

The L2 Acquisition of Functional Morphology: Why Syntacticians Need Phonologists

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1. Introduction

It is well-known that second language (L2) learners have difficulties with functional morphology when the native (L1) grammar does not overtly mark these properties. In the article domain, we observe omission in obligatory contexts (1a), as well as overuse of one article in place of the other (usually definite for indefinite) (1b). In the domain of inflection, omission is also very common (2a-b).

(1) Articles:

- a. So ~~the~~ brain is already shaped (L1 Turkish)
- b. She was holding the ~~a~~ fork (L1 Turkish)

(2) Inflection:

- a. And then Mary begins to tidy up her room (L1 Mandarin)
- b. I scanned ~~ed~~ some of them into the computer (L1 Mandarin)

The previous literature has largely considered non-phonological explanations for behaviour along the lines of (1)-(2): syntactic (e.g. Trenkic 2007), semantic (e.g. Ionin, Ko & Wexler 2004) or discourse/pragmatic explanations (e.g. Robertson 2000) are typically provided for omission and overuse of articles; and syntactic explanations (e.g. Tsimpli & Roussou 1991, Hawkins & Chan 1997) or difficulties in syntax–morphology mapping or in accessing forms from the lexicon (e.g. Lardiere 1998, Prévost & White 2000, Herschensohn 2001) have been provided for omission of inflectional morphology. However, alongside errors like those in (1) and (2) are other types of errors, shown in (3) and (4). Articles may appear as inappropriately stressed (indicated in bold italics) (3a); appropriate article use may be confined to DPs without adjectives where DPs with adjectives show article omission or stressing (3b); and substitution of other (stressed) determiners for articles may occur (3c). In the domain of inflection, we observe better performance on irregular than on regular past tense (4a); we find better performance on verbs ending in short (VV/VC-final) rhymes (e.g. ‘get’) rather than long (VVC/VCC-final) rhymes (e.g. ‘make’, ‘clean’) (4b); and we observe inappropriately stressed inflection alongside high rates of deletion (4c).

(3) Articles:

- a. ...***a*** man and ***a*** girl (L1 Turkish; Goad & White 2009a)
- b. the building vs. ***the*** big building (L1 Turkish; Goad & White 2009a)
- c. ...one ~~a~~ person is playing, playing one ~~a~~ guitar (L1 Mandarin; Goad & White 2008)

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- (4) Inflection:
- a. went to school and learn English (L1 Mandarin & Hokkien; Lardiere 2003)
 - b. then she gets dressed.... And then make breakfast and clean the dishes (L1 Mandarin; Goad, White & Steele 2003)
 - c. [dos árboles] → [dos arbolés] ‘two trees’ and [tres papéles] → [tres papél] ‘three papers’ (L1 French–L2 Spanish; Goad, White & Garavito 2011)

The errors in (3) and (4) have a phonological flavour to them, suggesting that omission in (1) and (2) may not always be due to problems in other components of the grammar. To account for the profile of errors in (3) and (4), alongside omission in (1) and (2), we have proposed the Prosodic Transfer Hypothesis (PTH) in (5):

- (5) Prosodic Transfer Hypothesis (PTH) (Goad, White & Steele 2003, Goad & White 2004, 2006):
Difficulties that learners have with the production of functional morphology stem from constraints on prosodic structure that are transferred from the native grammar.

As a consequence of (5), functional material may be variably produced or produced in non-target fashion if the necessary prosodic representations are not available in the L1 grammar. I will expand on this shortly.

Although I have claimed that the errors in (3) and (4) have a phonological source, it is important to point out that other explanations for some of these patterns of behaviour have been proposed in the literature. Concerning substitution of other (stressed) determiners for articles, Ionin, Baek & Kim (2011) have proposed a semantic explanation for substitution of demonstratives for definite articles. Similarly, Trenkic (2007) has provided a syntactic explanation for L2ers’ better performance on DPs without adjectives. Evidence for a phonological explanation would be a clustering of behaviour along the following lines: substitution of other determiners occurring alongside production of articles as stressed (both implicate the same prosodic representation; see (20a) below) or poorer performance on DPs with adjectives where difficulties manifest themselves not solely through higher rates of article deletion but also higher rates of stressed article production (see further section 3). In the same vein, we are not claiming that a phonological explanation accounts for all errors observed in the acquisition of functional morphology (e.g. we have nothing to say about substitution of one article for another (1b)). Clearly, though, a clustering of behaviour must be observed in order to tap into the source of L2ers’ errors and this, of course, requires careful consideration of a variety of factors. In view of the fact that omission is the most common error pattern in the L2 acquisition of functional morphology and that all proposals in the literature consider this in their explanation of the source of difficulty for L2ers, the following section examines a variety of factors that one should strive to control (or minimally be mindful of) when designing experiments that aim to probe L2ers’ syntactic knowledge of inflection; as we will see, phonological factors may often be responsible for the omission patterns observed.

2. A cautionary tale about phonology

English is the most common target language examined in the L2 acquisition of inflectional morphology. However, a variety of confounding factors arise for L2ers when learning an English-type language, given the segmental shape of inflectional morphemes, the types of syllable complexity that these morphemes attach to, and the way that these morphemes are organized into higher prosodic structure, in contrast to the way that inflection is organized in many other languages. In view of these factors, this section introduces, in the form of questions, a number of potential challenges that studies on inflection face.

2.1. Perceptual challenges

We begin with the perceptual challenges that L2ers may face. Consider the question in (6) overleaf:

- (6) Could non-suppliance of past tense and perfective morphology in English-type languages be due to L2ers' inability to reliably perceive it?

Although most experiments are conducted in quiet settings which minimize environmental masking, this, of course, is not true of the contexts in which language is both learned and used. In noisy environments, segments whose cues to identifiability are not particularly robust are less likely to be reliably perceived (see Wright 2004). Consider English past tense and perfective morphology in this context, which are marked with coronal stops (we focus here on the non-syllabic allomorphs, [t] and [d]). Because stops involve complete obstruction of air flow, they rely on adjacent segments to be identified. The formant transitions out of a stop closure (in e.g. 'tea') are less susceptible to environmental masking than those into a stop closure (in e.g. 'eat'), which means that English inflection, which is marked at the right edge of its host, is particularly vulnerable.

English syllable structure, which is quite permissive, can further impede the perceptibility of past tense and perfective morphology because of the stacking up of consonants that results. We expand on this as follows. Gestural overlap between adjacent segments always occurs in natural speech. Depending on the profile of the adjacent segments, this overlap can be beneficial or detrimental to segment identification (see Wright 2004). A high degree of overlap may yield perceptual dividends, i.e. an increase in the cues available, for example when a vowel at the end of a stem and a following inflection overlap, as in 'tried'. However, a high degree of overlap negatively impacts perceptibility when adjacent segments have (near) identical manners of articulation, for example when a stem-final obstruent is followed by inflectional [t/d], as in 'dived' or 'bribed'.

If words such as 'dived' or 'bribed' occur in utterance-final position, as in (7a), the perceptibility of final [d] will benefit from the fact that final stops must be released after obstruents and the release burst will contain cues to the identifiability of [d]. However, this will not be the case in (7b) when the inflected form is in medial position and followed by a segment with which it cannot be resyllabified.

- (7) a. ...tried## > ...dived## > ...bribed##
 b. ...tried some... > ...dived some... > ...bribed some...

Indeed, the challenges presented by the segmental context preceding inflection can be off-set – or amplified – by what follows. Compare at one extreme 'They bribed every official' where the past tense marker is followed by a segment with which it can be resyllabified, thereby enhancing its perceptibility, with 'They bribed the official', where the cues to [d] are virtually absent.

- (8) They bribed every official > They bribed some officials > They bribed the official

The preceding discussion has revealed that the perceptibility of English stop inflections is a function of the context in which they occur. Consistent with this, Klein and colleagues have proposed that variable suppliance of inflection in L2 is due to variable detection of the morphology in the ambient data. They examined L2ers' perception of English past tense morphology and observed that, independent of L1 (Chinese, Spanish, Russian), learners did not consistently perceive past inflected forms as different from uninflected forms, especially in the case of [t]/[d] allomorphs (Klein et al. 2004, Pugash et al. 2004, Solt et al. 2004) and especially after oral stops and nasals (Adams 2004).

Their methodology was as follows. The participant hears a context and then the target sentence, e.g. 'They waited at the station for a train'. The participant then sees 'They _____ at the station for a train' and must fill in appropriate form of the verb. The results for the [t] and [d] allomorphs, as reported in Pugash et al. (2004), are summarized in Table 1.

	[t]	[d]
High proficiency	70	62
Low proficiency	61	58

Table 1. Learners' perception of regular past tense (%) (Pugash et al. 2004)

The results are strikingly low, even for high proficiency learners. What is more astounding is that the verb in the auditorily-presented stimuli was always followed by a vowel which maximizes perceptibility of the morphology. These results should drive home the need to control the segmental context of the target verbs in any examination of the L2 acquisition of inflection.

2.2. *Perceptual challenges for segmentation*

The preceding section focused on past tense and perfective morphology, where the shape of the inflectional morpheme in English is a stop. Because strident fricatives have strong internal cues which ensure their perceptibility (Wright 2004), they should not be as vulnerable as stops, even when they are positioned after stem-final obstruents. As a result, plural and agreement morphology should not present the same set of challenges as past tense and perfective morphology: in and of themselves, they are not difficult to perceive. However, in the preceding section, we mentioned that a high degree of gestural overlap negatively impacts perceptibility when adjacent segments have (near) identical manners of articulation. In the case of stop-final stems before [s/z], e.g. [sɪts] ‘sits’, the stop is released into the strident fricative; in the case of stop-final stems before [t/d], e.g. [pækʰt] ‘packed’, the stem-final stop is not released at all. In both cases, the perceptibility of the stem-final consonant is compromised. In effect, then, for learners from some L1 backgrounds, forms such as [sɪts] and [pækʰt] could be perceived as [sɪs] and [pæt]. This, I suggest, could impact segmentation of the form into stem + inflection. Consider the question in (9):

- (9) Could the inability to reliably perceive the stem-final obstruent in CVC forms impact segmentation of the inflection (i.e. CVC+C_{inflec})?

(9) refers specifically to CVC forms, i.e. to stems that are monosyllabic and contain short vowels. To understand the rationale behind this, we must examine word minimality constraints. Most languages require lexical words to be minimally one binary foot (McCarthy & Prince 1986). In English, the effect of this constraint is that lexical words must minimally have one of the shapes in (10a). CV words, as in (10b), are ill-formed.

- (10) a. CVC [sɪt] ‘sit’
 CVV [si:] ‘see’
 [sai] ‘sigh’
 CVCV [sɪti] ‘city’
 b. *CV *[sɪ]

The perceptual challenge for segmentation is as follows. If [sɪts] ‘sits’ is perceived as [sɪs] or [pækʰt] ‘packed’ as [pæt], segmentation of the inflection, yielding [sɪ-s] and [pæk-t], could be prevented due to word minimality considerations: *[sɪ] and *[pæk] are ill-formed as lexical words. Such a segmentation problem should be confined to short stems (CVC); segmentation of the inflection in long stems (CVVC and CVCC) where the stem-final C has not been perceived will not violate word minimality. That is, if [baɪts] ‘bites’ is perceived as [baɪs] or [pɑ:kʰt] ‘parked’ as [pɑ:t], segmentation of the inflection – [baɪ-s] and [pɑ:t] – will yield well-formed [baɪ] and [pɑ:].

In short, although there may be a temptation for researchers to confine stems in their investigation of inflection to CVC, i.e. to those that are not particularly complex on syllabification grounds, the results may turn out to underestimate learners’ knowledge if it proves difficult for learners to segment the inflectional morphology from stems of this size.

2.3. *Production challenges: syllabification constraints*

In English-type languages where inflection is typically represented as a single consonant ([t,d] or [s,z]) and most stems end in consonants, the complexity of the right-edge cluster is increased with the addition of inflection. In view of this, we must consider the question in (11):

(11) Could deletion of inflectional morphology in English-type languages be due to L2ers' inability to syllabify the inflected form?

A proposal along these lines was forwarded by Lardiere (2003) to account for high rates of deletion of tense morphology in the L2 English of Patty, a native speaker of Mandarin and Hokkien. The prediction is that high rates of deletion are expected when the inflectional suffix does not appear before a segment with which it can be resyllabified as an onset:

(12) [traid ən ðə kout] > [traid ðə kout ən]
 'tried on the coat' 'tried the coat on'

and when the inflectional suffix is attached to a stem-final consonant of a particular profile:

(13) place-sharing nasal > other sonorant > obstruent
 [grɪnd] > [trɪnd] > [tɔkt]
 'grinned' 'trimmed' 'talked'

The scale in (13), where 'trimmed' is positioned so as to be less optimal than 'grinned', assumes that inflection is syllabified (prosodified) in the same fashion as an ordinary stem-internal final consonant (i.e. that the final cluster in [grɪnd] 'grinned' is prosodified in the same fashion as in [wɪnd] 'wind'). Note, however, that there are no monomorphemic words where nasals and following stops do not agree in place, in contrast to inflected words where this is commonplace ([trɪnd] 'trimmed', [wɪŋd] 'winged'). This suggests that the two types of clusters – those in monomorphemic words and those arrived at through the addition of inflection – are not prosodified in the same fashion in English.

What do L2ers understand about the prosodic organization of inflection in English? It appears that different subjects know different things. Patty reduces right-edge clusters in both past tense-inflected and monomorphemic words (Lardiere 2003). This is in contrast to the behaviour of the Chinese-English L2ers in Hawkins & Liszka (2003) and Bayley (1996). Hawkins & Liszka's data from two Chinese-speaking subjects shows 73% omission of *t/d* in past tense contexts vs. only 18% reduction of clusters in monomorphemic words. Bayley's data from 20 subjects shows 62% omission of *t/d* in past tense contexts vs. only 35% reduction of clusters in monomorphemic words. These results suggest that Patty prosodically organizes inflection in the same manner as stem-internal consonants whereas the Chinese speakers in the other two studies do not.

In view of this, while stimuli for experiments should be selected to be mindful of L1 constraints on syllabification, we cannot automatically conclude that these constraints will apply to clusters that arise through the addition of inflection. This leads to the final challenge that we will examine here.

2.4. Production challenges: the prosodic organization of inflection

The previous section implied that there are cross-linguistic differences in the way that languages prosodify inflection. This is indeed the case and, thus, in designing experiments on inflection, we must recognize that this could impact behaviour. Consider the question in (14):

(14) Can deletion of inflection be due to L2ers' inability to prosodically organize inflection into higher structure in the manner required by the target grammar?

To appropriately address this question, we begin with the prosodification of inflection in English-type languages. This requires an examination of the rhyme constraints that hold for monomorphemic and class 1 derived words. Most languages, English included, permit maximally binary rhymes (VV and/or VC in shape) word-internally; see (15a).¹

¹ There are a handful of exceptions to this in English; most have a particular segmental profile, e.g. both members of the coda-onset cluster must be coronal ([ʃou.l.dər], *[ʃou.l.kər]; [maun.tən], *[maum.pən]).

should be yes, (i) if there are cross-linguistic differences in the organization of inflection, and (ii) if the Prosodic Transfer Hypothesis in (5) is along the right lines. Concerning (i), although in English, inflection is adjoined to the PwD of its host as an affixal clitic, in Mandarin, inflection (aspect only) is organized inside the PwD of its host as an ‘internal clitic’ (i.e. using the same structure required for English *-th*) (see Goad, White & Steele 2003, Goad & White 2006 for evidence). Concerning (ii), for Mandarin-speaking learners of English, we observe deletion/retention patterns suggestive of prosodic transfer (Goad, White & Steele 2003).

The data reported on in Goad, White & Steele (2003) were collected through a story-telling task. The focus of the examination of prosodic transfer was agreement which, in English, is prosodically organized in the same manner as is tense (see (17a)). Twelve Mandarin-speaking learners of English participated in the study. Two patterns of behaviour were observed as follows:

1. *Across-the-board deletion of inflection*: Learners recognize that English does not permit a PwD-internal analysis of inflection and are sensitive to the need for a unified analysis of inflection. However, their grammars do not permit adjunction to the PwD.
Result: ATB deletion of inflection.
2. *Variable suppliance of inflection*: Inflectional morphology surfaces for stimuli where it can be incorporated into the PwD of its host, without violating syllable structure well-formedness.
Result: Variable suppliance of inflection but variability is predictable from stem length.

The results for both groups are presented in Table 2. The first column of results reveals that learners who followed the ATB deletion pattern have very low rates of suppliance of agreement morphology after both short and long stems. Further, deletion of agreement morphology is independent of cluster reduction in monomorphemic words, suggesting that the clusters that arise from the addition of inflection and those present in monomorphemic words are represented differently. The second column of results shows that learners who follow the variable suppliance pattern show relatively high rates of agreement morphology only after short stems. Further, their suppliance rate of agreement parallels their production of clusters in monomorphemic words, suggesting that forms like [kʊkt] and forms like [fækt] are represented identically.

Context	Suppliance	
	ATB deletion group (n=6)	Variable suppliance group (n=6)
After short stems (e.g. [kʊkt] ‘cooked’)	7	68
After long stems (e.g. [baikt] ‘biked’)	0	9
Word-final clusters in monomorphemic words (e.g. [fækt] ‘fact’)	57	68

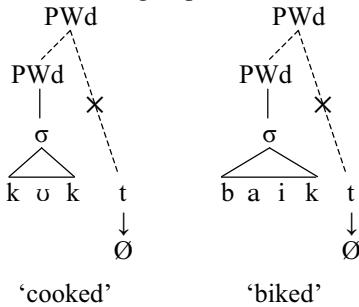
Table 2. ATB deletion and variable suppliance patterns of agreement morphology (%)

Let us turn to the prosodic structures that these two groups of learners build for inflection. The ATB deletion group recognizes that inflection must be treated uniformly in English (after both long and short stems) and in a manner that is not formally the same as right-edge clusters in monomorphemic words. However, they cannot build the appropriate adjunction structure and inflection is deleted across-the-board, that is, regardless of rhyme shape; see (18a) overleaf. The variable suppliance group formally represents inflection PwD-internally, in the same manner as inflection is organized in Mandarin and in the same manner as right-edge clusters in monomorphemic words are represented in English. However, the PwD-internal option is only suitable for stems that end in short rhymes, given the constraints on maximal rhyme shape discussed above; see (18b).

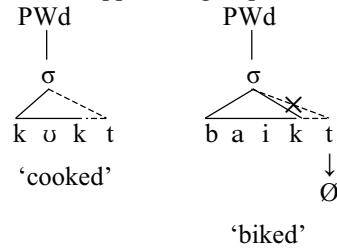
We may question which group of learners is more target-like. I suggest that it is the first: even though their suppliance rates are lower, these subjects ‘know’ that the L1 representation for inflection is not suitable for English. The variable suppliance group, by contrast, is still trying to use the L1 representation. On this view, then, higher suppliance cannot necessarily be interpreted as more target-like.

(18) Prosodic structures:

a. ATB deletion group:



b. Variable suppliance group:



2.5. Interim summary

To sum up thus far, we have seen that perceptual factors as well as L1 constraints on production at the segmental, syllabic and higher prosodic structure levels can lead to omission of bound morphology. Examination of the acquisition of inflectional morphology from any theoretical perspective should be mindful of this when designing stimuli for experiments.

3. Prosodic transfer and the acquisition of articles

In the preceding section, we observed that prosodic transfer may be responsible for two patterns of behaviour in the suppliance of agreement morphology in the productions of Mandarin-speaking learners of English. In this section, we turn to another functional domain, articles, to examine the effects of prosodic transfer in greater detail. In section 1, the definition of the Prosodic Transfer Hypothesis was provided as follows: Difficulties that learners have with the production of functional morphology stem from constraints on prosodic structure that are transferred from the native grammar. It was stated further that, as a consequence of the PTH, functional material may be variably produced or produced in non-target fashion if the necessary prosodic representations are not available in the L1 grammar. We will see shortly that, in the article domain, both variable production as well as non-target production are observed, namely stressing of articles in contexts that would be inappropriate in the language being acquired.

Our focus is on Turkish-speaking learners of English. Our principal claims and the consequences of these are summarized as follows: (i) Articles in English and Turkish are prosodified in different ways; evidence for this comes from the presence/absence of word order alternations in DPs with and without adjectives in the two languages. (ii) The differences in word order and prosodification stem from the [\pm bound] status of articles in the two languages: English articles are [-bound]; Turkish articles are [+bound]. (iii) Turkish-English L2 behaviour reveals evidence of transfer of the L1 representation for articles: DPs with adjectives show higher rates of article deletion and production of articles as stressed than DPs without adjectives. (iv) Which pattern of behaviour is observed for English articles depends on whether L2ers have transferred the [+bound] status of articles or the [-bound] status of other determiners from Turkish into the interlanguage grammar.

After providing some brief discussion of the Turkish determiner system, we turn to examine the prosodic structures available for determiners in each language.

3.1. Prosodic representations of determiners in English and Turkish

Turkish has an (optional) indefinite article only, unstressed *bir* in (19a).² Bare nominals are perfectly well-formed (19b); whether they are interpreted as definite or indefinite depends of a variety

² There is disagreement in the literature as to the status of unstressed *bir*. Kornfilt (1997) considers it to be an article, Underhill (1976) a numeral, and Lyons (1999) neither. Lyons refers to it as a 'quasi indefinite article' but proposes that definiteness is not grammaticalized in Turkish (see also Öztürk 2005).

of factors including word order and case marking. When *bir* is stressed, it is interpreted as the numeral ‘one’ (19c). Other determiners in the language, such as quantifiers, demonstratives, numerals and possessives, are also stressed (19d).

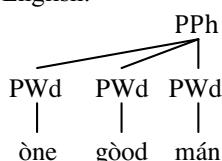
(19) Turkish determiners (from Kornfilt 1997, Öztürk 2005):

- a. bir kitap b. kitap c. *bir* kitap d. *bü* kitap
 ‘a book’ ‘a/the book’ ‘one book’ ‘this book’

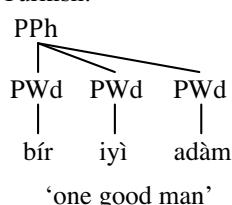
In both English and Turkish, determiners other than articles form independent PWds, as revealed by the fact that they are stressed; see (20a).³ Articles, by contrast, are organized in such a way as to reflect the fact that they are not stressed. In English, they link directly to the PPh as ‘free clitics’ (Selkirk 1996); see (20b.i). In Turkish, articles are adjoined to the PWd as ‘affixal clitics’ (Goad & White 2004), the most common structure observed for prefixes across languages; see (20b.ii).

(20) a. Other determiners:

i. English:

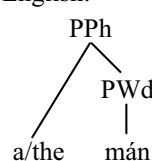


ii. Turkish:

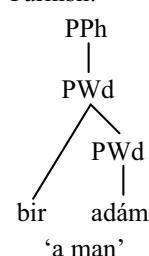


b. Articles:

i. English:



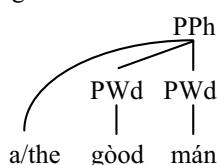
ii. Turkish:



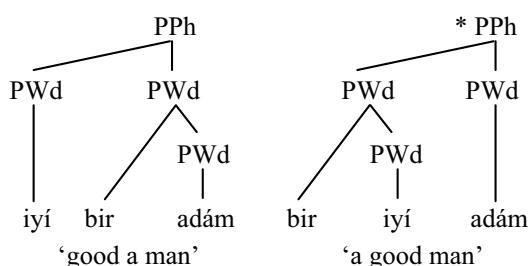
The evidence for the different representations for articles in the two languages comes from the presence or absence of word order alternations in DPs with adjectives. In English, DPs containing adjectives have the word order Det-Adj-Noun, regardless of the type of determiner involved, article or other (stressed) determiner. More specifically, even though an article does not form its own PWd, an intervening adjective has no impact on the relationship between the article and noun; this indicates that the article is linked high in the structure (to the PPh); see (21a). In Turkish, by contrast, the same word order is not observed in DPs containing indefinite *bir* and the numeral *bir*. (On word order constraints for other determiners, see section 3.4.) The canonical order for Turkish DPs is observed above in (20a.ii): Det-Adj-Noun. When the determiner is an article, however, the article must appear adjacent to the noun; compare the structures in (21b) with that in (20a.ii). This reveals that the article must prefix onto the head noun in Turkish. Further details on exactly how this arises are provided in section 3.4.

(21) DPs containing articles and adjectives:

a. English:



b. Turkish:



³ The trees in (20a) are identical in relevant respects. They differ in that phrase-level stress falls on the rightmost PWd in the PPh in English and on the leftmost PWd in the PPh in Turkish (Kabak & Vogel (2001), as indicated by the vertical line from PPh to the PWd with primary stress in each structure.

3.2. Predictions

Although English and Turkish have different prosodic representations for articles, they sound the same, i.e. both are unstressed. The question that arises for Turkish-speaking learners of English is thus: can they use their L1 affixal clitic representation for English articles? The answer depends on the structure of the DP. If the DP has no adjective, the answer is yes, but if the DP contains an adjective, the answer is no, because the Turkish representation is not compatible with English word order. In view of this, the types of behaviour we expect to observe in DPs with adjectives are listed in (22):

(22) Predicted behaviour for DPs with articles and adjectives:

- Use the L1 affixal clitic representation with Turkish word order in English (Adj-Art-N);
- Avoid producing DPs with adjectives;
- Omit articles in DPs with adjectives;
- Use the independent PWd representation for other determiners in Turkish and thereby stress articles or substitute other determiners for articles.

As we will see in the next section, all patterns of behaviour are attested except for (22a). (There were only three or four cases of Turkish word order observed in the entire database.)

3.3. Experiment (part 1)

The study reported on below examines the acquisition of DPs by Turkish-speaking learners of English (Goat & White 2009a). Subjects described a sequence of pictures designed to elicit DPs with and without adjectives. 18 subjects participated at three proficiency levels: low (n=9), intermediate (n=7), advanced (n=2).

The results in Figure 1 reveal that omission of articles is widely observed for all of the low proficiency subjects and for three from the intermediate group (T16, T8, T15). Stressing of articles is also common. All subjects, aside from T15 and T2, produce a sizeable proportion of stressed articles. Both of the advanced subjects and five of the intermediates (T15, T3, T9, T13, T1), however, produce most of their DPs with unstressed articles. Whether these involve the target free clitic representation (20b.i) or the L1 affixal clitic representation (20b.ii) cannot be known until a comparison of behaviour in DPs with adjectives is undertaken. Compare Figure 2 overleaf with Figure 1.

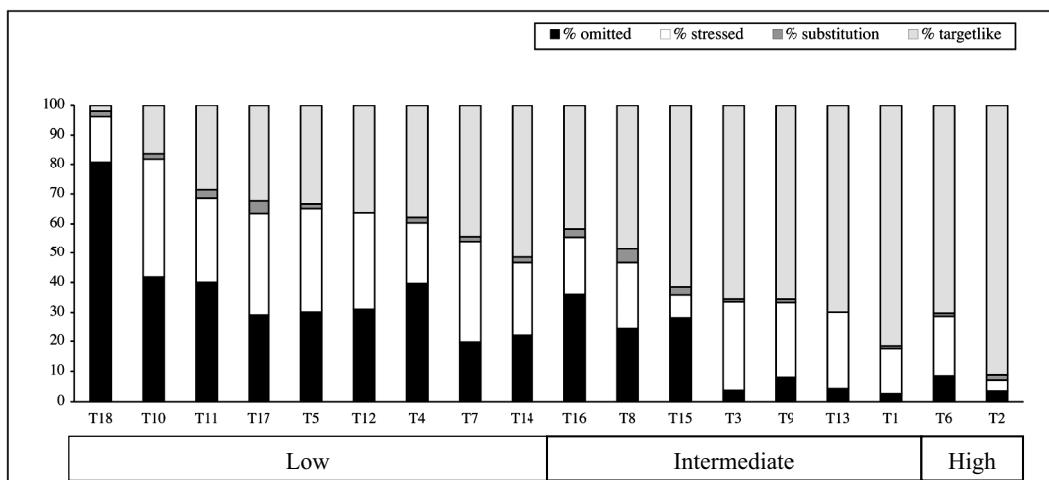


Figure 1. Patterns of article suppliance for DPs without adjectives

Figure 2 presents data from fewer subjects, as five subjects, all from the lowest proficiency group, did not produce enough adjectives for a comparison to be possible, despite our attempts to elicit them. This is consistent with the prediction in (22b).

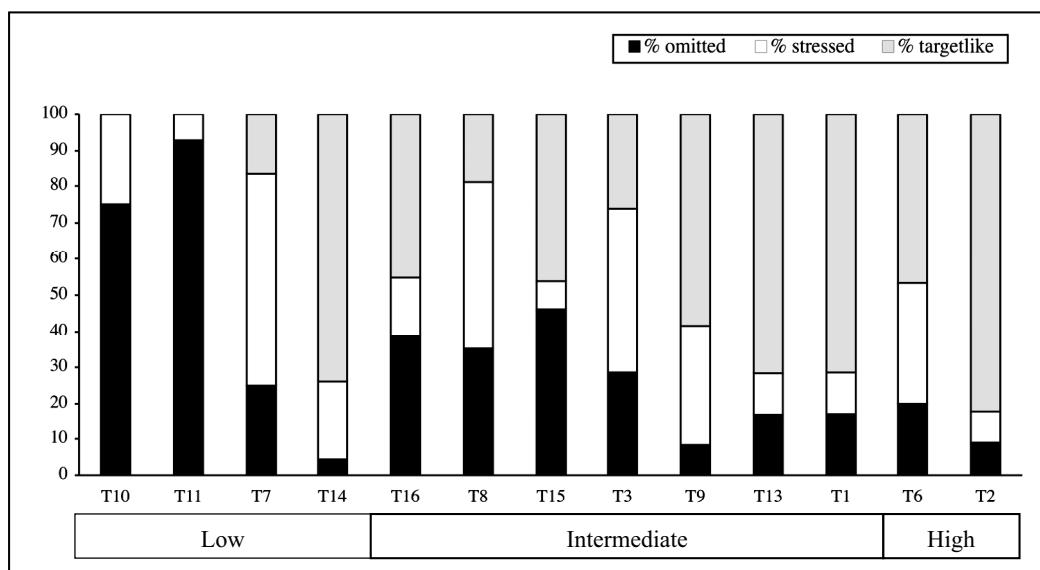


Figure 2. Patterns of article supplience for DPs containing adjectives

Recall from (22) that we also predict DPs with adjectives to show greater rates of article omission (22c) and production of articles as stressed (22d), if L2 speakers do not have access to the target free clitic representation for articles. A comparison of Figures 1 and 2 reveals that a number of subjects show behaviour in the predicted direction: for 7 of the 13 subjects (T10, T11, T7, T14, T8, T3, T6), the contingency between presence of an adjective and non-target-like article production was significant or neared significance. (The behaviour for T14 is the opposite of the direction predicted; we return to this below.)

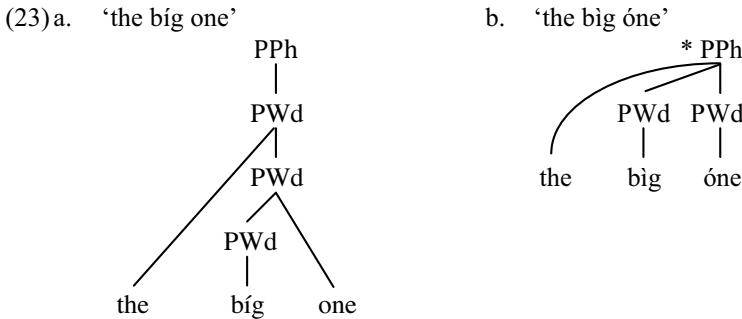
Table 3 examines the contingency data in terms of how target-like overall performance was on DPs without adjectives. Six of the subjects produce unstressed articles 49% of the time or less in DPs without adjectives (leaving aside the five who did not produce enough DPs with adjectives to be considered). A comparison of the target-like productions of these six in Figures 1 and 2 shows that four of them (T10, T11, T7, T8) have the predicted asymmetry in the right direction, in other words, omitting or stressing articles significantly more in the presence of an adjective. Four subjects showed target-like productions ranging from 61-68% when no adjective was present and two of these (T3 and T6) show the expected asymmetry. Finally, none of the subjects who produced a substantial majority of target-like forms when no adjective was present (70% or higher) show a significant contingency.

Target-like performance on DPs without adjectives	Contingency on \pm adj	No contingency	Not enough DPs with adjectives
0 - 49%	T10, T11, T7, T8, (T14)	T16	T18, T17, T5, T12, T4
50 - 69%	T3, T6	T15, T9	
70 - 100%		T13, T1, T2	

Table 3. Contingency or no contingency on \pm adjective

In sum, the number of subjects who show no contingency between presence of an adjective and target-like production of articles increases as target-like performance on articles in DPs without adjectives increases. Results from three subjects (T13, T1, T2) indicate that the target free clitic structure for English articles has been acquired. Three additional subjects (T16, T15, T9) are in the process of acquiring the target structure but are still showing considerable L1 effects as well.

Let us now return to T14 who shows a contingency in the wrong direction. A closer look at this subject's DPs with adjectives reveals that most of them are of the shape 'art adj one'. In this case, the L1 affixal clitic structure can be used, as the prosodic head of the DP is the adjective; see (23a). The structure involved is not that in (23b) (this would only be suitable for DPs with the odd-sounding stress pattern 'the big óne').



Although we have seen that L2 learners can acquire prosodic representations that are not present in their native language, most of the participants in our study continue to delete or stress articles, especially in DPs with adjectives. Several questions arise at this point:

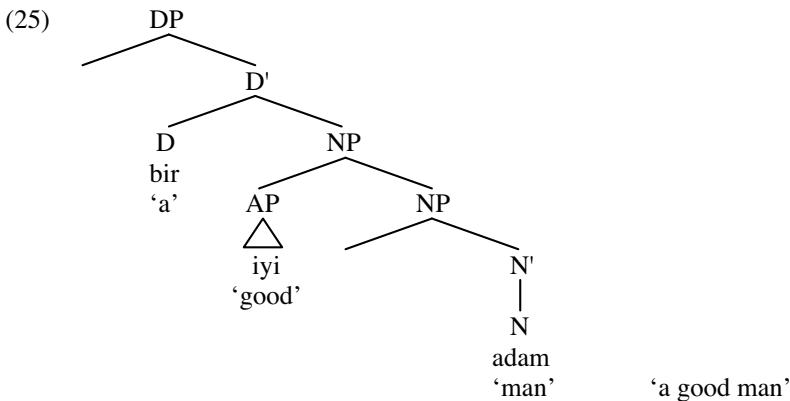
(24) Outstanding questions:

- Under what conditions do learners delete articles vs. stress articles?
- Can we predict who will delete and who will stress from anything other than proficiency level?

In order to address these questions, we must first examine Turkish word order alternations, in section 3.4.

3.4. Word order alternations in Turkish

As mentioned earlier, the canonical order for Turkish DPs is Art-Adj-Noun. As the tree in (25) shows, we assume that APs in Turkish are adjuncts (Goad & White 2011).



This is motivated by the relatively free ordering of adjectives in Turkish DPs, shown in (26a-b) (from Öztürk 2005).

- (26) a. *bú kırmızı kitâp* *kırmızı bú kitâp* 'this red book'
 this red book red this book
- b. *iki kırmızı kitâp* *kırmızı iki kitâp* 'two red books'
 two red book red two book

If L2 learners successfully acquire the English [-bound] representation and corresponding free clitic prosodification, pattern C, unstressed articles are predicted, regardless of whether or not the DP contains adjectives.

The results are presented in Table 5. Patterns for definite and indefinite DPs are provided separately, because most subjects did not treat the two articles uniformly (see further below). The principal patterns are in bold italics.⁴

	Definite DPs				Indefinite DPs			
	A→C		C		B		C	
	T3 T6 T8 T13 T15 T16 T17	T1 T2 T9 T14	T3 T6 T8 T9 T10 T14	T1 T2				
No adj unstressed	70.6	76.8	19.2	79.0				
stressed	9.3	9.4	61.2	12.3				
deleted	20.1	13.8	19.6	8.7				
Adj unstressed	50.7	83.3	14.6	73.3				
stressed	17.1	12.5	64.0	11.1				
deleted	32.3	4.2	21.4	15.6				

Table 5. Patterns of Article Production (in %)

The results show that the predictions are largely confirmed in that there is a relationship between the preferred non-target pattern and the bounded status of the determiner: target-sounding (unstressed) articles in DPs without adjectives are coupled with deletion in DPs with adjectives (pattern A); and stressed articles in DPs without adjectives are coupled with stressed articles in DPs with adjectives (pattern B).

There is, however, an unexpected definite-indefinite asymmetry. Pattern A is the predominant non-target pattern for definites: *the* is a [+bound] affixal clitic, the same representation that holds for indefinite *bir*; while pattern B is the predominant non-target pattern for indefinites: *a* is a [-bound] independent PwD, like other determiners in Turkish. At first glance, this result seems surprising, given that the indefinite article in Turkish is prosodically organized as in pattern A. An exploration of vowel harmony targeting articles in a subset of these L2ers, however, provides the source for this asymmetry (Goad & White 2009b). Examination of contexts where harmony does not apply reveals that the default vowel in the definite article is central for most subjects ([ɨ] or [ə]), while the default vowel in the indefinite article is front ([ɪ], [e] or [ɛ]). (This may stem from English orthography: ‘a’ is often a front vowel, [ei], notably in the letter A, while ‘e’ is often a schwa-like vowel.) If *the* contains a schwa-like vowel ([ə] or [ɨ]), a vowel which is unstressable in most languages, then the only suitable representation available for transfer from the L1 is the representation for unstressed indefinite *bir*. Since [ei] (orthographic *a*) is typically stressed in English, L2ers may have concluded that the [-bound] independent PwD representation for other determiners in Turkish is most appropriate for indefinite *a*.

3.6. Interim summary

Turkish-speaking L2ers have recourse to a variety of ways of prosodically representing articles in English, based on the structures that are permitted in the L1 grammar. Depending on the prosodic representation adopted, articles will be omitted, produced as stressed, or produced as seemingly target-like under certain conditions. In considering the prosodic representations employed, as well as the interlanguage analysis of articles as bound or free, a clear set of predictions emerges as to the

⁴ Two subjects for each of definite (T10, T11) and indefinite (T4, T16) contexts provide evidence of a Stage Ø where the predominant pattern is deletion of articles in both types of DPs. Also, there is one subject (T7) whose pattern of behaviour with definites is not interpretable. These five subjects have been excluded, but a more detailed discussion of them is provided in Goad & White (2011).

conditions under which particular non-target outputs should occur and these are largely supported by the data.

4. Conclusion

We began with the observation that omission of functional morphology has been argued to reveal syntactic, semantic, discourse/pragmatic or mapping/access difficulties. To this list, we have added a further area of difficulty: higher prosodic structure. As with other domains of the grammar, problems due to prosodic transfer will have a particular profile, where deletion is coupled with other types of behaviour.

Clearly, no one analysis will capture all non-target behaviour, as functional morphology implicates multiple levels of the grammar. To this list, we must add constraints on perception, segment structure and syllabification. These areas are not usually considered in explanations for learners' treatment of functional morphology, yet we have seen that they demand significant attention when designing experiments that aim to probe learners' knowledge of functional morphology in other components of the grammar: problems in perception, segment structure and syllabification may impede acquisition and/or underrepresent learners' abilities.

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