QUESTION FORMATION
BETWEEN THE MINIMALIST PROGRAM
AND OPTIMALITY THEORY

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ABSTRACT

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The purpose of this study was to investigate the construction of questions in English and Cairene Arabic (CA) using the Minimalist Program (MP) and Optimality Theory (OT) as two opposing views on how questions are formed and analyzed in both of these languages.

The dialect used in this thesis, CA, is one which is discussed briefly in the literature, only it is Egyptian Arabic (EA) that is mentioned. There aren't many references that mention CA and seldom ones that mention the optionality of wh- phrases found in it. CA as a dialect has proven to be one which is rich in it's analysis of question formation. The analysis of optionality of the wh- phrase, both in MP and OT, is the contribution this researcher is trying to provide to the academic research.

The Minimalist Program and Optimality Theory are used as the methods of research. These two competing theories use different approaches in describing and analyzing question formation. The Minimalist Program relies on feature checking to account for the movement of any element in the sentence. The uninterpretable feature of one element, called the Probe, needs to be checked by another element, called the Goal. A way of checking this feature comes in the form of movement of the Goal to a position where it can get into a checking relation with the Probe.

Optimality Theory focuses on the satisfaction of high- ranked constraints in a typology that is language- specific. Every sentence used grammatically in any language is the winning candidate in a

competition aimed at choosing that optimal form. The criterion used is a set of constraints; these constraints are ranked in a typological hierarchy that changes cross- linguistically. The constraints are general and universal. If one constraint is low-ranked, it can be violated by the winning candidate and the status of the optimal form's integrity is not compromised. As long as the higher- ranked constraint(s) are satisfied, then any violation of lower- ranked constraint(s) is tolerable within standard OT analysis.

The thesis is divided into three chapters, and a conclusion. Chapter one is the introduction where a short history of both theories is given along with their structure and respective components in details. Chapter two discusses question formation in the Minimalist Program. In this chapter, English and Cairene Arabic are the main languages of analysis. Every type of interrogatives in both of these languages is analyzed and trees are drawn when needed. Examples from Iraqi Arabic and Hindi are introduced. Chapter three begins with a detailed account of the steps taken to achieve an OT analysis. It then discusses the optimality- theoretic approach to question formation. Also, English and Cairene Arabic are the main languages of analysis; tableaux of the competitions are drawn when needed. The final section is the conclusion where the results of this research study are provided. At the end of the thesis, there are the references.

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researchers. There are more than 1000 articles in all sub-fields of Linguistics in ROA.

Finally, my mother, for a love and support that can only be measured by mountains, and there aren't enough mountains on this planet and all neighboring planets to measure. Also, for helping me with the Cairene Arabic (CA) examples that needed another native speaker to check for their use or lack thereof.

APPENDIX

The following table is of the abbreviations used in the study:

Abbreviation	Definition
ADJP	Adjective Phrase
ADVP	Adverb Phrase
C	Complementizer
CA	Cairene Arabic
CON	Constraint
CP	Complementizer Phrase
EA	Egyptian Arabic
EPP	Extended Projection Principle
Eval	Evaluator
FP	Functional Phrase
GEN	Generator
IA	Iraqi Arabic
IP	Inflectional Phrase
LF	Logical Form
MP	The Minimalist Program
NP	Noun Phrase
OT	Optimality Theory
P&P	Principles and Parameters Theory
PF	Phonetic Form
PP	Prepositional Phrase
PREDICATEP	Predicate Phrase
Q	Quantifier
QP	Quantifier Phrase
SA	Standard Arabic
TP	Tense Phrase
VP	Verb Phrase

Table 1. Abbreviations used in the Thesis.

The following tables[1] are charts of the IPA symbols used along with their corresponding Arabic letters:

	Labial	Plain		Emphatic[1]		Palatal	Velar	Uvular	Pharyngeal[2]
		Dental	Alveolar	Dental	Alveolar				
Nasal	م m		ن n						
Stop voiceless			ت t	ط tˤ[6]			ك k	ق q	
Stop voiced	ب b		د d	ض dˤ[6]		ج (d)ʒ ~ g[3]			
Fricative voiceless	ف f	ث θ	س s		ص sˤ	ش ʃ	خ x ~ χ[4]		ح ħ
Fricative voiced		ذ ð	ز z	ظ ðˤ ~ zˤ			غ ɣ ~ ʁ[4]		ع ʕ
Trill			ر r						
Approximant			ل ا ~ lˤ[5]			ي j[7]	و w		

Table 2. Modern standard Arabic Consonant Phonemes.

Due to space configurations, the following symbols are not present in the tableau:

a. The symbol for the Glottal Voiceless Stop (ʔ) (ء).
b. The symbol for the Glottal Voiceless Fricative (h) (ه).

[1] These tableaux are taken from Wikipedia [http://en.wikipedia.org]:
    (I)   The Consonant chart is taken from: [http://en.wikipedia.org/wiki/Arabic_phonology].
    (II)   The vowels chart is taken from: [http://en.wikipedia.org/wiki/Wikipedia:IPA_for_Arabic].

Vowels				
narrow	broad (MSA only)	Letter(s)	nearest English equivalent	Trans.
æ[13]	a		pat	a
æː[13]	aː	ا or ى[14]	pan	ā, a
ɑ[6]	a		park	a
ɑː[6]	aː	ا or ى[14]	par	ā, a
ɐ[15]	a	ة	cut	ah, a
e[16]			pet	e
eː[17]		ي or يه (in Egyptian Arabic)	pay	ē, ei, ai, ēh, eh, eih, aih
ɪ[18]	i		sit	i
i	i		sit	i
iː	iː	ي or ى[14]	see	ī, i, ee
o[16]			more	o
oː[17]		و (in Egyptian Arabic)	more	ō, o
ʊ[19]	u		soot	u, ou
u	u		soot	u, ou
uː	uː	و	soon	ū, u, ou, oo

Table 3. Vowels in Arabic.

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INTRODUCTION

1. Introduction

This chapter is an introduction to both the Minimalist Program (MP) and Optimality theory (OT). It is divided into three sections. The following section (second) is the Theoretical Background to both theories. Starting with the minimalist program, it introduces MP briefly then details the structure of the program such as the operations *Merge* and *Move-α*, and the use of Features. The third section discusses OT, where a brief history of the hypotheses is given and then a detailed account of the components such as the modules of grammar *Generator* (GEN) and *Evaluator* (EVAL), and the concept of the *Input*. Finally, the third section is the Literature Review of the articles and books related to the field of the study: the analysis of question formation in both theories. For both theories, the most prominent articles in the literature are mentioned and

a detailed account of the ones that discuss Egyptian Arabic (EA) or Cairene Arabic (CA) is given.

2. Theoretical Background

2.1. The Minimalist Program

2.1.1.Introduction

According to Hornstein et al. (2005), Universal Grammar (UG) is a set of principles; these principles have parameters which in turn have values. These values are called the parameters and they are set by the child acquiring the language through the different rules that are found in his/her environment[1]. This view is adopted by the *Principles and Parameters Theory* (P&P); once a parameter is set as ON or OFF, it cannot be changed. Hornstein et al. (2005) describe the beginning of the Minimalist Program (MP) as one where P&P is taken as a basis to build to MP. MP is a research program which is designed to take the principles of UG and create a simple, natural, elegant, and parsimonious analysis of the language at hand. Thus, take from the natural harmony of the language and build rules for its grammar accordingly (Hornstein et al. 2005).

Chomsky (1995) defines the minimalist design as [a] theory of language that takes a linguistic expression to be nothing other than a formal object that satisfies the interface conditions in the optimal way (p: 171).

MP reduces the levels of representations in a language to just the interface levels: Phonetic Form (PF) and the Logical Form (LF), thus simplifying language description. All conditions are applicable at these

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[1] The method used in setting the value of parameters is in the following: (Hornstein et al. 2005)
   (I)   Some parameters are set by the native speaker as "on" or "off".
   (II)   Others are set by the mere absence of a criterion as "the default on" or "the default off".
   (III)   Some are set by the influence of other parameters, depending on the latter's setting.

interface levels, any other levels of representations, such as the S-Structure and the D- Structure, are eliminated. A new method is used to describe and derive syntactic derivations; they are built to satisfy the properties of the words: their Features. Every word carries a set of features, which are responsible for every syntactic operation such as movement, topicalization, and focus (Chomsky 1995).

2.1.2. The Structure of MP

2.1.2.1. The Input

In MP, the input is a set of numeration of words in random order that are regulated by the X̀-theory to form constituents, which in turn are used by the operation *Merge* accordingly to form a sentence. These words are chosen by the speaker to form the derivation using the operation *Select*. The numeration is written as in the form below. Example (1a) shows the lexical item and then the number of times it is being used between brackets:

(1) a. [the (2), boy (1), walked (1), to (1), school (1)]

In this example, the lexical item *the* will be used twice and each of the other items will be used once. By the time all the items are used, the derivation is built, not before. This means that any derivation that needs more items than allocated or leaves behind few items not used, the derivation would crash either at LF or at PF. Economy conditions are satisfied through building the derivation; if two constructions are built from the same numeration, they are either identical or one of them has less/more items than needed. Economy conditions will rule the faulty construction out and the correct one will be the one used.

Building from the numeration in example (1) is represented in the following; with each use of an item, its number is reduced by one:

the [Merge] + school → *the school*   NP
[the (1), boy (1), walked (1), to (1), school (0)]
to [Merge] + the school → *to the school*   PP
[the (1), boy (1), walked (1), to (0), school (0)]
walked [Merge] + to the school → *walked to the school*   VP
[the (1), boy (1), walked (0), to (0), school (0)]
the [Merge] + boy → *the boy*   NP
[the (0), boy (0), walked (0), to (0), school (0)]
the boy [Merge] + walked to the school = *the boy walked to school*   TP

Then C merges with a declarative force creating the following CP:

   b. [CP [TP [NP The boy] [T' [VP walked [PP to [NP the school]]]]]]]

The derivation of the above example shows the basic building blocks for every sentence. These lexical items are not merged together at random. Every element is merged according to a need to satisfy its attributes, called Features.

2.1.2.2.   Features in MP

Every lexical element in a language carries a set of features to distinguish that element from others. For example, semantically, there are features that determine the person, gender, and number characteristics of the element, these are called *Phi*-features (φ features). There is another feature that determines, syntactically, whether the element is Nominative, Accusative, or Genitive, this is called the *Case* feature.

   The features of the lexical item are valued as [+/-Interpretable], this means that at LF, all features must be [+ Interpretable] to be recognized by the semantic component to be interpreted properly. Some elements, when they enter the derivation, already have their features set as [+Interpretable], they do not need another element to help them not crash at LF, they help other elements to check their [-Interpretable]

features so that the latter does not crash the derivation. This help process is called *Feature Checking*. In this process, the element with the [+Interpretable] feature gets into a checking relation with the element with the [-Interpretable] feature to delete the uninterpretable feature and ready the element for convergence at the LF and PF levels.

In the checking relation, the uninterpretable feature is deleted, whereas the interpretable one is not deleted to give it a chance to get into another checking relation with another element. For example, subjects are elements that have their φ- features [+Interpretable], and predicates have their φ- features [-Interpretable]:

(2) Mary loves John.
    a. [$_{TP}$ -s $_{\{φ-\}}$ [$_{VP}$ Mary $_{\{φ+\}}$ [$_{V`}$ love- John]]]
    b. [$_{TP}$ Mary $_{\{φ+\}}$ [$_{T`}$ -s $_{\{φ-\}}$ [$_{VP}$ t [$_{V`}$ love- John]]]
(Hornstein et al. 2005: no. 12 & 13)

This example shows that the subject *Mary* has a [+Interpretable] φ-features, and the predicate T has a [-Interpretable] φ-features, which make them get into a checking relation that would check and delete the [-Interpretable] φ-features; this way the derivation does not crash at LF.

In this sense, MP has unified the linguistic analysis to a single rule which is that elements are merged or moved in the derivation to delete the uninterpretable feature carried by other elements. The operation *Merge* is dealt with in the following section.

2.1.2.3.   Merge

The definition of the operation *Merge* is [a] grammatical operation that puts the lexical items together, organizing them into phrasal structures that comply with X`-Theory (Hornstein, et al. 2005: p 49).

(3) John said that Bill saw Mary.
(Hornstein et al. 2005: no. 50)

The numeration for the example given above is:
[John (1), Mary (1), Bill (1), said (1), saw (1), that (1)]

Saw [Merge] + Mary → *saw Mary*   VP
Infl [Merge] + VP → *saw Mary*   T`
Bill [Merge] + T` → *Bill saw Mary*   TP
that [Merge] + TP → *that Bill saw Mary*   CP
said [Merge] + CP → *said that Bill saw Mary*   VP
Infl [Merge] + VP → *said that Bill saw Mary*   T`
John [Merge] + T` → *John said that Bill saw Mary*   TP

This example represents the recurring nature of the operation *Merge*. According to the X`- theory and the numeration provided under the example, the derivation would not converge until all the elements of the numeration are used and the rules of X`- theory are followed. The *Case* features carried by each noun in this example are followed, in that for example since John carries the Nominative Case; it is the subject of the main clause. Another operation in MP is *Move-α* which is discussed in the following section.

2.1.2.4.   **Move-α**

The operation *Move-α* is defined as [move] anything anywhere anytime (Hornstein, et al. 2005: p 23). From its definition, there are no restrictions on this operation, no rules that could stop it or delay it. The two operations *Merge* and *Move-α* intersperse in their application. The case is that: whenever one operation is finished, the other one could begin. The following example shows this:

   (4) I wonder what Bill ate.
      [$_{CP1}$ C [$_{TP1}$ I [$_{VP1}$ wonder [$_{CP2}$ what$_i$ Q [$_{TP2}$ Bill [$_{VP2}$ ate t$_i$]]]]]]
      [-wh]   [+wh]
   (Hornstein et al. 2005: no 81)

Ate $_{[Merge]}$ + what → *ate what*   VP
Infl^2 $_{[Merge]}$ + VP → *ate what*   T`
Bill $_{[Merge]}$ + T` → *Bill ate what*   TP
C^0 $_{[Merge]}$ + TP → *Bill ate what*   C`
what $_{[Move]}$ → $_{whati}$ *Bill ate t_i*   CP
wonder $_{[Merge]}$ + CP → *wonder what$_i$ Bill ate t_i*   VP
Infl $_{[Merge]}$ + VP → *wonder what$_i$ Bill ate t_i*   T`
I $_{[Merge]}$ + T → *I wonder what$_i$ Bill ate t_i*   TP

After C merges with the TP *Bill ate what* to form the C`, the features carried by C come into play and they trigger movement using the following method: the functional head C in interrogatives carries an uninterpretable [EPP] feature, which triggers the movement of an element to the Spec(ifier) position. Since C also carries a [WH] feature, this moved element needs to be a +WH expression. Hence, the obligatory movement of wh- phrases in English from their base positions to Spec-CP. The strong [TNS] feature attracts the auxiliary to move from T to C.

Example (4) is a case of embedded wh-questions. C of CP1 carries a declarative force; hence the example has the reading of an embedded wh-question[3]. The following example is a case of a matrix wh-question:

(5) Which assignment have you done?
   [$_{CP}$ [which assignment]$_i$ have$_j$ [$_{TP}$ you t_j [$_{VP}$ done t_i]]]
(Radford 2004: no 35)

When C merges with the TP (*you have done which assignment*) at the state of derivation, it will be the following structure:

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[2] In the book, *Infl* is represented as (*I*) and not (*T*); it was changed to conform to the rest of the thesis.
[3] For reasons to be discussed in details later in chapter 2, the wh-phrase can not raised to the matrix CP.
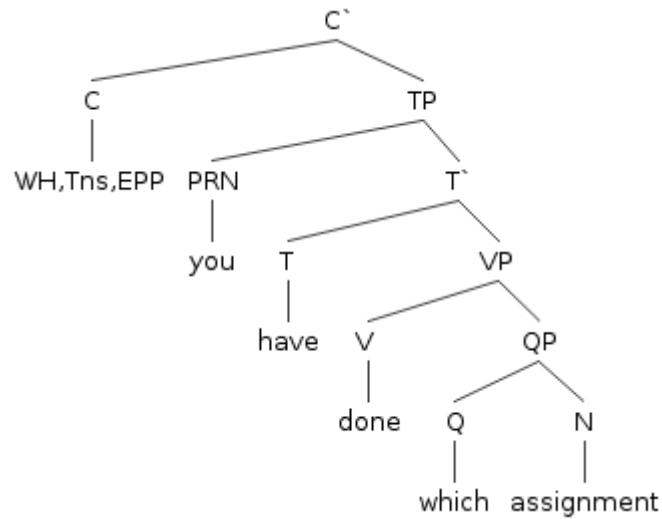
Figure (1)

The features (WH, TNS, and EPP) of C are deleted once their requirements are satisfied, the relevant movement operations will derive the structure below:
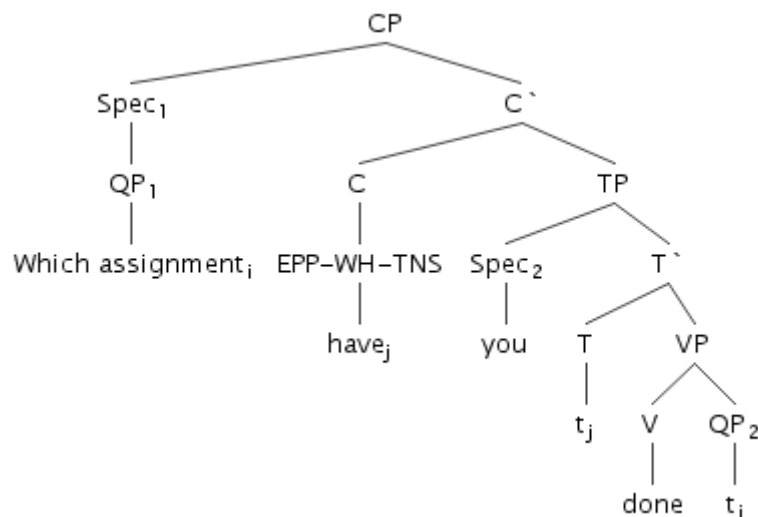
Figure (2)[4]

The features carried by the elements in the numeration determine the outcome of the derivation. The operations Merge and Move-α can intersperse in the derivation to accommodate the need for these features to be satisfied.

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[4] In the original diagram the QP "*which assignment*" has the strikethrough convention after movement, I replaced this with a trace co-indexed with the QP.

2.1.2.5.   The Output

The Output is the end result used in the language. Each output is the sum of a process that goes as follows: first, the numeration which is the input used to create a sentence. This input is the building blocks of the sentence. This numeration contains lexical items which carry features that determine the force of the sentence, either a declarative or an interrogative. Other features which determine which elements are merged together and which need to be moved. After the operations Merge and Move are performed using up all the elements in the numeration, the derivation is then taken to both the PF level for phonetic interpretation, and LF level for semantic interpretation.

A derivation can crash at these levels if it contains extra or fewer elements than there are in the numeration. Or one of the operations Merge and Move-α is not applied when needed. Or one or more features carried by a lexical item are not satisfied before the derivation is moved to LF. Once the derivation moves to LF, all overt operations stop functioning.

2.2. Optimality Theory

2.2.1.Introduction

The definition of Optimality according to Kager (1999: p 13) is:

- *Optimality*: An output is "optimal" when it incurs the least serious violations of a set of constraints, taking into account their hierarchical ranking.

Optimality Theory (OT) was first introduced to the Linguistics community at the University of Arizona Phonology Conference in Tucson in April 1991 by Alan Price and Paul Smolensky, they presented a paper entitled "Optimality" (Archangeli 1997). OT was developed by Prince and Smolensky in 1993, and was further modified in 2002 and

2004. OT is quite successful in Phonology; hence, the syntactic research is still in its beginnings. One of the essential articles in OT Syntax is Grimshaw (1997) from which OT's main hypotheses are taken:

- The nature of the Constraints in the grammar is universal and general.
- These Constraints can be violated and this violation does not affect their generality and universality.
- Grammars are rankings of constraints in a typology that is language- specific and there can't be two languages that share the same typology.
- The optimal form is grammatical; it is the data of the language. All non-optimal candidates are ungrammatical; they are ruled out since they fatally violate the high- ranking constraints.
- An optimal form for a given input is selected through a competition in which a set of candidates compete using the constraints ranking hierarchy. The candidate with the least number of violations and best satisfies the highest-ranking constraint(s) is *optimal*.

These universal constraints are violated in the sense that since they are universal, their importance is calculated through their effect on language. For example, some languages require that the wh- phrase is moved out of its base position (English), some languages do not have that requirement (Chinese), and hence the wh- phrase remains in- situ. A third kind of languages has both cases, in- situ and in Spec- CP positions (Cairene Arabic).

To accommodate such instances of movement, or lack thereof, and optionality, the constraint involved in moving the wh- phrase is satisfied by movement in one language (ex: English), and violated by the in- situ occurrence (ex: Chinese). The violation incurred by the constraint does not make it lose its universality or generality; only its rank would be affected. In the pro- movement language, the constraint limiting

movement will be low- ranked; and in the against- movement language, it will be high- ranked.

In the case of optional structures, the analysis of which will depend on the basic word order of the language variety, which will affect the ranking typology of the constraint limiting movement. In any competition, more constraints will be involved to choose the winning form by ranking them in a hierarchy.

The constraints in OT are universal in the sense that they are general in their wording and applicable to all languages. On the other hand, the constraints as they are presented in traditional theories, such as *Principles and Parameters Theory* (P&P[5]), are presented in the form that best conforms to the language being described. These constraints are worded in a way that would include a certain proviso or stipulation for it to be applied to the language. These provisos or stipulations are called *hedges*.

Speas (1997) shows in the following chart[6] the wide-spread usage of hedges incorporated into the otherwise pure and universal principles. These hedges are used to cast a wider net and catch more sentences in the sense that if a rule is fixed so that it only applies to certain sentences, a question will arise pertaining to the exceptions to these rule-abiding sentences.

Thus, paving the way for a theory like OT to remove these hedges and make principles more general, universal, and at the same time violable. So, if a case presents itself as an exception to the norm, the principle involved in the derivation would be violated without losing on generality or universality.

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[5] Sometimes is referred to as *Principles & Parameters Theory* (PPT).
[6] My thesis advisor and I hold some reservations to this chart pertaining to the wording of some of the hedges, but the idea of the existence of hedges is apparent. The table is continued into the following pages.

Principle	Essence	Hedge
Satisfy	All syntactic features must be satisfied…	…overtly if they are 'strong' and covertly at Logical Form if they are 'weak'.
Full Interpretation	There can be no superfluous symbols in a representation…	…except symbols which delete before the interface level.
Extended Projection Principle	All clauses must have a subject…	…except for languages which lack overt expletives.
Case Filter	An NP must have case…	…unless it is null.
Binding Principle A	An anaphor must be bound in its governing category…	…unless it is one of a special class of anaphors which need not be bound.
Binding Principle B	A pronoun must be free in its governing category…	…unless it occurs in an idiom like *lose her temper*.
Binding Principle C	A name must be free…	…unless it is an epithet.
X` Principles	Every category has a head, a specifier, and a complement…	…unless a given head takes no complement or has no features to check with its specifier.
Projection Principle	Lexical properties can not be changed in the course of a derivation…	…unless derivational morphology can take place in the syntax.
Empty Category Principle	A trace must be properly governed…	…where 'proper government' means government by a lexical head or by a close enough antecedent.
Theta Criterion	All thematic roles must be assigned to an argument	…except that the agent of a passive may be

	position, and all argument positions must receive a thematic role…	absorbed by the verb, and the thematic roles of nouns need not be syntactically realized.
Subjacency	Movement cannot skip potential landing sites…	…unless moving a 'D-Linked' *wh*-phrase.

Table 1. The chart by Speas (1997: p 184) showing the principles along with their hedges.

OT tries to remove the hedges by making the constraints more violable. The reason behind the hedges is to accommodate the examples that do not conform to the strict interpretation of the standard principles. The presence of these non-conformist examples is an indication of the language's vitality and common usage. However, the introduction of hedges is an indication that the original "principles" are somewhat rigid and particular to the point of making stipulations to analyze various languages.

A rule of analysis in a language is supposed to freely apply to various world languages and dialects without resorting to making language-specific rules. In OT literature, the rules are general and universal but violable. To reach Optimality in OT, a candidate will have to be the one that best satisfies the high- ranked constraint(s) and incurs the minimal violations of the lower- ranked constraint(s).

2.2.2. The structure of OT

2.2.2.1.   The Input

Also known as the *Lexicon*, (Kager 1999), represents the inventory of lexical items, needed to form the candidates, along with the properties of these items. The Input in syntax, as defined in OT literature, is [the] lexical head plus its argument structure and an assignment of lexical heads to its arguments, plus a specification of the associated tense and semantically meaningful auxiliaries (Grimshaw 1995: p 3). For example:

(6) Who saw John?

The lexical head in this example is the verb (see), the wh- phrase (who) is assigned to its external argument (subject), the NP (John) to its internal argument (object), and the Tense of the sentence is past. The Input for example (6) is written in the following format:

a. [See= x, y. x= who, y= John. Tense= Past.]

The Input is simply a mass of words related to each other via X`- theory and used by the module of the grammar responsible for generating candidates, GEN (Generator)[7], to produce Output forms. The conflict is between Output forms to achieve the right constraint typology and choose the winner. That is why there is the following rule:

- ***Richness of the Base***: No constraints hold at the level of underlying forms. (Kager 1999: p 19).

The constraints have their effects on Output forms. No rules of grammar are applicable to the Input. The Input in OT is similar to the numeration of MP. In that, the relationship between the lexical elements is ruled by the X`- theory. All the elements found in the Input should be present in the winning candidate. If a candidate fails to account for the components of the Input, it is marked as ungrammatical and is bound to violate related constraints in the competition. For example, in example (6), the Tns mentioned in the Input is past which makes the following example ungrammatical:

(7) *Who sees John?

Example (7), mentioned above, is an ungrammatical candidate in the competition to choose an optimal form from the Input provided for example (6). The only case where this example is grammatical is for it to

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[7] See the next section.

have a different Input where the Tns of the sentence is marked as present:

　　b. [See= x, y. x= who, y= John. Tense=Present]

For the Input provided for (7), a new competition will ensue to choose this example as the optimal form.

2.2.2.2.　　GᴇɴN for Generator

In OT, the component of the grammar responsible for generating the candidate set corresponding to a particular Input is called GᴇN (For Generator). In syntax, GᴇN has so far been assumed to generate only candidate structures which respect basic X`-Theory principles (Legendre et al. 2001).

　GᴇN in OT is the equivalent to the operations Merge and Move- α in MP. The candidates found in the competition are formed with freedom: some with movement of lexical elements, and some without; some with heads in maximal projections, and some without…etc, the candidate set is infinite. This freedom is defined as follows:

- ***Freedom of Analysis***: Any amount of structure may be posited. (Kager 1999: p 20)

However, this freedom is not without cost. If a candidate violates almost every constraint in the hierarchy, then this candidate is omitted from the competition without fear the analysis might crash, because this candidate will never win in any possible constraint typology. For example, as the Input for example (7) contains a subject (who), and in the competition one of the candidates is generated without a subject, then this candidate is omitted from the competition from the start. Another attribute of GᴇN is that it only produces the candidates that do not stray from the logic of the Input. For example, in example (7), the wh- phrase is the subject, the

NP John is the object, and the lexical head is the verb See. GEN will not produce the following candidate:

(8) *Mary bought a new car.

Example (8), mentioned above, violates the logic of the Input given in (b). None of the elements in the Input are used and the sentence is not even an interrogative. This type of examples is not permitted in the competition. This example is not just ruled out by the related constraints in the competition, but it would not be produced by GEN.

2.2.2.3.   EVAL for Evaluator

After GEN generates all possible forms from the given Input, a *Candidate Set* is created. This set contains the closest representations of the Input. This set is then transferred to another component of OT grammar responsible for evaluating it, EVAL (for Evaluator). The evaluation process takes place through a competition between the candidates of the candidate set, after which, a winner is chosen as the Optimal Form. This optimal form is the one that incurs the least amount of violations (or none at all) and best satisfies the high- ranking constraints. EVAL uses a *Constraint Hierarchy* in that process; this hierarchy is different cross- linguistically, depending on the ranking of every constraint and the importance of their satisfaction. A high- ranking constraint in one language can be low- ranking in another.

The process by which the winner is chosen is much like the World Cup finals. National Teams from around the world compete with each other, with every continent having their own play- offs. After long and sometimes difficult matches, a champion is selected to be the winner. This evaluation process is presented in the following diagram:

$$
\begin{array}{llll}
 & \text{Con}_1 & \text{Con}_2 & \text{Con}_n \\
\text{(9) Input:} & \text{Candidate a} \rightarrow & \rightarrow \quad \rightarrow & \\
 & \text{Candidate b} \rightarrow & & \\
 & \text{Candidate c} \rightarrow & \rightarrow & \\
 & \text{Candidate d} \rightarrow & \rightarrow \quad \rightarrow & \rightarrow \ \text{Optimal Form} \\
 & \text{Candidate} \ldots \rightarrow & \rightarrow & \\
\end{array}
$$

(Kager 1999, p: 22[8])

The constraint (C_1) is the highest ranking constraint, its satisfaction is crucial for a candidate to be considered for the next step in the evaluation. In the 1st elimination process, candidate (b) does not survive. In the next step, only candidates (a) and (d) are considered. In the final step, C_n represents the remaining constraints in the hierarchy; only one candidate comes out as the winner, candidate (d).

As shown in the competition, the low- ranked constraints play a role in choosing the optimal form. Unlike other theories, where the parameters are either ON or OFF, OT relies on a ranking of constraints. Even the low- ranking constraints are not said to be inactive in a competition, sometimes they tip the scale in favor of a winner or against it.

2.2.2.4.   Constraints in OT

The definition of *Constraint* according to Kager (1999: pp 9) is:

- *Constraint*: a structural requirement that may be either satisfied or violated by an output form.

The constraints themselves are taken from an inventory called CON for Constraints (Kager 1999), which has all of the constraints in random order; for each competition, few relevant constraints are taken and then

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[8] Some changes are made to Kager's example:
- (I)   The finalist in the competition is called "Output" in Kager's example; it is changed into "Optimal Form" here since all the candidates are called outputs.
- (II)   The constraints are referred to as "C" in Kager's example. They are written as "Con" here to differentiate them from the letter c of candidates.

ranked according to the data found in the language being analyzed. From the constraints that are taken to be relevant to the competition, one is said to be the most important to satisfy. Any violation of this high-ranked constraint renders the sentence ungrammatical. Hence, its importance is calculated in this way. The other constraints are ranked in the same fashion; in examining the data, the satisfaction of constraints determines their importance. The sentences are ruled out one by one if they don't satisfy the higher- ranked constraints until the optimal form is chosen.

The following tableau represents a competition between different candidates with the optimal form being candidate (a). The hierarchy of constraints is descending from left to right; with most important constraint is Con1, then Con2 and so on:

	Constraint$_1$	Con$_2$	Con$_3$	Con$_4$
→ a. Candidate no. 1				*
b. Candidate no. 2	*!			
c. Candidate no. 3		*!		*

Tableau 1. A representation of a competition and the choosing of a winner.

The violations incurred by the candidates are presented by an asterisk (*), and the fatal violations are presented by an asterisk along with an exclamation mark (!): (*!). The optimal candidate is marked by placing an arrow next to it (→)[9].

There are two kinds of constraints: Markedness constraints and Faithfulness constraints. Markedness constraints force specific syntactic rules onto the candidates. Faithfulness constraints are more concerned with the matching relation between the Input and the Outputs (Candidates) (Kager 1999). To best describe these two types of

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[9] Another convention for marking the optimal form is the pointing hand; it is quite widespread in the literature. However, this is not available in the MS 2003 Word software that I am using.

constraints an example of the constraints involved in English wh-questions is given below.

   The constraints which play a decisive role in wh-movement are taken from Grimshaw (1997):

- ***Operator in Specifier (OP-SPEC)***: syntactic operators must be in specifier position.
- ***Obligatory Heads (OB-HD[10])***: a projection has a head.
- ***Economy of Movement (STAY)***[11]: trace is not allowed.

The following example shows the above constraints in action:

   (10) Which books will they read?
The Input: read (x, y), x = they, y = which books (Q). Tense = future. Auxiliary = will.
   (Grimshaw 1997: no 2)

The analysis is in the following tableau:

Candidates	Op-Spec	OB-HD	Stay
a. [IP DP will [VP read which books]]]	*!		
b. [CP e [IP DP will [VP read which books]]]]	*!	*	
c. [CP which books e [IP DP will [VP read t]]]		*!	*
→ d. [CP which books will_i [IP DP e_i [VP read t]]]			**
e. [CP will_i [IP DP e_i [VP read which books]]]	*!		*

Tableau 2. The competition for example (11)[12]

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[10] This constraint is refuted in this study and another one is used instead. However, I've decided to keep this example in the introduction as a stepping stone for the coming change.

[11] In some versions of OT, the constraint STAY is changed to *t. See Legendre, Wilson, Smolensky, Homer, and Raymond (1995).

In candidate (a) there were no movement of both the wh-phrase and the auxiliary *will* which resulted in the violation of the higher constraint OP-SPEC. Even with the satisfaction of the constraint OB-HD and STAY, they are low-ranked and would not save the derivation.

   Candidate (b) is worse than candidate (a), in that it violates the higher-ranked constraint OP-SPEC and violates OB-HD by creating a maximal projection (CP) that no elements move into.

   Candidate (c) has the wh- phrase in Spec- CP, thus satisfying OP-SPEC. However, CP does not have a head, the auxiliary did not move from I to C, this violates OB-HD fatally. STAY is violated once.

   Even though the optimal candidate (d) violates STAY twice, it satisfies the higher-ranked constraints. This is acceptable behavior in OT analysis to find the winning candidate with one (or more) violation of low-ranked constraints. Candidate (e) violates OP-SPEC and STAY.

   The constraint OP-SPEC C in tableau (2) is a Markedness constraint, for it forces a rule on the candidates in English that the wh- phrase in English matrix wh- questions to move from its base position to a left-most peripheral position (Spec- CP).

   The Output form that does not contain all the elements found in the Input is said to be Unfaithful. The constraint Full- Interpretation (FULL-INT) is a Faithfulness constraint, its satisfaction guarantees that all the elements in the Input are found in the Output forms. Its definition according to Grimshaw (1997) is:

- *Full- Interpretation (FULL-INT)*: Lexical conceptual structure is parsed.

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[12] Grimshaw uses the wh- phrase *what* in the tableau (T1), even though the example has *which books*; it is changed into *which books* to match the data in the example used.

These two kinds of constraints are always in conflict; this conflict is settled through the competition between candidates to determine the constraint hierarchy. The cross- linguistic variation between one language and the rest is the re- ranking of the constraints. In a language like English, where movement of the wh- phrases is obligatory, the constraint that requires no movement of any element (STAY) is low-ranked. On contrary, in a language like Chinese, where movement of the wh- phrases is forbidden, STAY is high- ranked.

The relationship between the constraints is one of Domination:

- ***Domination***: The higher- ranked of a pair of conflicting constraints takes precedence over the lower- ranked one. (Kager 1999: p 13)

This relationship is not that of strict domination; not all constraints are said the have a perfect ranking typology. Some will tie in their importance; two constraints can be high- ranked together or low- ranked together. There cannot be a separating constraint between them; otherwise the tie will be broken. Nor can these two constraints be fused into one constraint, which should take away from their individuality, universality, and generality. In any analysis, the wording of the constraint should not be changed to accommodate for certain results obtained by the linguist. Another constraint could be coined instead and a family of constraints could be built.

2.2.2.5. The Output

The Output in OT is the candidate that gets into battle with other candidates using the constraint hierarchy as a criterion until a winner is chosen i.e. the *Optimal Form*. Any Output that does not match with the Input is said to be unfaithful. This output could either be permitted into the competition or ruled out from the start (cf. the section on GEN). The Output with the least number of violations and that best satisfies the high- ranking constraint(s) is the winner. A winning candidate can still

incur one or more violations, but as long as these violations are to low-ranked constraints, the winner is accepted as the Optimal Form.

3. Literature Review

3.1. Introduction

Since MP and OT are relatively new theories in syntax, they were both first introduced in the early 90s of the last century; the literature used in this study could not go back further than this time limit. References Principles and Parameters Theory (P & P) are not mentioned in this section; they are simply put in the list of references at the end and perhaps were mentioned briefly in the introductions to both MP and OT. This section is dedicated to the most prominent articles and books relevant to the topic of question formation are the ones cited in this section. However, there are other works related to the more general topics of MP and OT and these are cited in relevant examples throughout the thesis and listed at the end in the references.

In obtaining these sources, there were a lot of means to that end: I went online and used the search engine Google to search and download most of them on the professors' web pages or archives dedicated to MP[13] and OT[14], and the rest were either found in the AUC library or were given to me by my thesis advisor. There are few articles that have been emailed to me by professors living outside of Egypt.

There were no articles that I could find pertaining to wh-movement or question formation in CA; most of the articles that I have found were dealing with Egyptian Arabic (EA) like Cheng's (1991) dissertation. These articles were helpful in giving a framework to my own analysis

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[13] The website (Ling Buzz) is full of articles and book chapters concerning MP (and Government and Binding Theory in general.

[14] The most valuable resource for OT is the Rutgers University Archive (ROA), from which I have downloaded many article concerning OT literature.

and a background on which I could hopefully build a proper analysis in both MP and OT.

3.2. The Minimalist Program

3.2.1. Cheng 1991

Cheng (1991) treats Egyptian Arabic (EA) as an in-situ language. She explains the optional fronting of the wh- phrase that does occur in EA as an instance of WH- Clefting (reduced Clefting to be exact). She states that the wh- argument is base-generated as a subject of a cleft sentence and that it is not the result of movement.

Cheng starts the argument by distinguishing the use of both definite and indefinite NPs in EA cleft constructions in the following examples[15]:

(11) *dah meen ?illi[16] geh
     this[17] who   that   came
     Who was it that came?
(Cheng 1991: no. 14)

(12) dah_i ʕali_i ?illi Mona darabit-uh_i[18]
      This_i ʕali_i that Mona hit-him_i
      It is ʕali that Mona hit.
(Cheng 1991: no. 15)

Cheng uses these examples to show that the demonstrative "*dah*" (meaning *this*) can not be used with an indefinite NP, but used with the

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[15] As a native speaker of Cairene Arabic (CA), I find these examples to be questionable both as a negative example in the case of (11) and as a positive example in the case of (12). Example (11) is used in concord with a sinister tone. As for example (12), it needs the addition of another word and that is explained in the section itself.

[16] Cheng writes the complementizer meaning "*that*" as "*illy*". I'm changing it to "*?illi*" to conform to the rest of the thesis. Also, the wh-phrase "*meen*" (meaning *who*) is changed from "*miin*".

[17] The usage of the word "*dah*" (roughly translated as *this*) is as a slot filler or a dummy. It does not add nor subtracts any meaning to the sentence. There are many dummies in CA like the word "*ba?a*" (roughly translated as *be*" used also as a slot filler. The word *"yaʕni"* (meaning *means*) behaves the same way.

[18] The subscript is added here to present that the article, the proper noun, and the affixed pronoun are co-indexed; they all refer to the same entity. This is not found in the original Cheng examples; it is added for clarification.

Proper Noun *Ali* in example (12) which she describes as a cleft construction. My intuition about the above examples is that (11) is grammatical, and used regularly in everyday speech; as for (12), it is not used the way she puts it, this example has a better version:

(13) dah$_i$ kan ʕali$_i$?illi Mona darabit-uh$_i$
      This$_i$ was ʕali$_i$ that Mona hit-him$_i$
      It was ʕali that Mona hit.

Using the verb *kan* (meaning was) improves the sentence. Her informant may not have been a native of Cairo; hence his sentences do not set well with me as a Cairene.

   In the following example (14 a, b), Cheng further claims that users who refuse example (11) find this example to be also unacceptable:

(14) a. *dah$_j$ kitāb$_j$[19] ?illi ʕali sara?-uh$_j$
           This$_j$ book$_j$ that ʕali stole-it$_j$
           It is a book that ʕali stole.
      b. kitāb$_j$?illi   ʕali sara?-uh$_j$
           Book$_j$ that ʕali stole-it$_j$
          'It is a book that ʕali stole.'
   (Cheng 1991: no. 16 a & b)

Even as I find example (11) to be acceptable, I find it difficult to accept (14a) along with Cheng's informant. However, (14b) is quite controversial, she states that it is grammatical and builds her argument on it, that indefinite NPs can be clefted. If Indefinite NPs are clefted in EA, they have to be accompanied by an adjective, for example, to use her example (14b), it is saved by inserting a post-nominal adjective as in the following example:

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[19] Cheng uses the letters "aa" which I replaced by "ā" to represent the long vowel of "*pan*".

(15) kitāb rixees ?illi ʕali sara?-uh
      book cheap that ʕali stole-it
      It is a cheap book that ʕli stole.

Standard Arabic (SA), as a language, does not allow the use of a single noun without a complement as the nominal subject. The same rule applies to Egyptian Arabic. (Professor Batran, thesis supervisor)

   Cheng adopts McCloskey's (1978) concept of "reduced-clefts" found in Irish. Cheng's example, taken from McCloskey (1978), shows that indefinite NPs can be in a cleft clause without the use of the copular and the pronoun which are typical of a full-cleft construction:

   (16) Capall mór bán aL chonaic mé
        A horse big white COMP saw I
        'It was a big white horse that I saw.'
   (Cheng 1991: no. 18 b)

McCloskey defines this construction as a reduced cleft, meaning that the constituent in focus position is not preceded by the copula, as it is the case in 'full' clefts.

   Cheng uses McCloskey's definition together with the argument that Interrogative NPs like "who" are described as indefinite NPs (Chomsky 1964, Katz and Postal 1964, Kuroda 1964, Stockwell, Schacher and Partee 1973) and the claim that indefinite NPs in EA can be clefted to support her claim that the following example is a reduced cleft construction:

   (17) [$_{CP1}$ [$_{CP2}$ meen$_i$] [OP$_i$?illi [$_{IP}$ Mona ʃāfit-uh$_i$]]
                 Who$_i$ that   Mona saw-him$_i$
        'Who did Mona see?'
   (Cheng 1991: no. 24)

Cheng further claims that the subject wh- phrase is base- generated in its surface position, and there is an empty operator that moves to Spec of CP2 forming an operator-variable structure.

3.2.2.Wahba 1991

Wahba (1991) uses Iraqi Arabic (IA) to explain the phenomenon of the optional occurrence of the wh- phrase, sometimes it is found in a Specifier or in an in-situ position. IA is a language where the wh- phrase can also be found in any Spec position in the Tensed domain of the +Q Comp.

She gives an example from Iraqi Arabic (IA) that a wh- phrase carrying a +WH feature is licensed in any Spec position within the tensed domain of the +Q Comp. The following example represents a wh- phrase *meno* (meaning *who*) appearing in its base position and in every intermediate Spec position:

(20) a. [CP1 [Mona rɑdat[20] [CP2 [tidʒbir Suʕad [CP3 [tisaʕed *meno*]]]]]]?

        Mona wanted   to-force Suʕad   to-help who?

                +TNS   - TNS   - TNS

     b. [CP1 [Mona raadat [CP2 [tijbir Suʕad [CP3 *meno*i [tisaʕed *e*i]]]]]]?

     c. [CP1 [Mona raadat [CP2 *meno*i [tijbir Suʕad [CP3 *e*i [tisaed *e*i]]]]]]?

     d. [CP1 *meno*i [Mona raadat [CP2 *e*i [tijbir Suʕad [CP3 *e*i [tisaʕed *e*i]]]]]]?

    "Who did Mona want to force Suʕad to help?"

  (Wahba 1991: no. 10)

All the examples of (20) have a direct question reading, the answer to which will have to be someone serving as the object of the verb *tisaʕed*

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[20] The symbol used in Wahba's article for the long vowel used in "park" is (aa), it is changed to (ɑ), Pharyngeal Fricative Voiced sound (ʕ) (ع) is ('), and the Palatal/Velar Fricative Voiced sound (dʒ) (ج) is (j).

(meaning *help*). The C position in IA does not require the wh- phrase to obligatorily move in order to have its WH- feature checked as in English. The verbs in the embedded clauses are [- TNS], hence the wh- phrase can be found in any intermediate Spec position. If an embedded clause contains a tensed verb, the wh- phrase cannot be interpreted as a matrix question but an embedded one:

(21) a. [+wh [Mona$_i$ ħawlat [PRO$_i$ *ti∫teri* ∫eno]]]?
    Mona tried   to-buy what
  "What did Mona try to buy?"
 b. *[+wh [Mona tsawwarat [- wh [Ali *ishtara* sheno]]]?
    Mona thought   Ali bought what
  "What did Mona think Ali bought?"
(Wahba 1991: no. 15 a, b)

3.2.3. Bošković 1997

Bošković (1997) attributes the obligatory movement of wh- phrases in English to the insertion of C with strong +WH feature in overt syntax and that its strong feature must be checked before merging any more elements into the derivation.

He uses French as the basis of his argument where he gives examples showing that CP is introduced at LF in French to house the moved wh- phrase. After the derivation is finished at the stage of TP and it has a [+WH] element in it, the derivation then moves to LF to be interpreted as an interrogative. He discusses French optional movement of the wh- phrase in Matrix questions:

(22) a. Qui   as-tu   vu?
      Whom have-you seen
    b. Tu as vu qui?
(Bošković 1997: no. 5 a, b)

The question arises: does C in French have optional versions: one with strong WH- feature and one without? The examples given above show that the +WH feature in French is strong, because even the existence of some examples that show overt wh- movement proves that the wh-feature is strong in French. He explains this Optionality in matrix questions by introducing the concept of C being inserted covertly at LF in (22b), and overtly in (22a) thus triggering movement of the wh-phrase.

Some questions have the Complementizer being phonologically realized, in the form of "que"; the Comp is base- generated in the C position overtly and triggers movement of the wh- phrase as in the following example:

 (23) Qui que tu as vu?
   Whom C you have seen
  'Who did you see?'[21]
 (Bošković 1997: no. 13)

The ungrammaticality of the following example, (24), stems from leaving the wh- phrase in-situ with the presence of the Complementizer "que":

 (24) *Que tu as vu qui?
    C you have seen who
 (Bošković 1997: no. 14)

To explain the optional strategy of wh- questions in French as sometimes C has strong + wh feature and sometimes it does not, seems to be an ad- hoc solution and inconsistent in a Minimalist approach to language description. One way for the wh- phrase to take scope while remaining in- situ is to bind the wh- phrase using unselective binding with the Complementizer to ensure proper scope. However, the wh-

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[21] I think the more accurate translation of this question is: *Who is it that you have seen?*, since the presence of the Complementizer "que" should be represented in the translation.

feature on C still needs to be checked, this is done by adjoining the wh-phrase to the complementizer at LF.

Embedded wh- questions in French have the same structure as the matrix wh- question with the phonologically null C being inserted overtly thus triggering movement of the wh- phrase to the lower Spec-CP:

(25) a. Pierre a   demandé qui   tu   as   vu
         Pierre has asked   whom you have seen
      b.*Pierre a demandé tu as vu qui
   (Bošković 1997: no. 6 a, b)

This analysis does not save the wh-adjuncts ; he explains why LF movement does not save such examples:

(26) a. *Qui a réparé la voiture comment?
     b. *Who fixed the car how?
   (Bošković 1997: no. 23 a, b)

To ensure proper interpretation of the clause as an interrogative, the wh-phrase must undergo either one of two ways: (1) it gets moved to Spec-CP, or (2) to be selectively bound by the Comp itself. The second option is not possible according to Tsai (1994) and Reinhart (1995), for there is no "variable (i.e. an open position)", so, Tsai and Reinhart claim that wh- adverbs can not be interpreted in an in- situ position.

At the same time, there is no need for the wh- adverb to move, for movement only occurs to satisfy features and both C and the wh- phrase do not have any un-checked features. The only kind of movement left is LF movement; but by the time the derivation gets to the LF level to be interpreted, the sentence does not make sense, and even LF movement is prohibited by the Last Resort Condition which, according to Chomsky (1995), blocks further movement than is needed to satisfy a syntactic requirement.

3.2.4.Simpson 2000

Simpson (2000) argues that languages, such as Iraqi Arabic (IA) and Hindi, which have in- situ and in Spec- CP wh- questions are an instance of the wh- feature of the wh- phrase itself being satisfied in either place. Examples were taken from Iraqi Arabic (Wahba 1991) that proved that a wh- phrase can be in- situ and have a binding relation with its Comp antecedent without having to obligatorily move to Spec- CP. Hindi is another language that the wh- phrase can have optional occurrence and it is described the same way as IA.

Simpson corroborates Wahba's (1991) views and says that the domain for checking the WH- feature in IA is the tensed domain of the +WH Comp. He states the following as conclusions for his analysis of IA:

  a. All The wh- phrases of IA need their wh- feature to be checked.
  b. The functional head C in IA does not carry any uninterpretable features that demand any element to be moved to its Spec position.
  c. All the +WH features must be checked before Spell- Out. This solution contra Bošković (1997) where C is introduced at LF.
  d. The checking domain for the wh- feature carried by the wh-phrase in IA is the tensed domain of the +Q Comp. The wh-phrase can occur in any intermediate Spec- position m-commanded by that +Q Comp and be interpreted as a main question.

In this sense, Simpson is utilizing the wh- feature carried by the wh-phrase. Instead of postulating two functional heads C that would accommodate this optionality phenomenon, or assuming that C is introduced to the derivation at LF. This is the stand taken in this study to explain Cairene Arabic as another dialect that has the same optionality phenomenon.

3.3. Optimality Theory

3.3.1. Introduction

Principles and Parameters theory (P&P) has been the founding theory for many schools of Syntax. It started with Chomsky (1981) and paved the way to Government and Binding (GB) theory and the Minimalist Program (MP). However, Optimality Theory (OT) takes a different approach than P&P. Wherein P&P claims that each principle of UG in every language is either turned ON or OFF (Hornstein et al. 2005); that principle is either alive in a language where it has a function, or dead in another language where it does not affect the language description and generation in any way.

OT differs from the rest of Grammar theories in that the principles of UG are pure and uncomplicated in their form but violable if necessary to allow satisfaction of a higher-ranked (more important) principle, which are called constraints. Cross-linguistic variation derives from alternative rankings of these constraints. They can be constraints relating to Economy of movement, Economy of structure, Faithfulness to the Input, constraints controlling the form of the Output and so on.

The most prominent book in OT is Prince and Smolensky's 1994 *Optimality Theory: Constraint Interaction in Generative Grammar*; it is considered the ultimate source for any researcher who wants to embark on a career in OT. However, this book is mainly about phonology and the application of OT to that particular field. This being said, I have decided not to add it to this section and opted to mention it in the course of the study whenever needed. The literature review given below is of the most prominent references in OT relevant to the topic of the study.

3.3.2. Legendre et al. 1995

Legendre et al. (1995) "Optimality and Wh- Extraction" deals with extractions of subjects, objects and adjuncts, it talks of Government and

Locality. It introduces their relevant constraints and their order in the hierarchy, namely T-GOV and T-LEX-GOV which regulate government of the traces and the BAR family of constraints that is concerned with the number of barriers the wh- phrase have to cross to move to its final position.

In this article, the topic of LF is introduced to a certain degree. The authors claim that Scope specifications must be included in the Input, and they present a constraint for it called PARSE-SCOPE, which is violated when the scope of the wh- phrase as stated in the Input is not found in the Output. Covert movement at LF is represented by the constraint *ABSORB, which is violated when two operators absorb together in multiple questions. This last constraint is the equivalent to the LF movement that adjoins the second wh- phrase in multiple wh-questions to the already existing one in Spec-CP in English. In A language like English, *ABSORB will be low- ranked to allow the second wh- phrase to adjoin to the wh- phrase in Spec-CP. But will be high-ranked in a language like Bulgarian where the two wh- phrases are moved to the Spec position obligatorily.

3.3.3.Grimshaw 1997

Grimshaw's (1997) paper "Projections, Heads, and Optimality" is an analysis of question formation detailing the processes of Inversion and Do- Support. It is considered one of the main references to OT syntax analysts. She introduces the main concepts of OT, from which many of this study has taken many, such as the definition of the Input and the interpretation and usage of constraints.

She is of the view that subject wh-questions are IPs, which is something this researcher humbly disagrees with, and evidence is offered to modify this view and the structure is a CP like the rest of wh-questions.

One of the main issues in OT syntax is the few texts on the subject of LF. This article does not discuss the subject of LF extensively; the only mention is that all the candidates are "truth functionally equal". The candidates have the same LF, they all represent the same proposition, but only one incurs the least amount of violations and hence chosen as the optimal form. In this sense, GEN is responsible for regulating the Outputs as logical as possible, which was discussed in the GEN section earlier. Grimshaw (p.c. via email) says that researchers working on OT can include the topic of LF, or choose not to.

3.3.4.Ackema & Neeleman 1998

In their article "Optimal Questions", Ackema & Neeleman (1998) detail the Q- Marking of the clauses, and define LF as a level of semantic representation and a locus for covert movement. They present the constraint Q-SCOPE in terms of c- command saying that Q- elements must c- command the constituent corresponding to the proposition, in this case VP. The article is one of a very few pieces of literature that discusses the topic of c-command in OT analysis. They also introduce a unified account of the maximal projection as FP (Functional Phrase), and Government in terms of Paths.

3.3.5.Samek- Lodovici 1998

Samek- Lodovici (1998) discusses contrastive focus in relation to canonical word order in different languages. The relevant constraints are ALIGN-LEFT and ALIGN-RIGHT. Each language has one of these constraints as high- ranked, depending on its canonical word order. He derives the basic word order of the language from the interaction of three constraints. The first one is SUBJECT, which requires that the highest Spec- position is filled. The second one is STAY, which prohibits movement. The third is CASE-ADJACENT, which requires that there are no elements present between the case assigner and the assignee. He uses several languages such as Spanish and Italian to show the focus

treatment is analyzed as a consequence of the ranking of the focus-related constraints to the other word order constraints.

3.3.6. Müller 2001

Müller (2001) presents in his paper the treatment of Optionality in OT. He starts by explaining Optionality as different forms that are used to describe the same situation. This phenomenon has been the object of research dating back to the 1960s, where it was treated as the outcome of applying optional transformations as opposed to obligatory transformations. The following examples[22] are instances of Optionality:

(27) English complementizer drop is optional in declarative object clauses:

     a. I think that John is a fool.
     b. I think – John is a fool.
(Müller 2001: no. 1)

(28) English dative shift is optional:

     a. John gave [NP a book] [PP to Mary]
     b. John gave [NP Mary] [NP a book]
(Müller 2001: no. 2)

Throughout linguistic research, Optionality as a phenomenon is found, but the solutions provided by each theory are various. Some do not find any difficulties explaining it. Starting with GB (Chomsky 1981, Lasnik & Saito 1992), where a solution is provided where only one transformation that is applied optionally i.e. Affect α. This rule is used

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[22] There are three more examples of Optionality in French, German, and English:
  (I) German: *wh-* scope marker insertion is optional and also scrambling.
  (II) French: *wh-* movement of argument XPs is optional in root clauses.
  (III) English: PP extraposition from NP.

only if it satisfies all the constraints of grammar that require/ forbid it. This means that it is not problematic in GB theorizing.

The Minimalist Program (Chomsky 1995) faces no difficulties explaining Optionality. The operation Move-α occurs when a feature(s) on a Probe is uninterpretable and needs the movement of the Goal to satisfy it. If a certain feature is present/ absent, the operation Move-α acts accordingly; bearing in mind that: (a) if the element carrying the optional feature is present, the other element that does not carry that feature is obligatorily absent so that there is no confusion as to the analysis of that sentence, and (b) sentences with different LFs are analyzed separately.

Since Economy plays an important part in MP, the derivations that violate it by moving elements fare worse than other derivations with no movement. However, the basic MP requirement for uninterpretable features to be satisfied over-rules any Economy Condition.

Optimality Theory, as a theory depending on competition between candidates, finds it difficult to account for Optionality. The following are attempts by Müller to account for Optionality in optimality- theoretic syntax, and then choosing which method is best suitable to current state of OT research. These methods are the following sub- sections:

I. ***Pseudo- Optionality***: where there are two optimal candidates but they belong to two distinctive Inputs, hence they don't compete with each other.
II. ***True- Optionality***: where there are two optimal candidates sharing one Input and one constraint profile.
III. ***Ties***: where there are two candidates that share the same number of violations but differ on two or more constraints that are tied.
IV. ***Neutralization:*** where the two optimal candidates belong to different candidate sets but still compete with each other.

Every method has its pros and cons, but the best one, according to him, is Pseudo- Optionality; however it has a major flaw where it does not state the different situations both optimal candidates are likely to be used in.

3.3.6.1. Pseudo- Optionality

In English complementizer drop and English dative shift (cf. examples (27) and (28)), the Optionality is called *apparent*, the candidates belong to different candidate sets where they do not compete with each other for optimality, and each candidate is the optimal form of its respective candidate set.

To avoid the 'optional' candidates from competing with each other, Müller gives a definition for the Candidate Set that should enter a competition:

- ***Candidate Set****:* Two candidates C_i, C_j belong to the same candidate set iff:

  (a) C_i, C_j are realizations of identical predicate/ argument structures.
  (b) C_i, C_j have identical LFs.
  (Müller 2000: no.8)

Müller modifies the above definition of the candidate set by changing "identical predicate/ argument structure" into "identical numeration". This change would have the Input as one with/ without the element which creates Optionality in the first place. Hence, for example: there is an Input with the complementizer 'that' and one without:

The Input for example (27a) is: think (x, y), x= I, y= CP. Tns= present. Comp= that.
The Input for example (27b) is: think (x, y), x= I, y= IP. Tns= present.

Müller solves this dilemma for English dative shift, where both examples have the same Input, by positing the notion of Features[23]. Different optional features carried by elements in the Input makes one construction appear where the other is suppressed.[24]

These examples show slight differences in meaning as well; however small these differences are, they are not attributed to entirely varied Inputs. Müller says that the difference is not in 'numeration' or 'truth', but to pragmatic conditions or functional notions such as Focus or Topic. The English Dative Shift examples are his proof for this claim, where the LF and Numeration for the two candidates are the same, but the difference is a semantic one, Dative Shift gives rise to an affected indirect object.

In some cases, Optionality of candidates becomes called "*syntactic alternation*"; this means that the presence/absence, OR, in-situ/movement of elements in candidates become obligatory[25]:

Complementizer drop becomes obligatory with embedded topicalization and in subject clauses:

(29) a.   I think that [$_{PP}$ to John]$_1$ she gave a book$_1$
      b. *I think - [$_{PP}$ to John]$_1$ she gave a book$_1$
      c.   It surprised me [$_{CP}$ that the earth is round]
      d. * It surprised me [$_{CP}$ - the earth is round]
   (Müller 2001: no. 9)

Dative Shift is obligatorily-present/ blocked in certain contexts:

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[23] Using the terminology of Features to explain optionality is not new to OT. The term features is used in McCarthy's 2008 "*Doing Optimality Theory*" in Phonology.
[24] He doesn't elaborate further on the use of optional features.
[25] References cited by Müller for these examples are: Baker 1988, Larson 1988, McDaniel 1989, Rochemont 1989, Rizzi 1992, Grimshaw 1997, and Hölle 2000.

(30) a. *The orange socks cost [NP two dollars] [PP to/ for Linda]

     b.   The orange socks cost [NP Linda] [NP two dollars]

     c.   I donated [NP money] [PP to charity]

     d. * I donated [NP charity] [NP money]

(Müller 2001: no. 10)

Müller does not say what the 'certain contexts' are where this obligatory behavior occurs. He rather leaves it vague, which shows that this topic is in need of further research in OT syntax. At the end of this section, he abandons the notion of 'identical numeration' and 'pragmatic, functional' factors.

3.3.6.2. True- Optionality

Müller explains True- Optionality as one where the same candidate set has the same constraint profile but the optimal forms are two winners not one. He further states that these two forms have different contexts that are used in; but he does not say what these contexts are that distinguish the use of one winner over the other. He simply states that, for example, in the case of the complementizer drop of English, it is an instance of true Optionality and that Optimality Theory can allow for two winners in one competition which is far from the standard OT dogma.

   The following tableau shows an example from Grimshaw (1997) of having two winners that fare the same with the same constraint profile; the definitions[26] of the constraints[27] used are as follows:

- ***PURE-EP*** (Purity of Extended Projection): There is no adjunction to the highest XP of an extended projection or its head.
- ***OB-HD*** (Obligatory Heads): A projection has a head.
- ***STAY*** (Derivational Economy): Trace is not allowed.

---

[26] The definitions are taken from Grimshaw (1997).

[27] There is another constraint that he adds to the list: Top-Scope, but it is not relevant to this particular competition; Müller uses it for a different competition. It is also omitted from the tableau here.

Candidates	Pure-EP	OB-HD	Stay
→ C_1: think [$_{CP}$ that [$_{IP}$ John is a fool]]			
→ C_2: think [$_{IP}$ John is a fool]			
C_3: think [$_{CP}$ - [$_{IP}$ John is a fool]]		*!	
C_4: think [$_{CP}$ is$_2$ [$_{IP}$ John t$_2$ a fool]]	*!		*

Tableau 4. Optionality of complementizer drop in English (Grimshaw 1997)

Candidates (1) and (2) in the tableau are the apparent winners of this competition, they fare the same in relation to the number of violations (or rather lack thereof). Candidate (3) loses because CP does not have a head C which violates OB-HD. Candidate (4) loses because in trying to save the derivation, the verb *is* moves via Subject-Auxiliary Inversion, however, failure is waiting for this plan for the verb in this case is not an auxiliary but the main of the sentence and that renders it ungrammatical.

To say that two winners can be the outcome of a single competition and a single Input is a serious flaw of this treatment of Optionality. In OT analysis in the literature, either Phonology or Syntax, every competition produces only one winner, which can be named the Optimal Form. Grimshaw (1997), and in consequence Müller (2001), never address the concept of the Input of these particular winners. The subcategorization of the verb *think* plays a significant part in distinguishing the two winners as having different Inputs, hence cannot be part of the same competition.

The verb *Think* in candidate (C1) subcategorizes for a CP, and in candidate (C2) subcategorizes for an IP. This is a major difference between the two candidates; hence two different Inputs which cannot compete with each other to select a winner. This is another case of Pseudo- Optionality not True one. The two candidates appear to have the same construction, but a minute inspection of them would reveal subtle differences in meaning and a different context in which to use the two examples. These situations are to be analyzed and put into consideration in creating a constraint hierarchy to every competition.

Müller ends this section by saying that a constraint must enter the constraint profile to distinguish between the two winners, and that Grimshaw abandons this treatment of complementizer drop in (1999).

3.3.6.3. Ties

The basic idea of a tie is that two constraints share the same importance status in a competition. It is illustrated with shading[28] the two tied constraints to show that neither is higher or lower than the other. The following tableau[29]:

Candidates	Con1	Con2	Con3	Con4
→ C_1			*	
→ C_2		*		
C_3		*	*!	
C_4	*!			

Tableau 5. Ties   (Müller 2001: T1)

The constraints CON2 and CON3 share the same status in the competition, their satisfaction/violation is considered to be of equal importance. This is not strange in any OT analysis. Two constraints can have the same importance in a competition, not every constraint is ranked strictly in any OT analysis.

The only way to break this tie is to introduce another constraint, either higher or lower than these tied constraints. This constraint has to be an active one, its violation by one of the two winners will settle the competition and results in figuring out the single optimal form.

Some analysts could be tempted to merge the tied constraints into a single constraint since they share the same status. This is not helpful to

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[28] In the original tableau, the tied constraints are represented by a dotted line between the two columns; this convention could not be obtained by this researcher, so the shading convention was used instead.

[29] The constraints were written as A, B, C, and D. They were changed to the present format to conform to the rest of the thesis.

any analysis. The wording of one constraint that has a single function could be made more specific if the wording of another constraint with another function is added, thus, losing on generality and universality. Moreover, merging them can lead to a loss of two separate constraints that can help in another competition[30].

3.3.6.4. Neutralization

The notion of neutralization is taken to be that of the Input, where the optimal form will emerge as a candidate and win the competition that originally is one for a different Input. Say there is a language that must have a Comp in C, and there is the Input that is a + Comp, any candidate that does not contain the comp is rendered ungrammatical and will lose the competition. However, what if the winner of this competition emerges as the winner of another competition where the Input is – Comp. The optimal form will arise to satisfy the high- ranked constraint that dictates that any C must be realized by a Comp, even if it is not the faithful parse of the Input.

As it turns out, this approach is flawed:

a. For each optimal form, since the differences between candidate sets are minimal, many candidate sets are to be examined for the same Output.
b. The number for the candidate sets will also get bigger, since GEN will generate all kinds of Outputs and somewhat ignore elements of the Input to give a chance for more unfaithful parses to arise and compete.
c. Neutralization can lead to a case of ambiguous sentences that have different Inputs. This problem is solved by Prince & Smolensky (1993) with the concept of "Input Optimization", where the learner of a language chooses the optimal form then selects the Input for it.

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[30] The method used in ranking the constraints involved in any competition is discussed at length in Chapter 3.

Müller concludes the paper by pointing out that Optionality is not a clear cut analysis. That in recent year, the different approaches stated above can be combined together, that there can be analyses of Pseudo-Optionality and True Optionality, or Pseudo- Optionality and Neutralization. These approaches try to capture the otherwise elusive phenomenon of Optionality in languages.

Müller's analysis is one of the bases of the current study. It is to be taken into account that combining more than two approaches in his paper is a solution to a somewhat difficult analysis in OT approach to linguistic analysis and description. Pseudo- Optionality and Ties are combined in the current analysis. Pseudo- Optionality is implemented here in the form of using two Inputs to an optional construction. Ties is used in the sense that a constraint is added to the competition to favor the winning, optimal form.

3.3.7.Costa 2001

Costa (2001) gives examples of how languages have a basic word order and can have an alternate word order to satisfy high- ranked Discourse constraints. He follows the same path as Samek- Lodovici (1998) in postulating the same conclusions. Focus and Topic, as discourse factors, play a significant role in using an unmarked word order in a language. The unmarked word order is used due to the fact that the focus- and topic- related constraints are ranked higher in the competition. Hence, their satisfaction is more important than the other lower- ranked constraints. The focus and topic attributes are mentioned in the Input to the sentence, thus, incorporating it into GEN. Any candidate that is not faithful to the Input is eliminated using the hierarchy of constraints as the evaluating criterion.

3.3.8.Samek-Lodovici 2005

Samek- Lodovici (2005) uses Focus- related Constraints to account for the Optionality found in Italian focused elements found in an alternate

word order. In his papers, he uses examples from statements not WH-questions. He states that using the discourse- related constraints is not improbable in OT tradition. He also claims that syntactic and discourse constraint can intermingle. As long as the constraints interact in a competition to choose a winner, it is still OT analysis.

The papers, Costa (2001) & Samek- Lodovici (1998 & 2005), combine Syntax and Discourse in analyzing the optionality found in different languages. This is the approach that this study is attempting to do with Cairene Arabic (CA). The analysis of optionality in wh- questions in CA follows the same route as the above authors. This study uses Focus to account for the optional occurrence of the wh- phrase. Certain changes are introduced, since Costa and Samek- Lodovici only discuss declarative sentences. This is apparent in the introduction of a new constraint as an addition to the ALIGN-FOCUS family of constraints.

CHAPTER 2

QUESTION FORMATION
IN THE MINIMALIST PROGRAM

1. Introduction

Movement in MP is triggered to check features carried by elements in a sentence that if not checked, it would otherwise crash the derivation. Some languages, such as English, have obligatory movement of the wh-phrase to the Spec- CP position to check the EPP feature of C. While other languages, such as Chinese, prohibit such movement and the wh-phrase remains in- situ. CA, Iraqi Arabic, French, and Hindi are a few examples of languages and dialects that exhibit both instances of wh-phrases, the in Spec- CP and in- situ positions.

This chapter explores the mechanisms behind the English obligatory movement and the CA optional one, with the findings that English has uninterpretable Epp feature that forces the wh- phrase to obligatorily move from its base position to the left-most peripheral position: Spec- CP. CA, on the other hand, behaves like Iraqi Arabic (IA) and Hindi in that the wh- feature of the wh- phrase itself can be checked either in its base position (in- situ) or in a Specifier position (Spec- CP) by the functional head C.

The chapter is divided into two major parts; the first is dedicated to English, and the second to CA. This chapter discusses different types of questions in both languages: Yes/No questions, Argument and Adjunct wh- questions, Subject wh- questions, Embedded wh- questions, and Multiple wh- questions. Tree diagrams are provided when needed.

2. English

2.1. Yes/No Questions

The formation of Yes/No questions is a particular matter in MP analysis; since the presence of a wh- phrase is prohibited. However, the presence of a Q- marked element in the Complementizer position is obligatory to identify it as an interrogative.

The properties of the Q- marked elements are different from one language to the next. In English, C in Yes/No questions has uninterpretable Tense feature, which triggers movement of the auxiliary from T to C, this is called Inversion; and if an auxiliary is not present in the numeration, a dummy *Do* is inserted to carry the Tense and delete the uninterpretable features of C. For Example:

(1) Is it raining?
(Radford 2004: no. 69)

First, the auxiliary *is* (already inflicted as present tense) merges with the verb *raining* to form the T˙ phrase *is raining*

is $_{Merge}$ + raining → *is raining*   T˙

Next, T˙ merges with the subject *it* to form the TP *it is raining*

It $_{Merge}$ + is raining → *it is raining*   TP

Then, the TP merges with a null C (carrying TNS, WH, and EPP features)

C $_{Merge}$ + it is raining →   C˙

The uninterpretable TNS feature of C makes C a Probe searching for a Goal to delete this uninterpretable feature, the goal must be c-commanded by C, so the logical position would be T. A copy of T moves to C thus deleting the uninterpretable TNS feature and leaving a copy behind that gets a null spell-out at PF.

The other features carried by C, namely the EPP and WH, which require the presence of a + Q specifier are satisfied with the merging of a null Yes/No question operator in spec- CP. Radford (2004) uses a null *whether* as the Q- element[31], and it should be specified in the lexical entry of the word that it will receive a null spell out at PF.

The tree diagram presented below shows this:

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[31] Radford's use of the null *whether* stems from various reasons:

    (I)   In Elizabethan English, yes/no questions were introduced by an overt *whether* along with an auxiliary as in: *Whether dost thou profess thyself a knave or a fool?* (Lafeu, *All's Well That Ends Well, Act 4, Scene 5*).

    (II) In indirect speeches, embedded yes/no questions are introduced by *whether* as in: *He asked whether I was feeling better.*

    (III) Yes/no questions with auxiliary inversion resemble *whether* questions, they both can be answered by either yes or no as in: (i) *When he asked ' Did you vote for Larry […]?', I said 'Yes' and you said 'No'* (ii) *When he asked whether we voted for Larry […],I said 'Yes' and you said 'No'* .

    (IV) Main- clause yes/no questions can be tagged by *or not* much like complement- clause *whether* questions as in:

        (i)   *Has he finished or not*

        (ii)   *I can't say whether he has finished or not.*

This way, Radford arrives at a unified account of questions being CPs *with an interrogative specifier*.
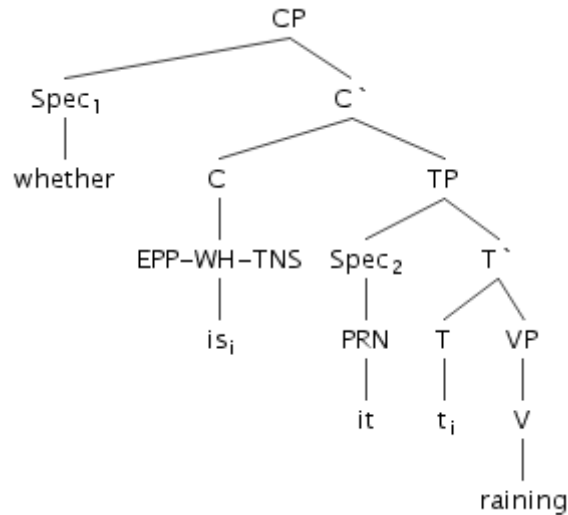
Figure (1) [32]

2.1.1. *Do* Support

Example (1) shows a Yes/No question with an auxiliary *is* already present in the numeration to the sentence, however that is not the only way of forming a Yes/No question. Some Yes/No questions are formed with the insertion of an auxiliary that is not present in the input. For example:

(2) Did he win the race?
(Radford 2004: no. 62 d)

The analysis of (2) is as follows:

A series of *Merge* and *Move* operations ensue until the following structure:

a. [CP [C Q] [TP he [T *TNS*] [VP [V *win*] *the race*]]]

---

[32] In Radford's book *Minimalist Syntax* (2004), from which some of the examples here are taken, the author does not discuss the traces of moved elements, he only mentions the positions from which they were moved and marks them with a strikethrough. However, using the Tree diagram website has made it difficult to show these strike-throughs:

    (I)   The adverb *whether* should be ~~whether~~ meaning it is not pronounced.
    (II) The auxiliary *is* under the node T should be written ~~is~~.
However, I changed them with the proper traces and used co- indexation.

C has a strong TNS feature, which acts like a probe seeking a goal to delete this feature, the only possible position that fits this criterion and is c- commanded by C is the TNS position under T. So C attracts it to adjoin to Q as shown in (b):

b. [CP [C *TNS* + Q] [TP he [T ~~*TNS*~~] [VP [V *win*] *the race*]]]

This syntactic structure is then sent to the PF component of the grammar for spell out. However, since there is no auxiliary present to carry the TNS feature, and the VP only has a main verb that does not undergo movement, plus the fact that not only the sentence is sent to PF but it is also sent to the semantic component of the grammar i.e. LF, and any unnecessary elements could cause the derivation to crash.

The solution is simple: find an auxiliary verb that can carry the TNS feature and at the same time does not affect the meaning. The dummy stem *Do* is introduced and is attached as such (*do + TNS + Q*) and is spelled out as *did*.

The properties of *Do*[33] in the English language are the basis of choosing it for this job. This verb is always described in the literature as a "meaningless chunk of morphology" (Radford 2004: 177), which is the exact quality needed here. *Do* is not included in the Input of the sentence, for it does not exist in the syntax, it is only used as a place holder for the TNS feature. Depending on the tense of the sentence, *Do* appears either as the present form *do/does* or the past form *did*.

2.1.2.Summary

To sum up, Yes/No questions are formed with an empty Q- operator in C that carries an uninterpretable EPP feature which prompts the insertion of a null *whether* in Spec-CP to delete that feature. The strong TNS feature carried by C triggers the movement of the auxiliary in T to move

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[33] Sometimes the verb *Do* is used as a lexical main verb as in: *You did this crime, we have proof.* However, the properties for this verb, both syntactically and semantically, are different from those of the dummy.

from T to C. If such an auxiliary is not present, a dummy *Do* is inserted to carry the T$_{NS}$ feature. It does not affect the meaning of the sentence since it is empty semantically.

2.2. Argument & Adjunct W$_H$- Questions

Argument and adjunct W$_H$ questions in English are formed with the wh-phrase found in Spec- CP. This movement is triggered by the uninterpretable E$_{PP}$ feature of C that makes the wh- phrase move from its base position to the left most peripheral position in the sentence.

  C in English carries an E$_{PP}$ feature which prompts it to project into a CP. Since in English every sentence must have a subject, this requirement for an element to exist in Spec-CP is obligatory. C also carries a +W$_H$ feature making it a requirement for the element that moves into Spec-CP to carry a +W$_H$ feature as well. The only element that fits these requirements is the wh- phrase found in the sentence. It serves as a goal for the C probe that attracts the wh- phrase into moving to Spec-CP.

    (3) What are you eating?

A simple wh- question as the above example is derived as follows:

First, the verb *eating* is merged with its complement *what* resulting in the VP *eating what*:
eating $_{Merge}$ + what → *eating what*   VP
are $_{Merge}$ + eating what → *are eating what*   T`
you $_{Merge}$ + are eating what → *you are eating what*   TP
C [WH, EPP, TNS] $_{Merge}$ + you are eating what →   C`

The resulting C` is one where C has uninterpretable E$_{PP}$ feature, a +W$_H$ feature, and a strong T$_{NS}$ feature. These features trigger movement of both the wh- phrase and the auxiliary. The former to Spec-CP and the latter from T to C as in the following:

a. $[_{CP}$ what$_i$ are$_j$ $[_{TP}$ you t$_j$ $[_{VP}$ eating t$_i$]]]
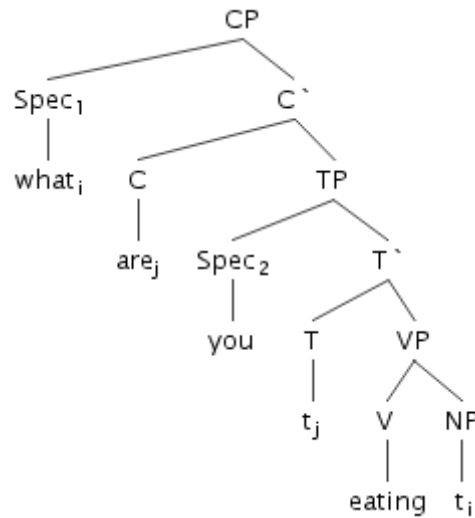
Figure (2)

2.2.1.*Do* Support

Do support is also used with argument and adjunct wh- questions. Some of the wh- questions do not include an auxiliary, in this case to satisfy the strong TNS feature of C, the dummy *Do* is inserted.

(4) Where did you go?

The derivation for the above example is as follows:
First, the verb *go* merges with the adverb *where* resulting in the VP *go where*:

go $_{Merge}$ + where → *go where*   VP
go where $_{Merge}$ + T past →   T`
T` $_{Merge}$ + you → *you go (past) where*   TP
C [WH, EPP, TNS] $_{Merge}$ + you go where →   C`

The uninterpretable EPP feature of C needs an element to fill the Spec-CP position and this element needs to carry a +WH feature. These features are found in the wh- phrase *where*, which is base generated inside the VP. Movement is triggered by these features combined and

the wh- phrase is moved from its base position within VP to the left most peripheral position: Spec-CP.

Do is inserted to satisfy the strong Tns feature of C, the tense of *do* is the past form *did*, and CP is formed as in the following:

a. [$_{CP}$ where$_i$ did$_j$ [$_{TP}$ you t$_i$ [$_{VP}$ go t$_i$]]]
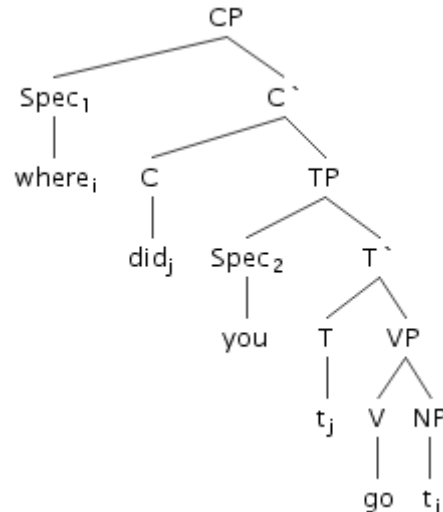
Figure (3)

2.2.2. Extraction out of Think$_{TP}$

The verb *think* subcategorizes for either a TP or a CP. The following example is one with a TP complement:

(4) What do you think he said?
[$_{CP}$ what$_i$ do$_j$ [$_{TP1}$ you t$_j$ [$_{VP1}$ think [$_{TP2}$ he [$_{VP2}$ said t$_i$]]]]]

The derivation of the above example starts with the verb *said* merges with its complement *what* to form the VP *said what*, and moves naturally all the way to the TP *you think he said what*. Then C [Wн, Eрр, Tɴs] merges with the TP forming the C`. This Merge operation forces the insertion of Do to satisfy the strong Tɴs feature and the auxiliary is the present tense form *do*.

C serves as a Probe to check its uninterpretable EPP feature. Since TP is a weak barrier (Haegeman 1994) and the Spec-TP positions of TP1 and TP2 are already filled with *he* and *you* respectively, the wh- phrase goal that carries the WH feature moves to Spec-CP in one step as in the following diagram:

```
                        CP
         Spec₁                    C`
         |
        whatᵢ   C                    TP1
                |
               doⱼ  Spec₂              T`₁
                     |
                    you   T₁              VP1
                          |
                         tⱼ   V₁            TP2
                              |
                            think  Spec₃       T`₂
                                    |
                                   he     T₂    VP2
                                          |
                                        past  V₂  NP
                                              |    |
                                            said  tᵢ
```
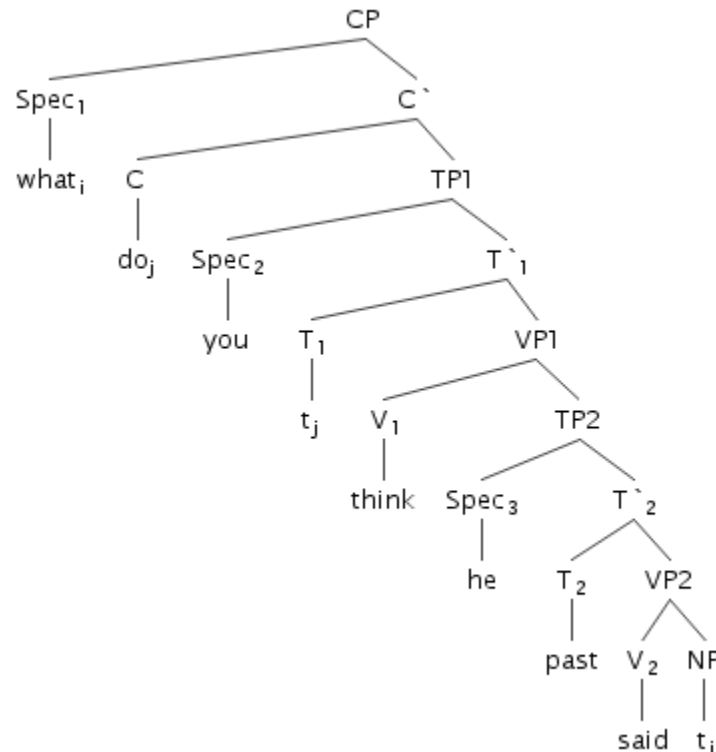
Figure (4)

2.2.3. Extraction out of Think_{CP}

In pre-minimalist approaches, CP is a strong barrier to extraction (Haegeman 1994). Chomsky (2001) defines CP as a phase that once it is completed, it will undergo transfer to the semantic component for interpretation and the phonetic component for pronunciation. This transfer blocks any element from moving out of it. This means that if CP is the complement of the verb *think* as in the following example, it is a barrier for the wh- phrase to move out of it:

(5) Where is it thought that he will go?
(Radford 2004: no. 13)

a. [$_{CP1}$ where$_i$ is$_j$ [$_{TP1}$ it t$_j$ [$_{VP1}$ thought [$_{CP2}$ t$_i$` that [$_{TP2}$ he will [$_{VP2}$ go t$_i$]]]]]]]

[WH, EPP, TNS]   [WH, EPP]

↑-------------------------------------↑-------------------------------↑

Radford (2004) suggests a solution to the blocking problem in which *that* carries EPP and WH features that allow the wh- phrase in VP to move successive cyclically from VP to Spec-CP. *That* [WH, EPP] merges with the TP *he will go where* forming the C` *that he will go where*. Then the wh- phrase is prompted to move to Spec-CP to check the EPP feature of *that*. Since it will attract the closest +WH element, the wh- phrase *where* moves from its base position as the complement of the verb *go* to the Spec-CP position. Then this CP and all the elements in it transfer to the semantic and phonetic component for interpretation and pronunciation.

The CP then merges as the complement of the verb *thought* with the wh- phrase in Spec-CP. the derivation progresses naturally until C [WH, EPP, TNS] merges to the TP *it is thought where that he will go* forming the C`. The auxiliary *is* is inverted to check the strong TNS feature and the wh- phrase is attracted to the main- clause Spec-CP to check the EPP feature forming the CP as in the following diagram:
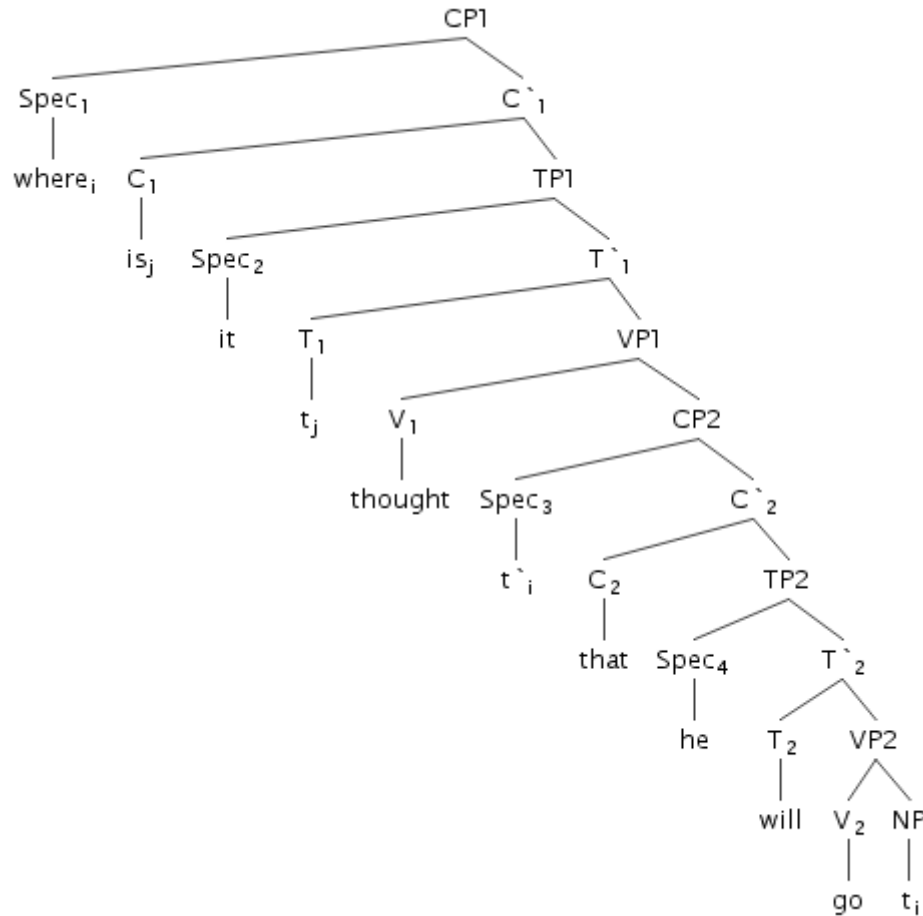
Figure (5)

However, there is strong evidence contrary to this solution. The complementizer *that* cannot form as a +Q operator in the sense proposed by Radford (2004). CP is a barrier to extraction because it transfers to PF and LF after it is formed. The only time extraction works in one step is in the case of extraction out of TP, since TP is a weak barrier. Extraction out of CP is blocked if it is not done cyclically. The Spec-CP2 position is not filled with any element, it could prove to be a stop on the way for the wh- phrase from inside the VP to the main- clause Spec-CP1.

This solution does not demand that a complementizer changes its semantic features to accommodate a move that otherwise is done easily without incurring any Subjacency violations. The cyclic movement is

presented in the following without the extra features of the complementizer *that*:

b. [$_{CP1}$ where$_i$ is$_j$ [$_{TP1}$ it t$_j$ [$_{VP1}$ thought [$_{CP2}$ t$_i$` that [$_{TP2}$ he will [$_{VP2}$ go t$_i$]]]]]
　　[W$_H$, E$_{PP}$, T$_{NS}$]
　　　↑----------------------------------↑------------------------------↑
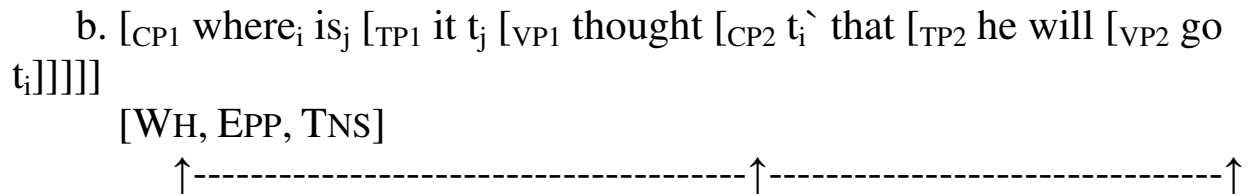
2.2.4. Summary

To sum up, the reasoning behind forming wh- questions in English is that C carries an uninterpretable E$_{PP}$, T$_{NS}$, and W$_H$ features. The latter feature is responsible for moving a +wh element to Spec-CP. The wh- phrase obligatorily moves from its base position to Spec-CP.

Do Support has the same explanation for wh- questions as Yes/No ones. The strong T$_{NS}$ feature triggers the movement of the auxiliary from T to C and if such an auxiliary is not present, a dummy Do is inserted.

Extraction of the wh- phrase out of a TP is allowed in English. The wh- phrase moves in one step from its base position to Spec-CP since TP is a weak barrier. Extraction out of CP is done cyclically to accommodate that CP is a strong barrier that blocks any element to move out of it.

2.3. Subject W$_H$- Questions

Subject wh- questions are CPs like all matrix wh- questions. However, the reasoning for the movement of the wh- phrase from its base position Spec- TP to the edge of the sentence i.e. Spec- CP is different from that of the other types of wh- phrases, hence a separate section is dedicated to subject wh- questions.

(6) Who called the police?
(Radford 2004: no. 42 c)

The derivation for this example is the following:

the $_{Merge}$ + police → *the police*   DP
call $_{Merge}$ + the police → *call the police*   VP
T (past) $_{Merge}$ + call the police → *called the police*   T`
who $_{Merge}$ + called the police → *who called the police*   TP
C [WH, TNS, EPP] $_{Merge}$ + who called the police →   C`

The WH and EPP features of C trigger movement of the wh- phrase to Spec- CP. However, the strong TNS feature, which is usually satisfied by the movement of T- to- C, cannot be satisfied in this case. The following example shows this:

(7) *Who did call the police?

Example (6) does not have an emphatic reading. So, the question would be: how to check the TNS feature without moving the T or inserting the dummy *Do*? There are two possible analyses to explain wh- subjects in the following sub- sections.

2.3.1.Radford 2004

Radford cites Pesetsky & Torrego (2001) in answering the above question of how to check the TNS feature without moving the T or inserting the dummy *Do*. The authors (Pesetsky & Torrego 2001) claim that the wh- phrase *who* already carries a Nominative Case from being the subject of the tensed clause, hence the wh- phrase carries a Nominative TNS feature, but this feature is not morphologically realized (as opposed to the Accusative *whom* or the Genitive *whose*). This analysis helps in satisfying all three features with moving just one element: the wh- phrase *who*.

The derivation continues from merging the wh- phrase to the VP *called the police* to form the TP as in the following:

Who $_{\text{Merge}}$ + called the police → *who called the police*   TP
C [WH, TNS, EPP] $_{\text{Merge}}$ + who called the police →   C`

   a. [$_{CP}$ Q [$_{TP}$ who [$_{VP}$ called the police]]]

After forming the C`, the Spec- position is filled with the wh- phrase to satisfy the three features carried by C:

Spec- CP $_{\text{Move}}$ + who called the police → *who called the police*   CP

   b. [$_{CP}$ who$_i$ Q [$_{TP}$ t$_i$ [$_{VP}$ called the police]]]
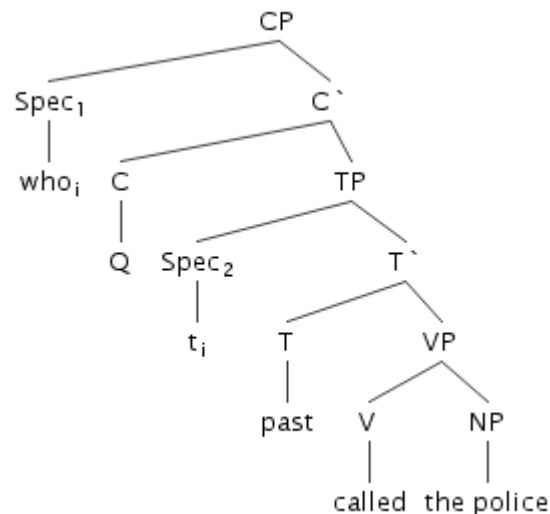
Figure (6)

This approach conforms to the notion of unifying the structure of the sentence: all wh-questions are CPs.

2.3.2.Agbayani 2006

Another approach to the analysis of subject questions is one by Agbayani (2006), where he gives another way to analyze this topic. He

says that forming subject questions involves two operations: Move F and Pied- Piping (Agbayani 2006: 88).

- *Move F*: The feature F (to be checked) of category α is extracted out of α and moves to the domain of a functional head H; F enters into a checking relation with an uninterpretable feature of H.
- *Pied- Piping*: Category α is pied- piped to Spec- H.

If C carries an uninterpretable WH feature (which it does in English), the feature needs to be checked; moving the feature of the wh- element checks this feature and the sentence is ready for interpretation. The operation Pied- Piping occurs to prevent the scattering of features: the extracted feature and its original category must be phonologically adjacent; no elements should intervene between the two.

   This means that in the case of the example above, there would be no need to move the wh- phrase from Spec- TP to Spec- CP, since there is no phonological element between the moved feature and its category:

a. [$_{CP}$ Q   [$_{TP}$ who [$_{VP}$ called the police]]]
      [+WH]   [+WH]
        ↑--------------↑
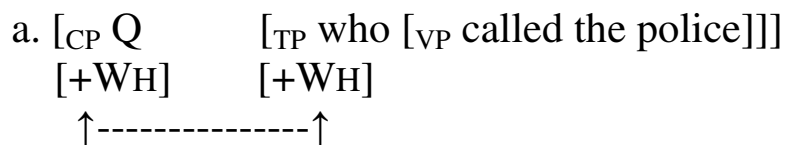
The WH- feature moves from the category *who* [+WH] to the domain of the functional head C with the feature [+WH]. The feature enters a checking process with the Head C satisfying it. There is no phonological element that intervenes between *who* and the extracted feature, then Agbayani follows the economy conditions and does not move *who*. However, if there is a language with elements found in between the extracted feature and its category, then the Pied- Piping operation will occur.

2.3.3. Summary

Wh- subject questions have been a topic of much research and controversy. Even in a language as wide spread as English. There are two views presented here. One where the formation of wh- subject questions is not different from any other type of questions (Radford 2004). The other is where the operations Move-F and Pied-Piping are involved (Agbayani 2006). The stand taken here is that of Radford's (2004) analysis, where subject questions are no different from other types of questions; they are all CPs with an uninterpretable EPP feature of C that is responsible for attracting the wh- phrase from its base position to Spec-CP. This way, the analysis is unified.

2.4. Embedded WH- Questions

Embedded wh- questions behave just like argument and adjunct main questions, the wh- phrase moves to Spec-CP, but in this case not the left most peripheral position of the matrix CP, but to the Spec-CP position of the embedded clause:

(8) I wonder what you cooked for dinner.

The derivation of the embedded wh- question starts as follows:

cooked $_{Merge}$ + what → *cooked what*   V`
cooked what $_{Merge}$ + for dinner → *cooked what for dinner*   VP
you $_{Merge}$ + cooked what for dinner → *you cooked what for dinner*   TP
C [WH, EPP] $_{Merge}$ + you cooked what for dinner →   C`
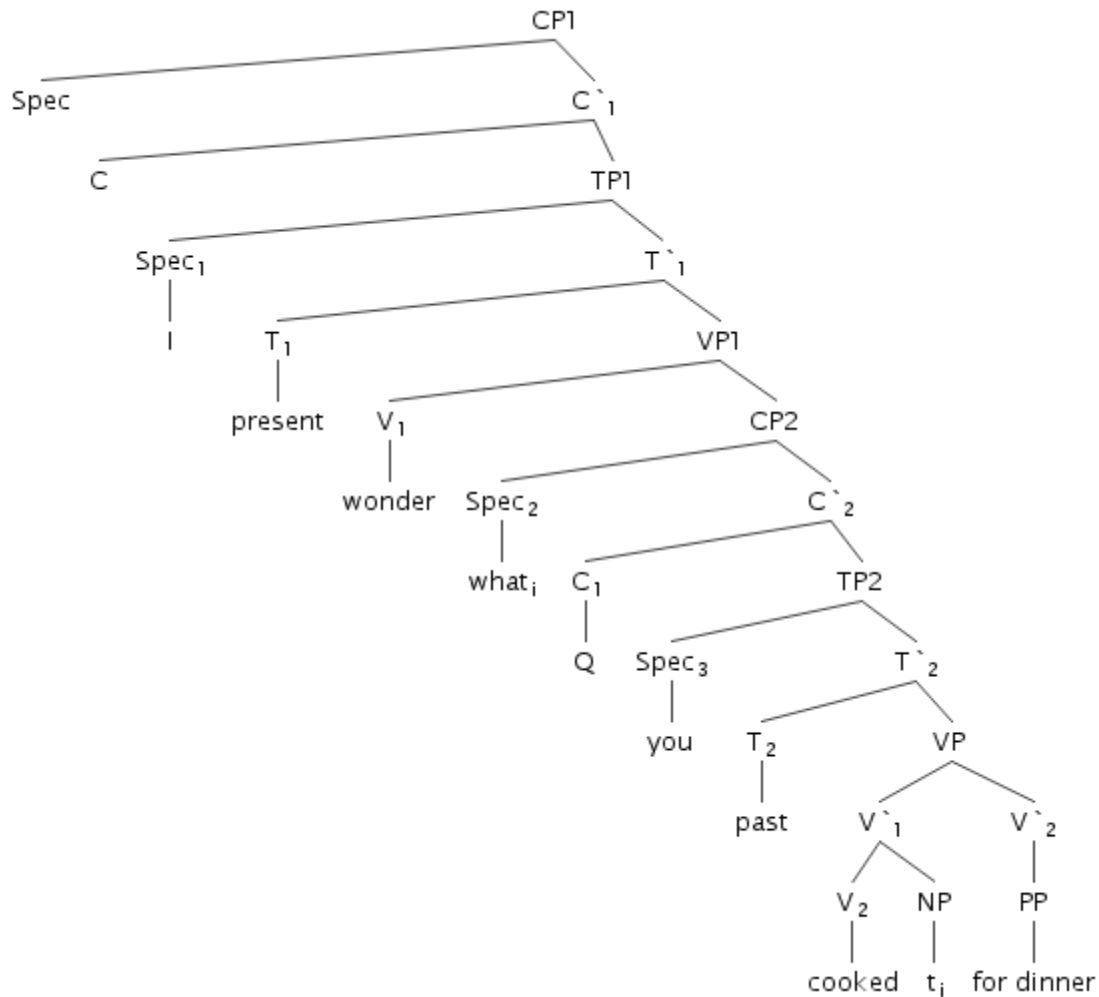
Figure (7)

C carries both a WH feature and an EPP feature that trigger the movement of the +WH element found as the complement of the verb *cooked*. The landing site for the wh- phrase is Spec-CP2. Spec-CP1 is not a valid landing site for it is [– WH] as the matrix sentence is declarative in force.

a. [CP1 [TP1 I [VP1 wonder [CP2 what$_i$ [TP2 you [VP cooked t$_i$ [PP for dinner]]]]]]]
    [-WH]   [+WH]   [+WH]
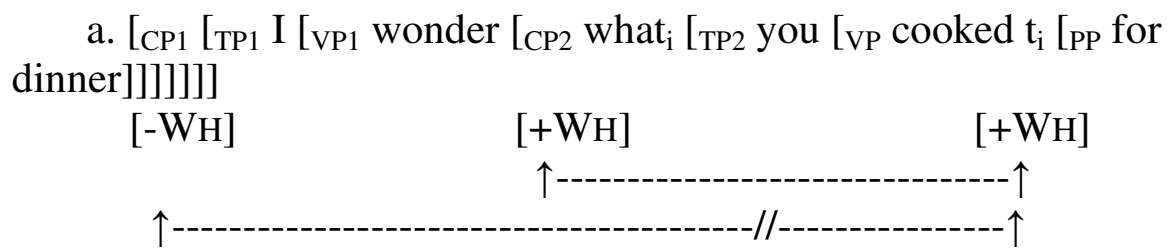
C in embedded wh- questions does not carry a strong TNS feature, which is why there is no auxiliary movement from T to C or Do- support. The following example shows this:

(9) *I wonder what did you cook for dinner.

Example (9) shows that Do support is not applicable here. The insertion of the dummy auxiliary crashes the sentence; hence, it is blocked. This confirms the deduction that C in embedded wh- questions does not carry a strong TNS feature.

The following example is one where an auxiliary is present in the sentence, but it does not move from T to C:

(10) I wonder what you will cook for dinner.

The following example is an ungrammatical one where the auxiliary moves and the result is a sentence crash:

(11) *I wonder what will you cook for dinner.

2.4.1. Summary

To sum up, embedded wh- questions differ from other types of wh- questions in that there is no movement of the auxiliaries found in the sentence or the insertion of the dummy Do. The wh- phrase still moves from its base position to Spec-CP to satisfy the EPP and WH features.

2.5. Multiple WH- Questions

In English multiple wh- questions, only one wh- phrase moves to Spec-CP, the other one remains in-situ. This is due to the Attract Closest Principle:

- ***Attract Closest Principle (ACP)***: A head which attracts a given kind of constituent attracts the *closest* constituent of the relevant kind. (Radford 2004: pp 200)

C with the [WH, EPP, and TNS] features will attract the closest wh-phrase in the C` domain:

(12) Who will do what?

The derivation starts with the verb *do* merges with the complement *what* to form the VP *do what*:

do ~Merge~ + what → *do what*   VP
will ~Merge~ + do what → *will do what*   T`
who ~Merge~ + will do what → *who will do what*   TP
C [WH, EPP, TNS] ~Merge~ + who will do what →   C`

a. [$_{CP}$ who$_i$ will$_j$ [$_{TP}$ t$_i$ t$_i$ [$_{VP}$ do what]]]
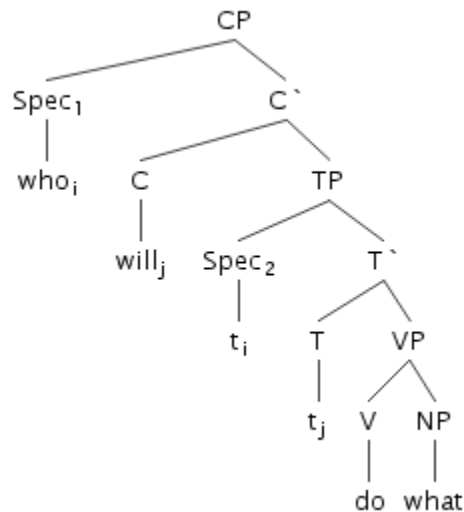
Figure (8)

The Attract Closest Principle claims that if C is a +WH, it will attract the closest +WH element. In this case *who* is closer that *what*:

b. *[$_{CP}$ what$_k$ will$_j$ [$_{TP}$ who t$_j$ [$_{VP}$ do t$_k$]]]

When *who* moves, the features are checked and there is no need for more wh- phrases to move anymore. Economy conditions prevent such extra movements:

   c. *$[_{CP}$ [who$_i$ what$_k$] will$_j$ [$_{TP}$ t$_i$ t$_j$ [$_{VP}$ do t$_k$]]]

At LF, *what* moves and adjoins to the wh- phrase *who*. The Spec position has the indexation of the existing wh- phrase *who*. Its indexation percolates onto the adjoined wh- phrase *what* and they both carry the original indexation:

   d. $[_{CP}$ [who$_i$+ what$_k$]$_i$ will$_j$ [$_{TP}$ t$_i$ t$_j$ [$_{VP}$ do t$_k$]]]

2.5.1. Summary

To sum up, multiple wh- questions in English are formed with moving one wh- phrase and the other remains in- situ. The latter adjoins to the Spec-CP position at LF. Economy conditions apply and only one wh- phrase moves, the closest to the Spec-CP.

2.6. LF

In the literature[34], LF in MP is both a level of semantic interpretation and the locus for covert movement. After the operations Merge and Move-α are finished in a derivation, the sentence then moves to the semantic component LF to get the proper interpretation. The functional head C in declarative sentences mark the sentence as [-WH], hence the interpretation will follow as a declarative. Simultaneously, the derivation then moves to the PF level to get the proper intonation. If C carries a [+WH] element, then at LF the derivation will get an interrogative interpretation. Since the target structures in this study are all questions then they will all get an interrogative interpretation.

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[34] For example: Chomsky (1995), Radford (2004), Hornstein et al. (2005).

As a rule, all wh- phrases in English move at LF to gain scope over the sentence and get a matrix question interpretation, except for embedded wh- questions. The latter type of questions has indeed a wh- phrase but C, of the CP where the wh-phrase is found, does not carry the [+WH] feature; hence its interpretation will not be that of an interrogative. In multiple wh- questions, there are two wh-phrases, one that obligatorily moves to Spec-CP and the other remains in-situ. The wh- phrase that remains in- situ moves to Spec-CP at LF.

2.7. Conclusion

All types of wh- questions in English follow the same rule in their formation. They are all CPs formed with moving the wh- phrase from its base position to the left- most peripheral position to satisfy the uninterpretable EPP feature carried by C. The wh- feature of C prompts the movement of a +WH element, this element in the sentence is the wh- phrase. If the sentence contains two wh- phrases, only one of them moves and the other remains in- situ.

This rule is applicable to all wh- phrases: argument and adjunct alike. After all the Merge and Move-α operations are finished, the sentence then moves to the LF and PF components of the grammar for interpretation. In LF, the wh- phrase that remained in- situ moves to gain scope over the sentence. In its movement, it adjoins to the wh- phrase already in Spec-CP. However, the indexation of the Spec position is the one of the original wh- phrase.

Subject wh- phrases are one of the difficult analyses of question formation. There are many attempts at a unified analysis. The rule followed here is treating them the same as any other wh- phrase. C carries an uninterpretable EPP feature that attracts the wh- phrase to satisfy it.

3. Cairene Arabic (CA)

3.1 Yes/ No Questions

Yes/No questions in CA are constructed differently than in English. They have the same sentence structure as declarative sentences, for example:

(13) ʕali$_i$ ge-h$_i$[35]   ?el-nahar-dah? /
    ʕali came (MASC. SING.) the-day-this?
    Did ʕali come today?
[$_{CP}$ Q [$_{TP}$ [$_{PredP}$ Ali came [$_{AdvP}$ today]]]]

The derivation of (13) is built in the following way:

Come $_{Merge}$ + AdvP today → *come today*   Pred`
ʕali $_{Merge}$ + Pred` → *came today*    PredP`
T (past tense) $_{Merge}$ PredP → *ʕali came today*   T`

Finally, TP is merged with a null Q- Operator that is base generated under C carrying a +WH feature which gives the clause interrogative force:

C [+WH] $_{Merge}$ + TP →   CP /

---

[35] The letter (h) refers to the suffixed pronoun that accompanies verbs to indicate whether the subject of that verb is masculine (h), feminine (t), or plural (m). this will be presented in details in the section that deals with Subject wh-questions
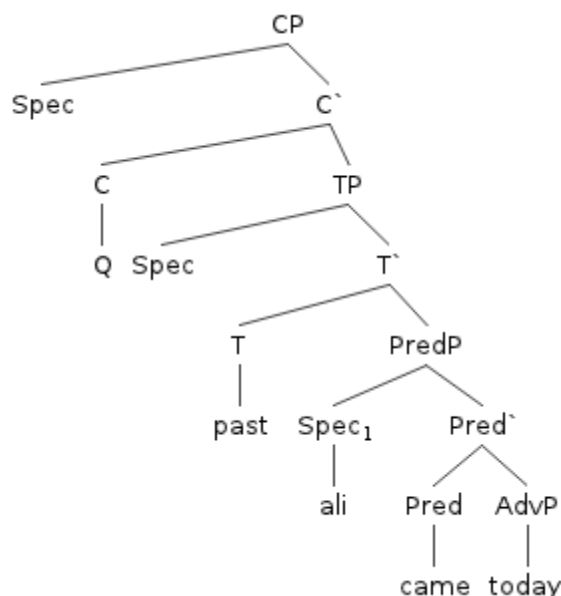
Figure (9)

This derivation then goes to the LF and PF components of the grammar. It is interpreted as an interrogative since C is filled by a [+WH] Q operator. After the sentence in built syntactically as shown above, it is sent to PF which gives it the proper intonation, and in this case, the rising intonation is the phonetic way of distinguishing the sentence as an interrogative one. The symbol (/) means a rising intonation.

C in example (13) is filled with a null Q-Operator which carries a [+WH] feature and a weak TNS feature, hence there is no need for either Subject-Auxiliary Inversion (T- to- C movement).

Another form of Yes/No questions in CA is one that might look like a Verbal Sentence since it starts with a verb, but it is not one, it starts with a small pro. In the following example, the sentence starts with a small pro followed by an overt verb:

(14) teftekry   ʕali geh   ?el-nahar-dah?
     pro(you)+think ʕali came the-day-this?
     You think ʕali came today?
     Do you think ʕali came today?

[$_{\text{CP}}$ Q [$_{\text{TP1}}$ [$_{\text{PredP1}}$ pro(you) think [$_{\text{TP2}}$ [$_{\text{PredP2}}$ ʕali came [$_{\text{AdvP}}$ today]]]]]]

The verb *teftekry* (meaning think) in (14) subcategorizes for a TP. It takes a [-WH] complement, the empty Q- Operator in CP takes wide scope at LF:
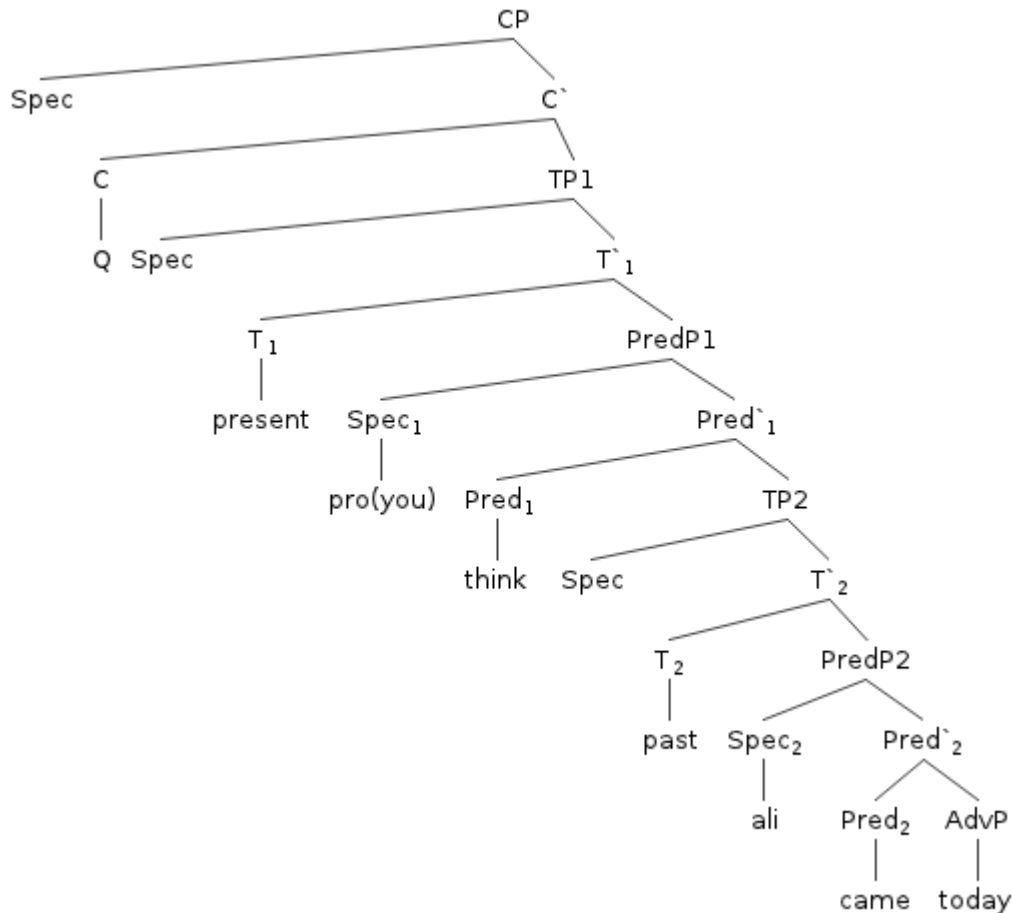
Figure (10)

One of the interesting observations about (14) and CA Yes/No questions in general, is that like English, there can be an element that means *whether* in Spec-CP. According to Radford (2004), English had to resort to a null counterpart of *whether*[36] in Spec-CP to unify the description of all the sentence structure being all CPs containing a specifier that is interrogative in nature.

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[36] The reasoning behind the use of the element *whether* was discussed in the Yes/No section in English, footnote (1).

The Yes/No examples in CA explain the attributes of C and proves that if C in CA allows for the presence of an element under the Spec Position overtly (as in the following example), then it could be present covertly to unify the structure of the questions in CA. The Q -operator can be null and the sentence is grammatical as a CP containing a +WH element under C that characterizes it as an interrogative. This means that C in CA carries an uninterpretable EPP feature, thus requiring Spec-CP to be filled either by an overt or a covert adverb *?iza kān* (meaning *whether*).

This notion of a covert adverb present under Spec-CP shows a similarity between the analysis of English and CA. The MP analysis of Yes/No questions for both of these language varieties is the same.

There are examples with the adverb *iza kān* (meaning *whether*) in CA. This adverb is base-generated under Spec-CP (Professor Batran, thesis advisor). The verb *?āl* (meaning *said*) subcategorizes for a CP in the following example:

(15) ʕali ?āl-li-k ?iza kān ?iʃtara ?el- ʕarabeya
    walla la?? /
      ʕali said –to-you whether was pro(he)-bought the-car
    or no
        ʕali told you whether he bought the car?
      Did ʕali tell you whether he bought the car?
[CP1 Q [TP1 [PredP1 ʕali$_i$ said to you [CP2 whether [TP2 [PredP2 (pro$_i$ he) bought the car [AdvP or not]]]]]]]

The presence of *?iza kān* (meaning *whether*) is overt in example (15), it is base generated under Spec- CP and the following example is one where it is present covertly:

(16) ʕali ?āl-li-k   ?iʃtara   ?el-ʕarabeya walla la?? /
       ʕali said-to-you pro(he)-bought the-car   or   no?
       ʕali told you (whether) he bought the car?
     Did ʕali tell you whether he bought the car?
[CP1 Q [TP1 [PredP1 ʕali_i said to you [CP2 (whether) [TP2 [PredP2 (pro_i he)
bought the car [AdvP or not]]]]]]

The verb *?āl* (meaning *said*) subcategorizes for either a CP or a TP as its
complement. In Example (16), the main verb *?āl* subcategorizes for a
Predicate Phrase complement, Spec-PredP is a small pro co- indexed
with Ali.

   The Adverb *walla la?* (meaning *or not*) in the examples above can be
construed with either the higher or lower PredP, in the higher PredP
interpretation the question is about whether he told you or not. If the
adverb is construed with the lower PredP, the interpretation is going to
be whether he bought the car or not. It depends on the choice of the
speaker.

   An interesting way of asking Yes/No questions in CA is one where the
matrix verb is negated, as in the following example:

   (17) ʕali ma-?āl-ʃ   ?iʃtara   ?el- ʕarabeya walla la?? /
       ʕali did-say-not   pro(he)-bought the-car   or   no?
       Didn't ʕali tell you whether he bought the car or not?
[CP Q [TP didn't [PredP ʕali_i say [TP [PredP (pro_i he) bought the car or not]]]]]

The verb *?āl* in the example presented above subcategorizes for a PredP
complement; Spec-PredP is a small pro co-indexed with the matrix
subject *ʕali*.

   The composition of the negated verb *ma-?āl-ʃ* (meaning *did-say-not*)
comes from the longer version *ma-?āl-ʃei?* (meaning *did not-say-*

something[37]); the (ʃ) sound is the only part of the original word that is used. This ellipsis of sounds is not an unfamiliar convention in any language variety. A close example from English is the contracted (*aren't*) with the original being (*are not*).

3.1.1. The Archi-Pro-Neme

Another way of forming the Yes/No questions in CA is using the *Archi-Pro-Neme* question particle as in the following example:

(18) huwwa$_i$ ʕali$_i$ ge-h$_i$?el-nahar-dah? /
Arch-Pro-Neme(he) ʕali came (MASC. SING.) the-day-this?
QP ʕali came today? /
Did ʕali come today?

[$_{CP}$ QP [$_{TP}$ [$_{PredP}$ ʕali [$_{VP}$ came today]]]]
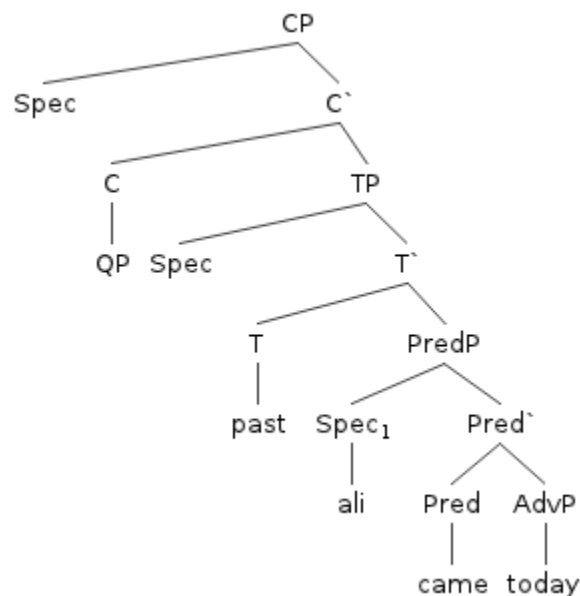
Figure (11)

The derivation of (18) is built exactly as (13), but instead of merging a null Q- operator, the *Archi-Pro-Neme* is used as it carries the [+WH] feature and takes a [+WH] complement.

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[37] This word is the literal translation of the word (*ʃai?*). The idiomatic translation should be (*anything*), but CA does not have a counterpart for *Anything* in it, the closest counterpart could be (*wala ħagah*) (meaning *not a thing*).

The Arch-Pro-Neme was first coined and introduced by Kenstwicz and Wahba (1983). It is a question particle that carries a [+WH] feature marking the sentence as an interrogative. Its form is that of an empty third person pronoun that is base- generated in a sentence- initial position under C. It takes the same gender and number of the following NP to its right. "If such an NP is not available, it surfaces as the unmarked singular *huwwa* (meaning he)." (1983: p 264).

Using the Archi-Pro-Neme gives proof that C in CA Yes/No questions does not carry a strong TNS feature, unlike its counterpart in English which triggers Subject-Auxiliary Inversion. The weak TNS feature of C in CA does not trigger any element to move from T to C. Moreover, when the whole derivation moves to PF, it is given a rising intonation[38], further proof that the construction is marked as an interrogative.

3.1.2. Summary

The analysis of Yes/No questions in CA provides a description of C. The functional head C in Cairene Arabic carries an uninterpretable EPP feature that needs an element in the Spec position. Spec- CP is occupied by either a covert or an overt *?iza kān* (meaning *whether*), like English. The reasoning is that if the adverb is present overtly and occupies a spot in the dialect, then it makes sense that the element is present covertly.

Another feature of C is that it carries a weak TNS feature. This feature does not allow subject-auxiliary inversion.

The construction of Yes/No questions can look like that of a statement. However, since C carries a +WH feature, it might look like a declarative but it is an interrogative. A native speaker would indicate that the sentence is actually an interrogative by using the rising intonation at the end of the sentence.

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[38] The rising intonation is given to differentiate the construction from that of the declarative, which is given a falling intonation in CA.

The Archi-Pro-Neme is used in Yes/No questions as long as it is present in the left-most peripheral position. It carries a [+WH] feature and requires a [+WH] complement.

3.2. A Minimalist Approach to Optionality in WH-Questions: A quick survey

3.2.1. Introduction

As was discussed in the section on English, this language has obligatory wh- movement; C has an uninterpretable EPP feature, which makes it a Probe, triggering the wh- phrase, which is the Goal, to move from its base position to Spec-CP to check that feature, otherwise, the sentence is ungrammatical. In other languages, such as Chinese, C does not carry an uninterpretable EPP feature prohibiting movement all together. These languages have a clear-cut analysis; they tend to be straight- forward about the reasons why wh- movement occurs or not. It is language varieties like CA that prove to be controversial and in need of further research.

There is evidence from other language varieties that exhibit the same Optionality phenomenon, which is presented in the following sub-sections. The analysis given to these language varieties can be applicable to CA. Examples are provided from Iraqi Arabic (IA) and Hindi, which exhibit such optional behavior.

In my conference presentation at Illinois Language and Linguistics Society in 2010, I was introduced to other language varieties, mainly in South East Asia, that exhibit the same optionality phenomenon. Since I was only aware of IA and Hindi during my research, I am only providing the analysis of these language varieties. This topic needs further research and collaboration.

3.2.2. Iraqi Arabic (IA)

Wahba (1991)[39] gives an example from Iraqi Arabic (IA) where a wh-phrase carrying a +WH feature is licensed in any Spec position within the tensed domain of the +Q Comp. In the following example, (example 20 in chapter 1, repeated here as 19), the sentence shows the wh-phrase *meno* (meaning *who*) appearing in its base position and in intermediate Spec positions:

(19) a. [$_{CP1}$ [Mona rɑda-t [$_{CP2}$ [tidʒbir Suʕad [$_{CP3}$ [tisaʕed *meno*]]]]]]?
               Mona wanted   to-force Suʕad   to-help who?
                   +Tns   -Tns   -Tns
     b. [$_{CP1}$ [Mona rɑda-t [$_{CP2}$ [tidʒbir Suʕad [$_{CP3}$ *meno*$_i$ [tisaʕed *e*$_i$]]]]]]?
     c. [$_{CP1}$ [Mona rɑda-t [$_{CP2}$ *meno*$_i$ [tidʒbir Suʕad [$_{CP3}$ *e*$_i$ [tisaʕed *e*$_i$]]]]]]?
     d. [$_{CP1}$ *meno*$_i$ [Mona rɑda-t [$_{CP2}$ *e*$_i$ [tidʒbir Suʕad [$_{CP3}$ *e*$_i$ [tisaʕed *e*$_i$]]]]]]?
     "Who did Mona want to force Suʕad to help?"
   (Wahba 1991: no. 10)

All of the examples in (19) have a direct question reading. The C position in IA does not require the wh-phrase to obligatorily move in order to have its WH-feature checked as in English. The verbs in the embedded clauses are [-TNS], hence the wh-phrase can be found in any intermediate Spec position. If an embedded clause contains a tensed verb, the wh-phrase cannot be interpreted as a matrix question but an embedded one, the following examples represent this:

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[39] There are some changes that were made to the examples in Wahba's article to conform to the rest of the thesis:
     (I)   The Pharyngeal Voiced Fricative (ʕ) (ع) is changed from (') to the symbol (ʕ).
     (II)   The Pharyngeal Voiceless Fricative (ħ) (ح) is changed from (h) to the symbol (ħ).
     (III)   The Palatal Voiceless Fricative (ʃ) (ش) is changed from (sh) to the symbol (ʃ).
     (IV)   The Glottal Voiceless Stop (ʔ) (ء) is added to every example that starts with that sound.
     (V)   The Palatal/Velar Voiced Stop (dʒ) (ج) is added instead of (j).
     (VI)   The Vowel (ɑ) is added instead of (aa) representing the long vowel of "park".
     (VII)   The suffixed pronoun (t) referring to the subject as feminine is separated from the verbs by a hyphen and a co-index is added to relate it to the main subject.

(20) a. [+WH [Mona$_i$ ħawla-t$_i$ [PRO$_i$ *ti ʃteri* ʃeno]]]?
                    Mona tried   to-buy what
      "What did Mona try to buy?"
   (Wahba 1991: no. 15a)

      b. *[+WH [Mona tsawwarat [-WH [Ali ?iʃtara ʃeno]]]?
                    Mona thought   Ali bought what
      "What did Mona think Ali bought?"
   (Wahba 1991: no. 15b)

Simpson (2000) corroborates Wahba's (1991) views and says that the domain for checking the WH- feature in IA is the tensed domain of the +WH Comp. He states the following as conclusions for his analysis of IA:

   a. All The wh- phrases of IA need their wh- feature to be checked.
   b. The functional head C in IA does not carry any uninterpretable features that demand any element to be moved to its Spec position.
   c. All the +WH features must be checked before Spell- Out. This solution contra Bošković (1997) where C is introduced at LF.
   d. The checking domain for the wh- feature carried by the wh- phrase in IA is the tensed domain of the +Q Comp. The wh- phrase can occur in any intermediate Spec- position m- commanded by that +Q Comp and be interpreted as a main question.

3.2.3. Hindi

Simpson (2000) also gives examples from Hindi, where the wh- phrase can be found optionally in its base position or in Spec-CP. The WH- feature carried by the wh- phrase can be checked in any position m- commanded by the +Q Comp in its own immediate tense domain:

(21) [CP [TP Raam-ne [Mohan-ko   kise   dekhne-ke liye] kahaa]]
         Raam-ERG Mohan-ERG   whom to-see   for   told
   "Who did Ram tell Mohan to look at?"
  (Simpson 2000: no. 18)

(22) [CP1 kOn [TP Raam-ne [VP kahaa [CP2 ki *t* aayaa-hE]]]]
         Who   Ram-ERG   said   that has-come
      "Who did Ram say has come?"
  (Simpson 2000: no. 20)

3.2.4. Cairene Arabic (CA)

The sentence construction for wh- questions in CA takes two forms: one
with the wh- phrase in its base position, in- situ; and one where the wh-
phrase is found in Spec-CP. The basic construction is the in- situ one, as
in the following example:

(23) ?el-walad   fein?
      The-boy   where?
      Where is the boy?
[CP Q [TP [PredicateP the-boy where]]] [40]

```
                        CP
          _____|_____
        Spec                      C`
                        _____|_____
                       C                   TP
                       |            _____|_____
                       Q  Spec              T`
                              _____|_____
                             T              PredicateP
                             |         _____|_____
                          present   Spec         Predicate`
                                              _____|_____
                                          Predicate    AdvP
                                             |           |
                                          the-boy      where
```
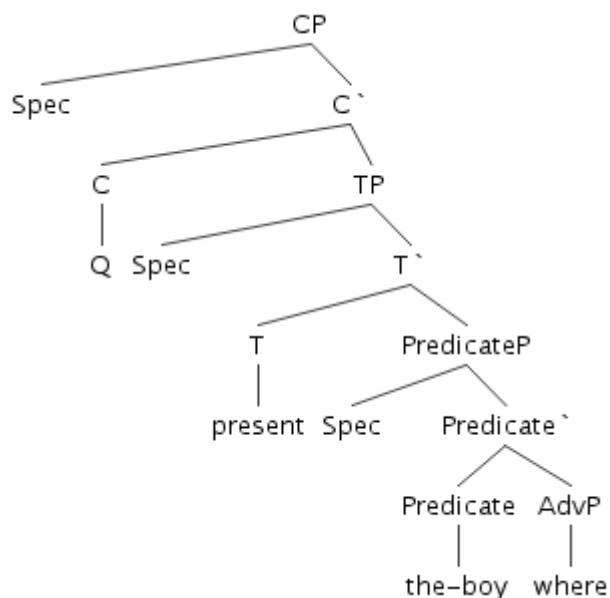
Figure (12)

The following example is one where the wh- phrase is in a Spec-CP position:

   (24) fein   ?el-walad? /
        Where the-boy?
        Where is the boy?
[CP where Q [TP [PredicateP the-boy]]]

```
                        CP
          _____|_____
       Spec₁                     C`
         |              _____|_____
       whereᵢ   C                   TP
                       |            _____|_____
                       Q  Spec              T`
                              _____|_____
                             T              PredicateP
                             |         _____|_____
                          present   Spec         Predicate`
                                              _____|_____
                                          Predicate    AdvP
                                             |           |
                                          the-boy      tᵢ
```
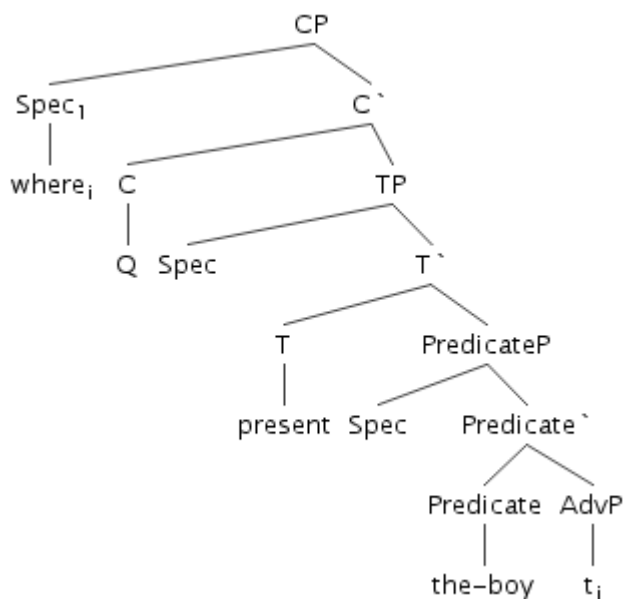
Figure (13)

This phenomenon can be explained by arguing that it is the wh- phrase itself which carries the wh- feature that gets into a checking relation with the functional head C either in the in-situ position or the Spec-CP position. Thus, following Simpson (2000)'s examples taken from Iraqi Arabic and Hindi, this Optionality can be attributed to the behavior of the wh- phrase itself. It needs its wh- feature to be checked by the + Q Comp, it can either move to the Spec-CP or remain in- situ.

3.2.5. Summary

Simpson (2000) is utilizing the wh- feature carried by the wh- phrase. Instead of postulating two functional heads C existing in the same language that would accommodate for this optionality phenomenon, or assuming that C is introduced to the derivation at LF. This is the stand taken in this study to explain Cairene Arabic as another dialect that has the same optionality phenomenon.

3.3. Argument Wh- Questions

The canonical position of wh- phrases is the In-Situ one:

   (25) ħasal   ?eh?
       Happened what?
       What happened?
[$_{CP}$ Q [$_{TP}$ [$_{PredP}$ happened what]]]

```
                              CP
                    _____/    \
                  Spec            C`
                            _____/    \
                           C           TP
                           |        __/   \
                           Q   Spec        T`
                                      ___/    \
                                    T          PredP
                                    |            |
                                  past         Pred`
                                             __/    \
                                          Pred       NP
                                            |          |
                                        happened     what
```
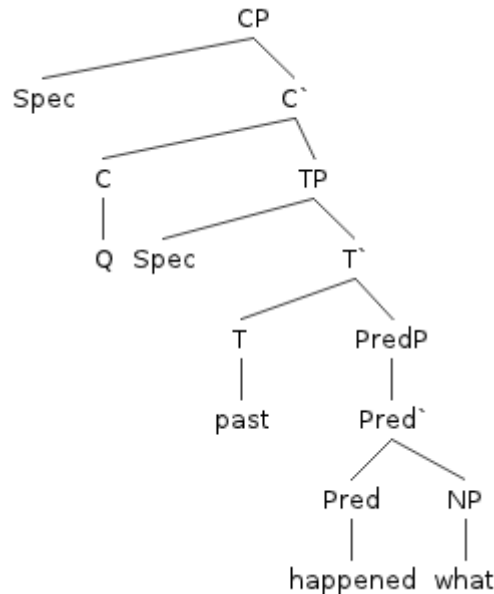
Figure (14)

At LF, the wh- phrase moves to Spec-CP to gain wide scope (Professor Batran, thesis advisor):

a. [CP ?eh$_i$ Q [TP [PredP ħasal   t$_i$]]]
   [CP what$_i$ Q [TP [PredP happened t$_i$]]]

The wh- phrase carries a [+WH] feature and it is checked by the +Q Comp in- situ.

   If example (25) is compared to the following example (26), it will prove the hypothesis that the canonical position for the wh-phrase in CA is in-situ:

   (26) *?eh   ħasal?
           What happened?

Example (26) is ungrammatical because the wh-phrase here is in Spec-CP unaccompanied by the complementizer *?illi* (meaning *that*) which is obligatorily present in all argument wh-phrases found in Spec-CP.

The complementizer *?illi* is the slang form of the Standard Arabic (SA) form ?a*llaði* (meaning *that*). This word is used as a modifier of Nouns. They are a family of modifiers that are gender specific. An example is the following:

(27) ?al-kitab-u ?allaði katab-tu-hu yakoon-u l-ak.
The-book$_i$ that wrote-I-it$_i$ is to-you.
(NOM. MSC. SNG.) (MSC. SNG.)
The book that I wrote is yours.

[$_{CP1}$ [$_{TP}$ the book$_i$ [$_{CP2}$ that wrote-I-it$_i$] [$_{VP}$ is yours]]]

This complementizer is base generated in C and it is only used with argument wh- phrases found in Spec-CP. With argument wh- phrases found in Spec-CP, otherwise, the sentence will be ungrammatical:

(28) ?eh ?illi ħasal?
What that happened?
What is it that happened?

[$_{CP}$ what$_i$ that [$_{TP}$ [$_{PredP}$ happened t$_i$]]]
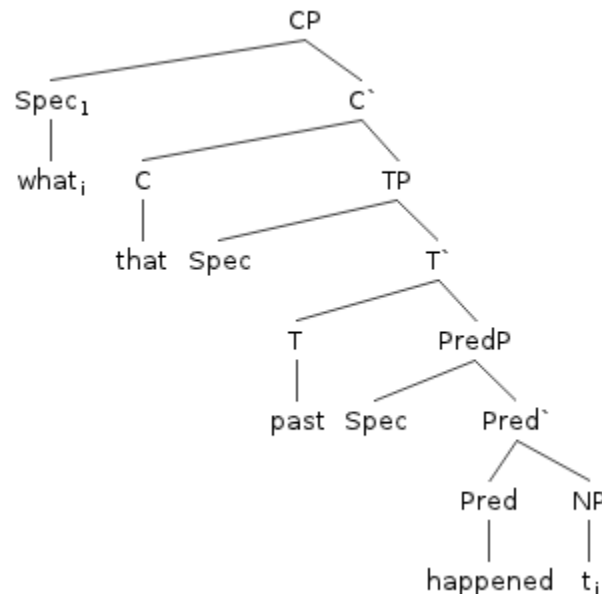
Figure (15)

The wh- phrase carries a +WH feature and it is checked by the +Q Comp in Spec-CP.

   ?Anhi- NP (*which-NP*) has the same Optionality of the positions of the wh- phrases and the presence of *?illi*:

   (29) ?enty ʕawz-a   ?anhi   kitab?
        You   want (FEM. SNG) which   book?
        Which book is it you want?
[CP Q [TP [PredP you want which book]]]
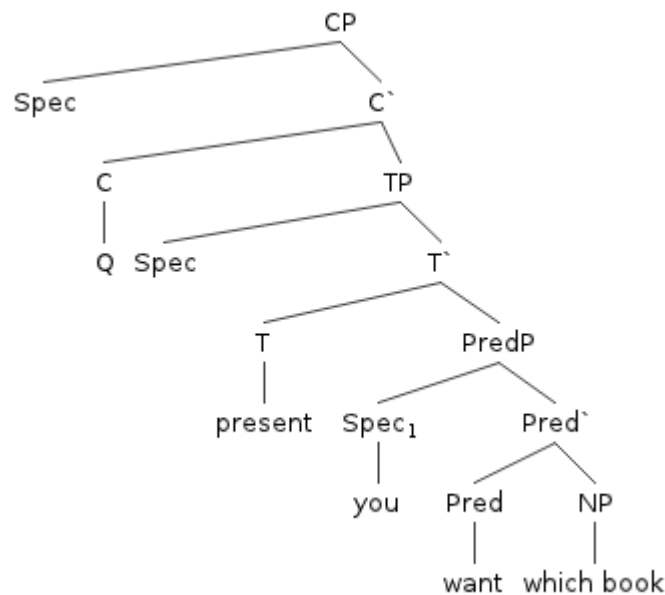
Figure (16)

Example (29) can be compared to example (25) given in the beginning of this section. The behavior of both examples where the wh- phrase is found in the in-situ position corroborates the assumption that the canonical position of the wh-phrase is the in-situ position.

The following example has the wh-phrase in Spec-CP. The presence of the complementizer is obligatory:

(30) ?anhi   kitab$_i$-dah[41] ?illi ?enty ʕawza-h$_i$?
      Which book$_i$-this   that you want-it$_i$?
      Which book is it that you want?
[$_{CP}$ which book$_i$-this that [$_{TP}$ you [$_{PredP}$ want-it$_i$]]]
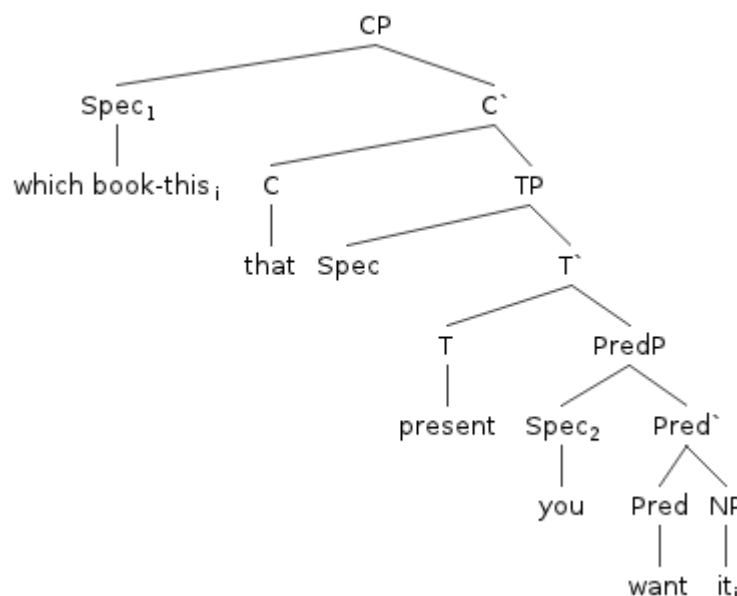
Figure (17)

The above mentioned example could be compared to the following ungrammatical example where the complementizer is not present:

(31) *?anhi   kitab$_i$-dah[42] ?enty ʕawza-h$_i$?
      Which   book$_i$-this   you want-it$_i$?
      Which book is it you want?
[$_{CP}$ which book$_i$-this Q [$_{TP}$ you [$_{PredP}$ want-it$_i$]]]

The ungrammaticality of (31) is due to the omission of the complementizer, since the semantics of the sentence needs it for completing the meaning.

---

[41] The demonstrative *dah* (meaning *this*) is a dummy used in CA a lot; its meaning does not affect the interpretation of the sentence. It is merely used as slot filler; otherwise the sentence would feel to a native speaker as one where it might be construed as ungrammatical.

[42] The demonstrative *dah* (meaning *this*) is a dummy used in CA a lot; its meaning does not affect the interpretation of the sentence. It is merely used as slot filler; otherwise the sentence would feel to a native speaker as one where it might be construed as ungrammatical.

3.3.1. The Archi-Pro-Neme

The Archi-Pro-Neme is also used with matrix wh- questions in either positions of the wh- phrase as long as the Archi-Pro-Neme is at the most peripheral position in the sentence:

    (32) huwwa ħasal   ?eh?
         QP   happened what?
      What happened?
[$_{CP}$ it [$_{TP}$ [$_{PredP}$ happened what]]]]
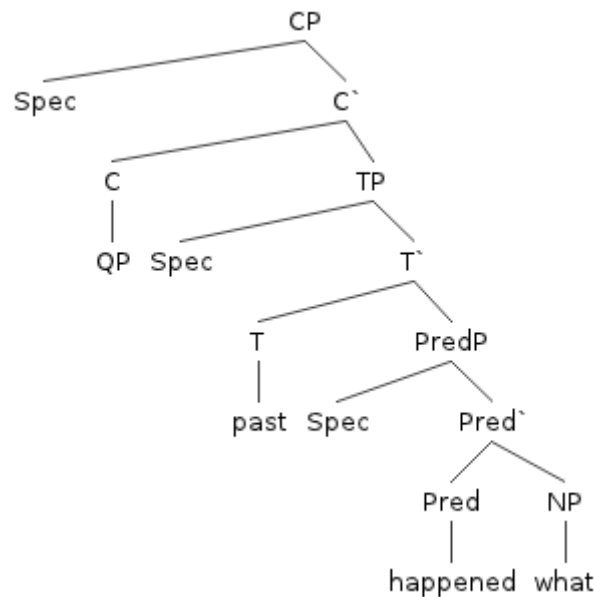
Figure (18)

At LF the WH- phrase moves to Spec-CP to gain wide scope over the sentence:

a. [$_{CP}$ eh$_i$ huwwa [$_{TP}$ [$_{PredP}$ ħasal t$_i$]]]]
   [$_{CP}$ what$_i$ it [$_{TP}$ [$_{PredP}$ happened t$_i$]]]]

Optionality occurs with the Archi-Pro-Neme constructions as long as its most important attribute is maintained: being at the most left peripheral position:

(33) huwwa ?eh   ?illi ħasal?
　　It　　　what that happened?
　　What happened?
[$_{CP1}$ [$_{CP2}$ QP] [$_{CP3}$ what$_i$ that [$_{TP}$ [$_{PredP}$ happened t$_i$]]]]
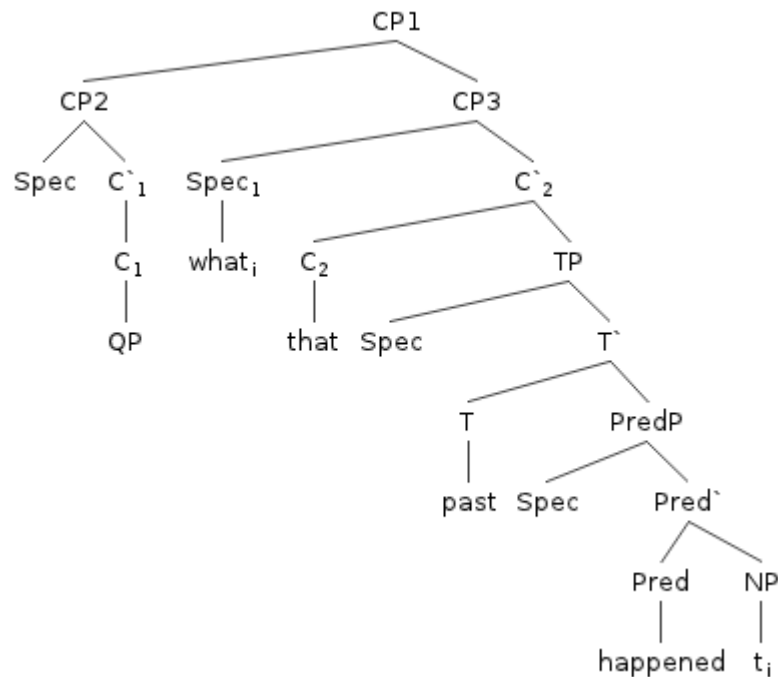
Figure (19)

3.4. Subject Wʜ-Questions

All subject wh- phrases in CA are found in the Spec-CP position and all
are obligatorily accompanied by the complementizer *?illi* (meaning
that):

(34) meen$_i$?illi   ge-h$_i$[43]　　　　　　　?el-nahar-dah?
　　Who   that   came   (Mᴀsᴄ. Sɪɴɢ.) the-day-this
　　Who is it that came today?
[$_{CP}$ who$_i$ that [$_{TP}$ [$_{PredP}$ t$_i$ came [$_{AdvP}$ today]]]]

---

[43] When the gender of the person is not known, the default version of the Masculine, singular pronoun is used.
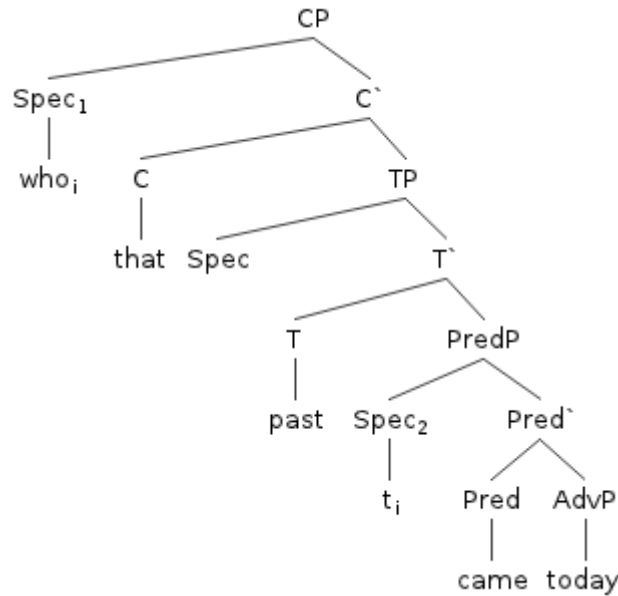
Figure (20)

The above example is formed as follows:

Come $_{\text{Merge}}$ + today → *come today*   Pred`
Who $_{\text{Merge}}$ + come today → *who come today*   PredP
T (past) $_{\text{Merge}}$ + who come today → *who came today*   TP
C (+wh) $_{\text{Merge}}$ + who came today → *who came today*   C`
Who $_{\text{Move}}$ → *who that came today*   CP

The wh- phrase carries a +WH feature and moves to Spec-CP. The wh-phrase moves from Spec-TP to Spec-CP after the merging of *?illi* (meaning that).

   Since it is established that C in CA does not carry an uninterpretable EPP feature that would require the wh- phrase to obligatorily move to Spec-CP, it is only safe to assume that subject wh- phrases are no different from any other wh- phrase that gets into a checking relation with the functional head C in the Spec-CP position. In the case of this type of wh- questions, the wh- feature carried by the wh- phrase is always checked in the Spec-CP position.

3.4.1. The Archi-Pro-Neme

The use of the Archi-Pro-Neme takes a different approach in subject wh-questions, in that it is adjoined to the matrix CP via Chomskian Adjunction:

(35) huwwa$_i$ meen$_i$?illi ge-h$_i$?el-nahar-dah?
     it   who   that came (SNG.- MASC.) the-day-this?
     Who is it that came today?
[$_{CP1}$ [$_{CP2}$ he$_i$] [$_{CP3}$ who$_i$ that [$_{TP}$ [$_{VP}$ came [$_{AdvP}$ the-day-this]]]]]]

Huwwa is base generated under C carrying the +WH feature.
Since the wh- phrase is present in Spec-CP, the Archi-Pro-Neme is derived as CP2, then it adjoins to the wh- question derived as CP3 forming the higher CP1. The Archi-Pro-Neme is co- indexed with the wh- phrase. One of the attributes of the Archi-Pro-Neme is that it agrees with the following NP taking its gender and number. In the above example, the verb is Singular and masculine which is the reason the wh-phrase is interpreted as a Singular and Masculine. Consequently, the Archi-Pro-Neme is the form *huwwa* (meaning he).

In the following example, the verb *gat* (meaning came) is Singular and feminine. Hence, interpreting the wh- phrase as also +feminine which consequently make the Archi-Pro-Neme appear in the feminine form *hiyya* (meaning she):

(36) hiyya$_i$ meen$_i$?illi ga-t$_i$?el-nahar-dah?
     She   who   that came (SNG.- FEM.) the-day-this?
     Who is it that came today?
[$_{CP1}$ [$_{CP2}$ she$_i$] [$_{CP3}$ who$_i$ that [$_{TP}$ [$_{VP}$ came [$_{AdvP}$ the-day-this]]]]]]

The following example is one where the verb of the sentence is Plural. Thus, interpreting the wh- phrase as plural and the Archi-Pro-Neme will be the plural form *humma* (meaning they):

(37) humma$_i$ meen$_i$?illi   go-m$_i$[44]   ?el-nahar-dah?
    QP(They) who   that came (PL.) the-day-this?
    Who is it that came today?
[$_{CP1}$ [$_{CP2}$ they$_i$] [$_{CP3}$ who$_i$ that [$_{TP}$ [$_{VP}$ came [$_{AdvP}$ the-day-this]]]]]]

3.4.2. Summary

The wh- phrase in Subject wh- questions in CA is always in Spec-CP. The wh- feature carried by the wh- phrase gets into a checking relation with C and it is checked with the wh- phrase in Spec-CP. The complementizer *?illi* (meaning that) is obligatorily present in subject wh- questions for semantic reasons. The sentence is ungrammatical without it.

   The Archi-Pro-Neme adjoins via Chomskian Adjunction to the CP creating a higher CP projection. It also takes different formats according to the interpretation of the following NP (wh- phrase). It could take the Singular Masculine form *huwwa*, the Singular Feminine form *hiyya* or the Plural form *humma*.

3.5. Adjunct Wʜ- Questions

Wh- adjunct phrases in CA are: Fein (*where*), Leh (*why*), ?ezzay (*how*), ?emta (*when*). Their behavior is the same as argument wh- phrases, they are found in both optional positions: in Spec-CP and in-situ and the wh- feature is licensed by the +Q Comp in the in- situ position or in Spec-CP.

   With the exception of *fein* (meaning *where*) (which will be discussed in the following sub- section), all adjunct wh- phrases are found in either optional position. The following is an example using the wh- phrase *leh* (meaning *why*) with the apparent optional occurrence of the wh- phrase starting with the wh- phrase in the in-situ position:

---

[44] The vowel changes in the plural form from the (i) to (o) for morphological reasons.

(38) ʕamal-t   keda leh?
    Did+pro(you)   this   why?
    Why did you do this?
[CP Q [TP [PredP pro(you) did this why]]]
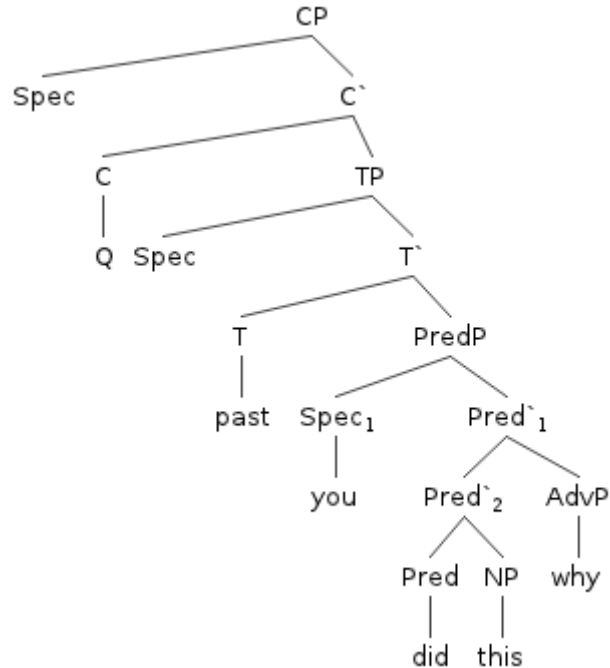
Figure (21)

At LF, the wh- phrase moves to Spec-CP to gain wide scope over the sentence. The wh- feature of the wh- phrase is checked in-situ by the Q operator found in C:

a. [CP leh$_j$ Q [TP pro$_i$ [VP ʕamal-t$_i$ keda t$_j$]]]
   [CP why$_j$ Q [TP you [VP did   this t$_j$]]]

The following shows the above example with the wh- phrase appearing in Spec-CP position:

(39) leh   ʕamal-t   keda?
      Why did+you   this?
      Why did you do this?
[CP why$_j$ Q [TP [PredP pro(you) did this t$_j$]]]
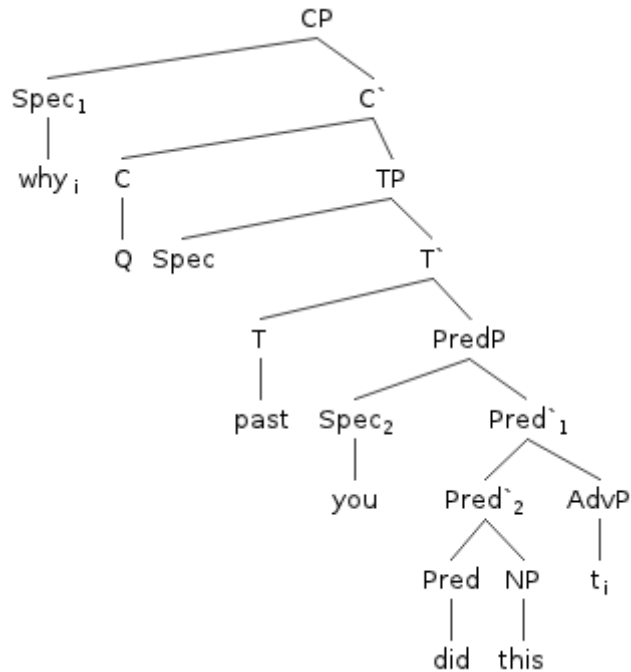
Figure (22)

3.5.1. The wh- phrase *Fein* (where)

The behavior of this wh- phrase differs from the other adjunct wh-phrases in that it is always found in the in- situ position. The following example is one where the adjunct wh-phrase ezay (meaning *how*) is used in-situ:

(40) roħt   ezzay ?el-nahar-dah?
       Went-pro(you) how   the-day-this?
       How did you go today?
[CP Q [PredP you went how today]]]

Example (40) is compared to example (41) where the wh- phrase *fein* is also found in- situ:

(41) roħt   fein   ?el-nahar-dah?
     Went-pro(you) where the-day-this?
     Where did you go today?
[CP Q [TP [PredP you went where]]]

C is the null Q operator and *fein* (where) is in situ. At LF, *fein* moves to Spec- CP to gain wide scope over the sentence:

a. [CP fein_i   Q [TP [PredP roħt pro el-nahar-dah t_i]]]
   [CP where_i Q [TP [PredP you went t_i]]]

Whereas the one with the wh- phrase is in Spec- CP position for the same numeration is ungrammatical:

(42) *fein   roħt   ?el-nahar-dah?
      Where went-pro(you) the-day-this?
      Where did you go today?

This particular wh- phrase is different from the other adjunct wh- phrases in that if the wh- phrase *fein* is to be found in Spec-CP, it has to be in a verbless construction (the Predicate Phrase of Arabic), in that it cannot be followed by the verb of the sentence. The wh- phrase is followed by an NP and this NP can be modified by CP. In this example, the NP is *el-makan* (the place) and it is modified by a CP headed by *illi* (that):

(43) fein   ?el-makān_j ?illi ?enta roħt-uh_j?
     Where   the-place_j   that you   went-it_j?
     Where is the place that you went to?
[CP where_i Q [TP the-place_j [CP that [TP [PredP you went-it_j t_i]]]]]

3.6. Summary

The analysis for matrix wh- questions in CA treats this dialect as one with optionality in the positions of the wh- phrase. It is analyzed as one

where the wh- feature carried by the wh- phrase gets into a checking relation with the functional head C either in- situ or in Spec-CP.

With the exception of the wh- phrase Fein (meaning *where*) where it can only be found in-situ, all wh- phrases in CA can appear in both positions; argument and adjunct wh- phrases alike.

3.7. Embedded WH-Questions

Like Matrix wh- questions, embedded wh- questions also have the Optionality observed in the placement of the wh- phrases. The following example represents the instance with the wh- phrase in- situ:

(44) Mona ʕawza teʕraf ħasal   ?eh.
     Mona wants know happened what.
     Mona wants to know what happened.

The verb *ʕawza* (meaning want) subcategorizes for a [-WH] complement:

a. [$_{CP1}$ [$_{TP1}$ [$_{PredP1}$ Mona want [$_{CP2}$ [$_{TP2}$ [$_{PredP2}$ know [$_{CP3}$ Q [$_{TP3}$ [$_{PredP3}$
    happened what]]]]]]]]]]
    [-WH]   [-WH]   [+WH]
                                              ↑--------------↑
                          ↑--------------//-------------------------↑
       ↑----------------------//--↑

The LF representation is in (b) shows that the wh- phrase cannot move into neither Spec-CP1 nor Spec-CP2 for they contain a C carrying a – WH, this forces the wh- phrase to only move to Spec-CP3 as it is the only legitimate landing site gaining narrow scope interpretation:

b. [CP [TP Mona [PredP ʕawza [CP [TP [PredP teʕraf [CP ?ehᵢ   [TP [PredP
   ħasal   tᵢ]]]]]]]]]
      [CP [TP Mona [PredP want   [CP [TP [PredP know [CP whatᵢ [TP [PredP
   happened tᵢ]]]]]]]]]

Optionality continues with embedded questions, the following example
is the same Input and structure as example (41), but in example (42), the
wh- phrase is in Spec-CP3 position:

(45) Mona ʕawza teʕraf ?eh   ?illi   ħasal.
     Mona wants know what that   happened
     Mona wants to know what happened.

[CP1 [TP1 Mona [PredP1 want [CP2 [TP2 [PredP2 know [CP3 whatᵢ that [TP3
   [PredP happened tᵢ]]]]]]]]]]
   [-WH]   [-WH]   [+WH]
                                                        ↑---------------↑
                                   ↑--------------------//-------------------↑
         ↑--//---------------------------↑
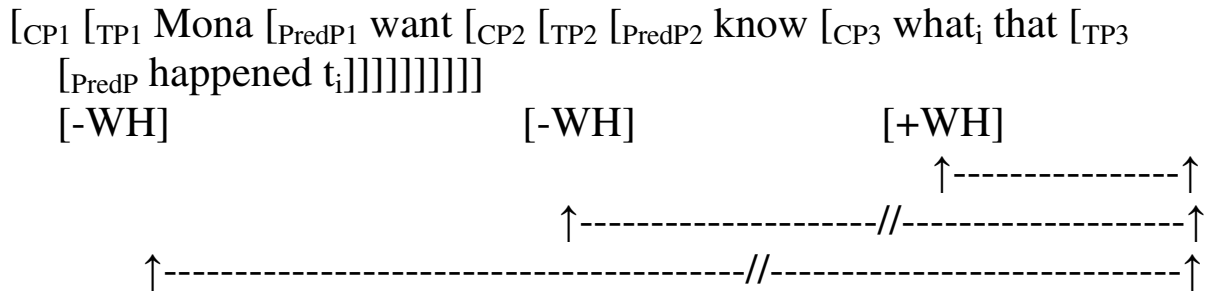
The LF representation of example (42) is the following:

[CP [TP Mona [PredP ʕawza [CP [TP [PredP teʕraf [CP ?ehᵢ   ?illi [TP [PredP
   ħasal   tᵢ]]]]]]]]
      [CP [TP Mona [PredP want   [CP [TP [PredP know [CP whatᵢ that [TP [PredP
   happened tᵢ]]]]]]]]

The following is an example of an embedded adjunct wh- phrase:

(46) Aħmad ʕaref   Mona ʕawza terouħ fein.
     Aħmad knows Mona wants   go   where.
     Aħmad knows where Mona wants to go.

The verb *ʕaref* (meaning know) subcategorizes for either a [+WH] or [-WH][45] complement, in this example a [+WH] one:

a. [CP1 [TP1 Aħmad know [CP2 Q [TP2 Mona want [CP3 [TP3 go where]]]]]]
   [-WH]   [+WH]   [-WH]

                                               ↑------//---------↓

                       ↑---↓

b. [CP1 [TP1 Aħmad [VP1 ʕaref [CP2 fein_i [TP2 Mona [VP2 ʕawza [CP3 [TP3 [VP3 terouħ t_i]]]]]]]]]]
    [CP1 [TP1 Aħmad [VP1 know [CP2 where_i [TP2 Mona [VP2 want [CP3 [TP3 [VP3 go t_i]]]]]]]]]]

The active participle *ʕaref* taken from the verb *yeʕraf* (meaning know)[46] subcategorizes here for a [+WH] compliment (as shown in (a) and the LF representation (b)), which makes Spec-CP2 a valid landing site for the wh- phrase at LF, taking narrow scope.

   Further movement to Spec-CP1 or Spec-CP2 is prohibited and unnecessary since it violates the Economy Principles of Chomsky (1995b) paraphrased by Speas (1997: 185):

- Least Effort: Make the *fewest number of moves possible.*
- Procrastinate: Do not move overtly *unless overt movement is forced by some UG principle.*
- Greed: Do not move X *unless X itself has a feature that is satisfied via that movement.*
- Minimality: Movement must be to the *closest possible landing site.*
- Minimize Chain Links: Long- distance dependencies must be *as short as possible.*

---

[45] The [-WH] complements are not the scope of this study, but an example of that is:
(I)   ?ana ʕarfa ?inn ?el-samak taza.
        I   know that the-fish   fresh.
        I know that the fish is fresh.
[46] The *active participle* is single, present, and masculine like the verb it is taken from.

At LF, the wh- phrase moves to the intermediate Spec- CP2 and gains narrow scope giving the sentence an embedded question reading. Spec-CP1 is unavailable as a landing site for the wh- phrase because C1 carries a [-Wʜ] feature.

These examples (and others like them) give further evidence pertaining to the legitimacy of the LF level in linguistic analysis. If LF didn't exist, how else would there be an explanation to the scope differences between matrix and yes/no questions on the one hand, and embedded questions on the other.

3.8. Multiple Wʜ- Questions

3.8.1. Argument multiple Wʜ- Questions

CA allows for the multiple occurrence of the argument wh- phrases as long as they are both in- situ. It does not allow the presence of one wh-phrase in Spec position and another in- situ:

(47) ?enta$_i$ edei-t$_i$?eh   le-meen?
    You   gave   what   to-whom?
    What did you give to whom?
[$_{CP}$ Q [$_{TP}$ [$_{PredP}$ you gave what [$_{PP}$ to-whom]]]]

Possible answer: ?edeit ?el-ʃanta le-ʕali, we   ?el-badla le-Aħmad.
        (pro) gave   the-bag   to ʕali, and the-suite to Aħmad.
        I gave the bag to ʕali and the suite to Aħmad.

The LF representation of (47) is the following, the two wh- phrases move to Spec- CP; however, they do not adjoin to each other:

a. [$_{CP}$?eh$_j$ + meen$_k$ Q [$_{TP}$ [$_{PredP}$?enta$_i$?edei-t$_i$ t$_j$ [$_{PP}$ le-t$_k$]]]]
   [$_{CP}$ what$_j$ + whom$_k$ Q [$_{TP}$ [$_{PredP}$ you gave   t$_j$ [$_{PP}$ to-t$_k$]]]]

Optionality here is not possible to either wh- phrase:

(48) *?eh$_i$?illi ?enta ?edeit-uh$_i$ le-meen?
     What$_i$ that you gave-it$_i$ to-whom?
      What is it that you gave to whom?

(49) *meen$_i$?illi ?enta ?edeit-l-uh$_i$?eh?
     Whom that you   gave-to-him what?
     Who is it that you gave what to?

In (48), *?eh* (what) already exists in Spec- CP, which means that any wh- phrase that moves to that position will have to absorb the indexation of the original host of that position, in this case *eh$_i$*. If *meen* (whom) is present in the Spec position, as in (49), the same reason for the ungrammaticality applies. Furthermore, both examples are ungrammatical because CA does not allow the presence of one wh- phrase in Spec position and another in- situ at the syntactic level in matrix wh- questions.

3.8.2. Adjunct multiple WH- Questions

CA does not allow for the presence of two adjunct wh- phrases in multiple wh- questions either in- situ or in Spec-CP:

(50) *?enta ʕamal-t keda leh   ?ezzay?
      You did-you this   why how?

The reason for the ungrammaticality of the above example is that the second wh- phrase *?ezzay* (meaning how) is [- Case]. Optionality cannot save the derivation from crashing. The following example is ungrammatical:

(51) *?ezzay ?enta ʕamal-t   keda leh?
      How   you   did-you this why?

3.8.3. Summary

There is an asymmetry in the analysis of multiple wh- questions in CA. Argument wh- phrases can appear together in a sentence as long as they both remain in- situ, whereas adjunct wh- phrases can not behave in the same way. The reason for that is that the second adjunct wh- phrase is [-Case].

3.9. Conclusion

Question formation in the Minimalist Program relies on the use of Features. These features can trigger movement of the wh- phrase itself (Epp carried by C in English), can trigger subject- auxiliary inversion (Strong Tns carried by C in English), or can get into a checking relation with the functional head C (Wh carried by the wh- phrase in Cairene Arabic).

   Yes/No questions are formed without a wh- phrase in both language varieties. C in both English and CA carries an uninterpretable Epp feature that forces the presence of an adverb in Spec-CP, *whether* in English and its counterpart *?iza kān* in CA. C, in English, carries a Strong Tns feature that prompts Subject-Auxiliary-Inversion. If an auxiliary is not present in the numeration, the dummy *Do* is inserted to check that feature thus prompting T-to-C movement. This is not the case in CA where C carries a weak Tns feature which does not require an element under it.

   Cairene Arabic presents an interesting case of Optionality. Wh- phrases, both argument and adjunct (with the exception of Fein- where), can be found either in- situ or in Spec-CP. The analysis from Iraqi Arabic and Hindi is applicable to CA. Both of these language varieties have optional placement of the wh- phrase. The analysis is that the wh- feature carried by the wh- phrase itself gets into a checking relation with the functional head C either in the in-situ position or the Spec-CP one.

It is only with the argument wh- phrases that the complementizer *?illi* (meaning that) is found and solely in the case of the wh-phrase found in Spec-CP. Its presence with adjunct wh- phrases is prohibited.

Subject WH- questions are treated as CPs. Their behavior is the same as all wh- phrases. In English, the wh- phrase moves from Spec-TP to Spec- CP to satisfy the EPP. In CA, the wh- phrase gets into a checking relation with the functional head C to check the wh- feature carried by the wh- phrase itself.

In Multiple wh- questions in CA, there is an asymmetry in the behavior between argument and adjunct wh- phrases. It is not allowed for adjunct wh- phrases to appear together in multiple constructions. While it is allowed for argument wh- phrases as long as they remain both in- situ.

In embedded wh- questions, the wh-phrase moves to the Spec-CP position of the nearest embedded [+WH] Spec-CP position since the matrix C is [-WH].

The subject of the LF covert movement is treated the same between English and CA. The wh- phrase moves at LF to the highest Spec-CP position to gain scope in main questions, except in the case of embedded wh- questions.

CHAPTER 3

QUESTION FORMATION
IN OPTIMALITY THEORY

1. Introduction

The route taken by Optimality Theory (OT) in forming questions (and sentence constructions in general) is quite different from previous theories. Here, OT relies on the violability of ranked constraints as a criterion to choose which form is the one used in the language. Also, the display used in showing the analysis is not the tree diagram of Principles and Parameters Theory and the Minimalist Program, but the tableau. In these tableaux, the competition between the candidates ensues until the optimal form is chosen as the winner; the constraints are put in these tableaux in a descending method from left to right, the most important then the less important and so on.

In his book "*Doing Optimality Theory: Applying Theory to Data*", McCarthy (2008) describes the method with which to form an analysis in Syntax. The following is an account of his analysis of *Do-* Support in Grimshaw's 1997 article: "*Projections, Heads, and Optimality*". He describes how she chose the problem, the observations about a certain phenomenon, choosing which candidates to involve in the competition, choosing the constraints involved in the competition, the Input she uses, and how she came to rank the constraints involved in a hierarchy. This is the same methodology McCarthy uses for phonology and according to him it proved to be applicable to Syntax as well[47].

1.1. How to Choose a Problem

Topics of research in Linguistics used to be limited to finding a phenomenon in a single language and studying it. That was, and still is in some models of Research, the common practice of linguists. Depending on the length of the paper or dissertation, a phenomenon in a certain language is chosen, and an extensive work is done to explain and describe it. However, that is not a practical method for an OT- based model of research.

Recent topics of research depend mostly on describing phenomena Cross- Linguistically. More languages are being used in a single paper or dissertation. This method helps the research community find answers to minute questions about human language behavior and language ability in general. It also helps in understanding Universal Grammar (UG) in a sense that would bring world languages together. It helps in proving or refuting theories of linguistic research.

Minimizing the topic of research, choosing the data to support it, and studying it cross- linguistically is the base of an OT- analysis model. The job of the OT- analyst according to McCarthy is given in the following statement:

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[47] The analysis for English and CA took the same root as this account of Grimshaw's paper. In the section discussing CA, I shall not repeat how I came to my conclusions about the ranking of the constraints, for this is how.

> "The analyst must sometimes modify old constraints or posit new ones, in addition to ranking a set of given constraints. Any OT analysis is a partial theory of CON as well as a description of some facts. The ultimate goal of the analysis is to support claims about the universal properties of CON. Success depends on how well the evidence does that." (p 31)

The guidelines for a topic are the indications of systematic "inconsistent behavior" which is a sign for constraint interaction. This is the base for conflict, competition, and finally choosing the optimal form. Inconsistent behavior is marked by noticing the phrases "'except when' or 'only when' ". For example, the need for Do- Support in English questions; the auxiliary *do* is not inserted except when it is needed to satisfy a constraint prohibiting maximal projections to be head-less (OB-HD). Finding a topic with these guidelines in mind makes it easier for the OT- analyst to study the constraint interaction phenomena in a structured way.

McCarthy does not analyze the entire article; he only tackles *Do-Support*. The data[48] he uses are the following examples:

(1) a. Robin ate apples.
     *Robin did eat apples. (Unstressed *did*)

    b. What did Robin eat?
      *Robin ate what? (As an matrix question, not an echo one)
      *What Robin ate?
      *What Robin did eat?

    c. What will Robin eat?
      *Robin will eat what?

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[48] McCarthy did not use a duplicate of the Grimshaw examples but they present the same concept.

  *What will Robin do eat?
  *What does robin will eat?
 (McCarthy 2008: no. 64)

This data shows *Do* in various situations, example (b) where it is required, and (a, c) where its presence is unnecessary, it renders the sentences ungrammatical. The first step towards describing such a phenomenon of a language is to discuss the Input of such data used which is the following section.

1.2. The Input

The Input of an analysis, in the abstract sense, is the lexicon of the specific language that pertains to the phenomenon being analyzed. The difference between languages is not the lexicon; rather it is how the constraints rank in a hierarchy in order to describe that lexicon in action (the data provided).

 This concept is called *Richness of the Base* (Prince and Smolenksy 2004: pp 205, 225). The base is the input of the language, meaning its lexicon; richness is the myriad forms of that lexicon in the language. Every language has for example many forms to ask the same question, these forms could be grammatical/ ungrammatical in comparison to other languages of the same family or different families. This concept allows languages to differ not in their lexicon but in the use of that lexicon. The OT approach to analyzing languages' differences is constraint ranking; no other method or concept could change that. Constraint hierarchy is the cross- linguistic criteria used to compare languages to each other because the concept of richness of the base is implemented.

 An argument for implementing richness of the base is *Economy*. Since differentiating between languages through comparing their lexicon is not practical, then a method should be used to make cross- linguistic study much easier. Since languages differ constantly in their constraint

ranking, then this presents a good method as the criteria used. Choosing one criterion for analysis makes language study easier and accessible.

Applying economy in choosing the method of research leads to economy of the rules as well. Having rules on the input (lexicon) gives rise to a *Duplication Problem*, where rules tend to have different forms in various sub-fields of linguistics[49]. For example a morphological rule that carries the same idea as a phonological rule. A solution for the Duplication Problem is to never limit the input but use constraints on the output. GEN produces an infinite number of outputs, which are not all used in the competition. It is easier to implement the rules on the output forms since only one of them is the winner. It also gives GEN the free hand to produce more candidates to choose from.

The input to a phenomenon is the total number of winner plus losers; even the losers that won't enter the competition, as was mentioned earlier in the Candidates section, help the analysis. Limiting the analysis to only candidates who strictly conform can hurt the analysis and cause it to be in-complete.

A common misunderstanding about OT's richness of the base is that it is meant as a way of conforming all languages' lexicons to become one. To the opposite, it gives way to variations not like any other theory. Languages can differ, for example, in the way a question is asked: syntactically, morphologically, phonetically…etc. without conforming to one universal grammatical form.

Another misunderstanding about the richness of the base is that all the inputs must map into meaningful outputs. Like the famous Chomsky example "colorful green ideas sleep furiously", a sentence can be grammatical and meaningless. Setting rules to prevent such examples from becoming winners, in a competition in Semantics for example, is the soul behind richness of the base.

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[49] See McCarthy (2002: pp 68-91) for further explanation of the Duplication Problem.

1.3. Candidates Used in the Competition

In the beginning, there is the data of the language. To reach these optimal forms, the analysis needs to represent which losers the winner had to beat to become the optimal form. Choosing which losers are to be added in the competition is not easy. The obvious questions are: why is the choice difficult? And why choosing losers is helpful to the analysis?

The answer to the first question why it is difficult is related to the (almost) infinite number of losing candidates produced by GEN to each Input. The appropriate losers are ones which are as faithful to the Input as can losers be[50].

The job of the Losers is double- fold. They help the analysis both at the beginning and at the latter stages of it. The first job is at the beginning of the analysis; where the basic principles of competition require that the winner competes with familiar losers to show why it is chosen as the optimal form. "The data of the language are the winners, so appropriate losers are needed" (pp 72). The second job is at the latter stages of the analysis. After figuring out the winner and possible ranking of the constraints, the losers help in modifying and improving the analysis by giving insight as to whether it is strong enough to hold.

Some losing candidates are considered as problematic; they would tie with the winner, or beat it altogether. If all the losing candidates are to be studied, even if not at length, the analyst might not have time to publish their work. A method could be implemented to avoid dealing with a countless number of losers. Few of these methods are mentioned in McCarthy's book and briefly discussed here.

One method of finding appropriate losers is introduced by Karttunen (2006). This method relies on computers to generate the candidates, and uses the winner to compare it with the losers. The drawback of this way

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[50] This is only a preliminary idea about the concept of *Richness of the Base*, which will be discussed at length in the section on the Input later on.

is that it needs the phenomenon to be known in advance, nothing can be discovered by it.

McCarthy suggests another way, "to explore the range of candidates *systematically*" (p 76). This means that in every competition: once a constraint is found to be undominated (higher- ranked), any candidate that violates it is eliminated for they will never threat the winner. If a candidate does not violate that high- ranked constraint, this candidate should be considered as an appropriate loser. There is a chance that this loser could tie or beat the winner if the ranking would change in the course of the analysis.

Prince & Smolensky (2004: p 139) offer yet another method of finding these appropriate losers, it is called the *Method of Mark Eliminability* (*MME*) shown in the following tableau[51]:

	Const1	Const2	Const3	Const4	Const5
a. →Winner				*	*
b. Loser			*		
c. Loser	*			*	
d. Loser		*		*	
e. Loser			*	**	
f. Loser				***	

Tableau 1. An illustration of the MME

The above given tableau is called a summary tableau. The winner and each of these losers competed and the ranking of the constraints is coming to view. Each of these losers' violations is studied with special attention to violations of the high- ranked constraints. In this case Const1 is the high- ranked. Any violation of this highest- ranking constraint is a fatal one.

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[51] This tableau is a copy of McCarthy's tableau number (50). The constraints in the original one are phonological, which is not the scope of this study. The number of constraints, their violations, and the number of candidates are the same.

The analysis of the behavior of the losers is analyzed as the following: candidate (b) violates Const3 which is higher- ranked and more important than Const4 and 5. Candidate (c) violates Const4 as the winner does but it will never threaten the winner since it violates the undominated constraint Const1. Candidate (d) incurs the same violation as the winner (a); however, it violates the higher- ranked constraint Const2. Candidate (e) incurs two violations of Const4 and violates Const3 as well. Finally, candidate (f) incurs three violations of the same constraint, Const4. It should be noted that all the losers in the above summary tableau do not violate the low- ranked constraint Const5, not even once. This means that in OT dogma, even if the winner violates a low- ranked constraint, this does not affect its choice as the optimal form.

Since Const4 is violated by the winner, according to MME it should be considered as a possible down fall. Focus is shifted to the losers that do not violate it and are considered possible threats. In this case, (b) proves to be a threat, it does not violate Const4. But looking at the violation that (b) incurs, it is of a higher- ranked constraint. Candidates (c) and (d) incur the same violation of Const4 as the winner. But looking at the rest of the tableau they violate Const1 and Const2 respectively.

To analyze the data in (1), or any data, there must be some observations noted when the data is presented. From the data in (1), some ideas are formed on how this particular language handles this particular phenomenon. The way to present these ideas within an OT framework is called *Descriptive Generalizations* which are presented in the following section.

1.4. Descriptive Generalizations

Choosing the data for analysis is not the same as writing the descriptive generalizations. They are explained by McCarthy as the middle step between data and analysis. Any observations about a certain systematic occurrence of a rule in a language are written into descriptive

generalizations about that rule. They should be precise, to a point where if the data was not provided, it would easier to make some up.

The reasons for the existence of generalizations according to McCarthy (2008) are the following:

a. These generalizations make the analysis easier; much of the actual work happens in observing the behavior of languages.
b. The road to a good result is not easy; an ill- formed rule can render the whole analysis mote; so mistakes are easily noticed and the analyst can back- track their path and find the mistakes' point of origin.

Explaining and describing the choice of the optimal output is the target result of any OT analysis. Any competition ensues between candidates is done to find the 'right' construction, the optimal form. Since the framework of this analysis is OT, then constraints of Markedness and Faithfulness will play an important part in formulating the output. McCarthy (2008) describes the concept of descriptive generalizations as those which [ideally] will contain statements about target output configurations and unfaithful mappings related to those configurations. (p 34)

Finding the right wording for these generalizations is very important. For to say that: [*Do* is added when needed], is not the same as to say that: [*do* is added to satisfy the important constraint Const1, except when an auxiliary is already present or the sentence does not have an emphatic reading]. The second version is certainly much better at giving a clearer view of the reasons why *do* is used and the situations it is used in.

The descriptive generalizations for the data in (1) are:

(2) Descriptive generalizations for English Do- Support:

    (a) The *wh-* phrase is in [Spec, CP]. This requirement is enforced by
        wh- movement: [$_\text{CP}$ *What$_i$ will$_j$* [$_\text{IP}$ *Robin e$_j$* [$_\text{VP}$ *eat t$_i$*]]].
    (b)   CP must have a head. This requirement is enforced by:
        (i) Moving the auxiliary: [$_\text{CP}$ *What$_i$ will$_j$* [$_\text{IP}$ *Robin e$_j$* [$_\text{VP}$ *eat t$_i$*]]].
        Or else
        (ii) Inserting and moving *do*: [$_\text{CP}$ *What$_i$ did$_j$* [$_\text{IP}$ *Robin e$_j$* [$_\text{VP}$ *eat*
t$_i$]]].
    (c) Unstressed *do* is forbidden, except when required by clause (ii) of
        (b).
    (McCarthy 2008: no. 65)

These generalizations are the end results of a lot of trials. They are not the first draft. Every point is tested and applied as it is until an example in the data provided gives rise to a change- alert. They are modified many times until they reach the final wording much like the use of the losers. In using different losers, the analyst reaches the results pertaining to the language of the study. Furthermore, the method used in wording these generalizations is close to the one used in wording and choosing the constraints used in the competition as shown in the following section.

1.5. Constraints Used in the Competition

At the beginning of the analysis, the data seem to be overwhelming, both winners and losers; and to find the appropriate constraints to include in the competition is not an easy task. The descriptive generalizations help in narrowing down the number of constraints relevant to the present phenomenon under analysis. The descriptive generalizations can help in choosing the constraints. Perhaps the analyst does not know the correct wording of certain constraints, but their concept remains the same. Moreover, even if a constraint is not yet known to the analyst, and its effect on the analysis is obvious, an ad hoc wording can be used until it is studied more.

The first step to be taken into account is that as shown in the introduction chapter, Markedness constraints (which enforce a certain rule on the Output candidates) dominate Faithfulness constraints (which demand candidates to stay as true to the Input as possible); this gives an idea about their possible ultimate ranking. This means that not only the descriptive generalizations given in (2) will help in figuring out which constraints to use; they will also help in figuring out their possible ranking.

In the beginning, some constraints are bound to be discarded by the analyst. These constraints are irrelevant and will not affect the outcome of the analysis either positively or negatively. Discarding these constraints has to be done methodically. The constraint's relevance to the analysis is a key reason why it should remain, be it a high- or low-ranked. Constraints that have no effect, either on the winning candidate or the losers, are safely discarded from the analysis. The same method was used in discarding the losers which do not challenge the winner in the competition.

If, further in the analysis, a new constraint is discovered to be relevant, this constraint will be one of two types. The first is one which "favors the loser" (pp 83), this constraint should be discussed at length as it gives doubt concerning the validity of the preliminary ranking of constraints. If after study it turned out that it does not affect the analysis negatively, the problem is solved by ranking it low in the typology. The other type is one which "favors a winner" (pp 84). This new constraint is valuable to the analysis in that even if it does not give further proof to the optimality of the winner, it still could give a different reason as to why it is optimal. Also it can change the previously possible ranking, which would give rise to further study.

After writing these generalizations in (2), Do- support can be explained via OT. But before introducing the relevant constraints and their relative ranking, a brief stop should be made, to discuss the method

used to achieve such ranking and any ranking of any competition in general.

1.6. How to Rank the Constraints and the Different Tableaux Used

For any competition, the candidates will compete for the winning position using constraint hierarchy as a criterion; achieving this hierarchy is done through ranking the constraints against each other and each language differs in its ranking typology. This ranking resolves the conflict and defines the winner.

The preliminary step for beginning an analysis is called a *Ranking Argument*. It is explained as taking basic introductory constraints, two for example, and choosing a loser candidate, then showing the possible ranking of the two constraints and the reason why the loser lost.

This ranking argument should display three requirements[52]:

(3) The Ranking Requirements:

a. *A conflict*: for every two constraints, there is a competition that examines their relevant ranking to each other, and helps in establishing their place in the hierarchy.
b. *A winner*: from the conflict and the resulting ranking of the constraints, a winner emerges; this winner obeys the higher- ranked constraint and violates the lower- ranked one. Thus resolving the conflict. The presence of a winner is a must; competition between losers does not give significant information about the possible ranking of the two constraints.
c. *No disjunction*: only two constraints per ranking argument. The presence of another constraint(s) that for example favors the winner could be harmful, for it might give different reason(s) as to why the winner won and threatens to undermine the possible ranking of the original two constraints.

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[52] These attributes are taken from the book (pp 41, 42); however, the paraphrases are mine.

In ranking the chosen constraints, some attention and deliberate action should be the focus of the linguist, otherwise mistakes are made in haste that could back- fire and ruin a perfectly sound analysis. The most common mistakes are (2008: pp 42):

a. Asserting Const1 >> Const2 when in fact the ranking is Const2 >> Const1;
b. Asserting Const1 >> Const2 when the evidence only supports Const1 >> Const2 *or* Const3 >> Const2;
c. Asserting Const1 >> Const2 when there is no evidence for ranking these constraints either way.

Insisting on ranking every single constraint in a hierarchy could lead to trouble. Some constraints are relevant to certain competitions but are left unranked towards other high- ranking constraints. To know that a constraint is in the same level as anther constraint and that both are higher/ lower than other constraints is not an uncommon practice in OT analysis. Certain constraints families (For ex: Constraints on Movement) are studied as higher/ lower than other families in the language analyzed in the analysis. It is always better to draw a dotted line between same-level constraints in the hierarchy tableau, than to insist on ranking them the wrong way.

The preliminary ranking of constraints is called the ranking argument. They are like the blue- prints of a building or the steps taken to solve a mathematics problem. Any faults in the outcome which could lead to the destruction of that building or delivering the wrong answer to a problem, every step is traced in these blue- prints to find out the reasons why the building fell or the right answer was not achieved. It also helps in finding the ways to remedy that in the future.

These ranking arguments and OT competitions in general are illustrated using tableau- format. The first tableau was introduced by Prince and Smolensky at the beginning of OT; it is called the *violation*

tableau. This is the very basic tableau that shows the candidates in rows, constraints in columns, and the violation marks (*) assigned to the appropriate offenders. The winner is indicated by an arrow (→) or in some references (a pointing hand). The constraints are put from left to right in the order of their importance, high- ranking first then lower and lowest. An example is given in the following figure[53]:

	Const1	Const2
a. → Winner		*
b. Loser	*	
c. Loser		**

Tableau 2. Violation tableau.   (McCarthy 2008: no. 2)

Another tableau is one where there is more information about the competition, but it is still called a violation tableau. More annotations mean more information. The exclamation mark is introduced (!), it is added to the asterisk (*!) to show that this particular loser fatally violates that constraint. Also the Input can be written above the candidates, this helps to show that these particular candidates are generated from the same Input. The shaded cell shows that since this candidate violates the highest- ranking constraint, the lower- ranked constraint is irrelevant. If the candidate violates a high- ranked constraint, it is ruled out of the competition, even if it satisfies a low- ranked constraint. This is illustrated in the following figure:

Input	Const1	Const2
a. → Winner		*
b. Loser	*!	
c. Loser		**!

Tableau 3. Violation tableau with annotations.   (McCarthy 2008: no. 3)

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[53] There are phonological examples in McCarthy's original tableau, but since it is not the scope of this study, changes are made, but the number of candidates, constraints and their relevant ranking, and violations is still the same.

Another type of tableau was introduced by Prince (2002a), the *comparative tableau*. In this tableau, the main idea is to show which constraints favor the winner over the losers by adding a (W) for *winner*, and which constraints favor the losers over the winner by adding an (L) for *loser*. An example is the following tableau:

Input	Const1	Const2
a. → Winner		
b. Loser	W	L
c. Loser		W

Tableau 4. Comparative tableau.   (McCarthy 2008: no. 5)

In (b), this loser loses against the winner by violating Const1, which is why the (W) is added. The same loser does not violate Const2; this constraint favors the loser, which is why an (L) is added. In (c), Const1 has no effect visible on both winner and loser (c), which is why the cell is left blank. This loser violates Const2, in that the constraint favors the winner, which is why a (W) is added. A sign that the winner is truly the optimal form, in each row of the losing candidates, every (W) dominates all the (Ls) in that row; and the winner does not have any (Ws) or (Ls) present.

   The type of tableau used in this work is the *combination tableau*. From its name, it combines both conventions mentioned above. The following is an example:

Input	Const1	Const2
a. → Winner		*
b. Loser	*W	L
c. Loser		**W

Tableau 5. Combination tableau.   (McCarthy 2008: no. 6)

In this tableau the violation marks are added to all candidates including the winner (if found) along with Ws and Ls to the losing candidates.

This type of tableaux is used in presenting ranking arguments. They show clearly the conflict between constraints and the reasons why the winner is chosen, the fist two requirements of the ranking arguments. The third requirement is showing no disjunctions which is displayed by not adding a third constraint that shall change the reasons for choosing the winner. This is exhibited in the following tableau[54]:

Input	Const1	Const2	Const3
a. → Winner		*	
b. Loser	*W	L	*W

Tableau 6. Combination tableau with hypothetical Const3 added. (McCarthy 2008: no. 8)

In tableau (6), the addition of Const3 complicates things. Both Const1 and Const3 favor the winner, and there is no legitimate way of showing which one of them dominates Const2, or that maybe both do; and which one of them is the reason for choosing the optimal.

Brasoveanu & Prince (2005) show the difference between the two types of tableaux, by examining which type should be used in various stages of the analysis. The combination tableau is best to figure out the ranking of the constraints when the winner is already known. Whenever there is data about a certain phenomenon of the language, the winner is already know as it is the data of that language. However, the ranking of the constraints involved in the competition is unknown. The case of Do-Support is an example of that. The violation tableau is best used when the winner is not known in advance. After the constraints are ranked, further data is needed to validate the findings; these data are used to confirm the ranking typology of languages, especially new languages that were not introduced before or studied by the analyst.

The tableaux, as helpful as they are, still have their short-comings. One very important observation about constraint ranking is that some high-

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[54] There are minimal changes done to the tableau, however the concept is still the same.

ranked constraints are known to dominate other lower- ranked ones, but how about the dominance relations between these high- ranked constraints and other high- ranked constraints?

The answer to that question is the continued research of OT itself. Figuring out the strict ranking of constraints involved in a single competition sometimes proves to be impossible. Sometimes language data does not give examples to help sort this ranking issue, perhaps other languages do; that should not stop the analyst for finishing the analysis. Other times, the constraints do not conflict in choosing which the optimal form is. Hence the convention of dotted lines is used between these un-ranked constraints.

The partial ranking of these higher- ranked constraints is best illustrated using a *Hasse diagram*. If Const1 and Const2 both, through analysis, dominate Const3, but the dominance relation between Const1 and Const2 is not known; it is presented in the following diagram:

(4) Hasse diagram: Const1, Const2 >> Const3

Const1   Const2

        Const3
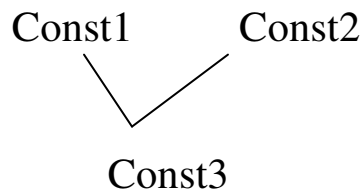
The three requirements of the ranking arguments, (cf. 3), exclude any excess data from entering the competition, otherwise, the analysis would snowball, and no outcome results are obtained.

If conflict (the first requirement for a possible concrete ranking) is not obvious between the constraints, then the optimal form will never be found and the ranking typology will never be known. This means that unless a constraint conflicts with the others, it shall not be included in the ranking argument. As it is a preliminary ranking for a competition, these types of constraints are not welcome. However, if after further

analysis it is needed, then they might be added later on. Their behavior should be noted as that of an extra proof to the legitimacy of the winner as the optimal form.

There are instances where two constraints that show no conflict. An example to this is one where the two are in a *stringency relation* (de Lacy 2002, Prince 1997b, 1997c). This relation is defined as follows: "constraint Const1 is more stringent than constraint Const2 if every violation of Const2 is also a violation of Const1, but there are violations of Const1 that aren't violations of Const2" (pp 65, 66).

The two constraints that exhibit a stringency relation in English are *T-Gov and T- Lex- Gov* of Grimshaw (1997):

- ***Trace Is Governed (T- GOV)***: a trace is governed.
- ***Trace Is Lexically Governed (T- LEX- GOV)***: a trace is lexically governed.

T-GOV is the more stringent constraint of the due. If a trace is governed, it could be not lexically governed. T-GOV is independent from T-LEX-GOV. The satisfaction of T-LEX-GOV is not tied to the trace being lexically governed. If the trace is not governed then it is not lexically governed. Any instance of T-LEX-GOV violation includes a violation of the more general constraint T-GOV.

These constraints are not included in the ranking argument for they do not exhibit conflict that would ultimately settle the competition between the candidates to choose the winner. Grimshaw (1997) ranks them as: T-GOV >> T-LEX-GOV. The more general constraint is higher then the more specific one.

The data that is included in the ranking argument should be limited to the competition; any un-necessary constraints are omitted, much like the extra losers that are discarded from the competition. However, there comes a situation where a candidate ties with the winner on all

constraint violations, with a firm ranking arrived at by several solid ranking arguments. As in the following example:

	Const1	Const2	Const3	Const4
→ Cand1		**		*
Cand2		**		*

Tableau 7. Tied candidates.   (McCarthy 2008: no. 40)

The analyst should not doubt the validity of the analysis, or repeat the work from the beginning. In this situation, a constraint is added to break the tie. This constraint does not need to have ranking relations with the other constraints (higher or lower). Hence it could be written in any column in the tableau, since it gives the optimal form the winning vote it needs no matter where the constraint is located in the hierarchy:

   The following tableaux (McCarthy 2008: no. 41) are an example of this free ranking of the tie breaker:

	Const5	Const1	Const2	Const3	Const4
→ cand1			**		*
cand2	*W		**		*

Tableau 8. The tie breaker is the highest-ranking constraint.

Or

	Const1	Const5	Const2	Const3	Const4
→ cand1			**		*
cand2		*W	**		*

Tableau 9. The tie breaker is ranked lower than Const1.

Or

	Const1	Const2	Const5	Const3	Const4
→ cand1		**			*
cand2		**	*W		*

Tableau 10. The tie breaker is in the middle of the hierarchy.

Or

	Const1	Const2	Const3	Const5	Const4
→ cand1		**			*
cand2		**		*W	*

Tableau 11. The tie breaker is higher than the lowest-ranking constraint Const4.

Or

	Const1	Const2	Const3	Const4	Const5
→ cand1		**		*	
cand2		**		*	*W

Tableau 12. The tie breaker is the lowest-ranking constraint.

The following tableau shows the ranking argument of the first two constraints needed to build a wh- question and then describe Do-support. The first constraint is related to the wh- operator and the obligatory movement of the wh- phrase in English. This is regulated by the constraint *Operator- in- Specifier*:

- **_Operator-In-Specifier (OP-SPEC)_**: Syntactic operators must be in specifier position. Grimshaw (1995/1997).

Another constraint is one which prohibits movement of any element in a derivation. This is regulated by the constraint *STAY*:

- **_STAY_**: Trace is not allowed. Grimshaw (1997).

	Op- Spec	Stay
a. → $[_{CP}$ What$_i$ will$_j$ $[_{IP}$ Robin e$_j$ $[_{VP}$ eat t$_i$]]]		**
b. $[_{IP}$ Robin will $[_{VP}$ eat what]]	*W	L

Tableau 13. Ranking argument: OP-SPEC >> STAY   (McCarthy 2008: no. 66)

What comes next is the concept that every maximal projection must have a head, the constraint for that is called *Obligatory- Heads* or OB-HD[55]:

- *Obligatory- Heads (OB-HD)*: A projection has a head. Grimshaw (1997).

Since wh- movement in English is always accompanied by movement of the auxiliary from I to C, then OB-HD must dominate STAY. The example to show this dominance relation is one where OB-HD is satisfied and STAY is violated and the clause retains its grammaticality, such example is the same example (3). The ungrammatical example (the loser) that competes with it should be one where OB-HD is violated but the constraint OP-SPEC must not be violated as it is proven in previous ranking argument that it dominates Stay, all this is shown in tableau:

	OB- HD	Op- Spec	Stay
a. → [$_{CP}$ What$_i$ will$_j$ [$_{IP}$ Robin e$_j$ [$_{VP}$ eat t$_i$]]]			**
b. [$_{CP}$ What$_i$ _ [$_{IP}$ Robin will [$_{VP}$ eat t$_i$]]]	*W		*L

Tableau 14. Ranking argument: OB-HD >> STAY   (McCarthy 2008: no. 67)

The trace of the auxiliary *will* in candidate (a) serves as a head of IP not violating OB-HD by the winner in this example.[56] The ranking between OB-HD and OP-SPEC is still undetermined.

   The insertion of *Do* is needed, according to the descriptive generalizations in (2) repeated here as (5), to fill the otherwise empty head of C.

---

[55] The use of the constraint OB-HD is not the stand taken in this study. The description in McCarthy and Grimshaw is written here as an example to show the progress of the analysis in OT. This is not the point of view of this analyst.
[56] The use of the letter [e] as a trace is a bit confusing even with a subscript co-indexation with the moved element; since [e] is sometimes used to denote empty heads. It would have been simpler to have used only the letter [t] for traces and [e] for empty heads.

(5) Descriptive generalizations for English Do- Support:

    a. The *wh-* phrase is in [Spec, CP]. This requirement is enforced by *wh-* movement:
        [$_{CP}$ *What$_i$ will$_j$* [$_{IP}$ *Robin e$_j$* [$_{VP}$ *eat t$_i$*]]].
    b. CP must have a head. This requirement is enforced by:
        (i) Moving the auxiliary: [$_{CP}$ *What$_i$ will$_j$* [$_{IP}$ *Robin e$_j$* [$_{VP}$ *eat t$_i$*]]].

        Or else
        (ii) Inserting and moving *do*: [$_{CP}$ *What$_i$ did$_j$* [$_{IP}$ *Robin e$_j$* [$_{VP}$ *eat t$_i$*]]].
    c. Unstressed *do* is forbidden, except when required by clause (ii) of (b).
(McCarthy 2008: no. 65)

The OT explanation of an element that is needed to satisfy a high-ranking constraint is that this element must be violating another constraint that forbids its presence. The later constraint in the case of English Do- Support is *Full- Interpretation* or FULL-INT:

- ***Full- Interpretation (FULL-INT)***: Lexical conceptual structure is parsed. Grimshaw (1997).

This constraint is violated by the presence of any element that is not present in the Input. The winner is (b) of (1), repeated here as (6), contains Do which incurs a violation of STAY:

(6) [$_{CP}$ What$_i$ did$_j$ [$_{IP}$ Robin e$_j$ [$_{VP}$ eat t$_i$]]]

The loser should be one where it does not have Do, thus OB-HD is violated as is shown in the following tableau[57]; however, STAY is only violated once since there is no Do to move:

---

[57] The column featuring Op- Spec was deleted for simplicity and relevance.

	OB- HD	Full- Int	Stay
a. →[CP What_i did_j [IP Robin e_j [VP eat t_i]]]		*	**
b. [CP What_i _ [IP Robin _ [VP eat t_i]]]	**W	L	*L

Tableau 15. Ranking argument: OB-HD >> FULL-INT >> STAY

This example shows that to satisfy a higher- ranking constraint, a lower-ranked one could be violated even by the winner. In this case, FULL-INT is violated once and STAY is violated twice. The violations incurred by the loser are fatal though even if STAY (a lower- ranked constraint) incurs one less violation than the winner. The ranking between FULL-INT and STAY is yet to be determined.

  The examples in (1, a), repeated here as (7), show the unnecessary occurrence of *Do*. They are a case of *Harmonic Bounding* which is discussed in the following section:

   (7) a.   Robin ate apples.
         b. *Robin did eat apples. (Unstressed *did*)

1.7. Harmonic Bounding

The losers in a competition threaten the winner in many ways:

  a. Being from the same Input: this makes the conflict more prominent by comparing candidates of the same Input which aspire to reach the same goal, being the optimal form.
  b. Having the same number of violations: a loser can have the same number of violations as the winner, this could be a problem if the violation marks are added to the same constraints; but it could pose no threat if the higher- ranked constraints are violated by that loser.

However, there are losers which no matter what the constraint ranking is, they never win; these losers are said to be *harmonically bounded* (Samek- Lodovici 1992, Samek- Lodovici & Prince 1999).

All the candidates in a competition aspire to be the optimal form. In their quest, some losers lack the stamina to finish the race on top, they settle for the silver and bronze medals. But some losers have the character of being fated to lose, even if the winner is taken out of the competition, some of these losers don't even win on principle. They are bounded in the sense that some other loser/winner stops them before even the race kicks off. Under any constraint ranking, these bounded losers could never win, even though this bounded loser shares the same Input as the winner, is of the same candidate set, and competes under the same constraints' hierarchy.

Figuring out the harmonically bounded loser is vital to OT analysis for the following reasons:

a. The concept of harmonic bounding is important in studying language typology; if this loser does not win for any constraints' hierarchy, it means that it is impossible to find it in any language, providing the same constraints are used in the competition.
b. Since this loser could never win and does not provide more information as to why the winner is chosen to be the optimal, then removing it would not harm the integrity of the analysis in any way.
c. If the winner is discovered to be bounded by a loser, then this could present a threat to the ranking of the constraints and would suggest a fatal flaw in the analysis.

Since Grimshaw (1997) adopts the Subject- In- VP hypothesis in her analysis of Inversion, the contrast between the two examples (7 a & b), repeated here as (8), is one where STAY and FULL-INT are violated equally by the loser and satisfied equally by the winner:

(8) a. [$_{VP}$ Robin ate an apple]
       b.*[$_{IP}$ Robin$_i$ did [$_{VP}$ t$_i$ eat apples]]

Both OB-HD and OP-SPEC are not relevant to the competition, the former because of the lack of operators in the clause, and the latter because there are no missing heads to violate it.

Any ranking of the four constraints will not favor the losing candidate; it is harmonically bounded by the winner in this ranking typology. The following tableau shows this:

	OB-HD	OP-Spec	Full-Int	Stay
a. →[$_{VP}$ Robin ate an apple]				
b. *[$_{IP}$ Robin$_i$ did [$_{VP}$ t$_i$ eat apples]]			*W	*W

Tableau 16. Harmonic bounding of *[$_{IP}$ Robin$_i$ did [$_{VP}$ t$_i$ eat apples]] (McCarthy 2008: no. 69)

1.8. The Final Analysis

From the data provided, ranking the four constraints should not be difficult. The following Hasse diagram shows the relationship between the constraints so far:

(10) Hasse diagram for English *do* support:

OP- SPEC   OB-HD

STAY   FULL- INT
(McCarthy 2008: no. 70)
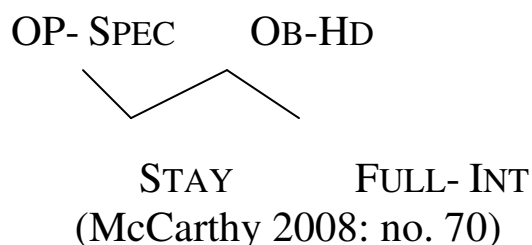
The diagram shows that both OP-SPEC and OB-HD are higher- ranked than both STAY and FULL-INT. But it does not provide the ranking between OP-SPEC and OB-HD nor between STAY and FULL-INT.

The examples in (8) could not be used to determine the ranking between STAY and FULL-INT, since in these examples where [$_{VP}$ Robin ate an apple] competes with *[$_{IP}$ Robin$_i$ did [$_{VP}$ t$_i$ eat apples]], both

constraints incur the same number of violations, hence not providing the contrast needed to rank them. OP-SPEC and OB-HD are ranked using data that is not in (1), since both constraints are not violated by any winning candidate. Grimshaw uses subordinate interrogatives to prove that there is wh- movement (obeying OP-SPEC) without the need for Inversion (since Inversion is prompted by the need of the maximal projection to have a head: (OB-HD). Determining which is higher comes at a later stage.

   Ranking OP-SPEC and FULL-INT is determined using data from (1), repeated here as (9); (a) has Wh- movement with Do- Support versus (b) with no movement and no do- support:

    (9) a.   What did Robin eat?
        b.   Robin ate what.

The following tableau shows the ranking argument for the winning candidate:

	OP-Spec	Full-Int	Stay
a. → [CP what$_i$ did$_j$ [IP Robin$_k$ e$_j$ [VP t$_k$ eat t$_i$]]]		*	***
b. [CP Robin ate what]	*W	L	L

Tableau 17. Ranking argument: OP-SPEC >> FULL-INT >> STAY (McCarthy 2008: no. 71)

The best way to check the validity of the analysis is to draw summary tableaux; they summarize all the data and help in ranking the constraints. The question that should be answered is: are the data and ranking of the constraints thus far follow the generalizations there were put at the start of the analysis? The answer is as follows:

    (10) Robin ate apples.
(McCarthy 2008: no. 72)

	OB-HD	OP-Spec	Full-Int	Stay
a. →[VP Robin ate an apple]				
b. *[IP Robin_i did [VP t_i eat apples]]			*W	*W

Tableau 18. The competition for example (10)

(11) What did Robin eat?
(McCarthy 2008: no. 73)

	OP-Spec	OB-HD	Stay	Full-Int
a. → [CP what_i did_j [IP Robin_k e_j [VP t_k eat t_i]]]			***	*
b. [CP Robin ate what]	*W		L	L
c. [CP What_i _ [IP Robin _ [VP eat t_i]]]		*W	*L	L
d. [CP What_i _ [IP Robin_k did [VP t_k eat t_i]]]		*W	**L	*

Tableau 19. The competition for example (11)

(12) What will Robin eat?
(McCarthy 2008: no. 74)

	OP-Spec	OB-HD	Stay	Full-Int
a. → [CP what_i will_j [IP Robin_k e_j [VP t_k eat t_i]]]			***	
b. [IP Robin_k will [VP eat what]	*W		*L	
c. [CP What_i will_j [IP Robin_k e_j [XP do [VP t_k eat t_i]]]]			***	*W
d. [CP What_i does_j [IP Robin_k e_j [XP will [VP t_k eat t_i]]]			***	*W

Tableau 20. The competition for example (12)

In studying these summary tableaux and comparing those to the descriptive generalizations presented up front and the ranking of the constraints involved in the competition, this should give the analyst the chance to review the process and finish the analysis.

First, the analyst should confirm that the analysis is air-tight i.e. that the winners of every competition are the grammatical, optimal form used in the language. Every loser row has a (*W) in it dominating every (L). The generalizations are applied correctly: movement of the wh- phrase occurs to satisfy OP-SPEC violating STAY which is dominated by OP-SPEC, every maximal projection has a head (even if it is a trace) to satisfy OB-HD, do- support occurs when needed violating FULL-INT to satisfy OP-SPEC and OB-HD which both dominate FULL-INT.

Second, it is important to count the violations incurred by the winners (if they occur) and tie any loose ends (if present). The one found here is the ranking of FULL-INT and STAY. The winners of the competitions in (11, a) and (12, a) respectively exhibit this phenomenon. The number of STAY violations supersedes the number of FULL-INT violations. This means that the final ranking of these constraints should be the following:

- OPERATOR- IN- SPECIFIER >> OBLIGATORY- HEADS >> FULL-INTERPRETATION >> STAY

1.9. Summary

To sum up, this introduction is a detailed analysis of the components of OT in describing and analyzing a phenomenon of language and the steps taken to form an analysis. The example used is the Do- support phenomenon in English. First, the data used in the language is given. Second, the topic of Input is discussed at length. Third, few ungrammatical examples (losers) are collected to counter the forms used. Forth, some observations are written about the behavior of the data of the language (the winning optimal form) and the counter examples (the losers) in the form of descriptive generalizations. Fifth, the

constraints involved in the competition are chosen according to their relevance to the phenomenon at hand. Sixth, the method in ranking these constraints and the tableaux used are presented. Seventh, a note on the absolute losers that are harmonically bounded by the winner is given. Finally, the analysis is compiled, completed and presented.

2. English

2.1. Yes/No Questions

English Yes/No questions are formed with movement of the auxiliary verb from I to C; if no such auxiliary is available in the Input, *Do* is inserted. The following examples are of Yes/No questions commonly found in English:

(13) Have you been to Paris?

C in English questions attracts the auxiliary from the I position to the C position, this is due to the fact that C has a strong Tense feature, this is preserved by a family of constraints called IDENTITY (Feature)[58]:

- *IDENT (F)*: is a family of constraints, one for each distinctive feature F, that prohibits changing feature values. McCarthy (2008)

This constraint is taken from Phonology, where every phoneme has its own attributes (Identity). Any violation in the Output of these attributes renders the candidate ungrammatical. It is an integral part of the cumulative attributes of C in English that if C is +WH that there has to be movement from I to C. I am proposing a syntactic constraint to be introduced to the IDENT family called IDENT(TNS):

- *IDENT (TNS)*: The Tense identity of C must be preserved.

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[58] In Legendre et. al (1998), this constraint is called *Check (Feature)*.

The constraint IDENT(TNS) is violated if the Tense identity of C demands moving I to C and no movement of I occurs. Or if the tense identity of C prohibits such movement and movement of I occurs. In a language where there is an obligatory movement from I to C, this constraint is high- ranked, whereas if a language does not exhibit this type of movement, this constraint is low ranked.

   Another constraint involved in the competition is PARSE-WH, this constraint is violated when the Output candidate has a +Q complementizer and it is interpreted as a declarative sentence. In English, a sentence cannot have the construction of a declarative and be interpreted as an interrogative:

- *PARSE-WH*: [+WH] elements in the input must be parsed.
    (Legendre et.al. 1995)

The constraint that prohibits maximal projections from not having a head is called *Obligatory Heads*.

- *Obligatory Heads (OB-HD)*: A projection has a head. (Grimshaw 1997).

The Input for example (16) will be: be (x, y), x= you, y= PP. Aux= have. Tns= Present Perfect. C= Strong Tns.

	Ident (Tns)	Parse-WH	OB-HD	Stay
→ a. [CP havei [IP you ti [VP been [PP to Paris]]]]				*
b. [CP Q [IP you have [VP been [PP to Paris]]]]	*!	*		

Tableau 21. The competition for example (13) - first draft

Candidate (a) is the winner; it satisfies the higher- ranked constraints IDENT(TNS) and PARSE-wh, and violates STAY by moving the auxiliary

verb *have* from I to C. Candidate (b) violates IDENT(TNS) by not moving the auxiliary from I to C. The constraint PARSE-WH is also violated because (b) has the construction of a declarative sentence and is not interpreted as an interrogative.

2.1.1. The Argument against OB-HD

The constraint OB-HD is not violated by both candidates. This constraint states that every maximal projection must have a head; it doesn't state that this head has to be an overt one. In this respect, I do not follow Grimshaw's (1999) analysis of Inversion as an operation needed to fill the head of C which is otherwise empty, thus, moving the auxiliary from I to C. In her paper (1999), the maximal projection CP is added to host both the inverted auxiliary and the wh- phrase. She explains the inversion as a need to satisfy OB-HD. However, since the constraint is general and universal, the need for a head in every maximal projection is satisfied in the candidates of example (16). In candidate (a), the auxiliary *have* moves and fills C which is already filled by a +Q operator, it leaves a trace behind which serves as the head of IP. In candidate (b), all heads are present and accounted for.

In the remaining analyses, I replace the constraint OB-HD with the constraint IDENT(TNS). Therefore, the tableau of the above example is the following, omitting the constraint OB-HD:

	Ident (Tns)	Parse-WH	Stay
→ a. [$_{CP}$ have$_i$ [$_{IP}$ you t$_i$ [$_{VP}$ been [$_{PP}$ to Paris]]]]			*
b. [$_{CP}$ Q [$_{IP}$ you have [$_{VP}$ been [$_{PP}$ to Paris]]]]	*!	*	

Tableau 22. The final competition for example (13)

2.1.2. *Do* Support

The following example has the auxiliary *Do* inserted in the optimal form:

(14) Did you perform the surgery?
The Input: perform (x, y), x= you, y= the surgery. Tns= past.

	Ident (Tns)	Parse-wh	Full-Int	Stay
→ a. [CP did$_i$ [IP you t$_i$ [VP perform [NP the surgery]]]]			*	*
b. [CP Q [IP you [VP performed [NP the surgery]]]]	*!	*		

Tableau 23. The competition for example (14)

Candidate (a) is the winner; it satisfies the higher- ranked constraints IDENT(TNS) and PARSE-WH. It violates FULL-INT by inserting the auxiliary *do* while it is not mentioned in the Input. It also violates STAY once; since these are lower- ranked constraints, the winner can violates them and still emerge as the optimal form. Candidate (b) violates IDENT(TNS) fatally. PARSE-WH is violated by not interpreting the sentence as an interrogative.

2.1.3. Summary

In the OT analysis of Yes/No questions, I diverted from the common analysis provided in the literature. The constraints used are mostly the same, except for the new addition of IDENT(TNS). This new constraint has its roots from phonology where the features of the phonemes are observed in the Outputs. It is used here to account for the auxiliary inversion found in English.

The other constraint, found in earlier works, OB-HD does not state that the maximal projection has an overt head; it only demands that the head

of the maximal projection be filled. A trace can be the head in a maximal projection without violating the constraint. With this reasoning, the need for moving the auxiliary from I to C to satisfy OB-HD is no longer used in this analysis. The need to satisfy the higher- ranking constraint IDENT(TNS) will replace using the constraint OB-HD in the analysis from here on.

2.2. Argument WH- Questions

Argument WH- phrases are: *what* and *who*[59], and *which- NP*. The analysis of *what* and *which- NP* is the same. Hence, the only argument wh- phrase to be discussed in this section is *what*:

(15) What will they read?
The Input: read (x, y), x= they, y= what. Auxiliary= will. Tense= future.

The following tableau[60] represents the competition that led to choosing the language data as the optimal form: (Tableau T1 of Grimshaw 1997):

	Op-Spec	Ident (Tns)	Stay
a. [IP DP will [VP read what]]	*!		
b. [CP e [IP DP will [VP read what]]]	*!	*	
c. [CP what$_j$ e [IP DP will [VP read t$_j$]]]		*!	*
→ d. [CP what$_j$ will$_i$ [IP DP t$_i$ [VP read t$_j$]]]			**
e. [CP will$_i$ [IP DP t$_i$ [VP read what]]]	*!		*

Tableau 24. The competition for example (15)

Candidate (a) violates OP-SPEC by not moving the wh- phrase to the Spec position. Candidate (b) violates OP-SPEC and also IDENT(TNS), the

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[59] Since *who* falls under subject wh- questions, it is given a separate section.
[60] There are some changes made to the original tableau:

(I)	The candidates in the original tableau were not given the numerations (a, b …), they are added here for clarification.
(II)	The constraint OB-HD is replaced by the new constraint IDENT(TNS). The number of violations of the new constraint is the same as OB-HD.
(III)	The trace of the wh- phrase was not t in the original tableau, it was *e* (meaning empty). This is changed for clarification and unity of analysis.

latter by not moving the auxiliary from I to C. Candidate (c) violates IDENT(TNS) the same as candidate (b), C of the CP is empty. Candidate (d) is the winner; it satisfies both the higher- ranked constraints with the wh- phrase's movement to the Spec position and C is filled. The optimal form violates STAY twice, but since this constraint is low- ranked, its violations do not have any effect on the outcome of the competition. Candidate (e) violates OP-SPEC and STAY.

The ranking of the constraints in English will be the following:

- OP-SPEC >> IDENT(TNS) >> STAY

2.2.1. *Do* Support

The dummy *Do* occurs in interrogatives only when it is needed. The faithfulness constraint that monitors every element in the Input and makes sure that it is present in the Output is *Full-Int*:

- ***FULL-INT (Full Interpretation)***: lexical conceptual structure is parsed. Grimshaw (1997).

This constraint also has the job of identifying any element in the Output that has no content. *Do* here is not the lexical verb that denotes performing an action, rather it is treated as a place holder for Tense:

(16) What did she say?
The Input: say (x, y), x= she, y= what. Tense= past.

	Op-Spec	No-Lex-Mvt	Ident (Tns)	Full-Int	Stay
→ a. [CP what_i did_j [IP she t_j [VP say t_i]]]				*	**
b. [CP what_i [IP she [VP said t_i]]]			*!		*
c. [CP what_i [IP she did [VP say t_i]]]			*!	*	*
d. [CP what_i said_j [IP she [VP t_j t_i]]]		*!			**

Tableau 25. The competition for example (16)

Candidate (a) is the winner; it satisfies the higher- ranked constraints OP-SPEC by moving the wh- phrase to a Spec position and IDENT(TNS) by moving the Infl from I to C. This optimal form violates FULL-INT by inserting an auxiliary verb that is not present in the Input and it is void of meaning. The winner violates STAY twice. Candidate (b) violates IDENT(TNS) and STAY. Candidate (c) violates IDENT(TNS), FULL-INT, and STAY. Candidate (d) violates NO-LEX-MVT by moving the lexical verb from V to I; this movement is prohibited in English. To keep from having such candidates as winners, a constraint is introduced that keeps lexical heads from moving:

- ***NO-LEX-MVT (No Lexical Movement)***: A lexical head cannot move. (Grimshaw 1997).

The ranking between NO-LEX-MVT and FULL-INT is crucial. If it was the other way around and FULL-INT dominates NO-LEX-MVT, the competition will result in the winning of a candidate like (d) over (a). This alternate ranking can be available in another language but not in English.

2.2.2. Extraction of WH- Arguments

Legendre et.al (1998) follows Chomsky's (1986) *Barriers*, where the length of a *chain link* is a single node, this is stated in the *Min(imal)Link* family of constraints:

- *BAR1*: a single link must not cross one barrier.
- *BAR2*: a single link must not cross two barriers.
- *BAR3*: a single link must not cross three barriers.

The universal ranking of these constraints is: BAR3 >> BAR2 >> BAR1. This ranking means that it is worse for a wh- phrase to cross three barriers at one fell swoop than to cross two barriers than to cross one. BAR3 is more important to satisfy than BAR2, and consequently, BAR2 is more important than BAR1.

Other constraints involved in the analysis are:

- *GOV (T):* Traces are governed. (Grimshaw 1997)
- *PARSE-SCOPE*: Scope requirements stated in the input must be parsed. (Legendre et. al. 1995)

In their account of extraction of wh- phrases, Legendre et.al (1995) assume that verbs in general subcategorize for either an IP or a CP complement. The verbs *grieve, gloat,* and *squeal* (to name a few) subcategorize for a complement CP, and following this hypothesis the verb *think* can have either an IP or a CP. All this is summarized in a SUBCAT constraint:

- *Subcategorization (SBC)*: Outputs should meet the subcategorization requirements of the verbs (this constraint is undominated). (Legendre et al. 1995)

2.2.2.1.   Extraction out of Think_{CP}

Legendre et al. (1995) gives an optimality- theoretic analysis of the extraction of direct object out of CP. This movement is possible because the traces of the wh- phrases are properly governed; hence there is no violation of the GOV(T) constraint.

The following tableau[61] is an example:

(17) What do you think that he said?
(Legendre et al. 1995: no 22a)

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[61] There have been changes made to the original tableau:
  (I)   Some constraints are omitted for relevance and will be introduced in the wh- adjuncts section.
  (II)   In the original tableau, the authors didn't use brackets to the complement CP or IP, nor have written the relevant subscripts.
  (III)   In the original tableau, candidate (a) violates BAR3 and candidate (b) incurs two violations of BAR2.
  (IV)   The constraint OB-HD is replaced by the new constraint IDENT(TNS).
  (V)   The constraint that prohibits traces (STAY) is called in the original tableau *T. Throughout the thesis, It is changed to conform to the rest of the tableaux.

	SbC/ Ident(Tns)/ Gov(t)	Parse- wh	Bar5	Bar4	Bar3	Bar2	*Stay
a. what$_j$ do [$_{IP1}$ you [$_{VP1}$ think [$_{IP2}$ he [$_{VP2}$ said t$_j$	*!SbC			*			*
→ b. what$_j$ do [$_{IP1}$ you [$_{VP1}$ think [$_{CP}$ e$_j$ that [$_{IP2}$ he [$_{VP2}$ said t$_j$					*	*	**
c. what$_j$ do [$_{IP1}$ you [$_{VP1}$ think [$_{CP}$ that [$_{IP2}$ he [$_{VP2}$ said t$_j$			*!				*
d. wh$_j$		*!					

Tableau 26. The competition for example (17)

Candidate (a) violates the high- ranked constraint SUBCAT with the verb *think* not subcategorizing for a CP. It also violates BAR4 by moving the wh- phrase from its base position to Spec- CP in one step crossing four nodes: VP2, IP2, VP1, and IP1. Candidate (b) is the winner; it satisfies the higher- ranked constraints. It moves the wh- phrase in a cyclic movement violating BAR2 by crossing VP2 and IP2, and BAR3 by moving it again and crossing CP, VP1, and IP1. It also violates STAY twice. Candidate (c) violates BAR5 by moving the wh- phrase in one step crossing VP2, IP2, CP, VP1, and IP1. Candidate (d) violates PARSE- WH by not interpreting the sentence as a question.

2.2.2.2.   Extraction out of Think$_{IP}$

The difference between IP and CP complements is that traces have an escape hatch to move into in a successive cyclic way in the case of CP

complements as opposed to IP complements. This way, the wh- phrase moves across more nodes in one step. The presence of a CP complement violates SUBCAT.

The competition is shown in the following tableau[62]:

(18) What do you think he said?
(Legendre et al. 1995: no 23 a)

	SbC/ Ident(Tns)/ Gov(t)	Parse-wh	Bar4	Bar3	Bar2	*Stay
→ a. what$_j$ do [$_{IP1}$ you [$_{VP1}$ think [$_{IP2}$ he [$_{VP2}$ said t$_j$			*			*
b. what$_j$ do [$_{IP1}$ you [$_{VP1}$ think [$_{CP}$ e$_j$ [$_{IP2}$ he [$_{VP2}$ said t$_j$	*! SbC			*	*	**
c. wh$_j$		*!				

Tableau 27. The competition for example (18)

Candidate (a) is the winner; it satisfies the high- ranked constraints. It violates BAR4 by moving the wh- phrase in one step crossing four nodes: VP2, IP2, VP1, and IP1. As a result of movement, STAY is violated once. Candidate (b) suffers a lot. It violates SUBCAT by the verb *think* subcategorizing for a CP instead of an IP. It also violates BAR3 and BAR2 by crossing three nodes and two nodes respectively. It also violates STAY twice. Candidate (c) violates PARSE-WH by not interpreting the sentence as a question.

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[62] In the original tableau, the winner incurs a violation of BAR3.

2.2.2.3.   Summary

To sum up, wh- argument phrases are extracted out of IPs and CPs in English if the higher- ranked constraints involved in the competition are satisfied. The notion of Barriers is represented in OT in the form of the BAR Family of constraints. These constraints regulate the number of barriers the wh- phrase has to cross to reach the Spec-CP positions. The universal ranking of these constraints is: BAR3 >> BAR2 >> BAR1.

2.3.   Subject WH- Questions

In OT literature, subject wh- questions are taken to be either VPs or IPs. Grimshaw states in her (1999) paper that a subject wh- question is a VP, in that the wh- phrase is in a Spec position, so it doesn't need to move to a Spec position to c- command the verbal projection. The reasoning behind this prediction is the formulation of the constraint OP-SPEC. this constraint requires that the wh- phrase is in a Spec position without postulating which one. Spec- IP is a candidate only if the sentence contains an auxiliary. The following tableau[63] represents this argument more formally:

	Op-Spec	No-Lex-Mvt	Ob-Hd	Full-Int	Stay
→ a. [$_{VP}$ **wh** V …]					
b. [$_{IP}$ **wh** e [$_{VP}$ **t** V …]			*!		*
c. [$_{IP}$ **wh** do [$_{VP}$ **t** V …]				*!	*

Tableau 28. Grimshaw's subject WH- questions.

Grimshaw explains that candidate (a) is optimal because it does not violate any constraints involved in the competition. It satisfies OP-SPEC with the wh- phrase in Spec-VP, NO-LEX-MVT with no movement of

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[63] The candidates in the original tableau were not given the numerations (a, b, and c), they are added here for clarification. I also kept the constraint OB-HD in the competition. Later in the section, the whole argument is replaced by a new analysis.

any lexical items, OB-HD with every head of a maximal projection being present and accounted for, FULL-INT with every element present in the Input is found in the Output and no extra elements are found, and finally STAY with no movement of any element.

Candidate (b) violates OB-HD. She states that the head of IP is missing, hence this constraint is violated. Candidate (c) violates FULL-INT with the presence of *do* where it is not required since *do* is prohibited with subject wh- questions.

She said (p.c.) that she used the Subject-in-VP-Hypothesis, this way the wh- phrase is already in a Spec- position; it does not to move to a higher Spec position violating STAY. Another reason for choosing VP is Economy of Structure. In her paper *Economy of Structure in OT* (2001: 19), she states that "A projection with fewer elements is preferred over one with more".

This could be a major drawback in OT. To treat a type of questions as different from the rest gives rise to using different rules to an otherwise the same genre of sentences. Subject wh- questions are not different from any other argument or adjunct wh- questions. The C position has a +WH element like any other interrogative sentence to mark it as one, hence the sentence must be a CP.

For the competition of subject wh- phrases, another constraint is introduced here to make sure that the wh- phrase is found in Spec-CP without resorting to a change in the generality and universality of the already existing constraint OP-SPEC. This constraint is called SUBJECT. This constraint places the wh- phrase not just in any Spec position (Grimshaw 1999's argument for OP-SPEC being responsible in placing the wh- phrase in Spec-IP) but specifically in Spec- CP:

- *SUBJECT*: The highest A-specifier of a clause must be structurally realized. Failed when the highest A-specifier of a clause is left structurally unrealized. (Samek- Lodovici 1998)

This constraint is a reminiscence of the Extended Projection Principle of Chomsky (1981). It was first introduced by Grimshaw (1993, 1997). In Samek- Lodovici's 1998 paper, the constraint is used for declarative sentences; hence the highest A- specifier is Spec-IP. That is not the case here. The highest A- specifier is Spec-CP since the construction under discussion here is an interrogative.

In English, this means that the sentence needs to have an element in the Spec- CP position. The ranking of this constraint in relation to OP-SPEC is undetermined. They both work at placing the wh- phrase in the proper position. A very important fact is that they cannot be combined into a single constraint; even if their function is closely related (cf sections 1.5 and 1.6 discussing Constraints in the introduction to this chapter).

(19) Who came today?
The Input: come (x), x= who. Tense= past. Adverb= today.

The example mentioned above of a standard wh- subject question can be analyzed in the following tableau:

	Op-Spec	Subject	Full-Int	Stay
→ a. [$_{CP}$ who$_i$ Q [$_{IP}$ t$_i$ [$_{VP}$ came today]]]				*
b. [$_{IP}$ who [$_{VP}$ came today]]			*!	
c. [$_{CP}$ Q [$_{IP}$ who [$_{VP}$ came today]]]		*!		

Tableau 29. The competition for example (19)

Candidate (a) is the optimal. It does not violate the high- ranking constraints OP-SPEC, SUBJECT, and FULL-INT. It violates the lower-ranked constraint STAY by moving the wh- phrase from Spec-IP to Spec-CP. Candidate (b) fatally violates FULL-INT by not adding the +WH C to the sentence, hence giving the sentence a non-interrogative interpretation. In candidate (c), the wh- phrase is in Spec-IP and the

+WH C is added and CP is created to host it. This candidate violates neither OP-SPEC nor STAY, but it violates SUBJECT by not moving the wh- phrase to Spec-CP.

(20) Who will come today?
The Input: come (x), x= who. Auxiliary= will. Tense= future. Adverb= today.

The analysis of example (20), which is a subject wh- question with the presence of an auxiliary, is in the following tableau:

	Op-Spec	Subject	Ident(Tns)	Full-Int	Stay
→ a. [CP who$_i$ will$_j$ [IP t$_i$ t$_j$ [VP come today]]]					**
b. [IP who will [VP come today]]		*!	*	*	
c. [CP will$_j$ [IP who t$_j$ [VP come today]]]		*!			*

Tableau 30. The competition for example (20)

Candidate (a) is the optimal. It only violates STAY twice, but since it is a lower- raked constraint, its violation is not fatal. Candidate (b) first violates FULL-INT by not including CP into the sentence, thus NOT interpreting the sentence as an interrogative. Next, it violates SUBJECT by not moving the wh- phrase to Spec-CP. Consequently, it violates IDENT(TNS) by not moving the auxiliary from I to C. Candidate (c) violates SUBJECT by not moving the wh- phrase from Spec-IP to Spec-CP. Candidate (c) violates STAY by moving the auxiliary from I to C.

2.3.1. Extraction out of Think$_{CP}$

The derivation crashes when *think* subcategorizes for a CP and the subject wh- phrase is extracted out of it, as seen in the following tableau[64]:

    (21) *Who do you think that left?
        *You think that who left?
    (Legendre et al. 1995: no. 20)

	Gov(t)	Parse-wh	BAR4	Parse Scope	BAR3	BAR2	*t
a. who$_i$ do[$_{IP1}$ you [$_{VP}$ think [$_{CP}$ that [$_{IP2}$ t$_i$ [$_{VP}$ left	*!		*				
b. Q$_i$ you [$_{VP}$ think [$_{CP}$ that [$_{IP}$ NP/wh$_i$[65] [$_{VP}$ left		*!		*			

Tableau 31. A case of Ineffability, no apparent winner.

Extraction of a wh-subject out of complement of *think*$_{CP}$ is ungrammatical in English. This is an instance of *Ineffability* in OT, where certain Inputs do not yield any faithful Outputs that are accepted in the language. Candidate (a) loses since the trace is not properly governed (the existence of *that* blocks the verb from governing the trace) violating the higher-ranking constraint GOV(T). It also violates BAR4 since movement crosses IP2, CP, VP, and IP1[66]. The remaining candidate (b) is an unfaithful parse, for it is a violation of PARSE-WH; it is grammatical, but is not a question. It cannot be the winner either because it violates PARSE-SCOPE resulting from a narrow interpretation

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[64] There are changes present in this tableau:
    More constraints were involved in the tableau and analysis, but were omitted for simplicity and relevance. They are: *Q which is the equivalent to OP-SPEC, and *ABSORB which will be introduced in the Multiple wh-questions' section. Their violation (or lack thereof) does not affect the current analysis.
[65] This is a reference to the fact that it is no longer a question, it is a statement.
[66] Legendre et.al does not follow Grimshaw's Subject-in-VP Hypothesis.

of *who* and since *think* does not allow an indirect question as a complement, this results in a violation of SUBCAT.

2.3.2. Extraction out of Thnik_{IP}

Extraction of a wh-subject out of complement of *think*_{IP} is grammatical, as shown in the following example:

(22) Who do you think left?
(Legendre et al. 1995: no. 21)

	Gov(t)	Pars e-wh	BA R3	Pars e Scop e	BAR 2	BA R1	*t
→ a. who_i do [_{IP1} you [_{VP} think [_{IP2} t_i [left			*				*
b. wh_i		*!					

Tableau 32. The competition for example (22)

Candidate (a) is optimal; however it violates BAR3 since it crosses three nodes: IP2, VP, and IP1; and it also violates *t. Candidate (b) violates the higher-ranking constraint PARSE-WH, the wh-phrase is either unrealized or is replaced by an NP resulting in a statement rather than a question, which is why it loses to the optimal form (a).

2.3.3. Summary

Subject wh- questions are not an easy topic for analysis, in either OT or any other linguistic theory. The winner, in English, is the candidate that best satisfies two high- ranked constraints OP-SPEC and SUBJECT. These constraints are together responsible for placing the wh- phrase in the Spec-CP position. Unlike earlier work in OT, the analysis of wh- subject questions in this study unifies the analysis of wh- questions in general. The construction of wh- subjects is not an IP but a CP.

Extraction of the wh- subject is not different from the wh- argument discussed in the previous section. As long as the high- ranked constraints and the BAR family constraints are satisfied, then wh- subjects can be extracted out of CPs and IPs. The analysis stops here and further research is highly recommended.

2.4.   Adjunct WH- Questions

Adjunct wh- questions do not differ in English from argument wh- questions in their constraint hierarchy. Movement of the wh- phrase to Spec- CP is obligatory, hence the high ranking of the constraint OP-SPEC. As it was established in previous sections, the auxiliary moves from I to C to satisfy the constraint IDENT(TNS) which is violated by candidates that contain an auxiliary in the Input but do not represent this type of movement in the Output:

(23) Where will the boy go?
The Input: go (x), x= the boy. Auxiliary= will. Adjunct= where. Tense= future.

	Op-Spec	Ident (Tns)	Stay
→ a. [$_{CP}$ where$_i$ will$_j$ [$_{IP}$ the boy t$_j$ [$_{VP}$ go t$_i$]]]			**
b. [$_{CP}$ will$_j$ [$_{IP}$ the boy t$_j$ [$_{VP}$ go where]]]	*!		*
c. [$_{CP}$ where$_i$ [$_{IP}$ the boy will [$_{VP}$ go t$_i$]]]		*!	*

Tableau 33. The competition for example (23)

Candidate (a) is the optimal form; it satisfies the high- ranking constraints OP-SPEC and IDENT(TNS). It violates STAY twice by moving the wh- phrase to Spec- CP and moving the auxiliary from I to C. Candidate (b) violates the higher- ranked constraint OP-SPEC by not moving the wh- operator to the Spec position, it also violates STAY once. Candidate (c) violates IDENT(TNS) by not moving the auxiliary from I to C.

2.4.1.Extraction of Wʜ Adjuncts

With wh- adjunct phrases, there are additional Bᴀʀ constraints added to the hierarchy. They are related to the case of Referentiality; according to Legendre et al. (1995), it is related to theta- roles and discourse-linking. Referentiality plays a significant role in the Extractability of wh- adjuncts.

  In the case of theta- roles, the authors site Rizzi (1990) and Cinque (1990) in making the distinction between the referential theta roles of the sentence (the agent and patient) and the non- referential theta- roles (the manner and reason):

    (24) ?What did john wonder how to weigh t?
    (Rizzi 1990: no. 37)

This question can only have one answer, which is *apples*, a patient referential theta- role. As opposed to the wrong answer, which *200 lbs*, a quasi- argumental non- referential theta- role (Rizzi 1990: 86).

  Discourse- (D) linking, according to Pesetsky (1987)[67], is the escape hatch used to deal with the absence of Superiority effects in English. The following example represents the treatment of D-linked and non- D-linked wh- phrases:

    (25) a. *Mary asked what$_j$ who read t$_j$?
        b. Mary asked which book$_j$ which man read t$_j$?
    (Legendre et al. 1995: no. 38 a &b)

The difference between the two examples is that, in (25a), it is not known to the asker or the asked what the books nor the readers are. As opposed to (25b), where there is a set of books and men to choose from. Presupposition is the criterion by which to mark the wh- phrases as

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[67] To explain D-Linking, Pesetsky's examples are of the wh-arguments.

either D- linked or not. In (25a), the wh- phrases *what* and *who* are non D- linked. Meanwhile, in example (25b), the wh- phrases *which book* and *which man* are D- linked.

The additional constraints are (taken from Legendre et. al. (1995) :

- *BAR1 [- REF]*: A single [- ref] link must not cross one barrier.
- *BAR2 [- REF]*: A single [- ref] link must not cross two barriers.
- *BAR3 [- REF]*: A single [- ref] link must not cross three barriers.

These constraints are higher- ranked than the BAR [+ REF] constraints already introduced in the section discussing extraction out of argument wh- questions. The non- referential wh- phrases are more marked than the referential ones. This Markedness gives rise to the related constraints, since the general rule in OT that Markedness constraints are higher than Faithfulness constraints. Then marked elements have their constraints set as higher than unmarked elements' constraints.

- The universal ranking is: BAR [- REF] >> BAR [+REF].

2.4.1.1. Extraction out of Think$_{CP}$

The wh- adjunct phrase can be extracted out of a CP complement if the movement is cyclic as shown in the following tableau[68]:

(26) How$_i$ do you think that he left t$_i$?
(Legendre et. al. 1995: no. 22 b)

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[68] There are some changes made to the original tableau:
    i.   The BAR [+ ref] constraints are omitted from this tableau for relevance.
    ii.   BAR5 [-REF] and BAR4 [-REF] are added.

	SbC/ Ob-Hd/ Gov(t)	Bar5 -ref	Bar4 -ref	Bar3 -ref	Parse wh	Bar2 -ref	Stay
a. how$_i$ do [$_{IP1}$ you [$_{VP}$ think [$_{IP2}$ he [$_{VP2}$ left t$_i$	*! SbC		*				*
→ b. how$_i$ do [$_{IP1}$ you [$_{VP1}$ think [$_{CP}$ e$_i$ that [$_{IP2}$ he [$_{VP2}$ left t$_i$				*		*	**
c. how$_i$ do [$_{IP1}$ you [$_{VP1}$ think [$_{CP}$ that [$_{IP2}$ he [$_{VP2}$ left t$_i$		*!					*
d. wh$_k$					*!		

Tableau 34. The competition for example (26)

Candidate (a) violates SUBCAT with *think* subcategorizing for an IP instead of a CP. it also violates BAR4 [-REF] by moving the wh- phrase across four nodes: VP2, IP2, VP1, and 1P1. Candidate (b) is the winner; it takes advantage of successive cylicity and that violates BAR2 [-REF] and BAR3 [-REF] respectively, which in turn violates STAY twice. Candidate (c) violates BAR5 [-REF] by moving the wh- phrase in one step crossing five nodes: VP2, IP2, CP, VP1, and IP1. This long movement violates STAY once. Candidate (d) violates PARSE-WH by not interpreting the sentence as an interrogative.

A comparison should be drawn between candidates (b) and (d). Since candidate (d) violates a constraint that is lower than BAR3 [-REF] that the optimal form (b) violates, this could be interpreted as a failure to choose the optimal form. However, (d) is an unfaithful parse which cannot win in any competition where a sentence should be interpreted as an interrogative. OT favors a candidate that is the best in the competition even if it violates one or more constraint(s).

2.4.1.2. Extraction out of Think$_{IP}$

The extraction of the adjunct wh- phrases out of IP complements is also possible even when this movement violates the high- ranked constraints BAR [-REF]. The successive cyclic option is not available since *think* subcategorizes for an IP:

    (27) How$_i$ do you think he left t$_i$?
    (Legendre et. al. 1995: no. 23 b)

	SbC/ Ob-Hd/ Gov(t)	Bar4 - ref	Bar3 - ref	Parse- wh	Bar2 - ref	*t
→ a. how$_i$ do [$_{IP1}$ you [$_{VP1}$ think [$_{IP2}$ he [$_{VP2}$ left t$_i$		*				*
b. how$_i$ do [$_{IP1}$ you [$_{VP1}$ think [$_{CP}$ e$_i$ [$_{IP2}$ he [$_{VP2}$ left t$_i$	*! SbC * Ob-Hd		*		*	**
c. wh$_i$				*!		

Tableau 35. The competition for example (27)

Candidate (a) is the optimal form. It violates BAR4 [-REF] and STAY. Candidate (b) violates almost every constraint in the competition. It violates SUBCAT by inserting a CP instead of an IP. This results in a violation of OB-HD since this CP does not have a head (empty or phonologically realized). It also violates BAR3 [-REF] and BAR2 [-REF] by moving the wh- phrase cyclically which results in violating STAY twice. Candidate (c) violates PARSE-WH by not interpreting the sentence as an interrogative.

2.4.1.3. Summary

To sum up, in describing the extraction of wh- adjuncts, a new set of constraints are used. They are the BAR [-REF] family. REF is short for Referentiality, which is related to the theta- roles of the wh- adjuncts (Manner and Reason) as opposed to the referential theta- roles of wh-

arguments (Agent and Patient). BAR [-REF] constraints rank higher than [+REF] ones.

2.5. Embedded WH- Questions

The key in the treatment of embedded wh- questions is the interpretation of the scope of the wh- phrase. It has narrow scope which is controlled by the constraint PARSE-SCOPE. This constraint regulates the faithfulness of the Outputs to the scope requirements included in the Input. If Scope is stated as narrow in the Input, then any candidate that has wide scope is considered as ungrammatical and ruled out as a loser:

- ***PARSE SCOPE***: Scope properties of wh- phrases must be parsed. (Legendre et. al. 1995)

Another constraint that joins the competition is PARSE-WH. This constraint controls the interpretation of the sentence as an interrogative. It is ranked high in the tableau so that any candidate that violates it is a loser:

- ***PARSE-WH***: [+WH] elements in the input must be parsed. (Legendre et.al. 1995)

The following is an example of a common embedded wh- question in English:

(28) I know what you did last summer.
The Input: know (x, y), x= I, y= CP. Tense= past. Scope= narrow.

	Op-Spec	Parse-wh	Parse-Scope	Full-Int	Stay
→ a. [IP1 I [VP1 know [CP what$_i$ [IP2 you [VP2 did t$_i$ [AdvP last summer]]]]]]					*
b. [IP1 I [VP1 know [IP2 you [VP2 did what [AdvP last summer]]]]]	*!				
c. [IP1 I [VP1 know [CP what$_i$ did$_j$ [IP2 you t$_j$ [VP2 do t$_i$ [AdvP last summer]]]]]]		*!		*	**
d. [CP what$_i$ do$_j$ [IP1 I [VP1 know [IP2 you t$_j$ [VP2 did t$_i$ [AdvP last summer]]]]]]		*!	*	*	**

Tableau 36. The competition for example (28)

Candidate (a) is the winner; it violates STAY once by moving the wh-phrase to Spec-CP. Since OP-SPEC is high- ranked in English, then the wh- phrase must move from its base position to a Spec position. Candidate (b) loses because the wh- phrase is not in a Spec position. Candidate (c) loses because it violates PARSE-WH by interpreting the embedded question as a matrix interrogative. It also violates FULL-INT by inserting *do* when it is not needed and STAY twice by moving both the wh- phrase and the auxiliary. Candidate (d) violates all the constraints in the competition except OP-SPEC. The reason behind the violations of PARSE-WH, FULL-INT, and STAY are the same as example (c). The added violation of PARSE-SCOPE is due to the violation of Scope requirement in the Input. It is stated in the Input that the scope is narrow; this candidate gives the wh- phrase wide scope, which is why it loses.

Candidates (b) and (d) violate another constraint which is not mentioned in the competition, which is SUBCAT. This constraint is violated by candidates that violate the subcategorization of the verbs. In this case, *know* subcategorizes for a CP, any candidate that has an IP for

the complement of *know* violates this constraint. As stated before, this constraint is undominated.

2.6. Multiple Wн- Questions

In English multiple wh- questions, only one wh- phrase moves to the Spec-CP position and the other one remains in-situ. The two operators absorb into one to mark the scope of the two variables (Legendre et. al. 1995). The constraint that controls this absorption process is one that prohibits it:

- ***ABSORB***: No absorption of Q- operators. (Legendre et. al. 1995)

This constraint is ranked low in English, which is why the two operators are allowed to absorb. The second wh- phrase adjoins to the first and both carry the indexation of the first wh- phrase.

Contrary to English, in a language like Bulgarian, this constraint is high- ranked to prohibit absorption that is why both wh- phrases in Bulgarian are fronted overtly and they don't adjoin together as in English. The following tableau represents the constraints typology for multiple wh- questions in Bulgarian:

$[Q_i Q_j [x_i V x_j]]$[69]	*Absorb	Op-Spec	Stay
a. $[Q_i Q_j [wh_i V wh_j]]$		*!*	
→ b. $[wh_i + wh_j [t_i V t_j]]$			**
c. $[wh_{i[j]} [t_i V wh_j]]$	*!		*

Tableau 37. Bulgarian multiple wh- questions. (Legendre et. al. 1995: no. 5b)

Candidate (a) violates OP-SPEC fatally by not moving both wh- phrases. Candidate (b) is the winner. It fronts both wh- phrases satisfying OP-SPEC. however, they do not adjoin which satisfies the higher- ranked

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[69] This is the Input to a multiple wh- questions in Bulgarian.

constraint *ABSORB. The winner violates STAY twice, but since it is a lower- ranked constraint, its violation is tolerated. Candidate (c) violates *ABSORB by adjoining the second wh- phrase to the first, thus, rendering it ungrammatical.

- The ranking for Bulgarian: *ABSORB >> OP-SPEC >> STAY.
- Multiple wh- questions in Bulgarian are constructed as follows: $[wh_i + wh_j [t_i V t_j]]$.

The following is an example of English multiple wh- questions:

(29) Who bought what?

	Op-Spec	Stay	*Absorb
a. $[_{CP}$ who$_i$ what$_j$ $[_{IP}$ $[_{VP}$ t$_i$ bought t$_j$]]]		**!	
b. $[_{CP}$ Q$_i$ Q$_j$ $[_{IP}$ $[_{VP}$ who$_i$ bought what$_j$]]]	*!*		
→ c. $[_{CP}$ who$_{i[j]}$ $[_{IP}$ $[_{VP}$ t$_i$ bought what$_j$]]]		*	*

Tableau 38. The competition for example (29)

Candidate (a) loses because it violates STAY twice, by first moving *who* to satisfy OP-SPEC, then moving *what*. Candidate (b) violates OP-SPEC by not moving any of the wh- phrases to the Spec- CP position. Candidate (c) is the winner even if it violates the lower- ranked constraints STAY and *ABSORB once each.

2.7. LF in Multiple WH- Questions

The question of LF movement arises in the treatment of the second wh- phrase in multiple wh- questions. Legendre et. al. (1995) says that there is only one level that includes S- structure, D- structure, and LF. OT's analysis according to McCarthy (2009) (p.c. via email) has the distinction of using ranked, violable constraints and as long as the researcher is doing that, then it is an OT analysis and to include LF is up to the analyst. Neeleman (2009) (p.c. via email) says that "the theory as

such does not require nor forbids" the inclusion of LF (both as a level of interpretation and a level for covert movement) into the analysis. In their Neeleman & Ackema (1998)'s article, Neeleman (p.c. via email) said that they "assume a limited amount of covert movement, and hence […] accept the existence of LF as separate from S- structure" (p.c. via email).

In the current analysis, the constraint *ABSORB subsumes the covert movement of the second wh- phrase. However, LF is integral in the sense that the entire candidate set should be derived from the same Input and have the same proposition.

2.8. Conclusion

The optimality- theoretic analysis of question formation in English is based on the typology of the following constraints: OP-SPEC and STAY. These two constraints play an important part in the constraint hierarchy of English. OP-SPEC plays an important role. Since it is the highest-ranking constraint in the typology, wh- phrases must move to the Spec position. Hence, all wh- phrases are found in Spec-CP in English. Except for multiple wh- questions where only one wh- phrase moves and the other remains in- situ. That other wh- phrase adheres to the significance of the constraint STAY which prohibits movement and the creation of traces.

In English, the main change to the analysis is the abandonment of the constraint OB-HD which prohibits the presence of maximal projections with empty heads and prompts the movement of the auxiliary to fill it. It is replaced by IDENT(TNS) which is more concrete in the sense that it maintains the integrity of the heads in the form that the auxiliary would move to satisfy it. This is obvious in the Yes/NO questions section.

In embedded wh- questions, the constraints involved are PARSE-SCOPE and PARSE-WH. The former to determine the scope property of the wh-phrase: if it carries the narrow scope property, then the sentence is interpreted as an embedded question. The latter constraint makes sure

that the sentence is NOT interpreted as a main question. The relevant ranking of these constraints to other constraints, such as OP-SPEC, ensures the interpretation of the sentence as an embedded question.

Argument and adjunct wh- phrases can be extracted out of ThinkIP and ThinkCP if they adhere to the +/-BAR Family of constraints. These constraints limit the number of barriers a wh- phrase can cross to reach Spec-CP. the violation of the BAR constraints could be construed as an indication that Subjacency is not observed in OT. This assumption can be misleading. The derivations that violate the high-ranking BAR constraints are considered to be ungrammatical as in candidate (c) in tableau 35. The violability is tolerated in optimal forms as long as there are intervening traces that could legitimize such movement since the constraint that prohibits movement, STAY, is low-ranking in English.

Subject wh- questions in English are the hardest to explain in an OT analysis, since there aren't these many references for the topic. The analysis given is an attempt to unify the wh- question analysis and not make this particular topic an anomaly. They are treated as CPs. The ungrammatical sentences with the wh- phrase found in Spec-IP instead of Spec-CP are a case of a violation of the constraint SUBJECT which is violated by any sentence that does not have an element in the Spec position of the CP. In English, C needs an element in the Spec position. In this sense, the presence of the subject wh- phrase in Spec-CP in English is a combined effect of both OP-SPEC and SUBJECT. This explanation of subject wh- questions is introduced here so that the constraints involved in the competition remain general and universal.

3. Cairene Arabic

3.1. Yes/No Questions

Like any Yes/No question in any language, this type of questions does no use a wh- phrase. However, the sentence construction is different in CA from a language like English for example. In CA, it is built like a

declarative sentence, the difference is the phonetically null Q operator that is found in C, and the rising tone used to distinguish it from a standard declarative sentence.

Since Yes/No questions in CA are built like a declarative construction, the most important constraint in the competition is PARSE-WH to distinguish the interrogative as one. In addition, the speaker uses a high intonation which is marked in the example by (/):

The following example is that of typical Yes/No question used in CA:

(30) ʕali ge-h   ?el-nahar-dah? /
     ʕali came (MSC. SNG.) the-day-this?
     Did Ali come today?

The Input: geh (came) (x), x= Ali. Tense= past. Adv= ?el-nahar-dah (today). Comp= +Q.

	Parse-wh	Full-Int
→ a. [CP Q [IP Ali [VP came [AdvP today]]]]		
b. [IP Ali [VP came [AdvP today]]]	*!	*

Tableau 39. The competition for example (30)

Candidate (a) is the winner; it does not violate any of the constraints involved in the competition. Candidate (b) violates both constraints: PARSE-WH, by not interpreting the sentence as a question; FULL-INT, by not including the complementizer C in the output.

The above mentioned example is an example of the SVO word order in Arabic, where a sentence starts with the subject followed by the verb. The following is an example of the VSO word order, which is one where the sentence starts with a verb followed by the subject:

(31) teftekr-y   ʕali ge-h   ?el-nahar-dah?
    Think-you (FEM. SING.) ʕali came (MSC. SNG.) the-day-this?
    Do you think Ali came today?
The Input: tefteker (think) (x, y), x= pro (you), y= IP.

	SubCat	Parse-wh	Full-Int
→ a. [CP1 Q [TP1 pro [VP1 think [TP2 Ali [VP2 came [AdvP today]]]]]]			
b. [CP1 Q [TP1 pro [VP1 think [CP2 [TP2 Ali [VP2 came [AdvP today]]]]]]]	*!		

Tableau 40. The competition for example (31)

Candidate (a) is the winner; it satisfies all the constraints involved in the competition. Candidate (b) loses because it violates the high-ranked constraint SUBCAT which is violated by candidates that have the wrong subcategorization for the verbs. The verb *tefteker* (meaning think) subcategorizes for an IP in this example.

3.1.1. The Archi-Pro-Neme

An example of a Yes/No question construction is the use of a question-particle instead of a wh-phrase to indicate that the clause is an interrogative. These are empty 3rd person pronouns appearing at the beginning of the matrix clause which Kenstowicz & Wahba (1983) call *"Archi-Pro-Neme"*. The Archi-Pro-Neme will match the following NP in number and gender, but if the NP is not available in its different formats then the Archi-Pro-Neme takes the form of the 3rd person pronoun singular "huwwa" meaning *he*.

(32) *huwwa*= he   *hiyya*= she   *humma*= they
(Kenstowicz & Wahba 1983: no. 8)[70]

   i. Mona ?āblit   il-talameez.
      Mona meet+ past the-students
      Mona met the students.
   ii. hiyya/*humma Mona ?āblit il-talameez.
      Did Mona meet the students?

   i. il-talameez   ?āblu   Mona.
      The-students meet+ past Mona.
      The students met Mona.
   ii. *hiyya/ humma il-talameez ?āblu Mona.
      Did the students meet Mona?

   i. mafrud^{ˤ} inn Mona ti?ābil il-talameez.
      Ought   that Mona to-meet the-students.
      *Mona is ought to meet the students?
   ii. *hiyya/*humma/ huwwa mafrud^{ˤ} in Mona ti?ābil il-talameez.
      *Mona ought to meet the students?

The Input for example (32 a, b, c): ?ābel (meet) (x, y), x= Mona, y= il-talameez (the students). Tense (a, b) = past, Tense (c) = future. Comp= hiyya (Archi-Pro-Neme).

Candidates	Parse-wh	Full-Int
a. [$_{CP}$ hiyya [$_{IP}$ Mona [$_{VP}$ met the students]]		
b. [$_{CP}$ humma [$_{IP}$ the students [$_{VP}$ met Mona]]		
c. [$_{CP}$ huwwa [$_{IP}$ Mona [$_{VP}$ to meet the students]]		

Tableau 41. A representation of the Archi-Pro-Neme. (Not a competition)

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[70] There were some changes that were made to the original examples:
    (I)   The long vowel (ii) is changed to (ee).
    (II)   The long vowel (aa) is changed to (ā).
    (III)   The emphatic Dental/Alveolar Stop (d) (ض) is changed to (d^{ˤ}).

The constraints PARSE-WH and FULL-INT in the above tableau are satisfied, which makes the candidates in it all optimal forms.

The Archi-Pro-Neme has to be present in the Input; other-wise the outputs would violate FULL-INT fatally. These Archi-Pro-Nemes are base-generated under C and have to be at the most left peripheral position; otherwise, they are interpreted as a regular pronoun.

(33) huwwa Ali ge-h   ?el-nahar-dah?
       He   Ali came (MSC. SNG.) the-day-this?
       Did Ali come today?
The Input: geh (came) (x), x= ʕali. Tense= past. Adv= el-nahar-dah (today). Comp= huwwa (Archi-Pro-Neme).

	Parse-wh	Full-Int
→ a. [$_{CP}$ huwwa [$_{IP}$ Ali [$_{VP}$ came [$_{AdvP}$ today]]]]		
b. [$_{CP}$ Q [$_{IP}$ Ali [$_{VP}$ came [$_{AdvP}$ today]]]]		*!
c. [$_{IP}$ Ali [$_{VP}$ came [$_{AdvP}$ today]]]	*!	*

Tableau 42. The competition for example (33)

Candidate (a) is the winner; it satisfies all the constraints involved in the competition. Candidate (b) violates FULL-INT because even though the sentence is interpreted as a question, the complementizer is not included in the output. Candidate (c) violates both constraints.

3.1.2.Summary

To sum up, the Yes/No questions in CA look like declarative sentences but they are not. The key constraint to distinguish them as interrogatives is PARSE-WH. This constraint is responsible for interpreting them as interrogatives. Any candidate that violates this high- ranked constraint is a loser. The Archi-Pro-Nemes are used with Yes/No questions. They are +WH elements that are base- generated under C.

3.2. An Optimality- Theoretic Approach to Optionality

In the introductory chapter, I introduced the general concept of the optionality phenomenon and a summary of the analysis in OT in the form of a synopsis of Müller's 2001 article that deals with the different types of optionality in various languages (cf. p 33). I shall not repeat the whole section but rather give a brief discussion of the route the analysis of optionality in CA is taking. There are four types of optionality analyses in Müller's article: Pseudo- and True optionality, Ties, and finally Neutralization. Of the four types, True optionality is the basis of the analysis of CA wh-questions. As it turned out from research, there can only be a difference in the Input for the existence of the two placements of the wh-phrase. With the in-situ form as the canonical position, the wh-phrase that is found in Spec-CP moves to satisfy a high-ranking constraint, which shall be introduced into the competition.

3.3. Argument WH- Questions

CA has two constructions for the same wh- question: one where the wh-phrase is found in –situ and the other is Spec-CP. The basic construction of the wh- argument questions in CA is the in- situ one, as in the following example:

(39) ħasal   ?eh?
        Happened what?
        What happened?
[$_{CP}$ Q [$_{IP}$ [$_{VP}$ happened what]]]
The Input: ħasal (happened) (x), x= ?eh (what). Tns= past.

The following ranking argument tableau is a representation of the competition to achieve a ranking of the constraints STAY and OP-SPEC that are relevant in the construction of wh- questions. The reasoning here is that STAY outranks OP-SPEC in CA yielding the in-situ construction. Example (43) is in competition with the following ungrammatical sentence using the same Input:

(40) *?eh   ħasal?
      *What happened?

	Stay	Op-Spec
→ a. [CP Q [IP [VP happened what]]]		*
b. [CP what_i Q [IP [VP happened t_i]]]	*!	

Tableau 45. The competition for example (40)

Candidate (a) is the winner; it violates OP-SPEC. Since it is a low-ranked constraint, the winner can violate it without losing its status as the optimal form. Candidate (b) violates the high- ranked constraint STAY fatally by moving the wh- phrase to Spec-CP.

   The other construction is where the wh- phrase is found in Spec-CP as in the following example:

(41) ?eh   ?illi   ħasal?
      What that   happened?
      What is it that happened?
[CP what_i that [PredP happened t_i]]]
The Input: ħasal (happened) (x), x= ?eh (what). Tns= past. Comp= ?illi (that).

When the wh- phrase is present in Spec-CP, the sentences must include the complementizer *?illi* (meaning that), this element is vital to the grammaticality of the sentences, if it is not present in the candidates as it is present in the Input, the sentences are rendered ungrammatical.

(42) *?eh   ħasal?
      *what happened?

Losers that do not contain *?illi*, such as example (42) above, violate the constraint FULL-INT. The ranking of FULL-INT in relation to STAY is in the following ranking argument:

	Full-Int	Stay
→ a. [$_{CP}$ what$_j$ that [$_{IP}$ [$_{VP}$ happened t$_j$]]]		*
b. [$_{CP}$ what$_j$ [$_{IP}$ [$_{VP}$ happened t$_j$]]]	*!	*
c. [$_{CP}$ [$_{IP}$ [$_{VP}$ happened what]]]	*!	

Tableau 46. Ranking argument: FULL-INT >> STAY

Candidate (a) is the optimal form even with a violation of the constraint STAY that resulted from moving *eh-what* from its base position (the argument of the verb *ħasal-happened*) to Spec-CP. Candidates (b) and (c) d not have *?illi* present, which means that they violate FULL-INT. (b) is worse than (c) in that it violate STAY as well.

Candidate (c) in the competition for example (41) is the grammatical example (39) with the wh- phrase found in- situ. This example is not the winner in this competition. The difference is the Input for example (40) which includes *?illi* (meaning that) forcing it to surface in the Output.

These examples show an instance of Pseudo- Optionality. *?illi* has to be present in the Input for it to be present in the Output. Another attribute of the complementizer *?illi* is that it is only present with argument wh- phrases and prohibited with adjuncts ones, as the section on wh- adjuncts phrases will show.

Combining the three constraints so far yields the following ranking argument tableau:

	Full-Int	Stay	Op-Spec
→ a. [$_{CP}$ what$_j$ that [$_{IP}$ t$_j$` [$_{VP}$ happened t$_j$]]]		**	
b. [$_{CP}$ what$_j$ [$_{IP}$ t$_j$` [$_{VP}$ happened t$_j$]]]	*!	**	
c. [$_{CP}$ [$_{IP}$ [$_{VP}$ happened what]]]	*!		*

Tableau 47. Ranking argument: FULL-INT >> STAY >> OP-SPEC

Candidate (a) is the optimal form, violating STAY twice. Candidates (b) and (c) do not parse the Complementizer *?illi* as it is present in the

Input; this violates FULL-INT fatally for both candidates. Candidate (b) violates STAY twice and candidate (c) violates OP-SPEC.

An interesting ungrammatical sentence is the following, where *?illi* is present in the Output but the wh- phrase does not move to Spec-CP:

(43) *?illi ħasal   ?eh?
       That happened what?

Example (43) is ungrammatical, but if it is compared to the grammatical example (41) where the wh- phrase is in Spec-CP, the outcome is not a logical result that would be found in a competition:

	Full-Int	Stay	Op-Spec
→ a. [CP what_j that [IP [VP happened t_j]]]		*	
b. [CP that [IP [VP happened what]]]			*

Tableau 48. A comparison between examples (39 & 43)

Both candidates incur the same number of violations. But the important question here is: How is it that a candidate with a violation of a low-ranked constraint loses to another candidate with a violation of a higher-ranked constraint? The answer that OT provides is one which includes a constraint that is ranked higher than FULL-INT and STAY, which the winner candidate does not violate. In this case it is the Discourse constraint ALIGN-FOCUS:

- ***ALIGN-FOCUS***: Align contrastively focused constituents with the left/right edge of VP. Samek-Lodovici (1998)

This constraint is violated by miss- aligned focused elements. To take the analogy from this constraint, the wh- phrase *eh* (what) in (41) is focused, which is included in the Input, it then moves to the left of VP and the landing position of it is Spec-CP since operators only move to Spec positions. An available Spec position is Spec-IP, but when the wh-phrase moves there, the sentence is still ungrammatical. The next Spec

position is in Spec-CP, the wh- phrase moves there and the sentence is grammatical. Moving the wh- phrase violates STAY twice but it satisfies the higher- ranked constraint ALIGN-FOCUS. The following tableau shows this:

	Align-Focus	Full-Int	Stay	Op-Spec
→ a. [CP what_j that [IP t_j` [VP happened t_j]]]			**	
b. [CP that [IP [VP happened what]]]	*!			*
c. [CP that [IP what_j [VP happened t_j]]]	*!		*	

Tableau 49. The competition for example (41)

The optimal form (a) violates STAY twice, by moving *?eh* from its argument position to Spec-IP then Spec-CP in a cyclic movement. Candidate (b) violates ALIGN-FOCUS fatally, rendering the sentence ungrammatical, added to this violation another one of OP-SPEC. In candidate (c), even with the satisfaction of OP-SPEC, the operator is in Spec-IP, the sentence is still ungrammatical because the wh- phrase did not reach its appropriate landing site.

   For this analysis of focused wh- phrases in CA, I am introducing the new constraint ALIGN-FOCUS(WH) to accommodate for wh- phrases moving to the Spec-CP position in languages that have no obligatory movement of these wh- phrases otherwise:

- *ALIGN-FOCUS (WH)*: focused wh- phrases move to the Specifier position of CP.

This new constraint is violated by focused wh- phrases that are not found in Spec-CP. The Input must include Focus requirements of the wh- phrases as in the following Input for example (41):

The Input: ħasal (happened) (x), x= ?eh (what) (Focused). Tns= past. Comp= ?illi (that).

The reasoning behind creating the new constraint ALIGN-FOCUS(WH) is the following. In the ALIGN-FOCUS family of constraints, there is no constraint specifically for moving wh-phrases; constraints are generally used for focused elements in declarative structures. To differentiate the usage of the other constraints from this, I have chosen to create a new constraint.

Another reason is that CA, as a rule, does not have obligatory wh-movement to Spec-CP. That is the reason behind ranking OP-SPEC low in the hierarchy. To account for this optional movement is the point of this work. Pseudo- Optionality in the case of the presence of *?illi* is explained using the information found in the Input. If the Comp is found in the Input, it is found in the Output. The other kind of Optionality that could not be explained by different Inputs is one where both the candidates share the exact same Input, but differ in the placement of one element i.e. the wh- phrase.

Choosing the Discourse- related constraint ALIGN-FOCUS (and its brother concerning wh- phrases ALIGN-FOCUS(WH) is a logical step; in a sense that since both candidates share the same Input and every element in this Input contains the same characteristics of the words represented in it, then the only way for their placements to differ is Discourse-related. The speaker chooses which word to Focus on (in this case a wh-phrase).

Another argument for creating a new constraint is that language varieties can not have two ranking hierarchies for the same structure, building two ranking typologies for CA is not a plausible solution. OP-SPEC cannot out-rank STAY in one typology and become low-ranked in another. Languages, as far as I know, do not behave in this way either in OT or in any other theory.

The analysis for the other argument wh- phrases *meen*[71] (object *whom*) and *?anhi-NP* (*which-NP*) is basically the same as the analysis of *?eh* (*what*). That is why I am limiting the analysis presented to *?eh* (*what*).

The wh- phrase can be found in- situ as in example (44):

(44) ?enta$_i$ ʃof-t$_i$ meen   ?el- nahar-dah?
     You   saw-you whom   the-day-this?
     Whom did you see today?

The Input: yeʃoof (see) (x, y) x= ?enta (you), y= meen (whom). Tns= past. Adv= ?el-nahar-dah (today).

	Full-Int	Stay	Op-Spec
→ a. [$_{CP}$ Q [$_{IP}$ you [$_{VP}$ saw whom [$_{AdvP}$ the-day-this]]]]			*
b. [$_{CP}$ whom$_j$ Q [$_{IP}$ you [$_{VP}$ saw t$_j$ [$_{AdvP}$ the-day-this]]]]	*!	*	
c. [$_{CP}$ whom$_j$ Q [$_{IP}$ you [$_{VP}$ saw-him$_j$ [$_{AdvP}$ the-day-this]]]]		*!	

Tableau 50. The competition for example (44)

Candidate (a) is the optimal form, even if it violates OP-SPEC, since it is a low- ranked constraint, it does not affect the outcome of the competition. Candidate (b) loses because it violates FULL-INT fatally, traces are morphologically realized in CA by an enclitic pronoun, and since that violates the integrity of the Input, then (b) is not chosen as the optimal form. Added to the violation marks incurred by (b) is one for the constraint STAY. Candidate (c) loses because it violates the constraint STAY.

The following example, (45), the wh- phrase is found in Spec-CP with the obligatory presence of the complementizer *?illi* (*that*):

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[71] *Meen* as an object form does not differ phonologically nor morphologically than *Meen* as a subject form.

(45) meen$_i$?illi ?enta ʃof-t-uh$_i$?el-nahar-dah?
  Who$_i$ that you saw-you-him$_i$ today?
   Whom is it that you saw today?
The Input: yeʃoof (see) (x, y) x= ?enta (you), y= meen (whom)
(Focused). Tns= past. Adv= ?el-nahar-dah (today).

	Align-Focus (wh)	Full-Int	Stay	Op-Spec
→ a. [$_{CP}$ whom$_i$ that [$_{IP}$ t$_i$` you [$_{VP}$ saw-him$_i$ [$_{AdvP}$ today]]]]			**	
b. [$_{CP}$ that [$_{IP}$ you [$_{VP}$ saw whom [$_{AdvP}$ today]]]]	*!			*
c. [$_{CP}$ whom$_i$ that [$_{IP}$ you [$_{VP}$ saw t$_i$ [$_{AdvP}$ today]]]]		*!	**	
d. [$_{CP}$ whom$_i$ [$_{IP}$ you [$_{VP}$ saw-him$_i$ [$_{AdvP}$ today]]]]		*!	**	

Tableau 51. The competition for example (45)

Candidate (a) is the optimal form, violating STAY twice but satisfying the high- ranked constraints ALIGN-FOCUS(WH) and FULL-INT. Candidate (b) violates the high- ranked constraint ALIGN-FOCUS(WH) fatally. Candidates (c) and (d) incur the same number of violations and to the same constraints. However, the reason behind the violation of FULL-INT by (c) is different than (d). In (c), the trace is not morphologically realized as *uh* (him) co-indexed with the wh- phrase *meen* (whom).

 Some traces are morphologically realized in CA by adding a resumptive pronoun attached to the verb co-indexed with the wh- element. The verbs that require a resumptive pronoun are transitive verbs such as: yakol (to eat), yeʃrab (*to drink*), yeʃoof (*to see*).

(46) ?anhi ʃanta$_j$?illi ?enty ʕawza-ha$_j$?
    Which bag$_j$ that you   want-it$_j$?
    Which bag do you want?
The Input: ʕawez (want) (x, y), x= ?enty (you), y= ?anhi-shanta (which
bag) (focused). Tns= present. Comp= ?illi (that).

Example (46) competes with the following ungrammatical sentence (47)
to further solidify the evidence of the dominance of ALIGN-FOCUS(WH)
over the other constraints:

(47) *?illi ?enty ʕawza-ha$_j$?anhi ʃanta$_j$?
    *That you   want-it$_j$ which bag$_j$?

	Align-Focus (wh)	Full-Int	Stay	Op-Spec
→ a. [$_{CP}$ which bag$_j$ that [$_{IP}$ t$_j$` you [$_{VP}$ want-it$_j$]]]			**	
b. [$_{CP}$ that [$_{IP}$ you [$_{VP}$ want-it$_j$ which bag$_j$]]]	*!			*

Tableau 52. The competition for example (46)

The optimal form (a) violates STAY twice in moving the wh- phrase
cyclically from the argument position through Spec-IP then to its final
landing site Spec-CP creating the trace t`. The violation of the constraint
STAY does not hurt the optimal status of the winning candidate. Low-
ranked constraints play a role in deciding the fate of most candidates and
resolve ties in many competitions; but as a rule in OT, the optimal form
could incur a violation or two of low-ranked constraints and still retain
the position of the optimal form.

   Candidate (b) violates the higher- ranked constraint ALIGN-
FOCUS(WH) by not moving the wh- phrase at all. Candidate (b) also
violates OP-SPEC, but since it is low-ranked, the only violation that is
crucial is the higher-ranked constraint ALIGN-FOCUS(WH).

3.3.1. The Archi-Pro-Neme

The Archi-Pro-Neme can be used with argument wh- questions:

(48) huwwa ?eh   ?illi ħasal?
       QP   what that happened?
     What is it that happened?

The Input: ħasal (happened) (x), x= ?eh (what) (focused). Tns= past.
Comp= ?illi (that). Comp= huwwa (Archi-Pro-Neme).

The Archi-Pro-Neme *huwwa* is base- generated under C of a CP that is adjoined to the already existing CP. it has to be present in the Input. If a candidate fails to parse the Archi-Pro-Neme, it is considered a loser:

	Align-Focus (wh)	Full-Int	Stay	Op-Spec
→ a. [CP huwwa [CP what_j that [IP [VP happened t_j]]]]			**	
b. [CP what_j that [IP [VP happened t_j]]]		*!	**	
c. [CP huwwa [CP that [IP [VP happened what]]]]	*!			*
d. [CP what_j huwwa [CP that [IP [VP happened t_j]]]]		*!	***	

Tableau 53. The competition for example (48)

Candidate (a) is the optimal form violating STAY twice but satisfying the higher- ranked constraints. Candidate (b) violates FULL-INT fatally by not parsing the Archi-Pro-Neme. Candidate (c) violates ALIGN-FOCUS(WH) fatally by not moving the wh- phrase to Spec-CP, which violates OP-SPEC. candidate (d) seemingly, looks grammatical, but it is not. One of the very important attributes of the Archi-Pro-Neme is that it has to be at the most peripheral position in a sentence, no elements

should occur before it. This violates FULL-INT. the extra movement of the wh- phrase incurs another violation of STAY making them three.

3.3.2.Summary

To sum up, optionality is apparent in argument wh- phrases. They can be found either in-situ or in Spec-CP positions. The complementizer *?illi* (*that*) is obligatorily present in the Input in the sentences with the wh- phrase found in Spec-CP. Candidates with a missing complementizer *?illi* (*that*), which is present in the Input, are considered to be ungrammatical.

The new constraint ALIGN-FOCUS(WH) is introduced to account for the wh phrase found in Spec-CP. It is violated by the candidates that do not move the wh- phrase to Spec-CP. The Input has to include whether the wh- phrase is +/- Focus. Otherwise, the sentence is rendered ungrammatical.

3.4.   Subject WH- Questions

Subject wh- phrases are originally generated in Spec-IP. I am assuming here that they move to Spec- CP because wh- subjects are inherently +Focus. This means that the subject wh- phrase in CA is always +focused in the Input. Consequently, the constraint ALIGN-FOCUS(WH) is involved in the competition. Another attribute of subject wh- questions is that the sentences obligatorily contain the complementizer *?illi* (meaning that) in the Input:

(49) meen ?illi ge-h?
     *Who that came (MSC. SNG.)?
     Who is it that came?
The Input: geh (came) (x), x= meen (who) (focused). Tense= past. Comp= ?illi (that).

	Align-Focus(wh)	Full-Int	Stay	Op-Spec
→ a. [CP who_i that [IP t_i [VP came]]]			*	
b. [CP that [IP who [VP came]]]	*!	*		
c. [CP who_i [IP t_i [VP came]]]		*!	*	

Tableau 54. The competition for example (49)

Candidate (a) is the winner; it satisfies the higher-ranked constraints ALIGN-FOCUS(WH) and FULL-INT. It violates STAY once by moving the wh- phrase from Spec-IP to Spec-CP. Candidate (b) loses since it violates ALIGN-FOCUS(WH) by not moving the wh- phrase to Spec-CP. It also violates FULL-INT since the +focus property of the wh- phrase is not present in the Output. Candidate (c) violates FULL-INT fatally with the complementizer not present in the Output as it is present in the Input. It also violates STAY.

3.4.1.The Archi-Pro-Neme

The Archi-Pro-Neme is used with subject wh- questions as in the following example:

    (50) huwwa meen ?illi ge-h?
        He   who that came (MSC. SNG.)?
        Who came?
The Input: geh (came) (x), x= meen (who) (focused). Tense= past.
Comp= ?illi (that). Comp= huwwa (Archi-Pro-Neme).

	Align-focus(wh)	Full-Int	Stay	Op-Spec
→ a. [$_{CP1}$ he [$_{CP2}$ who$_i$ that [$_{IP}$ t$_i$ [$_{VP}$ came]]]			*	
b. [$_{CP1}$ who$_i$ he [$_{CP2}$ t$_i$` that [$_{IP}$ t$_i$ [$_{VP}$ came]]]		*!	**	
c. [$_{CP}$ who$_i$ that [$_{IP}$ t$_i$ [$_{VP}$ came]]]		*!	*	

Tableau 55. The competition for example (50)

Candidate (a) is the winner; it satisfies the higher- ranked constraints ALIGN-FOCUS(WH) and FULL-INT. It violates STAY by moving the wh-phrase from Spec-IP to Spec-CP; but since this movement is to satisfy the most important constraint in the competition, the violation is tolerated. Candidate (b) loses because it violates FULL-INT; one of the most important attributes of the Archi-Pro-Neme is to be in the most peripheral position in the sentence. This candidate violates that. It also violates STAY twice. The wh- phrase moves from Spec-CP1 to Spec-CP2 incurring an extra violation of STAY. This movement is uncalled for, the highest- ranking constraint ALIGN-FOCUS(WH) is satisfied by the first movement, from Spec-IP to Spec-CP1. Since the first movement satisfies the highest- ranking constraint, further movement is prohibited. Candidate (c) violates FULL-INT fatally by not including the Archi-Pro-Neme in the Output as it is present in the Input.

3.4.2. Summary

Subject wh- phrases in CA are inherently focused. This is the reason why it always moves from its base position in Spec-IP to Spec-CP. this type of questions always includes the complementizer *?illi* (that) in the Input since its presence in the winner is crucial.

Like all wh- questions so far, the Archi-Pro-Neme is used as long as its most important attribute is maintained: it has to be present in the left-most peripheral position in the sentence.

In the analysis for English wh- subjects, along with the constraint OP-SPEC, another constraint was introduced into the competition to ensure that the wh- phrase lands in Spec-CP. this constraint is SUBJECT. Unlike the competition for English, the constraint SUBJECT is not included here. This constraint is not applicable in a language like Arabic where the presence of an element in the Specifier position is not obligatory.

3.5.   Adjunct WH- Questions

The treatment of adjunct wh- questions is the same as argument wh-questions. The basic construction is the one with the wh- phrase found in- situ as in the following example:

> (51) ?el- kalam-dah   ħasal   ?ezzay?
>   The-thing-this   happened how?
>   How did this thing happen?

The Input: ħasal (happened) (x). x= ?el-kalam-dah (this thing). Adverb= ?ezzay (how). Tns= past.

	Full-Int	Stay	Op-Spec
→ a. [$_{CP}$ Q [$_{IP}$ this thing [$_{VP}$ happened how]]]			*
b. [$_{CP}$ how$_j$ [$_{IP}$ this thing [$_{VP}$ happened t$_j$]]]	*!	*	
c. [$_{CP}$ that [$_{IP}$ this thing [$_{VP}$ happened how]]]	*!		*

Tableau 56. The competition for example (51)

Candidate (a) is the optimal form even though it violates the low- ranked constraint OP-SPEC, but since it is a low-ranked constraint; its violation does not harm the winner. Candidate (b) has the wh- phrase in Spec-CP when it is not specified in the Input that it is focused which violates FULL-INT. The candidate also violates STAY as well. Candidate (c) violates FULL-INT but for a different reason, it contains the complementizer *that* when it is not mentioned in the Input.

Optionality occurs in adjunct wh- questions. The following example is one with the same wh- phrase found in Spec-CP. It is written in the Input as +focused:

(52) ?ezzay ?el- kalam-dah ħasal?
  How the-thing-this happened?
  How did this thing happen?
The Input: ħasal (happened) (x). x= ?el-kalam-dah (this thing). Adverb= ?ezzay (how) (focused). Tns= past.

	Align- Focus (wh)	Full- Int	Stay	Op- Spec
→ a. [CP howj Q [IP this thing [VP happened tj]]]			*	
b. [CP Q [IP this thing [VP happened how]]	*!	*		
c. [CP howj that [IP this thing [VP happened tj]]]		*!		*

Tableau 57. The competition for example (52)

Candidate (a) is the winner even with the violation of low- ranked constraint STAY. Candidate (b) fails to satisfy the higher- ranked constraint ALIGN-FOCUS(WH) in not having the wh- phrase in Spec-CP. it also fails to fully interpret the elements of the Input, the wh- phrase is focused in the Input which should be present in the Output, hence the violation of FULL-INT. Candidate (c) satisfies the higher- ranked constraint but it has an extra element that is not present in the Input i.e. the Comp *that*, which violates FULL-INT fatally. The candidate (c) also violates OP-SPEC.

3.6. Embedded WH- Questions

Unlike matrix wh- questions, in embedded wh- questions, scope properties must be identified in the Input. The wh- phrases in this case have narrow scope; the constraint that ensures that scope properties

present in the Input are also present in the Output is one of the PARSE family of constraints called PARSE-SCOPE:

- **PARSE-SCOPE**: Scope properties of wh- phrases must be parsed. (Legendre et al. 1995)

This constraint is violated when a wh- phrase with wide scope is interpreted as one with narrow scope and vice versa. It ranks higher than PARSE-WH, for the sentence is a declarative as in the following examples:

(53) ?ana ʕarf-ah   ħasal   ?eh ?el-nahar-dah.
      I   know (FEM. SNG.) happened what the-day-this.
      I know what it is that happened today.

The Input: yeʕraf (know) (x, y), x= ?ana (I), y= CP. Tns= present. ħasal (happened) (x), x= ?eh (what). Tns= Past. Adverb= ?el-nahar-dah (today). Scope= narrow.

	Parse-Scope	Full-Int	Stay	Op-Spec
→ a. [IP I [VP know [CP Q [IP [VP happened what the-day-this]]]]]				*
b. [CP Q [IP I [VP know [CP [IP [VP happened what the-day-this]]]]]]	*!			*
c. [CP whatⱼ [IP I [VP know [IP tⱼ` [VP happened tⱼ the-day-this]]]]]	*!	*	**	

Tableau 58. The competition for example (53)

Candidate (a) is the optimal form, it violates PARSE-WH by not interpreting the sentence as a question; it also violates OP-SPEC with the wh- phrase not in a Spec position. However, the higher- ranked constraint PARSE-SCOPE is not violated, which makes this candidate the winner. Candidate (b) violates PARSE-SCOPE fatally by interpreting the sentence as a matrix question; it also violates OP-SPEC. Candidate (c) also violates PARSE-SCOPE, and FULL-INT by not adhering to the

subcategorization requirement of the verb *3arfa* (meaning know) in having a CP as its complement, and adds to these violations two of STAY by moving the wh- phrase cyclically to Spec- CP.

(54) ?ana ʕarf-a ?eh ?illi ħasal ?el-nahar-dah.
    I know (FEM. SNG.) what that happened the-day-this.
    I know what it is that happened today.

The Input: yeʕraf (know) (x, y), x= ?ana (I), y= CP. Tns= present. ħasal (happened) (x), x= ?eh (what) (focused). Tns= Past. Comp= ?illi (that). Adverb= ?el-nahar-dah (today). Scope= narrow.

	Parse-Scope	Align-Focus (wh)	Full-Int	Stay	Op-Spec
→ a. [IP I [VP know [CP what_j that [IP t_jˋ [VP happened t_j the-day-this]]]]]				**	
b. [CP1 what_j [IP I [VP know [CP t_j`` that [IP t_jˋ [VP happened t_j the-day-this]]]]]				*!**	
c. [CP Q [IP I [VP know [CP what_j that [IP t_jˋ [VP happened t_j the-day-this]]]]]]	*!			**	
d. [IP I [VP know [CP that [IP [VP happened what the-day-this]]]]]		*!		**	*

Tableau 59. The competition for example (54)

Candidate (a) satisfies the high- ranked constraint PARSE-SCOPE, since it complies with the scope specifications of the Input, it is the winner. Candidate (b) violates STAY by moving the wh- phrase to Spec-CP1 and that adds a violation to the constraint. The wh- phrase needs to move to the Spec position of the nearest CP; there is no need for it to move any further. Candidate (c) violates PARSE-SCOPE fatally by interpreting the sentence as a question, giving the wh- phrase wide scope. Candidate (d)

violates ALIGN-FOCUS(WH)[72] by not moving the wh- phrase to Spec-CP. All candidates incur the same number of violations to the constraint STAY.

Examples (53) and (54) are a case of Pseudo- Optionality, where the difference between the two examples is the presence of the complementizer *?illi* (that) in the Input. Both examples do not compete in the same competition, hence the different constraint profiles.

As with argument wh- phrases, Optionality occurs with embedded adjunct wh-phrases:

(55) ?ana ʕarf-a ?el-nas-di   ʕamal-o keda leh.
     I   know the-people-this did-they this   why.
     I know why these people did this.

The Input: yeʕraf (know) (x, y), x= ?ana (I), y= CP. Tns= present. ʕamal (did) (x, y), x= o (suffixed pronoun meaning they), y= keda (this). Adverb= leh (why). Tns= past. Scope= narrow.

	Parse-scope	Full-Int	Stay	Op-Spec
→ a. [IP I [VP know [CP Q [IP the-people-this [VP did-they this why]]]]]				*
b. [CP Q [IP I [VP know [CP [IP the-people-this [VP did-they this why]]]]]]	*!			*

Tableau 60. The competition for example (55)

Candidate (a) is the winner of this competition; it violates the constraints PARSE-WH by not interpreting the sentence as a matrix question, and OP-SPEC with the wh- phrase remaining in-situ. Candidate (b) violates the high- ranking constraint PARSE-SCOPE by interpreting the sentence as a matrix question, it also violates OP-SPEC.

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[72] The ranking between PARSE-SCOPE and ALIGN-FOCUS (WH) is not strict; their status as high- ranking constraint should not suffer the fact that they are not strictly ranked to one another. This is a common practice in OT i.e. not all constraints in the grammar are strictly ranked to each other.

The following example is the optional occurrence of the wh- phrase. The constraint profile changes with the addition of the constraint ALIGN-FOCUS(WH) into the competition to settle it for the winner:

(56) ?ana ʕarf-a   leh   ?el-nas-di   ʕamal-o keda.
      I   know (FEM. SNG.) why the-people-this did-they   this.
      I know why these people did this.

The Input: yeʕraf (know) (x, y), x= ?ana (I), y= CP. Tns= present. ʕamal (did) (x, y), x= o (suffixed pronoun meaning they), y= keda (this). Adverb= leh (why) (Focused). Tns= past. Scope= narrow.

	Parse-scope	Align-Focus (wh)	Full-Int	Stay	Op-Spec
→ a. [IP I [VP know [CP whyj Q [IP the-people-this [VP did-they this tj]]]]]				*	
b. [CP Q [IP I [VP know [CP whyj [IP the-people-this [VP did-they this tj]]]]]	*!				
c. [IP I [VP know [CP Q [IP the-people-this [VP did-they this why]]]]]		*!	*		*

Tableau 61. The competition for example (56)

Candidate (a) is the optimal form in this competition, it violates PARSE-WH and STAY, but the higher- ranked constraints are satisfied. Candidate (b) loses because it violates the high- ranked constraint PARSE-SCOPE by interpreting the sentence as a question. Candidate (c) incurs the most violation: it violates ALIGN-FOCUS(WH) by not moving the focused wh-phrase to Spec-CP, it also violates FULL-INT for the same reason (the properties of the wh- phrase in the Input were not present in the Output), and the constraint OP-SPEC.

The main difference between examples (55) and (56) is the fact that the wh- phrase is focused in example (56) which prompts it to move to Spec-CP. These two examples will not compete with each other, for they have different Inputs; they are the winners of their separate competitions. This is a case of Pseudo- Optionality, where the properties of the elements in the Input play a significant role in choosing which candidates are to compete in a single competition and the constraints profile used.

An important observation about embedded wh- questions is that they are IPs in OT analysis. Economy conditions in OT dictate that a sentence needs to be as big as it should (Grimshaw 2001). In this case, the presence of the maximal projection CP is uncalled for. Since it will not host the Q operator and the wh- phrase will not move to Spec-CP at LF to gain scope. Since this is a declarative sentence, OT treats it as an IP.

3.7. Multiple Wн- Questions

3.7.1.Argument Multiple Wн- Questions

In CA, two wh- phrases can appear in a multiple wh- construction as long as they both remain in- situ as in the following example:

    (57) ?enta ?eddei-t   ?eh   le- meen?
         You   gave (Msc. Sng.) what to-whom?
      What did you give to whom?
The Input: ?edda (give) (x, y, z), x= ?enta (you), y= ?eh (what), z= meen (whom). Preposition= le (to). Tense= past.

	Case	Full-Int	Stay	Op-Spec
→ a. [CP Q [IP you [VP gave what [PP to whom]]]]				**
b. [CP Q [IP you [VP gave what whom]]]	*!			**
c. [CP what_i Q [IP you [VP gave t_i [PP to whom]]]]			*!	*
d. [CP whom_j Q [IP you [VP gave what [PP to t_j]]]]			*!	*

Tableau 62. The competition for example (57)

Candidate (a) is the winner even if it violates the low- ranked constraints OP-SPEC twice by not moving the wh- phrases from their base position to the Spec-CP position, but since the constraint is lower than other more important constraints, its violation does not affect the optimal form. Candidate (b) loses because it violates the high- ranked constraint CASE with the second wh- phrase *meen* (whom) not carrying Case. It also violates OP-SPEC twice. Candidates (c & d) incur the same violations to STAY and OP-SPEC. Moving any of the wh- phrases is prohibited.

3.7.2.Adjunct Multiple WH- Questions

Multiple occurrences of adjunct wh- phrases are prohibited in CA; the reason for the following example's ungrammaticality is that the wh-phrase does not carry Case:

    (58) *?enta ʕamal-t   keda leh ?ezzay?
         *You did (MSC. SNG.) this why how?
The Input: yeʕmel (did) (x, y), x= ?enta (you), y= keda (this). Tense= past. Adverbs= leh (why), ezzay (how).

	Case	T-Gov	Full-Int	Stay	Op-Spec
a. [CP Q [IP you [VP did this why how]]]	*!				**
b. [CP how_i Q [IP you [VP did this why t_i]]]		*!		*	*
c. [CP why_i Q [IP you [VP did this t_i how]]]	*!			*	*

Tableau 63. The competition for example (58)

This is a case of Ineffability where GEN generates every possible candidate out of the same Input and the Outputs do not contain any winners. Candidate (a) loses because it violates the high ranked constraint CASE, the second wh- phrase does not carry case. Candidate (b) loses because the trace of the moved wh- phrase *how* is not governed violating T-GOV. Candidate (c) loses for the same reason as (a), the second wh- phrase does not carry case. Both candidates (b & c) incur the same number of violations for STAY and OP-SPEC.

3.7.3.Summary

There is an asymmetry in the analysis between argument and adjunct wh- phrases in multiple wh- questions. In the case of argument wh- phrases, they can occur together but they both must remain in- situ. On the other hand, adjunct wh- phrases are prohibited from appearing together in the same sentence. The reason for this is that the second wh- phrase will not carry Case, thus violating the high- ranked constraint CASE.

3.8. Conclusion

In CA Yes/No questions, the key constraint is PARSE-WH. This type of questions is built like a declarative, thus, to distinguish it as an interrogative, this constraint come at play to interpret the +Q operator found in C.

In main wh- questions, argument and adjunct wh- phrases show an optional behavior. They can either be in- situ or in Spec-CP. this optionality phenomenon is treated in OT as a case of Pseudo-Optionality. In the sense that, each example has a different Input and consequently, a different constraint profiles.

In the case of the wh- phrase found in Spec-CP, I introduced a new constraint into the competition. This constraint ensures that the attributes found in the Input relating to the wh- phrase are also found in the winning candidate. This constraint is ALIGN-FOCUS(WH). This higher- ranked constraint is violated by any candidate where the wh- phrase is +focused and it is not found in Spec-CP. Analyzing the sentences using Focus is the only method to explain such optional behavior.

The complementizer *?illi* (that) obligatorily appears with all argument wh- phrases including subject wh- phrases. The analysis of the latter type of wh- questions is the same as the other types. However, optionality does not occur here. Subject wh- phrases always move to Spec-CP to satisfy higher- ranked constraint ALIGN-FOCUS(WH), since they are inherently +focused.

The Archi- Pro- Neme is used with all types of questions as long as it remains in the left- most peripheral position.

In multiple wh- questions, argument wh- phrases can appear together but they both have to remain in- situ. On the other hand, adjunct wh- phrases are prohibited in this construction since the second wh- phrase is – Case.

CONCLUSION

It was already established in the literature, both theories aim at minimizing Linguistic Description, using in the process various ways to reach that objective. The Minimalist Program (MP) tries to unify the structure and analysis of sentences, concluding that they are all CPs with different Forces, declarative or interrogative. The use of features as the trigger of movement or lack thereof gives a simple enough answer to the cross- linguistic variation.

Optimality Theory (OT), on the other hand, uses a different approach. It aims at unifying linguistic description by claiming that every sentence can be analyzed using a hierarchy of violable constraints that are language- specific. These hierarchies will determine the winning sentence (optimal form) in the specific language. Movement relies on the importance of the relevant constraint(s), if a constraint is ranked high in the hierarchy, then its satisfaction by moving the element or not is the reason behind movement or lack thereof. The field of Question Formation is a rich ground to illustrate that.

There are some results that were reached in this study that find both similarities and differences between the two theories.

The first similarity between both theories is the sentence structure. Both theories aim at unifying this structure according to their (MP and OT) perspective rules and methods.

MP states that there is a unified (standard) format for the construction of questions, this format acts like a blueprint for all types of questions (WH and Yes/No questions alike): this format is the CP. All questions are CPs. This rule goes beyond the formation of questions to all kinds of sentences, they are all CPs.

The use of features makes that possible. Even in declarative sentences, the functional head C carries a declarative force. This way the description of exceptions is understood and tolerated within the language. Examples of these Exceptions are languages that do not exhibit an overt subject. The solution for that in MP is that there is a place for that subject in the tree even if it is not phonetically realized. However, the cost is (unnecessary?) empty maximal projections on top of empty maximal projections that otherwise would not have occurred.

OT is a theory that is very much aware of *cost*. Nothing is moved, traces are not created, and maximal projections and not formed without paying the utmost attention to their cost.

Grimshaw (1997) claims that wh- questions are not formed to be all CPs. The candidates are generated and evaluated and the winner is the one with the least amount of constraint violations. This way, if for example a type of questions (wh-subject questions) does not conform to all the other types (VP instead of CP), then it is tolerated within the language as an exception to the norm without creating more rules and hedges to the otherwise pure and general principles.

This stand taken by Grimshaw is not the stand taken in this study. Tense must project to an IP (OT holds to the terminology IP instead of MP's TP) and the +Q Complementizer must be created to denote that the sentence is an interrogative. Yes, cost is the focus of OT, but not at the

expense of unification of analysis (Pun intended). Traces are created but they are legitimized according to their need. No empty category is found in this study (hence the substitution of the constraint OB-HD with the newly coined one IDENT(TNS) in English.

The sentence construction of Cairene Arabic (CA) questions (WH and Yes/No) is a CP as well. This analysis is reached in both MP and OT. Even though both theories use different methods, the question structure in both is the CP.

Subjacency, as a constraint on movement, is observed by language variations either overtly or at LF. CA does not observe it at LF, and the examples from embedded questions have shown that. Sentences are grammatical even if the embedded wh-phrase moves to the Spec position of the matrix clause crossing one or more CP. This is not the case in English where Subjacency is observed in the sense that islands are not crossed without an escape hatch. This is not a difference between the two theories; CA behaves the same in both MP and OT.

OT deals with the Subjacency effect in the form of the BAR family of constraints. They are concerned with the number of maximal projections an element crosses in order to reach the destination position. Since the ranking of the BAR constraints is relevant to the competition, as long as they are lower- ranked, any violation incurred by the optimal form is tolerated.

In English, the BAR constraints are ranked high in the hierarchy and the examples that violate such constraints fatally are considered ungrammatical. This is another similarity between the theories.

In the matter of LF, MP has no difficulty to account for it both as a level of representation and as a covert movement. The analysis of CA is no different from that of English. The wh- phrase moves at LF to gain scope, either if it is already in Spec-CP or in-situ.

OT does not speak of LF as an example of covert movement at all, and the notion of covert movement is not introduced to OT to begin with. This is a drawback in OT and a major difference between MP and OT since LF is an important factor in linguistic description.

LF is not mentioned even as a level of representation, except in very few papers, such as Grimshaw 1997's remark "all the clauses are truth functionally equal". This remark means that all the candidates competing must have the same paraphrase. If these candidates are included in the competition, then it is understood that the subject entity is the same element throughout, and the object is the same, and so on and so forth.

Many papers talk of the Input as the base of the candidates but LF is not mentioned. All that is being said is that the candidates must share the same Input. Otherwise, they cannot compete in the same competition. This is the basic argument of Optionality in OT analysis. Different Inputs in CA cannot compete, hence the optional occurrence of the wh- phrase. However, in some papers (Legendre et. al. 1995) did talk of LF in the form of Scope properties. The wh- operator can either have wide or narrow scope.

When it comes to Traces in MP, the analysis is clear cut: they are either lexically- or antecedent- governed. This is the case of both English and CA.

OT, on the other hand, does not account for the government of the traces of wh- adjunct phrases. For a trace to not find its governor and resort to just saying that the T- LEX- GOV constraint is violated is not painting a complete picture for linguistic analysis. Leaving the trace as un-governed is a major flaw in OT. However, there are views of a Chain existing between the moved element and its trace, thus creating a relation that would make the trace governed, but with no talk of antecedent- government.

Optionality in CA is the major focus of this study. This phenomenon is accounted for in MP easily and in a syntactic method by claiming that the wh- phrase carries a wh- feature and it gets into a checking relation with the functional head C to check this feature. The wh- phrase can be located in the Spec position or in its base position (in- situ). The wh- phrase does not need to move to check that feature.

The evidence comes from Iraqi Arabic (Wahba 1991) where the wh- phrase can be found in any Spec position and the sentence is interpreted as a matrix question. This analysis is Pre-MP; it is analyzed in a minimalist approach by Simpson (2000) where he argues that it is the wh- feature carried by the wh- phrase and not C that needs to be checked. He also gives more examples from Hindi, where Optionality occurs as well. These analyses are applied to CA and the conclusion is the same.

The analysis in OT is quite different; it was difficult to account for Optionality in an optimality- theoretic analysis. Few Papers argue for Optionality in OT, for example Müller (2001) where the phenomenon is attributed to a difference in the Input. But analyzing optionality is difficult in OT by Müller's own admission and is in need of further research. Costa (2001) and Samek- Lodovici (1997 and 2005) explain it using Prosodic and Discourse- related constraints which weakens the analysis, for Prosody and Discourse analysis are not a tangible and concrete evidence of language behavior. These factors depend on the individual discretion of the speaker.

CA was treated as a dialect that relies on the difference of the Input as the cause of Optionality. The wh- phrase that is found in Spec-CP is +focused and that is mentioned in the Input. What makes it move from its base position (in- situ) to the Spec-CP position is the inclusion of the newly coined constraint ALIGN-FOCUS(WH). This constraint is high-ranked in the competition, which prompts the wh- phrase to move.

This is another major difference between MP and OT. The MP analysis tries to provide a purely syntactic analysis to a phenomenon that is difficult to analyze. OT, on the other hand, proved to be a theory that definitely needs further research.

It is not OT as a theory that is changed, only few elements as the analysis progresses. OT has proven to be a continuous-work-in-progress theory. Syntax is yet to grow under OT rule. This study is a beginner's attempt at OT, not the end of the road.

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