Chapter One
Theoretical Background

1.1 Introduction

Since it is the syllable around which the discussion will center in this dissertation, and since Optimality theory is the tool with which this discussion is ruled, it is a wise idea not to start tackling some of the interesting issues in this area before having a somewhat clear view of the theoretical background involved. In other words, this chapter is devoted to talking about the syllable as an essential component of the theory of grammar, on the one hand, and about Optimality theory as a potential framework regulating, among other things, the processes of syllabification and syllable structure in general on the other. So, this chapter will basically be divided into two main sections: one for the syllable, and the other for Optimality theory.

When talking about the syllable, below, two basic questions are going to be tackled. The first is related to whether we need the concept of the syllable in our theory of grammar and why if we do. On the other hand, the second question focuses on the internal structure of the syllable and whether the whole thing i.e., the syllable, belongs to a higher hierarchical structure of which it is a building block. To put it differently, we want to see if "the

syllable is an element of hierarchically organised prosodic structure" (Selkirk, 1982, p337).

The section devoted to talking about Optimality theory (O.T) will focus mainly on presenting the basic concepts and principles of the OT. Also, a presentation of the formalities of the theory will be made. By this, I hope that we will be able to demonstrate the profound difference between the traditional theoretical framework and the one in question. This means that it should be made clear that the essence of OT is to choose the OPTIMAL output not to take pains in building the perfect one as it used to be the case.

1.2 The Syllable

1.2.1 The Phonological Role of the Syllable

As mentioned above, the main goal of this section is to examine the importance of the phonological role the syllable plays in the overall theory of grammar. According to Selkirk (1982), Kahn (1976), Vennemann (1972), Hooper (1972), Clements and Keyser (1983), McCarthy (1979a, 1979b), and others, the syllable has a rather obvious phonological justification of existence and importance. Three empirical pieces of evidence have been put forward, by the above mentioned scholars, in support of this claim. In other words, it has been claimed that the role of the syllable as an important theoretical component is threefold. First of all, phonotactic constraints regard the syllable as the

natural domain where their statements can be expressed clearly. Secondly, phonological rules, or, as they are sometimes called rules of segmental phonology like aspiration nasalisation, etc. can only be adequately expressed and characterised with reference to the syllable. Finally, phenomena like stress and tone which are supra-segmental are based on the concept of the syllable due to the fact that they call for this intermediate level between the word or morpheme and the segments to be assigned to. Vennemann, however, has a rather moderate approach by claiming that we can do without reference to the syllable especially when we talk about the phonological rules, yet, and in an effort to hint at the importance of the syllable, he added that if we subtract the syllable from our analysis, we will end up with a rather obscure treatment of the matters discussed.

So, there appears to be substantial evidence for the existence of the syllable, and the main task of the following three subsections is to answer the question of why is it so? Each of the above mentioned pieces of evidence for the syllable will be discussed thoroughly giving clarifying examples where needed.

1.2.1.1 The Syllable and the Phonotactic Constraints

According to Kahn (1976), the set of morpheme structure constraints that guarantee the well-formedness of certain language utterances will be complex and inadequate unless

they recognise the syllable and make use of its boundaries. What this means is that the phonotactic constraints that will help in generating or choosing only the well-formed words that are in essence made up of sequences of possible syllables (c.f. Selkirk, 1982) must employ the concept of the syllable to be precise and concise.

To clarify this point, Kahn introduced the hypothetical example *atktin* as an impossible English word and tried to account for its ill-formedness employing two approaches: one that recognises the syllable as a phonological unit and one that makes no use of the syllable at all. This comparison revealed his claim about the syllable's important existence.

It will be very easy and straightforward to disallow words like *atktin* depending on a set of well-formedness phonotactic constraints making use of the syllable by simply saying that this word is impossible because we have constraints against syllable-initial /kt/ and syllable-final /tk/. This means that this word is disallowed no matter where we put the syllable boundaries. For example /.at.ktin./ ("." here and throughout this dissertation stands for the syllable boundary) is not accepted because we have the cluster /kt/ as syllable-initial, and the same goes for /.atk.tin./ where the cluster /tk/ is syllable-final. Obviously the application of these constraints is very smooth due to the recognition of the syllable without which

we would not be able to use neither syllable-initial nor syllable-final positions to limit the occurrence of certain phonological configurations.

On the other hand, we will face some difficulties as we endeavour to account for the unacceptability of *atktin* without referring to the syllable. The fact that word-final /tk/ and word initial /kt/ are disallowed does not mean that we may forbid the clusters altogether, since these clusters may appear word medially in quite a few well-formed words like *Atkins* and *Cactus* (Kahn 1976, p. 34). So, we find ourselves in a situation where we must bite the bullet and recognise such an ad hoc constraint as:

(1) (a) $* \begin{Bmatrix} [c] \\ \{tk\} \\ kt \\ [\#] \end{Bmatrix}$ (b) $* \begin{Bmatrix} (c) \\ \{tk\} \\ kt \\ (\#) \end{Bmatrix}$ (Kahn 1976, p.34)

Clearly, this constraint is not preferable owing to the fact that the environment { } is quite artificial since `C' (that stands for consonant) and # (that stand for word boundaries) have nothing in common (Kahn 1976, p.11).

So, I think that Kahn was somewhat successful in demonstrating the need to recognise the syllable in order to have phonotactic constraints that are clearly stated and

adequately functioning. In what follows, we will discuss the role of the syllable in phonological rules.

1.2.1.2 The Syllable and the Rules of Segmental Phonology

When we talk about rules of segmental phonology, we are referring to the phonological rules that have a direct effect on the segments like rules of nasalisation, vowel lengthening, or assimilation in general. And, if we follow Hooper in her claim regarding the syllable as an entity that is defined in terms of sequences of segments, we are, in a way or another, considering the syllable as a phonological unit heavily involved in carrying out these rules. To demonstrate this point, I will present two clarifying examples taken from two influential studies in this field.

We will take the process of open syllable lengthening in modern Icelandic from Vennemann (1972) as our first example to show that some phonological rules have to recognise the syllable to achieve the real generalisation. Consider the following data from Icelandic:

(2)

(a)	(b)	(c)	(d)
`hatred'	`hat'	`violence'	`shiver'
ha'tur	*ha'ttur*	*o'fsi*	
ti'tra			
/hatYr/	/hat:Yr/	/ɔfsI/	/tItra/
[ha:t^hYr]	[ha^h t:Yr]	[ɔf.sI]	[t^h I:t^h ra]

(Vennemann 1972, p.4)

If we consider (a)., (b) and (c) we will realise that the stressed vowel in these examples is lengthened only when it

precedes a single intervocalic consonant (c.f., (a)) not when it is followed by a cluster of two intervocalic consonants, even if they are geminates (c.f. (b) and (c)). On the other hand, (d) represents the exception. There, the stressed vowel is lengthened though it is followed by a cluster of two consonants, *t* and *r* in particular. These two consonants are not the only exception however. According to Vennemann there is a host of others.

(3)

$$\left\{\begin{matrix}\left[\ p\ \right]\\ \left\{\begin{matrix}t\\k\\s\end{matrix}\right\}\end{matrix}\right\}\text{plus}\quad\left\{\begin{matrix}\left[\ r\bullet\bullet\ \right]\\ \left\{\begin{matrix}j\\v\end{matrix}\right\}\end{matrix}\right.$$

(Vennemann, 1972, p.4)

So, how may we account for such a phenomenon? Let us follow the line of argument that Vennemann presented and try to solve this puzzle in a manner that does not make use of the syllable and see if it can take us anywhere.

If we pretend, for the sake of generalisation, that the exception cases in (2d) and (3) above do not exist, we may use the rule in (4) below to account for this stressed vowel lengthening.

(4)

$$\begin{matrix}v\\ +\ \text{stress}\end{matrix}\quad\text{----> [+long] / ---------- CV}$$

(Vennemann 1972, p.5)

Obviously this does not cover the forms in (3) where a particular type of clusters follow the stressed vowel. this will lead us to parameterise (4) in (5) below:

(5) v ⎧p⎫ ⎧r⎫
----> [+long] / ---------- ⎨t ⎬ ⎨j⎬
V ⎩k⎭ ⎩v⎭
+ stress ⎩s⎭

or to combine (4) and (5) in (6).

(6) v
-----> [+long] / ----------C1 (C2)v
+ stress

condition: C2 = r or j or v, and if C2 then c1 = p or t or k or s

This parameterisation is obviously at the expense of generalisation which is an ultimate goal of the theory of grammar.

On the other hand, if we use the syllable and, consequently, its boundaries and the phonotactic constraints on its possible initial and final clusters, we will find ourselves equipped with a rather powerful tool that will help us achieve generalisation. This means that if we, in this particular case, recognise the syllable and its boundaries and realise that the clusters in (3) above are representing the set of possible initial-syllable clusters in Modern Icelandic, we will use a very simple and quite general rule to account for open-syllable lengthening:

(7) v
-----> [+long] / ----------$ ($ = . i.e., syllable boundary)
+ stress

(Vennemann, 1972 p.5)

This rule simply says that a stressed vowel is lengthened before a syllable boundary capturing all the cases in (2) above, without using any conditions.

Another example presented by Hooper (1972) supports the claim that phonological rules better referred to the syllable to be adequate and general. Hooper used the process of nasal assimilation, among other processes in Spanish to demonstrate that. Based on Harris (1969), Hooper reports that nasals assimilate to the following consonant within words and across word boundaries and assimilate to glides only across word boundaries. Consider the following examples:

(8)

un beso	[umbeso]	`a kiss'
un gato	[uŋgato]	`a cat'
un hielo	[unyelo]	`an ice'
un huevo	[uŋweβo]	`an egg'
miel	[myel]	`honey'
nieto	[nyeto]	`grandson'

For some reason or another, Hooper chose not to introduce an example where the nasal assimilates to a following consonant, obstruent in particular, within a word though she explicitly mentioned that when she agreed with Harris and said that "nasals assimilate before obstruents in the same way ... " (Hooper , 1972, p.525). For the sake of argument, we will take her claim to be true and carry on our discussion. So, again, we find ourselves facing a phenomenon that is quite general and, to a large extent, universal. Yet it has at least in this particular case, an exception that will violate the generalisation if it is incorporated in the

rule that accounts for this assimilation. What I mean to say is that the assimilation will always happen unless the nasal is followed by a glide in the same word. However, this very exception is rather revealing of a more general approach.

If we isolate the cases where nasal is followed by glide whether across word boundaries or in the same word, we will realise the role the syllable plays in distinguishing between them. In the cases where the nasal is followed by a glide within a word, the glide is a mere part of the vowel (syllable's nucleus). On the other hand, it is a non syllabic segment when it occurs word initially. This means that the syllable boundary is the distinguishing factor that facilitates the assimilation when it intervenes between the nasal and the following consonant or glide. To put this generalisation in a rule, Hooper suggested the following:

(9)

$$\begin{array}{lcll} & & \alpha \text{ coronal} & \alpha \text{ coronal} \\ & & \beta \text{ anterior} & \beta \text{ anterior} \\ [+\text{ nasal}] & \rightarrow & \gamma \text{ back} & / \text{ ---------- } \$ \\ \gamma \text{ back} & & & \\ & & \delta \text{ distributed} & \delta \text{ distributed} \end{array}$$

(Hooper 1972, p.526)

By this, I think it became rather clear that the notion of the syllable is essential in representing phonological rules. We saw the amount of generalisation it maintains and the adequacy it brings about as it is recognised when presenting phonological rules. This is another piece of evidence for the syllable as a fundamental unit in

phonology. In what comes next I will present the final argument in support of the syllable. This argument is related to the supra-segmental phenomena.

1.2.1.3 Syllable and Stress Assignment

According to McCarthy (1979a, 1979b) , among quite a few, stress assignment is almost completely based on syllable weight and position. In other words, unless we recognise the syllable, we will encounter some problems in the processes of stress assignment. We could follow the footsteps of Chomsky and Halle (1968) and use the (c,v) device to discover that we are only adding to the complications and arbitrariness of stress assignment. Or, we could alternatively seek the help of the `mora' which is the mere abstract property of the syllable (McCarthy, 1979a, p.41); i.e., syllable weight can be determined by the mora. So, we find ourselves again referring to the syllable. To demonstrate this points, i.e., to show that it is the syllable weight (whether light, heavy or superheavy) which, in turn, is related to its structure (whether open with short or long vowel or closed), and that it is the syllable position (whether ultimate, penultimate, or antepenultimate) that are responsible for stress assignment to a very large extent, we will explore the rules of stress assignment in classical Arabic for instance as a language that takes these factors into consideration. I will present the rules of stress assignment in CA in three main points as follows:

(10) (i) When a word has only light syllables, the left-most one is assigned primary stress, with the antepenultimate as the left-most possible stressed syllable:

a.	ka′.ta.ba.	`he wrote'
b.	da′.ra.sa.	`he studied'
c.	sa.Ha′.ba.hu.	`he pulled him'
d.	Da.ra′.ba.ni.	`he hit me'

(ii) When a word has only one heavy syllable, it is assigned primary stress:

a.	ta.Saa′.fa.Hu.	`they shook hands'
b.	mu.saa′.9i.du.hu.	`his helper'
c.	yu. xa′w.wi.fu.ni.	`he is frightening me'
d.	ta.da′H.ra.ja	`he rolled'

(iii) When a word has more that one heavy syllable, the right-most one (though not the ultimate) is assigned primary stress.

a.	ra.?ii.su.hu′n.na	`their (fem) chief'
b.	mu.saa′.fir.	`a traveller'
c.	?iH.ma′r.ra	`he turned red'
d.	?is.ta9.ma.la′t.hum.	`she used them'

(Based on Al-ani 1970)

This is self-explanatory in the sense that syllable recognition is quite essential to stress assignment. This is simply because in all statements in (10) above, and basically in all similar statements, a reference to the syllable weight and/or position is a common place to adequately and clearly assign the stress. Again, the syllable could successfully demonstrate to us that it is very much related to our theory of grammar and that it is worthy of consideration and thorough analysis. This will lead us to what we are going to discuss in the next section, i.e., the question of whether the syllable is an element of

hierarchical structure. This means that we will try to understand the internal structure of the syllable and the structure to which the syllable itself belongs.

1.2.2 The Syllable as an Element of Hierarchical Structure

The main point to be looked at in this section is the one related to structure that represents the syllable itself and the structure of which the syllable is a prosodic unit. To do so, we will divide the discussion into two parts to cover these two claims. In the first, the syllable will be viewed as consisting of an onset and a rhyme and the latter consisting of a nucleus, or a peak, and a Coda. In the second part, the syllable will be perceived as a mere step or level of the prosodic hierarchy.

1.2.2.1 The Internal Structure of the Syllable

According to many scholars who are involved in this field, the syllable is traditionally viewed as consisting of an obligatory rhyme preceded by an optional onset. This rhyme can be simple which means that it is occupied by a single, usually [+ syllabic] segment. Or, it can be complex in the sense that it has additional segment, or segments, that could be either vocalic or non-vocalic. This means that there is an obligatory part within the rhyme itself which is called the nucleus or the peak. This is the [+ syllabic] segment mentioned above. The other [- syllabic] segment or segments in the rhyme, viz., the consonants which follow the

nucleus, which is usually a vowel, are grouped under the name Coda[1]. Though, it may be complex, containing more than one segment, the onset does not have vocalic segments. So, the following diagram will sum up the above information about the syllable internal structure

(11)

Yet, what is the evidence of the obligatoriness of the rhyme? There are quite a few reasons that made phonologists consider the rhyme in general and the nucleus in particular as the only obligatory constituent of the syllable. One of these reasons is the fact that the nucleus is the stress or tone bearing unit. The deletion of this unit will result in dislocating the stress or tone while nothing of that sort will take place if a consonant, i.e., an onset or a coda, is deleted (c.f. Kenstowicz 1994). Another reason is related to Clements and Keyser's proposal of types of the core syllables. They suggested that the primary core syllable types are:

(12)

a. cv
b. v
c. cvc
d. vc

(Clements and Keyser 1983, p.28)

[1]Yet, what about the other [+syllabic] segment if the syllable is of the type cvv, for instance. It is, obviously, a part of a complex rhyme, but is it a Coda or a mere part of a complex nucleus?

This inventory shows that the vocalic segment or the nucleus is always there representing, in a way or another, the existence of the syllable. This, nevertheless leads us to the most striking piece of evidence that the nucleus is the only obligatory constituent of the syllable. Consider the following representation from Taifi Arabic:

(13)	**UR**	**SR**	
a.	.ri.ki.bu.	.rik.bu.	`they rode'
b.	.bint.na.	.bin.ta.na.	`our daughter'

In 13 (a), The penultimate syllable, in UR., has disappeared completely in SR due to the deletion of its vowel, and in 13 (b) the penultimate syllable in SR is created as a result of inserting a vowel (the motivations of these phenomena will be dealt with in depth in chapter 3). So, it is very apparent that the existence of the syllable is completely based on the existence of its rhyme or its nucleus in particular.

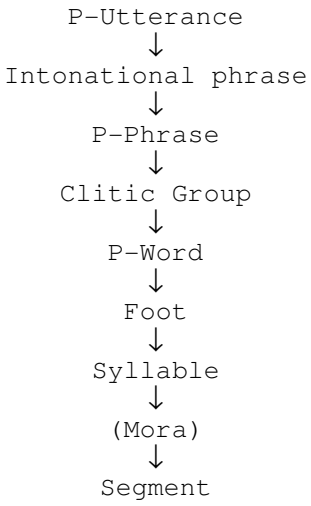
I hope it becomes clear that the syllable does have an internal structure that is well defined and justified. Now let us move to another point of hierarchical ordering of which the syllable itself is a building unit.

1.2.2.2 The Syllable as a level of Prosodic Hierarchy

It has been argued by many scholars working in this field that the syllable does belong to a prosodic hierarchy in which all phonological units belong to higher prosodic structure (Ito, 1985, p.3)

This means that segments belong to syllable, syllables, to feet, feet to prosodic (or phonological word), and so on until we reach the prosodic (or phonological utterance). The following diagram will clarify this ordering.

(14)



(Based on Roca, 1994 p.195)

What motivates such an ordering is not of our interest at the moment. However, we ought to know that its formality comes as a result of one of the basic principles of Prosodic Phonology discussed by Ito (1985 & 1989) which is called Prosodic Licensing.

Ito writes:

(15)

> Prosodic Licensing: All phonological units must be prosodically licensed, i.e., belong to higher prosodic structure (modulo extraprosodicity) (Ito, 1985 p.2)

So, if we took the discussion above that aimed at demonstrating that the syllable as a phonological unit, and we ought to, we would find ourselves, consequently putting it in this prosodic hierarchy to represent a certain level contained in higher units over it and contains lower ones below it.

Now, and after we discussed the main issues related to the syllable in general, viz., its role in the theory of grammar and its hierarchical structure, we will move to the second major part of this chapter and talk about the theoretical frameword that we will use in the following chapters to analyse the syllable structure of Taifi Arabic.

1.3 Optimality Theory (OT)

According to the advocates of OT, viz., McCarthy, Prince, and Smolensky, Optimality Theory provides the most suitable manner of relating a given input to a certain correct output. This means that the more traditional manner of relation that involves what is usually known as the set of *Rewrite* rules is no longer considered adequate. Consider the rewrite rule below.

(16) A $\longrightarrow$B/C ------D

This rule will only operate on a sequence CAD changing or transforming it to the form CBD which is in turn subject to a similar rule (McCarthy and Prince 1993). This means that we are depending on two theories: one for structural descriptions to determine forms like CAB, and another one for structural changes to justify A→B. In reality, these two theories are "loose and unformative" (Prince and Smolensky 1993, p.3). So, we do need to rely upon a theory that provides a better understanding of the relation between input and output forms. This theory is the Optimality

Theory. So, how it provides a better understanding of this relation, what its main principles and basic conventions are, and other fundamental questions are the issues to be tackled below.

1.3.1 From Input to Output within OT

Before discussing the formalities of achieving the desired or optimal output within OT, it would be a good idea to have a general idea about the essence of the theory in question. The basic point here is that Universal Grammar contains, mainly, a set of constraints on representational well-formedness. These very same constraints are the building material of individual grammars. And, the way in which individual grammars differ from each other is the language-particular ranking of these constraints. These constraints are highly conflicting in the sense that a certain form may satisfy a particular constraint and at the same time violate another. So, in addition to the Universal constraints, the individual languages have a means of resolving this conflict; this means that different languages must rank these constraints in certain order resulting in the qualification of the optimal analysis, i.e., the desired form.

So, we know by now that there are constraints supplied by UG and these constraints are ranked in a fashion resolving their conflicts to enable us to have our true outputs. Yet,

what will these constraints apply on? By definition, constraints need something to impose their restrictions on if they are to be considered as constraints. In order to answer this question, we need to have an idea about Gen.

Gen (short for "generator") is a function related to the OT. This function associates each input with an infinite set of candidate analyses. These analyses are the material on which the language –particularly ranked Universal constraints impose the circumscription. And, as a result, only one analysis will satisfy most and may be all, of the constraints to be regarded as the optimal form. This function of Gen is based on three principles:

(17) i – Freedom of Analysis:
Any amount of structure may be posited.
ii – Containment:
No element may be literally removed from the input form. The
input is thus contained in every candidate form.
iii – Consistency of Exponence:
No changes in the exponence of a phonologically-specified
morpheme are permitted.

(McCarthy and Prince 1993, p.8)

What we understand from these principles is that Gen can generate all the possible analyses without actually deleting or changing any element contained in the input. This means that the underparsing of some segments, i.e., not finding a place for them in the structure, will not affect the morpheme other than having it surface with a different phonological realisation.

Now, we can present the formal relation between the input and the output, the real output in particular, within the OT. Consider the structure:

(18) a. Gen (In_k) $\longrightarrow$ {Out_1,Out_2,...}

b. H-eval (Out_i; 1< i<∞) $\longrightarrow$ Out_{real}

(Prince and Smolensky, 1993, p.4)

This formal representation of the structure of Optimality reveals the function Gen as it takes a certain input and generates, within the limits of its principles discussed above, an infinite number of potential outputs. These outputs, in turn, are evaluated by having them pass the constraints filter which will discriminate between them and determine the optimal output which is in essence the real one. This shows that Gen does play an essential role; however, it is H-eval that takes the initiative in the real determination of our desired analysis that reflects the real output.

Now, let us present the formal principles of OT. According to Prince and Smolensky (1993) and McCarthy and Prince (1993), there are other basic principles of the theory: Violability, Ranking, Inclusiveness, and Parallelism. When we say violability we are hinting at the fact that constraints in OT are subject to being violated even by optimal analyses. This is because we are not after the perfect rather than the optimal (the best that we can achieve). This means that we are looking for the analysis

that least violates the set of ranked constraints, or to put it differently, we are aiming at the analysis that best satisfies the constraints. So, the violation, in this sense, must be minimal. The second principle, ranking, in essence works to achieve this minimal violation. This means that the Universal Constraints must be ranked in a language-particular order to have the optimal analyses of the language minimally violate them. The remaining two principles, viz. inclusiveness and parallelism ensure that the complete set of candidate analyses is included in the act of considering the optimal analysis. No transformational rules or "repair strategies" will be employed in this consideration. All of these candidate analyses will be looked at in a parallel fashion by making them pass through the same constraints filter.

By now, I think we have a rather good idea about the main principles of OT. In other words, we know that in OT the input is used by Gen to generate all the possible candidate analyses, then, comes H-eval to determine the optimal analysis which best satisfies, or least violates, the set of ranked constraints. Nevertheless, what is the formal process to determine this analysis, or what is the definition of least violation or best satisfaction of constraints in OT. This is the topic of the next section.

1.3.2 Harmonic Ordering

When two analyses are evaluated, and one of them is determined as the optional, we say that it is more harmonic than the other. And, we indicate this relation by using the sign `>'. This means that if cand1 and cand2 are evaluated by the set of constraints, and cand1, for example, proves to be the victor, we indicate that by writing `cand1 > cand2'. But, how did we come to this conclusion?

The parameter of determining whether a certain analysis is optimal is twofold. The highest constraints violated by the optimal analysis should be lower than the constraints violated by other candidate analyses, and violation of that particular constraint should be the least if compared to other analyses (c.f., Prince and Smolensky 1993, ch3 for an elaborate discussion of Harmonic Ordering). To make things easier, let us consider a hypothetical abstract example based on the one presented in McCarthy and Prince 1993.

Let us imagine that we have a very simple grammar that only has the constraints A and B along with Gen that will generate possible outputs like(cand1, cand2 }, {form1, form2}, etc. from the underlying inputs it deals with. These two constraints are ranked in a dominance order having the constraint violated by optimal analyses ranked lower than the one violated by non-optimal ones. Let us say that the order puts A higher that B, or A dominates B. This relation is written as follows:

(19) A >> B

So, if cand1 violates B and cand2 violates A, cand1 will be the optimal. Consider the following tableau:

(20) Constraint Tableau, A>> B /in_k/

Candidate	A	B
→ $cand_1$		*
$cand_2$	*!	

(McCarthy and Prince 1993, p.6)

Before we discuss what this tableau reveals, let us present some of the basic conventions employed in all optimality literature, and consequently hereafter:

(i) The left-to right order of constraints reveals the dominance order between constraints, the left most is the highest and the right most is the lowest.

(ii) The asterisk (*) means violation of a certain constraint.

(iii) A blank cell means that the relevant constraint is satisfied

(iv) The exclamation mark (!) points to the fatal violation. This means it tells us that a certain violation was responsible for not having a particular analysis as the optimal while other violations are not the reason we consider it a loser.

(v) The arrow is used to distinguish the optimal form. However, in the main literature, the sign of a pointing hand is used, but, due to typing limitations, we will use the arrow.

(vi) The shading represents the irrelevance of the constraint or constraints to determine the optimality or the non-optimality of a certain analysis as it was determined earlier by the higher constraints.

So, we can see that cand1 is considered optimal in Tableau (20) due to the fact that it violates a constraint that is lower than the one violated by cand2. Or, to say it the other way around, it satisfies the highest constraint violated by cand2. Yet, consider the case represented by Tableau (21)

(21) Constraint Tableau, A>> B /in_m/

Candidate	A	B
→ form1	*	*
form2	*	*!*

This tableau represents an example that employs the other fold of the parameter that determines the more harmonic analysis. Here, the first constraint could not discriminate between the analyses as they both violate it once, and it would be the same if they have not violated it at all. As a result, the decision is transferred to the second constraint

that it is also violated by both candidate analyses, yet form2 violates it more than does form1. As a result, form1 is considered to be the optimal.

In conclusion, the optimality theory appears to be a rather potential theoretical framework that may demonstrate attractive abilities in the analysis of syllable structure as a fundamental unit of phonology. This will be the main goal of the coming chapters.