

English Past Tense Alternations

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Introduction to the History of Studies in Past Tense Production

English is spoken by over 1.8 people and is the language of science, business, and the media (Census Bureau 2000). Words in the English language consist of morphemes which are the smallest units of information that can be understood to have meaning. In this sense they are the unbreakable particle of meaning. English morphemes can sometimes stand on their own whereas other times they require other morphemes to form complete words. They are also complicated by the fact that they can change their expression depending on the context they are placed in.

The past-tense morpheme is one morpheme that varies depending on which verb it is attached to. The most standard representation of past tense is the adding of the suffix [d] usually represented by -ed in English orthography. However, on the surface this morpheme can also appear as [t], [ʌ], [əd], [ɛ], [o] and does not even have to be a suffix.

Some phonologists argue that this morpheme appears as one underlying representation that is modified by phonological rules. Although, Pinker (1999) argues that since there are too many environments for some rules to apply (such as the rule $\text{ɪ} \rightarrow \text{ʌ}$ which applies in both *cling* [klɪŋ] which *clung* [klʌŋ] and *spin* [spɪn] that turns into *spun* [spʌn]) that the chosen underlying representation of a morpheme is based on similarity. Hayes & Albright (2005) Wug tested participants while using a GCM model to find similarity between words and found that it could not correlate similarity to likelihood of expression. It is possible that their model inaccurately describes similarity or, as suggested by Hayes and Albright, that there is a complex set of rules that describe how the past tense morpheme appears on the surface.

Possible Explanation: Semantics and Rules

The semantics of the modified verb could be a factor in determining the correct surface representation of a word. For instance, *give*[gɪv] becomes *gave* [geɪv] and *hand*[hænd] becomes *handed* [hændəd] in the past tense. There are situations in which *give* could include something not given from hand to hand such as kicking a soccer ball while *handed* always describes an action that is passed literally from hand to hand. In

cases where give[ɡɪv] is also meant as hand to hand it could be kept gave [geɪv] in order to retain simplicity. If meaning is a factor, then Wug Testing should provide different past-tense forms based on which “appropriate” context is said to have.

Of importance is that rules could also apply to prevent certain segments from appearing in English. Hand [hænd] cannot become [hændd] so it becomes [hændəd]. Therefore, [d] could be the underlying representation of the past tense morpheme chosen that is later modified by phonological rules

Experimental Design

Participants would be presented with english-like words and asked to change them into what they think would be the appropriate past tense forms. If they thought more than one form was possible they would arrange the forms in the order of highest likelihood or indicate equal likelihood. The context of the words would be provided and would be rotated based on the version of the quiz. The “context” would be based on whether or not a verb took a direct object, indirect object, or neither. Additionally, a set of known english verbs would also appear to test and see if the participant can correctly create the different surface forms of past tense.

Procedure

8 native english participants were provided with a quiz that asked them to change both 15(14 unique) english verbs and 20 english-like verbs into the past tense(with the possibility to list multiple answers for the english-like verbs and sort them based on likelihood). The english-like words were put into four groups of five with each group sharing example sentences to demonstrate their appropriate context. Four versions of the quiz were made so that the english verbs were in the same order but each english-like group appeared in each context exactly once. Participants took the quiz online and were assigned versions of the quiz to ensure that the amount of participants in each version was even. Their responses were given in standard English orthography and I used my native English intuition to judge which phonetic representation they meant. The quiz is presented in the accompanying links at the end of the paper.

Results

The results of the quiz are presented in figure 1 presented on the next page.

Words/ Participants	Participant A Condition 1	Participant C Condition 2	Participant B Condition 3	Participant D Condition 4	Participant E Condition 1	Participant F Condition 2	Participant G Condition 3	Participant H Condition 4
Sleep	Slept	Slept	Slept	Slept	Slept	Slept	Slept	Slept
Spring	Sprung	Sprung	Sprung	Sprung	Sprung	Sprung	Sprung	Sprung
Jump	Jumped	Jumped	Jumped	Jumped	Jumped	Jumped	Jumped	Jumped
Vote	Voted	Voted	Voted	Voted	Voted	Voted	Voted	Voted
Turn	Turned	Turned	Turned	Turned	Turned	Turned	Turned	Turned
Spring	Sprung	Sprung	Sprung	Sprung	Sprung	Sprung	Sprung	Sprung
Plan	Planned	Planned	Planned	Planned	Planned	Planned	Planned	Planned
Run	Ran	Ran	Runned	Ran	Ran	Ran	Ran	Ran
Leap	Leaped	Lept	Leapt	Lept	Leaped	Lept	Leapt	Lept
Speak	Spoke	Spoke	Spoke	Spoke	Spoke	Spoke	Spoke	Spoke
Leak	Leaked	Leaked	Leaked	Leaked	Leaked	Leaked	Leaked	Leaked
Ring	Rang	Rung	Rung	Rang	Rang	Rung	Rung	Rang
Stop	Stoped	Stopped	Stopped	Stopped	Stopped	Stopped	Stopped	Stopped
Meet	Met	Met	Met	Met	Met	Met	Met	Met
Learn	Learned	Learned	Learned	Learned	Learned	Learned	Learned	Learned
Sloke	Sloked	Sloked	Sloked	Sloked	Sloked	Sloked	Sloked	Sloked
Chlore	Chlored	Chlore	Chlored	Chlored	Chlored	Chored	Chlored	Chlored
Ting	Tinged	Tinged	Tung	Tinged	Tang	Tingged	Tinged	Tinged
Geet	Geeted	Geeted	Get	Geeted	Get	Geeted	Geeted	Geeted
Rool	Rooled	Rooled	Rooled	Rooled	Rooled	Rooted	Rooled	Rooled
Zleek	Zleeked	Zleeked	Zloke	Zleeked	Zleeked	Zleeked	Zleeked	Zleeked
Ling	Linged	Linged	Lung	Linged	Lang	Linged	Linged	Linged
Rog	Rogged	Rogged	Rogged	Roged	Rogged	Rogged	Rogged	Rogged
Reaplog	Reaplogged	Reaplogged	Reaplogged	Reaploged	Reaplogged	Reaplogged	Reaplogged	Reaplogged
Po	Poded	Poed	Poed, Pod, Pot	Poed	Pod	Poed	Poed	Poed
Ging	Ginged	Ginged	Gung	Ginged	Gang	Gingged	Ginged	Ginged
Kreen	Kreened	Kreened	Kreened	Kreened	Kreened	Kreened	Kreened	Kreened
Qweek	Qweeked	Qweek	Qwoke	Qweeked	Qweeked	Qweeked	Qweeked	Qweeked
Zo	Zoded	Zoed	Zoed	Zoed	Zod	Zo	Zoed	Zoed
Splink	Splinked	Splinked	Splunk	Splunk	Splinked	Spinked	Splinked	Splunk
Feek	Feeked	Feeked	Feeked	Feeked	Feeked	Feeked	Feeked	Feeked
Moar	Moared	Moared	Moared	Moared	Moared	Moared	Moared	Moared
Tink	Tinked	Tinked	Tunk	Tinked	Tanked	Tinked	Tinked	Tinked
Slog	Slogged	Slogged	Slogged	Sloged	Slogged	Slogged	Slogged	Slogged
Mun	Munned	Munned	Munned	Muned	Man	Munned	Munned	Munned

Figure 1: Words categories are bolded and italicized. Words that are irregular are bolded. Some differences are not bolded because they are just orthographically different.

Analysis

Participants had differences in how they produced some of the past tenses of run [rʌn], leap [li:p], and ring [riŋ]. Most of these were due to an attempt to normalize past tense endings. For example, Run [rʌn] had one case with the unique production, runned [rʌnd] and in some cases Leap [li:p] became leaped [lipt] instead of leapt [lɛpt] but leaped [lipt] was much less frequent. In the case of ring [riŋ] an equal amount of people created rang [ræŋ] and rung [rʌŋ]. This could mean that both forms are equally acceptable.

All the english-like words many words had the option of adding the regular affixes [d], [t], [əd] but some transformations were made to follow similar english words. Chlore [klɔr] could stay chlore [klɔr], zo [zou] could stay [zou], ting [tiŋ] could vary between tang [tæŋ] or tung [tʌŋ], get [git] could change to [gɛt], zleek [zlik] to zloke [zlouk], po [pou] to pod [pɒd], poded [poudəd], or pot [pɒt], tink [tiŋk] could change to tunk [tʌŋk] or tanked [tæŋkt], and mun [mʌn] to man [mæŋ].

However, the affixes were the dominant form in every production while the transformations that followed the pattern of other english words were the minority. This could mean that there are several past tense morphemes and these morphemes change based on rules, that there are optional rules, or that a rule could apply based “islands of reliability” (Albright, 2002).

If there was a past tense morpheme it would be the affix [d] because it appears in the greatest amount of words. One could argue that a rule exists that transforms [d] into other past tense affixes. These rules are provided on the next page.

Stop Final Devoicing

[+ anterior] → [-voice] \ [[-voice] ____]word
[-delayed release]

Schwa Insertion

∅ → [ə] \ [[+anterior] ____ [+ anterior]]
[[-delayed release] ____ [-delayed release]] word

There is also the possibility of the following rule in case of sing [sɪŋ] and sung [sʌŋ]:

I Lowering

[I] → [-high] \ [[_η]]word

Also in the case of read [rɪd] to read [rɛd] we would have this rule:

i Detensing

[i] → [-high] [-tense] \ [____ [+anterior]]
[[+delayed release]] word

For cases like speak [spɪk] to spoke [spouk] we would need this:

i Backening and Rounding

[i] → [+back] [+round] \ [[-syllabic] ____ [-syllabic]]
[-high] [] word

D Deletion

[+ anterior]
[-delayed release] → ∅ \ [___] word
[+voice]

ʊ Insertion

∅ → [+high] \ [[+tense]]
 [+back] \ [[+back] ___]
 [+tense] \ [[-high]]

t Insertion

∅ → [+anterior] \ [[+tense]]
 [+delayed release] \ [[+back] ___] word
 [-voice] \ [[-high]]

i Lowering

[i] → [-high]
 [+low] \ [[_ŋ]] word

However, these rules provide some problems. According to our english-like words it would seem like all of these rules are optional except for schwa insertion. However, in the case of spring [sprɪŋ], spinged [sprɪŋd] cannot be created, thus I Lowering must occur. Additionally, the data shows that I lowering can be ignored with a word like ling [lɪŋ] and even preferred. If this were the case then it could mean that there is another set of rules that bleed it. The following figure could explain a possible ordering of these rules.

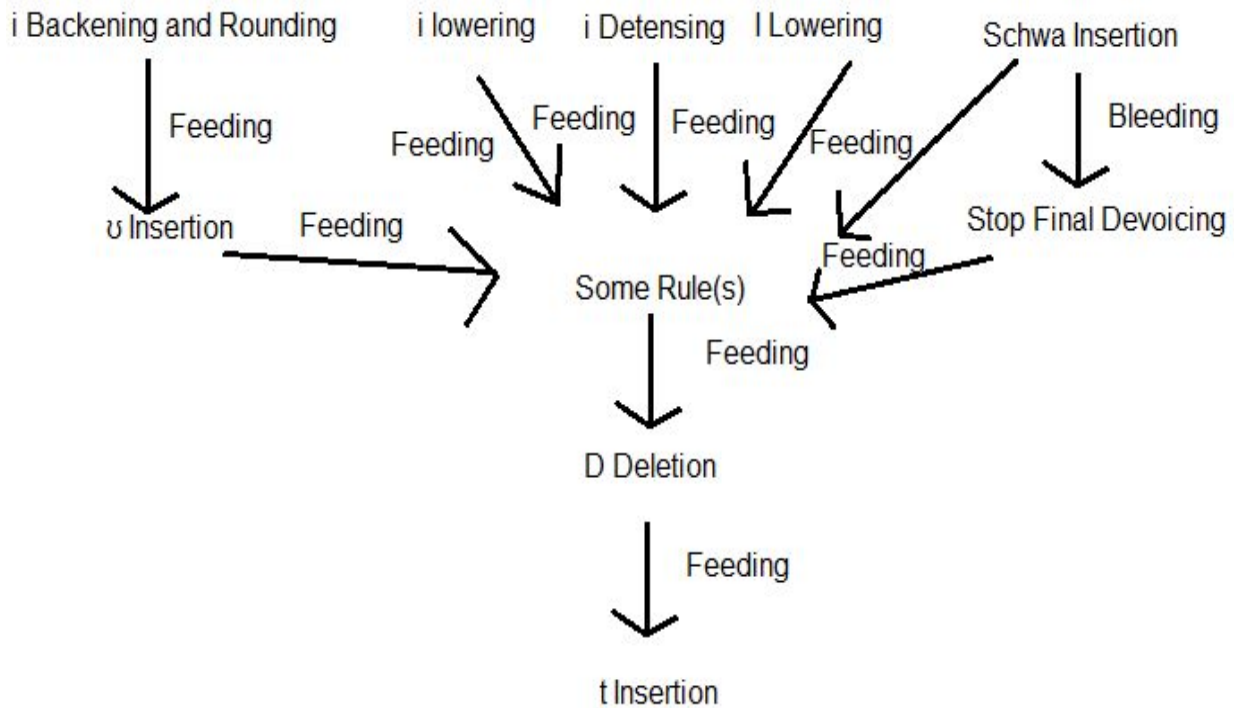


Figure 2 : Hasse Diagram Representing theoretical rule ordering.

The problem with generating these unknown rules is that they either affect more sounds than they should, affect sounds too far away, or they do not affect enough sounds. In order to be more accurate we need more specific environments. Theoretically, environments could be affected by how a verb acts, such as if it receives a direct object, indirect object, or not. According to my experiment, however, this did not have an affect on the word produced. Although, there could be more environments which change the likelihood of certain productions. Take certain words like sing [sɪŋ] which never have a surface form singed [sɪŋd]. Additionally, suppose there is a person named Sing, who likes to jump around a lot after eating ice cream. When one jumps around a lot after eating ice cream they can be said to have singed [sɪŋd]. There just might be a constraint in the lexicon that prevents singed [sɪŋd] from being the past tense of the traditional meaning of singing. Alternatively, it could be possible that instead of these being environments for rules, that there are environments to select the proper morpheme, so that rules can happen in purely phonological environments rather than including semantic ones.

Further Discussion

Different speakers have different preferences to which they make a new word into the past tense. Dive [daɪv] can become dived [daɪvd] or dove [dɒv] or like in the experiment leap [li:p] can become leaped [li:pt] or leapt [lɛpt]. Likewise, speakers can choose several productions for the formation of past tense from a novel word. It would be important to find out why certain productions are equally likely or plausible. This may help shed light on how past tense is formed. Furthermore, although there are environments already listed for phonological rules maybe there is a field of morphological environments (based on semantics) that in addition to rules, form the surface forms of the many words we see today. Constraints are also a useful idea to consider as some words seem like they should be possible phonologically even though they are not. Furthermore, the example I used of singed [sɪŋd] could show it is useful to make nonce verbs out of nouns and see how they are made into past tense.

Links to Quizzes

Quiz 1:

<https://docs.google.com/document/pub?id=1Hs742HrMNYgmRAb3WmaFy6QV0Uj-D8jY84D5zrLYzoA>

Quiz 2:

<https://docs.google.com/document/pub?id=1kgC82B5IO6s1tMnwAwfb3t3E4UQJFPZha350Xj61eXc>

Quiz 3:

<https://docs.google.com/document/pub?id=1szFOltwL-P2xA3Jlu5H43UewQMsS8VkJgRQhFoh2vIw>

Quiz 4:

https://docs.google.com/document/pub?id=1wKabkJH25-gPK_jqBJNjMTR07ssKJQjQ2nGv_lxkDZc

References

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