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Ultimate Attainment of L2 Inflection: Effects of L1 Prosodic Structure

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Abstract

Many L2 speakers fail to supply functional morphology consistently in production. In this paper, the Prosodic Transfer Hypothesis (PTH) is proposed, where this is attributed to L1 constraints on prosodic structure. The PTH maintains that functional material which is appropriately represented in syntax may be deleted in production if prosodic structures necessary in the L2 cannot be built from L1 structures. When non-target-like L1 structures are used to accommodate L2 functional material, use is variable and there are asymmetries in the contexts where it appears. The present focus is on an end-state Turkish-speaking learner of English. It is shown that the prosodic structures available in Turkish can be minimally adapted to yield the structure required for English inflection, where the speaker is highly accurate. To represent English articles, the required structure cannot be built from L1 structures; hence, rate of suppliance is lower and is largely determined by phonological context.

Introduction

A well-known and long-standing phenomenon in second language acquisition is the failure of many second language speakers to supply functional morphology on a consistent basis in spontaneous production. This is puzzling on at least two counts: (i) there is ample positive evidence in the L2 input for such morphology;[1] (ii) at the same time as having difficulties with functional morphology, L2 speakers are often highly accurate on related syntactic properties (e.g. Gavruseva and Lardiere 1996, Haznedar and Schwartz 1997, Ionin and Wexler 2002, Lardiere 1998a,b, 2000, Prévost and White 2000a,b, White 2003).

It is noteworthy that variability in suppliance of functional morphology is not confined to individuals who are still in the course of L2 acquisition. It is also found in the case of L2 speakers whose interlanguage grammars can be deemed, on independent grounds, to have reached a steady state. In two case studies of 'fossilized' speakers, Lardiere (1998a,b) and White (2003) show that certain kinds of inflectional morphology continue to be omitted. Lardiere reports 34.5% suppliance of past tense and 4.5% suppliance of agreement in the L2 English of Patty, a native speaker of Mandarin and Hokkien; White reports 60% suppliance of indefinite articles in the case of SD, an L2 English speaker whose L1 is Turkish (see below). Furthermore, there is little change in these proportions over time–a 9 year interval between data gathering sessions in the case of Patty; 18 months in the case of SD–, suggesting that native-like ultimate attainment in this domain is by no means assured.

In this paper, we propose that persistent low suppliance of functional morphology in the second language is due, in part, to the influence of constraints on prosodic structure from the L1. We call this the Prosodic Transfer Hypotheses (PTH). While every construction generated by the morphosyntax must have a corresponding phonological representation, the PTH can accommodate mismatches between syntactic knowledge and phonological outputs as follows: functional material which is appropriately represented in the syntax may be deleted in production if prosodic structures necessary in the L2 cannot be built from the licensing relations available in the L1; consequently, native-like prosodification of functional material will be impossible and L2 outputs will not be target-like. Importantly, the PTH is concerned with the role that the L1 plays in the production of functional material in L2 outputs. L1 prosodic constraints do not, on our view, act as a filter in comprehension which could prevent the establishment of the necessary syntactic representations in the L2.

Accounts of morphological variability: the role of the L1

A number of accounts of variable suppliance of L2 morphology have been proposed in recent years. Here, we present two opposing perspectives, both of which focus on the influence of the L1 grammar, one emphasizing properties of the L1 morphosyntax and the other, our position, concentrating on the role of the L1 phonology.

Failed Functional Features Hypothesis (FFFH)

The first account is known as the Failed Functional Features Hypothesis (FFFH). Under this view, morphological variability is attributed to an inability to represent certain grammatical features (particularly uninterpretable features) in the interlanguage grammar (Hawkins and Chan 1997, Tsimpli 2003, Tsimpli and Roussou 1991). Specifically, post-puberty second language learners are claimed to be unable to acquire abstract grammatical features which differ from those found in the L1. On this account, then, interlanguage syntactic representations are defective.

In originally proposing the FFFH, Hawkins and Chan (1997) argued for the purported absence of a [±wh] feature in the interlanguage grammar of Chinese-speaking learners of English. Subsequently, Hawkins and colleagues extended the FFFH to abstract features like tense (±past) and gender, claiming that the failure of adult learners to consistently supply overt tense morphology or to consistently supply gender agreement is a consequence of the absence of the corresponding features in the L1 grammar; for example, L1 Mandarin/L2 English in the case of tense (Hawkins 2000, Hawkins and Liszka 2003) and L1 English/L2 French or Spanish in the case of gender (Franceschina 2001, Hawkins and Franceschina 2004). Tsimpli (2003) makes similar claims with respect to definiteness (L1s Russian and Turkish/L2 Greek).

Recently, considerable evidence has accumulated against this position. It has been shown that even when L2 speakers omit overt morphology, they are in fact sensitive to syntactic, interpretive and morphological consequences of grammatical features which are assumed by Hawkins and colleagues to be absent in the L1s in question, for example, nominative case assignment implicating tense in the case of L1 Mandarin/L2 English (Lardiere 1998a, 2003), interpretive consequences of gender agreement in L2 Spanish implicating gender even in the case of L1 English-speakers (White, Valenzuela, Kozlowska-Macgregor and Leung 2004), and subtle definiteness effects in the case of L1 Turkish/L2 English (White 2003).

Such results suggest that there is a discrepancy between second language speakers' underlying knowledge of L2 morphosyntax and their realization of overt morphology, rather than a deficit affecting both. Hence, omission of functional morphology requires a different kind of explanation from that offered by the FFFH. In this paper, we propose that the explanation lies in L1 constraints on prosodic structure.

The Prosodic Transfer Hypothesis (PTH)

As mentioned earlier, we call our proposal the Prosodic Transfer Hypothesis. The PTH contends that L1 prosodic phonology constrains production of L2 functional morphology. If the L1 does not permit certain kinds of prosodic representations as required by the L2, then second language speakers will have difficulties in representing such morphology in the outputs of the phonological component of the interlanguage grammar.

In so far as L1 prosodic representations can be adapted to accommodate the L2, the PTH predicts that suppliance of functional morphology in production can reach native-like levels. However, when L1 constraints on licensing cannot be overcome, non-target-like behaviour is predicted to manifest itself in two ways. Firstly, in the most extreme case, functional material will invariably be deleted in production, and suppliance will thus be at zero percent. Secondly, non-target-like structures available from the L1 can be used to accommodate L2 functional material, but suppliance should be variable and there should be observable (phonologically-conditioned) asymmetries in the contexts in which the morphology is supplied.

In earlier work (Goad, White and Steele 2003a,b), we argued that these two scenarios were observed in the suppliance patterns for agreement morphology in the outputs of twelve Mandarin speakers of English. Mandarin does not permit adjunction to the Prosodic Word (PWd), the representation required for English agreement. Half of the subjects showed across-the-board deletion of agreement. The other half successfully supplied the morphology for those verbs which ended in rhymes that could accommodate the morphology within the lower PWd, consistent with the representation of functional material in the L1.

In the present paper, we offer an account of the successes and failures of a Turkish speaker, SD, in supplying inflectional morphology and function words in her L2 English. We will show that the prosodic structures available in Turkish can be 'minimally adapted' (see below) to yield the structure required for English inflection. This accounts for SD's considerable accuracy in supplying tense, agreement and plural morphology. In contrast, to represent articles in English, a structure is required which is neither available in the L1 nor can be built from existing L1 structures; hence her suppliance of articles in the L2 is considerably lower. In this case, a close examination of the data reveals that rate of suppliance can largely be determined by context.

Turkish

As alluded to above, the L2 functional material that we investigate includes tense, agreement and plural morphology at the right edge, and determiners at the left edge. In this section, we provide a brief description of these and related properties in Turkish, the L1 of the speaker examined in this study. The phonological properties of these morphemes are discussed below, after our assumptions about prosodic structure have been presented.

Turkish is a head-final agglutinative language, with rich verbal and nominal inflection in the form of suffixes. Verbal suffixes mark subject agreement (person and number), tense and aspect. Nouns and pronouns are inflected for number and case. These properties are illustrated in (1).[2]

(1) kitap-lar-ɨ oku-dɨ-m
book-PL-ACC read-PAST-1SG
'I read the books'

Bare NPs in Turkish are ambiguous as to definiteness (see (2a)). There is no definite article; in indefinite contexts, *bir* can be used. When *bir* is unstressed, it is an indefinite article, as in (2b); when stressed, it is the numeral *one*, as in (2c). (In fact, there is some disagreement on the status of Turkish *bir*. Kornfilt (1997) considers it to be an article; Underhill (1976) argues that it is a numeral; Lyons (1999) refers to it as a *quasi indefinite article*.) Other determiners, such as demonstratives, are stressed, as in (2d).

(2) a. kitáp
'(the/a) book'

b. bir kitáp
'a book'

c. bír kitap
'one book'

d. bú kitap
'this book'

A comparison of the data in (1) and (2) with parallel constructions in the target L2, English, reveals that the L2 functional morphology that we will focus on is, for the most part, overtly marked in the L1 as well. In addition, these morphemes appear in the same linear position relative to the base to which they attach in both languages, right edge for tense, agreement and

plural, and left edge for articles. Nevertheless, neither of these similarities is sufficient to ensure accurate realization of the morphology in L2 outputs. As we will show, what is essential is how the material is prosodically organized in the L2 vis-à-vis the types of structures available from the L1.[3]

The case study

In this paper, we will re-examine data previously reported in White (2003). The subject, SD, moved to Canada from Turkey when she was 40, her first significant exposure to English being at that time. After the move to Canada, the language spoken at home remained Turkish but SD also had considerable exposure to English: she attended college, where the medium of instruction was English, and subsequently worked in English-speaking environments. Impressionistically, SD's proficiency in English is advanced; this was confirmed by her performance on the ELI placement test, on which she scored 93.75%.

The data reported in White (2003) and below were gathered after SD had lived in Canada for 10 years. Four interviews were conducted over a two month period (Time 1). Eighteen months later, a fifth interview was conducted (Time 2). Her spontaneous production at these interviews was taped, transcribed and coded. More than 3400 utterances were recorded and analysed.

In Table 1, we report suppliance of right-edge inflectional morphology, both verbal and nominal, including regular past tense, 3rd person singular agreement and noun plurals (henceforth collapsed as TAP for 'tense-agreement-plural'). Table 2 reports suppliance of determiners (i.e. function words at the left edge), including definite and indefinite articles and other determiners (demonstratives, possessives, quantifiers).[4] Suppliance of right-edge morphology as a whole is significantly higher than suppliance of articles, both at Time 1 (χ^2 p=.0001) and at Time 2 (χ^2 p=.0001).[5] As can be seen in both tables, there is little change from Time 1 to Time 2; hence we conclude that SD has reached a steady state in her L2 English (see White 2003 for further discussion).

Table 1. Inflectional morphology (TAP) in obligatory contexts (right edge)

	Regular past (lexical V)		3sg agree (lexical V)		Plural morphology		Total right edge	
	Time 1	Time 2	Time 1	Time 2	Time 1	Time 2	Time 1	Time 2
Supplied	68	31	133	70	417	249	618	350
Omitted	20	23	40	14	63	29	123	66
% Suppliance	77%	57%	77%	83%	87%	90%	83%	84%

Table 2. Determiners in obligatory contexts (left edge)

	Definite articles		Indefinite articles		Other determiners		Total articles	
	Time 1	Time 2	Time 1	Time 2	Time 1	Time 2	Time 1	Time 2
Supplied	320	140	306	161	1118	797	626	301
Omitted	113	47	206	95			319	142
% Suppliance	74%	75%	60%	63%			66%	68%

Typical examples of suppliance and omission are given in (3) for agreement, (4) for past tense, (5) for definite articles, and (6) for indefinite articles.

(3) And she cleans… the house. And wash the dishes. And, uh, she makes the bed.

(4) There was a young woman who spank her children in the mall.

(5) Because windows are very small.

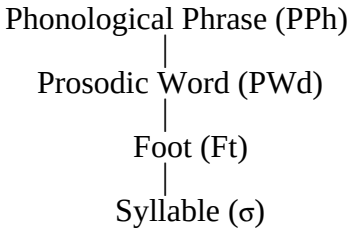
(6) I'm expecting telephone call.

At the same time as omitting functional morphology, White (2003) reports many indications that SD represents tense and agreement features, as well as definiteness, in her interlanguage grammar. Although inflection and function words are omitted, when they are supplied, they are accurate (e.g., there no cases of 3rd person singular agreement with 1st or 2nd person; no use of definite articles for indefinite or vice versa). Similar to Patty (Lardiere 1998a), SD's nominative case assignment is totally accurate (implicating tense); verb placement is appropriate for English (suggesting intact feature strength, contra Eubank and Grace (1998)); the copula and auxiliaries occur with greater than 97% accuracy (suggesting feature checking, as per Lardiere (1999)); and SD shows robust definiteness effects (implicating a ±definite feature, even though indefinite and definite articles are omitted more than other functional morphology). In other words, failure to consistently produce overt morphology cannot be attributed to failure to represent the relevant morphosyntactic features. An explanation must be sought elsewhere. Before providing an explanation for SD's productions and omissions in terms of the influence of Turkish prosodic structure on her interlanguage grammar, we outline our basic assumptions about prosodic structure and elaborate on the consequences of our hypothesis concerning prosodic transfer for Turkish–English interlanguage.

Prosodic structure

Prosodic constituents are typically assumed to be organized into a hierarchy as in Figure 1 (e.g. Nespor and Vogel 1986, Selkirk 1980, 1986). Segments are organized into syllables, syllables into feet (the domain of stress assignment), feet into prosodic words (the PWd is typically co-existent with the stem), and prosodic words into phonological phrases.

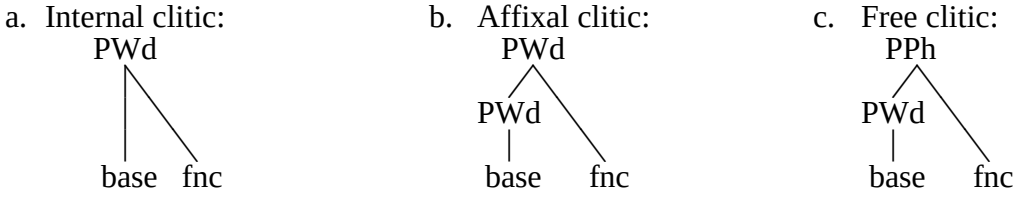
Figure 1



Although languages attempt to respect the arrangement of constituents in Figure 1, under certain well-defined conditions, prosodic constituents will not be dominated by the immediately higher constituent; that is, the structure will violate 'strict layering'. While in some languages, functional material is prosodified so as to respect strict layering, more typically, it is organized in ways that contravene it, by adjoining to the PWd or linking directly to the PPh. In the terminology of Selkirk (1996), 'internal clitics' are functional elements that strive to respect strict layering; they are organized internal to the PWd (see Figure 2a below). As will be seen in Figure 3, this is the representation required for TAP in Turkish. 'Affixal clitics' involve adjunction to the PWd (see Figure 2b), the structure required for TAP in English (at the right-edge) and for articles in Turkish (at the left-edge) (see Figure 4 and Figure 7a respectively). 'Free clitics' are bound elements that link directly to the PPh (see Figure 2c), the representation

required for articles in English (see Figure 7b). The types of phonological behaviour that motivate the differences in prosodication of the functional morphology under consideration will be discussed in detail below.

Figure 2



The PTH draws on cross-linguistic differences in the organization of functional material. The consequences for Turkish–English interlanguage are as follows. Concerning the right edge, Turkish and English both overtly mark TAP; however, these morphemes are not prosodically organized in the same fashion in the two languages. Similarly, at the left edge, both languages overtly mark articles, and yet these are not organized in the same fashion. In the next section, we will argue that the structure necessary for the prosodification of TAP in English can be built through minimally-adapting structures available from the L1; hence, rate of suppliance is high (as per Table 1). The notion of minimal adaptation is outlined in (7) and will be elaborated on below as appropriate.

(7) Minimal adaptation in prosodic structure:
   a. L2 structures are possible in the interlanguage grammar when they can be built through a combination of pre-existing licensing relations (cf. Brown 1998 on features);
   b. L2 structures are possible in the interlanguage grammar when they involve L1 structures being licensed in new positions.

In contrast to TAP, we demonstrate that, for articles, the structure required for English cannot be built through minimally-adapting available L1 licensing relations. Accordingly, rate of suppliance is depressed (Table 2).

Analysis

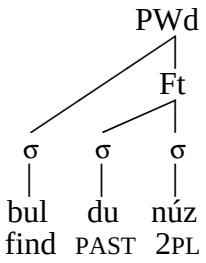
Our focus is on the organization of functional material at both the right and left edges in SD's interlanguage grammar. In the next section, we focus on tense, agreement and plural morphology which appear at the right edge in both Turkish and English. In the following, we turn to the left edge, in particular, to determiners.

The right edge: the prosodification of tense, agreement and plural (TAP)

Tense, agreement and plural morphemes in Turkish are all internal clitics; that is, they appear inside the PWd (stem), as shown in Figure 3.

Figure 3

Turkish TAP: Internal clitic:



Evidence for this analysis comes from vowel harmony and stress. The domain of vowel harmony in virtually all languages is the PWd. The examples in (8) show that TAP fall within the scope of vowel harmony in Turkish (e.g. Clements & Sezer 1982), strongly suggesting that they are internal to the PWd.

(8) a. /bul-dI-nIz/ → [bul-du-nuz]
find-PAST-2PL
'you found'

/been-dI-nIz/ → [been-di-niz]
like-PAST-2PL
'you liked'

b. /elma-lAr/ → [elma-lar]
apple-PLUR
'apples'

/ip-lAr/ → [ip-ler]
ropes-PLUR
'ropes'

The usual stress pattern in Turkish is for the rightmost syllable in the word to bear stress (e.g. Kabak and Vogel 2001, Sezer 1981). The data in (9) reveal that TAP morphemes are stressed when they occur word-finally. As the domain of stress assignment is the foot, and the foot is by definition internal to the PWd, these morphemes must be inside the PWd.

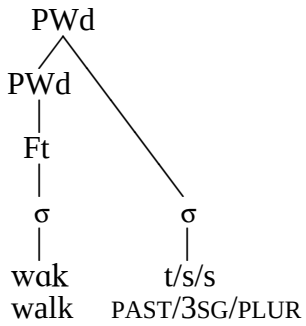
(9) a. bul-dú
's/he found'
bul-du-núz
'you (pl) found'

b. elmá
'apple'
elma-lár
'apples'

In contrast to Turkish, TAP morphemes are organized as affixal clitics in English. That is, they are adjoined to the PWd, as shown in Figure 4.

Figure 4

English TAP: Affixal clitic:



Evidence that TAP can be neither internal to the lower PWd nor linked directly to the PPh is provided as follows (from Goad, White and Steele (2003a,b)). Concerning the PWd-internal possibility, observe the following contrast between inflection and 'class 1' (i.e. stem-internal) derivation. When a class 1 consonant-initial suffix attaches to a base which has a final 'rhyme' of three segments (the maximum possible in monomorphemic words, e.g. [laɪf] 'life', [ʃɛlf] 'shelf', *[ʃaɪlf]),[6] the rhyme must shorten to accommodate the suffix. We focus on *-θ*, as this suffix parallels the shape of the inflectional morphemes under consideration, *-t/d* and *-s/z*. The bipositional vowel [aɪ] in a word like *five* must shorten to [ɪ] when *-θ* is attached: [fɪfθ], *[faɪfθ]. If class 1 suffixes incorporate into the lower PWd, the fact that these derived forms respect the upper bound on rhyme length that is motivated for monomorphemic words is straightforwardly captured. Inflectional suffixes, by contrast, do not induce shortening. The addition of *-t/d* or *-s/z* to a verb like *arrive* does not force [aɪ] to shorten to [ɪ]: [əraɪvd], *[ərɪvd]. Since the addition of inflection yields forms which would appear not to respect the upper bound on rhyme length, it must be the case that inflection attaches outside the lower PWd in English.

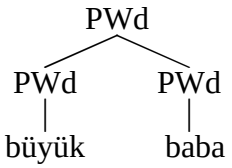
Concerning the possibility that TAP morphemes might link directly to the PPh, the following observation from Hayes (1989) reveals that this representation is not available for inflection, that it must be reserved for right-edge clitics like *it*. In comparing forms like *visit-ed* and *visit it*, Hayes notes that stem-final [t] can be lightly aspirated in the former, but not in the latter. As these forms are otherwise segmentally identical in relevant respects, this difference can only be accounted for if different representations are involved; *it* is a free clitic, which can be motivated on independent grounds, leaving the affixal clitic analysis for past tense, that is, the adjunction representation in Figure 4.

Turkish–English interlanguage representation of TAP

To summarize, TAP morphemes in English are prosodified by means of adjunction to the PWd, whereas in Turkish, these morphemes occur internal to the PWd. We now turn to the question of why SD's suppliance of TAP is relatively high overall, as shown in Table 1. Although Turkish does not employ adjunction to represent inflection at the right edge, there are, in principle, two ways that this structure can be built in the interlanguage grammar, given the tools available from the L1. The first possibility is that adjunction results from combining two structures available from the L1, as per (7a). The first structure is PWd dominating PWd, which is required to represent compounds in Turkish, as shown in Figure 5a. The second is PWd directly dominating σ at the right edge, the structure needed to capture the non-final placement of stress in a subset of the Turkish vocabulary known as 'Sezer stems' (mostly place names and foreign personal names (Sezer 1981)). Given that the Turkish foot is right-headed, the final syllable in Sezer stems must be outside the foot to remain unstressed; see Figure 5b.

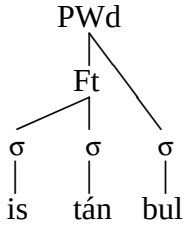
Figure 5

a.



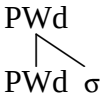
'grandfather'

b.



If the learner combines these two licensing options from the L1 – PWd dominating PWd, and PWd directly dominating σ – the result will be the adjunction structure required for English TAP, as shown in Figure 6.

Figure 6



The second way that the adjunction structure can be built is through the route in (7b): a licit L1 structure is licensed in a new location in the interlanguage grammar. Below we will propose that Turkish indefinite *bir* involves adjunction at the left edge (see Figure 7a). If this licensing relation can be 'flipped' to the right edge, the result will be the structure required for TAP in English.

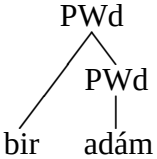
In sum, the representation needed for English TAP can be built in two ways, both of which involve minimal adaptations from the L1 grammar. Accordingly, suppliance of TAP is overall quite high. The situation is different, however, when we consider the left edge.

The left edge: the prosodification of determiners

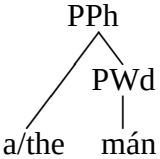
The structures needed to prosodically represent articles in Turkish and English are given in Figure 7. In Turkish, we propose that *bir* is an affixal clitic involving adjunction to the PWd as in Figure 7a. This representation is that typically assigned to prefixes across languages. In English, *a* and *the* are free clitics, linking higher in the tree, to the phonological phrase (Selkirk 1996); see Figure 7b.

Figure 7

a. Turkish indefinite article:
Affixal clitic (prefix):



b. English articles:
Free clitic:



Evidence that Turkish *bir* lies outside the lower PWd comes from vowel harmony. Recall that the domain of vowel harmony is the PWd. The vowel in *bir* does not undergo harmony (*[bɨr adam]), nor does it initiate left-to-right spread (*[bir edem]), both of which suggest that it cannot be within the same PWd (stem) as the following noun.

Of the two remaining options, the affixal and free clitic representations in Figure 7, we argue that the difference in word order illustrated in (10) constitutes evidence against the latter option. Indefinite *bir* and the numeral *bir* differ in terms of the position of *bir* when an adjective precedes the noun. In particular, indefinite *bir* cannot be separated from the noun by an adjective (compare (10a) with the illicit (10b)), in contrast to the numeral in (10c).

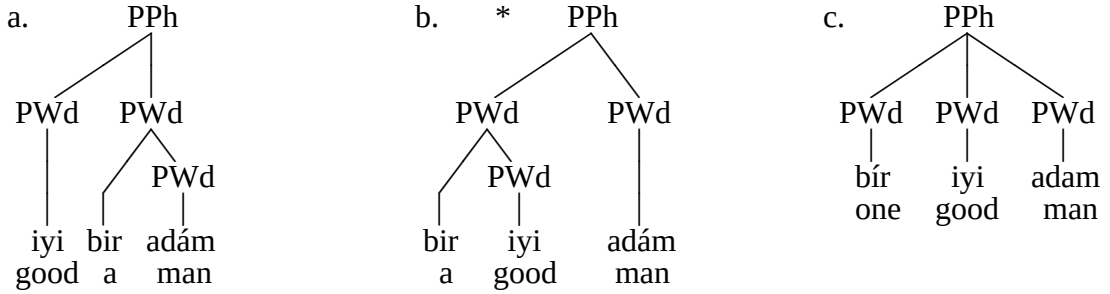
(10) a. iyi bir adám
good a man
'a good man'

b. *bir iyi adám

c. bír iyi adam
one good man
'one good man'

We propose that prosodic well-formedness drives this change in word order. Under the affixal clitic analysis, indefinite *bir* must be prefixed onto the head noun and the order *iyi bir adám* in Figure 8a results. The order **bir iyi adám* in Figure 8b is illicit, as the article is prefixed onto the adjective. When *bir* is a numeral, by contrast, the order where *bir* immediately precedes the adjective is well-formed because, as a numeral, *bir* is stressed and thus forms an independent PWd. As such, it is not prosodically-dependent on the head noun; see Figure 8c.[7]

Figure 8

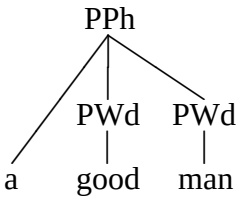


In English, the situation is different. Firstly, for completeness, we provide evidence from stress that articles cannot be internal to the lower PWd (see Selkirk 1996). In a four-syllable noun like *Màssachúsetts,* the initial syllable receives secondary stress. In contrast, if an article precedes a three-syllable noun like *potáto,* the article cannot be stressed: *the potáto, *thè potáto.* The article must therefore lie outside the scope of stress assignment, that is, outside the lower PWd.

Of the two remaining options in Figure 7a and b, the adjunction structure that Turkish opts for cannot be motivated for English. In phrases involving adjective + noun, the article cannot appear adjacent to the noun (see (11b)). That is, in contrast to Turkish, the article does not prefix onto the head noun and English instead opts for the free clitic representation in Figure 9. In short, articles attach to phrases, not words, in English.

(11) a. a good man
b. *good a man

Figure 9



Predictions for Turkish–English interlanguage representation of articles

Having motivated the structures for articles in the two languages, we now address the question of why SD's suppliance of English articles is relatively low compared to TAP (see Table 2). Since SD does in fact produce English articles, it must be the case that she has some means to represent them prosodically. It appears that free clitics are not permitted in Turkish at either edge.[8] Thus, L1 licensing options provide no way to associate articles directly with the PPh (the structure required for English; see Figure 7b). This leaves three alternative representations which could be used, based on available L1 structures: (i) adjunction to PWd (required for indefinite *bir* in Figure 7a) might be used in the interlanguage; (ii) a PWd-internal analysis might be adopted, where articles are incorporated into the lower PWd, along the lines of TAP (see Figure 3); or (iii) articles might be treated like other stressed determiners in the L1, forming their own PWds as in Figure 8c. The predictions that these possibilities present for SD's interlanguage productions are discussed below.

Adjunction to PWd

For DPs consisting only of an article followed by a noun with initial stress, it is in fact impossible to tell which representation is being adopted: a PWd-internal structure or one involving adjunction. However, our proposal that SD may be forced to use adjunction predicts contrasts between DPs which consist of an article and noun (e.g. *the book*) and DPs which consist of an article, adjective and noun (e.g. *the red book*). The former should be relatively unproblematic, because adjunction to PWd (from the L1) could be used in such cases. However, this analysis is not available when adjectives are present. Since adjectives appear between the article and noun in English, adjoining *a/the* to the following stem would involve their being incorrectly prefixed onto the adjective (cf. Figure 8b). We thus predict that omission of articles will be higher in contexts involving adjectives within the DP. As shown in Table 3, this prediction is supported.[9] In the case of indefinite articles, there is a highly significant contingency between suppliance of the article and presence of an adjective ($p<.0001$); in the case of definite articles, the contingency approaches significance ($p=.0769$). (Given the dearth of common adjectives in English with non-initial stress, the counts only include cases where the noun/adjective that immediately follows the target article is initially-stressed.)

Table 3. Article suppliance: Art + Noun vs. Art + Adj + N

		Definite	Indefinite
Art + [σ...]$_{Noun}$	Supplied	277	231
	Omitted	84	98
	% Suppliance	77%	70%
Art + [σ...]$_{Adj}$ + Noun	Supplied	61	121
	Omitted	30	124
	% Suppliance	67%	49%

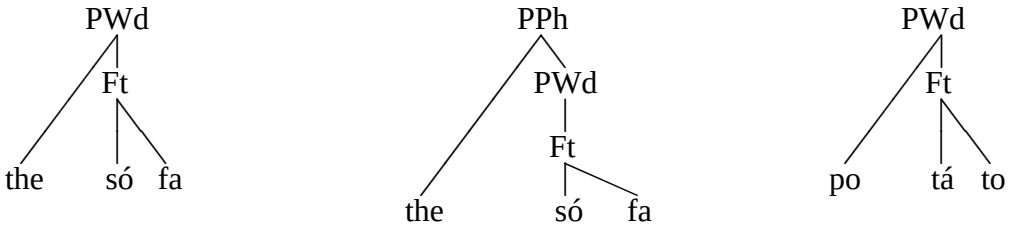
PWd-internal analysis

An alternative way that SD's interlanguage grammar might represent English articles is by using a PWd-internal structure, the representation required for Turkish TAP (at the right edge) (see Figure 3). This possibility can be tested by looking at article suppliance with respect to location of stress on the following noun. We first point out that SD's production of stress in English is highly accurate, suggesting that her interlanguage grammar recognizes (i) that English builds left-headed feet, e.g. $(\text{sófa})_{\text{Ft}}$,[10] and (ii) that all syllables are parsed into feet whenever possible, e.g. $(\text{Màssa})_{\text{Ft}}(\text{chúsetts})_{\text{Ft}}$ (and not *Massa(chúsetts)$_{\text{Ft}}$; see Figure 11b). Consistent with the left-headed footshape that English employs, nouns with second syllable stress, such as *políce*, must have their first syllable outside the foot and linked directly to the PWd, i.e. $[\text{po}(\text{líce})_{\text{Ft}}]_{\text{PWd}}$, $*[(\text{pólice})_{\text{Ft}}]_{\text{PWd}}$.

If articles in the interlanguage grammar are represented inside the lower PWd along with the noun, their rate of suppliance should be affected by the presence or absence of stress on the first syllable of the noun. For nouns like *sófa* with initial stress, the article can be linked directly to the PWd, as in Figure 10a. While this structure is not target-like (cf. Figure 10b), it is permitted in English for bare nouns with non-initial stress like *potáto* and *políce*, as in Figure 10c (and is allowed in mirror-image form in Turkish for Sezer stems in Figure 5b).

Figure 10

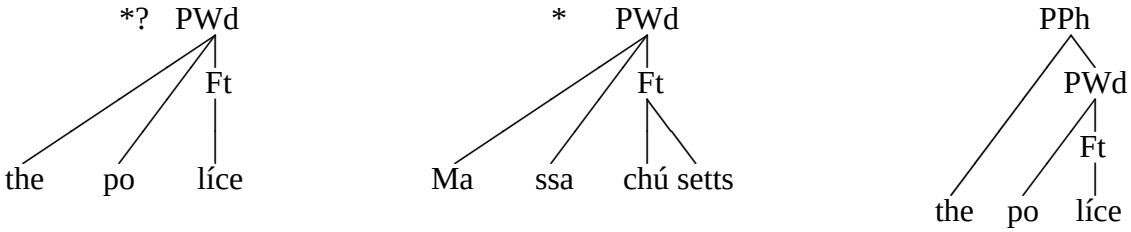
a. interlanguage rep: Art + $[\text{σσ}]_{\text{N}}$: b. Engl rep: Art + $[\text{σσ}]_{\text{N}}$: c. Engl rep: $[\text{σσ(σ)}]_{\text{N}}$:



However, when nouns like *políce* are preceded by an article, incorporating the article into the lower PWd will result in two PWd-internal unfooted syllables in a row, as shown in Figure 11a. Such a structure is marked and is not permitted in English, as illustrated by the illicit single-footed representation for monomorphemic $*[\text{Massa}(\text{chúsetts})_{\text{Ft}}]_{\text{PWd}}$ in Figure 11b. The correct English representation for *the políce* is in Figure 11c.

Figure 11

a. interlanguage rep: Art + $[\text{σσ}]_{\text{N}}$: b. Engl rep: $*[\text{σσσσ}]_{\text{N}}$: c. Engl rep: Art + $[\text{σσ}]_{\text{N}}$:



As to a possible contingency between determiner suppliance and stress placement, results are reported in Table 4. Unfortunately, there were relatively few nouns with second syllable stress in the data. The contingency was not significant, although the results with indefinite articles are in the right direction ($p=.07$). We leave this issue to future investigation where we can experimentally control for factors such as location of stress on the noun.

Table 4. Article suppliance in Art + Noun by location of stress

		Definite	Indefinite
Art + [σ́...]$_{Noun}$	Supplied	277	231
	Omitted	84	98
	% Suppliance	77%	70%
Art + [σσ́...]$_{Noun}$	Supplied	33	30
	Omitted	11	22
	% Suppliance	75%	58%

Independent PWds

SD's performance on other determiners, such as demonstratives, possessives and quantifiers, is highly accurate; these determiners are virtually always stressed in her outputs, and there appears to be no overuse or underuse of them (see Table 2). On our view, this is as expected, as these determiners are stressed and are therefore prosodified as independent PWds in both languages (see Figure 8c).

Our final prediction concerning the structure assigned to English articles is that SD's interlanguage grammar might sometimes represent them in the same way as other determiners, that is, with stress, hence forming their own PWds. This does not in fact occur. There are only a handful of stressed articles in SD's outputs. This is no doubt due to independent properties of English articles: unstressed [ðə] and [ə] are segmentally and moraically distinct from their stressed counterparts [ðiː] and [eː], making it unlikely that the latter would be substituted for the former.

A puzzle

A remaining puzzle concerns SD's overall rate of suppliance of definite vs. indefinite articles. The PTH predicts that she should be equally accurate (or inaccurate) on both, since the structures in Figures 7a and 10a should in principle be usable for articles of both types. This prediction was not supported: overall suppliance of definites is significantly ($p<.0001$) more accurate than indefinites at both Time 1 and Time 2 (see Table 2). We have no explanation for this result. Nevertheless, it is important to emphasize that the existence of indefinite *bir* in Turkish does not have a positive impact on the production of indefinite *a* in English. This is not inconsistent with the PTH: it is how functional material is organized into prosodic structure that is relevant. Whether or not a particular functional category is overtly realized in the L1 is irrelevant, as discussed above.

Discussion

To summarize: in this paper we have argued for the Prosodic Transfer Hypothesis. Our claim has been that production of L2 inflectional morphology and function words is constrained by the prosodic representations available in the L1 and that this, in part, accounts for the well-known phenomenon of morphological variability in L2 production. When L1 prosodic representations are not identical to those required for the L2, two scenarios have been proposed. In some cases, L1 representations can be minimally adapted to represent interlanguage outputs. L2 speakers are predicted to have little difficulty in constructing appropriate prosodic representations in such cases and, hence, they will produce rather than omit functional morphology. In other cases, the representations available in the L1 can less easily accommodate the requirements of the L2.

In the case of SD, the suppliance of right-edge morphology, including tense and agreement marking on verbs and number marking on nouns, is relatively high. Even though the L1, Turkish, does not permit the structure required for these morphemes in English – adjunction at the right edge – we have proposed that this structure can be built by minimally adapting licensing relations from the L1 grammar. In the case of articles, on the other hand, these cannot be represented as free clitics, as required by English. Instead, they are represented through adjunction (possible in Turkish at the left edge) or PWd-internally. Although these structures do not result in target-like representations, they often allow for realization of English articles. However, these representations are not appropriate in certain contexts (when the article precedes an adjective, or a noun with second syllable stress), leading to greater omission of articles than TAP.

Three issues remain to be addressed. The first concerns some unexpected differences in rate of suppliance across particular morphemes. Given the availability of suitable L1-based prosodic representations for TAP, one might ask why SD's suppliance of right-edge morphology is not overall higher. In this case, the necessary adjunction structure is not available in the L1. Since L1 structures must be adapted to build the representation required for the L2, it seems that using old structures in new ways comes at some cost. A related question concerns the fact that SD is better at supplying noun plurals than 3rd person singular agreement (see Table 1). The PTH predicts that these should be equally problematic or unproblematic, since they are both right-edge morphemes, are of identical segmental shape, and are prosodically represented in the same fashion in English. It is important to note that we are not claiming that influence of L1 prosodic constraints is the only thing that accounts for variable suppliance of L2 morphology. In this case, we speculate that performance considerations come into play: 3rd person singular is the only overtly agreeing form in English. Thus, the likelihood of deletion errors is enhanced through pressure toward paradigm uniformity. We should also predict similar treatment of definite and indefinite articles, contrary to what was found. As already mentioned, we have no explanation for this discrepancy.

The second issue concerns full versus partial access to Universal Grammar (UG). It seems clear that SD has reached a steady state in her L2 English, given the lack of change from Time 1 to Time 2 (with an 18 month gap between them). This raises the question of whether, in the domain of phonology (or prosodic phonology), there might be full transfer but not full access (cf. Schwartz and Sprouse 1996). In other words, it might be impossible to escape from the constraints imposed by the L1 prosodic phonology. If so, this would be consistent with Brown's (1998, 2000) claim concerning the influence of L1 segmental phonology on L2 acquisition. Brown hypothesizes that speech perception in L2 is constrained by the L1 feature inventory as follows: if a feature necessary for the L2 is not contrastive in the L1, then adult L2 learners will be unable to perceptually distinguish two L2 segments that depend on this feature. The only new segments that can be built in the L2 are those that involve combining features available from the L1. Brown supports this view through a comparison of the acquisition of the English /l/ vs. /r/ and /f/ vs. /v/ contrasts by Japanese speakers. On her view, the feature [coronal] is underspecified in Japanese, precisely the feature necessary to capture the /l/-/r/ contrast. If [coronal] is not distinctive in the L1, it cannot be retrieved from the UG inventory for use in the L2, and /l/ vs. /r/ is not acquirable. In contrast, while neither /f/ nor /v/ has phonemic status in Japanese, /f/ vs. /v/ is acquirable because the feature which marks the contrast, [voice], is distinctive in the L1. Hence, [voice] can be combined with the appropriate place and manner features in the L2 to yield /f/-/v/.

In short, on Brown's view, only features that are distinctive in the L1 can be exploited to deal with new phonemic contrasts which must be expressed in the L2; in other words, access to UG is only partial. Our notion of 'minimal change' from the L1 in the domain of prosodic phonology appears to be similar: prosodic structures necessary in the L2 which do not exist in the L1 can be established if they can be built through combining pre-existing licensing relations. However, with the evidence available thus far, whether the notion of minimal change is to be interpreted as partial access in the phonology (in contrast to full access in the syntax) or whether it merely serves to chart out a path in development (full access in the phonology), we do not yet know.

Under either scenario, we predict that in languages that permit neither affixal nor free clitics, the former structure will often be buildable from pre-existing structures whereas the latter will not; since most languages have compounding (typically PWd dominates PWd) and many allow syllables to link directly to the PWd, the adjunction structure needed for the representation of affixal clitics is buildable. The necessary building blocks to permit linking to the PPh are not, however, available from existing licensing relations; free clitics should thus either not be acquirable (implying partial access) or should emerge significantly later in development than affixal clitics (full access).

There is at least one respect in which our proposal differs from Brown (1998, 2000). It is important to point out that the PTH is a claim about the role of the L1 in the production of L2 functional material. We do not claim that L1 prosodic constraints function as a filter on perception. In other words, L1 prosodic representations constrain interlanguage outputs only. How, then, do L2 speakers represent functional material in their input representations? Since we have argued that SD's morphosyntactic representations of features like tense, agreement, number and definiteness are intact and appropriate to the L2, it must be the case that she perceives and correctly stores such forms in her input representations. If constraints on prosodic well-formedness are markedness constraints as conceived of in Optimality Theory, they will govern the well-formedness of outputs only (following Prince and Smolensky 1993). As there are no constraints that operate on inputs, functional morphology can be appropriately prosodified at this level of representation. Which prosodic representation emerges as optimal in production is entirely a function of constraint ranking.

The final issue concerns the predictions that the PTH makes for production data from modalities other than spoken language (see Goad, White and Steele 2003b, White to appear). Since the PTH is concerned with prosodic conditions on outputs, by definition, it only constrains oral production. One prediction of this is that for L2 speakers who have depressed rates of suppliance of functional material in oral production due to prosodic limitations, their production results from other modalities, in particular written language, should be much higher. This issue has been systematically examined by Lardiere for Patty. Lardiere (2003) reports that in Patty's e-mail correspondence, past tense morphology is supplied in 78% of obligatory contexts, in contrast to her oral production data where suppliance is as low as 6% for regular verbs. White (2003) also reports that SD is very accurate in supplying determiners appropriately in an elicited written production task, as well as judging them accurately in a grammaticality judgment task.

In conclusion, every construction produced by the syntax must have a corresponding phonological representation. Accordingly, we believe that the influence of L1 prosodic representations on interlanguage grammars is an area that merits further investigation, providing a partial answer to the question of why suppliance of inflectional morphology is frequently variable and, perhaps, for why performance in the steady state is often not native-like.

Acknowledgments

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Notes

[1] It is sometimes proposed that inflectional morphology in English is not salient (e.g. Leonard 1989). Hence, failure to regularly supply such morphology might be attributed to difficulties in perceiving it in the input. There are two problems with this approach. Firstly, while it might explain problems with inflection at early stages in acquisition, it is not sufficient to account for the kind of morphological variability discussed in the present paper, where L2 speakers can be shown to have already acquired inflection and use it accurately but not inevitably. Secondly, while it is true that the absence of a vowel in most allomorphs of the inflectional morphemes under present focus – regular past tense, 3rd person singular agreement and plural – may suggest lack of salience, it is difficult to make such an argument for the [s] and [z] allomorphs of agreement and plural as these segments have a greater concentration of energy at higher frequencies in the acoustic signal (e.g. Ladefoged 2001). Indeed, it is precisely its stridency which enables [s] to be licensed in positions where other consonants are not permitted in many languages (e.g. Goad and Rose 2004).

[2] Except where otherwise noted, all of the Turkish data in this paper come from Clements and Sezer (1982), Inkelas and Orgun (1998), and Ayse Gürel (p.c.).

[3] Note that this differs from what appears in White (2003). White speculates that if some morpheme is overtly marked in the L1, it may have a positive impact on its appearing in spontaneous production in the L2. Here we argue that what is relevant is similarities and differences in how morphemes are prosodified in the two languages.

[4] The data reported here differ slightly from White (2003), where regular and irregular past are collapsed and determiners other than articles are not discussed. In some cases, there are slight discrepancies between the totals reported here and in White (2003), due to minor revisions in the coding. In Table 2, the empty cells for number omitted under 'Other determiners' reflect the fact that it is virtually impossible to determine obligatory contexts for determiners other than articles. Nevertheless, as mentioned in the Discussion section below, there appears to be no overuse or underuse of such determiners.

[5] In both tables, there are observable differences in rate of suppliance for each morpheme. All but one of these are discussed in later sections. The remaining case is regular past tense at Time 2 where the rate of suppliance is remarkably low, at 57%. 74% of the cases of omission involved verbs whose stems end in [t] and [d]. Low suppliance may then perhaps be attributed to performance factors: Stemberger (1981) points out that haplology – the avoidance of the addition of a morpheme to a base that already appears to be marked for that morpheme – is a common speech error with past and perfective inflection for verbs ending in [t] and [d] among native speakers of English.

[6] We use the term 'rhyme' here for convenience. In reality, we consider rhymes to be maximally binary (with a handful of exceptions; see Goad, White and Steele 2003b for details and references), where the final consonant in a putative ternary rhyme, $(VX\underline{C})_{Rh}$, is the onset of an empty-headed syllable, $(VX)_{Rh}(\underline{C}Ø)_{\sigma}$.

[7] We are claiming that in languages where determiners are prosodified through adjunction, as in Turkish, the order of constituents in Figure 8b is universally illicit. However, given that the prosodic organization of the article in Figure 8a is identical to that in Figure 8b, morphosyntactic considerations must factor into the explanation for the ill-formedness of Figure 8b as well. Specifically, when languages employ adjunction to prosodically organize determiners, these constituents must appear adjacent to the syntactic head. Nevertheless, morphosyntactic considerations alone cannot be responsible for the ill-formedness of Figure 8b, as there is no

syntactic difference between *bir iyi adám* in Figure 8b and *bír iyi adam* in Figure 8c. As we have argued in the text, the difference in word order observed between the well-formed structures in Figure 8a and c, *iyi bir adám* and *bír iyi adam*, must be due to prosodic considerations.

[8] Kornfilt (1997) analyses a number of bound elements as right-edge clitics, for example inflected forms of the copula, based on the fact that they undergo vowel harmony but display exceptional 'prestressing' behaviour, e.g. *Hasan dün hastá-y-dı* (Hasan yesterday sick-COP-PAST) 'Hasan was sick yesterday' (Kornfilt 1997: 436). While Kornfilt does not consider how these elements are organized into prosodic structure, to capture their prestressing behaviour, Kabak and Vogel (2001) and Newell (2004) argue that they are adjoined to the PWd; indeed, Kabak and Vogel explicitly argue against their being attached to the PPh. Since, in our view, the domain of vowel harmony is the lower PWd, we consider these elements to be internal to this domain in order to fall within the scope of harmony. Importantly, however, under either view, these elements are not regarded as being linked to the PPh as free clitics.

[9] Recall from Tables 1 and 2 that there was little change in SD's performance between Times 1 and 2. Accordingly, all remaining tables collapse data from these two time periods.

[10] In the interest of clarity, the footings provided in the text, as well as those in the structures in Figures 10 and 11, ignore the fact that final syllables in English nouns are typically extraprosodic, formally expressed through their linking directly to the PWd.

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