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Morphomes, and what to do about them

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Morphemes, and what to do about them

1. Introducing Morphemes

- The term *Morphome* originates in Aronoff (1994). He introduces it using the example of past participle morphology in English.
- What's usually called the "past participle" in English has multiple realizations (-ed, -en, ablaut, and others) and it has a couple of very different-looking syntactic/semantic functions (passive and perfect).
- Importantly, Aronoff claims (correctly for my and many other Englishes, but whether this is true of all dialects I'm not certain) that no verb in English employs a different form for the eventive passive participle and the perfect participle: any irregularity found in the eventive passive is always found in the perfect, and vice versa (*the book was written in three weeks; she has written a book; Songs were sung, we have sung songs, etc).*
- Noting these facts, Aronoff suggests that Passive and Perfect must map to a function he calls F_{en} , and then a mapping from F_{en} to phonology gives you -ed, -en, ablaut, etc depending on the verb. He goes on to say the following (Aronoff 1994:25):

“What is F_{en} ? Formally, we may say that both Passive and Perfect are syntactic elements mapped onto the morphological function F_{en} . This function occupies a cell in the morphological paradigm of English that is neither syntactic nor phonological. Because the function itself is mapped from either Passive or Perfect and because the domain of the function (the class of verb lexemes) is morphological or lexemic, and not syntactic, its effect is to erase any possible distinction between the two syntactic elements in their realizations on the verb itself (though the difference in the auxiliary will distinguish the two constructions). F_{en} is neither morphosyntactic nor morphophonological but rather purely morphological—morphology by itself. Let us call the level of such purely morphological functions *morphomic* and the functions themselves *morphomes*.”

- Since Aronoff (1994), the idea of the morphome has been refined and pursued most vigorously by Martin Maiden and his associates (see Maiden 2018 for especially thorough discussion and a large number of case studies from the Romance family).
- Maiden (2021:105-6) offers the following characterization: “any morphological phenomenon that cannot be described without reference to a heterogeneous, incoherent morphosyntactic or phonological domain is, or is potentially, morphomic”.

¹ Adjectival (stative) passives are a different kettle of fish; they are often irregular even when the eventive passive and perfect forms are not (compare *an unshaven face*, with *I have shaved/I was shaved by a barber*).

- The English participles (and many other famous examples of morphemes, like the Latin *t*-stem) involve a single piece with several allomorphs, which seems to have more than one meaning or function.

→ Such *Piece-based Morphemes*, as I call them, are not especially problematic: they're expected given the Autonomy of (Morpho)Syntax!

- Much more troubling are what I will call *Process-based Morphemes*. My personal favorite example of this type of morpheme is the following one, from Spanish:

(1) **Gordon and Stillman (2004:23)**

“[The Imperfect Subjunctive] is derived from the third-person plural of the preterit. To form the imperfect subjunctive, you drop the **-ron** of the [3rd person plural] preterit and add one of the two imperfect subjunctive markers **-ra-** or **-se-** and the person endings.”

- [We'll see later that a version of the same generalization applies to the future subjunctive, which is now defunct in spoken Spanish.]
- This generalization is completely exceptionless—no matter how irregular a Spanish verb is otherwise, its imperfect subjunctive forms can always be accurately arrived at by following this procedure (likewise for the future subjunctive forms in older Spanish).

(2) **Imperfect Subjunctive Stems from 3rd Plural Preterit Stems Minus *-ron***

INFINITIVE (translation)	3rd Pers. Pl. Preterite Form - Imperfect Subjunctive Stem
<i>amar</i> (to love)	amaron - ama-
<i>comer</i> (to eat)	comieron - comie-
<i>dar</i> (to give)	dieron - die-
<i>estar</i> (to be)	estuvieron - estuvie-
<i>haber</i> (to have, to be)	hubieron - hubie-
<i>hablar</i> (to speak)	hablaron - habla-
<i>hacer</i> (to do)	hicieron - hicie-
<i>ir</i> (to go)	fueron - fue-
<i>poder</i> (can)	pudieron - pudie-
<i>querer</i> (to want)	quisieron - quisie-
<i>ser</i> (to be)	fueron - fue
<i>tener</i> (to have)	tuvieron - tuvie-
<i>traer</i> (to bring)	trajeron - traje-
<i>venir</i> (to come)	vinieron - vinie-
<i>vivir</i> (to live)	vivieron - vivie-

(Table from <https://www.spanish.academy/blog/master-the-imperfect-subjunctive/>)

- There's no clear sense in which the imperfect subjunctive contains the meaning or morphosyntactic features of the third person plural preterit “minus **-ron**”, whatever these would amount to, so that the procedure described in (1) doesn't seem compatible with a morpheme-based/piece-based view.

- Notice also what the procedure actually involves:
 - Looking at an inventory of forms (the preterit paradigm of some verb);
 - Finding one of those forms (the third person plural preterit form)
 - Performing some operation on it (subtracting *-ron*); and then...
 - Generating from the result another inventory of forms (the imperfect subjunctive paradigms).
- This is inherently *transderivational*: If I'm spelling out the first person singular imperfect subjunctive, I can't generate the form just from those features. I have to look across at what the 3rd person plural preterit looks like first.
- Process-based Morphemes (including this Spanish case) therefore bear on one of the big questions that has divided grammatical theory in some form ever since Priscian:

(3) Big Question

Are rules of exponence (a) sensitive only to information in the structure they are exponing, or are they also (b) potentially sensitive to the way other structures are realized, via transderivational principles that regulate surface correspondences?

- The procedure for generating Spanish imperfect subjunctive forms we've just discussed clearly presupposes that the answer to question (3) is (b).
- The sort of theory you've been learning about in this class operates on the assumption that the correct answer to (3) is instead (a).
- Those of us who believe in such a piece-based theory [me, for example] are on the hook for an alternative explanation of such apparent cases of Process-based Morphemes.
- **I think I have one for the Spanish case.**

2. More Detail on the Big Spanish Process-based Morpheme, and a Sketch of my Solution

- Gordon and Stillman sensibly don't include the future subjunctive in their pedagogical discussion, because it is now defunct outside of legalistic and archaic registers.
- But the future subjunctive *was* in productive use a few centuries ago. Since this is clearly a possible state of the language faculty, grammatical theory must confront it.
- I therefore restate the generalization as follows. Complete paradigms for a couple of Spanish verbs are also provided as illustration (the blue shading highlights the domain of the Big Morpheme):

(4) **Augmented version of Gordon and Stillman (2004:23)**

“[The Imperfect Subjunctive and the Future Subjunctive are] derived from the third-person plural of the preterit. To form the imperfect subjunctive, you drop the **-ron** of the [3rd person plural] preterit and add one of the two imperfect subjunctive markers **-ra-** or **-se-** and the person endings. [The Future Subjunctive is formed by dropping **-ron** and adding **-re-** instead, followed by the person endings.]”

(5) **Imperfect/Future Subjunctive Stems from 3rd Plural Preterit Stems Minus -ron**

a. Irregular Preterito Grave Verb
querer “to want”

INDICATIVE:			
PRESENT	IMPERFECT	PRETERITE	FUTURE
quiero	quería	quise	querré
quieres	querías	quisiste	querrás
quiere	quería	quiso	querrá
queremos	queríamos	quisimos	querrremos
queréis	queríais	quisisteis	querréis
quieren	querían	quisieron	querrán
CONDITIONAL:			
querría			
querrias			
querria			
querriamos			
querriais			
querrian			
SUBJUNCTIVE:			
PRESENT	IMPERFECT-1	IMPERFECT-2	FUTURE
quiera	quisiera	quisiese	quisiere
quieras	quisieras	quisieses	quisieres
quiera	quisiera	quisiese	quisiere
queramos	quisiéramos	quisiésemos	quisiéremos
queráis	quisierais	quisieseis	quisiereis
quieran	quisieran	quisiesen	quisieren
IMPERATIVE:			
quiere			
quered			
INFINITIVE:		PAST PARTICIPLE:	
querer	queriendo	querido	

b. Regularish *-ir* verb with lowering
pedir “to request”

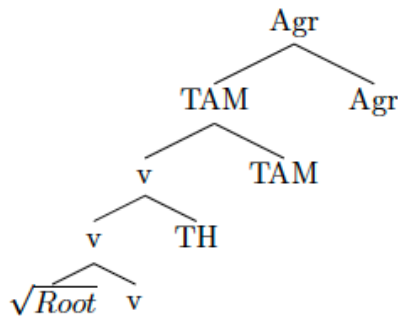
INDICATIVE:			
PRESENT	IMPERFECT	PRETERITE	FUTURE
pido	pedía	pedí	pediré
pides	pedías	pediste	pedirás
pide	pedía	pidió	pedirá
pedimos	pedíamos	pedimos	pediremos
pedís	pedíais	pedisteis	pediréis
piden	pedían	pidieron	pedirán
CONDITIONAL:			
pediría			
pedirias			
pediria			
pediríamos			
pediríais			
pedirian			
SUBJUNCTIVE:			
PRESENT	IMPERFECT-1	IMPERFECT-2	FUTURE
pid a	pidiera	pidiese	pidiere
pid as	pidieras	pidieses	pidieres
pid a	pidiera	pidiese	pidiere
pid amos	pidiéramos	pidiésemos	pidiéremos
pid áis	pidierais	pidieseis	pidiereis
pid an	pidieran	pidiesen	pidieren
IMPERATIVE:			
pid e			
pid id			
INFINITIVE:		PAST PARTICIPLE:	
pedir	pidiendo	pedido	

- A sketch of my proposal:
 - The Big Spanish Process-based Morpheme is in fact two separate phenomena:
 - One is the interaction between morphosyntax and Vocabulary Insertion: the distribution of many irregular stem allomorphs is governed by [-PRES] (usually in combination with [+FIN]).
 - The other is phonological, and it concerns vowel alternations (in the theme vowel for *-er* and *-ir* verbs, and in the roots of many *-ir* verbs).
 - Crucially, both of these phenomena need to be dealt with independently, because they extend in different ways beyond the parts of the paradigm that participate in the morpheme:

- Irregular stem allomorphs governed by [-PRES, +FIN] extend to the whole preterit indicative paradigm (cf. the bolded stem *quis* in (5)a).
 - The choice of the theme vowel allomorph *ie* for *-er* and *-ir* verbs turns out to be phonologically predictable, and is itself found in forms that aren't part of the morpheme (prominently the gerund—see underlining in (5)).
 - Root-internal vowel alternations in the *-ir* verbs (particularly the *e/i* alternation) also appear in forms that aren't part of the morpheme (see the distribution of the bolded *pid* form in (5)b), and also submit to a purely phonological account, albeit one with a non-trivial amount of abstractness.
- **The Punchline:** Once you've said what you have to say to cover the distribution of the relevant stem and theme vowel allomorphs, there's no work left for a morphomic statement to do!

2. The Details Part 1: Morphosyntax and Special Rules Tied to [-PRES, +FIN]

(6) Basic Syntax of the Spanish Verb (adapted from Arregi 2000; Roca 2010)



Key

TH = Theme Vowel

TAM = Tense/Aspect/Mood head

Agr = Agreement

(7) *Querer* Paradigm Repeated for Convenience

INDICATIVE:			
PRESENT	IMPERFECT	PRETERITE	FUTURE
quiero	quería	quise	querré
quieres	querías	quisiste	querrás
quiere	quería	quiso	querrá
queremos	queríamos	quisimos	querremos
queréis	queríais	quisisteis	querréis
quieren	querían	quisieron	querrán
CONDITIONAL:			
querría			
querrías			
querría			
querríamos			
querríais			
querrían			
SUBJUNCTIVE:			
PRESENT	IMPERFECT-1	IMPERFECT-2	FUTURE
quiera	quisiera	quisiese	quisiere
quieras	quisieras	quisieses	quisieres
quiera	quisiera	quisiese	quisiere
queramos	quisiéramos	quisiésemos	quisiéremos
queráis	quisierais	quisieseis	quisiereis
quieran	quisieran	quisiesen	quisieren
IMPERATIVE:			
quiere			
quered			
INFINITIVE:		PAST PARTICIPLE:	
querer	queriendo	querido	

Relevant VIs

√want ↔ kis / __ [-PRES, +FIN]

√want ↔ kEr

(The symbol "E" for an /e/ that alternates with [je] is taken from Harris (1969))

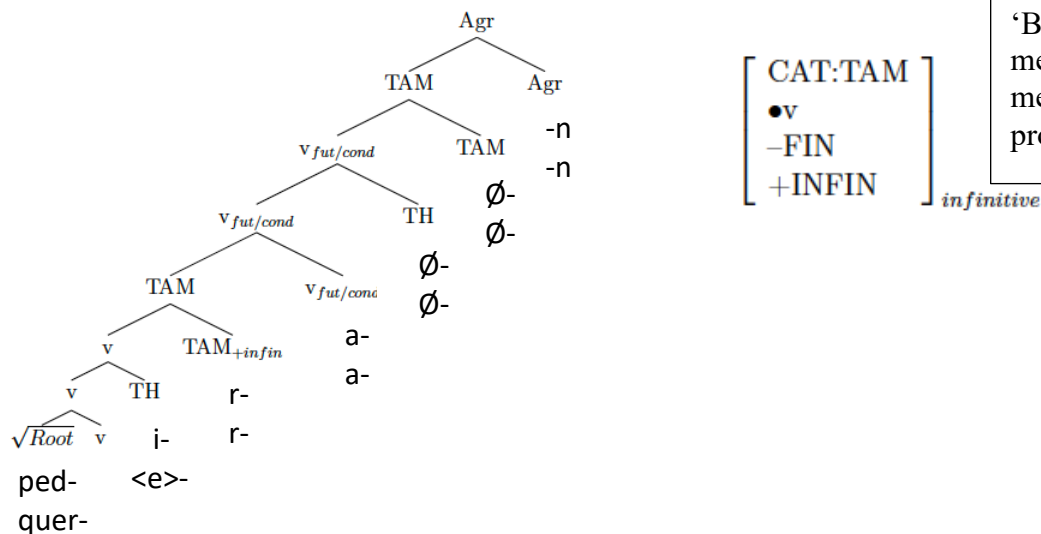
- **Issue:** despite being non-present tenses, the future, conditional, and imperfect indicative don't take the allomorph *quis-* (other irregular verbs have a similar distribution). These counter-examples to the suggested rules are only apparent, however:
 - The future and conditional are built on the infinitive form, so the root is not local to a finite TAM morpheme (-PRES or otherwise) in these structures.
 - The imperfect indicative is subject to the following Impoverishment rule:

(8) -PRES → ∅ / [____, +PAST, -PERF, -SBJV]_{TAM}

“Delete the feature -PRES when it occurs in the imperfect indicative.”

- While (8) is a stipulation, it is motivated:
 - The imperfect indicative is unique amongst past tenses in the language.
 - It is unusually *regular* (only two verbs, *ser* ‘to be’ and *ir* ‘to go’, have irregular imperfect indicative forms).
 - The impoverishment rule in (8) captures the imperfect indicative’s uniqueness in a way that is linked to its unusual regularity (since the feature deleted is one that, by hypothesis, conditions a number of irregularities in the language).
- The fact that the future and conditional don't select the same allomorph as the other non-present tense forms has to do with their internal structure:

(9) *pedirán* “they will request”/*querrán* “they will want”²



- The local TAM marker in these tense/moods is not [-PRES, +FIN] (see the entry for the infinitive piece on the right in (9)).
- This means that the rule that inserts the form /kis/ for the root $\sqrt{\text{want}}$ cannot apply, and the elsewhere allomorph /kEr/ wins by default.

² *Querer* is one of a handful of verbs in the language which undergoes theme vowel deletion in the future and conditional, yielding e.g. *querrán* in place of the expected **quererán*. Since this theme vowel deletion has no bearing on our morpheme-related problems, I say no more about it in this handout.

[**Sidenote:** Following Harris (1969:93-96), I assume that these structures are bicyclic: so in *pedirán* there will be an initial cycle for just *pedir*, and a second one for the whole word *pedirán*. This may ultimately prove unnecessary, but I maintain the assumption here because of a suspicion that it will play an important role in capturing future and conditional forms of verbs with complicated stem vowel alternations.]

- With this, the first part of the Big Process-based Morpheme is explained: relevant suppletive root allomorphs are conditioned by the features [-PRES, +FIN].

3. The Details Part 2: (Theme) Vowel Alternations

3.1 The Data, and Proposed Underlying Representations

- The Big Process-based Morpheme holds trivially in the 1st conjugation: the root and the theme vowel exhibit no special allomorphy within the morphomic pattern.

(10) 1st Conjugation (Table 1 from Roca 2010:410)

1st CONJUGATION *cantar* 'to sing'.

INDICATIVE:			
PRESENT	IMPERFECT	PRETERITE	FUTURE
canto	cantaba	canté	cantaré
cantas	cantabas	cantaste	cantarás
canta	cantaba	cantó	cantará
cantamos	cantábamos	cantamos	cantaremos
(cantáis)	(cantabais)	(cantasteis)	(cantaréis)
cantan	cantaban	cantaron	cantarán
CONDITIONAL:			
cantaría			
cantaría			
cantaría			
cantaríamos			
(cantaríamos)			
cantarían			
SUBJUNCTIVE:			
PRESENT	IMPERFECT-1	IMPERFECT-2	FUTURE
cante	cantara	cantase	cantare
cantes	cantaras	cantases	cantares
cante	cantara	cantase	cantare
cantemos	cantáramos	cantásemos	cantáremos
(cantéis)	(cantarais)	(cantaseis)	(cantareis)
canten	cantaran	cantasen	cantaren
IMPERATIVE:			
canta			
(cantad)			
INFINITIVE:			
GERUND:			
cantar	cantando	PAST PARTICIPLE:	
		cantado	

- The theme vowel allomorphy that is relevant for present purposes all arises in the *-er* and *-ir* verbs (the 2nd and 3rd conjugations respectively).

- As it happens, though, the distinction between 2nd and 3rd conjugation theme vowels collapses in most tenses (in favor of the 3rd conjugation, on my analysis).

(11) Regular 2nd and 3rd Conjugation Verbs (Roca 2010:419, table 2; 420, table 3)

2nd CONJUGATION *comer* 'to eat'.

INDICATIVE:			
PRESENT	IMPERFECT	PRETERITE	FUTURE
como	comía	comí	comeré
comes	comías	comiste	comerás
come	comía	comió	comerá
comemos	comíamos	comimos	comeremos
(coméis)	(comíais)	(comisteis)	(comeréis)
comen	comían	comieron	comerán
CONDITIONAL:			
comería			
comerías			
comería			
comeríamos			
(comeríais)			
comerían			
SUBJUNCTIVE:			
PRESENT	IMPERFECT-1	IMPERFECT-2	FUTURE
coma	comiera	comiese	comiere
comas	comieras	comieses	comieres
coma	comiera	comiese	comiere
comamos	comiéramos	comiésemos	comiéremos
(comáis)	(comierais)	(comieseis)	(comiereis)
coman	comieran	comiesen	comieren
IMPERATIVE:			
come			
(comed)			
INFINITIVE:		PAST PARTICIPLE:	
comer		comido	

3rd CONJUGATION *vivir* 'to live'.

INDICATIVE:			
PRESENT	IMPERFECT	PRETERITE	FUTURE
vivo	vivía	viví	viviré
vives	vivías	viviste	vivirás
vive	vivía	vivió	vivirá
vivimos	vivíamos	vivimos	viviremos
(vivís)	(vivíais)	(visteis)	(viviréis)
viven	vivían	vivieron	vivirán
CONDITIONAL:			
viviría			
vivirías			
viviría			
viviríamos			
(viviríais)			
vivirían			
SUBJUNCTIVE:			
PRESENT	IMPERFECT-1	IMPERFECT-2	FUTURE
viva	viviera	viviese	viviere
vivas	vivieras	vivieses	vivieres
viva	viviera	viviese	viviere
vivamos	viviéramos	viviésemos	viviéremos
(viváis)	(vivierais)	(vivieseis)	(viviereis)
vivan	vivieran	viviesen	vivieren
IMPERATIVE:			
vive			
(vivid)			
INFINITIVE:		PAST PARTICIPLE:	
vivir		vivido	

- Claims about Roots, verbalizers, and Theme Vowels:**
 - Roots and some verbalizers bear class features in the syntax.
 - Following Oltra-Massuet (1999) and Arregi (2000), I give these features the arbitrary designations $+/-\alpha$, $+/-\beta$.
 - All verbalizers merge first with their host (the root in the cases we're talking about), and secondly with a theme vowel node TH.
 - TH agrees with the root for its class features

(12) Schematic Lexical Entries for Roots (based on Arregi 2000:4, except for him the 3rd conjugation is marked for $-\beta$, rather than being unspecified as here)

1st Conjugation Root	2nd Conjugation Root	3rd Conjugation Root
$\left[\begin{array}{l} \text{CAT: Root, ...} \\ \text{CLASS: } -\alpha \end{array} \right]_{\text{Root1}}$	$\left[\begin{array}{l} \text{CAT: Root, ...} \\ \text{CLASS: } +\alpha, +\beta \end{array} \right]_{\text{Root2}}$	$\left[\begin{array}{l} \text{CAT: Root, ...} \\ \text{CLASS: } +\alpha \end{array} \right]_{\text{Root3}}$

(13) Schematic Lexical Entry for a Root-Attaching Verbalizer

$\left[\begin{array}{l} \text{CAT: v} \\ \bullet \text{Root} \\ \bullet \text{TH} \\ \dots \end{array} \right]_v$
--

'Bullet Point X' means 'Merge me with X, and project me.'

(14) Lexical Entry for TH

$\left[\begin{array}{l} \text{CAT: TH} \\ \square \text{Class} \end{array} \right]_{\text{TH}}$
--

'Square F' means Agree for the feature F.

- The pervasive neutralization of the distinction between the 2nd and 3rd conjugations is handled by the following Impoverishment rules.³

(15) $+β \rightarrow \emptyset / [___]_{TH} [-PRES]_{TAM}$
 “Delete the feature +β on TH when the adjacent TAM head is [-PRES].”

(16) $+β \rightarrow \emptyset / [___]_{TH} [+PRES, -FIN]_X$
 “Delete the feature +β on TH when the adjacent head is [+PRES, -FIN] (true of at least the gerund suffix, and the *-nte* adjective-forming suffix).”

- While these two rules delete the same feature, they cannot be collapsed because Impoverishment rules must be stated over natural classes. Is this a weakness?
- **No:** Italian has an equivalent of rule (16) (*vendere* ‘to sell’~*vendendo* ‘sell.ger’; *domire* ‘to sleep’~*dormendo* ‘sleep.ger’), but no equivalent of rule (15) (*vendevo* ‘I sell.impf’ vs *dormivo* ‘I sleep.impf’).
 - This supports the treatment of these as two separate neutralizations: Italian shows us you can have one and not the other.⁴
- Rule (15) applies in the imperfect, meaning it must apply before the Impoverishment rule in (8) (a counter-bleeding interaction).
- But this ordering might not need to be stipulated: it would follow automatically if **Impoverishment rules are cyclic** (Middleton 2023; Myler 2024).
 - TH, the head on which the feature targeted by rule (15) is found, is lower in the structure than TAM, the head on which the [-PRES] feature targeted by rule (8) is found.
- The resulting syntactic structure is the input to Vocabulary Insertion; the relevant rules for TH are as follows:

(17) a. $TH_{[-α]} \leftrightarrow a$
 b. $TH_{[+α,+β]} \leftrightarrow e$
 c. $TH_{[+α]} \leftrightarrow I$

- The exponents in (17)a and (b) have their usual value in the IPA, but the one in (17)c (a capital ‘i’ meant to indicate a special version of /i/) requires some comment.

³ Note that neither of these rules applies in the present subjunctive, despite the fact that the 2nd and 3rd conjugations look identical in this part of the paradigm too. I follow Harris (1969:98-100) in assuming that the *a* in e.g. *coma* ‘eat.3sg.pres.sbjv’ and *viva* ‘live.3sg.pres.sbjv’ is not a manifestation of the theme vowel, but rather of (what is labeled here as) TAM. The theme vowel in each case is underlyingly the same as in the present indicative, and regular phonology gives /kom-e-a/ → kóm-e-a → [kóma] and /bib-I-a/ → bíb-I-a → bíb-e-a → bíba → [bíβa] respectively. See the appendices and sample derivations below for more details.

⁴ Note in passing that the markedness relationship between the 2nd and 3rd conjugations is reversed in Italian relative to Spanish: in Italian, the distinctions are neutralized in favor of the 2nd conjugation, at least in the gerund.

- Spanish famously has five surface vowels:

(18) The Surface Vowel Inventory of Spanish (Roca 2010:412, his (12))

		+R[ound]	
i		u	+H[igh]
e		o	
	a		+L[ow]
			+B[ack]

- Now, most instances of these surface vowels undergo no important alternations. I assume these non-alternating vowels reflect underlying /i/, /e/, /a/, /o/, /u/, which are fully specified for all features and are pre-linked to the timing tier.
- However, at least the four [-Low] vowels also have variants that undergo certain seemingly morphologically restricted alternations.
 - In many roots, /e/ becomes /je/ when stressed (*querer* ‘want.inf’ vs *quiero* ‘I want’).
 - In many roots, /o/ becomes /we/ when stressed (*contar* ‘count.inf’ vs *cuento* ‘I count.’)
 - In many roots of the third conjugation, and also in the theme vowel of the same conjugation (as well as cases of the second conjugation theme vowel in forms where the second and third conjugations merge), /i/ alternates with /e/ when unstressed (*pedir* ‘request.inf’ vs *pide* ‘she requests’).
 - There are some cases in the third conjugation, involving the theme vowel and certain roots, where /i/ alternates with /je/ either **instead of or as well as with /e/**--this too is partly conditioned by stress (*adquirir* ‘acquire.inf’ vs *adquiere* ‘she acquires’ vs *adquirieron* ‘they acquired’).
 - In a handful of verb roots, restricted to the third conjugation and certain irregulars in the second conjugation, /u/ alternates with /o/ and with /we/; again, stress seems to be involved. (*dormir* ‘sleep.inf’ vs *duerme* ‘she sleeps’ vs *durmió* ‘she slept’).
 - [In exactly one verb root, /u/ alternates with /we/ but never with /o/. This is *jugar* ‘to play’~*juegas* ‘you play’; again, this is conditioned by stress.]
- Assuming (i) that the patterns exhibited by semi-irregulars are to be taken seriously and treated in the grammar, and (ii) that we want to avoid readjustment rules for reasons of modularity, such observations have to be captured phonologically:
 - That is, **alternating /i/s must be underlyingly different in some way from non-alternating /i/s**, and likewise *mutatis mutandis* for the other alternations.

- I propose (19) as the underlying vowel system for Spanish, where (following Harris 1969:24) capital letters indicate a special, alternating version of the relevant vowel.

(19) Underlying Vowel System for Spanish

i, I, I:	u, U
e, E	o, O
a	

- Key to these symbols:
 - I = /i/ that lowers to /e/ when unstressed, diphthongizes to /je/ when stressed and followed by certain combinations of segments (see below), and surfaces as /i/ when stressed in other segmental environments.
 - I: = /i/ that diphthongizes to /je/ when stressed, remains /i/ when unstressed before certain combinations of segments (see below), and lowers to /e/ when unstressed in other segmental environments.
 - U = /u/ that diphthongizes to /we/ when stressed, remains /u/ when unstressed before certain combinations of segments (see appendices), and lowers to /o/ when unstressed in other segmental environments.
 - E = /e/ that diphthongizes to /je/ when stressed, and otherwise surfaces as /e/.
 - O = /o/ that diphthongizes to /we/ when stressed, and otherwise surfaces as /o/.
- [Sidenote: Depending on how one deals with *hacer/hice/hecho/haciendo* ('do.inf/I did/done/doing') and *caber/quepo/cupe/cabiendo* ('fit.inf/I fit.pres/I fit.pret/fitting'), one might want to assume at least one special variant of the Low vowel /a/ as well, but I leave this possibility aside here.]
- What exactly is the featural composition of the special vowels? There are many possibilities, but I will adopt the following for concreteness:
 - /I/ (which doesn't always diphthongize when stressed) is [-back, -low], but is underspecified for [+/-high].
 - /I:/ is featurally the same as /I/, but involves an additional slot on the timing tier, with which it associates when stressed, ultimately yielding /je/.
 - Following Harris (1985:36), in cases of /E/, /O/, and /U/ (also /I:/; see above), an extra slot is present on the timing tier in comparison with /e/, /o/, and /u/. When stressed, these vowels associate with that timing slot, ultimately triggering a diphthongization rule.
 - As well as the extra timing slot, /U/ differs from /u/ in being underspecified for [+/-high] (i.e., it is just [+back, -low]).
- **Note:** While /E/, /O/, and /U/ are all attested in at least one non-3rd conjugation context, /I/ and /I:/ are only found in forms from the 3rd conjugation.
- I assume that this generalization has been detected by the learner, and is represented by the following restrictions on rule formats (the equivalent in the present system of Ye Olde Morpheme Structure ConditionesTM).

- (20) *[-α] ↔ /...I.../
 (21) *[+α, +β] ↔ /...I.../

- In prose:
 - MSC (20) says “no Vocabulary Insertion rule that has the feature [-α] in its structural description has /I/ or /I:/ as part of its structural change.”
 - MSC (21) says “no Vocabulary Insertion rule that has the feature [+α, +β] in its structural description has /I/ or /I:/ as part of its structural change.”
- With this much on the table, I repeat in (22)a the Vocabulary Insertion rule associated with the 3rd conjugation theme vowel (recall that this rule also applies in 2nd conjugation contexts in which Impoverishment rule (15) or (16) has applied).

- In addition, I provide rules for a smattering of interesting 3rd conjugation verb roots.

- (22)
- TH_[+α] ↔ I
 - √live ↔ viv (*vivir, vive, vivamos, vivieron*)
 - √merse ↔ merx (*sumergir, sumeрге, sumerjamos, sumergieron*)
 - √cern ↔ sErn (*discernir, discerne, discernamos, discernieron*)
 - √request ↔ pId (*pedir, pide, pidamos, pidieron*)
 - √feel ↔ sI:nt (*sentir, siente, sintamos, sintieron*)
 - √sleep ↔ dUrm (*dormir, duerme, durmamos, durmieron*)
 - √quire ↔ kIr (*adquirir, adquiere, adquiramos, adquirieron*)

- [Sidenote: There turn out to be striking patterns amongst the 3rd conjugation roots which might allow one to reduce the number of “special” underlying vowels in the system (see especially Bordelois and Brame 1973). Specifically, it seems that whether we get [je]/[we] versus [i]/[u] under stress may be at least partly predictable from the consonant(s) at the end of the root. I’m still working out the possibilities here.]

3.2 The Phonological Rules

- The following three rules, which apply in the order shown, are the most important in understanding the part of the Big Morpheme that involves theme vowel alternations.⁵

- (23) I → E / _____ [+coronal, αsonorant, βcontinuant]_a [+/-consonantal]_b [stress] (novel-ish; cf. Foley 1965:91-100; Harris 1969:186,(25))
- Conditions: (i) If α is “-”, then β is “+”
 (ii) If segment *a* is [-sonorant], then segment *b* is [-consonantal]
- “/I/ becomes /E/ when stressed, if followed by a coronal non-stop followed by another segment. This rule cannot apply if the following sequence consists of a fricative followed by another consonant.”

⁵All rules not marked “novel” are adapted from ones in Harris (1969:183-188), with updated assumptions about diphthongs from Harris (1985).

- A few additional general rules come into play in the next few derivations:

$$(29) \quad I \rightarrow j / \frac{\text{_____}}{[-\text{stress}]} [-\text{low}, +\text{stress}]$$

“Unstressed /I/ becomes yod before a following stressed non-low vowel.”

- All other instances of unstressed /I/ are turned to [e] by the following general rule:

$$(30) \quad I \rightarrow e / \frac{\text{_____}}{[-\text{stress}]}$$

“/I/ becomes /e/ when unstressed.”

- All instances of stressed /I/ which do not fall under the scope of rule (23) become [i]:

$$(31) \quad I \rightarrow i / \frac{\text{_____}}{[+\text{stress}]}$$

“/I/ becomes /i/ when stressed.”

- Rules (30) and (31) account for such pairs as *pedir* ‘request.inf’ vs *pide* ‘she requests’.

$$(32) \quad \text{Syntax:} [[[[\sqrt{\text{request}} \text{ v}] \text{ TH}_{[+\alpha]}] \text{ TAM}_{\text{pres.indic}}] \text{ Agr:1pl}]$$

UR: /pId-I-mos/
 Stress: pIdÍmos
 (30): pedÍmos
 (31): pedímos
 (other rules)
 SR: [peðímos]

$$(33) \quad \text{Syntax:} [[[[\sqrt{\text{request}} \text{ v}] \text{ TH}_{[+\alpha]}] \text{ TAM}_{\text{pres.sbjv}}] \text{ Agr:1pl}]$$

UR: /pId-I-a-mos/
 Stress: pIdÍámos
 (25): pidÍámos
 (30): pideámos
 Hiatus resolution: pidámos
 (other rules)
 SR: [piðámos]

$$(34) \quad \text{Syntax:} [[[[\sqrt{\text{request}} \text{ v}] \text{ TH}_{[+\alpha]}] \text{ TAM}_{\text{pret}}] \text{ Agr:3sg}]$$

UR: /pId-I-ó-Ø/
 Stress: pIdIó
 (25): pidIó
 (29): pidjó
 (other rules)
 SR: [piðjó]

- For completeness, here is a formulation of the diphthongization rule, adapted from Harris (1985):

$$(35) \quad \begin{array}{cccc} X & & X & & X & & X \\ | & & & & | & & \\ [-\text{high}, -\text{low}, \alpha\text{back}] & & \rightarrow & \text{GL}_{[\alpha\text{back}]} & [-\text{high}, -\text{low}, -\text{back}] & / & \frac{\quad}{[+\text{stress}]} \end{array}$$

“/E/ and /O/ become a sequence of a glide and [e] when stressed, where the backness of the glide matches the backness of the original vowel.”

- For reassurance, here is a sample derivation for a future indicative form.

$$(36) \quad \text{Syntax:} [[[[[[[\sqrt{\text{request}} \text{ v }] \text{ TH}_{[+\alpha]}] \text{ TAM}_{+\text{infin}}]_{\text{cycle1}} \text{ v}_{\text{fut/cond}}] \text{ TH }] \text{ TAM }] \text{ Agr:3pl}]_{\text{cycle2}}$$

CYCLE 1

UR: /pIdÍr/
 Stress: pIdÍr
 (30): pedÍr
 (31): pedír
 Output: pedír

Cycle 2

Input: pedíran
 Stress: pedírán
 Clash res.: pedirán
 (other rules)
 SR: [peðírán]

4. Conclusion

- **The Punchline:** Once you’ve said what you have to say to cover the distribution of the relevant stem and theme vowel allomorphs in Spanish, there’s no work left for a direct statement of the Big Process-based Morpheme to do!
 - Relevant suppletive root allomorphs are conditioned by a coherent morphosyntactic environment: [-PRES, +FIN].
 - Theme vowel alternations, and internal vowel alternations in the roots of 3rd conjugation verbs, are governed by phonology.
- Both components of this explanation do work beyond the claimed morphomic pattern—that is, they are needed anyway, and are not just ad-hoc devices specifically aimed at accounting for the claimed morphomic pattern.

- Recall the Big Question from earlier:

(37) Big Question

Are rules of exponence (a) sensitive only to information in the structure they are exponing, or are they also (b) potentially sensitive to the way other structures are realized, via transderivational principles that regulate surface correspondences?

- **Big Conclusion, if I'm right:**

The Big Spanish Process-based Morpheme cannot be cited in support of answer (b)!

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Appendices

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Appendix 1: The Pieces

- ‘Filled Bullet Point X’ means ‘Merge me with X, and project me.’
- ‘Clear Bullet Point X’ means ‘Merge me with X, and project X.’
- ‘Square F’ means ‘Agree for the feature F’.

<p>1st Conjugation Root</p> $\left[\begin{array}{l} \text{CAT: Root, ...} \\ \text{CLASS: } -\alpha \end{array} \right]_{\text{Root1}}$	<p>2nd Conjugation Root</p> $\left[\begin{array}{l} \text{CAT: Root, ...} \\ \text{CLASS: } +\alpha, +\beta \end{array} \right]_{\text{Root2}}$	<p>3rd Conjugation Root</p> $\left[\begin{array}{l} \text{CAT: Root, ...} \\ \text{CLASS: } +\alpha \end{array} \right]_{\text{Root3}}$	
<p>Root-attaching Verbalizer</p> $\left[\begin{array}{l} \text{CAT: v} \\ \bullet \text{Root} \\ \bullet \text{TH} \\ \dots \end{array} \right]_v$	<p>Future/Conditional Builder</p> $\left[\begin{array}{l} \text{CAT: v, fut/cond} \\ \text{CLASS: } +\alpha, +\beta, +\text{futcond} \\ \bullet \text{TAM}_{+\text{infin}} \\ \bullet \text{TH} \\ \circ \text{TAM}_{-\text{perf}, -\text{sbjv}} \end{array} \right]_{v_{\text{fut/cond}}}$	<p>Theme Vowel</p> $\left[\begin{array}{l} \text{CAT: TH} \\ \square \text{Class} \end{array} \right]_{\text{TH}}$	
<p>Present Indicative</p> $\left[\begin{array}{l} \text{CAT: TAM} \\ \bullet v \\ +\text{PRES} \\ -\text{PERF} \\ -\text{SBJV} \\ +\text{FIN} \end{array} \right]_{\text{pres.indic}}$	<p>Imperfect Indicative</p> $\left[\begin{array}{l} \text{CAT: TAM} \\ \bullet v \\ -\text{PRES} \\ +\text{PAST} \\ -\text{PERF} \\ -\text{SBJV} \\ +\text{FIN} \end{array} \right]_{\text{imperf.indic}}$	<p>Preterite Indicative</p> $\left[\begin{array}{l} \text{CAT: TAM} \\ \bullet v \\ -\text{PRES} \\ +\text{PAST} \\ +\text{PERF} \\ -\text{SBJV} \\ +\text{FIN} \end{array} \right]_{\text{pret.indic}}$	
<p>Present Subjunctive</p> $\left[\begin{array}{l} \text{CAT: TAM} \\ \bullet v \\ +\text{PRES} \\ -\text{PERF} \\ +\text{SBJV} \\ +\text{FIN} \end{array} \right]_{\text{pres.sbjv}}$	<p>Imperfect Subjunctive</p> $\left[\begin{array}{l} \text{CAT: TAM} \\ \bullet v \\ -\text{PRES} \\ +\text{PAST} \\ -\text{PERF} \\ +\text{SBJV} \\ +\text{FIN} \end{array} \right]_{\text{imperf.sbjv}}$	<p>Future Subjunctive</p> $\left[\begin{array}{l} \text{CAT: TAM} \\ \bullet v \\ -\text{PRES} \\ -\text{PAST} \\ +\text{SBJV} \\ +\text{FIN} \end{array} \right]_{\text{fut.sbjv}}$	
<p>Infinitive</p> $\left[\begin{array}{l} \text{CAT: TAM} \\ \bullet v \\ -\text{FIN} \\ +\text{INFIN} \end{array} \right]_{\text{infinitive}}$	<p>Gerund</p> $\left[\begin{array}{l} \text{CAT: TAM} \\ \bullet v \\ +\text{PRES} \\ -\text{FIN} \\ -\text{INFIN} \end{array} \right]_{\text{ger}}$	<p>Past Participle</p> $\left[\begin{array}{l} \text{CAT: TAM} \\ \bullet v \\ -\text{PRES} \\ -\text{FIN} \\ -\text{INFIN} \end{array} \right]_{\text{past.part}}$	
			<p>Subject Agreement</p> $\left[\begin{array}{l} \text{CAT: AGR} \\ \bullet \text{TAM}_{+\text{fin}} \\ \square \text{Pers} \\ \square \text{Num} \end{array} \right]_{\text{Agr}}$

Appendix 2: Rules of Impoverishment

- The ordering of these rules (which might follow from cyclicity) is as shown; rules under the same number are not ordered with respect to each other:

- (38) a. $+\beta \rightarrow \emptyset / [____]_{\text{TH}} [-\text{PRES}]_{\text{TAM}}$
b. $+\beta \rightarrow \emptyset / [____]_{\text{TH}} [+ \text{PRES}, -\text{FIN}]_{\text{X}}$
- (39) $-\text{PRES} \rightarrow \emptyset / [____, +\text{PAST}, -\text{PERF}, -\text{SBJV}]_{\text{TAM}}$
- (40) $\text{AGR}_{1\text{sg}} \rightarrow \emptyset / \{ \sqrt{\text{know}}, \text{v}_{\text{fut/cond}}, \dots \} \text{TAM}_{+\text{pres}, -\text{sbjv}} ____$

Appendix 3: Vocabulary Insertion Rules

- The following constraints on rules are assumed to have been acquired by the learner:

- (41) $*[-\alpha] \leftrightarrow / \dots I \dots /$
(42) $*[+\alpha, +\beta] \leftrightarrow / \dots I \dots /$

- The Vocabulary Insertion Rules themselves are listed below, in order from the bottom of the tree to the top.

Appendix 3.1 Non-Pretérito Grave *-ir* Verb Roots

- (43) $\sqrt{\text{live}} \leftrightarrow \text{viv}$
(44) $\sqrt{\text{merse}} \leftrightarrow \text{merx}$ (occurs in *sumergir*, *inmergir*)
(45) $\sqrt{\text{cern}} \leftrightarrow \text{sErn}$ (occurs in *cernir*, *discernir*, *concernir*)
(46) $\sqrt{\text{request}} \leftrightarrow \text{pId}$
(47) $\sqrt{\text{feel}} \leftrightarrow \text{sI:nt}$
(48) $\sqrt{\text{sleep}} \leftrightarrow \text{dUrm}$
(49) $\sqrt{\text{quire}} \leftrightarrow \text{kIr}$ (occurs in *adquirir*, *inquirir*)

Appendix 3.2: Selected Pretérito Grave Verb Roots

- (50) $\sqrt{\text{can}} \leftrightarrow \text{pOd}$
(51) $\sqrt{\text{put}} \leftrightarrow \text{pon}$
(52) $\sqrt{\text{put}} \leftrightarrow \text{pOs} / ____ [-\text{PRES}]$
(53) $\sqrt{\text{be}} \leftrightarrow \text{fU} / ____ [-\text{PRES}, +\text{FIN}]$
(54) $\sqrt{\text{have}} \leftrightarrow \text{tEn}$
(55) $\sqrt{\text{fit}} \leftrightarrow \text{kaP}$
(56) $\sqrt{\text{come}} \leftrightarrow \text{vI:n}$
(57) $\sqrt{\text{want}} \leftrightarrow \text{kis} / ____ [-\text{PRES}, +\text{FIN}]$
(58) $\sqrt{\text{want}} \leftrightarrow \text{kEr}$

Appendix 3.3: Selected Root-attaching Verbalizers

- (59) v \leftrightarrow [+high,-low] / ____ [grave]_{TH} [-PRES, +FIN]_{TAM}
(60) v \leftrightarrow K / {√have, √come, ...} ____
(61) v \leftrightarrow sK / {√grow, √be.acquainted, ...}

Appendix 3.4: Theme Vowels

- (62) TH_[-α] \leftrightarrow a
(63) TH_[+α,+β] \leftrightarrow e
(64) TH_[+α] \leftrightarrow I

Appendix 3.5: Tense/Aspect/Mood

- (65) TAM_[+PRES, -SBJV] \leftrightarrow Ø
(66) TAM_[+PRES, +SBJV] \leftrightarrow e / [-α]_{TH} ____
(67) TAM_[+PRES, +SBJV] \leftrightarrow a / [+α]_{TH} ____
(68) TAM_[+PAST, -PERF, -SBJV] \leftrightarrow ba / [-α]_{TH} ____
(69) TAM_[+PAST, -PERF, -SBJV] \leftrightarrow `a / [+α]_{TH} ____
(70) TAM_[+PAST, +SBJV] \leftrightarrow ra
(71) TAM_[+PAST, +SBJV] \leftrightarrow se
(72) TAM_[-PRES, -PAST, +SBJV] \leftrightarrow re
(73) TAM_[+INFIN] \leftrightarrow r
(74) TAM_[-FIN, -PRES] \leftrightarrow d
(75) TAM_[-FIN, +PRES] \leftrightarrow ndo
(76) TAM_[+PAST, +PERF, -SBJV] \leftrightarrow ste / ____ [2nd person]_{AGR}
(77) TAM_[+PAST, +PERF, -SBJV] \leftrightarrow ó / ____ [3sg]_{AGR}
(78) TAM_[+PAST, +PERF, -SBJV] \leftrightarrow ro / ____ [3pl]_{AGR}
(79) TAM_[+PAST, +PERF, -SBJV] \leftrightarrow Ø

Appendix 3.6: Agreement Markers

- (80) AGR_{1sg} \leftrightarrow o / [+PRES, -SBJV]_{TAM} ____
(81) AGR_{1sg} \leftrightarrow [-low] / [-PRES, +PAST, +PERF, -SBJV]_{TAM} ____
(82) AGR_{1sg} \leftrightarrow Ø
(83) AGR_{2sg} \leftrightarrow Ø / [-PRES, +PAST, +PERF, -SBJV]_{TAM} ____⁶

⁶ Many varieties of Spanish lack rule (83), so that they have e.g. *hablastes* rather than the normative form *hablaste* for ‘You_{sg,informal} spoke’.

- (84) AGR_{2sg} \leftrightarrow s
 (85) AGR_{3sg} \leftrightarrow \emptyset
 (86) AGR_{1pl} \leftrightarrow mos
 (87) AGR_{2pl} \leftrightarrow is
 (88) AGR_{3pl} \leftrightarrow n

Appendix 4: Additional Sample Derivations

- A verb root with underlying /I:/--*sentir* (UR /sI:ntIr/).

INDICATIVE:			
PRESENT	IMPERFECT	PRETERITE	FUTURE
siento	sentía	sentí	sentiré
sientes	sentías	sentiste	sentirás
siente	sentía	sintió	sentirá
sentimos	sentíamos	sentimos	sentiremos
sentís	sentíais	sentisteis	sentiréis
sienten	sentían	sintieron	sentirán
CONDITIONAL:			
sentiría			
sentirías			
sentiría			
sentiríamos			
sentiríais			
sentirían			
SUBJUNCTIVE:			
PRESENT	IMPERFECT-1	IMPERFECT-2	FUTURE
sienta	sintiera	sintiese	sintiere
sientas	sintieras	sintieses	sintieres
sienta	sintiera	sintiese	sintiere
sintamos	sintiéramos	sintiésemos	sintiéremos
sintáis	sintierais	sintieseis	sintiereis
sientan	sintieran	sintiesen	sintieren
IMPERATIVE:			
siente			
sentid			
INFINITIVE:	GERUND:	PAST PARTICIPLE:	
sentir	sinti endo	sentido	

- (89) Syntax: [[[[\sqrt{feel} v] TH_[+α]] TAM_{pret}] Agr:3pl]
 UR: /sI:nt-I-ro-n/
 Stress: sI:ntÍron
 (23): sI:ntÉron
 (24): sIntÉron
 Diphthongization: sIntjéron
 (25): sintjéron
 SR: [sintjéron]

- (90) Syntax: [[[[\sqrt{feel} v] TH_[+α]] TAM_{imperf.sbjv}] Agr:2pl]
 UR: /sI:nt-I-se-is/
 Stress: sI:ntÍseis
 (23): sI:ntÉseis
 (24): sIntÉseis
 Diphthongization: sIntjéseis
 (25): sintjéseis
 SR: [sintjéseis]
- (91) Derivation for the adjective/noun *sintiente* ‘sentient, one who feels’
 Syntax: [[[\sqrt{feel} v] TH_[+α]] Adj]
 UR: /sI:nt-I-nte/
 Stress: sI:ntÍnte
 (23): sI:ntÉnte
 (24): sIntÉnte
 Diphthongization: sIntjénte
 (25): sintjénte
 SR: [sintjénte]
- (92) Syntax: [[[[\sqrt{feel} v] TH_[+α]] TAM_{pres.indic}] Agr:1pl]
 UR: /sI:nt-I-mos/
 Stress: sI:ntÍmos
 (24): sIntÍmos
 (30): sentÍmos
 (31): sentímos
 SR: [sentímos]
- (93) Syntax: [[[[\sqrt{feel} v] TH_[+α]] TAM_{pres.sbjv}] Agr:1pl]
 UR: /sI:nt-I-a-mos/
 Stress: sI:ntIámos
 (24): sIntIámos
 (25): sintIámos
 (31): sinteámos
 Hiatus Resolution: sintámos
 SR: [sintámos]
- (94) Syntax: [[[[\sqrt{feel} v] TH_[+α]] TAM_{pret}] Agr:3sg]
 UR: /sI:nt-I-ó-Ø/
 Stress: sI:ntIó
 (24): sIntIó
 (25): sintIó
 (29): sintjó
 SR: [sintjó]