

## An Aspect of Flapping in American English

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Seo, Hongwon. “An Aspect of Flapping in American English.” *Studies in English Language & Literature* 46.3 (2020): 321-340. The goal of this paper is to investigate how flapping occurs in American English and to analyze under the framework of Optimality Theory. Flapping as one of consonant lenitions is rule-governed and can be dealt with respect to ambisyllabicity, whereby the consonant is treated as simultaneously behaving as the coda of the preceding syllable and as the onset of the following syllable. Coronal stops can be obligatorily or optionally flapped in word-final and word-initial positions as well as the word-internal position. Flapping in word-final and word-initial /t/s can operate irrespective of stress of neighboring vowels. Word-final /t/ is realized as a flap when immediately followed by a vowel, while word-initial /t/ flapping is confined to only a few words which undergo enclisis. The asymmetries between word-final and word-initial cases are closely related to the positional faithfulness, that segments in unprivileged positions are the target of phonological processes. In particular, flapping in word-initial happens when a prosodic word is newly postulated via enclisis based on the default condition that function words are subject to be encliticized to a preceding word. (Chonbuk National University)

**Key Words:** flaps, ambisyllabicity, resyllabification, consonant lenition, optimality theory

### I. Introduction

Flaps sometimes characterized as taps frequently occur as positional variants of coronal stops /t/ and /d/ in General American, certain Irish accents, some varieties of Southern British English and Australian English. According to Ladefoged (1975), a flap is produced by a swift movement of the tongue tip that is curled up and back

in a retroflex gesture and then hits the back part of the alveolar ridge as it goes back to the lower front teeth. A flap involves substantially less pressure to be built up than a regular stop.

/t/-flapping has been investigated extensively by a multitude of researchers as on how to characterize the prosodic conditions and factors triggering flapping; including stress and neighboring segments. To demarcate the phonological domain of flapping a set of universal prosodic categories in the hierarchy (Selkirk 1980) have been considered as follows: Utterance (U) » Intonational Phrase (IP) » Phonological Phrase (PPh) » Prosodic Word (PWd) » Foot (Ft) » Mora ( $\mu$ ). With respect to the phonological domain on flapping, Nepor and Vogel (1986) claim that the domain should be extended from Foot to Utterance. Kahn (1976) and Spencer (1996) analyze flapping from a rule-based approach by positing ambisyllabicity as the conditioning factor, twice associating the target consonant. Whereas Selkirk (1982) and Borowsky (1986) postulate resyllabification dissociating the onset of the unstressed syllable and attaching it to the coda of the preceding syllable. From a constraint-based approach, McCarthy and Prince (1993) account for flapping in connected speech by alignment constraints. Kim (2004) explain flapping or aspiration in the enclitic and proclitic contexts depending on the style of speech by reranking two alignment constraints. Jeong and Hong (2017) further provide a constraint-based account based on the probability that a flap is realized. Other researchers like Patterson and Connie (2001) and Hong (2009) present statistical analyses about flapping rates of word medial /t/ conducted with dependent variables in speech corpus. Despite the efforts to clarify flapping in American English, there are still unsolved problems concerning asymmetries for flapping in word-final and word-initial instances. Thus, this study will provide an alternative analysis with respect to ambisyllabicity under the framework of Optimality Theory (Prince and Smolensky 1993, 2004, McCarthy and Prince 1995).

The organization of this paper is as follows. Section 2 will present the data with flaps and look into the phonological environment in which flaps can be realized in

American English. Section 3 will review the previous analyses and identify some drawbacks and limitations each analysis has and provide an alternative constraint-based analysis of flapping in American English in a unified way. Finally, section 4 will recapitulate the results and suggest some implications for the future study.

## II. Properties of Flapping in American English

In this section, we will present the data that undergo flapping in American English. The phonological condition and domain triggering flapping will be investigated as well.

Compare the examples given in (1):

(1) flapping	no flapping
á <u>t</u> om	at <u>ó</u> mic
m <u>é</u> tal	met <u>á</u> llic
á <u>dd</u> ict	add <u>í</u> ction
l <u>á</u> dy	id <u>é</u> a

The /t/ and /d/ in the left column can be pronounced as a flap [ɾ], while those in the right column do not undergo flapping even in the case of morphologically related words. Such variations of /t/ and /d/ in certain intervocalic positions happen with respect to whether a target is the onset of a stressed syllable or not. That is, if coronal stops are between a stressed vowel and an unstressed syllable, they can be realized as [ɾ], whereas if they are between an unstressed vowel and a stressed syllable, they cannot. In addition to the intervocalic positions, most American English speakers also produce a flap when /t/ and /d/ follow any sonorant or precede a syllabic consonant, as exemplified in (2)<sup>1</sup>.

(2)	w <u>í</u> nter	lí <u>t</u> tle
	á <u>t</u> ter	á <u>t</u> om
	pá <u>r</u> ty	lá <u>t</u> ter

However, the phonological environment in which flapping can apply to /t/ and /d/ in the onset should be more extended. Although the preceding vowel is stressed in a majority of words, flapping is also permissible between two unstressed syllables. Whether an immediately preceding vowel is stressed or unstressed is not directly relevant to flapping. As shown in (3), the only necessary condition for flapping related to stress is that a coronal stop should not be in a stressed syllable. The crucial difference of words between columns is whether syllables including /t/ bear stress. The underlined /t/s of words in the left column are subject to flapping, while those in the right column fail to undergo flapping as the second syllables including /t/ bear secondary stress, respectively. Some examples are obtained from Spencer (1996) and Yavaş (2011).

(3)	flapping	no flapping
	sá <u>n</u> ity	lá <u>t</u> èx
	calá <u>m</u> ity	sá <u>b</u> otàge
	act <u>i</u> vity	há <u>b</u> itàt

According to the data we have considered, flapping can occur only when a coronal stop is in the middle of a foot with respect to stress, but not at any edge of the words. In other words, flapping cannot apply to /t/ and /d/ either in the onset

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<sup>1</sup> Flapping is not allowed before a syllabic consonant [ŋ] unlike other syllabic consonants as given in words such as *button* [bʌʔŋ] and *wooden* [wúʔŋ]. To account for segmental restrictions on the flapping rule, De Jong (2011: 2712) accepts Haugen's suggestion (1938) that a preceding consonant does not block the weakening, nor do following syllabic consonants, except /n/. Flapping of /t/ is gradually sensitive to consonant context, with greater weakening after /n/ than /t/. Further, both the stop and the homorganic nasal are subject to weakening.



Kahn (1980) and Spencer (1996) try to account for flapping with the notion of ambisyllabicity within the foot. Flapping is triggered by ambisyllabic /t/ and /d/ when the foot condition is met. On the contrary, glottalling of /t/ is applied when it is a pure coda. Thus, flapping can be succinctly dealt with by ambisyllabicity, as in (6).

(6) Flapping rule (Spencer 1996: 233)

$$/t, d/ \rightarrow [ɾ] / ( \dots[+son] \begin{array}{c} \text{Coda} \quad \text{Onset} \\ \diagdown \quad \diagup \\ \text{---} \\ \text{F} \end{array} )$$

However, flaps are not demarcated only within the boundary of words. Flaps occur in syntactic sandhi environments where a word ending with coronal stops is followed by a word beginning with a vowel. Across word boundary /t/ and /d/ can be pronounced as a flap. Even though the following vowel is stressed which indicates the phonological requirement for flapping is not met, medial stops are flapped. Examples are from Borowsky (1986) and de Jong (2011).

(7) flapping	no flapping	optional flapping
a <u>t</u> e up	a <u>t</u> ub	ge <u>t</u> #
ge <u>t</u> Anne	by <u>T</u> om	ha <u>d</u> #
ge <u>t</u> it	a <u>t</u> oll	

On the other hand, Nespor and Vogel (1986) suggest that the phonological domain of flapping should be extended to utterances. Consider the following examples from Nespor and Vogel (1986)<sup>2</sup>:

<sup>2</sup> Nespor and Vogel (1986) claim that semantic and pragmatic factors should also be considered along with phonological factors in the case of flapping across sentences. When it comes to utterance restructuring, see Nespor and Vogel (1986: 244).

- (8) a. A very dangerous wild cat<sub>ɾ</sub> escaped from the zoo  
 b. Just the other night<sub>ɾ</sub> a racoon was spotted in our neighborhood.  
 c. Have a seat. I'll be right back.  
 d. It's late<sub>ɾ</sub>. I'm leaving

As illustrated in the examples of (8c-d), the flapping rule works across sentences even beyond an intonational phrase if two successive words are spoken as a single utterance.

One of the remaining problems is whether word-initial /t/ is flapped or unflapped. Flapping in word-initial is possible when the preceding word ends in a vowel independent of whether a preceding syllable or a following syllable are stressed or not stressed. However, we should note that all the words that flapping takes place are the preposition *to* or begin with *to-*. These words are historically related to the preposition *to*, as Goldsmith (2011) points out. Consider the following examples from Kim (2004: 405):

- |   |                      |
|---|----------------------|
| (9) flapping or no flapping                         | no flapping          |
| a. by <u>t</u> omorrow                              | by <u>t</u> omatoes  |
| b. go <u>t</u> o Boston                             |                      |
| go <u>t</u> oday/ <u>t</u> onight/ <u>t</u> ogether |                      |
| c. say <u>t</u> o Bill                              | saw <u>T</u> oronto  |
| d. (They) grow <u>t</u> o the sky?                  | grow <u>t</u> obacco |

Based on Kahn's account (1976) that the preposition *to* acts as if it were the part of the preceding word, Kim (2004) tries to explain the data using a syntactic term called enclisis. According to Giergerich (1992: 268), enclisis refers to the phonological attachment of an unstressed syllable (mainly an unstressed function word) to the preceding stressed syllable where in syntactic terms it may well be more closely associated with the next word. Such enclisis results in the phonological

grouping which override syntactic groupings, and forms the phonological conditions for single words. The applicability of flapping depends on whether an enclitic is attached to the preceding word to form a prosodic word.

- |                   |   |   |
|-------------------|---|---|
| (10) <sup>3</sup> | flapping  | no flapping   |
|                   | a. [(say) <u>t</u> o] <sub>PWd</sub> [Bill] <sub>PWd</sub>    | [say] <sub>PWd</sub> [ <u>t</u> o Bill] <sub>PWd</sub>    |
|                   | b. [by <u>t</u> o-] <sub>PWd</sub> [(morrow)] <sub>PWd</sub>  |   |
|                   | c. [(go) <u>t</u> o-] <sub>PWd</sub> [(night)] <sub>PWd</sub> | [saw] <sub>PWd</sub> [ <u>T</u> o(ronoto)] <sub>PWd</sub> |

As shown in (10a), if *to* is enclitic to the preceding word across a syntactic boundary, flapping of /t/ happens, otherwise flapping does not. Enclisis can account for such optional flapping across the words which are not syntactically closely relevant each other. In other words, /t/ in *say to Bill* can be flapped or unflapped by enclisis depending on speech styles. The example of (10b) looks quite different from (10a) in that the preceding word is a function word not bearing stress, resulting in two consecutive unstressed syllables. Kim (2004: 407) claims that this can be regarded as a case of ‘lapse’, stress is assigned considering rhythm together with syntactic condition. Thus, in (10b), even though a lexical word, *tomorrow* is a free-standing prosodic word, ‘-*morrow*’ itself can be assumed to be constituted as a prosodic word via enclisis of ‘*to-*’ into the preceding word not to violate the constraint  $A_{NTI-LAPSE}$  (\* $\check{\sigma}\check{\sigma}$ ). Finally, data in (10c) show totally different asymmetries as to the applicability of flapping even though they seem to have similar phonological conditions at first glance. However, *tonight* is etymologically originated by compounding of the preposition *to* and *night*, but *Toronto* is an inseparable proper noun, itself. Thus, it is possible only *to* in *tonight* to be encliticized to a preceding word, and then word internal /t/ can be realized as a flap.

Concerning the occurrence of flapping, language external factors as well as

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<sup>3</sup> Parentheses indicate foot in (10).

language internal factors such as stress and morphological complexity should be taken into consideration, as well. For example, Patterson and Connie (2001) investigate how much lexical frequency correlates to a certain flapping rule based on corpus-based research and reveal that word-medial /t/ is almost always flapped in high frequency words, while only 76 percent of low frequency words exhibit flapping. With respect to flapping rates of word-medial /t/, Jeong and Hong (2017) also present the statistical analysis using the Buckey Speech Corpus and TIMIT considering two language internal factors, *stress* and *morphological complexity* and a language external factor, *lexical frequency*. In particular, they verify that lexical frequency has a significant role on optional flapping. The percentage of flapping is 86.82% in high frequency words and 70.89% in low frequency words in the Buckey Speech Corpus; in TIMIT, the flapping production of two word groups is 90.93% and 69.40%. The more frequent the words are, the more the medial /t/ is likely to undergo flapping. In this vein, divergence of flapping in (10c) may be explained. As the frequency of *today* is still higher, it is more likely to go through flapping than *tomato*.

So far, we have looked into a variety of data which exhibit flapping and considered the phonological conditions and domain affecting its application. In sum, flapping is affected by neighboring segments and the boundary. Word-medial coronal stops can be flapped in the contexts in which they are between a stressed vowel and an unstressed syllable and between two unstressed vowels. With respect to stress, the only condition for flapping is that coronal stops should not be in a stressed syllable. Besides intervocalic contexts, flaps can be realized in the environments where any sonorant precedes coronal stops and a syllabic consonant except /ŋ/ is followed. When two successive words are spoken together as a single utterance, flapping can also occur, which means the phonological domain should be extended into Utterance. Even a coronal stop is in the onset position of the following word, if the phonological environment of a flapping rule is created by enclisis, it is realized as a flap. In particular, optional flapping in the phonological environment via enclisis

should be considered along with language external factors such as speech rates and lexical frequency.

In the next section, we will provide an alternative analysis of flapping within the framework of a constraint-based theory (Prince and Smolensky 1993, McCarthy and Prince 1995).

### III. A Constraint-based Analysis on Flapping

#### 3.1 The Previous Analyses

McCarthy and Prince (1993) provide a constraint-based analysis of flapping by  $A_{\text{ALIGN-LEFT}}$  constraint governing ambisyllabicity at word-juncture. This is based on Kahn' claim (1976) that word-final consonants are parsed as ambisyllabic before vowel-initial words, but word-initial consonants are heterosyllabic after vowel-final words, as given in (11). Thus, /t/s in (11) differ in prosodic structure; /t/ in (11a) is ambisyllabic, but it is a pure onset in (11b). Flapping of /t/ occurs in the ambisyllabic structure in American English.

(11) Ambisyllabicity at word juncture (McCarthy and Prince (1993: 51))

a. /C-V/ juncture - ambisyllabicity

sought Ed [sɔɹɛd]

b. /V-C/ juncture - heterosyllabicity

saw Ted [sɔt<sup>h</sup>ɛd]

The constraints and the constraint ranking hierarchy they employ in their analysis for flapping are as follows:

(12) Constraints for flapping

- a.  $O_{\text{NSET}}$ : Every syllable must have onsets.
- b.  $A_{\text{ALIGN-LEFT}}$ :  $\text{Align}(\text{Stem}, L, \text{PrWd}, L)$
- c.  $F_{\text{FINAL-C}}$ :  $*V)\text{PrWd}$

(13) Constraint ranking

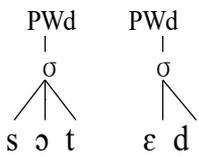
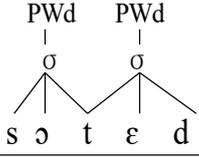
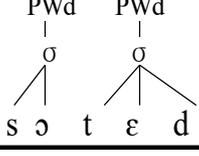
$$O_{\text{NSET}} \gg A_{\text{ALIGN-LEFT}} \gg F_{\text{FINAL-C}}$$

$A_{\text{ALIGN-LEFT}}$  requires that the left edge of the stem coincide with the left edge of the PrWd, which can account for the contrast between (11a) and (11b).  $O_{\text{NSET}}$  and  $F_{\text{FINAL-C}}$  govern the shape of the syllable in a prosodic word. Two constraints require that a prosodic word begin and end in a consonant, respectively. In this vein, ambisyllabicity at word juncture satisfies both  $O_{\text{NSET}}$  and  $F_{\text{FINAL-C}}$ . Consider how flapping can be dealt with in the following tableaux:

Tableau 1. Optimal ambisyllabic parse of *sought Ed*

candidates	$O_{\text{NSET}}$	$A_{\text{ALIGN-LEFT}}$	$F_{\text{FINAL-C}}$
<p>a.</p>	*!		
<p>b.</p>		*	
<p>c.</p>		*	*!

Tableau 2. Optimal heterosyllabic parse of *saw Ted*

candidates	O <sub>NSSET</sub>	A <sub>LIGN-LEFT</sub>	F <sub>INAL-C</sub>
a. 	*!	*	
b. 		*!	
c. 			*

When the stem is vowel-initial in tableau 1, candidate (a) should be ruled out by O<sub>NSSET</sub> even though it is a properly aligned candidate. Of the misaligned remaining candidates (b, c), candidate (b) is chosen as an optimal output since it satisfies F<sub>INAL-C</sub> requiring that any prosodic word end in a consonant. Thus, ambisyllabic /t/ can be realized as a flap. On the contrary, when the stem is consonant-initial in tableau 2, A<sub>LIGN-LEFT</sub> plays a crucial role in choosing an optimal output. Unlike /C-V/ juncture, initial consonants should not be considered ambisyllabic. Thus, despite the violation of O<sub>NSSET</sub>, candidate (c) is optimal.

The analysis by McCarthy and Prince (1993) has some drawbacks. First of all, the constraint, F<sub>INAL-C</sub> does not seem to have an important role in accounting for the motivation of ambisyllabicity. In addition, their analysis does not cover flapping within a single word and the case of being flapped via enclisis.

In order to overcome the limitations, Kim (2004) tries to provide an alternative analysis with two additional constraints, A<sub>LIGN-RIGHT</sub> and A<sub>TRACT-C</sub>. For an account for optional flapping in the contexts in which enclisis happens or does not. Kim chooses a strategy dependent on speech rates to re-rank A<sub>LIGN-RIGHT</sub> and A<sub>LIGN-LEFT</sub>. A<sub>TRACT-C</sub> to activate ambisyllabicity requires that the head of a prosodic word have a force to attract the onsets of stressless syllables. Compare the following tableaux.

Tableau 3. (say) [to Bill]<sub>PWD</sub> in formal speech

candidates	O <sub>NS</sub> ET	A <sub>L</sub> IGN-R <sub>I</sub> GHT	A <sub>L</sub> IGN-L <sub>E</sub> FT	A <sub>T</sub> TRACT-C
a.			*	
b.	*!		*	*
c.			*	*!

Tableau 4. [say to]<sub>PWD</sub> (Bill) in causal speech

candidates	O <sub>NS</sub> ET	A <sub>L</sub> IGN-L <sub>E</sub> FT	A <sub>L</sub> IGN-R <sub>I</sub> GHT	A <sub>T</sub> TRACT-C
a.			*	*!
b.	*!		*	
c.			*	

As given in tableaux 3 and 4, the optimal outputs can be obtained by the different ranking hierarchy depending on speech rates, respectively. However, Kim's postulation of a prosodic word including *to* along with either a preceding or following word causes two align constraints to have no power in selecting an optimal output. It is not economical to use a strategy to re-rank two alignment constraints considering all potential candidates simultaneously violate only one alignment constraint in each tableau. In addition, the scope that A<sub>L</sub>IGN-R<sub>I</sub>GHT works is indeed too limited to only particular words such as the preposition *to* and words etymologically related *to*. Thus, Kim's analysis to enforce A<sub>L</sub>IGN-R<sub>I</sub>GHT to dominate A<sub>L</sub>IGN-L<sub>E</sub>FT does not seem to have more explanatory adequacy for an optional flapping analysis in word-initial confined to a few words. Instead, it seems to be more plausible to accept the default condition that *to*, including *to-* in words

associated with the preposition *to* is encliticized to a host as a function word, as McCarthy (2002) points out. Also, ATTRACT-C he suggests as a ground of ambisyllabicity is wrongly evaluated in tableau 3, since the constraint is vacuously satisfied in the context in which the second syllable is stressed.

### 3.2 An Alternative Analysis

As mentioned earlier, the distributional generalization of a flap in American English can be explained based on the concept of ambisyllabicity: a coronal stop is realized as a flap if it simultaneously belongs to a member of the coda of a preceding syllable and the onset of a following syllable. Thus, we need to distinguish the condition in which word-internal /t/ is flapped from the conditions where word-final /t/ and word-initial /t/ are flapped. This indicates that flapping in word-internal happens within a single word, while a flapping rule in word-final and word-initial operates across the word in connected speech.

First, word-internal /t/s obligatorily appear as a flap in the intervocalic context,  $\acute{v} \_ \check{v}$ . There are three other intervocalic contexts to consider for flapping:  $\acute{v} \_ \acute{v}$ ,  $v \_ \acute{v}$ , and  $\check{v} \_ \acute{v}$ . In the first two, a flapping rule does not operate. However, in the third case, in which /t/ is surrounded by unstressed vowels, flapping optionally occurs. A coronal stop in word-internal is flapped in unstressed syllable regardless of whether a preceding syllable bears stress.

On the other hand, even though word-final /t/ is usually glottalized or unreleased, associated with a weak phrasal boundary it can be flapped when followed by a word beginning with a vowel regardless of whether the vowel is stressed or not. This is true whether the preceding vowel is stressed or unstressed.

Flapping of word-initial /t/ in certain particular words such as *to*, *today*, *tonight*, *tomorrow*, or *together* optionally occurs when it is encliticized to a previous word ending with a vowel. This case is entirely different from cases of word-internal or word-final /t/. As Goldsmith (2011) points out, a few finite words are all originated

from the preposition *to*.

Flapping that this study has looked into can be dealt with by the following constraints and under the constraint ranking:

(14) Constraints for flapping

- a.  $O_{\text{NSET}}$ : Every syllable must have onsets.
- b.  $A_{\text{ATTRACT-C}}$ : The head of a prosodic word has a force to attract the onsets of stressless syllables. (Kim 2004: 414)
- c.  $N_{\text{OASP\#}}$ : (Un)aspirated is not allowed in word-final.
- d.  $A_{\text{ALIGN-R}}$ : The right edge of the stem coincides with the right edge of the PrWd.

(13) Constraint ranking

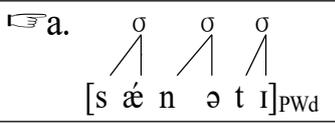
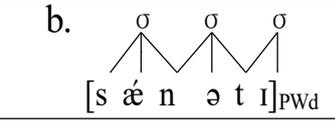
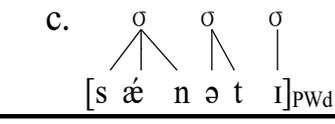
$O_{\text{NSET}} \gg A_{\text{ALIGN-RIGHT}} \gg N_{\text{OASP\#}} \gg A_{\text{ATTRACT-C}}$

Let us first consider how flapping in word-internal /t/ can be clarified in the following tableaux.  $A_{\text{ALIGN-RIGHT}}$  and  $N_{\text{OASP\#}}$  are totally irrelevant to the context for flapping within a word since two constraints are all related to a prosodic edge. In tableaux 5 and 6, candidate (c) should be eliminated since an onsetless syllable is not favored. Candidate (b) is also ruled out by violating  $A_{\text{ATTRACT-C}}$  requiring that onsets in an unstressed syllable should be ambisyllabic.

Tableau 5. atom [æɾəm]

candidates	$O_{\text{NSET}}$	$A_{\text{ALIGN-RIGHT}}$	$N_{\text{OASP\#}}$	$A_{\text{ATTRACT-C}}$
a.	*			
b.	*			*!
c.	**!			

Tableau 6. sanity [sæ̀nə̀ɾɪ]

candidates	O <sub>NSET</sub>	A <sub>LIGN-R</sub> I <sub>GHT</sub>	N <sub>O</sub> A <sub>SP</sub> #	A <sub>T</sub> T <sub>R</sub> A <sub>C</sub> T-C
a. 				**
b. 				
c. 	*!*			

Let us turn to the process which word-final /t/ is optionally realized as a flap. As stated earlier, flapping and glottalling are regarded representative consonant lenitions in American English. Such two phonological processes happen in the contexts that behave as weak segmental licensers and are disfavoured in strong contexts, such as the initial position in the word, stem, or foot. The combination of two of the weak positions, word-final and intervocalic can be incorporated into the conditions in which flapping occurs. Word-final /t/ undergoes flapping in a prevocalic coda, while an unreleased stop appears in a prepausal or preconsonantal coda.

As illustrated below, word-final /t/ of the first word is ambisyllabic when followed by a word beginning a vowel, and then it is optionally realized as a flap. The difference between tableaux (7) and (8) is whether the following syllable is stressed or unstressed. In case of (8), the resyllabification of word-final /t/ results in the condition for aspiration in which /t/ is incorporated in a stressed syllable, but N<sub>O</sub>A<sub>SP</sub># blocks /t/ to be aspirated. In both tableaux, O<sub>NSET</sub> and N<sub>O</sub>A<sub>SP</sub># can defeat candidate (a) and (c), respectively. Thus, candidate (b) survives as a final winner despite of the violation of A<sub>LIGN-R</sub>I<sub>GHT</sub>.

Tableau 7. get it [gɛɪt]

candidates	ONSET	ALIGN-RIGHT	NoASP#	ATTRACT-C
a.	*!			
b.		*		
c.		*	*!	

Tableau 8. get Anne [gɛɪæɪn]

candidates	ONSET	ALIGN-RIGHT	NoASP#	ATTRACT-C
a.	*!			
b.		*		
c.		*	*!	

Finally, let us consider how constraints can account for flapping and unflapping in word-initial /t/ and rule out the non-optimal outputs. The discrepancy between the cases illustrated in tableaux (9) and (10) is straightly associated with the possibility of the preposition *to* (*to-*) to be encliticized to a host. Although lexical words stand alone as prosodic words in English, function words cannot. Thus, *to* is likely to be encliticized to a preceding word in order to form a prosodic word. Also, *to-* in words like *tonight*, *tomorrow*, and *together* etymologically analogous with the preposition *to* is subject to enclisis. *To-*s in *tonight* and *tomatoes* are contrastive in that only *tomatoes* is a free standing prosodic word. This crucial difference can be accounted for by constraint ALIGN-RIGHT requiring the alignment of the right edge of the stem and the right edge of the prosodic word. ALIGN-RIGHT impedes the resyllbification of *to-* in tableau (10).

Tableau 9. go tonight: [(go) to-]<sub>PWd</sub> [(night)]<sub>PWd</sub>

candidates	O <sub>NS</sub> ET	A <sub>L</sub> I <sub>G</sub> N-R <sub>I</sub> G <sub>H</sub> T	N <sub>O</sub> A <sub>S</sub> P#	A <sub>T</sub> T <sub>R</sub> A <sub>C</sub> T-C
a.				*!
b.				
c.	*!			

Tableau 10. saw tomatoes: [saw]<sub>PWd</sub> [to(matoes)]<sub>PWd</sub>

candidates	O <sub>NS</sub> ET	A <sub>L</sub> I <sub>G</sub> N-R <sub>I</sub> G <sub>H</sub> T	N <sub>O</sub> A <sub>S</sub> P#	A <sub>T</sub> T <sub>R</sub> A <sub>C</sub> T-C
a.				
b.		*!		
c.	*!	*		

This section provided an alternative analysis for flapping in American English. The next section will summarize the analysis results and present some implications this study has.

### IV. Conclusion

This study looked into the phonological conditions and domain flapping occurs and reviewed the previous analyses about flapping. Flapping does not haphazardly happen, but it is rule-governed under certain circumstances. A flap in American English can be explained based on the concept of ambisyllabicity referred to as the coda of a preceding syllable and the onset of a following syllable simultaneously. Word-internal /t/s appear as a flap in the intervocalic context, when followed by an

unstressed vowel. Word-final /t/ and word-initial /t/ can be optionally flapped across the words in the connected speech irrespective of stress. /t/ in word-final instances is realized as a flap when followed by a vowel while word-initial /t/ is flapped when it is possible to be encliticized to a host.

This study has some advantages in that /t/ flapping in word-final and word-initial as well as in word-internal is accounted for in a unified manner. The flapping analysis in this study is conducted with the following constraint hierarchy:

(13) ONSET  $\gg$  ALIGN-RIGHT  $\gg$  NOASP#  $\gg$  ATTRACT-C

Adopting Kim's idea (2004), we have explained why ATTRACT-C is superior to FINAL-C (McCarthy & Prince 1993) when accounting for flapping with respect to the notion of ambisyllabicity. NOASP# prevents word-final /t/ from being (un)aspirated in connected speech even when it is followed by a stress-bearing vowel. When it comes to word-initial /t/ flapping, we have considered prosodic hierarchies. As lexical words can be regarded as free-standing prosodic words, the part of the words cannot be encliticized to a preceding word. On the contrary, *to* (including *to-* of words historically associated with *to*) can be a part of prosodic words via enclisis, based on the default condition for a function word to be a clitic (McCarthy 1992). Only in case of enclisis, flapping is applicable.

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