Intermediate Phonology

Part 2: Segmental allophonies

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Allophony

Sounds, in particular phonemes, undergo allophony, both diachronically and synchronically. The topic of this presentation is synchronic allophony.

Allophony is dependent on the context or on the speech style. It has no contrastive function.

Kinds of allophonies

- Alteration of segments in the environment of other segments (dissimilation, assimilation)
- Alteration of segments in special environments: neutralization, debuccalization, vowel reduction (loss of features), fortition, aspiration (addition of features), lenition etc.

Allophony leads to phonetic variations that are not part of the phonemic inventory, such as aspiration of voiceless stops in English or prenasalized stops in Greek, palatalized segments in both languages.

It can also lead to change of phonemic segments into other phonemic segments: Nasal assimilation, in which /b/ is changed into [m] before a labial stop, is a case at hand.

Other phonological processes (not allophony)

- Deletion of segments (elision, syncope)
- Addition of segments (epenthesis)
- Transposition of segments (metathesis)

Allophony

English:

Stops can be aspirated; stops can be debuccalized; [t]/[d] alternate with taps; [t]-deletion; [l] assimilates to a following consonant or is velarized; vowels are nasalized before a nasal consonant; palatalization.

Greek:

Stops are voiced when preceded by a nasal; a nasal assimilates to the articulator of a following obstruent; nasal is deleted; simple or extreme palatalization; [i/j] alternation; glide strengthening, dissimilation in sequences of obstruents; hiatus resolution.

Allophones of English stops

Voiceless stops in English have several allophones

1) aspiration (a kind of fortition)

aspirated: [p^h t^h k^h]

unaspirated: [p t k]

2) Glottalization or debuccalization (a kind of lenition) in British English (Lass 1984:28)

Coronal stops have additional alternations:

3) Tap: /t/ and /d/ are optionally realized as a tap [ɾ] between a stressed and an unstressed vowel (another kind of lenition), at least in General American.

4) t-deletion at the end of a word (a third kind of lenition): *breakfast, West, test, fast*

Allophony in English stops: aspiration

Voiceless stops in English can be aspirated: [pʰ tʰ kʰ] or unaspirated: [p t k]

Word-initial voiceless stops are aspirated:

(1)

pen	[**p**ʰɛn]	ten	[**t**ʰɛn]	cat	[**k**ʰæt˺]
pretty	[**p**ʰrɪɾi]	table	[**t**ʰeb̩l̩]	clean	[**k**ʰlin]
people	[**p**ʰip̩l̩]	tell	[**t**ʰɛɬ]	cut	[**k**ʰʌt˺]

(potato, tomato, kangaroo…)

Before a stressed vowel:

(2)

appear	[əˈ**p**ʰir]	attend	[əˈ**t**ʰɛnd]	acute	[əˈ**k**ʰjut˺]
approach	[əˈ**p**ʰrotʃ]	potato	[pəˈ**t**ʰeɾo]	cicada	[sɪˈ**k**ʰeɾə]
suppose	[səˈ**p**ʰoz]	photography	[fəˈ**t**ʰɑgrəfi]	location	[loˈ**k**ʰeʃn̩]

Hayes, Bruce (2009:31) *Introductory Phonology*. Oxford. Blackwell Publishing.

Allophony in English stops: aspiration

After word-initial [s] voiceless stops are unaspirated:

(3)						
	sport	[s**p**ort$^{\neg}$]	stem	[s**t**ɛm]	scream	[s**k**rim]
	spot	[s**p**ɑt$^{\neg}$]	stop	[s**t**ɑp$^{\neg}$]	skull	[s**k**ʌɬ]
	sprout	[s**p**raʊt$^{\neg}$]	steam	[s**t**im]	scary	[s**k**eri]

Word-medially and foot-medially, before an unstressed vowel voiceless stops are unaspirated:

(4)						
	apple	[æ**p**l]	winter	[wɪn**t**r]	lucky	[lʌ**k**i]
	happy	[hæ**p**i]	altitude	[æl**t**ɪt^{h}ud]	wicked	[wɪ**k**ɪd]
	capital	[k^{h}æ**p**ɪɾl]	salty	[sɑɬ**t**i]	secret	[si**k**rɪt]

Word-finally, voiceless stops in English vary in their pronunciation:

(5)				
	sip	[sɪp$^{\neg}$]	~	[sɪp^{h}]
	sit	[sɪt$^{\neg}$]	~	[sɪt^{h}] ~ [sɪʔ]
	sick	[sɪk$^{\neg}$]	~	[sɪk^{h}]

Allophony in stops: aspiration

In a typical OT analysis of allophony, markedness and faithfulness constraints conflict with each other.

The input is an unaspirated labial stop /p/ that is aspirated in the onset of stressed syllable (a trochaic foot) or at the beginning of a prosodic word.

A contextual markedness constraints forbids unaspirated stops in this environment:

$*_{F}$([–son, –cont, –asp] V >> IDENT[asp] >>*[asp]

This constraint is higher ranking than the constraint requiring identity between input and output for the feature [±aspirated]. The contextless constraint against aspiration *[asp] is ranked below or is tied to the faithfulness constraint.

/p/ [–son, –cont, –asp]	$*_{F}$([–son, –cont, –asp] V	IDENT[±asp]	*[asp]
☞ a. $_{F}(p^{h}$ _		*	*
b. $_{F}$(p _	*!		

The motivation can come from the need for fortition in the onset of a foot or prosodic word.

Allophony in stops: glottalization in British English

Glottalization or debuccalization inBritish English is confined to the syllable final position. The phenomenon is a neutralization in the coda: the articulator is delinked from the feature tree and the resulting segment is realized as a stop without an oral articulator (thus 'debuccalization'). Neutralization leads to ambiguity of underlying segment.

a. cat	/kæt/	is optionally realized as	[k^hæʔ]
b. cap	/kæp/	is optionally realized as	[k^hæʔ]
c. back	/bæk/	is optionally realized as	[bæʔ]

Glottalization can also take place without debuccalization. It is a gradient phenomenon:

a. cat	/kæʔt/
b. cap	/kæʔp/
c. back	/bæʔk/

Lass, Roger. 1984. *Phonology: An introduction to basic concepts*. Cambridge: Cambridge University Press.

Allophony in stops: [t/d] and tap [ɾ] in GA

The coronal stops [t] and [d] can be realized as the tap [ɾ] between a vowel and an unstressed vowel. This is more common in GA than in British E. No tap in the coda or in the onset of a stressed syllable, or if a coda consonant precedes the unstressed syllable *(active).*

	Phonemic	Phonetic		Phonemic	Phonetic	
data	/'deɪtə/	['deɪɾə]	*tan*	/'tæn/	['tæn]	
latter	/'lætɚ/	['læɾɚ]	*attend*	/ə'tɛnd/	[ə'tɛnd]	
eating	/'itɪŋ/	['iɾɪŋ]	*guilty*	/'gɪlti/	['gɪlti]	
Ottoman	/'ɑtəmən/	['ɑɾəmən]	*cat*	/'kæt/	['kæt]	*[kæɾ]
rhetoric	/'ɹɛtəɹɪk/	['ɹɛɾəɹɪk]	*active*	/'æktɪv/	['æktɪv]	
automatic	/ˌɔtə'mætɪk/	[ˌɔɾə'mæɾɪk]	*Atkins*	/'ætkɪnz/	['ætkɪnz]	

Hayes, Bruce (2009:31) *Introductory Phonology*. Oxford. Blackwell Publishing.

Allophony in English stops: t-deletion

There is also a more or less optional and gradient t-deletion process, more common in American English than in British English.

t-deletion is optional in

center ['sɛ̃nɚ, 'sɛ̃ntɚ] *Santa* ['sæ̃nə, 'sæ̃ntə].

intellectual [ˌĩnə'lɛktʃəwəl, ˌĩntə'lɛktʃəwəl].

A different t-deletion takes place quite regularly at the end of the words, especially if [t] is part of a cluster: *test, breakfast, West, fast*

With a plural suffix [s] in *such words*, [s] is a geminate: *tests* is pronounced [tɛss]

Allophony in English: allophones of [l]

The lateral [l] is coronal [l] (light variant), or velarized [ɬ] (dark variant).
[l] appears in an onset, and [ɬ] everywhere else, in the coda and in the syllable's peak.

Words with [l]	
listen	['lɪsən]
lose	['luz]
allow	[ə'laʊ]
aglow	[ə'gloʊ]
blend	['blɛnd]

Words with [ɬ]	
file	['faɪɬ]
fool	['fuɬ]
all	['ɔɬ]
ball	['bɔɬ]
fell	['fɛɬ]
feel	['fiɬ]

little	[litɬ]		
help	[hɛɬp]		

stressed			unstressed
dull	[dʌɬ]	or	[dɬ]
null	[nʌɬ]	or	[nɬ]
Culver	[kʌɬvɚ]	or	[kɬvɚ]
bulky	[bʌɬki]	or	[bɬki]
color	[kʌlɚ]		

Hayes, Bruce (2009:25) *Introductory Phonology*. Oxford. Blackwell Publishing.

Allophony in English: allophones of [l]

Moreover, as the result of assimilations, the lateral [l] can also be

• unvoiced [l̥] or partly unvoiced [l̥l] after a voiceless obstruent

Words with [l̥͡l]	
slight	['sl̥͡laɪt]
flight	['fl̥͡laɪt]
plow	['pl̥͡laʊ]
cling	['kl̥͡lɪŋ]
discipline	['dɪsəpl̥͡lən]

• or it is a velarized dental [l̪̈] before [θ].

Words with [l̪̈]	
wealth	['wɛl̪̈θ]
health	['hɛl̪̈θ]
filthy	['fɪl̪̈θi]
tilth	['tɪl̪̈θ]
stealth	['stɛl̪̈θ]

Allophony in English: allophones of [l]

In the input, the lateral is always coronal. The other versions are more marked and in need of additional features.

This (sketchy) OT analysis proposes a contextualized markedness constraint against syllable-final coronal [l] ranked above a faithfulness constraint. The velarized [ɬ] is the repair, but it is not motivated. (Repairs can take all sorts of forms, such as deletion, total replacement, or vowel epenthesis)

/l/ [lateral, coronal] *loose*	*[l])$_\sigma$	IDENT[lateral, coronal]	*[ɬ]
☞ a. [luz]			
b. [ɬuz]		*!	*

/l/ [lateral, coronal] *file*	*[l])$_\sigma$	IDENT[lateral, coronal]	*[ɬ]
☞ a. [faɪ̯ɬ]		*	*
b. [faɪ̯l]	*!		

Allophony in English: vowel nasalization

A vowel preceding a homorganic nasal consonant becomes itself nasalized by spreading of the feature [nasal]. The nasal itself can delete. In the analysis of Lass (1984) the resulting vowel is long because of compensatory lengthening due to the loss of the consonant.

Phonemic	/ k æn t /
	| | /\
Phonetic	[kʰ æ̃ː ʔ t]

Lass, Roger. 1984. *Phonology: An introduction to basic concepts*. Cambridge: Cambridge University Press.

Allophony in English: vowel nasalization

Ted [tɛd] vs. *ten* [tɛ̃n]

The OT analysis proposes a markedness constraint ranked above a faithfulness constraint: a vowel is not oral when it precedes a homorganic nasal. It acquires the feature [nasal] by feature spreading (assimilation or feature agreement). [V] stands for an oral vowel, [Ṽ] for a nasal vowel. The nasalized vowel is more marked than the oral one.

/ɛ/ in *Ted*	*[V] + [nasal C]	IDENT[nasal]	*[Ṽ]
☞ a. [tɛd]			
b. [tɛ̃d]		*!	*

/ɛ/ in *ten*	*[V] + [nasal C]	IDENT[nasal]	*[Ṽ]
a. [tɛn]	*!		
☞ b. [tɛ̃n]		*	*

Allophony in English: palatalization

The term ‘palatalization’ is used for several sound changes in English:

1. **Coronal palatalization**: the process involves a change of alveolars to palato-alveolars in the context of palatal glide [j] (in an unstressed syllable).

t – ʧ	*perpe*[t]*uity*	*perpe*[ʧ]*ual*
d – ʤ	*resi*[d]*ue*	*resi*[ʤ]*ual*
s – ʃ	*gra*[s]*e*	*gra*[ʃ]*ious*
z – ʒ	*plea*[z]*e*	*plea*[ʒ]*ure*

Kochetov, Alexei. 2011. Palatalization. *The Blackwell Companion to Phonology*. van Oostendorp, Marc, Colin J. Ewen, Elizabeth Hume and Keren Rice (eds). Blackwell Publishing.

Allophony in English: palatalization

2. **Velar softening**: alternations between velar stops [k g] and coronal fricatives or affricates [s] and [ʤ]: two non-identical changes – a shift of the voiceless velar stop to the alveolar fricative and a shift of the voiced velar stop to the palato-alveolar affricate.

k – s	*medi*[k]*ation*	*medi*[s]*ine*
	criti[k]	*criti*[s]*ize*
g – ʤ	*analo*[g]	*analo*[ʤ]*y*
	pedago[g]*ue*	*pedago*[ʤ]*y*

3. **Spirantization**: alternations between the alveolar stop [t] and the alveolar fricative [s] (or [ʃ] in conjunction with coronal palatalization). The process does not involve a change in place of articulation, but a change in continuancy and sibilancy.

t – s	*secre*[t]	*secre*[s]*y*	
	regen[t]	*regen*[s]*y*	
	emergen[t]	*emergen*[s]*y*	
	par[t]	*par*[ʃ]*ial*	first [s] then [ʃ]

Allophony in English: palatalization

C + i/j (or C + pal) sequences, i.e. a combination of a consonant and a palatal segment, are articulatorily and acoustically/perceptually difficult, thus phonologically marked: the two gestures have inherently conflicting phonetic targets and they lead to perceptual confusion. As a result, they are cross-linguistically avoided. (Bateman 2007, Kochetov 2011, 2016)

Palatalization is a repair strategy that involves feature sharing (assimilation) or overlap of features.

Kochetov (2011, 2016): Place-changing palatalization is functionally and formally related to other segmental processes, all competing strategies whose goal is to repair a highly marked structure, i.e., C + pal (*grace, gracious*: /si/ → [ʃ]). See next slide.

Bateman, Nicoleta. 2007. *A crosslinguistic investigation of palatalization*. San Diego, CA: University of California dissertation.

Kochetov, Alexei. 2016. Palatalization and glide strengthening as competing repair strategies: Evidence from Kirundi. *Glossa: A Journal of General Linguistics* 1(1): 23

Kochetov, Alexei. 2011. Palatalization. *The Blackwell Companion to Phonology*. van Oostendorp, Marc, Colin J. Ewen, Elizabeth Hume and Keren Rice (eds). Blackwell Publishing.

Allophony in English: palatalization

	Strategy	*Schematic examples*
a.	palatalization	pja → ʧa, mja → ɲa
b.	glide strengthening	pja → pca, mja → mɲa
c.	deletion	pja → pa, mja → ma
d.	epenthesis	pja → pija, mja → mija
e.	metathesis	apja → ajpa, amja → ajma

1. **Palatalization**, a merger of the two input segments (e.g. *atja → atʃa*). Place-changing palatalization – the process that shifts the target consonant's primary place of articulation vs. adding secondary palatal articulation. Both English and Greek have palatalization.

2. **Glide strengthening** /i,j/ are changed to a palatal fricative or stop, while preserving the identity of the target consonant (e.g. *atja → atça or atca*). Greek has glide stengthening, English doesn't.

Allophony in English: palatalization

OT analysis from Kochetov (2016)

In OT, palatalization is triggered by a markedness (phonotactic) constraint targeting prohibition of consonants followed by the palatal glide or a front vowel:

*C+pal (avoid consonant + palatal segment sequences) : *C+j, *C+i, etc.

This constraint is in conflict with a faithfulness constraint:

UNIFORMITY-IO: Output elements do not correspond to more than one input element (McCarthy & Prince 1999).

Uniformity relations.

	a.	b.
Input:	C_1 C_2	$*C_1$ C_2
Output:	C_1 C_2	$C_{1,2}$

a.	/an$_1$j$_2$a/	*C+pal	Uniform-IO
i.	an$_1$j$_2$a	*!	
ii.	☞ aɲ$_{1,2}$ a		*

b.	/an$_1$j$_2$a/	Uniform-IO	*C+pal
i.	☞ an$_1$j$_2$a		*
ii.	aɲ$_{1,2}$ a	*!	

Allophony in English: palatalization

The other strategies listed by Kochetov (2016) need other faithfulness constraints: no change violates *C+pal (a), palatalization violates UNIFORMITY-IO (b), deletion violates MAX (c-d), epenthesis violates DEP (e), metathesis violates LINEARITY (f).

Palatalization is preferred over other repair strategies and over no change in /n/ + /j/ sequence (hypothetical data).

	/an$_1$j$_2$a/	Max-IO	Dep-IO	Lin-IO	*C+pal	Uniform-IO
a.	an$_1$j$_2$a				*!	
b.	☞ aɲ$_{1,2}$ a					*
c.	an$_1$a	*!				
d.	aj$_2$a	*!				
e.	an$_1$əj$_2$a		*!			
f.	aj$_2$n$_1$a			*!		

Interim summary for allophony in English

All allophonies that were discussed for English take place in the prosodic words (ω-words) or at their boundaries.

Fortition

- Aspiration of stops

Lenition, deletion, and neutralization of features and segments

- Glottalization or debuccalization of stops
- t-deletion
- Tap

Assimilations

- Vowel nasalization
- Palatalization
- Allophones of [l]

Allophony

Greek:

Stops are voiced when preceded by a nasal; a nasal assimilates to the the articulator of a following obstruent; nasal is deleted; simple or extreme palatalization; [i/j] alternation; glide strengthening, dissimilation in sequences of obstruents; hiatus resolution.

Some of the Greek allophonies take place across word boundaries, more often so than in English.

Allophony in Greek: nasal assimilation

Both stops and fricatives trigger a **regressive assimilation of the nasal: i**n word-internal sequences of an alveolar nasal consonant /n/ + voiceless obstruent, the nasal assimilates to the obstruent's place of articulation:

labiodental:	αμφιβολία	[aɱfivolía]	'doubt'
	συμπάθεια	[simbáθia]	'compassion'
dental:	άνθος	[án̪θos]	'flower'
retracted alveolar:	πένσα	[pén̠sa]	'pliers'
alveo-palatal:	συγχύζω	[siɲçízo]	'to annoy'
or velar:	συγχωρώ	[siŋxoró]	'to forgive'
	άγχος	[áŋxos]	'stress'

Data from Modern Greek phonology (Wikipedia, March 15th 2023)

Allophony in Greek: post-nasal voicing of stops

Voiceless stops such as [p] in ο πατέρας [o **p**ateras] ‘the father -NOM.SG’, obligatorily become voiced after a nasal. The nasal assimilates to the articulator of the following obstruent, after which the stop optionally changes into a prenasalized voiced stop, and the nasal optionally deletes.

[d], [nd], and [nt] in loanwords are all written “ντ” in Greek.

τον πατέρα /ton patéra/	→ [to(m)batéra]	‘the father.ACC.SG’ *[ton paˈtera]
δεν πειράζει /ðen pirázi	→ [ðe(m)birázi]	‘it doesn't matter’ *[ðen piˈrazi]
τον πήραμε /ton pírame/	→ [to(m)bírame]	‘we took him’
μην πάτε /min páte/	→ [mi(m)báte]	‘don’t go’
τον τρελό /ton treló/	→ [to(n)dreló]	‘the madman.ACC.SG’
την τίμησαν /tin tímisan/	→[ti(n)dímisan]	‘they honoured her’
δεν τολμώ /ðen tolmó/	→ [ðe(n)dolmó]	‘I don’t dare’

Joseph, Brian D. & Tserdanelis, Georgios. 2003. Modern Greek. In Roelcke, Thorsten (ed.). *Variation Typology. A Typological Handbook of European Languages*. de Gruyter: 823–836.

Allophony in Greek: nasal voicing of stops

Deletion of the nasal

In some varieties, the nasal deletes after opaquely voicing the following stop: *post-nasal stop voicing* (PNV).

Alternations in different dialects:

/sin-paθ-i-a/ συμπάθεια [simbáθia] (Thessaloniki)/ [sibáθia] (Athens) ‘compassion’

/sin-tak-s-i/ σύνταξη [síndaksi] (Thess), [sídaksi] (Athens) ‘syntax’

The deletion of nasals before voiced stops seems to be a phenomenon that is spreading in SG, especially in Athens, with younger speakers showing more frequent pronunciations of plain voiced stops than older speakers.

Joseph, Brian D. & Tserdanelis, Georgios. 2003. Modern Greek. In Roelcke, Thorsten (ed.). *Variation Typology. A Typological Handbook of European Languages*. de Gruyter: 823–836.

Allophony in Greek: deletion of nasals before fricatives

Great deal of variation for post-nasal voicing, assimilation of the nasal and nasal deletion across word boundary, especially so with nasal-final function words such as clitics, particles, complementizers, determiners, followed by a content word.

In a sequence of nasal consonant + voiceless fricative the nasal is often deleted. This is optional but preferred across word boundaries:

/τον θε'o/ ton θeó ~ [το θeó] 'the god.ACC'

The final /n/ of the feminine article and weak pronoun την [tin] is normally deleted in both speech **and writing** when immediately followed by a word with initial /f, x, v, d, g, j, s, z, l, r, m, n/:

την λέξη	/tin 'leksi/	→ [tiléksi]	'the word'
την σεβάστηκαν	/tin se'vastikan/	→ [tisevástikan]	'they respected her'
την φιλοξένησα	/tin filo'ksenisa/	→ [tifiloksénisa]	'I gave her hospitality'

The final -n of the negative particle μη(ν) behaves in the same way:

μην με λυπάσαι	[mimelipáse]	'don't pity me'
μην βλέπεις	[mivlépis]	'don't look'
μην θυμώνεις	[miθimónis]	'don't get angry

Holton, David, Peter Mackridg & Irene Philippaki-Warburton. 2004. *Greek: an essential grammar of the modern language*. London: Routledge.

Allophony in Greek: post-nasal voicing of stops

Word-medially after nasals, only voiced stops occur, no voiceless stops occur in that context.

Pater's (1999, 2004) account of avoidance of nasal + voiceless stops clusters:

OT constraint *NC̥ forbids voiceless stops after nasals.

This marked structure can be avoided in a number of ways – through nasal substitution, nasal deletion, vowel epenthesis, post-nasal voicing or denasalization.

In Greek, two kinds of repairs of NC̥: post-nasal voicing and/or nasal deletion.

The nasal may be a separate segment or coalesce with the following stop into a voiced consonant preceded by nasal murmur [ᵐb ⁿd ᵑg]: *nasal-stop coalescence* (NASCOAL) in conflict with UNIFORMITY that requires that each input segment has its own output correspondent (Kong et al. 2007).

Only stops become voiced, fricatives do not voice.

Word-initially and after /r/ or /l/, stops are not prenasalised.

Allophony in Greek: palatalization

Palatalization in Greek has at least two variants:

Extreme palatalization (n + i → [ɲ]): replacement of C + /i, e, j/ by the palatalized variant.

Simple palatalization (/xeri/ → [çeri]): a single consonant is changed into another single C.

Glide Strengthening (GS) is further process: /p/ + /j/ → [pç]

The glide undergoes fortition, i.e., changes in manner of articulation from an approximant to a fricative or sometimes even a stop.

Topintzi, Nina & Mary Baltazani. 2013. Where the glide meets the palatals. *Selected Papers of the 20th International Symposium of Theoretical and Applied Linguistics*, Lavidas, N. et al. (eds.). Thessaloniki.

Baltazani, Mary, Kainada, Evia, Revithiadou, Anthi & Topintzi, Nina. 2016. Vocoid-driven processes: Palatalization and glide hardening in Greek and its dialects. *Glossa: A Journal of General Linguistics* 1(1): 23.

Allophony in Greek: palatalization

Extreme palatalization: Two segments are fused together

Sonorants + /j/ or /i/ are replaced by a corresponding palatal (coalescence of two segments into one)

/l/ + /j, i/ →	post-alveolar lateral /li/ → [ʎ]	παλιός	[paʎós]	‘old.MASC’
		κούκλα	[kú.kʎa]	‘dolls’
/n/ + /j, i/ →	alveolopalatal nasal /ni/ → [ɲ]	νιάτα	[ɲáta]	‘youth’
		πανιά	[pa.ɲá]	‘cloths’

Obstruents + /j, i/ are replaced by a single consonant (instance of coalescence) before V:

/k/ + /j, i/ → [c]	κιάλι	/ˈkjali/ →	[cáli]	‘binoculars’
/g/ + /j, i/ → [ɟ]	γκιαούρης	/ˈgjauris/ →	[ɟaúris]	‘infidel’
/x/ + /j, i/ → [ç]	χιόνι	/ˈxjoni/ →	[çóni]	‘snow’
/ɣ/ + /j, i/ → [ʝ]	γιάλα	/ˈɣjala/ →	[ʝála]	‘fish tank’

Topintzi, Nina & Mary Baltazani. 2013. Where the glide meets the palatals. *Selected Papers of the 20th International Symposium of Theoretical and Applied Linguistics*, Lavidas, N. et al. (eds.). Thessaloniki.

Allophony in Greek: palatalization

Simple palatalization: a segment changes its place of articulation

Velar stops [k, g] and velar fricatives [x, ɣ] become the palatal [c ɟ] and [ç ʝ] before the front vowels /i/ and /e/: this is a case of simple allophony

κύπος	/kipos/	→	[cípos]	*kipos	'garden'
κύμα	/kima/	→	[címa]	*kima	'wave'
κέρι	/keri/	→	[ceɾí]	*keɾi	'candle'

Velar stops: /k, g/ and the velar fricatives /x, ɣ/ do not change before a back vowel:

Stops:	/k/	κάτω [káto] 'down'
	/g/	Γκάνταλφ [gándalf] 'proper name'
Fricatives:	/x-χ/	χώνει [xóni] 's/he stuffs'
	/ɣ/	γάλα [ɣála] 'milk'

Superficially, there is a ç ~ x alternation of the same type as in German, except that the triggering vowel (back or front) is located after the fricative, not before: compare palatal συγχύζω [siɲˈçizo] 'to annoy', and velar άγχος [ˈaŋxos] 'stress'

Allophony in Greek: palatalization

Simple palatalization in Topintzi & Baltazani's (2013) analysis:

	kalós	*ki	IDENT-IO-PLACE
+	a. kalós		
	b. calós		*!

	kípos	*ki	IDENT-IO-PLACE
+	a. cípos		*
	b. kípos	*!	

Topintzi, Nina & Mary Baltazani. 2013. Where the glide meets the palatals. *Selected Papers of the 20th International Symposium of Theoretical and Applied Linguistics*, Lavidas, N. et al. (eds.). Thessaloniki.

Allophony in Greek: palatalization

Extreme palatalization: /obstruent + j/ is replaced by the palatal (instance of coalescence):

/k/ → [c] /ˈkjal-i/ → [ˈcali] ‘binocular’

OCP-PAL: No sequence of palatals

	/$k_1J_2$áli/	OCP-PAL	IDENT-IO [±voc]	UNIFORMITY
	a. cjá.li	*!		
	b. ci.á.li		*!	
+	c. $c_{1,2}$á.li			*

Again the repair that is chosen is only one among several possibilities.

Possible repairs palatalization

The other strategies listed by Kochetov (2016) need other faithfulness constraints: no change violates *C+pal (a), palatalization violates UNIFORMITY-IO (b), deletion violates MAX (c-d), epenthesis violates DEP (e), metathesis violates LINEARITY (f).

Palatalization is preferred over other repair strategies and over no change in /n/ + /j/ sequence (hypothetical data).

	/an$_1$j$_2$a/	Max-IO	Dep-IO	Lin-IO	*C+pal	Uniform-IO
a.	an$_1$j$_2$a				*!	
b.	☞ aɲ$_{1,2}$ a					*
c.	an$_1$a	*!				
d.	aj$_2$a	*!				
e.	an$_1$əj$_2$a		*!			
f.	aj$_2$n$_1$a			*!		

Allophony in Greek: Glide strengthening

Glide strengthening, with /j/ as a trigger: when /j/ occurs after labials and coronal obstruents (and /r/), the result is GS [ʝ] (after a sonorant or a voiced obstruent) or [ç] (after a voiceless abstruent) instead.

Glide strengthening in CjV

ˈpjano	[**pç**áno]	‘catch-1SG’
iˈsjoni	[i**sç**óni]	‘straighten-3SG’
ˈðjakos	[**ðʝ**ákos]	‘deacon’
mjaˈla	[**mɲ**alá]	‘brain-PL’
xoˈrjo	[xo**ɾʝ**ó]	‘village’

Glide strengthening does not always take place:

A tripartite distinction: ∅, i and strengthened-j:

a. βάζω	[ˈ**va**.zo.]	‘place, put-1SG’
b. βιάζω	[**vi**.ˈa.zo.]	‘rape-1SG’
c. βιάζωμαι	[ˈv**ʝa**.zo.me.]	‘be in a hurry-1SG’ Thanks to Jim Kotopouli for clarification

Baltazani, Mary, Kainada, Evia, Revithiadou, Anthi & Topintzi, Nina. 2016. Vocoid-driven processes: Palatalization and glide hardening in Greek and its dialects. *Glossa: A Journal of General Linguistics* 1(1): 23.

Allophony in Greek: palatalization

OT analysis of glide strengthening (Kochetov 2016):

UNIFORMITY-IO: Output elements do not correspond to more than one input element (McCarthy & Prince 1999).

This faithfulness constraint is in conflict with two markedness constraint:

*C + pal (avoid consonant + palatal segment sequences) : *C + j, *C + i, etc.

Agree[F]-CC: Consonants/glides in a cluster have the same values for consonantality, sonorancy, nasality, and voicing ([± consonantal, ± sonorant, ± nasal, ± voice]).

	/am$_1$j$_2$a/	Uniform-IO	*C + pal	Agree[F]-CC
a.	am$_1$j$_2$a		*	**!
b.	aɲ$_{1,2}$ a	*!		
c.	☞ amɲa		*	

Stop dissimilation and fricative dissimilation

When the underlying cluster contains two stops, the first member changes into a fricative (a), whereas in fricative clusters the second member becomes a stop (b)

a.	ptero	~	ftero	‘feather’
	ktena	~	xtena	‘comb’
	epta	~	efta	‘seven’
	okto	~	oxto	‘eight’
b.	xθes	~	xtes	‘yesterday’
	fθinos	~	finos	‘cheap’
	fxaristo	~	fkaristo	‘I thank’

Obstruent clusters containing an /s/ invariably delink the [+continuant] specification of the other segment (c, d).

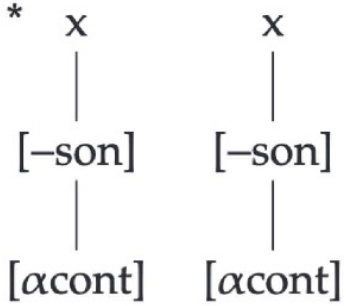
c.	sxini	~	skini	‘rope’
	pisθika	~	pistika	‘I was convinced’
d.	trex-o	~	e-trek-sa	‘I run-pres:past’

In low frequency Katharevusa words, non-dissimilated clusters are almost obligatory for most SG speakers e.g., /elikoptero/ ‘helicopter’ (/ptero/ ‘feather’ is found in formal registers or scientific speech, thanks to Jim Kotopouli, p.c. for clarification).

Allophony in Greek: dissimilation of the fricatives

If stops are [-continuant] and fricatives [+continuant], the dissimilation can be interpreted as an OCP-driven delinking of [continuant] values:

The OCP manner constraint for Modern Greek (modified from Tserdanelis 2001)



Tserdanelis, Georgios. 2001. A perceptual account of manner dissimilation in Greek. OSU Working Papers in Linguistics 55. 172-199.

Vaux, Bert & Brett Miller The representation of fricatives. 2011 The Blackwell Companion to Phonology. van Oostendorp, Marc, Colin J. Ewen, Elizabeth Hume and Keren Rice (eds). Blackwell Publishing.

Allophony in Greek: fricative-stop dissimilation

The model they propose is that ypsilon-F is ‘weaker’ than phi (φ) because it shows variation.

However, things are more complex because, on the other hand, phi (φ) deletes in some environments:

a. /ðulev-men-os/	[ðuleménos]	‘worked out’
b. /rav-men-os/	[raménos]	‘sawn’
c. /ɣraf-men-os/	[ɣraménos]	‘written’

Conclusion

English:

Most allophonies take place inside the prosodic words (ω-words), e.g., assimilation, or at their boundaries, e.g., fortition, deletion or loss of a feature. The syllable is important, as is the metrical foot in the case of aspiration of stops. Adjacent segments are triggering changes in the featural content of a segment.

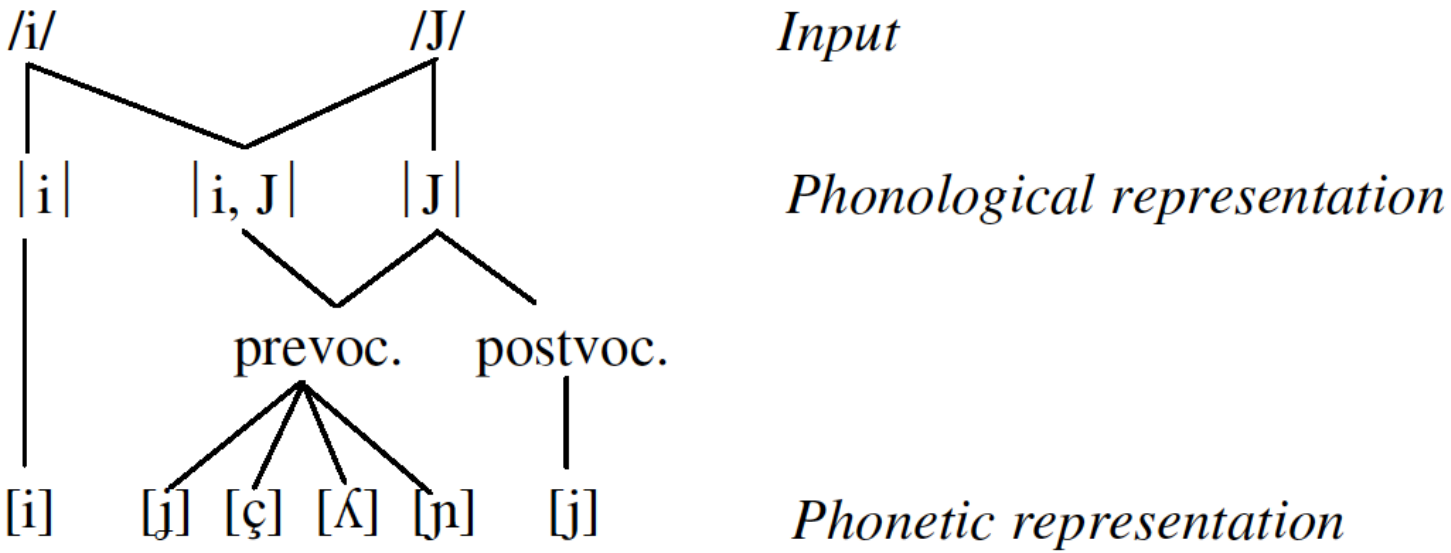
Greek:

Several allophonies, such as stop voicing and pre-nasalization, vowel deletion because of hiatus resolution, and consonant deletion in function words, take place across morpheme boundaries.

But stop voicing and pre-nasalization, dissimilations in obstruent clusters, palatalization are alternations also taking place inside the prosodic words.

Allophony in Greek: [i], [j] and [j̟/ç]

Baltazani & Topinzi (2013) propose two phonemes /i/ and (unspecified?) /J/ that may contrast with each other or that fall together in some contexts:



Topintzi, Nina & Mary Baltazani. 2013. Where the glide meets the palatals. *Selected Papers of the 20th International Symposium of Theoretical and Applied Linguistics*, Lavidas, N. et al. (eds.). Thessaloniki.

Allophony in Greek: [i], [j] and [j̟/ç]

Vowel hiatus is generally allowed: [peðío] - [peðíu] ‘field’

But the effect of paradigm uniformity – requiring that the number of the syllables of the noun remains constant across the paradigm – may result in hiatus resolution: [peðí] - [peðj̟ú] *[peðiú] ‘child’.

[i]~[j] alternations

pó.ði	“foot”	pó.ðja	“feet”
ðo.ká.ri	“girder”	ðo.kár.ja	“girders”
má.ti	“eye”	má.tça	“eyes”

Topintzi, Nina & Mary Baltazani. 2013. Where the glide meets the palatals. *Selected Papers of the 20th International Symposium of Theoretical and Applied Linguistics*, Lavidas, N. et al. (eds.). Thessaloniki.

Allophony in Greek: [i], [j] and [j̟/ç]

Vowel-glide variation before vowels

a. γυάλι	/jali/ [j̟aˈli]	‘glass’ /jali/
b. γυαλουργός	[ialuˈrɣos]	‘glassworker’
c. γυαλοπολέιο	/jalopolio/ [ialopoˈlio] ~ [j̟alopoˈlio]	‘glass shop’

According to Markopoulos & Revithiadou (2023), [i] is [+learned] and [j̟] is [–learned]. Variation is [±learned].

Learned (Katharevousa)/formal and

Non-learned/informal (demotic)

due to diachronic factors (e.g., period of diglossia between the two variants)

Markopoulos, Giorgos & Anthi Revithiadou. 2023. *F as in fricative or as in fortis? Or both*? Talk at GLOW 46.

Spirantization

Status of the fricativization (spirantization) has existed in many varieties of Greek since at least the first century BCE. The phonetic values of ⟨αυ⟩, ⟨ευ⟩ and ⟨ηυ⟩ are /av/, /ev/ and /iv/ when they appear before a voiced consonant or a vowel and /af/, /ef/ and /if/ otherwise (before voiceless consonants).

αυτοκίνητο	aftokínito	‘car’
αυγό	avγó	‘egg’
ευρώ	evró	‘euro’
ευστροφία	efstrofía	‘quickness of mind’

Allophony in Greek: fricative-stop dissimilation

Greek has a manner dissimilation process that turns fricative consonants (phi (φ) and beta (β)) to stops before sibilant /s/:

Perfective		Nominalizer		
a. /ɣraf-s-o/	[ˈɣrapso]	/ɣraf-sim-o/	[ˈɣrapsimo]	(fs → ps)
‘write-PFV-1SG’		‘writing’		
b. /rav-s-o/	[ˈrapso]	/rav-sim-o/	[ˈrapsimo]	(vs → ps)
‘sew-PFV-1SG’		‘sewing’		
c. /vrex-s-o/	[ˈvrekso]	/vrex-sim-o/	[ˈvreksimo]	(xs → ks)
‘drench-PFV-1SG’		‘drenching’		

Markopoulos, Giorgos & Anthi Revithiadou. 2023. *F as in fricative or as in fortis? Or both*? Talk at GLOW 46.

Allophony in Greek: fricative-stop dissimilation

Words with /F/ spelled with ypsilon (υ), henceforth ypsilon-F, do not dissimilate.
Ypsilon-F historically originates from the Ancient Greek diphthongs /aw/(αυ) and /ew/ (ευ)]

Perfective		Nominalizer	
a. /vravev-s-o/	[vravéfso]	'award-PFV-1SG'	βραβευ-
b. /prooðev-s-o/	[prooðéfso]	'progress-PFV-1SG'	προοδευ-
c. /aliev-s-o/	[aliéfso]	'trawl-PFV-1SG'	αλιευ-
d. /stoxev-s-o/	[stoxéfso]	'aim/target-PFV-1SG'	στοχευ-

phi (φ) and ypsilon-F are truly different: phi (φ) is a fricative that **always** dissimilates
ypsilon-F displays variation: it optionally dissimilates:

α. /prostatev-s-o/	[prostatéfso] ~[prostatépso]	'protect-PFV-1SG'	προστατευ-
b. /peδev-s-o/	[peδéfso] ~ [peδépso]	'torment-PFV-1SGS'	παιδευ-
c. /ekpeδev-s-o/	[ekpeδéfso] ~ [ekpeδépso]	'train-pfv-1sgs'	παιδευ- (Kotopoulis, p.c.)

Allophony in Greek: obstruent clusters

Realization of obstruent clusters

a. /ptoxefsi/ [ˈptoçefsi] ‘insolvency’

b. /ptoxokomio/ [ptoxokoˈmio] ~ [ftoxokoˈmio] ‘poorhouse’

c. /ptoxos/ [ftoˈxos] ‘poor’