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Word order and stress reconstruction in Persian

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This paper offers a new theory of nuclear stress assignment, focusing on data from Persian (an SOV language) and English (an SVO language). The proposed theory bypasses phrases and assigns nuclear stress to the last element of the sentence by default. Deviations from this pattern (which are abundant in Persian) are explained through "stress reconstruction" effects; even non-final elements that receive nuclear stress are base-generated at the lowermost position. Relying on the theory of antisymmetry, it is argued that the syntactic movements that are responsible for the SOV surface order are also responsible for non-final nuclear stress. In this manner, a combination of three assumptions already existing in the literature (antisymmetry, stress reconstruction, and rightmost prominence) is used to account for the Persian stress facts. The argument involves new data that challenge existing accounts of the language. Most importantly, it is shown that Persian ACC-marked objects behave in the same way as other objects in terms of stress assignment. Second, a range of sentence types with nuclear stress on post-verbal elements in Persian are discussed, challenging Kahnemuyipour's (2004; 2009) phase-based theory, which places nuclear accent on the highest element in the vP phase. Third, it is shown that the stress patterns in Persian scrambled sentences are most easily accounted for through stress reconstruction.

1 Introduction

In English, as well as in many other languages, among the words that receive pitch accent in a sentence, the last one is perceived to have a stronger accent. This final pitch accent is referred to as "main stress", "sentential stress", "nuclear stress", or "nuclear pitch accent". In the examples below, I mark words that have nuclear stress with double underlines.

(1) a. Mary <u>left</u>.
     b. Mary is watching a <u>movie</u>.
     c. Mary fell in a <u>trap</u>.
     d. Mary installed the painting on the <u>wall</u>.
     e. Mary reads books <u>slowly</u>.

As exemplified in these sentences, English sentences may end with different elements (verb, object, PP, and manner adverb in these particular examples), but the last element tends to receive nuclear stress in most sentence types. The importance of finality in nuclear stress assignment is acknowledged in several theories either completely (e.g. Newman 1946; Chomsky & Halle 1968; Zubizarreta 1998; Samek-Lodovici 2005) or partially as a manifestation of a general tendency for edges to receive prominence (e.g. Halle & Vergnaud 1987; Hayes & Lahiri 1991; Kahnemuyipour 2003; Sato 2012). However, it has long been known that in many languages, nuclear stress does not generally fall on the rightmost element. Consider the sentences in (2) from Tehrani Persian (henceforth Persian).[1]

(2) a. maryam <u>raft</u>.
         Maryam left
         "Maryam left."
     b. maryam dâre <u>film</u> tamâshâ   mikone.
         Maryam has   film watching does
         "Maryam is watching a movie."
     c. maryam tu <u>tale</u> oftâd.
         Maryam in trap fell
         "Maryam fell in a trap."

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[1] There are fundamental differences between Persian and languages like English regarding the phonological nature of stress. English stress tends to alternate between syllables, exhibits hierarchical prominence, and has strong manifestations in vowel duration and quality. Moreover, in English, the low and high pitch targets associated with a pitch accent vary depending on the tune (see Ladd 2008 for a review). Persian stress — or perhaps more accurately, "accent" (see Abolhasanizadeh et al. 2012; Rahmani et al. 2018) — has none of these properties. Nevertheless, it seems justified to speak of nuclear stress as a single concept in the two languages. As the last pitch accent in the Intonational Phrase, it is perceived as the most prominent pitch accent and shifts position as a function of focus and givenness. Moreover, as we shall see, it seems to interact with syntax in similar ways in the two languages.

    d.   maryam naqqâshi＝ro   zad be <u>divâr</u>.
        Maryam painting＝ACC hit   to   wall
        "Maryam installed the painting on the wall."

    e.   maryam <u>ârum</u> ketâb mikhune.
        Maryam slow   book   reads
        "Maryam reads books slowly."

While the last element receives nuclear stress in two of the examples in (2), it does not in the other three. It is also interesting that the element receiving nuclear stress in each of the Persian sentences corresponds to the last element in the English version; a point to which we shall return. In the present article, I argue that the relationship between nuclear stress and finality is relevant in Persian as well and can in fact be used to account for the Persian stress facts in an efficient way. The main idea is that even in cases where non-final elements receive nuclear stress, they do so only by virtue of having moved from the final position. Assuming a relationship between movement and stress assignment is rooted in the work of Bresnan (1971; 1972) and has been popular in accounts of stress above the word level in recent decades (e.g. Selkirk 1995; Legate 2003; Truckenbrodt 2019; Büring & Truckenbrodt 2021).

Apart from offering this theory, a major contribution of the present paper is the introduction of new sets of data from Persian that challenge existing theories. Given that the most successful theory of nuclear stress with respect to the Persian data is that of Kahnemuyipour (2009), a substantial portion of this article engages with that work. The most crucial pieces of data in this regard are argument PPs, ACC-marked objects, and scrambled sentences. The behavior of argument PPs is used as evidence against the phase-based account of Kahnemuyipour (2009). The stress patterns of Persian sentences with ACC-marked objects and scrambled sentences are used to show that the Persian stress facts not only do not call for an exclusively surface-based account, but may in fact militate against it and serve as evidence in favor of the relevance of movement and stress reconstruction effects.

After some preliminary material in Section 2, I begin the argument in Section 3 by showing that the position of nuclear stress is consistent across Persian sentences with different patterns of scrambling and argue that regardless of our general theory of nuclear stress, these similarities in stress patterns may be accounted for using Truckenbrodt's (2019) account of stress reconstruction.

In Section 4, I introduce the new theory, according to which nuclear stress is assigned to the final element and may be reconstructed for an element that has moved from the final position. If we assume a right-branching base order and explain the surface ordering through movement as in Kayne (1994), the non-finality of the verbal arguments in Persian and the non-finality of nuclear stress can be systematically connected through movement and stress reconstruction. In other words, I aim to show that by simply assuming Kayne's (1994) antisymmetry, a general

tendency for finality of nuclear stress, and Truckenbrodt's (2019) "stress reconstruction", patterns of nuclear stress assignment in Persian (and English) are automatically predicted with more success compared to previous theories.

2 Background

This study is limited to sentences in Tehrani Persian consisting of a single Intonational Phrase (IP).[2] Each word in a Persian sentence is either completely deaccented or bears a pitch accent on one of its syllables. The last pitch accent in an IP is perceived[3] as stronger than the rest and is referred to as nuclear stress. Following Mahjani (2003) and Sadat-Tehrani (2007) (as well as my own acoustic measurements and intuitions as a native speaker), I take these as the only distinct degrees of accentual prominence in simplex sentences with neutral focus in Persian. An example is presented in (3). I show words with regular pitch accent with single underlines and those bearing nuclear pitch accent with double underlines.

(3) maryam diruz   tu râh = e   khune kabâb khord.
     Maryam yesterday in way = EZ home   kebab ate
     "Maryam ate kebab yesterday on the way home."

The last word in (3) is completely deaccented such that none of its syllables is in any way more prominent than the others (The leveling of the syllables in deaccented final words is mentioned by Eslami 2000; Vahidian Kamyar 2001; and Kahnemuyipour 2003 and experimentally confirmed by Rahmani et al. 2018 and Sadeghi 2018 Section 2.4). Words that follow the element bearing nuclear accent are always deaccented.

The main question we are interested in is what determines the position of the nuclear accent in the sentence. Since every word following the nuclear stress is necessarily deaccented, one way to approach this question is to begin by determining which words receive pitch accents. This makes the task of finding the position of the nuclear accent trivial: the last pitch-accent-bearing word is the one with nuclear accent.

2.1 The phrasal approach

A potential path for implementing the idea described above is to account for pitch accent placement through phrasal prominence. Motivated by observations in English and several other

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[2] I only use affirmative sentences. As Kahnemuyipour (2003) has shown, negative Persian sentences have nuclear stress on the negated verb in the default case because negated verbs are treated as focused. Kahnemuyipour (2003) seems to suggest that this focus is necessarily contrastive, but I do not see that necessary. This has no bearing on the discussions of the present paper.

[3] It has been observed in different languages that nuclear accent is perceived as more prominent even though this does not seem to have any direct phonetic justification. Given that the perceived prominence is significant in its own right and that elements after the nuclear accent are deaccented, I continue to treat nuclear accent as a special entity worthy of investigation (see Ladd 2008: Section 7.1.2).

languages, the idea would be that words are those that are prominent in their respective phrases receive pitch accents. Depending on the specific implementation of the idea, "phrase" could be construed as syntactic phrase or (more commonly) Phonological Phrase, which is a phonological entity above the word level that only partially corresponds to the syntactic phrase and constitutes a level of the Prosodic Hierarchy (Selkirk 1980; 1984; Nespor & Vogel 1986). Under theories that adopt this approach, the position of nuclear stress may simply be determined as the last word of the sentence (or, more precisely, of the Intonational Phrase) that bears phrasal stress.

Let us now see how the position of phrasal stress inside each phrase is determined in phrasal approaches. In some theories, phrasal stress would be assigned to an edgemost word within a phrase (e.g. Chomsky & Halle 1968; Halle & Vergnaud 1987; Hayes & Lahiri 1991; Kahnemuyipour 2003). For instance, the word "rug" in the English phrase "the old red rug" would receive phrasal stress because English assigns phrasal stress on the right end of the phrase. A more language-neutral version of the phrasal approach (Truckenbrodt 1995; 2019) relies on the constraint "STRESS-XP" and tends to assign stress to the elements that are most deeply embedded in nested phrase structures. Roughly stated, STRESS-XP requires each phrase to contain one beat of stress. Moreover, it is assumed that phrasal stress "is assigned minimally but enough to satisfy STRESS-XP for all XPs" (Büring & Truckenbrodt 2021). Since a stress on an inner phrase satisfies the constraint on outer phrases too, the constraint may be minimally satisfied by just a stress on the innermost element in a nested phrasal structure. For instance, in [X [Y [Z]]], a stress on Z is sufficient to satisfy the constraint for all three phrases. This successfully captures the cross-linguistic observation that in both [V DP] and [DP V] constructions, nuclear stress appears inside the object DP. In the simplified structure in (4), this mechanism correctly predicts a stress on the object.

(4) $[_{VP} [_{NP} \underline{kabâb}]$ khordam]
                kebab   I.ate
        "I ate kebab."

In spite of its appeal, the phrasal approach does not seem to be suitable at all for handling stress above the word level in Persian. This is not immediately evident by looking at the way Persian nuclear stress behaves, but becomes clear in light of the fact that the concept of phrasal stress hardly has any manifestation in this language. Unlike many languages, Persian generally does not exhibit any kind of rhythmic alternation throughout the sentence. This is clearly shown in Sadat-Tehrani's (2007) experiment-based study and has been highlighted in (Rahmani 2019: Ch. 3) and Gussenhoven (2022). Factoring out a few special cases of sentence-medial deaccenting,[4] all lexical

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[4] The most important case of sentence-medial deaccenting is the deaccenting of certain types of subordinate clauses (see Sadat-Tehrani 2007: Ch. 5, Rahmani 2019: Ch. 3 for examples and generalizations on the facts). I do not discuss sentence-medial deaccenting in this paper.

words preceding nuclear stress are equally accented. Outside of the verbal domain, in virtually all environments where one expects a sequence of words to form a single Phonological Phrase given common assumptions regarding the prosodic hierarchy, we observe that every lexical word receives its own pitch accent and no hierarchy of prominence is formed. A few examples are shown (5).

(5) a. <u>piran</u>=e <u>maryam</u> <u>qashang</u>=e.
    dress=EZ Maryam beautiful=is
    "Maryam's dress is beautiful."

   b. <u>jodâyi</u> az <u>khânevâde</u> <u>sakht</u>=e.
    separation from family   difficult=is.
    "Being separated from one's family is difficult."

   c. <u>ye</u> <u>zendâni</u> <u>farâr</u> karde.
    one prisoner escape has.done
    "A prisoner has escaped."

   d. <u>ba'zi</u> <u>heyvunâ</u> <u>khatarnâk</u>=an.
    some animals dangerous=are
    "Some animals are dangerous."

   e. <u>in</u> <u>ketâb</u> <u>jâleb</u>=e.
    this book interesting=is
    "This book is interesting."

The items of interest in each sentence are the words before the nuclear stress. Example (5a) features a regular possessive construction. Possession is expressed in Persian with the possessor following the possessee with the morpheme *e* (called the *ezafe* morpheme) intervening between them. The possessor and the possessee both receive pitch accents (see Hosseini 2014 for examples and discussion). Example (5b) shows that a noun and its PP modifier both receive pitch accent. Finally, in examples (5c–e) we see that numerals, quantifiers, and demonstratives receive pitch accent and are therefore accentually as strong as the noun they modify. The same stress patterns are reported for similar constructions in the experimental study by Sadat-Tehrani (2007).[5] In all of these examples, the existence of the accent on the modifying words can be confirmed by replacing them with unaccented prepositions and making a comparison. For instance, replacing *ye zendâni* 'a prisoner' with *bâ zendâni* 'with the prisoner' results in a visibly different pitch contour since the first pitch accent would be lost.

  Obviously, the above facts do not make the prosodic hierarchy (or the concept of Phonological Phrases in particular) irrelevant in Persian phonology in general. What these facts suggest is that

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[5] In addition to his general analysis, the pitch contours and discussions pertaining to the following examples in his work are relevant here: Figures 66 and 68 (numerals), 43 (quantifiers), and 70 (demonstratives).

the question of whether a word is deaccented or receives a pitch accent in Persian cannot be answered through phrasal prominence. This makes phrasal prominence unusable for determining the position of nuclear stress.

In spite of what was said, Kahnemuyipour (2003) attempts to offer a phrasal account of the type described earlier for Persian. However, the success of this theory is limited to the verbal domain (Kahnemuyipour 2018; Rahmani 2019). The only type of nominal phrases Kahnemuyipour (2003) invokes for supporting his analysis are DPs containing demonstratives. For these, he reports accent patterns that do not match those of Sadat-Tehrani (2007: 123) and example (5f), but this turns out to be the result of an inaccuracy in reporting the data as explained in Rahmani (2019: Sec. 3.4.3).
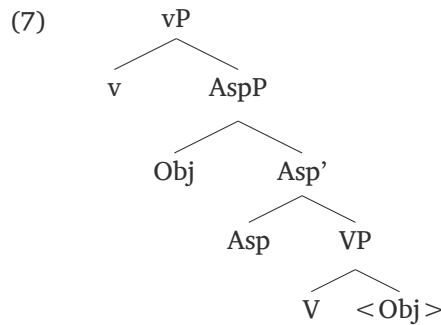
Another related theory of nuclear stress that needs to be mentioned is that of Cinque (1993), which ultimately relies on phrasal prominence as characterized in Halle & Vergnaud (1987). Roughly put, the main intuition behind Cinque's (1993) theory is that nuclear stress is assigned to the most deeply embedded element in the sentence. With a logic similar to what we saw in the case of one of its successor theories, i.e. STRESS-XP, this predicts nuclear stress to go on the object in both [V DP] and [DP V] constructions. However, unlike Truckenbrodt's (1995; 2019) STRESS-XP theory, Cinque (1993) does not identify the position of nuclear stress based on it being the last pitch accent in the sentence and does not require all phrases to contain "beats of stress". For instance, in a hypothetical structure such as (6), Cinque's (1993) theory predicts C to receive nuclear stress in the most general case, since it is the most deeply embedded element. However, according to Truckenbrodt's (1995; 2019) STRESS-XP theory, to guarantee that every phrase receives a beat of stress, each of C and D must bear stress, and nuclear stress is eventually assigned to D as the rightmost element among the two.

(6)   [A [[B [C]] [D]]]

It is not possible to present a detailed comparison of these theories and their predictions here. We may mention in passing that a few problems with Cinque's proposal have been discussed in the literature (e.g. Kahnemuyipour 2009: 36–42), mostly related to the difficulties that arise in situations where a non-final constituent (e.g. the subject) has a multi-layered internal structure that is deeper than the rest of the sentence (for a discussion of how Cinque addresses these cases and the potential issues, see Zubizarreta 1998: 86–88). Moreover, as Kahnemuyipour (2009) has noted, this theory cannot account for the position of nuclear stress in Persian sentences involving manner adverbs (see Section 3.4). In fact, two other major theories that inherit important elements of Cinque's (1993) work (i.e. Zubizarreta 1998; Legate 2003) suffer from the same problem in dealing with Persian manner adverbs (see Kahnemuyipour 2009 for a detailed discussion of the topic).

2.2 The phase-based approach

As far as the Persian data are concerned, the most successful theory of nuclear stress is that of Kahnemuyipour (2004; 2009). In this theory, Kahnemuyipour departs from the phrasal approach of Kahnemuyipour (2003) and argues for a purely syntactic theory of nuclear stress relying on phase theory. Adopting the common assumption that only CPs and (transitive or unergative) vPs constitute syntactic phases, his argument is that sentential stress is assigned to the highest element in the complement of a phase head. In this theory, the stress assigned at the vP phase is stronger than the one assigned at the CP phase.[6] In practice, this puts nuclear stress on the first element of the verbal domain in most Persian sentences. Crucially, this analysis is sensitive only to the surface syntactic form. Adopting Kayne's (1994) antisymmetry, he assumes that objects merge to the right of verbs in Persian but move higher to the specifier position of AspP. The Persian verb, however, does not move to the v head in his theory. This is shown in (7).

(7)

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              vP
            /    \
          v      AspP
                /    \
             Obj     Asp'
                    /    \
                 Asp      VP
                        /    \
                       V   <Obj>
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Let us see how this theory works in action. In the sentences in (8), the complement of the v head according to Kahnemuyipour (2009) is enclosed in brackets. Only nuclear stress is shown.

(8) a. maryam [neshast].
         maryam sat
         "Maryam sat down."

     b. maryam [pitzâ khord].
         Maryam pizza   ate
         "Maryam ate pizza."

     c. maryam pitzâ=ro   [khord].
         Maryam pizza=ACC ate
         "Maryam ate the pizza."

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[6] According to Kahnemuyipour (2009), the highest element in the complement of the C head receives secondary sentential stress in Persian. However, this does not seem to be correct according to my measurements (as well as impressionistic judgments) and is not corroborated by existing phonetic studies (Eslami 2000; Mahjani 2003; Sadat-Tehrani 2007).

    d.   maryam [<u>tond</u> pitzâ mikhore].
         maryam fast   pizza eats
         "Maryam eats pizza quickly"

    e.   maryam hamishe [<u>pitzâ</u> mikhore].
         maryam always   pizza eats
         "Maryam always eats pizza."

    f.   maryam [tu <u>tale</u> oftâd].
         maryam in   trap fell
         "Maryam fell in a trap."

    g.   maryam tu arusi   [<u>raqsid</u>].
         Maryam in wedding danced
         "Maryam danced at the wedding."

    h.   <u>bârun</u> umad.
         rain   came
         "It rained."

In (8a), the highest element in the complement of the v head is the verb itself. In (8b), it is the object. Thus, the appearance of nuclear stress on the verb in (8a) and the object in (8b) is correctly predicted. In (8c), relying on a vast literature on ACC-marked objects in Persian and elsewhere, Kahnemuyipour assumes that the ACC-marked object (marked by the morpheme *ro*) has moved out of the verbal domain, leaving the verb as the highest element in the complement of the v head and thereby allowing it to receive nuclear stress. The contrast between (8d) and (8e) follows smoothly from the assumption that manner adverbs are inside the verbal domain[7] while temporal adverbs are not. Again, in both cases, nuclear stress falls on the first element inside the verbal domain. In (8f), the PP *tu tale* "in trap" receives nuclear stress because it is an argument of the verb and therefore inside the verbal domain. Conversely, the PP in (8g) does not receive nuclear stress because it is not an argument and falls outside of the verbal domain. Finally, in the unaccusative construction in (8h), there is no vP phase under the CP, making the subject the highest element in the complement of the first phase head (i.e. the C head).

    Kahnemuyipour's (2009) theory is strictly surface-sensitive. This allows him to account for the apparent difference (but see Section 4.2) between the behaviors of non-ACC-marked and ACC-marked objects in (8b) and (8c) relying on their different surface positions and regardless of their identical merge positions. Similarly, this allows Kahnemuyipour (2009) to adopt Kayne's (1994) theory of antisymmetry and assume that Persian's surface SOV structure starts off as SVO. Since it is only the surface structure that matters, the non-ACC-marked object may receive nuclear stress

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[7] In sentences containing manner adverbs, he assumes that the specifier position of another functional projection between AspP and vP hosts the manner adverb.

as the highest element in the complement of the v head even though it is quite low at merge under antisymmetric assumptions.

It is now time to examine potential drawbacks of Kahnemuyipour's (2009) theory and justify the need for an alternative approach. Conceptually, it seems problematic that in Kahnemuyipour (2009) and its expansion in Kratzer & Selkirk (2007), there is no systematic explanation for why the very elements that steal nuclear stress from the verb in Persian (objects, PP arguments, and manner adverbs) tend to do so in English too. These elements have different surface positions in the two languages and therefore the phase-based approach assigns them nuclear stress for different reasons in Persian and English. For instance, in (8b), the object "pizza" receives nuclear stress in the equivalent English sentence too even though it follows the verb. Kahnemuyipour's (2009) explanation for the English pattern is that the verb is outside of the verbal domain in English. Thus, the similarity between the two languages is accidental. A similar situation holds in examples (8d) and (8f) with manner adverbs and PP arguments respectively. I believe that these correspondences are not accidental and need to find a systematic explanation in a successful theory of nuclear stress.

A related issue concerns the relationship between finality and nuclear stress. In Kahnemuyipour's (2004; 2009) theory and its revised version in Kratzer & Selkirk (2007), no such systematic relationship is acknowledged. Thus, it seems to be almost an accident that in a vast range of English sentences the last element receives nuclear stress (as is the case in all of the examples in 8). The importance of finality in nuclear stress assignment is discussed in more detail in the Section 4.

Putting aside these theoretical considerations, Kahnemuyipour's (2009) theory suffers from at least three empirical issues in relation to Persian. The first issue is that contrary to what it predicts, the same word receives nuclear stress in scrambled and non-scrambled sentences in Persian, suggesting that the surface position of elements is not all that matters in nuclear stress assignment. This is discussed in Section 3. The second issue is that once we eliminate confounding information structure effects, we observe that contrary to what Kahnemuyipour (2009) and a few other scholars have assumed, specific and non-specific objects do not have different stress patterns. This is argued for extensively in Section 4.2. Finally, Kahnemuyipour (2009) does not discuss a large class of PP arguments that follow the verb. In Sections 4.4, I show that the stress behavior of these PPs in Persian does not match Kahnemuyipour's (2009) predictions as they receive nuclear stress even though there is compelling evidence showing that the highest element in the verbal domain is the verb itself.

3 Stress reconstruction

Before moving forward and presenting cases where the pre-movement positions of elements affect nuclear stress assignment, it is useful to lay out the formal details of how such an effect may be

accounted for. I adopt Truckenbrodt's (2019) concept of "stress reconstruction", which in turn ultimately relies on the proposal presented by Bresnan (1971; 1972). Bresnan uses movement to explain the accent patterns in certain types of sentences in English. Consider the sentences in (9), where the last pitch accent (marked with double underlines) is not on the last content word in the sentence. In this representation, in anticipation of the discussion that is to follow, the empty positions of the elements that have moved up from the end of the sentence have been marked as blank.

(9)   a.   Mary liked the <u>proposal</u> that John left __.
        b.   John asked what <u>books</u> Helen had written __.
        c.   George found some <u>friends</u> he'd like you to meet __.

Bresnan's proposal is based on Chomsky and Halle's (1968) Nuclear Stress Rule (NSR), which assigns stronger stress to the last prominent vowel in a phrase. However, if the original NSR is applied to the surface form of the sentences in (9), the wrong accent patterns would be predicted (placing stress on the final verb in all three cases). Bresnan's (1971; 1972) idea relies on the fact that under standard assumptions, the word receiving nuclear stress has moved from the end of the sentence to its surface position. Bresnan offers a solution involving cyclic application of the NSR through the transformational cycles that would derive the surface syntactic form in early generative grammar. The crucial component of her account is that earlier applications of NSR occur before movement in these examples, with the effect that the base positions of the elements have a visible effect in the final accent pattern.

Truckenbrodt (2019) offers a theory producing similar results in the context of more recent assumptions about the architecture of grammar, i.e. the copy theory of movement (Chomsky 1993).[8] In this approach, an element may receive a certain degree of prominence not because of its own position, but because of the position of its lower copy. This type of "stress reconstruction" is similar in nature to reconstruction in other aspects of grammar, e.g. in binding.

3.1 Nuclear stress in scrambled sentences

We may now begin looking at the interaction between scrambling and nuclear stress in Persian. Persian allows a wide range of scrambling options. This relatively free word order offers new insights into the behavior of stress above the word level in the language. Let us begin by looking at a few different ways the elements in a sentence can be scrambled, as shown in (10).

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[8] To be able to account for certain cases where the effect is blocked, Truckenbrodt (2019) and Büring & Truckenbrodt (2021) frame the effect in the context of a multi-dominance view of movement as developed in Chomsky (2008). The absence of nuclear stress on topicalized ACC-marked objects can be accounted for in this manner by assuming that topics are special in that they are not linked to their lower copies.

(10)   a.   <u>maryam</u> <u>hamishe</u> <u>ârum</u> pitzâ mikhore.

            Maryam always slow pizza eats

            "Maryam always eats pizza slowly."

       b.   <u>hamishe</u> <u>maryam</u> <u>ârum</u> pitzâ mikhore.

            always Maryam slow pizza eats

       c.   <u>hamishe</u> <u>ârum</u> pitzâ mikhore maryam.

            always slow pizza eats   Maryam

       d.   <u>maryam</u> <u>hamishe</u> <u>pitzâ</u> <u>ârum</u> mikhore.

            Maryam always pizza slow eats

       e.   <u>maryam</u> <u>ârum</u> hamishe pitzâ mikhore.

            Maryam slow always   pizza eats

       f.   <u>ârum</u> maryam hamishe pitzâ mikhore.

            slow Maryam always   pizza eats

The first sentence shows the unmarked order. The other sentences are scrambled and vary in their degrees of markedness. However, all of them are certainly passable (unlike permutations such as *maryam hamishe mikhore pitzâ ârum*), and the stress patterns given in (10) are indeed the most neutral stress patterns given these word orders. In other words, for none of these word orders is there another stress pattern that sounds more or equally neutral. The examples in (10) do not cover all acceptable permutations, but they must be sufficient for giving a sense of the general situation, which can be described roughly in the following two generalizations:

1. Across different permutations, nuclear stress is always on the same element.
2. Elements following the sentence's nuclear stress are always deaccented.

To show that this pattern is not due to some form of focus effect specific to manner adverbs, another set of examples is given in (11) and (12). In both cases, the (a) sentence shows the unmarked order. In these sentences, nuclear stress is always on the direct object. To make the evaluation of the situation according to the phase-based theory easy, the complement of the v head is shown with brackets in the (a) examples.

(11)   a.   <u>maryam</u> <u>diruz</u>   [<u>keyk</u> dorost kard].

            Maryam yesterday cake   right   made

            "Maryam baked a cake yesterday."

       b.   <u>maryam</u> <u>keyk</u> diruz   dorost kard.

            Maryam cake yesterday right   made

(12)   a.   <u>dâram</u> [<u>pitzâ</u> mikhoram].
             I.have pizza I.eat
             "I'm eating pizza."
      b.   <u>pitzâ</u> dâram mikhoram.
             pizza I.have I.eat

The adverb *diruz* 'yesterday' in the first example is clearly not a verbal argument and falls outside of the complement of the v head. In fact, suggesting that it is inside the vP causes problems for the phase-based theory because in that case it is expected to receive nuclear stress in (11b). Progressive auxiliaries like *dâram* in (12) are also known to be outside the vP, as they normally appear before non-argument PPs (Ghomeshi 2001; Kahnemuyipour 2003). Thus, we observe that in both scrambled sentences (the (b) examples), the non-ACC-marked object receives nuclear stress even though it has moved out of the vP.

    The fact that the same element receives nuclear stress regardless of the ordering in these examples poses a challenge to surface-based theories. To save these accounts in the face of the present data, one might be tempted to suggest that the (b) sentences in (11) and (12) have narrow focus on the elements bearing nuclear stress, as Karimi (2005: 131–133) suggests for similar cases in Persian and Sato (2012) does with respect to similar data in Japanese. However, at least in Persian, this does not seem to be the case. It is true that the fronting of the object serves a (relatively elusive) pragmatic role in the discourse, but it does not involve focus on the object. All of these sentences can be uttered in contexts where focus on the entire event is expected. For instance, regarding (12b), consider the imaginary dialogue in (12b).

(13)   [-Are you asleep/playing/…?]
       -[na,] <u>pitzâ</u> dâram mikhoram
         no   pizza I.have I.eat
       "No, I'm eating pizza."

It must be noted that in the dialog in (13), as in most other contexts, the unscrambled order (as in 12b) is the unmarked form. But what matters to us here is the fact that the response in (13) is felicitous too. Given that this word order with a nuclear accent on the object is acceptable even when the context forces a wide focus on the entire event, it is clear that this sentence's use is not limited to cases where there is narrow focus on the object. Putting the nuclear stress on any of the the two other words in (13) is completely unacceptable.

    A theory of nuclear stress that relies on stress reconstruction can easily account for the data at hand. If an element that receives nuclear stress does so by virtue of its base position, it is not surprising for it to keep its nuclear stress wherever it moves because its unpronounced copy is still

at the stress-attracting position. This is shown schematically in (14) for a sentence of the form in (11) with a temporal adverb and a non-ACC-marked object.

(14)   Sbj TmpAdv <u>Obj</u> V t$_{Obj}$

To account for the same facts under a surface-based theory, one must probably argue that the movements under discussion constitute PF movement. However, note that everything following the nuclear accent is always deaccented. Thus, the choice of what to deaccent depends on the order created by these movements (e.g. in (11)–(12) some words receive pitch accent only when there is no scrambling). Therefore, under a PF movement scenario, it must be stipulated that nuclear stress assignment occurs before PF movement but the choice of what words receive regular pitch accent and what words are accentless occurs after PF movement. This is shown in (15) for the same sentence type as (14).

(15)   (Hypothetical scenario under a phase-based approach and PF movement)
        Sbj TmpAdv [Obj V]
        Sbj TmpAdv [<u>Obj</u> V]   (Nuclear Stress assignment)
        Sbj <u>Obj</u> TmpAdv V   (PF movement)
        <u>Sbj</u> <u>Obj</u> TmpAdv V   (Word stress assignment)

The item of interest here is the temporal adverb. If we simply assign regular pitch accent to all words preceding nuclear stress as soon as nuclear stress is assigned (i.e. the second line in 15), the temporal adverb must receive a pitch accent too, contrary to fact. Thus, it seems inevitable to separate the assignment of nuclear stress and the assignment of other pitch accents under this approach, as done in (15). Given these complications, it seems reasonable to argue that in the absence of other motivations, the reconstruction account is preferable.

4 A reconstruction-based theory of stress

Having to some extent motivated the relevance of stress reconstruction in Persian, I now turn to the main task of the present paper, which is offering an alternative account of nuclear stress in the language, which relies heavily on stress reconstruction. The theory I propose relies on three main assumptions: 1) stress reconstruction, 2) Kayne's (1994) theory of antisymmetry, and 3) that nuclear stress is assigned to the lowermost element in the syntactic structure. A few remarks regarding these three assumptions are in order.

Stress reconstruction was already discussed in the previous section. It must be noted, however, that regardless of how one treats the Persian scrambling data, there is compelling independent evidence for stress reconstruction (or, more generally, movement effects) in languages like English and German (Bresnan 1971; Selkirk 1995; Legate 2003; Truckenbrodt 2019; Büring & Truckenbrodt 2021).

The second assumption is the theory of antisymmetry. This is a controversial assumption, but one that it is already adopted in major works on the topic such as Kahnemuyipour (2009) and Zubizarreta (1998). To put it concisely, under this theory, asymmetric c-command invariably results in linear precedence. This means that any structure not involving movement in its derivation is strictly right-branching. Thus, in the base ordering, heads always follow adjuncts and precede complements. Wherever a complement appears before its head (as the object does in most Persian sentences), we are dealing with a case of movement from the original complement position to an adjunct position above the head.

The third assumption is not controversial in its essence. The idea that nuclear stress must "by default" appear on the right edge of the IP (to put it in phonological terminology) reflects a widely attested cross-linguistic tendency and aligns well with the edge-oriented tendencies prominence-related phenomena are generally known for. In its spirit, it relies on the observations that led to Chomsky and Halle's (1968) Nuclear Stress Rule (NSR) for English and the phrasal accounts that mark the rightmost phrase in the IP as most prominent (e.g. Hayes & Lahiri 1991; Kahnemuyipour 2003). If we express the same idea in the language of structural relations, we reach a characterization of the phenomenon almost identical to what Zubizarreta (1998) calls "constituent-based NSR" (C-NSR).

Zubizarreta's (1998) theory of nuclear stress defines a hierarchy of metrical prominence relying on asymmetric c-command. She goes into detail to explain how prominence relations are determined in different arrangements. In the present theory, since we are interested only in the merge positions of elements and given that we assume a strictly right-branching underlying order (following Kayne 1994), the picture becomes much simpler: the last element is always the most deeply embedded element and the element that is asymmetrically c-commanded by all other nodes. This element, I argue, is the bearer of nuclear stress.

As mentioned earlier, the relationship between finality and nuclear stress is at the heart of the theory presented in this paper. Even in Persian, where nuclear stress is non-final in most sentence forms, there is reason for acknowledging this relationship. First of all, even though nuclear stress is often non-final in verb phrases, it is final in DPs uttered in isolation as well as simple unergative sentences. More importantly, there is good reason to view non-final stress as marked. This is because it deaccents the words that follow it, thereby neutralizing differences between morpheme sequences that otherwise sound different.[9] Moreover, it is noteworthy that in para-syntactic structures such as lists of items (e.g. "Apples, bananas, oranges."), the default intonation pattern consists of a pitch accent on each word with nuclear accent perceived to be on the last element.

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[9] For instance, the experiments by Rahmani et al. (2018) show that the contrast between *tâbesh* "radiation" with final accent and *tâb=esh* "its swing" with initial accent is neutralized in post-focal environments.

Thus, we may argue that even within Persian, the data suggest that at some level of abstraction, non-final nuclear accent must be understood as reflective of some form of deviation from "normal". By attributing non-final nuclear accent to movement, this insight is nicely captured. In a theory that places nuclear stress on the highest element in the complement of the v head, sentences where nuclear accent is final are deemed as normal as those with non-final nuclear accent and deaccented final words. Even in theories that refer to depth of embedding either directly (e.g. Cinque 1993) or indirectly (e.g. STRESS-XP), although the connection between left-branching structure and non-final stress is captured, the inherent markedness of non-final nuclear stress goes unacknowledged (unless we accept that left-branching structure is in itself "marked").

The combination of our three assumptions simply means that the element that has the rightmost position in the merge order receives nuclear stress regardless of its surface position. Thus, for instance, the appearance of nuclear accent on the object in SOV languages like Persian is a result of the fact that the object is base-generated as a complement to the right of the verb, not because of its surface position (as Kahnemuyipour 2009 argues) or its selectional status in the argument structure (as Schmerling 1976; Gussenhoven 1983; Selkirk 1995; and Zubizarreta 1998 argue). Establishing a connection of this type between merge positions and nuclear stress gives us a powerful tool for accounting for the similarities in nuclear stress assignment between languages that have right-branching and left-branching surface structures.

In the following subsections, I go through major elements appearing in the verb phrase and examine how well our assumptions can predict their stress behaviors. In addition to the theoretical considerations discussed above, it is argued with respect to several phenomena that the antisymmetric account has empirical advantages over competing theories.

4.1 Objects without case marking

Non-ACC-marked and ACC-marked objects show different syntactic behaviors in Persian. This section looks at non-ACC-marked objects (ACC-marked objects are discussed in Section 4.2). In general, the non-ACC-marked object precedes the verb and attracts nuclear stress. In the absence of an object, however, the verb receives nuclear stress. We explain the nuclear stress on the object via movement. Assuming Kayne's (1994) antisymmetry, we expect the object (being a complement) to merge to the right of the verb.

(16) a. <u>maryam</u> [$_{vP}$<u>neshast</u>].
          Maryam   sat.down
          "Maryam sat down"
      b. <u>maryam</u> [$_{vP}$[<u>kabâb</u>] khord [k̶a̶b̶â̶b̶]].
          Maryam   kebab   ate   kebab
          "Maryam ate kebab."

In (16a), nuclear accent is predicted to be sentence-final since there are no order-changing movements (note that a string-vacuous series of movements does not lead to changes in the stress pattern). In (16b), the lower copy of the object is the lowest element in the tree. The pronounced copy of the object receives stress by virtue of the position of its lower copy. This account unifies the stress facts of Persian and SVO languages like English by attributing the presence of nuclear stress on the object to its sentence-final base position.

It is worth noting that there are certain verbs (or certain uses of them) for which a sentence-final object is considered unmarked. In these sentences, nothing is deaccented and the object receives nuclear stress, as shown in (17).

(17) a. <u>susan</u> [_{vP}<u>shod</u>   [<u>ra'is</u>=e   <u>dâneshkade</u>]].
          Susan   became   head=EZ   department
          "Susan became the head of the department."
      b. <u>esm</u>=esh=o   [_{vP}gozâshtim [<u>leylâ</u>]].
          name=3SG=ACC   we.put   Leyla
          "We named her Leyla"

This matches our predictions. In a sentence where the surface order matches the base order, a sentence-final stress is predicted. Kahnemuyipour (2009) does not discusses such cases in Persian. However, it seems that for his account to work, it must be assumed that the verb has moved out of the verbal domain. It must be mentioned that these data are easier to account for under Kratzer and Selkirk's (2007) version of the phase-based theory. They argue that nuclear stress goes on the highest *phrase* in the complement of the v head. Since the verb is not a phrase, they correctly predict the object rather than the verb to receive stress here (without having to assume that the verb has moved out of the verbal domain).

4.2 Case-marked objects

Persian features differential object marking. According to a common view (Browning & Karimi 1994; Karimi 1999; Kahnemuyipour 2009), the presence of the accusative marker denotes specificity in objects. However, other factors such as animacy have been argued to play a role in Persian object marking too (see Samvelian 2018 for a review). The accusative marker is the enclitic *ro* (*râ* in Formal Persian), which is usually pronounced as *o* after consonants. ACC-marked objects tend to precede manner adverbs and adjunct PPs. Thus, most generative syntacticians maintain that ACC-marked objects are positioned outside of the verbal domain (Browning and E. Karimi 1994; S. Karimi 1999; Kahnemuyipour 2003; S. Karimi 2005).

It is often reported that in sentences with ACC-marked objects, nuclear stress goes on the verb rather than the object (Vahidian Kamyar 2001; Kahnemuyipour 2009; Rahmani 2019).

An example provided by Kahnemuyipour (2009) (with minor modifications in formatting and glossing) is given (18).

(18) ali qazâ=ro   <u>khord</u>.
     Ali food=ACC ate.
     "Ali ate the food."

This is in contrast with the behavior of non-ACC-marked objects, which generally receive nuclear stress and leave the verb unaccented, as shown in (19).

(19) Ali <u>qazâ</u> khord.
     Ali food ate.
     "Ali ate food."

At first sight, these data pose a challenge to our theory. Our theory predicts the object to receive nuclear stress in information-structurally neutral sentences regardless of how high in the tree it has moved. It is beyond dispute that given (18) in written form and asked to read it aloud, Persian speakers normally read it with nuclear stress on the verb *khord* 'ate'. Nevertheless, I argue in this section that this is the result of the fact that speakers normally attribute a non-neutral information structure to sentences of this form. I demonstrate that the stress on such sentences in focus-neutral contexts is in fact on the ACC-marked object, just like non-ACC-marked objects. In other words, this is a case where what speakers may identify as the "normal" or "default" accent pattern of a sentence does not correspond to truly wide focus.

The information-structural factor that I argue to be relevant here is topichood. In particular, ACC-marked objects are normally treated as topics and therefore reject nuclear stress. However, once we enforce a reading where such topicalization does not occur, the focus becomes truly wide and ACC-marked objects no longer reject nuclear stress. To see that this is the case, we must first review certain key assumptions regarding focus.

In the following discussion, I make a few simplifying assumptions that do not interfere with the issue at hand. First, the focus domain is assumed to be the entire sentence. Second, the focus is assumed to be a single constituent. Note that only one word within the focus receives nuclear stress. Finally, I concentrate only on cases where no independent givenness effects interfere with the prosodic structure.

As famously proposed by Jackendoff (1972), we may treat focus as a feature present in the syntactic representation. A single sentence with a fixed stress pattern can be ambiguous in terms of what its focus is. In Chomsky's (1971) famous example in (20), for instance, even though nuclear stress is fixed on "shirt", the sentence can be interpreted with the focus being any of the bracketed constituents.

(20)   Was it [*a*an ex-convict [*b*with [*c*a red [*d*<u>shirt</u>]]]] that he was warned to look out for?

Depending on which of the constituents *a* through *d* we take to be the focus, one of the four responses in (21) becomes felicitous.

(21)   a.   No, it was an <u>automobile</u> salesman.
        b.   No, it was an ex-convict wearing <u>dungarees</u>.
        c.   No, it was an ex-convict with a <u>carnation</u>.
        d.   No, it was an ex-convict with a red <u>tie</u>.

There is consensus on the simple generalization that at least under the simplifying assumptions we have adopted, the nuclear stress of the focus domain must be inside the focus. As for the more interesting question of where in the focus the nuclear stress appears, things get more complicated in fringe cases, but under our assumptions, we can confidently rely on an important generalization by Jackendoff (1972), which was later adopted by many others (e.g. Cinque 1993; Zubizarreta 1998; Büring 2016: and implicitly by Kahnemuyipour 2009). According to this generalization, there is no mechanism beside the language's default stress assignment mechanisms for determining which word in the focus receives nuclear stress.

Looking at this from the opposite direction, we may conclude that the words that create focus ambiguity inside a constituent when they receive nuclear stress are those that are given prominence inside that constituent by the language's default stress assignment rules. For instance, the ambiguity in (20) shows that the default stress assignment mechanisms of English give the word "shirt" prominence in any of the constituents *a* through *d*. As we shall see below, this generalization gives us a powerful tool to determine the default stress mechanisms of a language when interference from information structure effects is too subtle to easily eliminate.

With this introduction, we may return to the question of Persian ACC-marked sentences. In (22), the word sequence used in the potential responses corresponds to Kahnemuyipour's (2009) example in (18). Here, the question forces a focus on the entire activity that serves as an alternative to playing. Of the two potential responses, only the one with nuclear stress on the object is felicitous. The author's judgment is confirmed by a survey of five Persian speakers,[10] in which four respondents preferred the (a) answer and one gave both (a) and (b) the perfect score.

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[10] All of the examples in this paper involving questions of focus and information structure were included in the survey. Recordings of the sentences and dialogues (in the author's voice) were played for the respondents (four female and one male, ages 23–38, speakers of Tehrani Persian having come to the US after 20, all with college degree or higher), and they presented their acceptability scores in a questionnaire. The score options were offered as 0 (*qeyr=e qâbel=e qabul* "unacceptable"), 1, 2, and 3 (*binaqs* "perfect"). Of course, the values may be subjective and incomparable from person to person (e.g. one "generous" respondent did not assign a zero to any of the examples). Thus, in most cases, including (22), I rely on the comparison of pairs of sentences and if five or four of the respondents prefer one option and no respondent prefers the other option, I present it as the only felicitous answer.

(22)   - [Did Ali play?]

        - (a) [na,] <u>qazâ</u>=ro   khord.
                no   food=ACC he.ate

        - (b) # [na,] qazâ=ro <u>khord</u>

        "He ate the food."

Relying on Jackendoff's generalization, we may argue that it is the "default" rules that are responsible for assigning nuclear stress to the ACC-marked object rather than the verb. Crucially, a nuclear accent on the verb is allowed only when there is narrow focus on the verb. The asymmetry between the verb and its object clearly shows the special status of the object as the rightful bearer of "default" stress.

Before looking at more examples, let us see how the stress pattern Kahnemuyipour (2009) observes for (18) and its contrast with the data in (22) must be explained. It seems undeniable that examples such as (22) reflect truly wide focus, meaning that cases such as (18) are the ones with non-neutral information structure in spite of sounding more "normal" in most situations. Identifying the exact information-structural mechanism that leads to (18) behaving in the way it does is not part of the immediate goal of this paper and I do not discuss it in detail, but it seems to suggest that the object rejects nuclear stress in (18) because it is topicalized. Many researchers have argued for a close connection between ACC-marked Persian objects and topicality (e.g. Peterson 1974; Ghomeshi 1997; Dalrymple & Nikolaeva 2011; Samvelian 2018).[11]

A somewhat similar situation holds in Turkish. Turkish ACC-marked objects are similar to their Persian counterparts and have similarly been argued to mark specificity (Enç 1991) and move out of the vP (Diesing 1992; Zidani-Eroğlu 1997; Kelepir 2001). Interestingly, earlier work on Turkish reported that ACC-marked objects do not receive nuclear stress (Orgun & Inkelas 2005), but it was shown later by authors such as Üntak Tarhan (2006) and Nakipoğlu (2009; 2019) that such cases all involve information-structural interference.

Given the similarities between Turkish and Persian in differential object marking and intonational patterns, the above point makes the claim being made in this paper regarding ACC-marked objects receiving nuclear stress in the default case more plausible. Nevertheless, the situation is not necessarily identical in the two languages. I rely on topicalization in my account and assume that elements can be topics without being given in the discourse (e.g. see Jäger 2001; Kratzer & Selkirk 2007 for analyses with the same assumption). Thus, the stress-rejecting ACC-marked objects in Persian are not necessarily discourse-given. This can explain why even isolated

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[11] Most of these works suggest that ACC-marked objects are always topicalized. Clearly, this is not the position I take here. Instead, I argue that through pragmatic mechanisms that remain to be explored, ACC-marked objects "normally" behave in this manner. However, as cases like (22) and the examples in the rest of this section show, this is not always the case.

sentences presented to speakers in written form are typically read without nuclear stress on the object, even though no relevant discourse exists in such situations. This seems to be different from the case in Turkish, where presupposition has been argued to be what interferes with object nuclear stress assignment. As Dolatian (2022) shows in a comparative study, Persian speakers may place nuclear stress on the verb even in situations where Turkish and Western Armenian speakers place nuclear stress on the ACC-marked objects.

It is now time to present more examples demonstrating the stress behavior of ACC-marked objects in wide-focus contexts. The interaction between focus and ACC-marked objects can be seen more clearly when a focus operator such as *faqat* 'only' is used. For (23), all of the survey's respondents preferred (a) to (b) and gave it a perfect score.

(23) a. Ali faqat <u>qazâ</u>=ro   khord; esterâhat <u>nakard</u>.
          ali   only food=ACC ate;   rest   did.not.do
          "Ali only ate the food; he didn't take a rest."
      b. #ali faqat qazâ=ro   <u>khord</u>; esterâhat <u>nakard</u>.
          Ali   only food=ACC ate;   rest   did.not.do
          "Ali only ate the food; he didn't take a rest."

In analyzing these sentences, we assume that the part of the sentence that is the scope of the operator 'only' receives focus (e.g. see Jackendoff 1972; Krifka 1992). The acceptability of (23a) shows that a nuclear stress on the ACC-marked object (leaving the verb deaccented) allows a reading in which the focus is on the entire sequence *qazâ ro khord* 'ate the food'. On the other hand, in (23b), the utterance is unnatural presumably because a nuclear stress on the verb signals that the verb has narrow focus. As another set of examples, two dialogues are presented in (24). We are primarily interested in comparing the acceptability of the third response in (a) with the third response in (b), given the different questions. All five respondents to the survey prefer the (b) case and give it the perfect score (i.e. 3). The average score for the (a) case is 0.8.

(24) a. mikhây   mâshin=o <u>beshuri</u>?
          you.want car=ACC   you.wash.SBJV

          - #[na,] mikhâm <u>zamin</u>=o   beshuram.
              no   I.want   floor=ACC I.wash.SBJV
          "No, I was washing the door."

          - [na,] mikhâm <u>ta'mir</u>=esh konam.
            no   I.want   repair=3SG I.do.SBJV
          "No I want to repair it."

          - #[na,] mikhâm <u>bâzi</u>   konam.
              no   I.want   game I.do.SBJV
          "No, I want to play."

b. mikhây   <u>mâshin</u>＝o beshuri?
you.want car＝ACC   you.wash.SBJV
"Do you want to wash the car?"

- [na,] mikhâm <u>zamin</u>＝o   beshuram.
  no   I.want   floor＝ACC I.wash.SBJV
"No, I was washing the door."

- #[na,] mikhâm <u>ta'mir</u>＝esh konam.
    no   I.want   repair＝3SG I.do.SBJV
"No I want to repair it."

- [na,] mikhâm <u>bâzi</u>   konam.
  no   I.want   game I.do.SBJV
"No, I want to play."

In each dialogue, the three responses correspond to the following three different focuses: the verb ('washing'), the object ('the car'), and the combination of the object and the verb ('washing the car'). In (24a), only the second response is available, showing that when nuclear stress is on the verb, the only available reading is a focus on the verb. In (24b) where the nuclear stress in the question is on the object, the sentence can be interpreted to have focus on the object (the first response) or on the sequence containing both the object and the verb (the third response). This means that the question sentence in (24b) is the one with wide focus, confirming that in the absence of interfering information-structural factors, the ACC-marked object receives nuclear stress and leaves the material after it deaccented.

Even with a verb such as *azyat kardan* "to tease", which is not expected in the context of the question, the same effect is observed, as shown in (25). For this example, all five respondents prefer the first response and give it a perfect score. The average score for the other response is 1.

(25)   maryam dâre <u>esterâhat</u>   mikone?
Maryam has   relaxation does
"Is Maryam having a rest?"

-[na,] dâre <u>susan</u>＝o   azyat   mikone.
  no   has   Susan＝ACC teasing does
"No, she's teasing Susan."

-#[na,] dâre susan＝o <u>azyat</u> mikone.

Given existing assumptions regarding the position of the Persian ACC-marked object, if we accept that ACC-marked objects receive nuclear stress just like non-ACC-marked objects in information-structurally neutral contexts, the phase-based theory faces a problem. In the phase-based theory,

ACC-marked objects must not receive nuclear stress given that they are outside of the verbal domain in the surface structure. To save the theory in the face of this issue, one may argue that ACC-marked objects in these examples are low enough to fall inside the complement of the v head. This is what Üntak Tarhan (2006) suggests for Turkish ACC-marked objects in order to reconcile the Turkish data with this theory (see Nakipoğlu 2019 for an objection). While not impossible, this proposal goes against Kahnemuyipour's assumption that manner adverbs mark the left edge of the verbal domain, since ACC-marked objects generally precede manner adverbs in both Turkish (Üntak Tarhan 2006) and Persian. A Persian example is given in (26), in which the object precedes the manner adverb *bad* (= "bad") and still receives nuclear stress.

(26) [What has this kid done?]

 <u>mashq</u> = esh = o   bad neveshte?   <u>da'vâ</u> karde?

 homework = 3SG = ACC bad has.written fight   has.done

 "What has this kid done? Has s/he done her/his homework poorly? Has s/he fought [with anyone]?"

As before, it must be noted that nuclear stress normally goes on the manner adverb in the presence of an ACC-marked object, because the normal reading in such sentence does not have wide focus. What triggers the nuclear stress going on the object in this particular example is that the event is contrasted with other events, thereby enforcing wide focus. Four of the survey's respondents gave this sentence the perfect score, i.e. 3, and one gave it 2 in our four-value 0–3 scale.

4.3 Manner adverbs

Let us now see how manner adverbs are accounted for in the present theory. Manner adverbs are known to behave differently from higher adverbs. In English, they generally appear after the verb whereas other adverbs precede it, as shown in (27).

(27) a. He is constantly talking.
    b. He is talking angrily.

The appearance of manner adverbs after the verb is not a peculiarity of English. In fact, manner adverbs generally follow the verb in languages with VO surface order (Dryer 1992). In line with the framework of antisymmetry and the assumption that VO is the base order, I assume that the post-verbal position reflects the base position of manner adverbs, even in languages where it has a different surface position. It has long been argued (Larson 1988 building on the work of McConnell-Ginet 1982, also see Kayne 1994: Ch. 7; Alexiadou 1997) that manner adverbs are base-generated deep inside the verb phrase as a complement. In his work on phrase stress, Cinque (1993) uses this analysis to account for the stress facts of English and Italian. The adverb in (27a),

on the other hand, is an adjunct (or the specifier of a functional head) above the v head, thus it is expected to be generated on the left of v under the assumptions of antisymmetry.

In Persian, unlike English, all adverbs precede the verb. However, if manner adverbs are base-generated lower than the verb as discussed above, our theory would predict it to receive nuclear stress. This is indeed the case, as shown in (28).

(28) a. maryam boland mikhande.
          Maryam loud   laughs
          "Maryam laughs loudly."
      b. maryam hamishe mikhande.
          Maryam always   laughs
          "Maryam always laughs."
      c. maryam tond ketâb mikhune.
          Maryam fast book   reads
          "Maryam reads books fast."

In (28a), the manner adverb receives nuclear stress because its lower copy has the lowest position in the tree. In (28b), the adverb is not a manner adverb. We may assume that it is adjoined to the left of the verb phrase, and therefore its base position matches its surface pre-verbal position. (28c) features both a manner adverb and an object preceding the verb. Here too, we assume that the English (and cross-linguistically common) surface order reflects the base order in Persian, meaning that the manner adverb is base-generated low and thereby attracts nuclear stress.

As discussed in Section 2.2, the phase-based theory of Kahnemuyipour (2009) predicts the presence of stress on Persian manner adverbs with no problem. This theory is sensitive only to the surface position of constituents. Even though Kahnemuyipour (2009) do not consider the manner adverb to have been generated lower than the verb, he does assume that the manner adverb (unlike other adverbs) is inside the verbal domain. Thus, the manner adverb receives stress as the highest element in the stress-receiving domain (i.e. the complement of v). However, unlike Persian, the stress on manner adverbs in English, shown in (29), poses a potential challenge for the phase-based theory.

(29) a. Mary shouted angrily.
      b. Mary hung up the phone angrily.

At least at first glance, it is not clear why the manner adverb receives nuclear stress in (29) under the phase-based theory. After all, in these sentences, the highest element in the complement of the v head seems to be the verb itself. Kahnemuyipour (2009) argues (following Cinque 2004) that in English sentences with sentence-final manner adverbs, the verb and its adverb have

both moved out of the complement of v. This means that his theory's regular stress-assignment mechanism cannot not assign nuclear stress to any element in the sentence. The stress we see on the manner adverb, according to him, is the result of a backup mechanism that is activated when the complement of v is phonologically null, placing nuclear stress on the closest element to the complement of the v in such situations. Given the absence of independent motivation for this backup mechanism and the fact that the cases of Persian and English manner adverbs find unrelated accounts in his theory, his solution does not seem attractive.

As mentioned earlier, in the modified version of the phase-based theory presented by Kratzer & Selkirk (2007), the stress in the vP phase goes on the highest *phrase* (rather than the highest constituent) in the complement of v. This solves the issue in (29a), but not (29b). In (29a), since the verb is not a phrase, the highest phrase in the verbal domain is the manner adverb. In (29b), however, the highest phrase in the verbal domain is presumably the object, but nuclear stress goes on the manner adverb. A similar problem facing this theory concerning post-verbal PPs is already discussed by Shaw 2009 and Rochemont 2013.

4.4 Argument PPs

As Kahnemuyipour (2009) has rightly pointed out, there is a contrast in stress behavior between argument and adjunct PPs in Persian. While argument PPs receive nuclear stress and leave the verb unaccented, adjunct PPs reject nuclear stress. This is demonstrated in the examples in (30) (repeated from (8).

(30)   a.   <u>maryam</u> tu <u>arusi</u>   <u>raqsid</u>.
            Maryam in wedding danced
            "Maryam danced in the wedding."
       b.   <u>maryam</u> tu <u>tale</u> oftâd.
            Maryam in trap fell
            "Maryam fell in a trap."

Similar to the case of adverbs, to explain the above facts, we need to assume that the two types of PPs have different base positions. In (30a), the PP *tu arusi* 'in the wedding' is an adjunct and therefore base-generated to the left of the verb. Therefore, it does not have a lower copy after the verb and does not receive nuclear stress. In (30b), the PP *tu tale* 'in trap' is an argument of the verb. Therefore, it is generated to the right of the verb, which means that its lower copy earns it the nuclear stress.

For our account to be convincing, it is helpful to have further motivation for the proposal that the PPs that receive nuclear stress are indeed generated to the right of the verb. Fortunately, there is independent evidence for this in Persian, coming from directional and goal PP arguments. These arguments usually appear after the verb, i.e. in the position which we take to be their base

position. The stress pattern of sentences of this type has been described by Sadat-Tehrani (2007), but has not been discussed by Kahnemuyipour (2003; 2009). Even in the case of (30b), it would be at least as acceptable to place the PP after the verb. Further examples are given below.

(31) a. <u>maryam</u> <u>bargasht</u> <u>tehrân</u>.
          Maryam   returned   Tehran
          "Maryam returned to Tehran."
      b. <u>susan</u> <u>umad</u> tu <u>otâq</u>.
          Susan   came   in   room
          "Susan entered the room."
      c. <u>zadam</u> = esh   be <u>divâr</u>.
          I.hit = 3SG   to   wall
          "I installed it on the wall."
      d. <u>biâ</u>   <u>pâyin</u>!
          come   down
          "Come down!"

In Formal Persian, unlike Tehrani Persian, goal PPs usually precede the verb (and usually require prepositions, unlike 31a and 31d). In such sentences, the adverbial receives nuclear stress and the verb is left unaccented. In our theory, the fact that goal PPs have the same stress status regardless of their position is expected. The formal equivalents of the first two sentences in (31) are given in (32).

(32) a. <u>maryam</u> be <u>tehrân</u> bargasht.   (*Formal Persian*)
          Maryam   to   Tehran   returned
          "Maryam returned to Tehran"
      b. <u>susan</u> dar <u>châle</u> oftâd.   (*Formal Persian*)
          Susan   in   hole   fell
          "Susan fell in a hole."

The problems faced by Kahnemuyipour (2009) in explaining the stress facts regarding sentence-final PPs in colloquial Persian (and English) are similar in nature to the ones mentioned in the previous subsection for sentence-final manner adverbs in English and have been discussed by Shaw (2009: 30) and Rochemont (2013). Kahnemuyipour (2009) does not mention these Persian examples, but he does mention sentence-final PPs in English. His solution for those is the same as the one he offers for sentence-final manner adverbs. Thus, his theory can account for these sentences if we assume that the verb and its argument are both outside of the verbal domain and that in the absence of a pronounced element inside the verbal domain, a backup mechanism

assigns nuclear accent to the last element in the sentence. However, even this convoluted solution runs into problems when goal PPs and manner adverbs appear together, as in (33).

(33) <u>maryam</u> <u>nârâzi</u> bargasht tehrân
 Maryam discontented returned Tehran
 "Maryam returned to Tehran discontentedly."

Recall that Kahnemuyipour's (2009) account requires the verb and the PP to have moved outside of the vP in (31a). But in (33), we observe that the verb and the PP follow the manner adverb and are both deaccented, suggesting that they are inside the vP under his assumptions. Thus, unless through far-fetched movement scenarios, it seems impossible for his theory to account for (31a) and (33) simultaneously.[12] It is worth noting that the version of the phase-based theory proposed by Kratzer & Selkirk (2007), which avoids assigning nuclear stress to verbs because they are not phrases, does not suffer from a problem in these cases.

4.5 Complex predicates

In Persian, the vast majority of verbal constructions come in the form of complex predicates, constructions composed of a non-verbal element (NVE) which bears the main semantic content of the verb and a conjugated light verb (see Karimi 1997; Folli et al. 2005; Megerdoomian 2012, *inter alia* for thorough discussions of the syntax of complex predicates in Persian).

(34) a. <u>bâzi</u> kard.
   game did
   "played"

   b. <u>kharj</u> kard.
   expenditure did
   "spent"

   c. <u>dâd</u> zad.
   cry hit
   "yelled"

   d. <u>var</u> oftâd.
   on fell
   "died out"

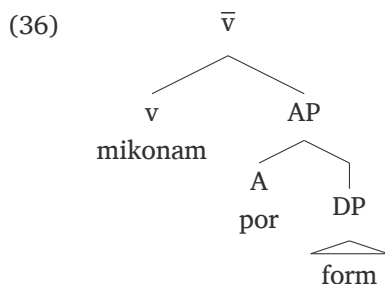[12] This pair of sentences also causes a problem for the older theory based on phrasal prominence presented in Kahnemuyipour (2003). Under that theory, the deaccentuation of *bargasht tehrân* "returend to Tehran" in (33) means that they form the same Phonological Phrase with the manner adverb. However, these two words receive separate pitch accents in (31a), meaning that they do not form a single Phonological Phrase. Under normal assumptions, an edge-based theory of Phonological Phrases is expected to create the same phrase boundaries in both sentences.

e. <u>pas</u> dâd.
  after gave
  "returned" (transitive)

It is not always easy to tell apart an NVE from a regular non-ACC-marked object. Nevertheless, in spite of the apparent difficulty in categorizing many particular instances, the conceptual distinction seems to be solid (Megerdoomian 2012). In any case, the analysis of the sentences in (34) seems straightforward. Like objects, an NVE is the complement of the light verb and is therefore merged to its right. This explains its stress behavior. A more interesting case occurs when NVEs and non-ACC-marked objects co-occur in a sentence, as in the examples below.

(35) a. <u>docharkhe</u> ta'mir mikonam.
      bicycle   repair I.do
      "I repair bicycles."
  b. <u>form</u> por mikonam.
      form full I.do
      "I fill out forms."

In analyzing these sentences, we follow the proposal offered by Folli et al. (2005). Building on the work of Hale & Keyser (2002) on argument structure and relying on how the interaction between the identity of the NVE and the verb determines the argument and event structure of complex predicates in Persian, they argue that in sentences of this type the object and the NVE merge together to form an AP with the NVE adjective serving as the head. In the account presented by Folli et al. (2005), antisymmetry is not assumed and the merge positions match the surface positions. However, we may modify it to comply with Kayne's (1994) ordering. For this purpose, the light verb, being a head, must precede the AP. Similarly, inside the AP, the adjective NVE must precede the object DP. Thus, for (35c), we get the pre-movement arrangement shown in (36).

(36)

```
                    v̄
              _____|_____
             |            |
             v            AP
          mikonam      ___|___
                      |       |
                      A       DP
                     por      /\
                            form
```

This means that the order of the three elements at merge is the reverse of their surface order. Under our assumptions, this explains the assignment of nuclear stress to the object. The situation

after movement is shown below. The object receives nuclear stress because its lower copy is the last element in the sentence. I do not discuss the mechanics of the movements and the exact landing sites.

(37)   [$_{vP}$ [form] por mikonam ~~por~~ ~~[form]~~]

Let us now briefly discuss cases involving nuclear stress on the light verb. So far in this subsection, I argued that default nuclear stress goes on an element in the complement of the verb in the base structure. This implies that whenever the stress is on the verb itself, there is narrow focus on the verb. This even includes cases where the verb does not have an independent relevant meaning.

(38)   a.   maryam   bar   migarde.
              Maryam   over   turns
              "Maryam returns."
         b.   maryam   bar   migarde, [vali kas=i=ro unjâ nemibine.]
              Maryam   over   turns
              "Maryam does return, but she doesn't see anyone there."

The stress pattern in (38a) represents the default case. In (38b), the stress is on the verbal element of the complex predicate, even though the complex predicate's meaning is non-compositional, making focus on the verb unexpected at first sight. However, the English translation (which is normally read with narrow focus on the auxiliary "does") helps in revealing the nature of the phenomenon. It seems clear that it is not the lexical meaning of the verb *migarde*, but its quality as a verb, presumably through having tense or aspect, that qualifies it for narrow focus in (38b) (see Sadat-Tehrani 2017 for a detailed demonstration of the facts and a different analysis). The prosodic role of the morpheme *ke*, which is brought up by an anonymous reviewer, can be understood in the same light.

(39)   bar   ke migarde, [vali kas=i=ro unjâ nemibine.]
         over *ke* turns
         "She/He does return, but she/he doesn't see anyone there."

A more rough translation of the first clause in (39) would be "As far as returning is concerned, she does return." Thus, we may argue that when *ke* attaches to a constituent, it places it outside of the focus. The mechanics of this behavior are not simple, but given the English translation and what we saw in (38b), it should be clear that the morpheme's pragmatic role affects the information structure of the sentence. The additive morpheme *ham* seems to have a similar role, but I refrain from discussing it here due to its more complicated nature.

4.6 Ditransitives

The stress pattern of sentences involving both PP arguments and objects is relatively complicated, and judgments are not clear in most cases. I start with the cases where the object is non-ACC-marked. For these, giving examples like (40), Kahnemuyipour (2009) reports that nuclear stress goes on the direct object.

(40) ali ye <u>ketâb</u> ru miz gozâsht.
      Ali one book on table put
      "Ali put a book on the table."

For Kahnemuyipour (2009), this stress pattern is predicted given that the object is the highest element in the complement of the v head according to standard assumptions. Our theory's prediction depends on where we assume PP arguments to merge. Following the work of Barss & Lasnik (1986) and more importantly Larson (1988), it has usually been assumed that the PP argument merges lower than the direct object. For instance, in an English sentence such as "Mary gave the book to John.", the low surface position of the PP "to John" is assumed to reflect its low merge position. If we adopt this assumption for Persian, which is also in accordance with Kayne's proposal (1994: 70–71), we expect nuclear stress to go on the PP argument, contrary to what we see in (40). As we shall see, the facts are more complicated than what (40) suggests and if anything, support our assumptions.

First of all, it must be noted that if we replace "the table" with a phrase that is not easily presupposed in any discourse, the pattern in (40) becomes unacceptable.

(41) #[khâb didam] ye chakkosh=e <u>qermez</u> be bâbâ=ye obâmâ dâdam.
      dream I.saw one hammer=EZ red to dad=EZ Obama I.gave
      "I dreamed I gave a red hammer to Obama's dad."

It seems that (41) is felicitous only in situations where the PP is given. To express this proposition, two other sentence types, shown in (42), sound natural at first glance. All five survey respondents assign the score 3 ("perfect") to both sentences in (42) but the average score for (41) is 1.6 (the respondents' individual scores are are 1, 1, 1, 2, and 3).

(42) a. [khâb didam] ye chakkosh=e qermez dâdam be bâbâ=ye <u>obâmâ</u>
          dream I.saw one hammer=EZ red I.gave to dad=EZ Obama
          "I dreamed I gave a red hammer to Obama's dad."
      b. [khâb didam] be bâbâ=ye obâmâ ye chakkosh=e <u>qermez</u> dâdam
          dream I.saw to dad=EZ Obama one hammer=EZ red I.gave

These sentences place nuclear stress on different elements (one puts it on the PP argument and one on the object). It is not immediately clear which one must be viewed as the default case as far as stress and information structure is concerned. To find the answer, we may use contexts where focus on the entire event is enforced as we did in Section 4.2. The somewhat surprising result is that none of the stress patterns is felicitous for a situation where wide focus is needed. Our respondents' average scores for (43) and (44) were as low as 0.2 and 0.6 respectively. Two other versions with the nuclear stress on the object but different word orders (Obj PP V, Obj V PP) were also given to the respondents and both received average scores of 0.4.

(43)   be maryam ye <u>chakkosh</u> dâdi?
        to Maryam one hammer   you.gave
        "Did you give a hammer to Maryam?"
        - #[No, I played soccer.]

(44)   ye chakkosh dâdi   be <u>maryam</u>?
        one hammer   you.gave to Maryam
        "Did you give a hammer to Maryam?"
        - #[No, I played soccer.]

While both stress patterns are unacceptable in (43) and (44), a slight difference between the two types of stress pattern emerges in sentences with bare nouns.

(45)   bâyad tu sup <u>piâz</u>   berizam?
        NEC   in soup onion I.pour.SBJV
        "Should I add onions to [the] soup?"
        - #[No, you should wash the dishes.]

(46)   bâyad piâz   berizam   tu <u>sup</u>?
        NEC   onion I.pour.SBJV in soup
        "Should I add onions to [the] soup?"
        - ?[No, you should wash the dishes.]

The respondents' average scores for (45) and (46) are 0.8 and 1.8 respectively, showing a preference for a nuclear stress on the PP argument, as our assumptions predict.[13] Three respondents prefer (46), one prefers (45), and one respondent gives them both a score of 2 (in a 0–3 scale). The preference seems meaningful, but the result is not conclusive since the number of

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[13] Keeping the order as in (46) but putting the nuclear stress on the object as in (45) strongly signals narrow focus on the object. This option was not included in the survey.

respondents is small and only one respondent finds the preferred pattern (i.e. 46) perfect. It may be worth adding, by the way, that the author's own intuitions also strongly prefer (46) to (45).

To summarize, to the extent that wide-focus readings are available, they favor nuclear stress on the PP argument, as predicted by our assumptions. Let us now consider what happens when the object is ACC-marked. In such cases, the stress is normally on the PP argument, as shown below. Like the other cases we saw in Section 4.4 where the PP argument follows the verb, Kahnemuyipour's (2009) theory faces issues in this case. I do not repeat the arguments here.

(47) a. mikhâm ali = ro bebaram muze = ye <u>olum</u>.
          I.want Ali = ACC I.take.SBJV museum = EZ science
          "I want to take Ali to the science museum."

      b. medâd = e maryam = o gozâshtam tu kif = e <u>susan</u>.
          pencil = EZ Maryam = ACC I.put in bag = EZ Susan
          "I put Maryam's pencil in Susan's bag."

      c. piâzâ = ro rikhtam tu <u>sup</u>.
          onions = ACC I.poured in soup
          "I added the onions to the soup."

As in the case of non-ACC-marked objects, our theory easily predicts the nuclear stress on the PP in these examples. However, it is fair to ask what happens if we use a question-answer setting like we did above to enforce a wide-focus reading in these cases too.

(48) - mikhây esterâhat koni?
        you.want relaxation you.do.SBJV
      "Are you going to have a rest?"

      - ?[na,] mikhâm <u>ali</u> = ro bebaram muze = ye olum.
         no I.want Ali = ACC I.take.SBJV museum = EZ science

      - ?[na,] mikhâm ali = ro bebaram muze = ye <u>olum</u>.
         no I.want Ali = ACC I.take.SBJV museum = EZ science

      "No, I want to take Ali to the science museum."

The survey's results are not completely conclusive, but encouraging. The average scores for the two responses are 1.6 and 2.4 (out of 3) respectively. One respondent finds both responses perfect, three strongly prefer the second response, and one strongly prefers the first response. What is perhaps more important is that four out of five respondents give the second response the perfect score. Thus, it seems that placing nuclear stress on the PP is indeed the preferred way for marking wide focus in these constructions, as our theory predicts.

5 Conclusion

The theory presented in this paper places new emphasis on the relationship between finality (or, to look at it structurally, having a low position in the syntax tree) and stress above the word level. In addition to this, this paper brings stress reconstruction to the center of its analysis of nuclear stress assignment mechanisms and by doing so brings up (once again) the question of the limits of stress reconstruction and where it fails to apply. The question of how useful this approach is in accounting for languages other than Persian requires more investigation. The consistency with which Persian assigns nuclear stress to the same item regardless of its position is not observed in other languages.[14] In English, for instance, when syntactic constituents undergo radical movements (that are not acceptable in normal speech) for stylistic reasons, judgments do not seem to be as consistent as they are in Persian.

(49)   a.   I feel grave danger.
          b.   Grave danger I feel.

Consistent with what our theory predicts (assuming no PF movement is involved), English speakers do have a tendency to keep nuclear stress on "grave danger" in (49b). However, this tendency does not seem to be nearly as strong as it is in similar Persian sentences (see Section 3.1). It has been long known that in the most general case (but see Section 3), English keeps nuclear stress on the last element. This means that the range of cases where stress reconstruction applies is more limited in English. Therefore, if we wish to account for the Persian data using stress reconstruction as this paper proposes, we must view Persian as a language that demonstrates a mechanism that is partly blocked in other languages. Offering a comprehensive theory of where stress reconstruction fails to occur is outside of the scope of this work, but it may be pointed out as a general remark that blockage of stress reconstruction across languages is *a priori* expected. If we accept that the presence of nuclear accent near the right edge of the sentence is a universal tendency, then it is expected that stress reconstruction, which by nature is in tension with this tendency, is blocked by it in some circumstances. Wherever stress reconstruction occurs, an element receives stress in spite of its surface position, leading to an utterance with a phonologically non-ideal stress pattern. Specific mechanisms have already been identified (Truckenbrodt 2019; Büring & Truckenbrodt 2021) that block stress reconstruction (within the framework of STRESS-XP), and more are expected to be found in the future.

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[14] The independence of stress position from ordering and its almost exclusive sensitivity to syntax are reminiscent of Rahmani's (2019; Ch. 3) work, who argues that accent assignment in Persian is sensitive to morpho-syntax alone and does not undergo prosodic readjustments. Nevertheless, I do not fully embrace his theory since Persian seems to feature lexically specified stress too. Moreover, (Rahmani 2019: 25) does not acknowledge nuclear stress in Persian as a meaningful entity.

Abbreviations

In addition to the abbreviations listed in the Leipzig glossing rules, I use the following abbreviations in glossing the examples in this paper: EZ: The Ezafe morpheme, NEC: Necessitative.

Supplementary files

The files used in the survey along with the results are available online at https://doi.org/10.16995/glossa.11592.s1.

Ethics and consent

The study was granted exemption by the University of Arizona IRB and the survey was performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

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The author has no competing interests to declare.

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