بالإضافة إلى ذلك، لن يتم الإشارة إلى أي معلومات شخصية في أي منشور أو بحث مستقبلا أي أنها ستكون مجهولة المصدر وذلك لضمان سريتها وخصوصيتها.

<u>هل سأعرف النتائج؟</u>

لن يتم الكشف عن النتائج التي تتعلق بالأفراد المشاركين في الدراسة.

لقد راجعت لجنة أخلاقيات البحث العلمي في قسم علم اللغة واللغويات في جامعة يورك هذه الدراسة ووافقت عليها. يمكنك الاتصال برئيس اللجنة، إيتان زويج، في حال كان لديك أي أسئلة تتعلق بذلك

(البريد الإلكتروني ; :*eytan.zweig@york.ac.uk* تلفون(: *322663 (00441904)*

إذا كان لديك أسئلة أخرى حول هذه الدراسة، فلا تتردد في الاتصال ب:

اسم الباحث: محمد علي صلاح بني يونس

قسم علم اللغة واللغويات،

جامعة يورك،

هسلنجتون، يورك،

YO10 5DD

رقم الجوال:

(+44) 7537800005

(+962) 789112122

البريد الإلكتروني maby500@york.ac.uk

UNIVERSITY *of York*

DEPARTMENT OF

LANGUAGE AND

LINGUISTIC SCIENCE

Heslington, York, YO10 5DD, UK

Email : Maby500@york.ac.uk

INFORMATION SHEET

PLEASE KEEP THIS INFORMATION SHEET AND A SIGNED COPY OF THE CONSENT FORM FOR YOUR RECORDS

You are invited to take part in a research study. Before you decide whether to participate it is important for you to understand why the research is being done and what it will involve. Please take the time to read the following information carefully. If there is anything you do not understand, or if you want more information, please ask the researcher.

Title of study: The meaning and interpretation of sentences in Arabic

Researcher: Mohammad Ali Salah Bani Younes

What is the research about?

This research investigates how different kinds of sentences are interpreted in Arabic.

Who is carrying out the research?

The researcher who is a PhD student at the University of York will run this research. He is Mohammad Ali Salah Bani Younes.

Who can participate?

Speakers of Arabic

What does the study involve?

The study will be about many Arabic dialects. Participants will listen to some utterances and choose one of the two provided multiple-choices.

Do I have to take part?

You do not have to take part in the study if you do not want to.

If you decide to take part you will still be free to withdraw without giving a reason, even during the session itself. If you withdraw from the study before finishing the experiment, the researcher will destroy your data and will not use it in any way.

What are the possible risks of taking part?

There are no risks of participating in this study as you will only listen to some utterances and then choose the answer that seems best to you.

Are there any benefits to participating?

Participating in this study will help increase our knowledge of Arabic dialects by studying a linguistic phenomenon that has not been studied.

What will happen to the data I provide?

The data you provide will be used alongside the data of other participants to be analysed.

Your data will be stored securely at the University of York Google Drive that belongs to the researcher. It is protected by a username and password.

The data will also be used for research purposes and may be presented in academic papers or conferences given that any personal information will not be used in any research.

What about confidentiality?

Your names will not be mentioned in the recordings and will not be associated with your answers, so there will be no identifying information in the answers. All information you provide will be kept strictly confidential. In addition, any personal information in any future publication or research will be anonymised to ensure confidentiality.

Will I know the results?

No individual results will be disclosed.

This study has been reviewed and approved by the Departmental Ethics Committee of the Department of Language and Linguistic Science at the University of York. If you have any questions regarding this, you can contact the chair of the L&LS Ethics Committee, Eytan Zweig, (email: linguistics-ethics@york.ac.uk; Tel: (01904) 322663).

If you have further questions regarding this study, please feel free to contact:

Researcher name
Mohammad Ali Salah Bani Younes
Department of Language and Linguistic Science
University of York, Heslington, York, YO10 5DD
Mobile: (+44) 7537800005
(+962) 789112122
email: maby500@york.com

(B.4) The consent form given to the participants in Experiment 1

معنى وتفسير الجمل في اللغة العربية

الباحث: محمد علي صلاح بني يونس

نموذج الموافقة

هذا النموذج لك، لتتمكن من إبداء الموافقة من عدمها على المشاركة في هذه الدراسة. الرجاء قراءة كل سؤال والإجابة عليه. إذا كان لديك أي شيء غير واضح ولا تفهمه، أو إذا أردت مزيدا من المعلومات، يرجى منك أن تسأل الباحث عن ذلك.

هل قرأت وفهمت الورقة التي تزودك بالمعلومات عن الدراسة؟	نعم ❐ لا❐
هل كانت لديك الفرصة لتوجيه أسئلة عن الدراسة؟ وهل تمت الإجابة على تلك الأسئلة بشكل تام ومرضٍ؟	نعم ❐ لا❐
هل فهمت بأن فريق البحث سيُبقي المعلومات التي تقدمها لهم بشكل سري وأن اسمك أو أي معلومات شخصية مثل المعلومات التعريفية بك لن تُذكر بأي بحث سيُنشَر لاحقاً؟	نعم ❐ لا❐
هل فهمت بأنه يجوز لك أن تنسحب من الدراسة بأي وقت قبل إنهاء جلسة جمع البيانات وذلك دون إبداء أي سبب لذلك وأنه في هذه الحالة سيتم حذف جميع بياناتك التي قدمتها؟	نعم ❐ لا❐
هل فهمت بأنه قد يتم الاحتفاظ بالمعلومات التي تقدمها وذلك لفترة تتجاوز مدة هذا المشروع وأنه قد يتم استخدامها في أبحاث لغوية اخرى بالمستقبل؟	نعم ❐ لا❐
هل توافق على المشاركة في هذه الدراسة؟	نعم ❐ لا❐
هل توافق على أن يقوم الباحث بالاحتفاظ بمعلومات الاتصال الخاصة بك بعد إنهاء هذا المشروع البحثي وذلك لكي يتمكن الباحث من الاتصال بك مستقبلاً حول إمكانية المشاركة بدراسات اخرى؟ (يمكنك المشاركة في الدراسة دون الموافقة على ذلك)	نعم ❐ لا❐

اسمك____

توقيعك____

اسم الباحث: محمد علي صلاح بني يونس

التاريخ____

The meaning and interpretation of sentences in Arabic

Lead researcher: Mohammad Ali Salah Bani Younes

Consent form

This form is for you to state whether or not you agree to take part in the study. Please read and answer every question. If there is anything you do not understand, or if you want more information, please ask the researcher.

Have you read and understood the information leaflet about the study?	Yes ❒ No ❒
Have you had an opportunity to ask questions about the study and have these been answered satisfactorily?	Yes ❒ No ❒
Do you understand that the information you provide will be held in confidence by the research team, and your name or identifying information about you will not be mentioned in any publication?	Yes ❒ No ❒
Do you understand that you may withdraw from the study at any time before the end of the data collection session without giving any reason, and that in such a case all your data will be destroyed?	Yes ❒ No ❒
Do you understand that the information you provide may be kept after the duration of the current project, to be used in future research on language?	Yes ❒ No ❒
Do you agree to take part in the study?	Yes ❒ No ❒
Do you agree to the researcher's keeping your contact details after the end of the current project, in order that he may contact you in the future about possible participation in other studies? *(You may take part in the study without agreeing to this).*	Yes ❒ No ❒

Your name (in BLOCK letters):

____

Your signature:

____

Researcher's name: Mohammad Ali Salah Bani Younes

Date:

____

(B.5) The language background questionnaire used in Experiment 1

(Adapted from Hellmuth & Almbark, 2017)

الهدف من هذا الاستبيان هو الحصول على معلومات من تاريخك. نود معرفة اللهجة العربية التي تتحدث بها، وكذلك اللغات الأخرى التي تعرفها.

الجنس ذكر انثى	
العمر	
بلد الولادة	
مدينة الولادة	
كيف تصنف مكان ولادتك؟ مدينة قرية البادية الأردنية	
أماكن أخرى عشت فيها وكم المدة؟	
مكان ولادة الأب	
مكان ولادة الأم	
مكان ولادة الجد	
مكان ولادة الجدة	
هل تتحدث بلغات أخرى؟ إذا نعم فمنذ متى وأنت تتكلم كل لغة؟	
عدد سنين تعلم اللغة الإنجليزية	
مستوى التعليم	
هل تود الحصول على معلومات حول تقدم مشروع البحث؟ إذا نعم فمن فضلك أكتب إيميلك	
رجاءً أذكر لنا إن كان لديك أي اختلالات صوتية أو سمعية	

Language Background Questionnaire

(Adapted from Hellmuth & Almbark, 2017)

This questionnaire aims at getting more information about your language history. I would like to know the dialect of Arabic and the other languages you speak.

Gender Male Female	
Age	
Country of birth	
City of birth	
How do you describe the place where you were born? City Village Desert	
Other places you lived in and how long?	
Father's place of birth	
Mother's place of birth	
Grandfather's place of birth	
Grandmother's place of birth	
Do you speak other languages? If so, how long so you speak each one?	
Years of learning English	
Your level of education	
Do you want to get information about the progress of this research project? If yes, please provide your email.	
Do you have any speech or hearing problems? If so, please mention this.	

References

Abd-El-Jawad, H. (1987). Cross-dialectal variation in Arabic: Competing prestigious forms. *Language in Society, 16*(3), 359-367.

Abdul-Fattah, H., & El-Hassan, S. (1994). Syntactic errors of Jordanian school children in English: The role of the native language. *Papers and Studies in Contrastive Linguistics*, 29, 181-204. Retrieved from https://search.proquest.com/docview/58295086?accountid=15181

Abu-Abbas, K, Zuraiq, W. & Al-Tamimi, F. (2010). Assimilation and local conjunction in Arabic. *SKASE Journal of Theoretical Linguistics*, 7(3), 64-83.

Abu Ain, N. (2016). *A Sociolinguistic Study in Saḥam, Northern Jordan* (Doctoral dissertation). University of Essex, UK.

Abu-Chacra, F. (2007). *Arabic: An essential grammar*. London: Routledge.

Abu Guba, M. N. (2016). *Phonological adaptation of English loanwords in Ammani Arabic* (Doctoral dissertation). University of Salford, UK.

Abu Helal, F. A. (1993). *Perception and interpretation of English and Arabic intonation patterns by Jordanian university students* (Master's thesis). Yarmouk University. Irbid, Jordan.

AbuSeileek, A. F., & Rabab'ah, G. (2013). Discourse functions and vocabulary use in English language learners' synchronous computer-mediated communication. *Teaching English with Technology, 13*(1), 42-61.

Agresti, A. (2019). *An introduction to categorical data analysis*. Hoboken, USA: John Wiley & Sons, Inc.

Al Amayreh, M. M. K. (1991). *A study of the basic intonational patterns in Standard and Jordanian Arabic* (Master's thesis). University of Jordan. Amman, Jordan.

Al-Azzawi, M. B. K. (2002). *The forms and functions of intonation in Modern Standard Arabic with reference to English* (Doctoral dissertation). University of Mosul, Iraq.

Al-Azzawi, M. B. K. (2010). Intonation in English- consecutive interpreting Arabic. *Adab Al-Rafidayn*, 58, 26-52.

Albirini, A. (2016). *Modern Arabic sociolinguistics: Diglossia, variation, codeswitching, and identity*. New York: Routledge.

Al-Deaibes, M. (2016). *The phonetics and phonology of assimilation and gemination in Rural Jordanian Arabic* (Doctoral dissertation). University of Manitoba, Manitoba, Winnipeg, Canada. Retrieved from https://mspace.lib.umanitoba.ca/handle/1993/31639

Al-Deaibes, M & Rosen, N. (2019). Gemination in Rural Jordanian Arabic. In A. Khalfaoui & M. A. Tucker (Eds.), *Perspectives on Arabic Linguistics XXX* (pp. 53-76). Amsterdam: John Benjamins Publishing Company.

Alharbi, L. M. (1991). *Formal analysis of intonation: The case of the Kuwaiti Dialect of Arabic* (Doctoral dissertation). Heriot-Watt University, UK.

Al-Hawamdeh, A. M. (2016). *A Sociolinguistic Investigation of Two Hōrāni Features in Sūf, Jordan* (Doctoral dissertation). University of Essex, UK. Retrieved from http://repository.essex.ac.uk/17607/1/the%20thesis-final%20.pdf

Alhazmi, L. (2018). *Perceptions of Hijazi Arabic Dialects: An attitudinal approach* (Doctoral dissertation). The University of Sheffield, UK.

Al Huneety, I., A. (2015). *The phonology and morphology of Wadi Mousa Arabic* (Doctoral dissertation). University of Salford, UK.

Ali, A.-K. (2014). *Syllabification and Phrasing in Three Dialects of Sudanese Arabic* (Doctoral dissertation). University of Toronto: Toronto.

Ali, A.-K. (2017). Prosodic domains of syllabification in Sudanese Arabic. In H. Ouali (Ed.), *Perspectives on Arabic Linguistics XXIX* (pp. 33–54). Amsterdam: John Benjamins Publishing Company.

Al-Jarrah, R. (2002). *An Optimality-theoretic analysis of stress in the English of native Arabic speakers* (Doctoral dissertation). Ball State University. Indiana.

Al-Khalifa, F. E. (1984). *An intonational study of Kuwaiti Bedouin Arabic* (Doctoral dissertation). University of London, UK.

Al-Khouri, S. I. (2010). *Forms of interrogatives in Modern Standard Arabic and Jordanian dialects* (Master's thesis). Yarmouk University. Irbid, Jordan.

Almalki, H., & Morrill, T. (2016). Yes/No question intonation in Urban Najdi Arabic. In J., Barnes., N.,Veilleux., S.,Shattuck-Hufnagel., & A, Brugos (Eds.), *Proceedings of Speech Prosody Conference, 8(PP*. 606-610). Boston: Boston University.

Almalki, H. (2020). *The production and perception of prosodic prominence in Urban Najdi Arabic* (Doctoral dissertation). George Mason University, Fairfax.

Almbark, R. A. (2012). *The Perception and production of SSBE vowels by Syrian Arabic learners: The Foreign Language Model* (Doctoral dissertation). University of York, UK.

Almbark, R. Bouchhioua, N. Hellmuth, S. (2019). Is there an interlanguage intelligibility benefit in perception of English word stress? *Loquens 6(1).*

Almhairat, A. S. (2015). *Code-switching from the Jordanian Bedouin dialect to the*

Jordanian Urban Dialect, in Amman: A sociolinguistic study (Master's thesis). Middle East University, Amman, Jordan.

Al Mashaqba, B. M. (2015). *The phonology and morphology of Wadi Ramm Arabic* (Doctoral dissertation). University of Salford, UK.

Al-Masri, M. (2009). *The acoustic and perceptual correlates of emphasis in Urban Jordanian Arabic* (Doctoral dissertation). The University of Kansas, Kansas, USA.

Al-Momani, I. M., & Al-Saidat, E. M. (2010). The syntax of wh-movement). in Jordanian Arabic. *European Journal of Scientific Research, 40*(4), 609-628.

Al Omar, M. (2011). *A comparative study of phonological processes in Syrian and Jordanian Arabic An optimality theoretic approach* (Doctoral dissertation). University of Essex, UK.

Al-Omyan, N. N. F. (2014). *Intonational patterns in Jordanian Arabic* (Master's thesis). The Hashemite University. Zarqa, Jordan.

Aloni, M., & van Rooy, R. (2002). The dynamics of questions and focus. In B. Jackson (Ed), *SALT XII* (PP. 20-39). Ithaca, NY: Cornell University.

Aloni, M., Égré, P., & de Jager, T. (2013). Knowing whether A or B. *Synthese,* 190, 2595–2621.

Aloufi, A. M. S. (2011). *Intonation in Hijazi Arabic* (Master's thesis). University of Sussex, UK.

Al-Qadi, M. (2003). *A comparative study of the rising intonation in Deristian Palestinian Dialect of Arabic and English* (Master's thesis). University of Jordan. Amman, Jordan.

Alqattan, S. (2015). *Early phonological acquisition by Kuwaiti Arabic children* (Doctoral dissertation). Newcastle University, UK.

Al-Qenaie, S. D. (2011). *Kuwaiti Arabic: A socio-phonological perspective* (Doctoral dissertation). Durham University, UK. Available at Durham E-Theses Online: http://etheses.dur.ac.uk/935/

Al-Shawashreh, E. (2016). *Aspects of grammatical variation in Jordanian Arabic* (Doctoral dissertation). University of Ottawa, Ottawa, Canada.

Al-Shawashreh, E., Jarrah, M., Al-Omari, M., & Al-Deaibes, M. (2019). A prosodic account of wh-formation in Jordanian Arabic. *Lingua*, 102741. Retrieved 12 October 2019 from https://doi.org/10.1016/J.LINGUA.2019.102741

Al-Sughayer, K. I. (1990) *Aspects of comparative Jordanian and Modern Standard Arabic phonology* (Doctoral dissertation). Michigan State University, Michigan.

Altakhaineh, A. R. M. S. (2016). *Compounding in Modern Standard Arabic, Jordanian*

Arabic and English (Doctoral dissertation). Newcastle University, UK.

Al-Wer, E,. (2007a). The formation of the dialect of Amman: From chaos to order. In C. Miller, E. Al-Wer, D. Caubet, & J. Watson (Eds.), *Arabic in the City: Issues in dialect contact and language variation* (pp. 55-76). London: Routledge.

Al-Wer, E. (2007b). Jordanian Arabic (Amman). In K. Versteegh (Ed.), *Encyclopedia of Arabic Language and linguistics* (pp. 505-517). Leiden: Brill.

Al-Wer, E., Horesh, H., Herin, B., & Fanis, M. (2015). How Arabic regional features become sectarian features: Jordan as a case study. *Zeitschrift für Arabische Linguistik*, 62, 68–87.

Al-Wer, E. (2020). New-dialect formation: The Amman dialect. In C. Lucas & S. Manfredi (Eds.), *Arabic and contact-induced change* (pp. 551–566). Berlin: Language Science Press. DOI:10.5281/zenodo.3744549.

Alzaidi, M, S. A. (2014). *Information structure and intonation in Hijazi Arabic* (Doctoral dissertation). University of Essex, UK.

Al-Zamil, A., & Hellmuth, S. (2019, September). *Do Arabic speakers produce Yes/No Questions differently across the Arabian Peninsula?* Poster presented at PARLAY 2019, University of York, UK.

Alzamil, A., & Hellmuth, S. (2020, July). *Intonational variation in the Arabian Peninsula: a study on yes/no-questions*. Paper presented at Arabic Linguistics Forum Conference, University of Leeds. Abstract retrieved from http://arabiclinguisticsforum.com/leeds-programme/.

Alzoubi, E. (2020). *Idioms and idiomatic expressions in Levantine Arabic: Jordanian Dialect*. New York: Routledge.

Amer, F., Buragohain, D., & Suryani, I. (2020). Responding strategies in Jordanian Arabic: A socio-pragmatic study. *Journal of Scientific Research & Reports, 26*(2), 13-26.

Arvaniti, A. (2011). The Representation of intonation. In M. Oostendorp, C. J. Ewen, E. Hume, & K. Rice (Eds.), *the Blackwell companion to phonology* (pp. 757-780). Oxford: John Wiley & Sons, Ltd.

Arvaniti, A. (in press). The Autosegmental-Metrical Model of intonational phonology. In Shattuck-Hufnagel, S. and Barnes, J. (Eds.), *Prosodic Theory and Practice*. Massachusetts: MIT Press.

As-Samman, M. I. J. (2009). *Intonation in news reading in Arabic* (Master's thesis). University of Mosul. Mosul, Iraq.

Aziz, I. B., & Ali, H. K. (2020). An Autosegmental analysis of intonation in selected English and Arabic preaches. *Journal of Al Frahedis Arts*, *12*(40), 705-718.

Baayen, R. H., Davidson, D. J., & Bates, D. M. (2008). Mixed-effects modeling with crossed random effects for subjects and items. *Journal of memory and language, 59*(4), 390-412.

Baayen, R. H. (2008). *Analyzing linguistic data a practical introduction to statistics using R*. Cambridge: Cambridge University Press.

Bhatt, R., & Dayal, V. (2020). Polar question particles: Hindi-Urdu kya:. *Nat Lang Linguist Theory*. https://doi.org/10.1007/s11049-020-09464-0.

Bartels, C. (1997). *Towards a compositional interpretation of English statement and question intonation* (Doctoral dissertation). University of Massachusetts Amherst, USA.

Bartels, C. (1999). *The intonation of English statements and questions: A compositional interpretation*. New York: Routledge.

Bartels, C. (2013). *The intonation of English statements and questions: A compositional interpretation*. New York: Routledge.

Bates, D. (2005). Fitting linear mixed models in R. *R news*, *5*(1), 27-30.

Bates, D., Maechler, M., Bolker, B. & Walker, S. (2015). Fitting Linear Mixed-Effects Models using lme4. *Journal of Statistical Software, 67*(1), 1-48. doi:10.18637/jss.v067.i01.

Beck, S., & Kim, S. S. (2006). Intervention effects in alternative questions. *The Journal of Comparative Germanic Linguistics, 9*(3), 165-208.

Beckman, M., Hirschberg, J., & Shattuck-Hufnagel, S. (2005). The original ToBI system and the evolution of the ToBI framework. In S.-A.Jun (Ed.), *Prosodic Typology: The phonology of intonation and phrasing* (pp. 9-54). Oxford: Oxford University Press.

Benkirane, T. (1998). Intonation in Western Arabic (Morocco). In D. Hirst & A. D. Cristo (Eds.), *Intonation systems a survey of twenty languages* (pp. 348-362). Cambridge: Cambridge University Press.

Ben-Meir, N. (2015). *Patterns of the Urban Jordanian Arabic broken plural* (Master's thesis). San José State University, San Jose, USA.

Biezma, M. (2009). Alternative vs polar questions: The cornering effect. In Cormany, S. Ito & D. Lutz (Eds.), *Proceedings of the 19th Semantics and Linguistic Theory Conference (SALT) 19 (*PP. 37–54). Ohio: The Ohio State University.

Biezma, M. & Rawlins, K. (2012). Responding to alternative and polar questions. *Linguistics and Philosophy, 35*, 261–406.

Biezma, M., & Rawlins, K. (2015). Alternative questions. *Language and Linguistics Compass, 9*(11), 450-468.

Biezma, M., & Rawlins, K. (2017). Rhetorical questions: Severing questioning from asking. In Dan, B., Jacob, C., Sireemas, M., & Brynhildur, S (Eds.), *Proceedings of the 27th Semantics and Linguistic Theory Conference, 27 (PP*. 302–322). Maryland: The University of Maryland, College Park.

Blodgett, A., Owens, J., & Rockwood, T. (2007). An initial account of the intonation of Emirati Arabic. In *Proceedings of the 16th International Congress of Phonetic Sciences, Saarland University, Saarbrücken, Germany, August 6* (Vol. 10, pp. 1137-1140).

Blum-Kulka, S., House, J., & Kasper, G. (1989). Investigating cross-cultural pragmatics: An introductory overview. *Cross-cultural pragmatics: Requests and apologies*, 31, 1-34.

Boersma, P., & Weenink, D. (2019). Praat: doing phonetics by computer [Computer program]. Version 6.0.56, retrieved 20 June 2019 from http://www.praat.org/.

Boersma, P., & Weenink, D. (2020). Praat: doing phonetics by computer [Computer program]. Version 6.1.36, retrieved 6 December 2020 from http://www.praat.org/.

Bolinger, D. (1978). YES-NO Questions are not Alternative Questions. In H. Hiz (ed.), *Questions* (pp. 87-105). Boston, U.S.A.: D. Reidel Publishing Company.

Bouchhioua, N., Hellmuth, S., & Almbark, R. (2019). Variation in prosodic and segmental marking of yes-no questions in Tunisian Arabic. In C. Miller, A. Barontini, M. Germanos, J. Guerrero, & C. Pereira (Eds.), *Studies on Arabic Dialectology and Sociolinguistics: Proceedings of the 12th International Conference of AIDA held in Marseille from 30th May- 2nd June 2017*. Aix-Marseille: IREMAM (Institut de recherches et d'études sur le monde arabe et musulman). https://doi.org/10.4000/books.iremam.3961.

Büring, D. (2007). Semantics, intonation, and information structure. In G. Rachmond & C. Reiss (Eds). *The Oxford Handbook of Linguistics interfaces* (445-473). Oxford: Oxford University Press.

Catford, J. C., Palmer, J. D., McCarus, E., Moray, E., & Snider, S. A. (1974). *A Contrastive Study of English and Arabic*. Contrastive Analysis Project. Department of Linguistics, University of Michigan produced for Defense Language Institute. Monterey, Calif: Defense Language Institute. Retrieved 18 October 2019 from https://eric.ed.gov/?id=ED105761

Celce-Murcia, M., & Larsen-Freeman, D. (1999). *The grammar book: An ESL/EFL teacher's course*. The United States of America: Heinle & Heinle Publishers.

Chahal, D. (1999). A preliminary analysis of Lebanese Arabic intonation. In Henderson, John (ed.) *Proceedings of the 1999 Conference of the Australian Linguistic Society* (pp. 1-17).

Perth: The University of Western Australia.

Chahal, D. (2001). *Modelling the intonation of Lebanese Arabic using the Autosegmental-Metrical Framework: A comparison with English* (Doctoral dissertation). University of Melbourne, Australia.

Chahal, D. (2007). Intonation. In K . Versteegh (Ed). *Encyclopedia of Arabic Language and Linguistics*. Vol II, (pp. 395-401). Leiden: Brill.

Chahal, D. & Hellmuth, S. (2014). The intonation of Lebanese and Egyptian Arabic. In S.-A. Jun (Ed.), *Prosodic Typology II: The phonology of intonation and phrasing* (pp. 365-404). Oxford: Oxford University Press.

Chládková, K., Hamann, S., Williams, D., & Hellmuth, S. (2017). F2 slope as a perceptual cue for the front-back contrast in Standard Southern British English. *Language and Speech*, 60(3) 377–398.

Ciardelli, I., Groenendijk, J., & Roelofsen, F. (2019). *Inquisitive semantics*. Oxford: Oxford University Press.

Cleveland, R. (1963). A Classification for the Arabic dialects of Jordan. *Bulletin of the American Schools of Oriental Research*, (171), 56-63. doi:10.2307/1355607.

Colantoni, L., Steele, J., & Escudero, P. (2015). *Second language speech: Theory and practice*. Cambridge: Cambridge University Press.

Cowell, M. W. (2005). *A Reference Grammar of Syrian Arabic.* Washington, D.C.: Georgetown University Press.

Cruttenden, A. (1997). *Intonation*. Cambridge: Cambridge University Press.

Dayal, V. (2016). *Questions*. Oxford: Oxford University Press.

de Jong, K., & Zawaydeh, B. A. (1999). Stress, duration, and intonation in Arabic word-level prosody. *Journal of Phonetics*, *27*(1), 3-22.

Delais-Roussarie, E., & Turco, G. (2019). Intonation of alternative constructions in French: Which cues allow distinguishing statements. In I. Feldhausen, M. Elsig, I. Kuchenbrandt, & M. Neuhaus, *Romance languages and linguistic theory 15 selected papers from 'Going Romance' 30, Frankfurt*. Amsterdam, the Netherlands: John Benjamins Publishing Company.

Dupire, C. (2017, October 09). Refugees reshape Jordan's urban landscape — report. *The Jordan Times*, retrieved from http://www.jordantimes.com/news/local/refugees-reshape-jordan%E2%80%99s-urban-landscape-%E2%80%94-report.

Edith, A., M. (1971). *Some cross-linguistic generalizations about yes-no questions and their answers* (Doctoral dissertation). Stanford University, USA.

Eid, M. (1974). *Disjunctions and alternative questions in Arabic*. Indiana: I.U. Linguistics Club.

Eid, M. (1992). Pronouns, questions, and agreement. In E. Broselow, M. Eid, & J. McCarthy (Eds.), *Perspectives on Arabic Linguistics IV*: *Papers from the Fourth Annual Symposium on Arabic Linguistics* (pp. 107-141). Amsterdam, the Netherlands: John Benjamins Publishing Company.

El-Hassan, S. (1988). The intonation of questions in English and Arabic. *Abhath Al-Yarmouk*, 22, 97-108.

El-Hassan, S. A. (1990). Intonation in the Educated Spoken Arabic of Jordan: The patterning of accents. *Abhath Al-Yarmouk*, *8*(2), 7–31.

El-Hassan, S. (1991). Intonation-groups in English and Standard Arabic. *Dirasat*, 18(1), 7-24.

El-Hassan, S. (1994). English accentuation and vowel quality as pronounced by Arabs: A pedagogic statement. *Papers and Studies in Contrastive Linguistics*, 29, 205-216. Retrieved from https://search.proquest.com/docview/85617024?accountid=15181.

El-Yasin, M. K. (1985). Basic word order in Classical Arabic and Jordanian Arabic. *Lingua* 65, 107-122.

El Zarka, D. (2017). Arabic Intonation. *Oxford Handbooks Online.* Retrieved from http://www.oxfordhandbooks.com/view/10.1093/oxfordhb/9780199935345.001.0001/oxfordhb-9780199935345-e-77.

Erlewine, M., Y. (2014). Alternative questions through focus alternatives in Mandarin Chinese. In A. Beltrama, T. Chatzikonstantinou, J. L. Lee, M. Pham, & D. Rak (Eds.), *Proceedings of the 48th Meeting of the Chicago Linguistic Society, CLS 48 (*PP. 221–234).

Fakih, A. H. (2012). *The syntax of questions in Modern Standard Arabic: A minimalist perspective*. Germany: LAMBERT Academic Publishing.

Fakih, A. H. A., and Al-Dera, A. S. (2014). Question affix analysis in Standard Arabic: A minimalist perspective. *International Journal of English Linguistics,* (4) 6, 1-15.

Ferguson, C. A., & Ani, M. (1961). *Damascus Arabic*. Washignton D.C.: The Center for Applied Linguistcs.

Féry, C. (2017). *Intonation and prosodic structure*. Cambridge: Cambridge University Press.

Frota, S., & Prieto, P. (2015). *Intonation in Romance*. Oxford: Oxford University Press.

Froud, K. & Khamis-Dakwar, R. (2018). Neurophysiological investigations in studies of Arabic linguistics: The case of Arabic diglossia. In E. Benmamoun & R. Bassiouney (Eds.), *The Routledge handbook of Arabic linguistics* (pp. 249- 262). New York:

Routledge.

Gary, J. O., & Gamal-Eldin. S. (1982). *Cairene Egyptian Colloquial Arabic, volume 6 of Lingua Descriptive Studies*. Amsterdam: North-Holland.

Genzel, S., & Kügler, F. (2020). Production and perception of question prosody in Akan. *Journal of the International Phonetic Association*, 50(1), 61–92. doi:10.1017/S0025100318000191.

Ghazal, M. (2016, January 30). Population stands at around 9.5 million, including 2.9 million guests. *The Jordan Times*, retrieved from http://www.jordantimes.com/news/local/population-stands-around-95-million-including-29-million-guests.

Ghrefat, Z. A. (2007). *An instrumental study of intonation in Hebron Arabic Dialect* (Master's thesis). Yarmouk University. Irbid, Jordan.

Goenaga, P. (2009). Hauta-galderez. *ASJU 43, 381-404*.

Gračanin-Yuksek, M. (2016). Alternative questions in Turkish. *Dilbilim Araştırmaları Dergisi*, *1*, 39-68.

Grabe, E. (2004). Intonational variation in urban dialects of English spoken in the British Isles. In P. Gilles & J. Peters (Eds.), *Regional Variation in Intonation* (pp. 9-31). Tuebingen: Niemeyer.

Grice, H. P. (1975). Logic and conversation. In P. Cole & J. Morgan (Eds.), *Syntax and semantics 3*: *speech acts*, (pp. 41–58). New York: Academic Press.

Gussenhoven, C. (2007). Intonation. In P. Lacy (Ed.), *the Cambridge handbook of phonology* (pp. 253-280). Cambridge: Cambridge University Press.

Gussenhoven, C., & Jacobs, H. (2011). *Understanding phonology*. London: Hodder Education.

Hadjer, T. (2017). *The influence of Algerian Arabic intonation on English intonation learning: A case study of third year LMD English students at Mostaganem University* (Master's thesis). Abdelhamid Ibn Badis University of Mostaganem. Mostaganem, Algeria.

Halliday, M. A. K. (1967). *Intonation and Grammar in British English*. The Hague, Mouton Publishers.

Halliday, M. A. K. (1970). *A Course in Spoken English: Intonation*. Oxford: Oxford University Press.

Hamzah, N. J. (2011). A comparative analysis of alternative questions in English and Arabic. *Journal of Al-Qadisiya University, 14*(3), 23-42.

Han, C-H & Romero, M. (2004). Disjunction, focus, and scope. *Linguistic Inquiry, 3*5(2), 179–217.

Haspelmath, M. (2007). Coordination. In T. Shopen (Ed.), *Language typology and syntactic description II* (pp. 1-51). Cambridge: Cambridge University Press.

Hazem, A. H, & Kamil, D. F. (2019). Problems encountered in translating Alternative Questions from Arabic into English. *Journal of Language Studies* 2(4), 76-90. Retrieved from file:///C:/Users/soopt/Downloads/ProblemsEncounteredinTranslatingAlternativeQuestionsFromArabicintoEnglishEnglish.pdf.

Heidenreich, S. (2014). *Disjunctive questions: Disjunctive meanings* [Qualifying Paper, Northwestern University, Evanston, IL].

Heidenreich, S. (2019). *Disjunctive questions: Experimental evidence in prosody and discourse* (Doctoral dissertation). Northwestern University, Illinois.

Hellmuth, S. (2004). Prosodic weight and phonological phrasing in Cairene Arabic. *Papers from the Regional Meetings, Chicago Linguistic Society*, 40(1), 97-111.

Hellmuth, S. (2006). *Intonational pitch accent distribution in Egyptian Arabic* (Doctoral dissertation). School of Oriental and African Studies, University of London, UK.

Hellmuth, S. (2013). Phonology. In J. Owens (Ed.), *the Oxford Handbook of Arabic Linguistics* (pp. 45-70). Oxford University Press.

Hellmuth, S. (2014). Investigating variation in Arabic intonation: the case for a multi-level corpus approach. In: Farwaneh, S. and Ouali, H. (eds.), *Perspectives on Arabic Linguistics XX1V-XXV* (pp. 63-89). Amsterdam, the Netherlands: John Benjamins.

Hellmuth, S. & Almbark, R. (2017). *Intonational Variation in Arabic Corpus*. UK Data Archive, Colchester, Essex.

Hellmuth, S. (2018). Variation in polar interrogative contours within and between Arabic dialects. *Proceedings of Speech Prosody. Poznań, Poland, 13-16 June.*

Hellmuth, S. (2020). Contact and variation in Arabic intonation. In C. Lucas & S. Manfredi (Eds.), *Arabic and contact-induced change* (pp. 583–601). Berlin: Language Science Press.

Hellmuth, S. (in preparation). *Intonation in Spoken Arabic Dialects*. Oxford: Oxford University Press.

Holes, C. (1990). *Gulf Arabic*. London: Routledge.

Holes, C. (1995). *Modern Arabic: Structure, function, and varieties*. New York: Longman Publishing.

Hualde, J. I., & Prieto, P. (2016). Towards an international prosodic alphabet (IPrA). *Laboratory Phonology: Journal of the Association for Laboratory Phonology,* 7(1): 5, 1-25. DOI: http://doi.org/10.5334/labphon.11.

Hutchby, I. & Wooffitt, R. (2008). *Conversation analysis* (2nd ed.). Cambridge: Polity Press.

Igarashi, Y. (2018). Intonation. In Y. Hasegawa (Ed.), *the Cambridge handbook of Japanese linguistics* (pp. 181-201). Cambridge: Cambridge University Press.

Irshied, O. (1984). *The phonology of Arabic: Bani Ḥassan, a Bedouin Jordanian dialect* (Doctoral dissertation). University of Illinois Urbana-Champaign, United States.

Irshied, O. & Kenstowicz, M. (1984). Some phonological rules of Bani-Hassan Arabic: a Bedouin dialect. *Studies in the Linguistic Sciences*, 14. 109-148.

Jaber, A., Omari, O., & Al-Jarrah, R. (2019). The domain of emphasis spread in Arabic: Evidence from Urban Jordanian Arabic. *Lingua*, 222, 10–25.

Jaradat, A. (2018). *The syntax-prosody interface of Jordanian Arabic (Irbid Dialect)* (Doctoral dissertation). University of Ottawa, Ottawa, Canada.

Jongman, A., Herd, W., Al-Masri, M., Sereno, J., & Combest, S. (2011). Acoustics and perception of emphasis in Urban Jordanian Arabic. *Journal of Phonetics, 39*, 85–95.

Jun, S.-A. & Fletcher, J. (2014). Methodology of studying intonation: From data collection to data analysis. In in S.-A. Jun (Ed.), *Prosodic Typology II: The phonology of intonation and phrasing* (pp. 493-519). Oxford: Oxford University Press.

Kadmon, N. (2001). *Formal pragmatics: semantics, pragmatics, presupposition, and focus*. Oxford: Blackwell Publisher LtD.

Kaiser, E. (2003). A question of case. *Nordlyd, 31(4),* 694-707.

Katamba, F. (1989). *An introduction to phonology*. New York: Addison Wesley Longman Publishing.

Katanani E., J., K. (2002). *Intonation of interrogation of English and the accent of Yazour in Palestine* (Doctoral dissertation). University of Jordan, Amman, Jordan.

Kulk, F., Odé, C., & Woidich, M. (2003). The intonation of colloquial damascene Arabic: a pilot study. In *Proceedings of the Institute of Phonetic Sciences 25* (*PP.* 15-20). Amsterdam: University of Amsterdam.

Ladd, D. R. (1996). *Intonational phonology*. Cambridge: Cambridge University Press.

Ladd, D. R. (2008). *Intonational phonology* (2nd ed.). Cambridge: Cambridge University Press.

Ladefoged, P. (2003). *Phonetic data analysis: An introduction to fieldwork and instrumental techniques*. Oxford: Blackwell Publishing.

Leech, G., & Svartvik, J. (2002). *A communicative grammar of English* (3rd ed.). London: Routledge.

Levis, J. M. (1999). Intonation in theory and practice, revisited. *TESOL Quarterly, 33*(1), 37-63.

Levis, J. (2012). Suprasegmentals: Intonation. In C. A. Chapelle (Ed.), *the encyclopedia of applied linguistics*. Blackwell Publishing Ltd. doi:10.1002/9781405198431.wbeal1124.

Levis, J. M., & Wichmann, A. (2015). English intonation - form and meaning. In M. Reed & J. M. Levis (Eds.), *The handbook of English pronunciation* (pp. 139-155). UK: Wiley Blackwell.

Liberman, M. (1975). *The intonational system of English* (Doctoral dissertation). MIT.

Lucas, C., & Lash, E. (2010). Contact as catalyst: The case for Coptic influence: in the development of Arabic negation. *Journal of Linguistics* 46, 379-413.

Mahadin, R & Jaradat, A. (2011). The pragmatic function of intonation in Irbid Dialect Acoustic analysis of some speech acts. *International Journal of Humanities and Social Science* 1 (9), 243-251.

McLoughlin, L. J. (1982). *Colloquial Arabic (Levantine)*. London: Routledge.

McMahon, A. (2002). *An introduction to English phonology*. Edinburgh: Edinburgh University Press Ltd.

Meertens, E. (2019). How prosody disambiguates between alternative and polar questions. In J. J. schlöder, D. McHugh & F. Roelofsen (Eds.), *Proceedings of the 22nd Amsterdam Colloquium*. The Institute for Logic, Language and Computation (ILLC): The University of Amsterdam.

Meertens, E., Egger, S., & Romero, M. (2019). Multiple accent in alternative questions. In M. Teresa Espinal, E. Castroviejo, M. Leonetti, L. McNally and C. Real-Puigdollers (Eds.), *Proceedings of Sinn und Bedeutung, 23, Vol 2* (pp. 179–196). Cerdanyola del Vallès, Bellaterra: Universitat Autònoma de Barcelona.

Mitchell, T. F. (1993). *Pronouncing Arabic II*. Oxford: Oxford University Press.

Mousa, N. (2019). *Grammatical aspects of Rural Palestinian Arabic*(Doctoral dissertation). Arizona State University, Arizona.

Musabhien, M. (2008). *Case, agreement and movement in Arabic:A Minimalist Approach* (Doctoral dissertation). Newcastle University, UK.

Na'eem, H., Abudalbuh, M., & Jaber, A. (2020). Medial tri-consonantal clusters in Urban Jordanian Arabic. *Jordan Journal of Modern Languages and Literatures, 12*(1), 45-56.

Nolan, F. (2006). Intonation. In B. Bas & A. McMahon (Eds.), *the handbook of English* *linguistics* (pp. 433-457). USA: Blackwell Publishing Ltd.

Norlin, K. (1989). A preliminary description of Cairo Arabic intonation of statements and questions. *Speech Transmission Quarterly Progress and Status Report, 1*, 47-49.

O'Connor, J. D., & Arnold, G. F. (1973). *Intonation of colloquial English*. London: Longman Group Ltd.

O'Mahony, J. (2014). *The Prosodic cues used in the disambiguation of disjunctive questions.* (University of Amsterdam, Amsterdam. Retrieved from https://pdfs.semanticscholar.org/369f/7721109072d1698772bf66f0c0d67417f4c4.pdf).

Omar, M. K. (1975). *Saudi Arabic, Urban Hijazi Dialect: Basic course*. USA: Foreign Service Institute, Department of State.

Palva, H. (1984). A general classification for the Arabic dialects spoken in Palestine and TransJordan. *Studia Orientalia*, 55(18), 359-376.

Pierrehumbert, J. (1980). *The phonology and phonetics of English intonation* (Doctoral dissertation). MIT.

Pierrehumbert, J. & M. Beckman (1988). *Japanese tone structure, linguistic inquiry monograph 15*. Massachusetts: The MIT Press.

Pierrehumbert, J. and Hirschberg, J. (1990). The meaning of intonational contours in the interpretation of discourse. In P. R. Cohen, J. Morgan, & M. E. Pollack (Eds.), *Intentions in communication* (pp. 271-311). Cambridge, Massachusetts: The MIT Press.

Pike, K. L. (1945). *The intonation of American English*. Ann Arbor: University of Michigan Press

Pruitt, K. (2007, May). *Perceptual relevance of prosodic features in non-wh-questions with* disjunction. Paper presented at the UMass 2nd-year Mini-Conference, UMass Amherst, Amherst.

Pruitt, K. (2008a, April). *Prosody and focus in alternative questions: accounting for interpretation*. Poster presented at Experimental and Theoretical Advances in Prosody, Cornell University, Ithaca.

Pruitt, K. (2008b, March). *Mapping prosody to interpretation in alternative questions*. Poster presented at the 21st CUNY Conference on Human Sentence Processing, University of North Carolina, Chapel Hill, NC.

Pruitt, K., & Roelofsen, F. (2011). Disjunctive questions: prosody, syntax, and semantics. In a seminar at the Georg August Universität Göttingen.

Pruitt, K., & Roelofsen, F. (2013). The interpretation of prosody in disjunctive questions. *Linguistic Inquiry*, *44*(4), 632-650.

Qafisheh, H. (1977). *A short reference grammar of Gulf Arabic*. Tucson, Arizona: University of Arizona Press.

Quirk, R., Greenbaum, S., Leech, G., & Svartvik, J. (1985). *A comprehensive grammar of the English language*. London: Longman.

R Core Team. (2019). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL https://www.R-project.org/.

Rakhieh, B., A. (2009). *The phonology of Ma'ani Arabic: Straral or parallel OT* (Doctoral dissertation). University of Essex, UK.

Rammuny, R. (1989). Instrumental and auditory analysis of Colloquial Jordanian Arabic, an update. *Journal of Arabic Linguistics (*20) 23-42.

Rastegar-El Zarka, D. (1997). *Prosodische Phonologie des Arabischen* (Doctoral dissertation). Karl-Franzens-Universität, Graz.

Rifaat, K. (2005). The structure of Arabic intonation: A preliminary investigation. In M. T. Alhawary & E. Benmamoun (Eds.), *Perspectives on Arabic Linguistics XVII–XVIII: Papers from the seventeenth and eighteenth annual symposia on Arabic linguistics* (pp. 49–67). Amsterdam, the Netherlands: John Benjamins Publishing Company.

Roach, P. (2009). *English phonetics and phonology*. Cambridge: Cambridge University Press.

Roelofsen, F. and van Gool, S. (2010). Disjunctive questions, intonation, and highlighting. In M. Aloni, H. Bastiaanse, T. de Jager, and K. Schulz, editors, Logic, Language, and Meaning: Selected Papers from the Seventeenth Amsterdam Colloquium, pages 384–394. Springer.

Romero, M. and Han, C-H. (2003). focus, ellipsis and the semantics of alternative questions, in Claire Beyssade, Olivier Bonami, Patricia Cabredo Hofherr and Francis Corblin (Eds.), empirical issues in formal syntax and semantics 4. Paris: Presses Universitaires de Paris-Sorbonne. Pp. 291-307.

Ryding, K. (2005). *A reference grammar of Modern Standard Arabic*. Cambridge: Cambridge University.

Sa'aida, Z. A. M. (2015). *Aspects of the phonology of English loanwords in Jordanian Urban Arabic: A Distinctive Feature, Moraic, and Metrical Stress Analysis* (Doctoral dissertation). The University of Leeds, UK.

Sa'aida, Z. (2017). Deixis in spontaneous speech of Jordanian Urban Arabic native speakers. *Advances in Language and Literary Studies, 8*(1), 88-94. doi:http://dx.doi.org/10.7575/aiac.alls.v.8n.1p.88

Saltarelli, M. (1988). *Basque*. London: Croom Helm.

Sawaie, M. (2007). Jordan. In K. Versteegh, M. Eid, A. Elgibali, M. Woidich, & A. Zaborski (Eds.), *Encyclopedia of Arabic Language and Linguistics*, Vol II (pp. 498-505). Leiden: Koninklijke Brill NV.

Schubiger, M. (1958). *English intonation: Its form and function*. Tübingen: Max Niemeyer Verlag.

Selkirk, E. (2000). The interaction of constraints on prosodic phrasing. In M. Horne (Ed.), *Prosody: Theory and experiment*. (pp. 231-262). Dordrecht: Kluwer Academic Publishers.

Shoup, J. A. (2007). *Culture and customs of Jordan*. Westport, Connecticut: Greenwood Press.

Soraya, H. A. (1966). *An intonational study of Egyptian colloquial Arabic* (Doctoral dissertation). The University of London, UK.

Stewart, J. (2015). *Production and perception of stop consonants in Spanish, Quichua, and Media Lengua* (Doctoral dissertation). University of Manitoba, Winnipeg, Canada.

Stowasser, K., & Ani, M. (1964). *A dictionary of Syrian Arabic: Dialect of Damascus*. Washington, D. C.: George University Press.

Styler, W. (2017). Using Praat for linguistic research. Version 1.8.1. Retrieved from http://wstyler.ucsd.edu/praat/

Suleiman, S. (1985). *Jordanian Arabic between diglossia and bilingualism: Linguistic analysis*. John Benjamins Publishing Company: Amsterdam/Philadelphia.

Sulaiman, M. (2016). *The syntax of wh-questions in Syrian Arabic* (Doctoral dissertation). Newcastle University, UK.

Tench, P. (2005). Talking intonation. *Speak Out!* 34, 3-15, ISSN: 1026-4345.

Tench, P. (2015). *The intonation systems of English*. London: Bloomsbury Academic. https://doi.org/10.5040/9781474285674

Truckenbrodt, H. (2012). Semantics of intonation. In C. Maienborn, K.v Heusinger & P. Portner (Eds.), *Semantics: An international handbook of natural language meaning, Vol 3* (pp. 2039-2069). Berlin/Boston: Walter de Gruyter GmbH.

Truckenbrodt, H. (2013). An analysis of prosodic F-effects in interrogatives: Prosody, syntax and semantics. *Lingua 124*, 131-175.

Uegaki, W. (2014). *Cross-linguistic variation in the derivation of alternative questions: Japanese and beyond*. In L. Crnič & U. Sauerland (Eds.), The Art and Craft of Semantics: A Festschrift for Irene Heim, MITWPL 71 (pp. 251-274). Cambridge, MA:

MIT Working Papers in Linguistics.

Ultan, R. (1969). *Some general characteristics of interrogative systems* (Working Papers on Language Universals, Stanford University No. 1). Retrieved from Eric Website: https://eric.ed.gov/?id=ED116449

van Rooy, R., & Šafářová, M. (2003). On polar questions. In R. Young, & Y. Zhou, (Eds.), *Proceedings of the 13th Semantics and Linguistic Theory Conference, 13 (PP*. 292–309). Washington: The University of Washington.

Veilleux, N., Shattuck-Hufnagel, S., & Brugos, A. (2006). *6.911 Transcribing Prosodic Structure of Spoken Utterances with ToBI.* January IAP 2006. Massachusetts Institute of Technology: MIT OpenCourseWare, https://ocw.mit.edu.

Watson, J. C. (1993). *A syntax of Ṣan'ānī Arabic*. Wiesbaden: Harrassowitz Verlag.

Wells, J. C. (2006). *English intonation: An introduction*. Cambridge: Cambridge University Press.

Winans, L. D. (2012). *Alternative disjunctions in Egyptian Arabic* (Master's thesis). University of California Los Angeles, California, USA.

Winans, L. (2019). Disjunction and alternatives in Egyptian Arabic In K. von Heusinger, V. O. Gaspar, & M. Zimmermann (Eds.), *Questions in Discourse* (pp. 237–285). Leiden, The Netherlands: Brill.

Winter, B. (2013). Linear models and linear mixed effects models in R with linguistic applications. arXiv:1308.5499. [http://arxiv.org/pdf/1308.5499.pdf].

Winter, B. (2020). *Statistics for linguists: An introduction using R*. London: Routledge.

Yasin, A. (2012). *Syntax-prosody interface: Evidence from wh-movement in Jordanian Arabic and Egyptian Arabic* (Doctoral dissertation). Purdue University, Indiana.

Yip, M. (2002). *Tone*. Cambridge: Cambridge University Press.

Zawaydeh, B. A. & de Jong, K. (2011). The phonetics of localising uvularisation in Ammani-Jordanian Arabic. In Z.M. Hassan & B. Heselwood (Eds.), *Instrumental Studies in Arabic Phonetics* (pp. 257-276). Amsterdam: John Benjamins Publishing Company.

Zuraiq, W., & Zhang, J. (2006). Phonological assimilation in Urban Jordanian Arabic. *Kansas Working Papers in Linguistics*, 28, 33-64.