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| RESEARCH ARTICLE

Metathesis in Moroccan Arabic: Optimality-theoretic account

Oumaima Idrissi
Doctoral student, Cambridge certified ESL instructor, Faculty of Languages, Letters and Arts, English Department, Ibn Tofail University, Kenitra, Morocco
Corresponding Author: Oumaima Idrissi, **E-mail**: oumaima.idrissi@uit.ac.ma

| ABSTRACT
This paper aims to examine the phonological process of metathesis occurring in MA. The article provides preliminary observations and analysis within Optimality Theory and the rule-based approach. Notably, this paper aims to analyse and unveil the constraint interactions responsible for the consonantal sequence alteration occurring in MA. After presenting the MA data, an optimality-theoretical analysis is developed for further scrutiny. The results have highlighted that the SyllCon constraint is an undominated constraint and motivating force behind the metathesis process in MA.

| KEYWORDS
Metathesis, Optimality theory, Markedness constraint, Faithfulness constraint, Moroccan Arabic

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1. Introduction

Language is considered a unique system of rules intertwined to form a communicative tool. Significantly, within words sounds subdue to well-formedness principles. Hence, these sounds are arranged according to phonotactic rules. Unconsciously, speakers disrupt the linear arrangement of segments and end up with either ambiguous terms or confusing sounds, resulting in misinterpretation of the speaker's intention.

According to (Al-khamash, I996: I3) and Safwa (1980:431), this linguistic phenomenon in Standard Arabic is known *as ʔal-qalb ʔal-makani*. For example, both /ʒaðaba/"*attract*" and /ʒabaða/"*attract*" have the same meaning, but Bani Qurayshi uses the target while Banyi Tamym uses the output. Given the distinctiveness of this phonological process, pinpointing an account for the transposition of the sounds is quite challenging. Although, there is little literature and studies on this phonological process in Moroccan Arabic. Still, we can find some patterns of metathesis in MA. In this regard, the data analysed is based on personal observations of spontaneous public speech. In order to understand the constraint interaction underlying this process, the present article presents an OT analysis of metathesis in MA and a short account of how rule-based theory reckons this process within its framework.

2. Literature Review

According to Fromkin (7967:47) and Green (1969:80), speech errors represent significant sources for historical linguistic change. The sense that speech errors are viewed as means for verifying the speech production process mechanism and play an essential role in understanding the reality of the phonological units and rules. Considering Sturteland's (1947:38) perspective, such speech errors, or 'lapse,' are defined as "an intentional linguistic innovation." It sometimes occurs in both learners' performance and that of the native speakers. On a superficial level, metathesis is perceived similarly to speech errors in speech.

Metathesis in the literature is known as a segment's transposition or linear reordering of segments. Accordingly, it has been commonly recognised as a minor sound change, perceived as "a performance factor responsible for spoonerism and other surface deviations" (Montreuil, 1981, p. 67). Its realisation differs according to the position of the metathesised letters. Within such a context, it occurs between the initial letters, such as /ħaʃraʒ/, which is metathesised into /ʃaħraʒ/, a form that is not found in Standard Arabic. As a result, what can be observed from the given examples is that the transposition happens between adjacent letters.

Additionally, perceptual optimisation plays a crucial role in shaping patterns of metathesis. Metathesis in Arabic is a well-known linguistic phenomenon that requires more attention. It is noticed in children's language and colloquial discourse. As discussed in Hume (1998, 2000), metathesis frequently occurs in low-salience contexts and enhances the contrast of the sounds in that context. Therefore, in terms of the overall perceptual salience of the segments involved, the form metathesis outperforms the expected metathesised form. The latter is achieved by altering a consonant from an environment with solid indicators to its identification or switching segments to increase the overall salience of an adjacent sound.

Sifting the literature, we can conclude that such a phenomenon has historically been disregarded as a speaker error. Considerably, (Crystal, 1997, p. 240) has distinguished metathesis as a performance error manifested as tongue slips. Illustratively, "aks" for "ask" are one of the best examples of consonant transposition. Overall, two essential factors contribute to the lack of consensus on the root cause of such a phonological phenomenon. One is associated with data, the other with theory.
Regarding data, despite a myriad of cases disclosed on metathesised forms of speech, our knowledge still needs to be improved in the full range of possible metatheses in a language. In addition to under what circumstances it applies, the reason behind its occurrence and manifestation on the articulatory level. Last, we need an account of how it interconnects with other processes altering the sound structure. The latter input is crucial to allocating an explanatory framework to account for the nature of metathesis. Theoretically, the latter is of utmost importance to the furtherance of the phonological theory, given that without a complete account of phonological processes viable in a whole range of languages, constructing a revelatory theory of the system of sounds will be rendered far-fetched. However, an increase in the empirical basis of metathesis has been noticed in recent years. Merely due to the assemblage of cross-linguistic surveys (see, e.g., Blevins & Garrett 1998; Hume 1998b, 2000, Mielke & Hume 2001) and works exploring psycholinguistic influences on metathesis (e.g., Makashay 2001; Winters 2001). Significantly, the Ohio State University has accumulated a database of cases of metathesis instances which will ultimately provide an excellent foundation for future researchers to pinpoint the linguistic, cultural, and cognitive factors inducing such sound transposition. Thus, such works emphasise that although metathesis is not as recurrent as assimilation or deletion, it is materialising as a relevant synchronic process across various languages; this is backed up by the latest research demonstrating that metathesis occurs as a synchronic, observable phonological process in a variety of languages (Hume 1998, 2001).

Acoustically, Hock (1985:534) has suggested that regular metathesis eliminates clusters when it fails to conform to the preferred syllable structure. Hence, the sonority rises at the onset and declines at the coda. Further, Selkirk (1984) has highlighted that the sonority sequence principle specifies the order in which consonants assemble themselves from the syllable nucleus to its edge: stop-fricative-nasal-liquid-glide-vowel-glide-liquid-nasal-fricative-stop. Therefore, whenever there is an increase in the sonorant quality of a sound, it increases its propensity to undergo metathesis. We will be able to see the latter manifest in metathesis in MA since it is a phonological process sensitive to the degree of sonority distance between the coda and the onset. For our present analysis, Selkirk's conclusions serve as an excellent account for the transposition of the segments in Moroccan Arabic.

3. Methodology

The following MA data will be analysed in light of OT. According to Hume (2004), Optimality Theory (OT) (Prince & Smolensky, 2004) is ideal for accounting for the perceptual and structural grounding of metathesis.

Most Moroccan dialects	**Some Moroccan dialects**	**Gloss**
z**əʃma**	z**əmʃa**	*Really*

Table 1: Moroccan data

Hierarchically, conductive to induce metathesis, markedness constraints that prompt metathesis must outrank the faithfulness constraints that preserve the linear order of sounds in a word (i.e., Linearity). Thus, metathesis is the strategy used to repair the Ill-

formedness of a particular structure. In this regard, the ill-formedness of a given form is formally described through a markedness constraint. Necessarily, this constraint is more highly ranked than Linearity, thus, forcing a violation.

In our analysis, let us assume Q to be a markedness constraint. The latter is illustrated in the table below. The structure of segments in the input is faithful to candidate A but violates the markedness constraint Q. By reversing the order of the segments C2 and C3 in candidate (B), the markedness constraint Q is satisfied. Illustratively, in tableau 2, such reordering causes a violation of Linearity. Thus, the ranking of this constraint below Q means that the second candidate is selected as the output. Accordingly, Linearity is violated when there is a mismatch in linear ordering relations between a string of segments in the output and the corresponding string in the input (and vice versa). McCarthy (2000) elaborates on how the subordination of LINEARITY to other constraints forces a change in the linear ordering of segments. Thus, metathesis manifests. Therefore, to satisfy other more highly-ranked constraints, LINEARITY-IO may be violated.

Input: /C1vC2C3V/	***Q***	***Linearity-IO***
A. ***C1vC2C3V***	****!***	
☞ **B.** ***C1vC3C2V***		*******

Table 2: Constraint description

[1]***3.1 Segment transposition motivation***

Sonority is considered a pillar in phonological theory. Purposely, it is a solid argument to account for cross-linguistic preferences in segmental sequencing between and within syllables. For example, (Hooper, 1976; Murray and Vennemann 1983, and Vennemann 1988) have captured in their study the selection for coda+onset clusters in which the coda has greater sonority than the onset. Further, most accounts of cluster phonotactics have utilized some formulations of the syllable contact law. Notably, within OT, many analyses have deduced cross-linguistically syllable contact as a single markedness constraint against rising sonority across the syllable boundary. In the sense that codas prefer to be louder in acoustic terms.

By contrast, onsets prefer being less sonorous. Some languages worldwide disallow any rising sonority cluster and generally accept other cluster types. At the same time, other languages show sonority distance effects, whereby metathesis in MA is a phonological process sensitive to the degree of sonority distance between the coda and the onset.

Correspondingly, a popular approach within OT is to consider syllable contact as a single markedness constraint SYLLABLE CONTACT (SYLLCON), which forbids a rise in sonority across the syllable boundary (e.g., Baertsch and Davis 2004; Bradley 2006a, 2007, Davis and Shin 1999; Holt 2004, among others). Substantially, (Hudson 1995, and Hume 1999) have stated that violations of the SCL are responsible for synchronic and diachronic language alterations. Therefore, the repair strategies that many languages choose to undertake manifest in assimilation (e.g., in Korean nasal+liquid sequences, stop insertion in sonorant clusters (Old Spanish, Old French), or metathesis. See Davis and Shin (1999). In this case, we will consider the syllable contact law simply since we have a clear sonority hierarchy violation. In the segment, nasals are more sonorous than fricatives, and the most sonorous sound should be close to the peak. According to syllable contact law, a syllable contact AB is the more preferred, the greater the sonority of the offset A and the less the onset B. Therefore, as discussed before, we will use the markedness constraint SYLLABLE CONTACT (SYLCON) for accounting for the winning segment. Linearity is ranked lower as a faithfulness constraint:

[1] Banjar (2003) deals with CC metathesis as manifested in Eastern Arabic with special reference to the dialects used in Mecca and Cairo. However, rather than presenting an analysis, she merely lists 34 tables containing instances of adjacent and non-adjacent metathesis1. She also argues that "the nature of Arabic sonorant consonants: /m/, /n/, /l/, and /r/2 gives them credit to be metathesised." (p. 28).

SyllCon >> Linearity-IO

/ʕm/	SyllCon	Linearity-IO
A. ʕ . m	**!***	
☞ **B. m . ʕ**		*

Table 3: Segment description

3.2 Insertion of schwa

According to, Benhallam (1989), schwa appears between two consonants, implying that schwa is epenthetic. Following MA syllabification rules and the principle that CCC clusters are not allowed in Moroccan Arabic, we have inserted a schwa to break up the cluster of three consonants. Considerably, in / Zmʕa /, the sonority of the root consonants is the deciding factor when it comes to schwa epenthesis. From an OT account, we will use the constraint DEP-IO which prevents epenthesis, *complex to avoid the consonant cluster. The ranking of constraints is as follows:

***Complex, SyllCon >> Linearity-IO, DEP-IO**

/ zʕma /	*Complex	SyllCon	Linearity-IO	DEP-IO
A. Zəʕ**. m**a		*!		*
☞ **B.** Z**əm.** ʕa			*	*
C. ZʕmaZ	*!			
D. Z**m**ʕa	*!		*	

Table 4: The case of some Moroccan dialects

The tableau shows that schwa insertion is used as a repair strategy to break the cluster of three consonants since MA does not accept such clusters. The markedness constraints are equally ranked. Similarly, faithfulness constraints exhibit an equal ranking. Even if we swap the ranking, there will be no change; the optimal candidate B will remain the winner. For more illustration, the optimal candidate is B since it violates the Linearity constraint, which is lower in rank than the SCL constraint. Candidate A is ruled out for violating the syllable contact constraint since the offset is less sonorant than (m).

***Metathesis, *Complex>>SyllCon, DEP-IO**

/ Zʕma /	*Metathesis	*Complex	SyllCon	DEP-IO
☞ **A.** zəʕ . ma			*	*
B. zəm . ʕa	*!			*
C. zʕma		*!		
D. zmʕa	*!	*		

Table 5: The case of most Moroccan dialects

The tableau illustrates that *Metathesis is used as a highly ranked constraint since people say (Zəʕ. ma) as a default form in most Moroccan dialects. In order to achieve this, we used this constraint to penalise metathesis. The result is the appearance of candidate A as the optimal candidate.

4. Rule-based model vs constraint model

Before the 1990s, a rule-based model (RBM) played a significant role in employing rules to account for natural language alterations. However, since the 1990s, a new model of phonological derivation, a constraint-based model, or Optimality Theory (OT), has become prominent. Rules fall from grace, and the explanatory burden is placed entirely on Universal Grammar's (UG) constraints. The present paper's constraint-based analysis provides a superior account of metathesis and its motivation. To demonstrate this, let us give the rule-based notation for the metathesis occurring in the example [zəʕma] / [zəmʕa]:

Rule:

$$[+\text{voice}, +\text{pharyngeal}, +\text{cont}]_1 \; [+\text{nasal}, +\text{lab}]_2 \rightarrow 2 \; 1$$

From the rule notation above, RBP as a mode of phonological analysis displaying word-internal levels without independent justification beyond the phenomenon under discussion holds little promise compared with the constraint analysis provided with the OT framework. The rule notation describes what is going on at the surface level of the segments, while in OT, we can see various rules interacting with ranking constraints. In a sense, ranking is language-specific and differs from one language to another. By evidence, Moroccan Arabic does not accept a cluster of 3 consonants. Thus, within OT, we have constraints accounting for this principle. Notably, metathesis, as seen in the rule notation, is accounted for using numerical transposition. However, within the framework of OT, it is accounted for using universal constraints and language-specific ranking.

5. Conclusion

To conclude, this article has shed light on the metathesis process in MA. The main aim of the present analysis was to examine the phonological trigger that induces metathesis in Moroccan Arabic and provide a contrasting analysis of metathesis in MA, utilising both a theoretic optimality approach and the rule-based one. The current study provides a firm grounding for future works concerning the typology of metathesis across different dialects of the Arabic language. The analysis findings have allocated that the constraint SYLLABLE CONTACT (SYLLCON) constraint is an undominated constraint and motivating force behind the metathesis process in MA. As part of future analysis, the results are significant for further research addressing the psycholinguistic mechanisms responsible for such a phenomenon in MA.

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ORCID iD: Oumaima Idrissi https://orcid.org/0000-0003-3855-7667

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