On the Taxonomy of Root Suppletion

Daniel Siddiqi

1. Introduction

In this paper, I return to fairly familiar ground with the ambitious hope that I can settle a long-standing debate that is prevalent in lexical-realizational models of morphology (to use Stump 2001's typology)—especially Distributed Morphology (DM: Halle & Marantz 1993, 1994), Exoskeletal Syntax (ESS: Borer 2003), Nanosyntax (Starke 2009), and Lexical Realizational Functional Grammar (LrFG: Melchin, Asudeh & Siddiqi 2020a,b). The broader debate hinges on the question of how Roots are individuated. Abstract, semantic, and phonological individuation are the competing hypotheses for the individuation of Roots.

This paper has a very narrow focus. I do not provide arguments for or against the semantic or abstract individuation of Roots, nor do I offer new arguments against the *Phonological Individuation Hypothesis* (PIH). Rather, I return to an empirical argument made throughout the literature, but specifically in Haugen & Siddiqi (2013) and Harley (2014): that the existence of Root suppletion falsifies the PIH. In the literature of realizational models of morphology, this argument echoes and argument made in Marantz (1995, 1997), that the existence of Root suppletion would mandate *some* form of Root individuation. This argument is simple: If Root suppletion exists, then Roots do not have consistent phonology, and thus phonology cannot be what identifies or individuates them. Because this is an empirical argument, this argument hinges on agreed upon standards of what would constitute empirical counter-evidence. Putative examples of Root suppletion abound, so this standard must delineate what constitutes what the literature has called "true" Root suppletion. In other words, this debate has become *taxonomical*.

Here, I propose such a standard—one by which we can determine whether a putatively suppletive phonology-semantics covariance constitutes counterevidence to the PIH. This standard synthesizes classical arguments on the nature of suppletion as well as contemporary arguments from Borer (2014) and Marantz (1995, 1997) about what characteristics of a covariance would be true to unambiguously be "true" Root suppletion.

Having proposed the standard, I test the standard against familiar suppletion data. I look at data from English first. Since the English data is well known and has long been considered insufficient for falsifying the PIH, the proposed standard ought to eliminate the English data. I show that it always does. I then look at other data that has appeared in this debate: Uto-Aztecan (Hopi nouns and Hiaki/Hopi verbs). Again, since the Uto-Aztecan verbs have already been eliminated as possible candidates (Borer 2014), we expect the proposed standard to eliminate them as well. As expected, it does. Finally, I look at both nominal and verbal suppletion data from Algonquian, in particular Ojibwe (Nishnaabemwin). In the end, I find that the standard does indeed exclude much of the data we are familiar with, but the Root suppletion in the Ojibwe verb *amw-miiji* 'eat', which suppletes for argument animacy, survives the standard, as does the Hopi nominal suppletion, which suppletes for number (e.g. *wùuti* 'woman.SG'- *wùuti.t* 'woman.DL'-*momoya.m* 'woman.PL'). These alternations then do, unambiguously, provide counter-evidence to the PIH, falsifying it.

2. Background and Context

Unfortunately, the entirety of the debate on the nature of Roots is far too long for me to summarize in a proceedings paper smaller than a squib. I point the reader to Alexiadou, Borer, & Schafer (2015) for such a good summary. For space, I narrow this quick summary to the relevant discussion on Root suppletion as an argument against the Phonological Individuation Hypothesis in lexical-realizational models of morphology, where the main models that have participated in this discussion are DM and ESS. Allomorphy in ESS functions such that Roots are (under)specified for phonology and allomorphic processes operate on such specifications (see Borer 2003). In DM, the nature of Roots has changed with time. In the original conception of DM (Halle & Marantz 1993, 1994, Marantz 1995, 1997), Roots were not individuated at all and Vocabulary items that expressed Roots were in free variation (this can be called the *L-node Hypothesis* as described in Harley & Noyer 2000; see also Harley 1995 and Harley & Noyer 1999). Following work from Embick (2000), a competing hypothesis took shape that argued that Root phonology must be present early in the derivation (I have called this hypothesis *Early Root Insertion* elsewhere (Haugen & Siddiqi 2013); see also Embick & Halle 2005, Embick & Noyer 2007). Following that period, another competing hypothesis that Roots must participate in competition arose (this can be called the *Root Competition Hypothesis*, most prominently found in Harley 2014, but also found in Chung 2009 and Siddiqi 2009). The *Root Competition Hypothesis* is also fundamental in the way that other lexical-realizational models account for allomorphy: For example, in Nanosyntax, Cyclic Override destructively replaces phonology with new phonology as allomorphic conditions license (see Caha 2009).

This full debate largely played out in a 2014 volume of *Theoretical Linguistics* in the responses to Harley (2014). I point you to that volume for reference to the rest of the arguments not discussed here.

2.1 Root Suppletion

The argument for competition of Roots that I discuss here is the existence of Root suppletion. As argued in Harley (2014) and Haugen & Siddiqi (2013), the existence of Root suppletion simultaneously provides evidence for the claim that Roots *must* be individuated and that they *must not* be individuated phonologically (i.e. the *Phonological Individuation Hypothesis*). The specific data under discussion in the 2014 issue of *Theoretical Linguistics* was Uto-Aztecan suppletive verbs (see Hill & Black 1998; Haugen & Everdell 2015), because that was the data used to support the argument in Harley (2014). Haugen & Siddiqi (2013) also discuss that data (among others), so I will summarize from Haugen & Siddiqi (2013).

In Uto-Aztecan verbs, there are putatively suppletive pairs that contrast for number agreement with one of their arguments (subject for intransitives and object for transitives). For example, in Hopi (Hill & Black 1998): *mooki* 'die.SG' vs *so'a* 'die.PL'. I show the transitives in Table 1, reproduced from Haugen & Siddiqi (2013).

Table 1: Hopi and Hiaki –Verb Suppletion for Object Number (Hill & Black 1998)

Gloss	Hopi		Hiaki	
	SG/DL OBJ	PL OBJ	SG OBJ	PL OBJ
'bring along'	*wiiki*	*tsaama*	--	--
'bring in, put into'	*pana*	*tangata*	*kivacha*	*kiima*
'kill'	*niina*	*qöya*	*me'a*	*sua*
'put, place'	*tavi*	*oya*	*yecha*	*hoa*
'put on top'	*tsokya*	*kwapta*	--	--
'stand (s.t.) up'	--	--	*kecha*	*ha'abwa*

Back then, we had two criteria for what would constitute Root suppletion, both of which the Uto-Aztecan met. The textbook definition of suppletion is that there is no phonological overlap between the alternants. This can be summed as: the two forms are not cognate. Obviously, speakers have no knowledge of the diachrony of a form, but the ban on cognates is an easy way of capturing "unpredictable phonology". This is intended to be a gross oversimplification of the definitional 'maximal irregularity' from Mel'cuk (1994), which I point the reader to as a detailed description of suppletive semantics-phonology covariance. This criterion is also the distinction between so-called *strong* suppletion and *weak* suppletion. Weak suppletion, where the forms are cognate—or where the output phonology fits a predictable pattern—must be excluded from the definition of "true" suppletion as it can be reasonably captured through restricted phonological rules. I am definitely aware that I have previously argued against this criterion (see Haugen & Siddiqi 2016 for further discussion), but I will stipulate it here, again to make the strongest possible criteria.

They also meet the condition for "true" suppletion that exists primarily in the DM literature: they involve clear semantic content that cannot be analyzed as bleached or grammaticalized forms that realize purely functional information (exemplified by Marantz 1995, 1997). This criterion has always been tough to nail down. This is because the diachronic pressures that lead to suppletion—high frequency chief among them—also lead to semantic bleaching and grammaticalization. So, there is a narrow window where something is suppletive *and* contains a Root. That is what we were aiming for in 2013/2014. The Uto-Aztecan verb roots are high frequency, but they aren't arguably functional.

Borer (2014) (in that same volume as Harley 2014) defends the PIH against the putative Uto-Aztecan counter-evidence, making two key arguments (as well as an argument from rarity not discussed until later): (**A**) Borer (2014) observes that, for any putative case of suppletion, we must exclude the hypothesis that the forms are simply run-of-the-mill synonyms; she cites previous claims that alternations like *so'a/mooki* in Uto-Aztecan are not agreement-driven suppletion of a single Root, but instead two nearly-synonymous Roots with distinct selection patterns (see for example Durie 1986, Mithun 1988, Corbett 2000, Bliss 2004)—as in the English pair *murder* and *massacre*, which involve a similar lexical (rather than grammatical) distinction in the number of their arguments. (**B**) Borer (2014) argues that if the Uto-Aztecan data involved true suppletion, we would expect other Roots to show the same semantic distinction with a regular morphological alternation. In unambiguous cases of irregular allomorphy, it is precisely the fact that the unpredictable form appears to *block* an expected regular form that leads us to analyze the irregular morpheme as an allomorph. The second is an important enough argument that I have dedicated all of Section 3 below to recapitulating it.

Together these four arguments represent the beginnings of a reasonable standard for what evidence would be required to conclusively falsify the PIH. That evidence should be *strong* suppletion, so not cognate or at least no predictable phonology. That evidence should not be functional—i.e. the meaning should be contentful enough to convince us of the presence of a Root. I'll break Borer's arguments into three criteria. We need the covariance to participate in a paradigmatic opposition that is otherwise expressed by regular morphology, and that regular morphology needs to be blocked. Finally, we need to be sure that the semantic contrast that is expressed by the covariance is functional and not contentul, so we know that the opposition is not a function of Root semantics.

To the best of my ability, this captures all the arguments against the existence of Root suppletion (such that it falsifies the PIH) in the literature. Taken together they create a very high set of standards. But we want these standards to be very high. After all, the standards we apply to empirical evidence in order to conclusively reject a hypothesis must be *unambiguously* high.

3. Irregular Covariance

It is worth a moment to recapitulate some of Borer's (2014) discussion in order to remember how we identify regular morphological alternations (something we have gotten really good at). We can use this to establish criteria for identifying what is an *irregular morphological pattern* and not just a fun one-off semantic-phonological covariance. This will justify the two of the criteria I propose.

In the case of regular affixal morphology, we identify a systematic phonological alternation covarying with a systematic semantic/formal alternation. These are commonplace and not super hard to find. In the case of unambiguously accepted *irregular* allomorphy, we use the existence of that regular covariance to justify our assumption that a *different* phonological alternation is an irregular covariance with the *same* semantics. The systematic meaning change is present, and the normal systematic phonological change is unavailable. It helps our assumption that a covariance is an irregular variant of a regular pattern when both sides of the irregular phonological alternation are cognate forms, as is usually the case. It also helps when there is an identifiable pattern to irregularity in a language. Compare in English for example umlaut (*foot-feet, old-elder*), final denominal voicing (*teeth-teethe, house(n)-house(v)*), and rhyme replacement with /ɔt/ (*buy-bought, think-thought*).

In short: we accept a proposed irregular covariance specifically because it *blocks* the regular covariance.

We know that a particular irregular allomorphy exists because there is a corresponding regular paradigmatic opposition with the same meaning alternation that the stem is excluded (or blocked) from. Blocking of the regular form tells us that the irregular form is truly an irregular expression. This is why Borer (2014) argues that we should look for Root suppletion in inflectional paradigms. This is where we see regular paradigms! But there is no prima facia reason that we would expect suppletion to be limited to *inflection*. Indeed, Harley (2014) responds that we see derivational Root suppletion frequently, using as an example (among others) the English inchoative-causative contrast which is regularly expressed with a zero but also irregularly expressed with ablaut: *fall-fell, lie-lay, rise-raise*. This contrast includes pairs that are non-cognates: *learn-teach, come-bring,* and *die-kill*.

Borer (2014) and Harley (2014) are both right. In inflection, we are provided with the key tools that we can use to be confident that we have truly found a covariance relationship because there is a regular paradigmatic opposition and the relevant Root is excluded from that opposition. We need to be looking for regular paradigmatic oppositions and they abound in inflection, but they are not *only* in inflection. Harley's example of the English causative-inchoative alternation would be more convincing if there were a regular overt causative morpheme that was blocked.

If putative root suppletion belongs to a regular paradigmatic opposition (regardless of whether that paradigm is inflectional), we would have *falsifiable predictions* about that covariance: We predict that the covariance is elsewhere regularly expressed and that the relevant root is excluded (blocked) from it.

We therefore take from Borer (2014) that we should not take any of the shortcuts that we are used to in identifying morphemes, especially irregular ones, and return to the basics. We need to find a putative suppletive covariance that exists within a paradigmatic opposition that has a regular expression where that regular expression is blocked. Ideally, both sides of the opposition should have overt expression, but an opposition where only one side is marked (which is fairly typical of paradigmatic oppositions) would still constitute such an example.

4. The Taxonomy of Root Suppletion

We are now in a position to synthesize all the above arguments into a testable proposal. I adopt Borer's and Martantz's arguments, outlined above, as the standard (seen below in 1) that putative cases of root suppletion *must* meet in order to constitute counterevidence to the PIH. I argue that this is the highest possible standard which a phonological-semantic covariance must meet to be unambiguously considered Root suppletion for the purposes of falsifying the PIH. This doesn't mean that a covariance pattern that fails to meet one of these criteria is necessarily non-suppletive, only that such patterns cannot be decisive to the question of how Roots are individuated.

(1)   *The Taxonomy of Root Suppletion*

To be unambiguously considered "true" Root suppletion for the purposes of falsifying the Phonological Individuation Hypothesis, a phonology-semantics covariance must:

    a.   Employ an unpredictable, irregular, non-cognate phonological alternation.
    b.   Express clearly contentful Root semantics.
    c.   Express a paradigmatic opposition that is otherwise expressed in the language via regular morphology.
    d.   Block the regular expression of the Root with the conditioning contrast.
    e.   Express a semantic contrast that is clearly grammatical.

5. Testing the Standard

In this section, I test this standard against familiar putative examples of Root suppletion in English, Uto-Aztecan, and Algonquian. Well, they're familiar to me at least—I admit this section charts a course through my career from English major to Arizona grad student to Ottawa linguist!

5.1 English

Root suppletion in English has long been the standard of what *should not* count as "true" root suppletion for a variety of reasons. If this standard works, it should eliminate all the cases of English Root suppletion that the literature has already eliminated as insufficient for falsifying the PIH (2).

(2) a.   *go-went, bad-worse* (see discussion in Marantz 1995): As high frequency words with almost no semantic content, these violate (1b). These could be functional words.

      b.   *person-people* (see discussion in Arregi & Nevins 2014): The regular form of this covariance, *persons*, is not blocked. This violates (1d). It is worth stating that this alternation is an exceptional case. It is typical in cases where blocking fails that the irregular form has the specialized meaning and the regular form is entirely compositional (Aronoff 1976), but in this case, for many dialects *persons* has specialized meaning.

      c.   *seek-sought, think-thought, buy-bought, teach-taught* (see Haugen & Siddiqi 2016): While the possibility that these forms are derived via a phonological rule strains credulity because the inputs vary so wildly, both members of the alternation are cognates and the output forms are predictable, so these violate (1a).

      d.   *die-kill, come-bring, learn-teach* (see discussion in Harley 2014): There is no regular alternation to be blocked here, so these violate (1c). Also, it is not clear that causativization is grammatical meaning in English. Causativization in English could be a function of Root semantics. This would violate (1e).

As expected, the standard shows in (2a-d) why the English cases of Root suppletion have been insufficient to falsify the PIH. This is a low bar to clear given the depth of the literature arguing there is no Root suppletion in English, but the standard succeeds in clearing it.

5.2 Uto-Aztecan

Two different Uto-Aztecan patterns have been used to argue for the existence of Root suppletion. Harley (2014) and Haugen & Siddiqi (2013) both used the verb alternation described in above in Table 1. This is the data to which Borer (2014) responded. The proposed standard was designed with Borer's arguments in mind, so it is designed to defeat the Uto-Aztecan verbs. It is then unsurprising that it does

so. As argued by Borer (2014), the Uto-Aztecan verb alternations do not express a covariance (object number agreement) that is otherwise expressed regularly, thus they violate (1c). There is also no evidence that the semantic alternation is not a function of Root semantics (a la *murder-massacre*), thus they violate (1e).

However, there is a second pattern of putative Root suppletion in Uto-Aztecan described by Haugen & Siddiqi (2013): nouns suppleting for number. In Hopi, animate nouns are marked for a three-way contrast in number. Singulars are unmarked (*sino* 'person.SG'), duals are marked with the affix *-t* (*sinot* 'person.DL'), and plurals are marked with the affix *-m* (*sinom* 'person.PL') (Hill & Black 1998; see Haugen & Siddiqi 2013). Several Roots show suppletion for the plural with a regular for the dual,[1] seen here in Table 2. In this case, the suppletive forms are not portmanteaux—the regular form of the conditioning affix (*-m*) is present.

Table 2: Suppletive nouns in Hopi (Hill & Black 1998 , via Haugen & Siddiqi 2013).

Gloss	Singular	Dual	Plural
woman	*wùuti*	*wùuti-t*	*momoya-m*
boy	*tiyo*	*tiyo-t*	*tooti-m*
clan member	*-wungwa*	-----	*ngya-m*
house mouse	*pöösa*	*pöösa-t*	*pövöya-m*

We are now equipped to test the examples provided by Haugen & Siddiqi (2013) against the new standard. **Condition 1a:** While *tootim* and *pövöyam* share some phonology with the base form *momoyam* and *ngyam* are clearly maximally irregular. **Condition 1b:** While some are high frequency, all of these forms clearly employ Root semantics. **Condition 1c:** Number marking has a regular form in Hopi. **Condition 1d:** According to Hill & Black 1998, these are true suppletion, blocking the regular. **Condition 1e:** Number is clearly grammatical.

The number suppletion in Hopi, as described by Haugen & Siddiqi (2013), simultaneously satisfies all five conditions we have put on putative "true" Root suppletion. This means that Hopi nominal suppletion is unambiguously Root suppletion for the purposes of falsifying the PIH and thus is indeed counter-evidence.

5.3 Algonquian

There are two patterns of suppletion that will be familiar to those of us who think about Algonquian a lot (see for example Thevierge in this volume): nominals which supplete for possession and a verb which suppletes for object animacy.

5.3.1 Suppletion triggered by possession

Simple possessive constructions in Ojibwe are formed by a noun stem affixed by a person prefix indexing the possessor (such as *ni-* for first person) and sometimes a possessive suffix (often *-im*). In (3), the possessive construction is formed by adding the first-person prefix *ni-* and optionally the possessive suffix *-im* to the noun *jiimaan* `canoe' (all examples from Valentine 2001).

(3)   *njiimaan(im)*
        ni-jiimaan-im
        1-canoe poss
        'my canoe'

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[1] For obvious space reasons, I can't talk about Bobaljik (2012)'s *ABA stuff here, even though it would be great. Smith et al (2019) talk about sg-dl-pl patterns in pronouns at length. Alas, the discussion on ABA suppletion patterns is far too large for me to do any more than wave at in a footnote.

In some cases, however, the noun that appears as a possessum has a different form than its independent counterpart. In examples (4a), (5a), and (6a), the nouns appear independently (i.e. they are not in a possessive construction). In examples (4b), (5b), and (6b), the nouns appear as possessa.

(4)	a.	*nimosh*		b.	*nday*
		animosh			ni-day
		dog			1-dog
		'dog'			'my dog'

(5)	a.	*bnoojiinh*		b.	*nniijaanis*
		abinoojiinh			ni-niijaanis
		child			1-child
		'child'			`my child'

(6)	a.	*nini*		b.	*nnaabem*
		ininiw			ni-naabem
		man			1-man
		'man'			'my husband'

Again, we are in the position to assess this data against the standard: **Condition 1a:** These forms are not cognates, so they satisfy condition (1a). **Condition 1b**: The nouns here are clearly contentful, so they satisfy condition (1b). **Condition 1c:** The trigger for these is regularly expressed (-*im*), so they satisfy condition (1c). **Condition 1d**: There is no blocking effect in these cases! Valentine (2001) observes that alongside (5b) and (6b), the non-suppletive forms (5c) and (6c) also exist. They therefore *fail* condition (1d).

(5)	c.	*ndabnoojiinh*	(6)	c.	*ndinniim*
		nid-abinoojiinh			nid-ininiw-im
		1-child			1-man-poss
		'my child'			'my husband'

Condition 1e: These seem to have straightforward possessed semantics, and possession is a typically considered grammatical, especially with a regular paradigmatic opposition as is found in Ojibwe. However, in example (6), the non-possessed form (6a) is translated as 'man' whereas the possessed form (6b) is translated as 'husband'. This strikes me as likely the interpretation of a possessed man, but it may be more nuanced. The other examples may also have nuanced meanings I am unaware of. If so, they would be very close synonyms, like Borer (2014) was concerned about and then fail condition (1e). This is an empirical question, but not an especially pressing one given that this data otherwise doesn't meet the standard.

While the Ojibwe nouns then appear to be root suppletion, because they fail to block the regular, they fail to meet the proposed standards for falsifying the PIH.

5.3.2   Suppletion triggered by object animacy

In Ojibwe, verbs bear particular transitive derivational morphology depending on the animacy of their arguments. In (7), the VTA (transitive animate) affix -*am* indexes that the object (*kwe* `woman') is animate.[3]

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[3] Morpheme by morpheme glosses are contributed by Will Oxford, whom I thank. If I messed this up, that's on me.

(7)   *nwaabmaa*   *kwe*
        ni-   waab-   **-am**   -aa   ikwew
        1-   see-   **-VTA**   3.obj   woman(an)
        `I see the woman.'

In (8), the VTI (transitive inanimate) affix *-and* indexes that the object (*jiimaan* 'canoe') is inanimate.

(8)   *nwaabndan*   *jiimaan*
        ni-   waab   **-and**   -aa   -n   jiimaan
        1-   see-   **-VTI**   -in.obj -1sg   canoe(in)
        `I see the canoe.'

As seen in (7) and (8), verbs in Ojibwe show a paradigmatic opposition for the object animacy. This opposition suppletes in the case of the verb *-amw / -miiji* 'eat' (9 and 10). Note that in both cases, the suppletive form expresses the transitive marker as well as the Root (portmanteaux indicated with parentheses).

(9)   *ndamwaa*   *waabmin*
        nid-   **amw**   -aa   waabimin
        1   **-eat(VTA)**   -3.obj apple(**an**)
        `I eat the apple.'

(10)   *nmiijin*   *wiiyaas*
        ni   **-miiji**   -n   wiiyaas
        1   **-eat(VTI)**   -1sg   meat(**inan**)
        `I eat the meat.'

We can now test this against the standard for "true" root suppletion: **Condition 1a**: These forms have completely different, unpredictable phonology. **Condition 1b**: The verb meaning 'eat' is clearly contains Root semantics. **Condition 1c**: The trigger for verb suppletion, namely the animacy (gender) of the internal argument, is otherwise expressed regularly in the language (see 7 and 8). **Condition 1d**: The regular expression is blocked with these roots—a regular VTI form, *amw-dan[4]*, does not exist. **Condition 1e**: The animacy contrast is strictly formal, not contentful. There is a long tradition amongst Algonquianists of illustrating this with fruits, which are clearly randomly sorted between animate and inanimate. I will carry on this tradition (11).

(11)   **Animate**   **Inanimate**
        waabmin `apple',              *miin* `blueberry'
        bookdoonsh `pear'             *dewmin* `strawberry'
        mskomin `raspberry'           *wiigwaasmin* `cherry'

Like the Hopi nouns, the Ojibwe verbs simultaneously satisfy all five conditions we have put on putative "true" Root suppletion. The *amw-miiji* alternation in Ojibwe is unambiguously Root suppletion, therefore Root suppletion exists, therefore the PIH is falsified.

6.   Conclusions: On the argument from rarity

I set out propose a very high standard against which to test putative "true" Root suppletion for the purposes of the *Phonological Individuation Hypothesis* and to test that standard against familiar Root

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[4] Since there are various derivational patterns, it's not obvious what the regular TI partner of TA *amw-* ought to look like, but another good candidate would be just *am-* (Wiil Oxford, p.c.)

suppletion patterns. Given that I set the standard very very high, it is unsurprising that most of the familiar patterns failed. However, two patterns met the standard. The Hopi number suppetion, *wùuti-momoyam* 'woman', and the Ojibwe animacy suppletion, *amw-miiji* 'eat', satisfied all the criteria. Root suppletion, for the purposes of falsifying the Phonological Individuation Hypothesis, exists. But, as Borer (2014) argues, it is exceedingly rare.

"How small is too small?" is of course consistently a valid concern in every scientific endeavor. There will always be exceptional data, especially in the behavioral sciences, which abound in confounds. Very rare data historically gets put into two categories based on theoretical distinctions: *counterexamples* versus *data that require exceptional explanations*. Unfortunately, science doesn't come with an easy set of criteria for us to determine the difference between the two. I argue here that in this context we have already determined the criterion by which to assess this sorting: parsimony.

The main appeal of the *lexical-realizational* models in discussion here, as opposed to *inferential-realizational* approaches to morphology (exemplified contemporaneously by Word-And-Paradigm models such as PFM) is that they are *parsimonious, elegant,* and *restrictive*. They treat morphology as underlyingly concatenative and thus underlyingly syntactic. This means that they treat non-concatenative processes, such as stem allomorphy or defectiveness, as requiring exceptional explanations because it is *overall* more parsimonious to treat them as such.

Since what is and isn't parsimonious is model-specific, the answer to whether Root suppletion is rare enough to be considered exceptional is also model-specific.

In Exo-skeletal Syntax, Roots are individuated phonologically but are underspecified for their phonological content. A suppletive alternation with no shared phonology cannot be accounted for with underspecification. This means that true suppletive Root allomorphy must be individuated through some other mechanism that is unique to suppletive roots. Thus, there is a significant metatheoretic cost to accounting for Root suppletion (a very small number of forms) with grammatical architecture: the model requires an entirely different means for individuating this small set of roots. Therefore, the concerns of economy and elegance in ESS demand that the larger set of irregular verbs be treated with underspecification while a small number of putative suppletive verb be treated as literally a coincidence (i.e. two nearly synonymous Roots with coincidentally complimentary defective paradigms rather than one covariance; Borer 2014). Therefore, in ESS, the argument from rarity is compelling.

In Distributed Morphology, the concerns are reversed. Non-suppletive root allomorphy accounts employ a distinct mechanism (readjustment) from the default mechanism used for allomorphy (competition). Putative root suppletion accounts *do not.* They employ competition. Thus, the cost of distinguishing between suppletive and non-suppletive allomorphy comes from adding a generative mechanism (readjustment) that is unique to non-suppletive irregular Roots. If we deny the PIH and treat Root suppletion as a prediction of the grammar and not exceptional, competition can be the only mechanism employed for allomorphy, and DM is more parsimonious. Therefore, in DM, the argument from rarity is *not* compelling.

In Nanosyntax, because Roots are always overridden by cyclic override, if the PIH were true, root phonology would be unlearnable absent some other device, so Nanosyntax is more parsimonious with a falsified PIH.

In Lexical Realizational Functional Grammar, Roots are necessarily individuated syntactically and semantically. There is no mechanism through which the PIH could be upheld, absent some additional mechanism, so LrFG is more parsimonious with a falsified PIH.

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