Asymmetrical Sensitivity to Prosodic Positions and Glottalization in Cockney

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Koo, Bon-Jung. 2002. **Asymmetrical Sensitivity to Prosodic Positions and Glottalization in Cockney.** *SNU Working Papers in English Language and Linguistics* 1, 1-16. This paper examines Cockney English, a dialect spoken among workers in southeastern London area, to show that phonological phenomena are asymmetrically sensitive to syllabic positions. The asymmetrical sensitivity of phonology to prosodic position is termed positional asymmetry in this paper. To argue for the existence of positional asymmetry, this paper focuses on the phenomenon of Glottalization in Cockney English. Glottalization in this dialect takes place in coda position rather than in onset position. This paper adopts Optimality Theory (Prince and Smolensky 1993) as a theoretical framework to analyze Glottalization. It is thus shown in this paper that the role of positional asymmetry in Cockney Glottalization is formalized by dynamic interaction between positional markedness constraints and positional faithfulness constraints. **(Seoul National University)**

Keywords: positional asymmetry, weakening, glottalization, Cockney

1. Aspects of glottalization in Cockney English[1]

Referring to a working-class London dialect, Cockney exhibits some features that distinguish it from standard English.[2] Among them, glottalization is known as the most famous marker of Cockney English. It generally introduces a glottal stop in place of an oral stop as in:

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[1] The data for Cockney glottalization are collected from Sivertsen(1960), Altendorf(1999), and Schmid(1999).

[2] Other than glottalization, Cockney has more phonological features such as following:
a. /h/ deletion as in [and] for [hand],
b. TH-fronting as in [fɪŋ] for 'think',
c. stop replacement as in [sɛ m] for 'seven',
d. /r/-intrusion as in 'put a comma[r] in'

(1) glottalization of /t/ word-finally or preconsonantally[3]

[paʔ	part
[gɛʔ	get
[wɔʔ	what
[fʊʔ ɔ̆	football
[nʌʔ ɛ	nutmeg
[wɪʔ ɪ	witness

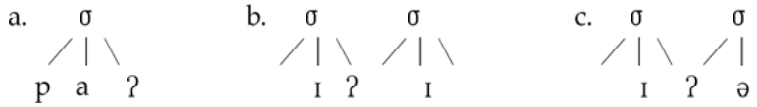
/t/ is glottalized to [ʔ ʔ *part*, or within a word before a consonant [wɪʔ ɪ *witness*. Intervocalic glottalization is also allowed in Cockney as the following data show:

(2) glottalization of /t/ intervocalically

[leɪʔə	later
[bʌʔə	butter
[wɔʔə	water
[dɔʔə	daughter
[paʔɪ	party

We will assume ambisyllabicity in this analysis, so the glottalizations in (1) and (2) occur in the same syllable-final environment.

(3) syllable structure for Cockney



In (3.c), the intervocalic consonant [ʔ is doubly-linked, i.e. it is linked to the coda of the preceding syllable and to the onset of the following syllable. Assumption of ambisyllabicity will enforce our argument for glottalization in coda and enable us to provide a phonological analysis in a consistent way.

Glottalization is also attested at phrase level. /t/ is glottalized in coda followed by another word:

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[3] Because I am concentrating on consonantal behavior, I shall give representations of the vowels only if I have to, and avoid the complexities with regard to vowel specification.

(4) glottalization of /t/ word-finally followed by a consonant-initial word
[geʔ ɬawn] get down
[woʔ ːo] what for
[ð ˈ ə that stuff

(5) glottalization of /t/ word-finally followed by a vowel-initial word
[geʔ ə ˌ get up
[teɪʔ ɪʔ ɔ take it off
[staʔ ə ɪ ɪ start a business
[noʔ ð ‹ač not on the catch
[spɪʔ ʔ ɪ ɬ] spit at him

Not only the environment but also the target of glottalization is quite comprehensive in Cockney English. Compared to General American in which /t/ is usually the only target of glottalization, as in [bʌʔn̩] *button*, Cockney seems to strongly prefer the placeless consonant to three voiceless stops, /p,t,k/. The following examples illustrate /t/ is not the only target of glottalization in Cockney.

(6) a. glottalization of /p/ word-finally
[ǰ ʔ jump
[ǰ ʔ ɬawn] jump down
b. glottalization of /p/ intervocalically
[peɪʔə paper
[səʔə supper
[ə ɪʔ ə ʔ equipment
c. glottalization of /k/ word-finally
[š ˈ shock
[pɪŋ pink
[wəʔ work
d. glottalization of /k/ intervocalically
[reʔn̩] reckon
[sɔʔə soccer
[teɪʔə əʔ taken up
[reʔɔ ɪ recognize

The two more voiceless stops /p/ and /k/ undergo glottalization when they are in coda position in this dialect. Voiceless stops /p,t,k/ are pronounced with sudden release of constricted glottis if they end a word followed by another word beginning with a consonant or a vowel, or if they occur between two vowels within a word. Due to the widespread use of a glottal stop as an allophone of the voiceless stops, *whip*, *wit*, and *whit* are pronounced homophonously as [wɪʔ in Cockney.

However, glottalization is not allowed for fricatives or word-initially.

(7) glottalization of fricatives is not allowed
* [əʔ ə ɻ] husband

(8) glottalization is not allowed word-initially
*[ʔ ɪʔ packet
*[ʔ ʔ ʔ ɪ ɪ] part time
*[ʔ ʔ Pat
*[ʔəʔ ɪʔə potato
*[ʔ əʔ carrots
*[gɛʔ ʔɔʔ get caught

2. Positional asymmetry and weakening

2.1 Positional asymmetry

In the phonological literature (Goldsmith(1990), Jun(1995), Lombardi(1999), ets.) , the observation has obtained general agreement that there is a correlation between phonological change and syllable positions. Segments do or do not undergo phonological change depending on the syllable position they occupy. If a segment occupies syllable-final position, coda, it is readily susceptible to change because it is in a phonologically weak position. But, if the segment is in syllable-initial position, onset, it hardly changes because it is in a phonologically strong position. Or, even if it undergoes change, the change will be of a different type than that in coda. The positions in syllable structure thus exhibit functional difference in phonological processes and this is referred to as positional asymmetry in phonological literature. The positional asymmetry between onset and coda has been recognized by numerous researchers, who have identified it as a crucially active factor in phonological changes.(Hooper(1972), Selkirk(1982),

Goldsmith(1990), Lodge(1992), Beckman(1997), Steriade(1993, 1999), etc)

Coda is phonologically weak in that 1) coda is restricted as to the contrasts. Goldsmith (1990) has argued that coda is restricted in licensing the features and called it a secondary licenser. Observing that fewer contrasts are allowed in coda than in onset cross-linguistically, he has claimed that phonological contrasts are frequently neutralized in coda. He has also argued that codas in countless languages do not have the privilege of bearing a contrastive feature, pointing out the well-known German devoicing as a typical example. Inkelas and Cho (1993), in their discussion of Hausa, have observed that coda is restricted to the segments that it can tolerate. In Hausa, coda obstruents are sonorized because only sonorants may appear in coda position here in order to get mora. The obstruent sonorization of Hausa supports the observation that coda is restricted as to the contrasts. The restrictiveness in contrasts makes coda a phonologically weak position: 2) coda is more readily susceptible to phonological changes than onset. It underlies Jun (1995), who sees English regressive assimilation from the gestural point of view. Arguing for regressive place assimilation in English, Jun (1995) claims that the direction is not a coincidence. The effort for producing sound is reduced in coda, making it a target rather than a trigger in assimilation. He argues that acoustic cue of coda is inherently weak, so gestural effort is reduced in it, resulting in regressive assimilation.

(9) late call --> [leɪ ɔ ɪ ɔ
green paint --> [grim peɪ ɪ t]
phone book --> [foʊm bʊk] * [foʊn dʊk]

His argument found its way to the crosslinguistic generalization that direction of place assimilation is determined by acoustic cues of trigger and target. He introduced the following hypothesis that is responsible for the directionality of place assimilation:

(10) **Production Hypothesis (Jun 1995:29)**
Speakers make more effort to preserve the articulation of speech sounds with powerful acoustic cues, whereas they relax in the articulation of sounds with weak cues.

Even though the hypothesis does not specify which sounds are with

powerful or weak acoustic cues, it understandably points out onset and coda respectively. Applying the hypothesis to place assimilation, Jun argues that the universal direction of assimilation is regressive. Onset, having inherently powerful acoustic cue, preserves its place feature, while coda should be susceptible to change due to its inherently weak acoustic cue. The direction of assimilation thus results from susceptibility of coda.

Extending this hypothesis to other phonological phenomena, we understand the neutralization is a preferred pattern in coda. Since coda is acoustically weak, its potential for licensing contrasts is diminished. Thus, coda will predictably induce neutralization such as glottalization in Cockney. Glottalization in Cockney English, in that it represents loss of contrast in coda position, strongly argues for positional asymmetry.

Then what features define onset as a phonologically strong position? First, onset allows more contrasts than coda. Steriade (1993) suggests that marked or perceptually difficult contrasts are confined to positions in which they can be more easily discerned or produced. Calling the special positions as privileged licensers, she lists syllable onsets, peripheral syllables, and stressed syllables as the examples. Beckman(1997) has the same idea when she argues that psycholinguistically prioritized or perceptually prominent linguistic positions, such as syllable onsets and initial syllables insist on output preservation of underlying contrast. Neutralization hardly occurs here and prohibition-type of condition such as Coda Condition is hardly formulated against onset. Second, onset tends to be resistant to phonological change. As Production Hypothesis claims, having a strong acoustic cue, onset serves as a trigger rather than as a target in assimilatory process. Place assimilation in English supports the robust status of onset. When two words meet in English, the onset of the second word triggers a change in the coda of the first word, as is illustrated in the following examples. Within a heteromorphemic word, the place assimilation is also regressive:

(11) right call --> [raɪ ɔ ɪ ɔ ,
iN possible --> i[m]possible, *ɪ ɪ]tossible
iN tolerable --> i[n]tolerable, *ɪ n]polerable

The examples illustrate that onset initiates phonological change as a

trigger but resists change. Within or across words, it is always coda which is affected. Onset always triggers, but is hardly affected.

The positional asymmetry between onset and coda thus defined, we consider it as natural that a phonologically weak position induces weakening. For weakening phenomenon, we will temporarily define it as involving increase of sonority or loss of contrast. A change to a more sonorous sound is weakening since it causes less constriction in articulatory process of the sound. Flapping (t,d --> D as in *wri[D]er, ri[D]er*) and spirantization (t -->s as in *democrat* vs. *democra[s]y*) belong to this category. Loss of contrast is weakening since feature contrast disappears, as in degemination
(*i[l]egal*), and complete elision (*appoin[θ]ment*) as well as glottalization.

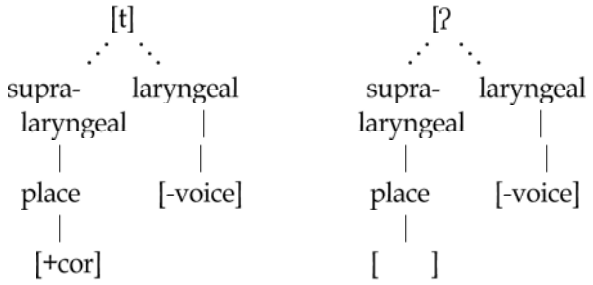
Cockney glottalization, in these respects, belong to weakening since place contrast for stops are lost in coda position.

Now, we will enter into discussing glottalization as weakening in the next section.

2.2 Glottalization as weakening

Producing a glottal stop [ʔ involves a laryngeal gesture and not oral gestures. A glottal stop is defective in that it lacks place features. It is the minimal stop in this respect. The laryngeal gesture for a glottal stop is made by an organ called glottis. The glottis indicates the gap between the vocal folds, through which the airstream passes upwards into the pharynx and the mouth. When the vocal folds are brought close together so that no air can pass through them, a glottal stop results from this closure of the glottis and subsequent release. In producing a glottal stop, the air-stream is blocked with the closure of vocal folds and no oral articulator is in action. The feature structures for oral and glottal stops help understand the difference between two sounds. Only empty structure for supralaryngeal feature is provided for a glottal stop [ʔ

(12) Feature structure for an oral and a glottal stop (Clements 1985)



The removal of place node results in loss of feature, defining glottalization as a weakening. Hayes(1992) deals with glottalization in a similar stream when he argues that reduction of a coronal stop in coda position gradiently leads to a glottal stop in casual American speech:

(13) what [wʌ ~ ʌ ʔ] ~ [wʌʔt] ~ [wʌʔ]

He maintains that a weakened alveolar /t/ is usually covered with a simultaneous glottal closure. This is compatible with our view of glottalization as weakening since he implies that a sound change gradiently resulting in a glottal stop is weakening.

Another interesting point about glottalization is that it occurs in coda rather than in any other position.[4] This is compatible with our view of glottalization as weakening since a weak position provides an environment for weakening phenomenon. Some languages are attested to admit only a glottal stop in coda. Hayes(1986) takes an example of an Austronesian language Toba Batak where only a glottal stop is admitted in coda: Voiceless stops /p,t,k/ in coda position are glottalized to [ʔ in this language. In Cockney, voiceless stops are glottalized in coda. The inherent property of a glottal stop seems closely related to its site of occurrence.

[4] A vowel is enforced by adding a glottal stop before it in syllable initial position of a stressed vowel: [ʔæsɔʊtlɪ *absolutely*, [traɪʔʌ ə ɪ] *triumphant*, etc. We consider it as vowel enforcement and exclude it from our discussion of coda weakening.

3. Optimality-Theoretic account of glottalization in Cockney

The extensive glottalization in Cockney gives us an impression that it is a dialect which favors a placeless sound [ʔ and our analysis will take this into consideration. This will be reflected in Optimality Theory as ranking Coda Condition higher than faithfulness constraints for features. For a glottal stop to occur as the allophone of /p,t,k/ and in intervocalic position, Coda Condition against coda being specified for place should be made more dominant than a faithfulness constraint for place in Cockney.

Since we assume ambisyllabicity, an intervocalic consonant is linked to a preceding syllable as coda. The following set of constraints are required in the given order to account for ambisyllabicity:

(14) **Crisp Edge [σ** [5] : The edge of a syllable is crisp.
Final-C : A syllable should end in a consonant.
Onset : A syllable should have an onset.

Final-C , Onset ≫ Crisp Edge

The following tableau lays out the interaction of three constraints in Cockney.

(15) Tableau for 'potato' in a language allowing ambisyllabicity

The first candidate with an ambisyllabic consonant violates Crisp Edge

[5] Definition : Let A be a terminal substring in a phonological representation, C a category of type PCat, and A be-the-content-of C. Then C is crisp if and only if A is-a PCat. Crispness constraint Crisp[PCat]: A PCat is crisp. The constraint requires that the association of a syllable constituent be unique. It disfavors multiple linking of a segment to onset and coda.(Ito & Mester 1994)

/pə ɪ ə	Final-C	Onset	Crisp Edge
☞ pə ɪ ʔə			*
b. pə ɪʔ. ə		*	
c. pə ɪ ʔə	*		

while it observes Final-C and Onset since the ambisyllabic consonant *t* serves as coda of the second syllable and onset of the third syllable. The second candidate obeys the Crisp Edge constraint since *t* is uniquely linked to the preceding syllable. However, its unique linking to coda of the preceding syllable deprives the following syllable of its possible onset, so Onset is violated. The third candidate with no ambisyllabic consonant satisfies Crisp Edge and Onset at the same time, due to unique linking of *t* to the onset of the following syllable. But, since its second syllable has no coda, it violates the highest Final-C constraint. In this language, the first candidate which has doubly-linked consonant is selected as opitmal output.

Then, to capture the generalization that glottalization occurs in coda position, the following Coda-Condition is necessary;

(16) **Coda-Condition** : Feature for place is not licensed in coda.

* C]$_\sigma$
|
[place]

This positional markedness constraint will effectively filter out coda consonants with place feature, and virtually replace them with a glottal stop via interaction of other constraints. /h/ does not belong to the consonant inventory of Cockney dialect, as seen in [and and ɛ | for *hand and head.* Thus, Coda-Condition formulated as above, is not confusing as to checking [ʔ or [h] in coda. If a hypothetical output candidate contains [h] in coda, it will be filtered out by a higher constraint which controls the phonotactics of Cockney. Since Cockney allows ambisyllabicity, an intervocalic consonant is virtually a coda. Then, glottalization in Cockney is consistently explained away as positional asymmetry. The ranking between Coda-Cond and the constraints for

syllabification is determined as follows:

(17) Final-C, Onset ≫ Crisp Edge ≫ Coda-Cond

The tableau (18) illustrates the relationship between ambisyllabicity and Coda-Cond.

(18) Tableau for 'later' in Cockney English

/leɪ ə ˈ	Final-C	Onset	Crisp Edge	Coda-Cond
☞ leɪ ʔ ə			*	
b. leɪ t ə			*	*
c. leɪ ə	*			
d. leɪ ə		*		*

Candidate a realizes a glottal stop in coda and is the optimal candidate. The glottal stop is intervocalic and ambisyllbic, but satisfies Coda-Cond. This confirms our argument that intervocalic glottalization is also attributable to positional asymmetry.

Positional markedness constraint alone is not enough to account for all the data, especially for blocking of a glottal sound in word initial position as in *[ʔ ʔɪ ɪʔ ʔɛð tell. Here, positional faithfulness constraints are invoked to protect the onset consonant in word initial position.

(19) **IDENT-Pl** : Place feature in input has a correspondent in output.
(20) **IDENT-Pl/Ons** : Place feature of onset in input has a correspondent in output.

These constraints check if the input feature for place is faithfully realized in output. The first one is general, demanding that every input feature for place, regardless of its position, be faithfully realized in output. The second one is more specific, governing only the place feature for onset in input. According to Pānini's Theorem, the specific constraint

should dominate the more general one in ranking and ultimately disable it. The following analysis will show that the constraint hierarchy in our dialects observes the theorem. The constraints are ranked as IDENT-Pl/Ons ≫ .≫ DENT-Pl universally.

The intervocalic glottalization implies that Coda-Cond should outrank IDENT-Pl/Ons. The intervocalic consonant is coda and onset at the same time, but does undergo glottalization. It is because observing Coda-Cond is more important than observing IDENT-Pl/Ons. IDENT-Pl/Ons in turn outranks IDENT-Pl due to Pānini's Theorem:

(21) Coda-Cond ≫ DENT-Pl/Ons ≫ DENT-Pl

(22) Tableau for 'later' in Cockney English

/leɪ ə ˈ	Coda-Cond	IDENT-Pl/Ons	IDENT- Pl
☞a. leɪ ʔ ə		*	*
b. leɪ t ə	*		

Candidate a is optimal even though it violates IDENT-Pl/Ons, because it satisfies higher-ranked Coda-Cond.

Since noncoronal stops also undergo glottalization in this dialect, Coda-Cond should take precedence over both IDENT-[COR]/Coda and IDENT-[NONCOR]/Coda:

(23) **IDENT-[COR]/Coda** : Input feature for [coronal] in coda is preserved in output.
IDENT-[NONCOR]/Coda : Input feature for [noncoronal] in coda is preserved in output.

Coda-Cond ≫ DENT-[COR]/Coda, IDENT-[NONCOR]/Coda

(24) Tableau for 'shop'

/šɔ /	Coda-Cond	IDENT-[COR]/Coda	IDENT-[NONCOR]/Coda
☞ a. šɔʔ			*
b. šɔ	*		

The whole set of constraints is arranged in the following hierarchy for glottalization in Cockney:

Final-C, Onset ≫ Crisp Edge ≫ Coda-Cond ≫
IDENT-[COR]/Coda, IDENT-[NONCOR]/Coda,
IDENT-Pl/Ons ≫ DENT-Pl

The glottalization in Cockney English supports our view of glottalization as coda weakening attributable to positional asymmetry. The intervocalic glottalization in Cockney is dealt with without an arbitrary like *V? . Ambisyllabicity and interaction of such constraints as Onset and Crisp Edge are sufficient for accounting for intervocalic glottalization. The following tableaux will illustrate the interaction of constraints in this dialect.

(25) Tableau for 'later' in Cockney English

/leɪ ə ˈ	Final-C	Crisp Edge	Coda-Cond	IDENT-[COR]/Coda	IDENT-Pl/Ons	IDENT-Pl
☞ . leɪ ʔ ə		*		*	*	*
b. leɪ t ə		*	*			
c. leɪ ʔə	*				*	*

Candidate a satisfies Final-C which is violated by candidate c and is selected as an optimal output. Intervocalic glottalization as coda weakening is possible since an intervocalic consonant is partially linked to coda and should satisfiy Coda-Cond.

(26) Tableau for 'paper' in Cockney English

/peɪ ə ˈ	Crisp Edge	Coda-Cond	IDENT-[NONCOR]/Coda	IDENT-Pl/Ons	IDENT-Pl
☞ a. peɪ ʔ ə	*		*	*	*
b. peɪ p ə	*	*			

Candidate a satisfies Coda-Cond by glottalizing an ambisyllabic consonant. Here, glottalization of /p/ is allowed since IDENT-[NONCOR]/Coda is lower than Coda-Cond. Candidate b, even though it satisfies IDENT-[NONCOR]/Coda, violates Coda-Cond which is ranked higher than it. Ranking Coda-Cond higher than IDENT-[NONCOR]/Coda is appropriate to account for extensive glottalization in Cockney English. Rather than setting up a language-specific constraint for /p/-glottalization, just making the context-dependent markedness constraint dominate the context-dependent faithfulness constraint provides a right way to solving the problem.

(27) Tableau for 'part time'

/part taɪ ɪ/	Coda-Cond	IDENT-[COR]/Coda	IDENT-Pl/Ons	IDENT-Pl
☞ paʔ ɪ ɪ		*		*
b. paʔ ʔ ɪ ɪ		*	*	* *
c. pat. taɪ ɪ	*			

The winning candidate is candidate a with a glottal stop in coda and faithful consonants in onset; [paʔ ɪ ɪ] (one violation mark in Coda-Condition in the candidate is from *m* in *time*). It is superior to the most faithful candidate c since it does not violate Coda-Cond: the first *t* in [pat.taɪ ɪ] does not undergo glottalization, and incurs violation of oda-Condition. The candidate b which has a glottal stop in word-initial onset violates IDENT-Pl/Ons and loses out to the optimal [paʔ ɪ ɪ].

4. Conclusion

We have seen that facts from Cockney glottalization strongly argue for connection between phonological phenomena and syllable positions. We have attempted an Optimality-Theoretic analysis of Cockney glottalization in which positional asymmetry is successfully resolved via interaction of positional markedness constraint(Coda-Condition, etc.) and positional faithfulness constraint (IDENT-Pl/Ons, etc.). The phonetical relationship between the alternating sounds, or the frequency of glottalization in stops rather than in fricatives is left for future research.

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