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## On the Morpho-phonology of Verbal Endings in Kalhori Kurdish

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### ABSTRACT

Kalhori Kurdish verbal endings (personal markers) attach to the stem as suffixes, with their phonetic forms undergoing changes depending on the phonological context. This study investigates the alternating forms of these endings resulting from morphophonological processes, aiming to determine whether or not an underlying initial vowel exists in their representation, identify the processes involved, and establish the order in which these processes apply. Using a descriptive-analytical method within Optimality Theory (McCarthy, 2008), data were collected through 12 hours of interviews with 15 Kalhori Kurdish speakers. Additional data from two speakers' responses to the "Atlas of Iranian Languages" questionnaire were transcribed using IPA and then analyzed through segmentation. Findings reveal that verbal endings have an underlying initial vowel. Three dominant processes—deletion, glide formation, and vowel coalescence—apply in that order to resolve vowel hiatus. The analysis of the data shows that specific constraints are active in Kalhori Kurdish, with their ranking determining various hiatus resolution strategies. High vowels resist deletion, causing deletion to yield to glide formation. However, since sequences of two high elements are prohibited, glide formation is replaced by vowel coalescence when it would create such a sequence. These constraint interactions demonstrate the systematic nature of morphophonological alternations in Kalhori Kurdish verbal morphology.

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## **1. Introduction**

Kalhari Kurdish is one of the Southern dialects of the Kurdish language. Scholars such as Nebez (1976), Hassanpour (1989), MacKenzie (1961), and Izadi (1992) classify Kurdish into four groups: Northern, Central, Southern, and Hawrami. "Kalhari is one of the principal dialects of Southern Kurdish" (Kamandar Fattah, 2000, p. 55), spoken in Iran in cities such as Kermanshah, Gilan-e Gharb, Eslamabad-e Gharb, Eyvan-e Gharb, Sarpol-e Zahab, and Ilam, and in Iraq in cities such as Khanaqin and Mandali.

The addition of affixes to a stem in the underlying representation sometimes causes changes in the phonetic form of morphemes, depending on the phonological context. In Kalhari Kurdish, person markers (verbal endings) are added to the stem as suffixes, carrying the features of person and number. The only difference between the present and past tense markers in this dialect concerns the third person singular; according to Fattahi (2011), this marker is null in the past tense and has no phonetic realization. Furthermore, based on Fattahi and Jafari (2025), the second- and third- person singular markers have three underlying forms each, in free variation, and the first-person plural marker also has two underlying forms with the characteristic of free variation. Each of these forms, in turn, is phonetically realized differently in various phonological contexts. Since free variations are studied within the domain of historical linguistics and language change and do not affect the final results of this study, addressing them falls outside the scope of the present research. The criterion for data analysis will be based on one of these free variants and its alternating forms, which have a higher frequency in this dialect.

The aim of the present study is to examine the alternating forms of Kalhari Kurdish verbal endings resulting from the application of morphophonological processes. The analyses are conducted within the framework of Parallel Optimality Theory, based on McCarthy (2008), in order to identify the violated faithfulness constraints and the active markedness constraints, and to determine the ranking relations among them. Given that the phonetic forms of the markers are represented both with and without an initial vowel, the present study first seeks to identify the first phoneme of the underlying representation of the markers in Kalhari Kurdish. The second question is which morphophonological processes are responsible for the alternating forms of the markers. Finally, the third question addresses the problem of what kind of ordering between these processes is determined by Optimality Theory.

## **2. Methodology**

Data were collected through 12 hours of interviews with 15 male and female Kalhari Kurdish speakers. Additionally, the responses of two other speakers to the "Atlas of Iranian Languages" questionnaire were carefully examined, and the required data were extracted from them. Furthermore, the linguistic intuition of the authors, as native speakers of Kalhari Kurdish, was also utilized. The data were recorded using an Olympus LS-14 voice recorder, and subsequently, the International Phonetic Alphabet (IPA) was used to transcribe them. Then, morphemic segmentation was performed on them to prepare the alternating forms for analysis.

## **3. Literature Review**

Numerous analyses have been conducted concerning the alternation of phonetic forms in the verbal system of Kurdish. In all related studies in this field, alternations are formed to resolve vowel hiatus.

Fattahi and Kurd-e Zafaranlu Kambuziya (2014) examined morpheme movement as a strategy for resolving vowel hiatus in the verbal system of Kalhari Kurdish and concluded that this

movement occurs when the vowel of the third person singular pronominal clitic is positioned between the vowel of the past tense suffix and the vowel of the verbal suffix. Fattahi (2014), based on the Harmonic Serialism approach in Optimality Theory, investigated vowel glide formation as one of the strategies for resolving vowel hiatus in Kalhori Kurdish and demonstrates that in a sequence of a low vowel followed by a high vowel, the high vowel becomes a glide; furthermore, if the first vowel is front, certain changes also occur in its features. By identifying the constraints related to these processes and their dominance relations, he shows that the constraints  $MAX_{LEX}$ ,  $*VV$ , and  $DEP$  dominate the constraint  $MAX(V_{[+LOW]})$ , which in turn dominates  $AGREE(GLIDE)$ , and finally, all these constraints dominate  $IDENT$ . Badakhshan and Zamani (2014), after examining the glide formation process in the Kalhori dialect, concluded that the  $[REL-CONST]$  constraint has a low ranking in Kalhori Kurdish, contrary to many of the world's languages, and that in this dialect, not only high vowels but also non-high vowels such as /e/ undergo glide formation. Fattahi and Choubsaz (2016) also examined the greater diversity of strategies in Kalhori Kurdish for resolving vowel hiatus compared to other Kurdish dialects like Sorani and Ardalani within the framework of Optimality Theory, based on the alternating forms of the verbal system. According to the results of this study, Kalhori Kurdish adopts a wider variety of strategies for resolving vowel hiatus compared to Sorani and Ardalani because, in addition to vowel deletion and glide formation, which are also used in Sorani and Ardalani, it also employs the strategy of coalescence.

Sadeghi and Sadeghi (2017) examined strategies for resolving vowel hiatus in Sorani Kurdish based on Optimality Theory and concluded that if a /V+V/ sequence is created at the syllable boundary during word formation, depending on the phonological and morphological conditions, one of the strategies of consonant epenthesis, deletion, or glide formation is applied. Ahmadi, Zahedi, and Gholami (2019), in their investigation of the alternating forms of the verbal system in Central Kurdish within the framework of Optimality Theory, classified the processes of glide formation and deletion as the most common methods for resolving vowel hiatus in this dialect, respectively. They also conclude that the deletion process only occurs when both adjacent vowels are low and their glide formation is not permitted.

Jafari and Fattahi (2025) investigated alternations in Kalhori Kurdish clitics and their hosts within the framework of Optimality Theory and, after discovering the constraint rankings, concluded that based on the diversity in resolving vowel hiatus, priority is given to the strategy of epenthesizing the glide corresponding to V1, unless the required glide does not exist in the phonological system of this dialect. In this case, V2 becomes its corresponding glide, unless such a glide also does not exist in the dialect, in which case the grammar finally applies vowel deletion as the third and last priority. Thus, the deletion strategy for resolving vowel hiatus between clitic vowels and host vowels is postponed as much as possible. In another study, Jafari and Fattahi (2025) examined the movement of the third person singular pronominal enclitic in Kalhori Kurdish to resolve vowel hiatus within the framework of Optimality Theory and demonstrated that the aforementioned morpheme moves not only in the context of suffixal verbs but also when adjacent to the emphatic enclitic /iʃ/; this movement occurs not only to resolve hiatus of three vowels but also to resolve hiatus of two vowels.

Regarding alternations in the phonetic form of the verbal system in other Iranian languages, research has also been conducted. Among them, one can mention Esmailimatin et al. (2017), in which the researchers investigated the resolution of vowel hiatus in the /a-i/ sequence at the derivation boundary of Persian words within the framework of Optimality Theory. The results of this study show that the most common strategy for resolving vowel hiatus in Persian is consonant epenthesis. In the case studied, vowel hiatus was resolved by inserting the intervening consonants

[j], [ʔ], and [v] at word derivation boundaries. Rezainejad (2019) examined the alternating forms of the verbal system in Azerbaijani Turkish, the Meshkin Shahr dialect, within the framework of Optimality Theory and identified various strategies for resolving vowel hiatus, each used depending on phonological, lexical, and semantic conditions. The findings of this study show that deletion from the initial position of the stem is not permitted, and furthermore, suffixes consisting of a single segment (vowel) are never permitted to be deleted to resolve vowel hiatus. Jam (2023), within the framework of Optimality Theory, investigated how vowel hiatus between long vowels and the vowel of the plural morpheme is resolved in Persian and shows that between the plural suffix /-an/ and the final vowel /u:/ in nouns, the glide [w] is inserted, while vowel hiatus in nouns ending with the vowels /i:/ and /ɑ:/ is resolved by inserting the glide [j]. Furthermore, it is shown that the long vowels /u:/ and /i:/ also become shorter. Moshayedi and Ainezhad (2023) studied the Sonority Sequencing Principle in the syllabic structure of Persian within the framework of Optimality Theory and investigated the harmony and unity of function of various phonological processes; while demonstrating the inability of derivational rules to account for this unity, by examining the Sonority Sequencing Principle, they show how Optimality Theory effectively uncovers the harmony between different phonological processes.

#### **4. Theoretical Framework**

Optimality Theory (OT) was first proposed by Prince and Smolensky (1993). This theory goes beyond Chomsky and Halle's (1968) Derivational Phonology in accounting for allomorphic forms, providing not only a description of the changes applied to linguistic forms but also a precise explanation for them. According to this theory, a language consists of a set of violable faithfulness and markedness constraints which, while being universal, are ranked in a language-specific manner. That is, the surface forms of a language are not derived by applying a series of rules to an underlying form, but rather result from specific rankings among these constraints. Optimality Theory is superior to rule-based generative theory in this respect because it uncovers a single commonality between seemingly unrelated phonological processes, such that, for example, the application of one rule and the non-application of another may be linked to the same underlying reason. This important feature, known as "conspiracy," is considered one of the strengths of Optimality Theory compared to rule-based generative phonology (McCarthy, 2008, p. 2).

A few explanations about the mechanism and components of Parallel Optimality Theory will make the data analysis more tangible. The "Generator" (GEN) is the component that, upon receiving the "Input" (the underlying form), can apply zero to an infinite number of different modifications to it, thereby producing numerous possible candidates, which it then sends to the "Evaluator" (EVAL). This component consists of universal, violable constraints. The language-specific ranking of these constraints selects the candidate that violates the fewest important, high-ranking constraints as the optimal winner. According to Prince and Smolensky (2004), the mapping from Input to "Output" (the surface form) occurs in a single stage. At the end of the analysis, if the constraint ranking has been correctly discovered, the winning candidate will be the expected form that speakers actually produce.

#### **5. Data Analysis**

As stated in the Introduction, the aim of the present study is to examine the alternating forms of Kalhori Kurdish person markers. The examination of data shows that these markers begin with a vowel in certain contexts, and with a consonant in others. At first glance, one might assume that the markers inherently possess an initial vowel; their attachment to vowel-final stems would then create vowel hiatus, which in some verbal forms leads to the deletion of the marker's initial vowel. However, considering the issue from another angle could also lead to the assumption that the

markers begin without a vowel; their attachment to consonant-final stems would create a consonant cluster. In this situation, a vowel would be epenthesized between them to simplify the consonant cluster. The continuation of the discussion will be dedicated to examining these assumptions, as each has a significant impact on the direction of the research.

Initially, the assumption is that Kalhori Kurdish person markers lack an initial vowel in their underlying representation, and the vowel observed in the surface form after the marker attaches to the stem results from an epenthesis process that the grammar applies between the final consonant of the stem and the initial consonant of the marker in order to simplify a consonant cluster.

If the presence of the vowel [e]<sup>1</sup> in forms such as the third person plural [ʃʃeren] ("They call.") is assumed to result from epenthesis, the conclusion would be that Kalhori Kurdish does not tolerate the consonant cluster [rn]. However, the simultaneous existence of forms like [dern] ("odor, smell") and [deren] ("They tear.") demonstrates that the cluster [rn] is tolerable in Kalhori Kurdish. The same logic – through different examples, though – can be put forth about the existence of the an underlying initial /e/ for the first-person singular marker; in a verbal form as [gerem] ("I take.") the vowel preceding [m] cannot be an epenthesized one since the cluster [rm] is well tolerated in Kalhori Kurdish as in [gærm] ("warm"). . Therefore, the vowel [e] at the beginning of the first person singular and third person plural markers cannot be the result of epenthesis; rather, it is the onset of these markers and is present in their underlying representation.

Regarding the vowel [i] at the beginning of the second person singular, first person plural, and second person plural markers, it must also be said that this vowel cannot result from epenthesis, as there is no motivation for its insertion. If the presence of the vowel [i] in a form like [ræsim] "we arrive" is assumed to result from epenthesis, the interpretation would be that Kalhori Kurdish does not tolerate the sequence [sm]. Yet, in the phonetic forms [ʔesm] "name" and [ræsm] "tradition/custom" in this dialect, this very sequence is produced without any process, including vowel epenthesis, having been applied to simplify it. Even in cases where a consonant cluster is unacceptable and needs to be simplified by vowel epenthesis, the epenthesized vowel certainly cannot be the marked vowel [i]; as evidenced in mappings like /qæsr/ → [qæser] "castle," /ʃæt/ → [ʃæter] "umbrella," /sæbr/ → [sæber] "patience," we observe the epenthesis of the unmarked vowel [e]. Furthermore, assuming the absence of the vowel [i] in the underlying representation of the markers, one would expect that upon attaching a marker to a low vowel-final stem, what appears immediately after the stem vowel would be the nasal consonant of the marker. However, the manifestation of the glide [j] in the surface form of data related to this context shows traces of the vowel [i] that has undergone glide formation to resolve vowel hiatus. Consider the glide [j] in the phonetic form [nqjm] "we don't come." Aside from the fact that the marked vowel [i] is never chosen for epenthesis, the presence of a glide in this context can never be a sign of epenthesis. This is because, assuming the absence of the vowel [i] in the underlying representation of the marker in question and attributing its presence in the surface form to epenthesis, we observe that no consonant cluster is formed in the combination /nɑ/ + /m/, and consequently, there is no motivation for vowel epenthesis. Unless we consider the vowel to be part of the marker's onset,

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<sup>1</sup> Some studies assume a schwa instead of this vowel in Kalhori; however, considering the similarities observed between this vowel and its counterpart in Persian, on the one hand, and the lack of comprehensive phonetic analysis of the vowel system in Kalhori Kurdish in the literature, on the other, this distinction is not emphasized in this study. What matters here is the presence of a non-round non-low vowel at the beginning of the verbal endings playing roles in phenomena such as vowel hiatus, rather than the fine distinction and true nature of this vowel.

which, after attaching to a low vowel-final stem, undergoes glide formation to resolve vowel hiatus.

Regarding whether the vowel [ɪ:] at the beginning of the third person singular marker is present as part of the marker's onset in its underlying representation or is merely an element epenthesized in the surface form, three points must be noted. Given that vowel epenthesis in such cases is applied to simplify a consonant cluster, the reason for its presence in the form [gerr:d] "he/she takes" must be linked to the intolerability of the consonant cluster [rd]. Yet, the existence of this sequence in forms such as [gerd] "arranged/round" and [merd] "he died" refutes the claim of this sequence's intolerability. Second, between the marked vowel [ɪ:] and the unmarked vowel [e], the latter is a better choice for epenthesis. Third, assuming the absence of the vowel [ɪ:] in the underlying representation of the third person singular marker, after attaching this marker to a low vowel-final stem, such as /xæ/ + /d/, one would expect the alveolar consonant of the marker, [d], to appear immediately after the final vowel of the stem. But what actually happens is the manifestation of the glide [ɹ] before the marker, producing the form [xɛɹd] "he/she throws." The presence of this glide, which indicates the glide formation of the vowel [ɪ:] to resolve vowel hiatus, can mean nothing other than that this vowel belongs to the marker and is present in its underlying representation.

Based on the reasons examined above, the presence of the vowels [e], [i], and [ɪ:] at the beginning of Kalhori Kurdish person markers is not the result of epenthesis; rather, they constitute the onset of the markers and are present in their underlying representation. Accordingly, attaching the markers from the table below to vowel-final stems results in vowel hiatus, which is resolved through various strategies.

**Table 1 – Kalhori Kurdish Verbal Endings (markers)**

| Verbal Endings | Singular | Plural |
|----------------|----------|--------|
| First-person   | /-em/    | /-im/  |
| Second-person  | /-id/    | /-in/  |
| Third-person   | /-ɪ:d/   | /-en/  |

### 5.1. Vowel Deletion

Vowel hiatus is disfavored in Kalhori Kurdish, and the grammar resolves this situation through various strategies. This section is dedicated to the examination and analysis of the deletion strategy for the person markers in this dialect. First, examples of markers attaching to consonant-final stems are presented to show that when the stem does not end in a vowel, vowel hiatus does not occur, and consequently, no change happens in the mapping from input (phonological level) to output (phonetic level).

1. /dyn-em/ → [dynem]      2. /zan-id/ → [zanid]  
 SEE - 1S      "I see."      KNOW-2S      "You know."
3. / xæn - ɪ:d/ → [xæɪ:d]      4. /kwet-im/ → [kwetim]  
 LAUGH-3S      "(S)he laughs."      SMASH-1P      "We smash."
5. /gir-in/ → [jirin]      6. /ræs-en/ → [ræsen]  
 CRY-2P      "You cry."      ARRIVE-3P      "They arrive."

Having observed the morphophonological behavior of the markers in a context where vowel hiatus does not occur, we now present examples where the sequence of the marker's initial vowel with the final vowel of the stem, or with other affixes in the verbal structure such as past tense suffixes, has been resolved by deletion.

- |  |   |
|--|---|
| 7. /sæn-y-em/ → [sænym]<br>BUY-pp <sup>1</sup> -1S "I had bought." | 8. /bæs-ɑ-em/ → [bæsɑm]<br>CLOSE-pst <sup>2</sup> -1S "I closed." |
| 9. /xæ-em/ → [xæm]<br>DROP-1S "I drop."                            | 10. /bu-em/ → [bum]<br>BE(sbjn <sup>3</sup> ) – 1S "I be."        |
| 11. /bæs-ɑ-en/ → [bæsɑn]<br>CLOSE-pst-3P "They closed."            | 12. /xæn-i-en/ → [xænin]<br>LAUGH-pst-3P "They laughed."          |
| 13. /ræs-i-in/ → [ræsin]<br>ARRIVE-pst-2P "You arrived."           | 14. /pær-i-imen/ → [pærimen]<br>JUMP-pst-1P "We jumped."          |

Based on the observation of the mappings above, the descriptive generalization concerning the status of the markers is presented below. It is necessary to state that a descriptive generalization is a preliminary report within which the status of the studied forms and the changes applied to them are described. Advancing the analysis based on this initial description significantly aids in correctly identifying constraints, discovering their rankings, and preventing possible errors, especially in cases where the analyses are more complex and the ranking among more than two constraints must be determined.

**Descriptive Generalization (1):** In Kalhori Kurdish, vowel hiatus is not permitted; this situation is resolved in person markers by vowel deletion.

The formation of alternating forms in Optimality Theory results from unfaithful mapping and means the dominance of markedness constraints over faithfulness constraints (structure-preserving constraints). Accordingly, the deletion process signifies a violation of the faithfulness constraint MAX; this constraint is defined as follows within Optimality Theory.

**MAX:** In the mapping from input to output, the deletion of any linguistic element is not permitted, and a violation mark must be assigned for each instance of deletion.

The dominant markedness constraint that, in order not to violate it, the MAX constraint is violated, is called ONSET, and it is defined as follows according to Optimality Theory.

**ONSET:** In the mapping from input to output, a syllable without an onset is not permitted, and a violation mark must be assigned for each syllable without an onset.

In the competition between these constraints in Tableau 1, the dominance of ONSET over MAX is clearly confirmed, as the three main and important conditions for determining dominance relations between constraints are satisfied: the winning candidate is clear; a conflict exists between the two constraints, meaning one of them favors the winning candidate (a) and the other

<sup>1</sup> past participle marker

<sup>2</sup> past marker

<sup>3</sup> subjunctive

favors the losing candidate (b); furthermore, the condition of *no disjunction* holds, meaning no other constraint is found that performs the role of the dominant constraint in selecting the winning candidate. Other signs confirming the correctness of the dominance relations are the presence of 'W' to the left of 'L' and the solid line between the two constraints in question. Confirming the correctness of dominance relations between constraints in Optimality Theory requires satisfying those three important conditions. In the present study, the discovery of each new dominance relation has been accompanied by satisfying the three mentioned conditions, but to avoid repetition, restating them has been omitted.

| /xæ-em/           | ONSET | MAX |
|-------------------|-------|-----|
| a. $\text{☞} xæm$ |       | *   |
| b. $xæ.em$        | *W    | L   |

Tableau 1- ONSET >> MAX

The dominance of ONSET over MAX indicates that the winning candidate must not violate ONSET, or if such a situation exists, the number of times the winner violates this constraint must be less than the number of times it violates MAX. With this reasoning, the incorrect yet optimal candidate \*[xem] challenges candidate (a) exactly like the winner, without violating ONSET and with only one violation of MAX, and is as qualified to win as the winning candidate. In such cases, it is highly probable that another inviolable constraint is involved, which, while favoring the winning candidate, penalizes the challenging form \*[xem] and eliminates it from the competition. Challenging and incorrect candidates in Optimality Theory tableaux are marked with the symbol  $\text{☞}$ ; observing this symbol next to any candidate means that, while not being the winner, this candidate has the same status as the winning form in terms of the number of constraint violations and can challenge it. If no action is taken to remove this incorrect candidate from the competition, a correct analysis of the data will not be obtained. To better understand the risk posed by such candidates, consider the performance of \*[xem] in Tableau 1. In this tableau, candidate (b) is eliminated from the competition at the outset due to violating the dominant constraint ONSET; the presence of the symbol  $\text{☞}$  next to candidate (c) means that, despite being incorrect, this candidate behaves similarly to the winning candidate (a) with respect to the constraints MAX and ONSET, violating MAX exactly once and not violating ONSET. Therefore, it must be eliminated from the competition.

| /xæ-em/           | ONSET | MAX |
|-------------------|-------|-----|
| a. $\text{☞} xæm$ |       | *   |
| b. $xæ.em$        | *W    | L   |
| c. $\text{☞} xem$ |       | *   |

Tableau 2- Disjunction between candidates (a) and (c)

In Optimality Theory, to eliminate forms like \*[xem] from the competition, one must first compare them with the winning candidate and identify their differences. The difference between \*[xem] and the winning candidate [xæm] (where a vowel is deleted in both) is that the deleted vowel in the winning candidate belongs to the grammatical morpheme (i.e., the person marker), while the deleted vowel in candidate (c) belongs to the lexical morpheme (i.e., the verb root). According to Jafari and Fattahi (2025), in Kalhori Kurdish, priority is always given to deleting grammatical elements, and lexical elements are not deleted unless no other option remains to

resolve the created situation. In this regard, it is necessary to redefine the general constraint MAX into two more specific constraints, MAX<sub>LEX</sub> and MAX<sub>FUNC</sub>. To remove the incorrect and challenging candidate from the competition, a conflict must be established between these constraints, and the one with the higher ranking, while favoring the correct linguistic form, must penalize and eliminate the other candidate. The following descriptive generalization better explains this situation.

**Descriptive Generalization (2):** In Kalhori Kurdish, vowel hiatus is not acceptable; this situation is resolved by deleting one of the vowels, unless one of the vowels belongs to a lexical element, in which case the vowel of the grammatical element is deleted.

Accordingly, vowel hiatus in Kalhori Kurdish person markers is resolved by deleting the vowel belonging to the marker as a grammatical element. Thus, the constraint opposing the deletion of grammatical elements is violated in order to satisfy the constraint opposing vowel hiatus, which means the dominance of ONSET over MAX<sub>FUNC</sub>. Furthermore, the winning candidate's non-violation of MAX<sub>LEX</sub> carries two important implications: first, that MAX<sub>LEX</sub> dominates MAX<sub>FUNC</sub>, because between deleting the vowel of the grammatical element (marker) and the vowel of the lexical element (stem), the marker's vowel is deleted; second, that there is a *disjunction* between ONSET and MAX<sub>LEX</sub>, meaning the winning candidate violates neither of them. Therefore, the dominance relation between them is indeterminate, and in the OT tableau, the line between the cells of these two constraints is drawn as a dotted line. The definitions of the constraints MAX<sub>LEX</sub> and MAX<sub>FUNC</sub> are described below.

**MAX<sub>LEX</sub>:** In the mapping from input to output, the deletion of lexical elements is not permitted, and a violation mark must be assigned for each deletion of such elements.

**MAX<sub>FUNC</sub>:** In the mapping from input to output, the deletion of grammatical elements is not permitted, and a violation mark must be assigned for each deletion of such elements.

Tableau 3 shows the conflict between MAX<sub>LEX</sub> and MAX<sub>FUNC</sub> and the dominance of the former over the latter; the presence of 'W' before 'L' also confirms this, and in satisfying ONSET, priority is given to deleting the vowel of the grammatical element.

| /xæ-em/            | ONSET | MAX <sub>LEX</sub> | MAX <sub>FUNC</sub> |
|--------------------|-------|--------------------|---------------------|
| a. <del>xæ</del> m |       |                    | *                   |
| b. xem             |       | *W                 | L                   |

**Tableau 3- MAX<sub>LEX</sub> >> MAX<sub>FUNC</sub>**

When markers attach to the past tense suffixes /-a/ and /-i/, which are grammatical, single-segment morphemes, the marker's vowel is deleted. Deleting these two vowels, due to their being single-segmented, in addition to violating the constraint opposing the deletion of grammatical elements, would also constitute a violation of the dominant constraint opposing the deletion of an entire morpheme, namely MAX<sub>morph</sub>. For this reason, this does not happen. The definition of this constraint and the related tableau illustrating its function are as follows.

**MAX<sub>morph</sub>:** In the mapping from input to output, the deletion of an entire morpheme is not permitted, and a violation mark must be assigned for the deletion of each morpheme.

| /bæs-a-em/ | MAX <sub>morph</sub> | MAX <sub>FUNC</sub> |
|------------|----------------------|---------------------|
|            |                      |                     |

|   |    |   |
|---|----|---|
| a. $\text{b}\ddot{\text{a}}.\text{sam}$ |    | * |
| b. $\text{b}\ddot{\text{a}}.\text{sem}$ | *W | L |

Tableau 4-  $\text{MAX}_{\text{morph}} \gg \text{MAX}_{\text{FUNC}}$

### 5.2. Glide Formation

The second strategy for resolving vowel hiatus in person markers is the conversion of a vowel to a glide. Examination of the data shows that in glide formation within a V1V2 sequence, the second vowel is converted to its corresponding glide. The descriptive generalization for this situation is as follows.

**Descriptive Generalization (3):** In Kalhori Kurdish, vowel hiatus is not acceptable; this situation is resolved by converting the second vowel to a glide.

Therefore, the constraint that penalizes the glide formation of the second vowel is called IDENT (V2). Since converting V2 to a glide constitutes a change in one of the vowel's features (the syllabic feature), it is defined as follows.

**IDENT (V2):** In the mapping from input to output, a change in the features of the second vowel in a V1V2 sequence is not permitted, and a violation mark must be assigned for each such change.

Glide formation of the marker's vowel to resolve vowel hiatus and satisfy ONSET means the dominance of ONSET over IDENT (V2). In the examples below, glide formation of the marker's vowel has occurred to resolve vowel hiatus.

- (14) /xæ - id/ → [xɛjd]                      (15) /bæs - a - id/ → [bæsajd]  
 DROP - 2S    "You drop."                      CLOSE -pst - 2S    "You closed."
- (16) /xæ - i:d/ → [xɛɪd]                      (17) /næ - a - imen/ → [nɛjmen]  
 DROP - 3S    "(S)he drops."                      PUT-pst- 1P        "We put/placed."
- (18) /kiʃ - a - in/ → [kiʃajɲ]                      (19) /xæ - in/ → [xɛjɲ]  
 PULL-pst-2P    "You pulled."                      DROP-2P        "You drop."

Tableau 5 below shows glide formation and the dominance of ONSET over IDENT (V2).

| /ba- i:d/                              | ONSET |  | IDENT (v2) |
|--|-------|--|------------|
| a. $\text{b}\ddot{\text{a}}\text{i:d}$ |       |  | *          |
| b. $\text{ba.i:d}$                     | *W    |  | L          |

Tableau 5-  $\text{ONSET} \gg \text{IDENT (V2)}$

Tableau (5) shows that glide formation occurs due to the dominance of ONSET over IDENT (V2). However, it does not answer two important questions: First, why in all examples related to vowel glide formation in table (3), only the two vowels /ɪ:/ and /i/ become glides, and there is no conversion of the vowel in the first-person singular and third person plural markers, namely /e/, to a glide? Second, wasn't it established in the previous section that vowels of grammatical elements like person markers are deleted when facing a vowel sequence? So why are the marker vowels in the examples of table (3) converted to glides instead of being deleted? What factor leads to the use of two different methods, deletion and glide formation, to resolve a single problem?

In response to the first question, it must be said that in the mapping /xæ-em/ → [xæm], there is no obstacle to deleting the vowel /e/ due to its lack of the [+high] feature, because as will be discussed later, a constraint is active in this dialect that does not permit the deletion of high vowels. Of course, one cannot ignore the fact that converting non-high vowels like /e/ to a glide constitutes a fatal violation of the dominant constraint \*[-high, -syll], and a candidate that violates this constraint loses the competition. Thus, the initial vowel /e/ in first person singular and third person plural markers is deleted due to the dominance of ONSET over MAX<sub>FUNC</sub>, and on the other hand, due to the high ranking of \*[-high, -syll], it is not permitted to become a glide. The definition of \*[-high, -syll] is as follows.

**\*[-high, -syll]:** In the mapping from input to output, the presence of any glide corresponding to non-high vowels is not permitted, and a violation mark must be assigned for each observation of such glides.

Since violating this constraint in glide formation also constitutes a type of violation of IDENT (V2), their ranking relative to each other is currently indeterminate in Tableau 6. According to tableau (6), the conflict between IDENT(V2) and MAX<sub>FUNC</sub>, and the dominance of the former over the latter, favors the deletion of the grammatical element's vowel over glide formation.

| /xæ-em/          | *<br>[-high]<br>[-syll] | IDENT (v2) | MAX <sub>FUNC</sub> |
|------------------|-------------------------|------------|---------------------|
| a. $\text{xæ̣m}$ |                         |            | *                   |
| b. xæ̣em         | *W                      | *W         | L                   |

**Tableau 6-** \*[-high, -syll], IDENT(V2) >> MAX<sub>FUNC</sub>

In Optimality Theory, the ideal state in analyses and their tableaux is that dominance relations between constraints are discovered as much as possible based on the available data from the language under study, thereby converting dotted lines into solid lines. At the same time, it must be noted that the data and evidence of each language are the ultimate determinants; some constraints, because they are inviolable and active, are simultaneously placed in a high ranking alongside other such constraints, and their dominance relations are not clear and may never become clear, such as IDENT(V2) and \*[-high, -syll] in Tableau (6).

Now, the answer to the second question is coupled with the assumption that if the deletion of grammatical morphemes is the primary strategy for resolving vowel hiatus in person markers, and generally in all grammatical affixes, then from the process of converting the high vowels /ɪ:/ and /i/ to glides and their not being deleted, the conclusion is reached that one or more inviolable constraint(s) dominate MAX<sub>FUNC</sub> and IDENT(V2), which in some cases do not permit vowel deletion. These constraint(s) permit the deletion of vowels of grammatical elements only on the condition that these vowels do not have the [+high] feature. If the vowel possesses this feature, IDENT(V2) is violated so that the correct candidate is obtained through the method of glide formation, and not through deletion of the high vowel. The simpler interpretation of this is expressed by the following descriptive generalization.

**Descriptive Generalization (4):** In Kalhori Kurdish, vowel hiatus is not acceptable; this situation is resolved by deleting the vowel of the grammatical morpheme, unless that vowel is [+high], in which case it is converted to its corresponding glide.

The definition of the constraint opposing the deletion of high vowels is as follows.

**MAX[+high]:** In the mapping from input to output, the deletion of high vowels is not permitted, and a violation mark must be assigned for each deletion of such elements.

The answers to the two posed questions were obtained based on the active constraints \*[-high, -syll] and MAX[+high], and their mode of operation. The answer to the second question, concerning the reason for glide formation of the two high vowels /i/ and long /ɪ:/ instead of their deletion, is also observed in Tableau 7. It should be stated that the dominance of IDENT(V2) over MAX<sub>FUNC</sub> was previously obtained in tableau (6). The main purpose of constructing Tableau 7 is to show the high ranking of MAX[+high] and its co-ranking with ONSET. Given the high ranking of this constraint and its prohibition against deleting high vowels, resolving vowel hiatus and satisfying ONSET is achieved not by deleting high vowels and violating MAX[+high], but by converting these vowels to glides and violating the less important constraint IDENT(V2).

| /ba-r:d/   | ONSET | MAX<br>[+high] | IDENT<br>(V2) | MAX<br>FUNC |
|--|-------|----------------|---------------|-------------|
| a. $\text{b}^{\text{h}}\text{ba}^{\text{h}}\text{d}$ |       |                | *             |             |
| b. bad   |       | *W             | L             |             |
| /ba-id/  | ONSET | MAX<br>[+high] | IDENT<br>(V2) | MAX<br>FUNC |
| a. $\text{b}^{\text{h}}\text{ba}^{\text{h}}\text{d}$ |       |                | *             |             |
| b. bad   |       | *W             | L             |             |

Tableau 7- ONSET, MAX[+high] >> IDENT(V2) >> MAX<sub>FUNC</sub>

So far, from examining the processes of deletion and glide formation, the priority in applying them to resolve vowel hiatus has been determined: the constraint MAX[+high] and its dominance over MAX<sub>FUNC</sub> prevents the deletion of high vowels in person markers; consequently, vowel hiatus is resolved by the second strategy, glide formation. This also implies the dominance of MAX[+high] over IDENT (V2); meaning, in a situation where deletion of a high vowel is not permitted, that vowel is converted to a glide. On the other hand, the reason for the non-conversion of the vowel /e/ to a glide in a mapping like /xæ em/ → [xæm] is that priority lies with vowel deletion and there is no obstacle in the way of this process, because the vowel in question meets the conditions for deletion and is not forced to undergo glide formation. The Hasse diagram below provides a clearer representation of what has been established so far regarding the processes of deletion and glide formation applied to the markers.

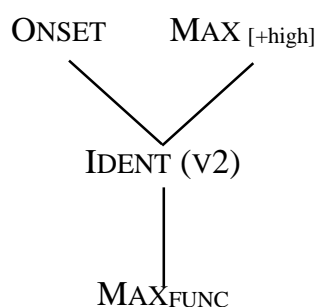


Figure 1: Hasse Diagram of Tableau (7)

### 5.3 .Coalescence

The third strategy for resolving vowel hiatus is the process of coalescence. The cases below show examples of the marker's vowel coalescing with the host vowel. After explaining the mechanism of the coalescence process, the reason for the non-application of other processes such as glide formation and deletion will be examined, so that the constraint ordering and priority in applying different processes in the alternating forms of the markers gradually becomes clearer. In the following examples, vowel hiatus has been resolved by coalescence.

(20) /bu - id/ → [byd]  
BE-subj. 2S "(that) you be".

(21) /bu - in/ → [byn]  
BE-subj. 2P "(that) you (pl.) be".

(22) /bu-imen/ → [bymen]  
BE-subj. 1P "(that) we be".

For instance, the unfaithful mapping /bu id/ → [byd] in example (20) shows that in the sequence of two vowels /u-i/, both have coalesced and become the vowel /y/. In the coalescence of two vowels, the features of both are manifested in a single vowel; that is, the final product is a blend of the features of both. Just as in this recent Kalhori Kurdish example, the resulting vowel from coalescence, /y/, has taken the feature [+round] from /u/ and the feature [+front] from /i/. Between these two coalesced vowels, V1 belongs to the stem and V2 to the marker. Since all unfaithful mappings result from the activity and dominance of markedness constraints over faithfulness constraints, first the violated faithfulness constraint and then the markedness constraint dominating it in coalescence are identified. In the coalescence process, the violated faithfulness constraint opposes the merging and becoming one of two vowels; this constraint is called UNIFORMITY in Optimality Theory. According to the processes applied to resolve vowel hiatus, the primary motivation for violating this new constraint is the effort to avoid violating the highly active and inviolable constraint ONSET. Tableau 8 displays the dominance relations of the constraints involved in the coalescence process.

**Descriptive Generalization (5):** In Kalhori Kurdish, vowel hiatus is not acceptable; this situation is resolved in person markers by coalescing the two vowels.

**UNIFORMITY:** In the mapping from input to output, a two-to-one correspondence of vowels is not permitted, and a violation mark must be assigned for each observation of such a case.

| /bu-id/            | ONSET | UNIFORMITY |
|--------------------|-------|------------|
| a. $\emptyset$ byd |       | *          |
| b. bu-id           | *W    | L          |

**Tableau 8 – ONSET >> UNIFORMITY**

The reason for vowel coalescence is the dominance of ONSET over UNIFORMITY, but it is not the only reason. As mentioned before, the correctness of dominance relations between constraints is always confirmed by satisfying three basic conditions: the existence of a winner, a conflict between constraints, and no disjunction. In Tableau 8, two of these important conditions—the existence of a conflict between the two constraints and the existence of a winner—are satisfied, but the third condition concerning no disjunction does not hold. To recall, disjunction means that more than one constraint, in the present analysis a constraint in addition to ONSET, prefers the winning candidate over the losing candidate. This constraint apparently disfavors a sequence of two elements with the identical feature [+high], and violating it, like violating ONSET, is fatal and

leads to the production of an incorrect candidate. The definition of the new constraint, named OCP[+high], is as follows.

**OCP[+high]:** In the mapping from input to output, a sequence of two high elements is not permitted, and a violation mark must be assigned for each occurrence of this situation.

This constraint, along with ONSET, disfavors the sequence /u i/; OCP[+high] because of the sequence of two high elements /u i/, and ONSET because of the vowel hiatus. Therefore, it is not specifically clear for the satisfaction of which of these two the coalescence of the two vowels has occurred. The only completely clear result this tableau provides is that, in any case, the phenomenon of coalescence and the violation of UNIFORMITY have simultaneously satisfied the constraints ONSET and OCP[+high]; hence, both of these constraints jointly dominate UNIFORMITY, and due to this disjunction, their ranking relative to each other is unclear. Determining for the satisfaction of which of these two constraints the coalescence essentially occurred would be possible if the disjunction between them in selecting the winning candidate were eliminated. This is achievable by presenting two candidates, one correct and one incorrect, from the data of this dialect, such that one constraint prefers the correct winning candidate and the other prefers the incorrect one. By doing this, the ranking of the constraints in this section would be determined, and with an intralinguistic datum from the Kalhori Kurdish dialect, the created disjunction would be eliminated. Among the person markers, a candidate with such conditions is not found; therefore, there is no obstacle to doing this by examining an example from clitics. Thus, in the first part of the two-part Tableau 9, an example from person markers is provided, based on which the disjunction between ONSET and OCP[+high] is not removed; and thus, in the second part of the tableau, by providing an example from Kalhori Kurdish clitics, the disjunction between ONSET and OCP[+high] is resolved and the dominance of the former over the latter will be revealed.

| /bu-id/                    | ONSET | OCP[+high] | UNIFORMITY |
|----------------------------|-------|------------|------------|
| a. $\varnothing$ byd       |       |            | *          |
| b. bu.id                   | *W    | *W         | L          |
| /kæmry-id/                 |       |            |            |
| a. $\varnothing$ kæm.ry.ɪd |       | *          |            |
| b. kæm.ry.id               | *W    | L          |            |

Tableau 9 - ONSET >> Ocp[+high] >> UNIFORMITY

Based on the provided evidence, the main reason for the coalescence process is to satisfy ONSET. Considering the input /bu-id/, important questions arise: Why, despite the conditions being present for applying the processes of deletion and glide formation, has the third process of coalescence come into play? Is there a necessity for applying three diverse strategies to resolve vowel hiatus, or can we rely on the previously examined methods of deletion and glide formation? To reach an answer to this question, one must first go to the reason for the non-deletion of the vowel. The answer to why deletion does not occur instead of coalescence lies in the features of the two vowels in hiatus. The incorrect candidate \*[bud] meaning "you (pl.) be," due to satisfying ONSET and not violating UNIFORMITY, is considered an optimal, and even more optimal, candidate than the winning form and has more potential to win than [byd]. From examining deletion in person markers, it was determined that priority is always given to deleting the marker's vowel as a grammatical morpheme. In this situation, paying attention to the feature of the high vowel /i/ in the input /bu-id/ reminds us of the active constraint MAX[+high]; a constraint that

does not permit the deletion of high vowels. In fact, deleting the high vowel of the marker in this linguistic form counts as a violation of both constraints MAX<sub>FUNC</sub> and MAX[+high], because its deletion constitutes the deletion of a high grammatical vowel; ultimately, between these two, MAX[+high], due to its high ranking, deems it an incorrect candidate and eliminates it from the competition. It is necessary to recall that MAX[+high] was first introduced in the section on glide formation as an active constraint preventing the deletion of high vowels, which dominated IDENT (V2), and to avoid violating it, the vowel in question was converted to a glide. Before drawing the tableau for this section, the dominance relation ONSET over MAX[+high] is determined based on the mapping /di- id/ → [did], meaning "you saw."; a mapping in which the high vowel of the marker is deleted to satisfy ONSET.

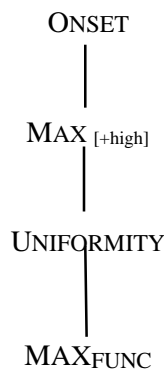
| /di-id/           | ONSET | MAX <sub>[+high]</sub> |
|-------------------|-------|------------------------|
| a. $\text{ɸ}$ did |       | *                      |
| b. di-id          | *W    | L                      |

**Tableau 10 - ONSET >> MAX[+high]**

Therefore, the tableau of dominance relations discovered so far will be as follows; in such tableaux, the lines between constraints are all solid, and its Hasse diagram is also single-branched.

| /bu-id/           | ONSET | MAX <sub>[+high]</sub> | UNIFORMITY | MAX <sub>FUNC</sub> |
|-------------------|-------|------------------------|------------|---------------------|
| a. $\text{ɸ}$ byd |       |                        | *          |                     |
| b. bud            |       | *W                     | L          | *W                  |

**Tableau 11 - ONSET >>MAX[+high] >> UNIFORMITY >> MAX<sub>FUNC</sub>**



**Figure 2 – Hasse Diagram of (11)**

The incorrect candidate \*[bujd] challenges the winning candidate in another way; this candidate, through glide formation and violation of the low-ranking constraint IDENT (V2), should, in principle, have optimality and the merit to win the competition. However, despite not violating ONSET nor UNIFORMITY, it is not selected as the winning candidate. The reason for applying coalescence instead of glide formation is certainly the domination of IDENT (V2) over UNIFORMITY. However, the answer to the question of why, despite the conditions being present for converting the second vowel to a glide, this does not happen, must be sought from the active constraint OCP[+high]/rhyme. This constraint disfavors the occurrence of two high elements in

the rhyme of a single syllable; its high-ranking disfavors the production of the incorrect form \*[bujd] due to having the sequence of two high elements [uj] in the syllable rhyme, and in this situation, coalescence is preferred over glide formation. Glide formation in this incorrect candidate constitutes a violation of both OCP[+high]/rhyme and IDENT (V2); among these, OCP[+high]/rhyme, being inviolable, dominates UNIFORMITY.

**OCP[+high]/rhyme:** In the mapping from input to output, a sequence of two high elements within the rhyme of a single syllable is not permitted, and a violation mark must be assigned for each occurrence of this situation.

The examination of the processes of deletion, glide formation, and coalescence in person markers to satisfy the constraint ONSET and resolve vowel hiatus led to the identification of unfaithful mappings. The analysis of these mappings within the framework of Parallel Optimality Theory revealed the active markedness constraints, the violated faithfulness constraints, and the ranking among them. The following descriptive generalization is, in a sense, an overall summary of what has occurred in the process of resolving vowel hiatus in the markers.

**Descriptive Generalization (6):** Vowel hiatus is not acceptable in Kalhori Kurdish; this situation is resolved in person markers by deleting the vowel of the grammatical element, unless these vowels possess the feature [+high], in which case they are converted to their corresponding glide, unless glide formation results in two high elements occurring in the margin of a single syllable, in which case the two consecutive vowels coalesce.

Thus, having identified deletion, glide formation, and coalescence as the first, second, and third strategies, respectively, for resolving vowel hiatus in person markers, the final ranking of the constraints, based on the transitivity principle, is presented below. According to the transitivity principle, whenever constraint A dominates constraint B, and constraint B dominates constraint C, then constraint A also dominates constraint C.

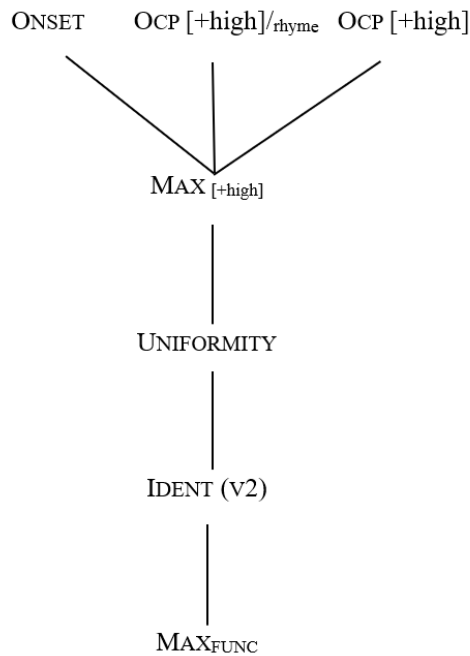
$$\left. \begin{array}{l} \text{IDENT (V2)} \gg \text{MAX}_{\text{FUNC}} \\ \text{UNIFORMITY} \gg \text{IDENT (V2)} \\ \text{UNIFORMITY} \gg \text{MAX}_{\text{FUNC}} \end{array} \right\} \text{UNIFORMITY} \gg \text{IDENT (V2)} \gg \text{MAX}_{\text{FUNC}}$$

From the above dominance relations and based on the tableaux obtained thus far, the dominance relation UNIFORMITY >> IDENT (V2) >> MAX<sub>FUNC</sub> was established. It is necessary to recall that all these processes have been applied to satisfy the constraint ONSET. In almost all analyses and tableaux, the domination of this constraint over all the above dominance relations was demonstrated, such that ONSET >> UNIFORMITY >> IDENT (V2) >> MAX<sub>FUNC</sub>.

| /di-imen/              | ONSET | OCP<br>[+high]/rhyme | OCP<br>[+high] | MAX<br>[+high] | UNIF | ID<br>(V2) | MAX<br>FUNC |
|------------------------|-------|----------------------|----------------|----------------|------|------------|-------------|
| a. <sup>∅</sup> di.men |       |                      |                | *              |      |            | *           |
| b. dij.men             |       | *W                   | *W             | L              |      | *W         | L           |
| c. di.imen             | *W    |                      |                | L              |      |            | L           |
| /ba-r:d/               |       |                      |                |                |      |            |             |

|                                   |    |    |    |    |  |   |    |
|-----------------------------------|----|----|----|----|--|---|----|
| a. $\text{ba}_{\text{ɪ}}\text{d}$ |    |    |    |    |  | * |    |
| b. bad                            |    |    |    | *W |  | L |    |
| c. ba.r:d                         | *W |    |    |    |  | L |    |
| <b>/ba-id/</b>                    |    |    |    |    |  |   |    |
| a. $\text{ba}_{\text{ɪ}}\text{d}$ |    |    |    |    |  | * |    |
| b. bad                            |    |    |    | *W |  | L | *W |
| c. ba.id                          | *W |    |    |    |  | L |    |
| <b>/bu-id/</b>                    |    |    |    |    |  |   |    |
| a. $\text{by}_{\text{d}}$         |    |    |    |    |  | * |    |
| b. bujd                           |    | *W | *W |    |  | L | *W |
| c. bud                            |    |    |    | *W |  | L |    |
| d. bu.id                          | *W |    |    |    |  | L |    |

**Tableau 12– Dominance Relations of Markedness and Faithfulness Constraints for Explaining Variation in Markers**



**Figure 3 – Hasse Diagram of (12)**

#### 5.4 .Non-application of Epenthesis

Jafari and Fattahi (2025), in their examination of clitics, have shown that in Kalhori Kurdish, a glide epenthesized between two vowels always corresponds to the preceding vowel, i.e., V1. If V1 is a vowel for which the corresponding glide does not exist in the phonological system of this dialect, a method other than epenthesis is applied. They have also shown that in the phonological system of Kalhori Kurdish, only [+high] vowels have corresponding glides; the observation of glides other than these constitutes a violation of the constraint  $*\begin{bmatrix} -\text{high} \\ -\text{syll} \end{bmatrix}$ . Now, examples of vowel hiatus in the person markers of this dialect are analyzed where, despite the conditions for glide epenthesis being present, this phenomenon does not occur. For instance, consider the two incorrect phonetic forms \*[dijem] and \*[buwem] meaning "I saw" and "I should be." Although in these two candidates the epenthesized glide corresponds to the first vowel, and although they are considered optimal candidates with respect to constraints opposing deletion, glide formation, and coalescence, they are not winning candidates and such forms are not produced in Kalhori Kurdish. The correct forms of these two verbs are obtained through the deletion process and manifest as [dim] and [bum]. The reason why this epenthesis does not occur, despite the conditions being present, relates to the constraint OCP[+high]. Epenthesizing the glide corresponding to the first vowel in the incorrect candidates \*[dijem] and \*[buwem] creates a sequence of two high elements—a sequence of a high vowel and its corresponding glide; a process whose application constitutes a violation of the dominant constraint OCP[+high], a constraint which disfavors a sequence of two high elements. Therefore, the incorrectness of the above candidates and the non-application of epenthesis in the person markers is considered a fatal violation of the dominant constraint OCP[+high], and any candidate that violates this constraint will certainly be eliminated from the competition. Tableau (13) shows the non-application of epenthesis in the person markers.

| /di-em/                      | ONSET | OCP[+high] | MAX <sub>FUNC</sub> |
|------------------------------|-------|------------|---------------------|
| a. $\text{d}^{\text{h}}$ dim |       |            | *                   |
| b. di.jem                    |       | *W         | L                   |
| c. di.em                     | *W    |            | L                   |

Tableau 13 - ONSET, OCP[+high]>> Max<sub>FUNC</sub>

## 6 .Conclusion

In the present study, it was first demonstrated that person markers in Kalhori Kurdish have an initial vowel in their underlying representation, and that when attached to vowel-final stems, vowel hiatus occurs. Subsequently, it was determined that these morphemes adopt processes such as deletion, glide formation, and coalescence in order to resolve vowel hiatus and satisfy the constraint ONSET, and that in the case of glide formation, the second vowel always converts to its corresponding glide.

Further analysis revealed that the primary strategy employed by person markers for resolving vowel hiatus is the deletion process, which is prioritized for two reasons: first, the nature of the vowels in hiatus in these cases is such that neither the epenthesis of a glide corresponding to the first vowel, nor the conversion of the second vowel to a glide, nor the coalescence of the two vowels is possible; second, the type of deletion in person markers differs from that in clitics. This process in person markers results in a violation of the constraint opposing the deletion of grammatical elements, namely MAX<sub>FUNC</sub>, which has a low ranking in Kalhori Kurdish and is violable. For this reason, it can be selected as the first strategy.

The reason for the second strategy, in which the vowel undergoes glide formation instead of deletion, is the high quality ([+high]) of the marker vowel. In Kalhori Kurdish, a constraint opposing the deletion of high vowels is active, which does not permit the deletion of these vowels; therefore, vowel hiatus is resolved through the application of glide formation. It was also determined that another constraint is placed among the dominant, inviolable constraints which does not permit two high elements (whether vowel-vowel or glide-vowel) to occur within the syllable rhyme. This situation arises when, in addition to the marker vowel, the stem vowel is also high. Consequently, in order to prevent two high elements from occurring within the syllable rhyme, the third strategy, namely coalescence, is adopted.

Accordingly, it can be concluded that vowel hiatus in person markers is resolved through the strategies of deletion, glide formation, and coalescence, the application of which are prioritized as first, second, and third, respectively. Furthermore, the dominance relations of the constraints involved in these processes were established as follows:

ONSET, OCP[+high]/rhyme, OCP[+high] >> MAX[+high] >> UNIFORMITY >> IDENT (V2) >> MAXFUNC

This ranking accounts for the full range of alternations observed in Kalhori Kurdish person markers and demonstrates the complex yet systematic interaction of markedness and faithfulness constraints in this dialect. The findings contribute to the broader understanding of morphophonological processes in Kurdish and Iranian linguistics, and highlight the typological position of Kalhori Kurdish among related varieties.

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