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SYLLABIFICATION OF SINGLE INTERVOCALIC CONSONANTS IN THE ARABIC DIALECT OF SAKAKA CITY: EVIDENCE FROM A NONWORD GAME

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This paper offers a short report on an Optimality Theoretic analysis of the syllabification of single intervocalic consonants in the Arabic dialect of Sakaka city. This study aimed at investigating how intervocalic consonants of different sonority profiles are treated in the dialect of Sakaka City. Thirty monolingual male participants were recruited voluntarily in this study. Participants' judgments were elicited using a metalinguistic word blending task with pairs of disyllabic nonwords of the structure 'CVCVC + 'CVCVC, where stress was on the first syllable only throughout the data. All phonemes involved in this structure are in conformity with Arabic phonotactics. In addition, the intervocalic consonants under examination belonged to four sonority levels; glides ([j] and [w]), liquids ([r] and [l]), nasals ([m] and [n]) and obstruents ([s] and [b]). The low vowel [a] was the only vowel used in this structure. Unlike many works of this nature, ambisyllabicity and word minimality effects were blocked in this complete word task. Although the investigation shed light on several important universal rules of syllabification, sonority profile of intervocalic consonants was the overriding preference in this blending task. That is, glides, liquids and nasals were parsed in coda position by the majority of participants whereas obstruents were parsed in onset position. However, the effects of other universal principles of syllabification such as Maximal Onset Principle and stress placement were minimized. The study concluded that the Split Margin Hierarchy adopted showed a strong preference for coda parse with high sonority consonants and onset parse with low sonority ones, thus adding further support to the abstractness of the syllable as a higher prosodic constituent and the discreteness of phonemes in the human speech stream.

Keywords: Arabic dialect, Sakaka city, Optimality Theory, intervocalic consonants, nonwords, ambisyllabicity, minimality effects, Split Margin Hierarchy, sonority, Maximal Onset Principle, stress, syllable, speech stream.

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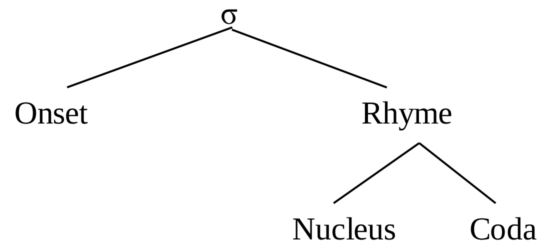
CHAPTER 1

INTRODUCTION

Before immersing into a discussion of the syllabification of intervocalic consonants, a logical question is often thrown by almost any study of this nature. Do syllables really exist? Before attempting to answer this question, let us first take a brief orientation around the idea of the speech stream. In fact, the issue of the identity of human speech stream is often discussed in many studies in the fields of phonetics and phonology. As known to phoneticians and phonologists, the speech stream itself is continuous. However, some believe that it processes as a stream, not cut into discrete parts like phonemes (Port & Leary 2005, among many others). Others believe that as we process the speech stream, we break it into discrete parts (phonemes) based on certain cues in the stream. In fact, a great deal of theory in this domain assumes that the stream of human speech consists of discrete sounds and that they can be organized in a hierarchical fashion. Based on this view, phonemes have a physical reality and are often grouped in larger entities governed by higher prosodic constituents such as syllables. For the sake of brevity, we are not going to elaborate on this issue. However, an extensive discussion of these two issues can be found in Blevins (1995, among others) and a fairly short but informative discussion of these views can be found in the introduction of recent works (Coetzee 2011, among many others). By adopting the view that phonemes can be identified separately, the syllable as a domain of phonemes' affiliation in language and an entity for phonological rules serves as a basis for this current investigation. Given that the physical reality of discrete phonemes is still controversial, the idea of the existence of higher prosodic constituents like syllables and the important role they play on speech sounds' segmentation as an abstract mental process has been the central focus of many recent works in this domain. With this issue sorted out, the current study tried to tap into the existence of syllables and the discreteness of phonemes in the minds of speakers and was able to support the existence of the syllable. The study was designed in order to provide insights on how Arabic speakers treat phonemes within and across syllables. The task implemented in this study required speakers of Sakaka City dialect (a city in the northern region of Saudi Arabia) to blend parts of pairs of CVCVC non-words that fit the phonotactics of Arabic in order to create new CVCVC blends. The resulting blends then were analyzed to figure out which of the single intervocalic consonants from the original pairs appeared in the new blended word. The choice of intervocalic consonant in the new blend gives us insight into the organization of segments into syllables in the minds of the participants. An optimality theoretic framework is used to analyze the results of this psycholinguistic experiment.

Within the phonological domain of the syllable, vowels (or sometimes vocoids) are believed to be the head of each syllable occupying a slot in the syllable called “Rhyme” or “Nucleus” respectively. Consonants (or sometimes contoids), on the other hand, generally constitute the other two parts of a syllable. The “Onset” is always to the left of the nucleus constituting the beginning of the string of phonemes in the syllable. The last part, which is located to the right of the nucleus, is called “Coda” which is believed by many phonologists to be the third and last constituent of a syllable (Nathan 2008). The diagram in (1) shows the hierarchical construction of the syllable.

(1) The hierarchical construction of the syllable



The syllable structure of languages has been of major interest for researchers for decades. Some languages such as English have been studied extensively in this domain. On the contrary, some languages have not had this major concentration. When syllables first emerged in the linguistic field of phonology, they were thought of as a mere group of sounds ordered in a certain manner specific to each language in the world (Hooper 1972). Later, researchers tackled the important role that syllables of words play in perception and production of language in both spoken and written tasks (see Mehler, Dommergues & Frauenfelder 1981, Segui 1984, Spoehr 1981, Taft 2001). There are many syllable rules or restrictions that are viable in certain languages and are not viable in others. For instance, English language allows consonant clusters in the onset and coda units (e.g., Treiman 1989). On some analyses, the nucleus unit may contain two vowels or a vowel and a glide. On the contrary, Classical Arabic language does not allow onset clusters but does allow vowel clusters in the nucleus or consonant clusters in word final position (See for example, Watson 2002).

The affiliation of phonemes within the syllable has received a lot of attention from various researchers studying those cases in which a phoneme could be attached at more than one node. For example, intervocalic consonants, which fall between two vowels, in multisyllabic words have received a lot of attention. They may be onsets to the second syllable or codas in the first syllable. The Maximal Onset Principle (see, for example, Selkirk 1982) indicates that there is a tendency for speakers of a language to assign consonants to the onset as much as they can, which would imply that intervocalic consonants are always onsets. However, the strategy of syllabification changes when it comes to the essential part stress plays in syllabification. That is, according to some phonological rules such as the argument that consonants belong to the more stressed syllable of the two neighboring syllables (see Wells 1990), some argue that a word with initial stress would pull an intervocalic consonant into the coda of the first syllable leaving the second syllable onsetless. Another approach is to consider intervocalic consonants as belonging to both syllables as onsets and codas being ambisyllabic as proposed by Kahn (1976).

Sonority also plays a role in syllabification. Sonority is viewed as the resonance of a phonetic segment (sound) in relation to other segments (Burquest & Payne, 1993, Burquest 1998). Some leading theories propose a sonority scale that ranks the phonemes in all languages from the most sonorous to the least sonorous (e.g. Parker, 2008). In this view, vowels and glides are the most sonorous, and obstruents are the least sonorous (see Hooper, 1976, Kiparky, 1979). Liquids are just below vowels and glides in sonority and nasals are more sonorous than obstruents but less sonorous than liquids. The less sonorous a segment is, the better it is as a consonant or parsed in a consonantal position. The more sonorous a segment is, the better it is as a vowel or parsed in a vocalic position. Nathan (2008) presents a sonority hierarchy as follows; glides > liquids > nasals > fricatives > stops. Researchers generally agree that sonority within a syllable rises in the beginning to a sonority peak in the nucleus and falls again toward the end of the syllable. Moreover, steep rises and falls in sonority levels are better at syllable edges. This pattern of sonority sequencing is preferred by most languages of the world and they tend to follow it in their syllable inventories (Hooper 1976, Greenberg 1978, Selkirk 1984, Berent, Steriade, Lennertz & Vaknin 2007, to name but a few). Hence, syllables that do not follow sonority sequencing are said to be rare or even entirely impossible for most languages. Accordingly, onsets prefer consonants with low sonority whereas codas prefer consonants with high sonority (Clements 1990).

In addition, many studies on English and other languages have provided evidence that liquids make better coda segments than obstruents (Fudge 1969, Hooper 1976, Kiparsky 1979, Selkirk 1982, Treiman 1989, among others). Nasals also make better coda segments than obstruents, and obstruents, while they can appear in coda position, are the least preferable coda segments. In an intervocalic environment, this translates into liquids often being parsed as coda segments while obstruents are more likely to be parsed as onsets to the second syllable (see Baertsch, 2010, for example on the syllable affiliation of intervocalic consonants). The sonority sequencing principle (SSP) is thus a very important principle that can often help to explain the syllabification of medial consonants (see, for example, Selkirk 1984, Clements, 1990, among many).

The phonology of Arabic has received a great deal of attention during the recent decades. Much attention concentrated on issues related to syllabification of phonemes, syllable structure and weight, the sonority scale and stress placement. Overall, works within this domain illustrated that there are differences between Arabic varieties when it comes to syllable structure, stress and syllabification. At the same time, however, most works converge on the idea that all varieties share similar properties in that no matter what the variety under question is, its basic syllable structure contains a vowel (nucleus) and an onset. Coda is not obligatory but it can appear as a single consonant or a cluster of two consonants (see, for example, McCarthy 1994, Kiparsky 2003). In this vein, both Classical Arabic, often referred to as Modern Standard Arabic (MSA), and the Sakaka city variety under investigation in this study allow both syllable structures; CV and CVC. With this being said, it is necessary to indicate that, to my knowledge, the dialect under investigation has not undergone any kind of extensive linguistic or phonological investigation before this study. Therefore, the claim that this dialect attests both CV and CVC syllable structures is derived from the researcher’s experience as a native speaker.

When syllabification and syllable structures are discussed there is often the assumption that consonants at the beginning of a word are syllable-initial and consonants at the end of a word are syllable-final. This idea is widely agreed upon (Turk 1994: 107). However, the case of intervocalic consonants has attracted the attention of many researchers in the field (Derwing 1992, among others). Approaches, in general, to this issue differ and have led to conflicting results sometimes.

In fact, attempts to explore the affiliation of intervocalic consonants usually take various pathways. That is, most studies in this domain derive the results from phonetic evidence, phonological evidence, or psycholinguistic evidence. A phonetic account tends to analyze speakers' performance by looking at the physical properties of sound waves using computer programs often referred to as speech analyzing programs. Phonological accounts look primarily at the sequencing of sounds within words and phonotactic restrictions on those sequences. On the other hand, in a psycholinguistic account, participants are usually asked to manipulate a word or sequence of words in an attempt to understand the mental organization of words within speakers. This study combines both the phonological and the psycholinguistic approaches, presenting an optimality theoretical analysis of the results via a psycholinguistic experiment.

Optimality Theory (often abbreviated as OT) is considered to be an evolutionary approach toward the field of linguistics in general and in the field of phonology in particular. The OT framework in generative grammar was first introduced in the book-length manuscript by Prince and Smolensky in 1993. Remarkably, not only was this framework successful in accounting for the phenomena that existed in phonology but it has also been extended to syntax, sociolinguistics, historical linguistics and language acquisition (see Prince and Smolensky 2004, an expansion of the original work).

Before OT was introduced, phonological patterns or tendencies were accounted for by using a rule-based approach in a sequential way. This was the idea proposed by early works in phonology (see, for example, Chomsky & Halle 1968). At a later time, the idea of phonological conspiracy evolved which proposes that a group of certain rules conspire together to form a certain representation or output. In other words, the restrictions within a group of rules lead to the final output or result. Indeed, a fairly extensive body of work has been devoted to finding out more about phonological conspiracies in different aspects such as children's error patterns and adults' error patterns and performance in general (cf. Bakovic 2000, 2001; McCarthy 2002, and many others). The role of OT extends beyond explaining such phonological conspiracies in that it addresses how grammatical rules interact.

In this output-based framework, OT, the idea is that phonological decisions made by language speakers undergo a parallel assessment or evaluation (opposite to the rule-based framework) of available choices according to specific often conflicting language-specific demands. Therefore, the core of OT grammar is that for each possible input (mental representation or underlying form) in the language, there are several outputs (actual performance or surface form). These outputs are evaluated by certain restrictions called constraints. The input is not governed by any constraints. In practical terms, there is a generator (GEN) that generates candidate sets for each input according to specific rules of well-formedness and then these candidates go through an evaluator (EVAL) to select the best candidate. What makes a candidate win over the remaining candidates is the number of violations of constraints it incurs with respect to the number of violations other candidates incur relative to the weight of those constraints in the grammar of the language. That is, all constraints are violable but the winning candidate incurs the least number of violations of the highest ranking constraints compared to the others. Constraints are considered to be universal (available in every language) and are ranked according to a specific ranking hierarchy. It is the ranking of the universal constraints that leads to different grammars for different languages. The hierarchy is often represented in a linear fashion from left side to right side e.g. $C_1 >> C_2 >> C_3$ where the constraint that has the highest ranking is the leftmost one C_1 and the constraint that has the lowest ranking is the rightmost one C_3. These constraints are often presented in tableaux similar to the one in (2) below.

(2) An example tableau in OT

	/X/	C_1	C_2	C_3
→	[A]		*	*
	[B]	*!		

In the tableau above, /X/ represents a phonological input, [A] and [B] represent two possible candidates (outputs) that were generated for /X/. The three constraints are represented by the horizontal cells of the tableau. Each single asterisk/star (*) under each constraint represents a single violation of that constraint. The arrow in the first column indicates the winning candidate. As we can see, candidate A incurs two violations and candidate B incurs one violation. However, B gets thrown out because it incurred a fatal violation (indicated by the exclamation mark) by disobeying the constraint that has the highest ranking whereas A incurred more violations to lower ranked constraints but not to the highest ranked one. It should be noted that the ranking or order of these constraints is subject to change according to language-specific rules and universal rules. For an extensive explanation and discussion of this framework see McCarthy (2008).

By going back to the issue of uncertainty of the syllabification of intervocalic consonants, the current study tries to tackle this issue using a psycholinguistic approach the results of which are analyzed in an OT framework. For this purpose, a set of 'CVCVC non-words that obey the phonotactics of Arabic was devised and participants were asked to blend two such non-words. The focus of the study was to identify the syllable affiliation of single intervocalic consonants based on the resulting blend. The next chapter introduces some of the background and literature that are most relevant to the current study.

CHAPTER 2

BACKGROUND

As discussed in the first chapter, generally, investigations of the affiliation of intervocalic consonants take different directions. Some directions of investigation involve experiments that attempt to find phonetic evidence for syllabification through various analyses of the physical properties of sounds. Other directions of investigation often involve psycholinguistic experiments using both real words and/or non-words. In this section, I will first present studies that took phonetic or acoustic approach and then studies that took psycholinguistic approach which is the main focus of this study and finally, some of the relevant rule-based restrictions in phonological theory.

2.1. Phonetic evidence for syllable boundaries.

A considerable body of research in early investigations of phonemes' affiliations within syllables was conducted by analyzing the physical gestures and properties of sounds in the human speech stream. The speech stream is often examined using speech analyzing programs run by computers. The most investigated properties relevant to syllabification of consonants include acoustic characteristics such as consonant or vowel duration, release bursts, and stop aspiration and articulatory gestures such as the movement of the lips or other articulatory organs over the course of production (see, for example, Coker and Umeda 1975, Nakatani and Dukes 1977, Krakow 1989). For example, voiceless stop consonants in syllable initial position before a stressed vowel are aspirated in English. The aspiration is manifested in the speech stream by a lag between the release of the stop and the onset of voicing for the vowel. Aspiration is rarely present in coda position. In intervocalic position, then, the presence of aspiration after a voiceless stop would be an indication of the onset affiliation of that stop. Phonetic approaches to the affiliation of intervocalic consonants include Nolan's (1994) inquiry into the affiliation of intervocalic velar stops and Turk's (1994) study of intervocalic labial stops in English.

Nolan (1994) employed electro-palatographic (EPG) recordings as well as release bursts and aspiration to identify the affiliation of single intervocalic consonants in an English variety spoken in London. For this purpose, Nolan used four English words with the medial structure /-'VkV-/: *ticking* /-'ɪkɪ-/, *ticker* /-'ɪkə-/, *tucking* /-'əkɪ-/ and *tucker* /-'əkə-/. Nolan got conflicting results from the two experiments. The EPG recordings indicated that the [k] belonged to the coda position in the first syllable. This indication resulted from the greater palatal contact by the tongue during the production of the velar. However, the measurements of the burst and aspiration of the intervocalic velar indicated that it belonged to the second syllable constituting an onset. According to Nolan, these two conflicting results suggested by the two different approaches were misleading because they measure different aspects of the phonetic stream. He argued that the best analysis of these data is considering the medial consonant a transition point from the first vowel to the second vowel rather than making artificial boundaries in a continuous concrete entity. He suggests that this issue of syllabification needs to be correlated with either perception or production as these two domains are not always similar.

Turk (1994) approached the problem of the syllabification of intervocalic stops from a different perspective. She used X-Ray Microbeams to track both vertical and horizontal movements of the upper lip gestures of intervocalic /p/ and /b/in American English in a phonological environment similar to Nolan's and compared the peak-velocity and vertical displacement ratios of words like *leper* with those in which the /p/ or /b/ is uncontroversially syllable-final, as in *captor*, or syllable-initial, as in *repair*, through discriminant analysis. Her results indicated that the intervocalic consonant is tied with the stressed vowel. In other words, the syllabification of a word like *leper* is CVC.VC (where the period indicates the syllable boundary). This result converges with what many phonologists argue in that intervocalic consonants in English belong to the stressed syllable of the two neighboring syllables as stated in the introduction of this paper.

Unfortunately, most of the studies that employ phonetic analyses do not examine consonants of different sonority profiles, perhaps due to the increase of the burden testing different kinds of consonants might cause. This makes a phonetic approach unsuited to an exploration into to the role sonority plays in the syllabification of intervocalic consonants. Therefore, this study opts for a psycholinguistic approach for collecting data.

2.2. Psycholinguistic Evidence for syllable boundaries.

Lately, an increasing body of research has been devoted to investigate the syllabification judgments of intervocalic consonants from speakers of different languages in disyllabic words or non-words using metalinguistic/psycholinguistic tasks. The most commonly used tasks in the literature include *pause insertion/slash insertion tasks, syllable reversal tasks, syllable reduplication tasks, syllable repetition tasks, syllable substitution tasks, fragment insertion tasks*, and *short-term memory tasks.* For simplification, the English word *lemon* is used as an example to illustrate each task. The pause/slash insertion task requires speakers to insert a pause between the syllables of a word if pronounced orally or draw a slash between the syllables if it is a written task. In this case, *lemon* is theoretically pronounced as *le…mon* or *lem…on* or written as *le/mon* or *lem/on*. Studies of this nature are very common (Fallows 1981, Schiller, Meyer & Levelt 1997, McCrary 2004, Goslin and Floccia 2007, among others). However, the requirement is different in syllable reversal tasks. Here, speakers are asked to reverse the order of the syllables. For example, *lemon* becomes *mon-le*. Usually, this kind of study produces a high rate of errors and is often not used (see, for example, Barry, Klein & Koser 1999, Content, Kearns & Frauenfelder 2001). In the syllable reduplication tasks, speakers are asked to utter the given word with one of its syllables repeated at the beginning or end of the word. In this case, *lemon* becomes either *le-lemon* or *lemon-mon* (Treiman and Zukowski 1990, Berg 2001, among others). In syllable repetition tasks, speakers are asked to take one syllable of a given stimulus and repeat it. *Lemon* is therefore *le…le…le* or *mon…mon…mon* (see, for example, Cebrian 2002). Syllable substitution is not really common, however, in this task speakers are asked to replace a certain syllable with one of the two syllables in a disyllabic word. An example that is used in Bertinetto, Marco, Caboara, Gaeta & Agonigi (1994) is the syllable [vu]. In this case, speakers either produce *vu-mon* or *le-vu*. The task of fragment insertion requires speakers to insert certain phrases between the syllables of a given word in a variation of the pause insertion task. In a word like *lemon*, speakers could say *I say le and then mon* or *I say le* or *I say mon* (Content et al. 2001). The final task is the short-term memory task. In tasks of this nature, speakers usually listen to a stimulus and repeat it as is. The stimuli are either single words or pairs of words. The purpose of this task is to investigate the errors speakers make when repeating the stimuli. Recently, Côté and Kharlamov (2011) tested several of these tasks using the same stimuli in an attempt to find out more about the universal comparability of the tasks. While all of these tasks have been used to explore the parsing of intervocalic consonants, some of the studies that are most relevant to the current study are elaborated on below.

One of the early studies of this nature was conducted by Fallows (1981). In this study two metalinguistic experiments with bisyllabic English words were used in order to see if universal principles of syllabification like stress, type of intervocalic consonant (sonority profile), and Maximal Onset Principle influence the syllabification of single intervocalic consonants. Fallows first employed a syllable reduplication task in which she asked children from 4-10 years old to reduplicate either the first or second syllable of a two-syllable word, eliciting patterns such as *sham-shampoo* or *shampoo-poo* from words like *shampoo*. She then used the same stimuli with the same speakers in a pause-insertion task, eliciting patterns like *sham…poo* or *shamp…oo* from the same word. Overall, results showed that universal principles of syllabification affected speakers' judgments on syllable boundaries. First syllable stress was found to be pulling intervocalic consonants into the first syllable especially when the vowel in the first syllable was lax. A small number of ambisyllabic responses was also found among nasals and liquids when the second syllable was stressed and she related this type of syllabification to a conflict between the Maximal Onset Principle and the stress-to-weight principle.

Similar patterns were observed in a study of intervocalic consonants conducted by Treiman and Danis (1988) but with adults. They employed a syllable reversal task followed by a slash insertion task. Generally, their results showed that obstruents were part of the second syllable and more sonorous consonants like nasals and liquids were part of the coda of the first syllable, especially when the stressed vowel was lax. Ambisyllabic responses were more common with nasals and liquids when the stress was on the first syllable than when it was on the second syllable as suggested by Khan (1976).

In another study, Treiman and Danis (1988) focused on the rhyme as a constituent in the syllable and if the rhyme was sensitive to the sonority of potential coda consonants. This study included two experiments of interest to the current study. Both experiments were short term memory repetition tasks. In the first experiment, they used an instrument that consisted of 30 lists of 6 one syllable non-words each with the structure *CVC*. Final consonants in each list included *liquids, nasals* and *obstruents* from the English consonant inventory. The task required

36 native English-speaking participants to listen to these prerecorded stimuli and repeat them in the order given list by list. Overall, 42% of responses were correct. Most errors shared one or two phonemes from one nonword and some from another nonword. Statistical analysis showed that when one phoneme is remembered it was often an onset whereas if two phonemes were remembered they were often the rhyme's members. Within rhymes, codas with liquids were more accurately remembered. In order to see whether rhymes themselves have an internal hierarchy, they conducted another list repetition task, this time with nonwords consisting of the structure *VCC* where the first consonant was a liquid, a nasal or an obstruent and the final consonant was always an obstruent. More errors occurred in this task (only 25% of responses were correct). Statistical analysis of the errors showed that rhymes were divided between the vowels and consonants in different ways depending on the sonority of the first consonant. VC/C instances outnumbered other instances when C_1 was a liquid whereas in the case of nasals and obstruents, results were divided between V/CC, VC/C and VCC. Overall, results implied that sonority of consonants plays a role in the syllabification in that liquids were often parsed in the coda of the syllable constituting a member of the rhyme. Subsequent studies pursued by Treiman and her colleagues (see for example, Treiman and Zukowski 1990, Treiman, Gross & Cwikiel-Glavin 1992) also revealed tendencies for intervocalic consonants in English to be codas and/or onsets depending on universal principles like the maximal onset principle, stress, sonority profile and vowel length.

Treiman, Straub and Lavery (1994) focused on the syllabification of intervocalic consonants through the examination of short-term memory errors. Three experiments were used for this purpose and each used pairs of CVCVC nonwords. The first one included 50 college students who were native speakers of English. The stimuli was a list of 180 /CVC'VC/ nonwords like /vər'ud/ and /tʃɪl'ɛp/ in which stress was on the second syllable. Medial consonants included liquids, nasals and obstruents. Participants were asked to remember each pair of stimuli and repeat it. Then errors in repetitions were examined. For the liquids and nasals the CVC/VC errors occurred more than CV/CVC while CV/CVC errors in the pairs that contained obstruents were more common than CVC/VC errors. These results suggest that liquids and nasals were parsed in the coda of the first syllable. Obstruents, on the other hand, were parsed as onsets of the second syllable. These results are consistent with sonority based accounts in that more sonorous liquids and nasals were more likely to appear as codas and less sonorous obstruents were more likely to appear as onsets. In the second task, stress was shifted to the first syllable and the first vowel was lax. Otherwise the procedures were the same as in the first task. Results here were similar for the sonorous medial liquids and nasal. However, the results did not show a significant pattern for medial obstruents. The third experiment used the same stimuli from the second experiment except that the lax vowels were replaced by tense vowels. Results in this task showed that sonority was not a factor. Both sonorant and obstruent medial consonants were parsed as onsets of the second syllable (CV/CVC). Results of the three tasks together indicated that coda syllabification of liquids and nasals is preferable when the vowel of the first syllable is lax.

Derwing (1992) used a pause break task to investigate the syllabification of intervocalic consonants in Arabic, English, Blackfoot, Korean and Swiss German. Overall results showed that the Maximal Onset Principle had a strong effect on the syllabification judgments from the diverse language speakers in that intervocalic consonants were mostly parsed in the onset of the second syllable. Of interest to this section is the portion of study that involved literate and semi-literate Egyptian Arabic speakers. The study included single intervocalic consonants, two consonant clusters and geminate or long consonants. Instead of asking participants to insert slashes to divide syllable boundaries in written words as Treiman and Danis (1988) did, the words were presented orally using short pauses that represented three possible boundary divisions. Overall, the technique was easily understood and carried out by those speakers. Researchers in this task presented an example of a word like the English word *lemon* in normal intonation. Possible responses were then given. In the first option, the pause is placed before the medial consonant *le…mon*, assigning it to the onset of the second syllable. In the second option, the pause is placed after the medial consonant *lem…on*, assigning it to the coda of the first syllable. The third option allowed the medial consonant to be ambisyllabic *lem…mon*, occurring in both syllables. The results from the 48 students at Cairo University and the 13 semiliterate participants were similar in that there was a preference to assign single intervocalic consonants to the onsets of the second syllable obeying the MOP. In addition, college students and semi-literate speakers produced very similar results. Thus, it can be seen that level of education was not a major factor in speakers' syllabification judgments. However, although intervocalic consonants of different sonority profiles were used, this study did not split patterns of the results by sonority levels.

Schiller et al. (1997) conducted a syllable reversal study with Dutch speakers in which participants were presented with CVCVC words and asked to reverse the syllables. Results revealed that the MOP had a strong effect in Dutch, and that syllabification was also influenced by stress placement and sonority of consonants. Two patterns were most common: CVC/CVC (ambisyllabicity) and CV/CVC (onset). Coda parses (CVC/VC) were not very common especially among obstruents.

Syllable reversal and syllable reduplication tasks were tested with Finnish and German speakers. Berg and Niemi (2000) investigated the syllabification of single intervocalic consonants, and clusters of two and three consonants. Although they did not directly specify these consonants in terms of sonority profiles, results revealed a tendency for German speakers to parse most intervocalic consonants in onset position. On the contrary, Finnish speakers tended to split these clusters between the first and second syllables in clusters of two, and when the clusters consisted of three consonants, to include the first two consonants in the coda of the first syllable and the last consonant in the onset of the subsequent syllable. However, there was some tendency for sonorous consonants to be parsed more often in the coda of the first syllable than for obstruents to take a coda parse. Likewise, Content et al. (2001) used syllable reversal and syllable repetition tasks to investigate the syllabification of intervocalic consonants in French. Results of this experiment again revealed a strong tendency for speakers to parse single intervocalic consonants in onset position. However, there was also some tendency for speakers to parse nasals and liquids in coda position.

Finally, Ishikawa (2002) studied English and Japanese speaker's syllabification of single intervocalic consonants in bisyllabic English words and non-words that are composed of the structure CVCVC. A total of fifty four participants (24 English speakers and 30 Japanese speakers) were asked to insert a pause between the syllables of the oral stimuli they heard. This was followed by a second syllable-counting task that involved the native Japanese speakers only. Overall, in the oral task both English and Japanese speakers tended to syllabify the intervocalic consonants as onsets to the second syllable following the maximal onset principle although Japanese speakers showed a stronger preference for this syllabification, probably due to the fact that in Japanese open syllables (CVs) often occur more than other types of syllables. Results from the second experiment showed that, in general, trained Japanese speakers tended to treat intervocalic consonants as ambisyllabic more than any other type of segmentation. However, Ishikawa concluded that CVC/VC responses (intervocalic consonants being in the coda of the first syllable) were observed with more sonorous consonants (mostly nasals and liquids) but not with obstruents and she attributed these patterns to factors like sonority profile of intervocalic consonants, vowel type/length, and stress placement.

Overall, the psycholinguistic evidence, like the phonetic evidence, highlights the effects of conflicting pressures for syllabification. The experiments discussed above suggest that the maximal onset principle is a strong factor in many languages, along with a tendency for more sonorous consonants to defy the maximal onset principle and be parsed as codas, depending also upon vowel length and/or stress. The task developed for the current study is similar to the psycholinguistic tasks outlined above in that it seeks to identify the participants' parsing of intervocalic consonants with attention to the sonority profile of those consonants. The interaction of competing syllabification principles also lends itself quite well to an optimality theoretic analysis of the results, which is outlined in the following chapter.

2.3. Phonological evidence for syllable boundaries.

With the idea of the mental reality of the syllables being established, it is important to discuss some early and commonly used rule-based principles in the phonological theory. It has been argued that language is systematic in that human speech sounds do not occur in a random way. There have been different phonological rules that are often being implemented to explain some of the patterns of syllabification of segments inside the syllable. This section elaborates on the most relevant theories and how they can be tied into the current study.

Among the rules that are thought to govern the assignment of segments inside syllables is the Principle of Maximum Open Syllabicity (Pulgram 1970), Obligatory Onset Principle (Hooper 1972), Onset First Principle (Clements and Keyser 1983), Principle of CV-Precedence (Ito 1986), the preference of the Head Law (Vennemann 1988), or Maximal/Maximum Onset Principle (often abbreviated as MOP) (Blevins 1995, among others). These rules are based on the assumption that all languages attest CV syllables (some only have CVs) whereas a CVC is not obligatory in any language. Therefore, in the speakers' job of parsing segments in words that contain more than one syllable, the priority is given to the onsets of these syllables first. That is, the first segments that are usually assigned to syllables are vowels (being the heads of syllables) and then consonants are assigned to the onsets of these syllables as much as possible. The remaining consonants are then assigned to coda position in these syllables, when codas are allowed in the language under study. According to this rule, the syllabification of a word that has the structure CVCVC is theoretically CV.CVC, where the first and second consonants from the left are onsets. Many researchers then wondered if this is an ultimate rule that applies to all situations of syllabification in a language or not, which led to many of the studies discussed in the previous chapter. The simplest answer to this question is no. Different investigations of the assignments of segments inside syllables showed that this rule does not always apply. A second question of whether this rule is applicable in all languages of the world came out and the answer is also no. Studies have also shown that onset preference is stronger in some languages than others.

One principle in competition with the MOP is the Sonority Sequencing Principle (SSP). What this principle states is that not all segments are the same with respect to sonority profiles. Some are more sonorous than others and less sonorous segments are more susceptible to the

MOP than are more sonorous segments (Clements 1990). The distribution of segments within sonority sequencing is that the heads of syllables (vowels) are the most sonorous ones and consonants to the left and right of these heads must have a higher sonority than consonants that are farther away from them. Under this principle, there is also the proposal that coda segments prefer to be higher in sonority than onsets. Under this Core Syllabification Principle, a CVCVC string can be syllabified as CV.CVC if the intervocalic consonant is very low in sonority and CVC.VC if the intervocalic consonant has a relatively high sonority profile.

The issues discussed above can also be complicated when stress is brought into the discussion. Stress is believed to play a very important role in many languages of the world. In some languages, stressed syllables become heavy and the unstressed ones become light. This rule is often called Weight-to-Stress Principle (WSP) (Prince 1990). English is one of the languages affected by the WSP, which partially explains some of the results of Treiman and her colleagues in the previous section. Of interest to this study is the impact stress can have on syllabification. It has been argued that a stressed syllable usually attracts the biggest number of consonants whereas the unstressed one does not. By conforming to this theory, a CVCVC string can be syllabified as CVC.VC if the stress is initial (on the first syllable), and CV.CVC if the stress is final (on the second/last syllable). The obvious reason for this is that in order for a syllable to be stressed it has to be heavy and a CV syllable (with a lax vowel in English) does not meet this condition. Therefore, the solution is to include the intervocalic consonant as a coda segment to add extra weight to the rhyme (see Clements 1990, among others). The remaining issue under stress restrictions is ambisyllabicity. The WSP partially explains the phenomenon of ambisyllabicity noted in several studies in the previous chapter. Because a stressed syllable must also be heavy under the WSP, speakers try to syllabify a single intervocalic consonant as a coda in words with initial stress. But the MOP pushes the same speakers to parse the same consonant as an onset, leading to an experimental result in which the intervocalic consonant appears to be both a coda and an onset (Khan 1976). Selkirk (1982), however, explains the same phenomenon through the process of resyllabification. That is, CV/CVC is the initial syllabification by speakers and it changes to CVC/VC due to the influence of stress.

Within Optimality Theory (OT), the competition between conflicting principles is foundational (see, Prince and Smolensky 2004, for an extensive discussion on this issue). Indeed, the way in which this approach accounts for syllabification regulations is not totally distant from the above rules. Since OT is based on the optimality of the output candidates to an underlying representation, MOP can be formulated in the restricting constraints of OT as *NoCoda* and *Onset*. The *NoCoda* constraint demands that for a syllable in order to be optimal it must not have consonants in coda position. The syntax of the constraint incorporates both the preference for an intervocalic consonant not to be parsed as a coda and for the possibility that languages may ban coda consonants altogether. On the other hand, the *Onset* constraint demands that a syllable must have consonants in onset position in order to be optimal. The Onset constraint incorporates both the preference for syllables to have an onset (the MOP) and the typological reality that all languages either allow onsets or require them. The two constraints together result in the same effect obtained by the MOP in earlier rule-based accounts. Under any ranking of these two constraints, the best output of a VCV sequence is V.CV which does not have a coda but has an onset. A VC.V parse of the same sequence incurs a violation of both NoCoda (because it has a coda) and Onset (because the second syllable lacks an onset).

However, many languages allow VC.V parses in addition to V.CV parses. This is encoded in OT through the Peak (nucleus) and Margin (onset) hierarchies, which identify low sonority consonants as preferable for onsets and high sonority vowels as preferable for peaks. Baertsch (1998, 2002) adds a third hierarchy to this (the M_2 hierarchy) which identifies high sonority consonants as preferable for codas. Both of these constraint hierarchiess govern consonants of different sonority profiles within singleton onsets (M_1) and coda (M_2) according to language-specific preferences. These preferences give a priority for consonants with low sonority in onsets whereas in coda the preference is for high sonority consonants. The different interactions between these constraints can override the pressure for onset formation inherent in the NoCoda and Onset constraints.

With all that being outlined, the current study aimed at investigating the syllabification of single intervocalic consonants (liquids, glides, nasals and obstruents) in disyllabic non-words of the structure ('CVCVC) through a non-word blending task within an OT framework. The major interest was to find whether these consonants are tied to the rhyme of the first syllable constituting the coda or to the onset of the second syllable based on which intervocalic consonant is chosen for the blended word. The syllabification choice is presumed to be affected by the MOP and by the sonority of different natural classes of consonants as previous literature on this issue argues. The inventory of phonemes constituting the overall structure of non-words is derived from the Classical Arabic phoneme inventory. Overall, the study seeks answers to the following questions:

1- Where does each type of the targeted single intervocalic consonants belong in non-words of two syllables?

2- Do universal principles of the syllable including sonority profile of consonants and the MOP stated above have an impact on the syllabification judgments of speakers?

Along with the main inquiries stated above, the extent to which rules like Maximal Onset Principle and Sonority Sequencing Principle influence the syllabification is tested. Moreover, since stress is placed initially throughout the stimuli, its role is minimized. Little work has been devoted to test these principles on Arabic in general and none has been devoted for the dialect under investigation. If these principles are really universal, then their influence should be evident in speaker's treatments of syllabification in the dialect of Sakaka City. As previous work on the theory of this kind of investigation provided evidence, the researcher believes that this study will extend the scope and lead to a greater understanding and conceptualization of the intervocalic syllabification of the different phonemes in the four targeted natural classes of sounds in the Arabic dialect of Sakaka City. Not only will this type of investigation add to Arabic Language phonology, but to the discipline of phonology in general.

The next chapter provides detailed information on the nature of the task used and the methodology of the investigation. Chapter 4 reports the results of the analysis accompanied by some discussions of the patterns observed in these results. Finally, the last chapter concludes the thesis by putting any scattered pieces together and provides some suggestions for further work that would pick up after this one.

CHAPTER 3

EXPERIMENT

The experiment included a psycholinguistic/metalinguistic task devised in order to investigate the syllabification of single intervocalic consonants and to provide a preliminary answer to the questions stated in the previous chapter. Below is detailed information about the nature of the task, participants, stimuli, and procedure implemented.

3.1. Participants.

For the purpose of the study, thirty participants were recruited voluntarily. As for gender, the sample included only males because the researcher did not have access to females. Moreover, the participants' age ranged from 25 to 45 only. In fact, this 20-year window was chosen in order not to introduce generational differences. It is almost impossible to find participants under the age of 25 who have not received English language education. All participants were native residents in the city of Sakaka in Aljouf Region of the Kingdom of Saudi Arabia. For the purpose of increasing the validity of the results, the sample included monolingual participants only. In order to avoid any metalinguistic knowledge about Arabic, all participants were chosen from the working class who have had elementary or intermediate schooling only. Also, the participants had no knowledge or competence in any other language than their mother tongue; Arabic. Lastly, all participants had no detectable speaking or hearing impairments.

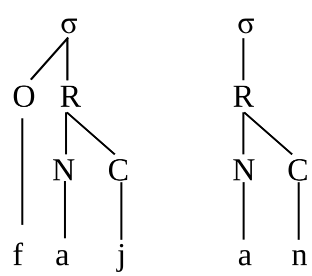
3.2. Stimuli.

This study focuses on the production of the participants only. For this purpose, the instrument was divided into two parts. The first part consisted of a demographic questionnaire which requested information that included: age, level of education, exposure to languages other than Arabic, Arabic speaking countries visited in the last 5 years, and non-Arabic speaking countries visited in the last 5 years. Part two of the instrument is the production task which consisted of stimuli of 44 pairs of disyllabic non-words. These non-words (included in Appendix A) are formed using the structure ('CVCVC), where the underlined consonant is the targeted intervocalic consonant which was tested. These intervocalic consonants fall at four sonority levels. These sonority levels are glides, liquids, nasals and obstruents. Glides contained the two phonemes /j/ and /w/, liquids contained the two phonemes /l/ and /r/, nasals contained the two phonemes /m/ and /n/, lastly, obstruents contained one voiced stop /b/ (the voiceless version /p/ does not exist in the phonemic inventory of Standard Arabic nor in the dialect under investigation), and one voiceless fricative /s/. The consonant in the underlined position is systematically changed to pair consonants at each tested sonority level ([j], [w], [r], [l], [m], [n], [s] and [b]) with a second consonant at each tested sonority level. However, the consonants at the boundaries contained various consonant types that are attested in Standard Arabic and the dialect under investigation. In addition, phonemes which represent allophonic variations between Classical or Modern Arabic and the dialect under investigation in this study were not included in the inventory of the intervocalic consonants in order to avoid confusion by the participants as they might produce one sound while they mean the other. However, the vowels were all identical (the low vowel /a/) which was maintained throughout the list of stimuli. None of the stimuli items and none of the possible blends resulting from each pair of stimuli are actual words in Arabic, but all fit the phonotactics of Arabic. One thing to notice in these non-words' structure is that the place of stress is consistently on the first syllable. In addition, the reason for choosing non-word stimuli for this study is that previous investigations on this issue have proved that using real words might have other internal effects on results such as word spelling.

3.3. Procedure.

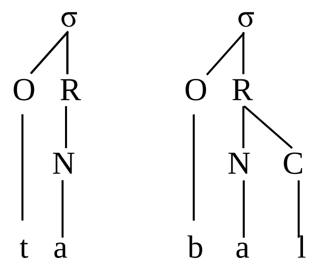
After participants agreed to participate in this study and completed the demographic questionnaire, the list of 44 pairs (a total of 88 non-words) was administered orally and individually by the researcher to the thirty participants. These individual interviews lasted approximately thirty minutes for each participant. The production of participants was hand written by the researcher on a separate sheet of paper that was already prepared beforehand. In order to keep participants blind from the real purpose of the task, they were told that the task seeks to find out about pronunciation of Arabic sounds in general. Based on the assumption that the novelty of such a task will pose some difficulty to the participants, the researcher introduced five practice pairs and explained to each individual participant how the task works. The task of this instrument was very simple as participants were read the actual pairs of non-words and asked to “take the first part of the first word of each pair and combine it with the second part of the second word of each pair to create a totally new non-word that contains exclusively the segments from the pairs produced by the researcher” (consonants and the only vowel that is consistent throughout the pairs which is /a/). The assumption here in choosing the first or second part of a given word is that participants will choose a syllable or some node within a syllable (onset or rhyme) as many studies of similar nature have noted (Treiman and Danis 1988). The production was limited to two choices, they either put the target intervocalic consonant in the coda position or in the onset position. Accordingly, every possible combination of sonority is made for the sake of neutrality of the instrument. Participants’ choice of intervocalic consonant in the blending task is the basis for coding. That is, if they chose the intervocalic consonant from the first word in their new word, the implication is that the intervocalic consonant is part of the coda of the first syllable in the original word (first word). If participants chose the intervocalic consonant from the second word, the implication is that the intervocalic consonant of the original first word is not part of the coda and that the intervocalic consonant of the second original word is parsed as an onset in the second syllable. To simplify these patterns, let us consider the following example pair of nonwords *fajan* + *tabal*. As you can notice here that we have the consonant /j/ as an intervocalic consonant in the first nonword of the pair *fajan*, and we have the consonant /b/ as the intervocalic consonant in the second nonword of the pair *tabal*. Participants have two choices for the resulting blendings from these two nonwords, either *fajal* or *fabal*. If participants made the resulting blend *fajal*, this means that they parsed the intervocalic consonant /j/ in coda position in the first syllable of the first nonword of the pair *fajan*, as in (3). Here, participants have taken the first syllable of the first word, including the coda [j]. The second part of this resulting blend consists only of the rhyme of the original second word, [al].

(3) Coda parsing of intervocalic /j/ if the blending result is *fajal*



On the other hand, if they made the resulting blend *fabal*, the first syllable of the first word consists only of [fa] and the intervocalic consonant /b/ comes from the second word and is thus in onset position in the second syllable of the second nonword of the pair *tabal*, as shown in (4).

(4) Onset parsing of intervocalic /b/ if the blending result is *fabal*



Notice here that we are not talking about how these intervocalic consonants are syllabified in the resulting combinations as this cannot be easily attempted without a thorough analysis of the syllabification of these resulting combinations. Recall that in (3) and (4) above we investigated the syllabification of the intervocalic consonants in the original nonwords of the pair with help of the nonwords from the blending results.

Within the Optimality Theory adopted in this study, the resulting blend in (3) indicates that participants preferred to parse the first intervocalic consonant in coda position rather than parsing the other intervocalic consonant that was tested with it in onset position. In this case, the corresponding margin constraint for coda position is $*M_2/X$ whereas the corresponding one for onset position is $*M_1/Y$. Hence, the constraint ranking $*M_1/Y >> *M_2/X$ is implemented to account for the results. Opposite to the indication above, the resulting blend in (4) indicates that participants preferred to parse that intervocalic consonant in onset position rather than parsing the other intervocalic consonant that was tested with it in coda position. In this case, the constraint ranking $*M_2/X >> *M_1/Y$ generates this pattern.

Before moving to the next chapter, it should be noted that all consonants are assumingly accepted in onset and coda position due to lack of literature on the dialect under investigation. Only through examining how they will be syllabified intervocalically will we be able to find out more about how this dialect tends to assign consonants in onset and coda positions. The results of the blending task along with an OT analysis of those results are presented in the following chapter.

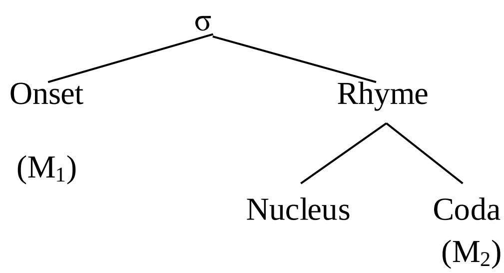
CHAPTER 4

RESULTS

Results of the blending task outlined in the previous chapter showed in general that there is a great tendency for participants to opt for an intervocalic sonorant from the first word of the pair (thus, a coda) no matter what the intervocalic consonant in the second word of the pair was. This is, of course, with some exceptions as in the case of obstruents which are the least sonorous consonants. That is, when the intervocalic consonant in the first word was an obstruent ([b] and [s] only), participants showed an overwhelming tendency to choose the second intervocalic consonant; glides, liquids and nasal, which might be interpreted as participants opted for a (fairly marked) onset rather than a (very marked) coda. Moreover, when the intervocalic obstruent in the first word was paired with another intervocalic obstruent in the second word of the pair, there was a great tendency for participants to choose the second intervocalic obstruent which can also be interpreted as participants were trying to parse obstruents in the onset rather than the coda.

In this study, an optimality theoretic approach is implemented in order to account for the patterns in the results of the data. Within Optimality Theory (OT), we have underlying forms as inputs and surface forms as possible candidates. The optimal candidate (the winner) among all the candidates of an input is the one that speakers of a language produce (the actual performance). According to OT, the constraint ranking generates the winning candidate. In this particular study, analysis follows the split margin hierarchy approach to syllabification (Baertsch 2002, 2010). In this approach, the sonority of the prevocalic consonant segment (the consonant in the onset) is more preferred when it is very low. Coda segments, on the other hand, are more preferred the more sonorous they are. Within the split margin hierarchy approach, a single consonant in the onset fills an M_1 position whereas a single consonant in the coda fills an M_2 position as shown in the syllable diagram in (5).

(5) M_1 and M_2 positions in the syllable



Each syllable position is governed by a margin hierarchy. The margin constraint hierarchies in both M_1 and M_2 are given in (6). The M_1 hierarchy governs onsets and incorporates the preference for low sonority in this position. The M_2 hierarchy governs codas and incorporates the preference for high sonority in this position. Within these margin hierarchies, the constraint that is leftmost (highest ranking) is the least preferable constraint and the most marked segment in the corresponding syllable position. Segments become more preferable and less marked as we gradually go to the right so that the rightmost constraint is the most preferable. The use of the asterisk symbol (*) before each constraint means ‘do not parse this segment in this position’. For example, the constraint *M_1/Obs means that an obstruent segment must not be parsed in onset position (onset position indicated by the number after the abbreviation M), and the same rule applies for coda position which is M_2.

(6) The margin hierarchies (following Baertsch 2010)

M_1 hierarchy (which governs segments in onset position)

*M_1/[+hi] >> *M_1/Liq >> *M_1/Nas >> *M_1/Obs

M_2 hierarchy (which governs segments in coda position)

*M_2/Obs >> *M_2/Nas >> *M_2/Liq >> *M_2/[+hi]

When applying these constraints to the blending of the example pair given above (/fajan/ + /tabal/), the presence of /j/ in the resulting blend indicates that the [j] is parsed in coda position in the first nonword, making it available as part of the 'first part' of the first word that participants were asked to select. This selection indicates that the constraint ranking in use by the speaker is $*M_1$/Obs >> $*M_2$/[+hi]. With this constraint ranking it is more preferable to parse glides in coda position, violating $*M_2$/[+hi], than it is to parse an obstruent in onset position, a violation of the constraint $*M_1$/Obs. Consequently, the parsing of /j/, which is a violation of $*M_2$/[+hi], in coda position is the resulting form and the winning candidate (indicated by the arrow) because $*M_1$/Obs is ranked higher than $*M_2$/[+hi]. This can be seen in tableau (7) below.

(7) The example pair /fajan/ + /tabal/

	/fajan/ + /tabal/	$*M_1$/Obs	$*M_2$/[+hi]
→	/faj.al/		*
	/fa.bal/	*!	

Note also that the opposite choice (/fabal/) would indicate that the constraint ranking is reversed.

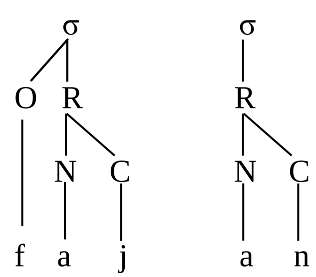
In the following body of this chapter, I describe in more detail how each intervocalic consonant of each sonority level was treated by participants when paired with another intervocalic consonant from the four sonority levels. Under each sonority level, the number and percentage of participants who chose to parse the intervocalic consonant of the first nonword of the pair as coda and who chose to parse the intervocalic consonant of the second nonword of the pair as onset are provided under each pair of nonwords. Then, an optimality theoretic analysis is provided to account for these results along with tableaux that show the ranking of the constraints and the winning candidate for each pair of the stimuli. This following body of analysis starts with the highest sonority consonants, glides, and ends with the lowest sonority consonants, obstruents.

4.1. Glides.

As we will see, when the intervocalic consonant in the first word of the pair was the glide /j/, there was a consensus from all participants (100%) to take the glide /j/ from the coda in the original word (first word of the pair). Below, we will see how the glide /j/ was treated when it is paired with each sonority level in the second word of the pair.

When the intervocalic consonant in both words of the pair was a glide, as in the pair *fajam* + *zawan*, the response always included the glide from the first word of the pair, *fajan* in this case. This indicates that the participants consider the *faj* portion of the first word to be a unit, the first syllable of the word. The remainder of the word is made up of the rhyme of the second word, as in the diagram in (8).

(8) Syllabification of *fajam* + *zawan* = *fajan*



As we can see from the syllable structure diagram above, the first and second nonwords of the pair consist of two syllables. The *faj* portion is taken from the first syllable of the first nonword of the pair and the *an* portion is taken from the second syllable of the second nonword of the pair and the resulting blending is thus *fajan*. Hence, we can say that the glide /j/ is parsed in coda position of the first syllable in the original word *fajam*.

In optimality theoretic terms, the response *fajan* indicates that a coda parse of [j], a violation of *M_2/[+hi], is better than an onset parse of [w], which is a violation of *M_1/[+hi]. The tableau in (9) shows that the ranking of these two constraints is therefore *M_1/[+hi] >> *M_2/[+hi]. In this tableau, the second candidate, in which the glide from the second word is chosen, fails due to the higher ranking of *M_1/[+hi], leaving the first candidate *fajan* as the winner.

(9) /fajam/ + /zawan/

	/fajam/ + /zawan/	*M_1/[+hi]	*M_2 /[+hi]
→	/faj.an/		*
	/fa.wan/	*!	

In the *fajam* + *zawan* pair, 100% of participants chose /j/ to be the intervocalic consonant in the resulting combination of the two nonwords. This choice is repeated in the other nonword pairs testing coda [j] against onsets of lower sonority as well.

When the second word of the pair includes an intervocalic liquid /r/, as in the pair *ʕajadʒ + laraz*, the response always included the glide from the first word of the pair, *ʕajaz* in this case.100% of participants again considered the glide [j] to be part of the first syllable of the first word. The remainder of the word is made up of the rhyme of the second word, and the syllabification of this pair is similar to the syllabification in diagram (8). The violation of *M_2/[+hi], is better than an onset parse of [r], which is a violation of *M_1/Liq, as shown in the tableau in (10). In this tableau, the second candidate, in which the liquid /r/ from the second word is chosen, fails due to the higher ranking of *M_1/Liq, leaving the first candidate *ʕajaz* as the winner.

(10) /ʕajadʒ/ + /laraz/

	/ʕajadʒ/ + /laraz/	*M_1/Liq	*M_2 /[+hi]
→	/ʕaj.az /		*
	/ʕa.raz/	*!	

There was no change in responses when the second word of the pair included the other liquid /l/, as in the pair *majadʒ* + *kalaθ*. The responses always included the glide from the first word of the pair, *majaθ* in this case. This is consistent with the ranking established in (10), above, and is shown for this pair of nonwords in (11).

(11) /majadʒ/ + /kalaθ/

	/majadʒ/ + /kalaθ/	*M_1/Liq	*M_2 /[+hi]
→	/maj.aθ/		*
	/ma.laθ/	*!	

Because *M_1/[+hi] >> *M_1/Liq, we can combine the constraint rankings thus far into *M_1/[+hi] >> *M_1/Liq >> *M_2/[+hi]. When the second word of the pair includes an even less-sonorous intervocalic nasal /m/, as in the pair *tˤajam* + *bamaðˤ*, the response always included the glide from the first word of the pair, *tˤajaðˤ* in this case. This indicates that the participants consider the *tˤaj* portion of the first word to be a unit, the first syllable of the word. The remainder of the word is made up of the rhyme of the second word.

Again, in optimality theoretic terms, the response *tˤajaðˤ* indicates that a coda parse of [j], a violation of *M_2/[+hi], is better than an onset parse of [m], which is a violation of *M_1/Nas. The tableau in (12) shows that the ranking of these two constraints is therefore *M_1/Nas >>

$*M_2$/[+hi]. In this tableau, the second candidate, in which the nasal /m/ from the second word is chosen, fails due to the higher ranking of $*M_1$/Nas, leaving the first candidate *tˤajaðˤ* as the winner.

(12) /tˤajam/ + /bamaðˤ/

	/tˤajam/ + /bamaðˤ/	$*M_1$/Nas	$*M_2$ /[+hi]
→	/tˤaj.aðˤ/		*
	/tˤa.maðˤ/	*!	

In a similar way, when the second word of the pair includes an intervocalic obstruent /b/, as in the pair *fajadʒ* + *ʃabam*, the response always included the glide from the first word of the pair, *fajam* in this case. This indicates that the participants consider the *faj* portion of the first word to be a unit, the first syllable of the word. The remainder of the word is made up of the rhyme of the second word.

Continuing within the current framework, the response *fajam* indicates that a coda parse of [j], a violation of $*M_2$/[+hi], is better than an onset parse of [b], which is a violation of $*M_1$/Obs. The tableau in (13) shows that the ranking of these two constraints is therefore $*M_1$/Obs >> $*M_2$/[+hi]. In this tableau, the second candidate, in which the obstruent /b/ from the second word is chosen, fails due to the higher ranking of $*M_1$/Obs, leaving the first candidate *fajam* as the winner.

(13) /fajadʒ/ + /ʃabam/

	/fajadʒ/ + /ʃabam/	$*M_1$/Obs	$*M_2$ /[+hi]
→	/faj.am/		*
	/fa.bam/	*!	

Given the data including [j] as the intervocalic consonant of the first word of the pair, this analysis suggests that participants will always prefer to parse intervocalic [j] as a coda before taking any intervocalic onset consonant from the second word of a pair in the blending task. Combining the ranking arguments above, (14) shows the overall ranking of the $*M_1$ hierarchy with respect to $*M_2$/[+hi].

(14) Ranking of $*M_1$ hierarchy with respect to $*M_2$/[+hi]

$*M_1$/[+hi] >> $*M_1$/Liq >> $*M_1$/Nas >> $*M_1$/Obs >> $*M_2$/[+hi]

If both glides are the same sonority, the nonword pairs including intervocalic [w] in the first word should pattern identically to the intervocalic [j] words just discussed above. Indeed, as with the case of the intervocalic glide /j/, the intervocalic glide /w/ was treated similarly by having the same consensus from all participants. Whenever the intervocalic consonant was the glide /w/, it was considered to be part of the coda in the original word (first word of the pair). Below is how the glide /w/ was treated when paired with each sonority level in the second word of the pair.

When the second word of the pair includes an intervocalic glide /j/, as in the pair *mawaf* + *dʒajatˤ*, the response always included the glide from the first word of the pair, *mawatˤ* in this case. This indicates that the participants consider the *maw* portion of the first word to be a unit, the first syllable of the word. The remainder of the word is made up of the rhyme of the second word.

In OT, the response *mawatˤ* indicates that a coda parse of [w], a violation of $*M_2$/[+hi], is better than an onset parse of [j], which is a violation of $*M_1$/[+hi]. The tableau in (15) shows that the ranking of these two constraints is therefore $*M_1$/[+hi] >> $*M_2$/[+hi], supporting the analysis of coda /j/ above. In this tableau, the second candidate, in which the glide /j/ from the second word is chosen, fails due to the higher ranking of *M_1/[+hi] leaving the first candidate *mawatˤ* as the winner.

(15) /mawaf/ + /dʒajatˤ/

	/mawaf/ + /dʒajatˤ/	*M_1/[+hi]	*M_2 /[+hi]
→	/maw.atˤ /		*
	/ma.jatˤ/	*!	

In the above pair, 100% of participants chose /w/ to be the intervocalic consonant in the resulting combination of the two nonwords. Similarly, this choice is repeated in the other nonword pairs testing coda [w] against onsets of lower sonority as well.

Next, when the second word of the pair includes an intervocalic liquid /r/, as in the pair *mawaʃ + ʃaraθ*, the response always included the glide from the first word of the pair, *mawaθ* in this case. It can be seen that the participants consider the *maw* portion of the first word to be a unit, the first syllable of the word. The remainder of the word is made up of the rhyme of the second word.

According to OT, the response *mawaθ* indicates that a coda parse of [w], a violation of *M_2/[+hi], is better than an onset parse of [r], which is a violation of *M_1/Liq. The tableau in (16) shows the ranking of the constraints generating the winning candidate.

(16) /mawaʃ/ + /ʃaraθ/

	/mawaʃ/ + /ʃaraθ/	*M_1/Liq	*M_2 /[+hi]
→	/maw.aθ /		*
	/ma.raθ/	*!	

When the second word of the pair was the other intervocalic liquid /l/, as in the pair *qawaʃ + ʃalan*, the response always included the glide from the first word of the pair, *qawan* in this case. Hence, participants are treating both liquids similarly.

Within OT, the response *qawan* corresponds to the same constraint ranking of the previous argument and this is shown in (17) below.

(17) /qawaʃ/ + /ʃalan/

	/qawaʃ/ + /ʃalan/	*M_1/Liq	*M_2 /[+hi]
→	/qaw.an /		*
	/qa.lan/	*!	

Similar results were also observed with nasals. When the second word of the pair includes an intervocalic nasal /m/, as in the pair *lawaʃ* + *qamaf*, the response always included the glide from the first word of the pair, *lawaf* in this case. This pattern is shown in (18) below.

(18) /lawaʃ/ + /qamaf/

	/lawaʃ/ + /qamaf/	*M_1/Nas	*M_2 /[+hi]
→	/law.af /		*
	/la.maf/	*!	

When the second word of the pair includes an intervocalic obstruent /d/, as in the pair *lawaʃ* + *ʃadas*, the response always included the glide from the first word of the pair, *lawas* in this case. Apparently, the treatment of the obstruent is not different from the treatment of the other consonants above as can be seen in (19).

(19) /lawaʃ/ + /ʃadas/

	/lawaʃ/ + /ʃadas/	*M_1/ Obs	*M_2 / [+hi]
→	/law.as/		*
	/la.das/	*!	

Given the data including [w] as the intervocalic consonant of the first word of the pair, this analysis also suggests that participants will always prefer to parse intervocalic [w] as a coda before taking any intervocalic onset consonant from the second word of a pair in the blending task. By combining the ranking arguments above, we have support for a hierarchy which is identical to the previous one in (14).

By careful examination of the results above, we can see that glides, in general, were always treated as members of the coda in this CVCVC + CVCVC structure which is not odd. That is to say, a great deal of the research done on the rules governing the constituents of the syllable indicates that there is a strong preference for very sonorous phonemes to be parsed in coda position immediately after the (peak or nucleus), and glides are the most sonorous consonant phonemes on all of the proposed sonority scales.

4.2. Liquids.

Similar results were observed in the case of liquids. That is, the majority of participants chose to parse the two liquids (/r/ and /l/) in coda position. However, a small number of participants chose to parse some of the consonants in the second nonword of the pair in onset position. The minority responses appeared in liquids, nasals and obstruents. Therefore, a thorough discussion of these responses will be included in this section and less discussion will be provided when we talk about similar phenomena in the other two sections.

In regard to the first consonant in this section, /r/, it was observed that when the intervocalic consonant in the first word of the pair was the liquid /r/, there was a consensus from the majority of participants to parse the liquid in coda position in the original word (first word of the pair) similar to the situation with the glides /j/ and /w/ in section 4.1. However, the situation is a little bit different with liquids as a minority of participants chose to parse the intervocalic consonant of the second nonword of the pair in onset position in some pairs. The minority performance will be discussed in more detail as we come across it when we talk about the relevant pairs. Below, we will see how the liquid /r/ was treated when it is paired with each sonority level in the second word of the pair.

When the second word of the pair includes an intervocalic glide /j/, as in the pair *baraχ* + *dʒajatˤ*, the response of the majority of participants included the liquid /r/ from the first word of the pair, *baratˤ* in this case. This indicates that the participants consider the *bar* portion of the first word to be a unit, the first syllable of the word. The remainder of the word is made up of the rhyme of the second word.

Similar to the situation with glides in the previous chapter, the response *baratˤ* indicates that a coda parse of [r], a violation of $*M_2$/Liq, is better than an onset parse of [j], which is a violation of $*M_1$/[+hi]. The tableau in (20) shows that the ranking of these two constraints is therefore $*M_1$/[+hi] >> $*M_2$/Liq. In this tableau, the second candidate, in which the glide /j/ from the second word is chosen, fails due to the higher ranking of $*M_1$/[+hi], leaving the first candidate *baratˤ* as the winner.

(20) /baraχ/ + /dʒajatˤ/

	/baraχ/ + /dʒajatˤ/	$*M_1$/[+hi]	$*M_2$ /Liq
→	/bar.atˤ/		*
	/ba.jatˤ/	*!	

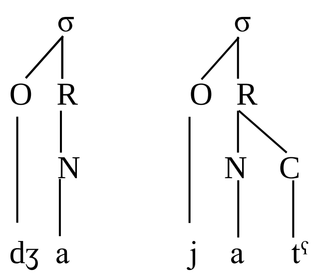
In the *baraχ* + *dʒajatˤ* pair, 90% of participants (27 out of 30 participants) chose /r/ to be the intervocalic consonant in the resulting combination of the two nonwords. 10% of participants (3 out of 30 participants) chose the glide /j/ to be the intervocalic consonant in the resulting combination of the two nonwords. In this minority performance and within OT analysis, the response *bajatˤ* indicates that an onset parse of [j], a violation of $*M_1$/[+hi], is better than a coda parse of [r], which is a violation of $*M_2$/Liq. The tableau in (21) shows that the ranking of these two constraints is therefore *M_2/Liq >> *M_1/[+hi]. Opposite to the tableau above, this tableau shows that the first candidate in which the liquid [r] from the first word is chosen, fails due to the higher ranking of *M_2/Liq, leaving the second candidate *bajatˤ* as the winner.

(21) /baraχ/ + /dʒajatˤ/ (minority response)

	/baraχ/ + /dʒajatˤ/	*M_2/Liq	*M_1 /[+hi]
	/bar.atˤ/	*!	
→	/ba.jatˤ/		*

In addition, the syllable structure is different in the minority response. The syllable structure diagram in (22) shows that the glide [j] is parsed in onset position of the second syllable of the second nonword of the pair *dʒajatˤ*.

(22) Syllabification of *baraχ* + *dʒajatˤ* = *bajatˤ*



In the case of the glide /w/ as in, *baraχ* + *zawan*, a similar treatment of /j/ was observed. Therefore, the response of the majority of participants included the liquid [r] from the first word of the pair, *baran* in this case. The response *baran* indicates that a coda parse of [r], a violation of *M_2/Liq, is better than an onset parse of [w], which is a violation of *M_1/[+hi] as in (23).

(23) /baraχ/ + /zawan/

	/baraχ/ + /zawan/	*M_1/[+hi]	*M_2 /Liq
→	/bar.an/		*
	/ba.wan/	*!	

In the *baraχ* + *zawan* pair above, 86.66% of participants (26/30 participants) chose /r/ to be the intervocalic consonant in the resulting combination of the two nonwords. The remaining 13.33% of participants (4/30 participants) chose the glide /w/ to be the intervocalic consonant in the resulting combination of the two nonwords as in (24) below.

(24) /baraχ/ + /zawan/ (minority response)

	/baraχ/ + /zawan/	$*M_2$ /Liq	$*M_1$/[+hi]
	/bar.an/	*!	
→	/ba.wan/		*

However, when the second word of the pair includes the other intervocalic liquid /l/, as in the pair *ʁaraħ* + *ʃalaʁ*, the response always included the liquid from the first word of the pair, *ʁaraʁ* in this case. The winning candidate is shown in (25).

(25) /ʁaraħ/ + /ʃalaʁ/

	/ʁaraħ/ + /ʃalaʁ/	$*M_1$/Liq	$*M_2$ /Liq
→	/ʁar.aʁ/		*
	/ʁa.laʁ/	*!	

The argument above indicates that when the two liquids were tested, the first liquid, /r/ in this case, is parsed in coda position. This will raise the question of what will happen if [l] is tested with [r] in the second word. This question will be answered when we discuss the relevant pair below. For the majority responses, incorporating this ranking into the ranking from above, the overall constraint ranking for the arguments involving a liquid in the first word of the pair so far is $*M_1$/[+hi] >> $*M_1$/Liq >> $*M_2$ /Liq.

Furthermore, when the second word of the pair includes an intervocalic nasal /m/, as in the pair *ʁaraħ + ʃamadʒ*, the response always included the liquid from the first word of the pair, *ʁaradʒ* in this case.

In optimality theoretic terms, the response *ʁaradʒ* indicates that a coda parse of [r], a violation of $^*M_2$/Liq, is better than an onset parse of [m], which is a violation of $^*M_1$/Nas as in (26) below.

(26) /ʁaraħ / + /ʃamadʒ/

	/ʁaraħ / + /ʃamadʒ/	$^*M_1$/Nas	$^*M_2$ /Liq
→	/ʁar.adʒ/		*
	/ʁa.madʒ/	*!	

The last consonant that is tested with the liquid /r/ is the obstruent [t]. When the second word of the pair includes an intervocalic obstruent [t], as in the pair *baraχ + ðˤataf*, the response always included the liquid from the first word of the pair, *baraf* in this case. The treatment was identical to those treatments above as can be seen in (27) below.

(27) /baraχ / + /ðˤataf /

	/baraχ / + /ðˤataf /	$^*M_1$/Obs	$^*M_2$ /Liq
→	/bar.af/		*
	/ba.taf/	*!	

Given the data including [r] as the intervocalic consonant of the first word of the pair, this analysis suggests that participants will usually prefer to parse intervocalic [r] as a coda before taking any intervocalic onset consonant from the second word of a pair in the blending task. Combining the ranking arguments above and adding the $^*M_2$/[+hi] constraint from the previous chapter, (28) shows the overall ranking of the $^*M_1$ hierarchy with respect to the M_2 hierarchy thus far.

(28) Ranking of $*M_1$ hierarchy with respect to $*M_2$/Liq

$*M_1$/[+hi] >> $*M_1$/Liq >> $*M_1$/Nas >> $*M_1$/Obs >> $*M_2$/Liq >> $*M_2$/[+hi]

Of interest now is the other liquid in this sonority level. Similar to the results of the liquid [r], when the intervocalic consonant in the first word of the pair was the liquid [l], there was a consensus from the majority of participants to parse the liquid it in coda position in the original word. Only a minority of participants chose the intervocalic consonant from the second word to be the onset. The minority performance will be discussed in more detail as we come across it when we talk about the relevant pairs. Below, we will see how the liquid /l/ was treated when it is paired with each sonority level in the second word of the pair.

When the second word of the pair includes an intervocalic glide /j/, as in the pair *balaχ* + *kajak*, the response of the majority of participants included the liquid /l/ from the first word of the pair, *balak* in this case. This indicates that the participants consider the *bal* portion of the first word to be a unit, the first syllable of the word. The remainder of the word is made up of the rhyme of the second word.

Following OT framework, the response *balak* indicates that a coda parse of [l], a violation of $*M_2$/Liq, is better than an onset parse of [j], which is a violation of $*M_1$/[+hi]. The ranking of constraints is identical to that of [r] above, and is shown in (29).

(29) /balaχ/ + /kajak/

	/balaχ/ + /kajak/	$*M_1$/[+hi]	$*M_2$ /Liq
→	/bal.ak/		*
	/ba.jak/	*!	

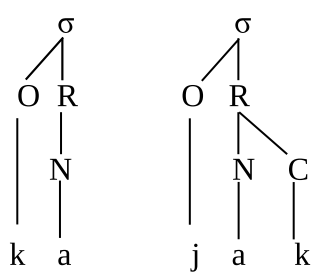
In the *balaχ* + *kajak* pair, 70% of participants (21/30 participants) chose /l/ to be the intervocalic consonant in the resulting combination of the two nonwords. However, 30% of participants (9/30 participants) chose the glide /j/ to be the intervocalic consonant in the resulting combination of the two nonwords as shown in (30) below.

(30) /balaχ/ + /kajak/ (minority response)

	/balaχ/ + /kajak/	*M_2 /Liq	*M_1/[+hi]
	/bal.ak/	*!	
→	/ba.jak/		*

The syllable structure diagram in (31) shows that the glide /j/ is parsed in onset position of the second syllable of the second nonword of the pair *kajak*.

(31) Syllabification of *balaχ* + *kajak* = *bajak*



When the second word of the pair includes an intervocalic glide /w/, as in the pair *balaχ* + *qawaθ*, the response of the majority of participants included the liquid /l/ from the first word of the pair, *balaθ* in this case. The tableau in (32) shows similar ranking of constraints to that of [j] above.

(32) /balaχ/ + /qawaθ/

	/balaχ/ + /qawaθ/	*M_1/ [+hi]	*M_2 /Liq
→	/bal.aθ/		*
	/ba.waθ/	*!	

However, in the *balaχ* + *qawaθ* pair, 76.66% of participants (23/30 participants) chose [l] to be the intervocalic consonant in the resulting combination of the two nonwords. Only 23.33% of participants (7/30 participants) chose the glide /w/ to be the intervocalic consonant in the resulting combination of the two nonwords. The constraint ranking in this case is presented in (33) below.

(33) /balaχ/ + /qawaθ/ (minority response)

	/balaχ/ + /qawaθ/	$*M_2$ /Liq	$*M_1$/[+hi]
	/bal.aθ/	*!	
→	/ba.waθ/		*

Back to the question raised above of whether a similar or different treatment will be observed when [l] is tested with [r] in the second word. When /l/ was tested with the other liquid /r/, as in the pair *balaχ + ʃaraðˤ*, the response of the majority of participants included the liquid from the first word of the pair, *balaðˤ* in this case. It is clear that there is a strong preference among participants to parse /l/ in coda position over parsing /r/ in onset position in this case.

Again, the response *balaðˤ* indicates that a coda parse of [l], a violation of $*M_2$/Liq, is better than an onset parse of [r], which is a violation of $*M_1$/Liq. The tableau in (34) shows that the ranking of these two constraints is therefore $*M_1$/Liq >> $*M_2$/Liq.

(34) /balaχ/ + /ʃaraðˤ/

	/balaχ/ + /ʃaraðˤ/	$*M_1$/Liq	$*M_2$ /Liq
→	/bal.aðˤ/		*
	/ba.raðˤ/	*!	

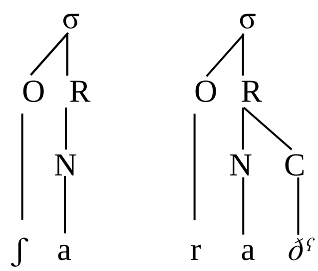
In the above pair, 90% of participants (27/30 participants) chose /l/ to be the intervocalic consonant in the resulting combination of the two nonwords. However, 10% of the participants (3/30 participants) chose the liquid /r/ to be the intervocalic consonant in the resulting combination of the two nonwords, *baraðˤ* in this case. This can be seen in (35) below.

(35) /balaχ/ + /ʃaraðˤ/ (minority response)

	/balaχ/ + /ʃaraðˤ/	$*M_2$ /Liq	$*M_1$/Liq
	/bal.aχ/	*!	
→	/ʃa.raðˤ/		*

Recall that the syllable structure diagram is different in minority response as in (36).

(36) Syllabification of *balaχ* + *ʃaraðˤ* = *baraðˤ*



Similar to the treatment of the nasal /m/ with the liquid /r/ above, when /m/ was tested with /l/ in the pair *balaχ* + *kamaθ*, the response of the majority of participants included the liquid from the first word of the pair as in (37) below.

(37) /balaχ/ + /kamaθ/

	/balaχ/ + /kamaθ/	*M_1/Nas	*M_2 /Liq
→	/bal.aθ/		*
	/ba.maθ/	*!	

In the *balaχ* + *kamaθ* pair, 90% of participants (27/30 participants) chose /l/ to be the intervocalic consonant in the resulting combination of the two nonwords. However, 10% of participants (3/30 participants) chose the nasal /m/ to be the intervocalic consonant in the resulting combination of the two nonwords. See the tableau in (38).

(38) /balaχ/ + /kamaθ/ (minority response)

	/balaχ/ + /kamaθ/	*M_2 /Liq	*M_1/Nas
	/bal.aθ/	*!	
→	/ba.maθ/		*

Finally, when the second word of the pair includes an intervocalic obstruent /b/, as in the pair *balaχ* + *zabasˤ*, 100% of participants made the blending *balasˤ*. The treatment in this pair did not differ from the treatment when the obstruent was tested with [r] above.

So, the response *balasˤ* indicates that a coda parse of [l], a violation of $*M_2$/Liq, is better than an onset parse of [b], which is a violation of $*M_1$/Obs. The tableau in (39) shows that the ranking of these two constraints is therefore $*M_1$/Obs >> $*M_2$/Liq.

(39) /balaχ/ + /zabasˤ/

	/balaχ/ + /zabasˤ/	$*M_1$/Obs	$*M_2$ /Liq
→	/bal.asˤ/		*
	/ba.basˤ/	*!	

Given the data including [l] as the intervocalic consonant of the first word of the pair, this analysis suggests that participants will usually prefer to parse intervocalic [l] as a coda rather before taking any intervocalic onset consonant from the second word of a pair in the blending task. Combining the ranking arguments above, (40) shows the overall ranking of the $*M_1$ hierarchy with respect to $*M_2$/Liq.

(40) Ranking of $*M_1$ hierarchy with respect to $*M_2$/Liq

$*M_1$/[+hi] >> $*M_1$/Liq >> $*M_1$/Nas >> $*M_1$/Obs >> $*M_2$/Liq >> $*M_2$/[+hi]

Again, the liquid [l] was parsed in coda position by the majority of participants. Only a small minority of participants treated the intervocalic consonants in the second original word of the pair as onset members.

So far, we have examined each liquid phoneme alone. As a way of summary, (41) below shows how the liquid class including both /r/ and /l/ was parsed in coda when tested with the other classes in general.

(41) The percentages of coda parse of liquids with the other classes

Liquids + Glides	80%
Liquids + Liquids	95%
Liquids + Nasals	95%
Liquids + Obstruents	100%

By careful examination of the results above, we can see that liquids, in general, were treated as members of the coda in this CVCVC + CVCVC structure which is not odd with liquids being the most sonorous after glides on all of the proposed sonority scales (although some elaborate scales treat /r/s as more sonorous than /l/s putting them on different sonority degrees on the scale such as /l/ > /r/). This is also supported in (41) when liquids were tested with glides (80% of coda parse) while the rest of classes incurred higher percentages of coda parse.

4.3. Nasals.

The overall treatment of nasals was similar to the previous sections but with an increase in the responses from the minority of participants. As for the first consonant tested in this sonority level, when the intervocalic consonant in the first word of the pair was the nasal /m/, there was a consensus from the majority of participants to parse the nasal /m/ as part of the coda in the original word (first word of the pair) similar to the situation with glides and liquids above. A minority of participants chose to parse the intervocalic consonant of the second nonword of the pair in onset position in some pairs. The minority performance will be discussed in more detail as we come across it when we talk about the relative pairs. Below, we will see how the nasal /m/ was treated when it is paired with each sonority level in the second word of the pair.

When the second word of the pair includes an intervocalic glide /j/, as in the pair *bamaχ* + *tˤajaθ*, the response of the majority of participants included the nasal /m/ from the first word of the pair, *bamaθ* in this case. This indicates that the participants consider the *bam* portion of the first word to be a unit, the first syllable of the word. The remainder of the word is made up of the rhyme of the second word.

In optimality theoretic terms, the response *bamaθ* indicates that a coda parse of [m], a violation of $*M_2$/Nas, is better than an onset parse of [j], which is a violation of $*M_1$/[+hi]. The tableau in (42) shows that the ranking of these two constraints is therefore $*M_1$/[+hi] >> $*M_2$/Nas. In the tableau below, the second candidate, in which the glide /j/ from the second word is chosen, fails due to the higher ranking of $*M_1$/[+hi], leaving the first candidate *bamaθ* as the winner.

(42) /bamaχ/ + /tˤajaθ/

	/ bamaχ/ + /tˤajaθ/	$*M_1$/[+hi]	$*M_2$ /Nas
→	/bam.aθ/		*
	/ba.jaθ/	*!	

In this pair, 86.66% of participants (26/30 participants) chose [m] to be the intervocalic consonant in the resulting combination of the two nonwords. However, 13.33% of participants (4/30 participants) chose the glide /j/ to be the intervocalic consonant in the resulting combination of the two nonwords as in (43) below.

(43) /bamaχ/ + /tˤajaθ/ (minority response)

	/bamaχ/ + /tˤajaθ/	$*M_2$ /Nas	$*M_1$/[+hi]
	/bam.aθ/	*!	
→	/ba.jaθ/		*

When the second word of the pair includes an intervocalic glide /w/, as in the pair *kamaf* + *bawað,* the response of the majority of participants was similar to the treatment of /j/ above. The response *kamað* indicates that [m] is parsed in coda as in (44) below.

(44) /kamaf/ + /bawað/

	/kamaf/ + /bawað/	*M_1/[+hi]	*M_2/Nas
→	/kam.að/		*
	/ka.wað/	*!	

In the *kamaf* + *bawað* pair, 86.66% of participants (26/30 participants) chose /m/ to be the intervocalic consonant in the resulting combination of the two nonwords. However, 13.33% of participants (4/30 participants) chose the glide /w/ to be the intervocalic consonant in the resulting combination of the two nonwords. The tableau in (45) shows that the ranking of the constraints is therefore *M_2/Nas >> *M_1/[+hi].

(45) /kamaf/ + /bawað/ (minority response)

	/kamaf/ + /bawað/	*M_2/Nas	*M_1/[+hi]
	/kam.að/	*!	
→	/ka.wað/		*

When the second word of the pair includes an intervocalic liquid /r/, as in the pair *bamaθ* + *qaraχ*, the pattern of treatment did not change. Refer to the tableau in (46) below.

(46) /bamaθ/ + /qaraχ/

	/bamaθ/ + /qaraχ/	*M_1/Liq	*M_2/Nas
→	/bam.aχ/		*
	/ba.raχ/	*!	

In the *bamaθ* + *qaraχ*, pair, 97% of participants (29/30 participants) chose /m/ to be the intervocalic consonant in the resulting combination of the two nonwords. Only 1% of participants (1participant) chose the liquid /r/ to be the intervocalic consonant in the resulting combination of the two nonwords as in (47) below.

(47) /bamaθ/ + /qaraχ/ (minority response)

	/bamaθ/ + /qaraχ/	$*M_2$ /Nas	$*M_1$/Liq
	/bam.aχ/	*!	
→	/ba.raχ/		*

Combining the constraint rankings from the arguments we have so far, we have the ranking $*M_1$/[+hi] >> $*M_1$/Liq >> $*M_2$ /Nas.

When the second word of the pair includes an intervocalic liquid /l/, as in the pair *bamaf + ʃalaθ*, all participants parsed /m/ in coda position similar to /r/ above. The tableau in (48) shows the ranking of constraints and the winning candidate in this case.

(48) /bamaf/ + /ʃalaθ/

	/bamaf/ + /ʃalaθ/	$*M_1$/Liq	$*M_2$ /Nas
→	/bam.aθ/		*
	/ba.laθ/	*!	

Moreover, when the second word of the pair includes the other intervocalic nasal /n/, as in the pair *tˤamaf + lanaʁ*, 100% of participants parsed [m] in coda position. See tableau (49) below for the ranking of constraints in this case.

(49) /tˤamaf/ + /lanaʁ/

	/tˤamaf/ + /lanaʁ/	$*M_1$/Nas	$*M_2$ /Nas
→	/tˤam.aʁ/		*
	/tˤa.naʁ/	*!	

When the second word of the pair includes an intervocalic obstruent /b/, as in the pair *tˤamaχ + sabadʒ*, the response always included the nasal from the first word of the pair, *tˤamadʒ* in this case. The tableau in (50) shows that the ranking of these two constraints is therefore $*M_1$/Obs >> $*M_2$/Nas.

(50) /tˤamaχ/ + /sabadʒ/

	/tˤamaχ/ + /sabadʒ/	$*M_1$/Obs	$*M_2$ /Nas
→	/tˤam.adʒ/		*
	/tˤa.badʒ/	*!	

Thus, given the data including [m] as the intervocalic consonant of the first word of the pair, this analysis suggests that participants prefer to parse intervocalic [m] as a coda rather than taking any intervocalic onset consonant from the second word of a pair in the blending task. Combining the ranking arguments above, (51) shows the overall ranking of the $*M_1$ hierarchy with respect to $*M_2$/Nas.

(51) Ranking of $*M_1$ hierarchy with respect to $*M_2$/Nas

$*M_1$/[+hi] >> $*M_1$/Liq >> $*M_1$/Nas >> $*M_1$/Obs >> $*M_2$/Nas >> $*M_2$/Liq >> $*M_2$/[+hi]

The other nasal in this sonority level was not treated differently. However, the number of responses from the minority increased a little. Overall, the majority of participants parsed the nasal /n/ in coda position.

When the second word of the pair includes an intervocalic glide /j/, as in the pair *kanaθ* + *dʒajaðˤ*, the response of the majority of participants included the nasal /n/ from the first word of the pair, *kanaðˤ* in this case. Again, this is an indication that the participants consider the *kan* portion of the first word to be a unit, the first syllable of the word. The remainder of the word is made up of the rhyme of the second word.

Accordingly, the response *kanaðˤ* indicates that a coda parse of [n], a violation of *M_2/Nas, is better than an onset parse of [j], which is a violation of *M_1/[+hi]. The tableau in (52) shows that the ranking of these two constraints is therefore *M_1/[+hi] >> *M_2/Nas.

(52) /kanaθ/ + /dʒajaðˤ/

	/ kanaθ/ + /dʒajaðˤ/	*M_1/[+hi]	*M_2 /Nas
→	/kan.aðˤ/		*
	/ka.jaðˤ/	*!	

In the *kanaθ* + *dʒajaðˤ* pair, 56.66% of participants (17/30 participants) chose /n/ to be the intervocalic consonant in the resulting combination of the two nonwords. However, 43.33% of participants (13/30 participants) chose the glide /j/ to be the intervocalic consonant in the resulting combination of the two nonwords. The minority response is indicated in tableau (53) below.

(53) /kanaθ/ + /dʒajaðˤ/ (minority response)

	/ kanaθ/ + /dʒajaðˤ/	*M_2 /Nas	*M_1/[+hi]
	/kan.aðˤ/	*!	
→	/ka.jaðˤ/		*

When the second word of the pair includes an intervocalic glide /w/, as in the pair *lanal* + *kawaχ*, it received similar treatment as in /j/ above.

Also, according to OT, the response *lanaχ* attests similar ranking of constraints as in /j/ above. The ranking is shown in (54) below.

(54) /lanal/ + /kawaχ/

	/lanal/ + /kawaχ/	*M_1/[+hi]	*M_2 /Nas
→	/lan.aχ/		*
	/la.waχ/	*!	

In the *lanal* + *kawaχ* pair, 63.33% of participants (19/30 participants) chose /n/ to be the intervocalic consonant in the resulting combination of the two nonwords. However, 36.66% of participants (11/30 participants) chose the glide /w/ to be the intervocalic consonant in the resulting combination of the two nonwords. The minority response is shown in (55) below.

(55) /lanal/ + /kawaχ/ (minority response)

	/lanal/ + /kawaχ/	*M_2 /Nas	*M_1/[+hi]
	/lan.aχ/	*!	
→	/la.waχ/		*

Similarly, when the second word of the pair includes an intervocalic liquid /r/, as in the pair *kanaθ* + *qaral*, the response of the majority of participants included the nasal from the first word of the pair, *kanal* in this case. See the tableau in (56) below for more detail.

(56) /kanaθ/ + /qaral/

	/kanaθ/ + /qaral/	*M_1/Liq	*M_2 /Nas
→	/kan.al/		*
	/ka.ral/	*!	

In the *kanaθ* + *qaral*, pair, 63.33% of participants (19/30 participants) chose /n/ to be the intervocalic consonant in the resulting combination of the two nonwords. However, 36.66% of participants (11/30 participants) chose the liquid /r/ to be the intervocalic consonant in the resulting combination of the two nonwords. The minority response is shown in (57) below.

(57) /kanaθ/ + /qaral/ (minority response)

	/kanaθ/ + /qaral/	*M_2 /Nas	*M_1/Liq
	/kan.al/	*!	
→	/ka.ral/		*

Similar to /r/ above, when the second word of the pair includes an intervocalic liquid /l/, as in the pair *kanaθ + ʃalaʁ*, the response of the majority of participants included the nasal from the first word of the pair, *kanaʁ* in this case. This response is shown in (58) below.

(58) /kanaθ/ + /ʃalaʁ/

	/kanaθ/ + /ʃalaʁ/	*M_1/Liq	*M_2/Nas
→	/kan.aʁ/		*
	/ka.laʁ/	*!	

In the *kanaθ + ʃalaʁ* pair, 76.66% of participants (23/30 participants) chose /n/ to be the intervocalic consonant in the resulting combination of the two nonwords. However, 23.33% of participants (7/30 participants) chose the liquid /l/ to be the intervocalic consonant in the resulting combination of the two nonwords. The minority response is shown in (59) below.

(59) /kanaθ/ + /ʃalaʁ/ (minority response)

	/kanaθ/ + /ʃalaʁ/	*M_2/Nas	*M_1/Liq
→	/kan.aʁ/	*!	
	/ka.laʁ/		*

When the second word of the pair includes the other intervocalic nasal /m/, as in the pair *kanaθ + tamadʒ*, there was a consensus from all participants to parse /n/ in coda position.

In optimality theoretic terms, the response *kanadʒ* indicates that a coda parse of [n], a violation of *M_2/Nas, is better than an onset parse of [m], which is a violation of *M_1/Nas. The tableau in (60) shows that the ranking of these two constraints is therefore *M_1/Nas >> *M_2/Nas.

(60) /kanaθ/ + /tamadʒ/

	/kanaθ/ + /tamadʒ/	*M_1/Nas	*M_2 /Nas
→	/kan.adʒ/		*
	/ka.madʒ/	*!	

Finally, when the second word of the pair includes an intervocalic obstruent /b/, as in the pair *kanaθ* + *mabam*, there was also a consensus from all participants to parse /n/ in coda position as shown in (61) below.

(61) /kanaθ/ + /mabam/

	/kanaθ/ + /mabam/	$*M_1$/Obs	$*M_2$ /Nas
→	/kan.am/		*
	/ka.bam/	*!	

Given the data including [n] as the intervocalic consonant of the first word of the pair, this analysis suggests that participants will usually prefer to parse intervocalic [n] as a coda rather than taking any intervocalic onset consonant from the second word of a pair in the blending task. Combining the ranking arguments above, (62) shows the overall ranking of the $*M_1$ hierarchy with respect to $*M_2$/Nas, which is also identical to the ranking for [m] above.

(62) Ranking of $*M_1$ hierarchy with respect to $*M_2$/Nas

$*M_1$/[+hi] >> $*M_1$/Liq >> $*M_1$/Nas >> $*M_1$/Obs >> $*M_2$/Nas >> $*M_2$/Liq >> $*M_2$/[+hi]

In fact, when we compare the nasal /n/ to the nasal /m/ in the results above, we can clearly see that more participants avoided choosing the nasal /n/ as coda than they did with the nasal /m/. This variation of treatment of both nasals /m/ and /n/ was not very surprising as these phonemes are less sonorous and nasals are in the middle place on all of the proposed sonority scales. This variation of the treatment can be considered as the starting point of deviation from the norms that were noticed from the previous two levels of sonority in 4.1 and 4.2. However, sonority can only predict that if a consonant is parsed in coda position it will be a high sonority consonant, but it doesn’t predict at what point on the sonority scale that break will occur.

By compiling the instances of both nasals with the other classes in (63) , we can see that when nasals were tested with glides they incurred the least percentages of coda parse (73.3%) while the percentages increase as sonority profile of tested classes decreases until it reaches 100% with nasals and obstruents.

(63) The percentages of coda parse of nasals with the other classes

Nasals + Glides	73.3%
Nasals + Liquids	84.2%
Nasals + Nasals	100%
Nasals + Obstruents	100%

4.4. Obstruents.

Surprisingly, in this sonority level, the majority of participants parsed the other consonant (in the second nonword) that was tested with these obstruents in onset position. That is, when the intervocalic consonant in the first word of the pair was the obstruent /s/, there was a strong consensus from the majority of participants to parse the intervocalic consonant from the second word of the pair as part of the onset. This treatment is obviously the opposite of the previous sections. It appears that there is a strong dispreference for parsing an obstruent as a coda. In OT terms, this strong dispreference can be related to the fact that the constraint that prevents parsing these obstruents in coda position ($*M_2$/Obs) is ranked above the one that prevents other consonants from being parsed in onset position ($*M_1$). Below, we will see how the obstruent /s/ was treated when it is paired with each sonority level in the second word of the pair.

When the second word of the pair includes an intervocalic glide /j/, as in the pair *sasad* + *bajab*, the response always included the glide from the second word of the pair, *sajab* in this case. This indicates that the participants consider the *jab* portion of the second word to be a unit, the second syllable of the word. The first portion of the word is made up of the onset plus nucleus of the first word. This consensus from all participants is consistent throughout the pairs in this section except the last pair where /s/ is tested with another obstruent.

Back to optimality theoretic terms, the response *sajab* indicates that an onset parse of [j], a violation of $*M_1$/[+hi], is better than a coda parse of [s], which is a violation of $*M_2$/Obs. The tableau in (64) shows that the ranking of these two constraints is therefore $*M_2$/Obs >> $*M_1$/[+hi]. In this tableau, the first candidate, in which the obstruent /s/ from the first word is chosen, fails due to the higher ranking of $*M_2$/Obs, leaving the second candidate *sajab* as the winner.

(64) /sasad/ + /bajab/

	/sasad/ + /bajab/	$*M_2$/Obs	$*M_1$ /[+hi]
	/sas.ab/	*!	
→	/sa.jab/		*

Therefore, the syllable structure of the second nonword of the pair is similar to that of the minority performance syllabification in glides, liquids and nasals. For example, refer to the syllable structure diagram in (36). For the purpose of reserving space, we are not going to investigate similar syllable structure in the coming body of results.

An identical treatment was observed when the second word of the pair includes an intervocalic glide /w/, as in the pair *sasad* + *ðawaχ.* The response *sawaχ* entails an identical constraint ranking shown in (65) below

(65) / sasad/ + /ðawaχ/

	/sasad/ + /ðawaχ/	$*M_2$/Obs	$*M_1$ /[+hi]
	/sas.aχ/	*!	
→	/sa.waχ/		*

Moreover, when liquids were tested, they yielded identical results too. Therefore, when the second word of the pair includes an intervocalic liquid /r/, as in the pair *sasad* + *karaʁ*, the response always included the liquid from the second word of the pair, *saraʁ* in this case. The tableau in (66) shows that the ranking of these two constraints is therefore $*M_2$/Obs >> $*M_1$/Liq.

(66) /sasad/ + /karaʁ/

	/sasad/ + /karaʁ/	$*M_2$/Obs	$*M_1$ /Liq
	/sas.aʁ/	*!	
→	/sa.raʁ/		*

In the pair *sasad* + *χalaz,* /l/ treatment did not change. This is shown in (67) below.

(67) /sasad/ + /χalaz/

	/ sasad/ + /χalaz/	$*M_2$/Obs	$*M_1$ /Liq
	/sas.az/	*!	
→	/sa.laz/		*

Moreover, when the second word of the pair includes an intervocalic nasal /m/, as in the pair *sasad* + *kamaθ,* it was also treated the same as above. The winning candidate and ranking of constraints is shown in (68) below.

(68) /sasad/ + /kamaθ/

	/sasad/ + /kamaθ/	$*M_2$/Obs	$*M_1$ /Nas
	/sas.aθ/	*!	
→	/sa.maθ/		*

If more sonorous consonants were parsed in onset position when tested with /s/, then, it is logical to assume that when it is tested with another obstruent (less sonorous), the speakers of this dialect will prefer an onset parsing similar to the patterns observed above. In fact, when the second word of the pair includes an intervocalic obstruent/d/, as in the pair *lasar + ʃadam*, /d/ was parsed in onset position of the second nonword of the pair by 90% of participants (27/30). In this case, the ranking of constraints is shown in (69) below.

(69) /lasar/ + /ʃadam/

	/lasar/ + /ʃadam/	*M_2/Obs	*M_1 /Obs
	/las.am/	*!	
→	/la.dam/		*

The remaining 10% of participants (3/30 participants) chose the obstruent /s/ to be the intervocalic consonant in the resulting combination of the two nonwords, hence, preferring to parse it in coda position as shown in (70) below.

(70) /lasar/ + /ʃadam/ (minority response)

	/lasar/ + /ʃadam/	*M_1/Obs	*M_2/Obs
→	/las.am/		*
	/la.dam/	*!	

In the case above, the syllable structure is different in that it is similar to the syllabification of majority responses in the previous sections.

Given the data including [s] as the intervocalic consonant of the first word of the pair, this analysis suggests that participants will prefer to parse the intervocalic consonant from the second word as an onset before taking the intervocalic coda consonant from the first word of the pair in the blending task. Combining the ranking arguments above, (71) shows the overall ranking of the $*M_1$ hierarchy with respect to $*M_2$/Obs.

(71) Ranking of $*M_1$ hierarchy with respect to $*M_2$/Obs

$*M_2$/Obs >> $*M_1$/[+hi] >> $*M_1$/Liq >> $*M_1$/Nas >> $*M_1$/Obs >> $*M_2$/Nas >> $*M_2$/Liq >> $*M_2$/[+hi]

As for the last consonant in this sonority level, the treatment was similar to /s/ above. Therefore, when the intervocalic consonant in the first word of the pair was the obstruent /b/, there was a strong consensus from the majority of participants to parse the intervocalic consonant from the second original word of the pair as part of the onset. However, it was parsed in coda position in the first original word of the pair by one participant only in the last pair when it was paired with another obstruent /ð/. Below, we will see how the obstruent /b/ was treated when it is paired with each sonority level in the second word of the pair.

When the second word of the pair includes an intervocalic glide /j/, as in the pair *labaf* + *ʕajam*, the response always included the glide from the second word of the pair, *lajam* in this case. This indicates that the participants consider the *jam* portion of the second word to be a unit, the second syllable of the word. The first portion of the word is made up of the onset of the first word. Similar to the /s/ above, the tableau in (72) shows the winning candidate and the ranking of constraints.

(72) /labaf/ + /ʕajam/

	/labaf/ + /ʕajam/	$*M_2$/Obs	$*M_1$/[+hi]
	/lab.am/	*!	
→	/la.jam/		*

Also, when the second word of the pair includes an intervocalic glide /w/, as in the pair *labam* + *fawaf*, results were similar as shown in (73) below.

(73) /labam/ + /fawaf/

	/labam/ + /fawaf/	*M_2/Obs	*M_1 /[+hi]
	/lab.af/	*!	
→	/la.waf/		*

Likewise, when the two liquids were tested, similar results were observed. The pairs *labam* + *qaraz*, and *labam* + *ʃalar* are shown in (74) and (75) respectively.

(74) /labam/ + /qaraz/

	/labam/ + /qaraz/	*M_2/Obs	*M_1 /Liq
	/lab.az/	*!	
→	/la.raz/		*

(75) /labam/ + /ʃalar/

	/labam/ + /ʃalar/	*M_2/Obs	*M_1 /Liq
	/lab.ar/	*!	
→	/la.lar/		*

Also, when the second word of the pair includes an intervocalic nasal /m/, as in the pair *labam* + *tamadʒ*, the response always included the nasal from the second word of the pair, *lamadʒ* in this case. (76) below shows the ranking of constraints and the winning candidate.

(76) /labam/ + /tamadʒ/

	/labam/ + /tamadʒ/	*M_2/Obs	*M_1/Nas
	/lab.adʒ/	*!	
→	/la.madʒ/		*

The last pair that is tested in the stimuli is *labaf + baðaʃ*. The response of the majority of participants is similar to that when /s/ was tested with /d/ previously. Only 1 participant chose to parse /b/ in coda position. The response of the majority of participants is shown in (77) below.

(77) /labaf/ + /baðaʃ/

	/labaf/ + /baðaʃ/	$*M_2$/Obs	$*M_1$/Obs
	/lab.aʃ/	*!	
→	/la.ðaʃ/		*

Given the data including [b] as the intervocalic consonant of the first word of the pair, this analysis suggests that participants prefer to parse the intervocalic consonant from the second word as an onset rather than taking the intervocalic coda consonant from the first word of a pair in the blending task. Combining all the ranking arguments above, (78) shows the overall ranking of the $*M_1$ hierarchy with respect to $*M_2$/Obs.

(78) Ranking of $*M_1$ hierarchy with respect to $*M_2$/Obs

$*M_2$/Obs >> $*M_1$/[+hi] >> $*M_1$/Liq >> $*M_1$/Nas >> $*M_1$/Obs >> $*M_2$/Nas >> $*M_2$/Liq >> $*M_2$/[+hi]

Overall, when we compare the obstruent /s/ with the obstruent /b/ in the results above, we can clearly induce that the majority of participants avoided choosing them as codas whereas they preferred choosing the other intervocalic consonants of the second original word of the pair as onsets.

In fact, this drastic shift of treatment of both obstruents /s/ and /b/ was not very surprising as these phonemes belong to the class of obstruents which is considered to be least sonorous on all of the proposed sonority scales. Indeed, this shift of the treatment can be considered as the ending point of deviation from the norms that were noticed from the previous three levels of sonority in 4.1., 4.2. and 4.3. (79) summarizes the overall instances of coda parse of obstruents when tested with the other classes of sounds in the second word of the pair.

(79) The percentages of coda parse of obstruents with the other classes

Obstruents + Glides	0%
Obstruents + Liquids	0%
Obstruents + Nasals	0%
Obstruents + Obstruents	6.6%

The overall percentage of coda parsing and onset parsing when the intervocalic consonant in the first word of the pair is from each of the four sonority levels is given in (80).

(80) Summary of participants' preferences for coda vs. onset parse

Sonority level	% Coda parse	% Onset parse
Glides	100	0
Liquids	92	8
Nasals	85	15
Obstruents	2	98

As can be seen from the table above, coda parsing for glides is 100% and the coda parse decreases gradually as sonority level decreases until it is only 2% in obstruents. On the other hand, the preference for onset parsing increases as we go from glides to obstruents (98%).

Generally, as shown in the final ranking of constraints for all patterns of syllabification observed in all four sonority levels, we can see that there is a tendency from all participants to parse consonants with high sonority in coda position in the first syllable of the first word of each pair and parse consonants of low sonority (obstruents) in onset position in what seems to be conformity with the Sonority Sequencing Principle (SSP). This is also an indication that the syllable structure in the Arabic dialect of Sakaka City abides by the universal SSP. Since we now have a full ranking of M_1 vs. M_2 constraints based on the choices participants made in the blending task, we can make a prediction about the syllabification of any individual word (like the resulting blend). For example, if we have a CVCVC word and the intervocalic consonant is the liquid [l], the syllabification would be CVC.VC because $*M_1$/Liq >> $*M_2$/Liq according to the full ranking shown in (78).

CHAPTER 5

CONCLUSION

The results observed in this report constitute a first step in the overwhelming and often controversial syllabification of intervocalic consonants. The goal of the current study was to investigate the syllabification of single intervocalic consonants from four sonority profiles using a metalinguistic task. It is clear that speakers treated the phonemes in the speech stream in a systematic manner, i.e. they parsed phonemes according to their relative sonority profile in different positions of the syllable conforming to the universal rules of syllabification. As a result, this research study, along with previous studies (see, for example, Dinnsen & Farris-Trimble 2009, Ali, Ingleby & Peebles 2011, Berent, Lennertz & Smolensky 2011, Coetzee 2011, Baertsch 2012, Parker 2012, to name but a few) supports the hierarchical organization of the syllable.

Some recent works like Côté and Kharlamov (2011) questioned the global comparability of studies using different psycholinguistic tasks. One of the reasons is that because these studies often use a singleton task. In fact, the idea of implementing multiple tasks may seem appealing at first but in reality it is very difficult because single tasks themselves proved to be difficult and overwhelming for both researchers and participants at the same time. The second reason is that most of these tasks involve minimality effects if participants are asked to perform a partial task (i.e. taking and producing one syllable from the given stimulus) which, of course, may confound the results and call for more justifications in terms of prosodic influence on the syllable. However, the task used in this study did not attest any type of minimality effects because participants were asked to take one syllable of the first word and blend it with another syllable from the second word of a pair to produce a full word that contains two syllables. The third and heavily debated reason is lexical access by speakers when given a stimulus that is similar to other lexical items in the lexicon of speakers. This similarity could be of phonemes and how they are grouped into words in certain orders or even some prosodic features of these stimuli. Indeed, the study was also able to eliminate this threat by using nonsense words that did not cause any kind of analogy to real words by speakers.

By examining the patterns in the results we can see that coda parse of high sonority segments overrides onset parse. On the contrary, a strong preference for onset parse was observed in segments of low sonority (obstruents). These two patterns conform to the literature and the expectations the researcher had prior to conducting the study (see for example, Treiman & Danis 1988, Derwing 1992, Treiman, Straub & Lavery 1994). In fact, what these patterns suggest is that although MOP, SSP and stress rules seem to be competing, they converge on the same results in the end. However, sonority profile is overriding other universal rules of syllabification in this particular study as evidenced by the treatment of these intervocalic consonants by speakers. That is, by examining glides, liquids and nasals, it could be argued that stress is pulling these intervocalic consonants in coda position of the first syllable but if stress is really affecting speakers' treatments it would have pulled obstruents in coda position too. MOP, on the other hand, proved to be active during the syllabification of obstruents. It should be noted though that in most of the works similar to the nature of this one the major focus has been on obstruents only with little or no focus on more sonorous consonants. As a result, it is often concluded that MOP is a very strong factor in the syllabification that overrides any other rule. Hence, the results of this study may seem consistent with the rest of the works on the surface but deeply they are different as the study looked at four sonority levels that triggered other rules besides MOP.

The results of this study were consistent to a great extent in that consonants tested under each level of sonority were treated similarly by speakers. However, with obstruents in this study including only one stop [b] and one fricative [s], the question that may be raised is whether all stops and fricatives attested in the inventory of consonants in the dialect under investigation pattern similarly. In addition, by considering the stress placement on the stimuli, another question of whether results would be different if stress was placed on the second syllable may also be raised. As mentioned in the introduction, the role of stress has been controlled in this study. If stress plays a role in the syllabification of these blends, moving stress to the second syllable will presumably attract more intervocalic consonants to onset position of that syllable. Another issue is the possibility of ambisyllabic responses from speakers (Khan 1976). Indeed, one of the factors this study was successful in preventing is ambisyllabicity by having speakers perform complete tasks instead of partial tasks (Côté and Kharlamov 2011).

Since this study involved single intervocalic consonants only, of interest now is how intervocalic consonant clusters or triple consonants are treated in this dialect. A further pursuit of this study can also include more independent variables like gender and different age groups to test the various patterns that might be observed. Like most countries in the world, Saudi Arabia has a diverse range of linguistically differing dialects that could be compared to widen the scope of investigation. However, any type of research often causes us to ask more questions than we can simply answer because the scope of issues it tries to cover is unlimited.

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APPENDICES

APPENDIX A

List of pairs of nonsense words used in the instrument

Intervocalic /j/:	Intervocalic /m/:
1. fajam zawan 2. ʕajadʒ laraz 3. majadʒ kalaθ 4. tˤajam bamaðˤ 5. fajadʒ ʃabam	1. bamaχ tˤajaθ 2. kamaf bawað 3. bamaθ qaraχ 4. bamaf ʃalaθ 5. tˤamaf lanaʁ 6. tˤamaχ sabadʒ
Intervocalic /w/:	Intervocalic /n/:
1. mawaf dʒajatˤ 2. mawaʃ ʃaraθ 3. qawaʃ ʃalan 4. lawaʃ qamaf 5. lawaʃ ʃadas	1. kanaθ dʒajaðˤ 2. lanal kawaχ 3. kanaθ qaral 4. kanaθ ʃalaʁ 5. kanaθ tamadʒ 6. kanaθ mabam
Intervocalic /r/:	Intervocalic /b/:
1. baraχ dʒajatˤ 2. baraχ zawan 3. ʁaraħ ʃalaʁ 4. ʁaraħ ʃamadʒ 5. baraχ ðˤataf	1. labaf ʕajam 2. labam fawaf 3. labam qaraz 4. labam ʃalar 5. labam tamadʒ 6. labaf baðaʃ
Intervocalic /l/:	Intervocalic /s/:
1. balaχ kajak 2. balaχ qawaθ 3. balaχ ʃaraðˤ 4. balaχ kamaθ 5. balaχ zabasˤ	1. sasad bajab 2. sasad ðawaχ 3. sasad karaʁ 4. sasad χalaz 5. sasad kamaθ 6. lasar ʃadam

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