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The relationship between synchronic and diachronic linguistic processes: a discussion of language acquisition and language contact

Hracs, Lindsay


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The relationship between synchronic and diachronic linguistic processes: A discussion of language acquisition and language contact

Lindsay Hracs
University of Calgary

Abstract

The present study investigates the relationship between synchronic processes in Second Language Acquisition and diachronic processes in Language Contact. The focus is on examining laryngeal contrasts in the L2 acquisition of English stops by native speakers of Dutch, and the hypothesized Romance/Germanic contact situation which is argued to have resulted in the Dutch laryngeal system. Using van Coetsem’s (1988) framework, the investigation reveals that there are indeed similarities. Furthermore, a re-examination of the acquisition data (originally presented in Simon, 2009, 2011) shows that a more detailed account must be made to claim that there is a relationship between synchronic and diachronic processes. Moreover, I argue that for the Uniformitarian Principle to hold true, theories must make the same predictions regarding both language acquisition and language contact data.

Key words: language contact, second language acquisition, laryngeal contrasts, voicing, Uniformitarian Principle, Dutch, English
1 Introduction

Investigating the similarities between Second Language Acquisition (SLA) and Language Contact (LC) can help shed light on the similarities between synchronic and diachronic processes. This is the main claim of the Uniformitarian Principle (Christy, 1983). The assumption under the Uniformitarian Principle is that observing present-day linguistic processes can shed light on linguistic processes of the past. In other words, the influences that we observe in language acquisition are the same influences that played a role in historical language change. This paper examines the linguistic forces that are in effect when two laryngeal stop systems come into contact in SLA and in LC situations.

Laryngeal contrasts have been examined from the perspective of both phonological theory and historical linguistics (Eckman & Iverson, 2015). Claims from phonological theory suggest that different laryngeal systems make use of different contrastive features. Historical approaches on the other hand, examine when and how the variations in the laryngeal systems of the languages emerged. Eckman & Iverson (2015) state that recently, more and more research has focused on the SLA of laryngeal contrasts. They suggest that research in SLA can provide insight into historical contact situations. This paper examines the relationship between a hypothesized contact situation involving a Romance voicing language and a Germanic aspirating language (which is said to have resulted in the laryngeal stop system of Dutch) and the acquisition of the English laryngeal stop system by native speakers of Dutch. I examine data presented in Simon (2009, 2011) and argue that a more detailed explanation of the data using van Coetsem's (1988) framework is needed in order to make explicit claims about the relationship between SLA and LC. Finally, I discuss the data from the perspective of both traditional generative theories and Exemplar Theory, and argue that if the Uniformitarian Principle is to hold for the correspondence between SLA and LC, a theory should be expected to make the same predictions for each situation.

2 The phonology of Dutch and English laryngeal systems

2.1 Voicing vs. aspirating languages

Previous studies on the L2 acquisition of laryngeal systems have made use of the contrasts originally proposed in Lisker & Abramson (1964). In their study, Lisker & Abramson set out to determine whether Voice Onset Time (VOT) is sufficient in characterizing the distinctions in the stop categories of multiple languages that differ in both the number of stop categories present and the phonetic characteristics exhibited in the stop categories. They suggest that features such as voicing and aspiration are predictable consequences of differences in timing during articulation, and that cross-linguistic variation in VOT is far from random. In concordance with these findings, Simon (2010) points out that stop consonants can be classified on the basis of three different voicing conditions: prevoicing (negative VOT), short voicing lag (short VOT), and long voicing lag (long VOT).

This paper focuses on voicing languages and aspirating languages. Voicing languages show a two-way contrast between prevoiced and short-lag stops. Specifically, these languages exhibit stop consonants that have a negative VOT (i.e. voicing happens before the release) and stop consonants with a relatively low VOT (i.e. voicing occurs only a short time
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after the release) (Docherty, 1992, as cited in Simon, 2011). Aspirating languages on the
other hand show a two-way contrast between short-lag and long-lag stops. In these
languages, voicing occurs after the initial release of the stop consonants, but the contrast
exists in a difference in VOT (Jansen, 2004, as cited in Simon, 2011).

2.2 Dutch and English

A brief discussion of the English laryngeal stop system is necessary to examine the
acquisition data that is presented in section 4. Dutch and English both exhibit a two-way
laryngeal contrast (Simon, 2009). The stop system in Dutch is an example of a typical
voicing language.1 Simon (2011) states that Dutch voiceless stops are realized with a short
VOT (VOT between 0 and 20 ms) and Dutch voiced stops are prevoiced (VOT is
approximately -90 ms). The stop system in English, on the other hand, is that of a typical
aspirating language. In word-initial position, voiceless stops are usually produced with
aspiration in the long-lag region (VOTs between 60 and 90 ms), and voiced stops are
produced in the short-lag region (Simon, 2011). Table 1 summarizes these two systems:

<table>
<thead>
<tr>
<th></th>
<th>Dutch</th>
<th>English</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voiced stops /b, d, g/</td>
<td>-90 ms (prevoiced)</td>
<td>0-20 ms (short-lag)</td>
</tr>
<tr>
<td>Voiceless stops /p, t, k/</td>
<td>0-20 ms (short-lag)</td>
<td>60-90 ms (long-lag)</td>
</tr>
</tbody>
</table>

Crucially, Dutch voiceless stops and English voiced stops are articulated with the same
VOT.

3 Language contact

In any situation where LC exists, it is pertinent to discuss a Source Language (SL) and a
Recipient Language (RL) (van Coetsem, 1988). Essentially, a phonological loan of any sort
implies a transfer of material from one language to another. Consider the diagram in (1).

1) \[ SL \Rightarrow RL \]
source language \[ \Rightarrow \] recipient language (van Coetsem, 1988, p. 7)

The source language transfers a certain phonological property to the recipient language.
Thus, in van Coetsem's (1988) framework, a phonological loan is considered to be an
imitation, replication, or reproduction of SL pronunciation in the RL.

In order to fully understand how loan phonology works in van Coetsem's (1988)
framework, it is necessary to discuss speaker agentivity. The agent is roughly considered to
be the one who transfers phonological elements from the SL to the RL. The following
section provides a discussion of the differences between RL agentivity and SL agentivity.

1 It is generally argued (Iverson & Salmons, 2003, 2008; Simon, 2009, 2011; among others) that the Dutch
fricative system is not as straight forward as the stop system; arguments primarily from historical contact
data suggest that fricatives exhibit typical Germanic aspirating properties, whereas stops exhibit the
properties of a voicing language.
3.1 RL speaker agentivity

RL speaker agentivity occurs when the speaker of a RL imitates the SL while speaking their native language (see (2)).

2) The SL is imitated by the RL speaker (agent) in the RL.  
   (van Coetsem, 1988, p. 9)

For example, when a native speaker of English, the RL, produces the [y] in *deja vu* [de.ʒa vy], the speaker is imitating the French vowel, which is not part of their native system (van Coetsem, 1988). In this case, the speaker of the RL is actively imitating part of the SL phonology. Van Coetsem (1988) argues that in such a case, the RL speaker is the agent, and transfer of phonological material into the RL is taking place. Importantly, this type of imitation by the RL agent yields a *borrowing*.

Adaptation may occur after the borrowing takes place; this occurs when the RL agent adds an SL pronunciation into the native system (van Coetsem, 1988). However, adaptation is a separate mechanism, and thus does not necessarily follow from imitation/borrowing. Consider the diagram in (3).

3)  
   \[
   \text{RL agentivity} \\
   (\text{RL speaker} = \text{agent, RL = recipient of the action})
   \]

   step 1: imitation
   \[
   \downarrow
   \]

   borrowing  
   \[
   (\text{van Coetsem, 1988, p. 10})
   \]

The diagram in (3) illustrates an example of RL dominance. In (3), the RL speaker is considered to be the RL dominant (i.e. linguistically dominant) bilingual, who initiates a borrowing from the SL, but whose strength (i.e. knowledge/ability) is greater in the RL than in the SL (van Coetsem, 1988). Van Coetsem argues that in cases of RL agentivity, the RL is linguistically dominant.

3.2 SL speaker agentivity

SL speaker agentivity occurs when the speaker of the SL applies articulatory habits to the RL. Consider the definition in (4).

4) The SL speaker (agent) adapts the RL to the SL.  
   (van Coetsem, 1988, p. 11)

---

2 Simon (2011) provides the following quote from Winford (2000, p. 6) on linguistic dominance: "In borrowing, materials from a non-dominant SL are imported into an RL via the agency of speakers for whom the latter is the dominant or primary language, i.e., RL agentivity...In imposition, the SL is the dominant (usually the first or primary) language of the speaker, from which materials are transferred into an RL in which the speaker is less proficient, i.e. SL agentivity." Thus, linguistic dominance is a psycholinguistic notion; a linguistically dominant language is the language in which the speaker has a greater proficiency. Simon (2011) indicates that linguistic dominance as used by van Coetsem differs from *social dominance*. Social dominance refers to the social status of the RL when compared to the SL, but is equally important to consider when examining historical contact situations (van Coetsem, 1988).
Van Coetsem uses another example from English and French to illustrate (4). When a native speaker of French, the SL, is using English, the RL, and pronounces a word like *pit* as [pit] instead of *[pʰɪt]*, the speaker applying SL articulatory habits to the RL (van Coetsem 1988). In this case, the French speaker is using the native [p] and [i] instead of the English [pʰ] and [ɪ], thus, these forms are included in the RL by the SL agent. Van Coetsem (1988) argues that in cases in which he SL speaker applies the articulatory habits of the native language to the RL, the SL speaker is actively the agent and the RL is the recipient of the action. This type of phonological process is referred to as *imposition*, which is an adaptation under SL agentivity (van Coetsem, 1988).

In contrast to RL agentivity, in contact situations in which the SL speaker is the agent, imitation can appear as an independent mechanism if the SL speaker learns to imitate the RL pronunciation (van Coetsem, 1988). This can be seen in the diagram in (5).

5)  
```
<table>
<thead>
<tr>
<th>(SL agentivity)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(SL speaker = agent, RL = recipient of the action)</td>
</tr>
<tr>
<td>step 1: adaptation</td>
</tr>
<tr>
<td>↓</td>
</tr>
<tr>
<td>phonological imposition</td>
</tr>
</tbody>
</table>
```

The diagram in (5) illustrates SL dominance. The SL agent is a SL dominant bilingual with a functional knowledge of the RL (van Coetsem, 1988). In cases such as these, the SL agent is stronger in the SL than the RL.

### 3.3 West Germanic stop systems

West Germanic stop systems (Dutch in particular) have been examined in detail throughout the literature, more recently by Iverson & Salmons (2003, 2008) and Simon (2009, 2010, 2011). As Simon (2011) remarks, a LC account for the laryngeal system of Dutch has been proposed by Iverson & Salmons (2003, 2008) and Kloeke (1954). The prevoiced unaspirated stop system of Dutch is thought to be a result of a contact situation between speakers of a Germanic aspirating system and speakers of a Romance voicing system (Simon, 2011). Based on van Coetsem’s (1988) framework, Simon (2011) proposes two different hypotheses to account for the Dutch stop system. These hypotheses can be seen in (6).

6)  

a. Hypothesis 1: The Imposition Hypothesis  
Speakers of the Romance SL are the agents who impose the stop system of their linguistically dominant language onto the Germanic RL in which they become bilingual. The Romance speakers retain their stop systems (prevoiced and voiceless unaspirated stops), and do not adopt the aspirating system of the Germanic language (non-prevoiced and voiceless aspirated stops).

b. Hypothesis 2: The Borrowing Hypothesis  
Speakers of the Germanic RL become bilingual with the Romance language, and have borrowed the voice system of the Romance language when speaking their
Germanic language. Essentially, the Germanic speakers abandon their aspirating stop system (non-prevoiced and voiceless aspirated stops) in favour of the Romance stop system (prevoiced and voiceless unaspirated stops).

(adapted from Simon, 2011, p. 234)

Importantly, in both the Imposition Hypothesis and the Borrowing Hypothesis the SL is a Romance language and the RL is a Germanic language; the difference between the two hypotheses exists in speaker agentivity (Simon, 2011).

3.4 Van Coetsem (1988) on language acquisition

As discussed above, van Coetsem’s framework refers to SL bilinguals (SL/RL) and RL bilinguals (RL/SL). The difference between these two types of bilinguals depends on the type of linguistic transfer (imposition vs. borrowing) and the linguistic dominance of the speaker (van Coetsem, 1988). Thus, a shift in the speaker’s first language is a change from one type of bilingual to another. If the change happens over time, the RL bilingual is said to change into a SL bilingual, and if the dominant language use is situation dependent, the speaker is said to be partly a RL bilingual and partly a SL bilingual (van Coetsem, 1988). Importantly, van Coetsem states that a shift in linguistic dominance can affect a group of individuals or a speech community. This is an important notion to keep in mind, as it is relevant for how LC and SLA play a role in language change.

In situations of RL agentivity, imitation signifies the acquisition of certain phonological properties of the SL by the RL speaker, specifically in terms of supplementing the RL by borrowing (van Coetsem, 1988). However, in situations of SL agentivity, imitation is said to be true acquisition, specifically realized as SLA (van Coetsem, 1988). Van Coetsem (1988) asserts the importance of remembering that imitation is a secondary mechanism in SL agentivity situations (see the diagram in (5)), and since imitation is not a necessary part of SL agentivity, neither is acquisition. Consider the diagram in (7).

7) SL agentivity
   (SL speaker = agent, RL = recipient of the action)
   step 1: adaptation
   ↓
   phonological imposition
   step 2: imitation
   ↓
   SLA
   (adapted from van Coetsem, 1988, p. 18)

Crucially, there is a change in process between adaptation and imitation as shown in (7). In particular, there is a shift from a strictly transfer procedure (SL to RL), to a process of language acquisition, with the RL as the target language and the SL as the learner’s native language (van Coetsem, 1988).

Arguably, adaptation in SL agentivity happens in compensation for incomplete language acquisition (van Coetsem, 1988). In other words, the speaker uses properties of their native language to fill in gaps during acquisition. In particular, imposition affects the RL in the speech of the SL, but the degree of imposition decreases as the acquisition
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process progresses (van Coetsem, 1988). Specifically, the more aspects of the RL grammar that the SL agent acquires, the less the SL agent will have to impose portions of the SL grammar onto the RL in order to fill in informational gaps in the RL. This claim illustrates the amount of psycholinguistic effects present in a LC situation. Consider Figure 1.

![Figure 1: Acquisition and imposition in language contact (van Coetsem, 1988, p. 19)](image)

As time increases, acquisition begins to reach a maximum and imposition begins to reach to a minimum. It is important to remember that with SLA in particular, the grammar may fossilize before acquisition reaches a true maximum and imposition reaches a true minimum. That is, aspects of the target language may never fully be acquired, and as such, it is expected to see continued imposition on the part of the SL to fill in for incomplete acquisition.

4 Second language acquisition data

When drawing connections between language acquisition language contact it is important to examine data from both subfields. This section reviews a production study that was discussed in detail by Simon (2009 & 2011). Simon (2009) completed a study which investigated the acquisition of a laryngeal *aspirating system* (English) by speakers of a *voicing system* (Dutch). In this study, data from VOTs in learners’ productions provide information on how well learners have acquired the target language stop system, i.e. target-like VOTs in English.

As discussed in section 2.2, Dutch and English stop consonants can be distinguished on the basis of VOT; the Dutch stop system is typical of a voicing language and the English stop system in English is of a typical aspirating language. Essentially, the production study was designed to examine the extent to which advanced learners of English who speak Dutch as a native language can shift the boundary between the categories of stops from their native language to the target second language (Simon, 2011).
4.1 Simon’s production study

Participants were asked to complete a word-reading task in both Dutch and English that contained stop-initial words which were read from a computer screen; word-initial forms were elicited because the contrast between the two stop categories is maintained in both voicing and aspirating languages in word-initial position, but variations in voicing exist in stop consonants produced in word-medial and word-final positions (Simon, 2011). A control group of native speakers of British English completed the same reading task.

Table 2 shows the mean VOTs produced for each voiceless stop. Data from the native speaker control group is in the L1 English column.

<table>
<thead>
<tr>
<th></th>
<th>L1 Dutch</th>
<th>L1 English</th>
<th>L2 English</th>
</tr>
</thead>
<tbody>
<tr>
<td>/p/</td>
<td></td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>/t/</td>
<td>23</td>
<td>73</td>
<td>64</td>
</tr>
<tr>
<td>/k/</td>
<td>29</td>
<td>76</td>
<td>86</td>
</tr>
<tr>
<td>mean</td>
<td>21</td>
<td>76</td>
<td>77</td>
</tr>
</tbody>
</table>

(Simon, 2011, p. 238)

Close to all L1 Dutch subjects produced longer VOTs in English than in Dutch, which suggests that they have target-like productions of the voiceless stops.

Table 3 shows the number of tokens produced with prevoicing. As Simon (2011) suggests, it is the presence or absence of prevoicing that cues the contrast in Dutch, rather than prevoicing duration (see van Alphen, 2004 for a discussion). The Dutch participants' data is seen in the L1 Dutch and L2 English columns, and data from the native speaker control group is in the L1 English column. Simon (2011) points out that the production of the voiced velar stop /g/ generally does not exist in Dutch, so the production of /g/ was not examined.

<table>
<thead>
<tr>
<th></th>
<th>L1 Dutch</th>
<th>L1 English</th>
<th>L2 English</th>
</tr>
</thead>
<tbody>
<tr>
<td>/b/</td>
<td>95/100 (-130 ms)</td>
<td>29/100 (-82 ms)</td>
<td>95/100 (-113 ms)</td>
</tr>
<tr>
<td>/d/</td>
<td>91/100 (-117 ms)</td>
<td>26/100 (-79 ms)</td>
<td>90/100 (-105 ms)</td>
</tr>
<tr>
<td>mean</td>
<td>186/200 (-124 ms) (93%)</td>
<td>55/200(-81ms) (28%)</td>
<td>185/200 (-109 ms) (93%)</td>
</tr>
</tbody>
</table>

(Simon, 2011, p. 239)

Ultimately, the Dutch learners of English produced target-like aspiration, but did not learn to produce target-like short-lag stops. Simon (2011) argues this is likely a case of transfer of Dutch prevoiced stops into English, i.e. learners displayed a mixed system at the time of testing.

In the next section, I provide a more detailed account of the production data using van Coetsem’s (1988) framework. Simon (2011) briefly discusses the idea that the mixed system shown in her production data could be transitional. Although her Imposition Hypothesis as seen in (6a) can account for the L2 acquisition data, she does not provide a detailed account of the data using van Coetsem’s claims regarding imposition and
acquisition. I argue that while SLA data can act in an informative capacity when describing historical contact situations, a detailed description of the acquisition data in a LC framework is needed.

4.2 Second language acquisition of English stops in van Coetsem’s framework

The production data discussed above are an example of imposition as defined by van Coetsem (1988) and spelled out by Simon’s (2011) Imposition Hypothesis.

Regarding the data presented in section 4, Dutch is the SL, and English is the RL in which the learners will eventually become bilingual. However, as shown in section 3, it is not as simple as saying that the Dutch speakers retain their stop system, since the data show that they have at least acquired the VOT for English voiceless stops. Unfortunately, Simon (2011) does not go into detail regarding the similarities between the acquisition data and the contact situation. Moreover, Simon (2011) suggests that the mixed laryngeal systems are common throughout the world’s languages and that the learner’s interlanguage grammars exhibited in her earlier work (Simon, 2009) can be considered natural grammars. However, she does not discuss the possibility that their grammars will change as acquisition progresses and as van Coetsem’s framework predicts. I argue that the data can be more accurately accounted for with a more in depth analysis using van Coetsem’s framework.

Consider the diagram in (8), which illustrates the similarities between the hypothesis for the Dutch voicing system and the acquisition data from Simon (2009 & 2011).

8) Dutch voicing contact hypothesis:

| SL agentivity (imposition) |
| SL Romance (linguistically dominant) | ⇒ | RL Germanic |
| Romance prevoiced stops | ⇒ | Germanic prevoiced stops |

\[
\begin{align*}
\text{SL agentivity} & \\
\text{(SL/Romance speaker = agent, RL/Germanic = recipient)} & \\
\text{step 1: adaptation} & \quad \text{down} & \quad \text{step 2: imitation} & \quad \text{down} & \quad \text{phonological imposition} & \quad \text{SLA}
\end{align*}
\]

In (8), the Romance SL speaker is imposing the voicing system onto the Germanic aspirating language. If the difference in voicing and aspirating languages is due to phonetic implementation of the feature [voice], then the Romance SL is imposing its implementation of [voice] onto the Germanic system, resulting in voicing beginning earlier in prevoiced stops than short-lag stops, (compared to voicing beginning earlier in short-lag stops than long-lag stops in Germanic). However, if the difference in voicing and aspirating languages is due to a difference in phonological features, then the Romance SL is imposing its contrastive [voice] feature on the aspirating Germanic RL which employs [spread glottis] as the contrastive phonological feature in its stop system. As Simon (2011) states, this is an
attractive analysis given the complexity of the nature of the laryngeal system in Dutch; Dutch has Romance-like stops and Germanic-like fricatives (see Iverson & Salmons, 2003 for a detailed discussion). A diagram of outlining the process of acquiring the L2 English stop system by L1 Dutch speakers can be seen in (9).

9) L1 Dutch acquiring L2 English stop system:
   SL agentivity (imposition)
   SL Dutch (linguistically dominant) $\Rightarrow$ RL English
   Dutch prevoiced stops $\Rightarrow$ English produced with prevoicing

As previously mentioned, van Coetsem (1988) argues that there is a change in process between step 1 and step 2. Specifically, there is a shift from a strictly transfer procedure (SL to RL), to a process of language acquisition with the RL as the target language and the SL as the learner’s native language. Recall that the data presented in section 4 show that the speakers of Dutch learn the VOT distinction for English word-initial voiceless stops, but they have not learned to suppress prevoicing in English word-initial voiced stops. This suggests that while the process has shifted from strictly a process of imposition to a process of acquisition, the acquisition of the English stop system is not complete as the Dutch speakers are still imposing the prevoicing of voiced stops. Consider Figure 2.

Figure 2 is meant to illustrate the stage of acquisition of the English stop system by speakers of Dutch, and the stage of imposition of the native Dutch stop systems on the RL English, respectively. Importantly, acquisition has not reached a maximum and imposition has not reached a minimum. Thus, the data in section 4.1 match what we would expect to see at this point in the process, namely that part of the English stop system has been
acquired, but imposition of part of the Dutch system on the target language is still occurring.

5 Traditional generative approaches

5.1 An overview of the generative approach to acquisition and language change

One fundamental generative notion is that language change can affect synchronic grammars, and synchronic grammars can affect language change (Dresher, 2015). In fact, Dresher claims that diachronic processes cannot be fully understood without an analysis of synchronic processes. As Dresher (2015) points out, language acquisition occurs on the basis of evidence available to learners in their environments. Although different cognitive processes must be defined to explain how language acquisition takes place, it can be said that language learners are the locus of language change.

Under this approach, we would fully expect children’s grammars to be the same as their parents’ grammars if what they heard was exactly what their parents heard as children (Dresher, 2015). If this were indeed the case, language change would not occur. However, it is indeed not the case that children hear the same language their parents heard as children. Dresher (2015) states that language is always changing in minor ways, and that in some cases, minor changes will not be enough to affect change in a learner’s grammar but in other cases, these minor changes may be enough for a child to converge on a grammar that is different than the grammar of their parents, causing changes in the grammar that may trigger future changes. Dresher (2015) suggests that even if one assumes that not all language change is a result of language acquisition, it is clear that at least some language change is a direct result of acquisition processes.

Importantly, the generative notion of grammar must be defined to provide a clear account of the relationship between synchronic and diachronic processes. As stated by Dresher (2015), sounds have two representations: (i) a phonetic representation that approximates its pronunciation, and (ii) a phonemic representation that represents its contrastive value within the phonological system. Generative theories state that phonemic representations are underlying, i.e. in a learner’s mental grammar. Essentially, for generativists, grammars are just a set of ordered rules. Both synchronic and diachronic changes are expressed in terms of these rules, allowing one to explain the relationship between the two processes (Dresher, 2015). Specifically, rules that are based on diachronic events enter the synchronic grammars of language users, but it is not the case that language users merely mimic rules that exist diachronically (Dresher, 2015). Chomsky and Halle (1968) suggest that the grammars contain rules which reflect historical changes, but a change persists only if future generations continue to acquire a grammar containing those rules (see Dresher, 2015). Thus, it is clear that generative theories of language attempt to connect synchronic and diachronic linguistic processes. The following section discusses the data presented earlier in this paper from the traditional generative approach.
5.2 Laryngeal stop systems from a generative approach

A grammar, in the generative sense, is a set of ordered rules. The following examples illustrate possible rules for VOT from both a phonetic perspective, in which [voice] is a contrastive feature that is implemented in different ways (i.e. the Single Feature Hypothesis), and a phonological perspective, in which voicing and aspirating languages differ in the contrastive feature used (i.e. Multiple Feature Hypothesis). Note that the rules can apply in both a Romance/Germanic contact situation, or a L1 Dutch/L2 English acquisition situation.

The examples in (10) show what the underlying laryngeal stop systems look like under a Single Feature Hypothesis.

10) Single Feature Hypothesis
   a. word-initial voiced stops in voicing languages and aspirating languages
      /b/ = [-cor, +ant, -cont] -> [+voice] / #_
      /d/ = [+cor, -ant, -cont] -> [+voice] / #_
      /g/ = [-cor, -ant, -cont] -> [+voice] / #_
   b. word-initial voiceless stops in voicing languages and aspirating languages
      /p/ = [-cor, +ant, -cont] -> [-voice] / #_
      /t/ = [+cor, -ant, -cont] -> [-voice] / #_
      /k/ = [-cor, -ant, -cont] -> [-voice] / #_

Under the Single Feature Hypothesis, voicing languages and aspirating languages make use of the same contrastive features, and the differences in VOT between prevoiced, short-lag, and long-lag stops are articulatory in nature. In other words, word initial-voiced stops in both voicing and aspirating languages have the same underlying representation, and the same phonological rules apply to the phonemes. The same story can be told for word-initial voiceless stops in these languages. Regarding language acquisition and historical contact, there is no change to a speaker’s underlying system (i.e. competence). Instead, learner’s must shift articulatory processes to produce stops in the target-like range (i.e. performance).

Next, the examples in (11) show the underlying laryngeal stop systems with respect to the Multiple Feature Hypothesis.

11) Multiple Feature Hypothesis
   a. word-initial stops in voicing languages
      /p/ = [-cor, +ant, -cont] -> [-voice] / #_
      /t/ = [+cor, -ant, -cont] -> [-voice] / #_
      /k/ = [-cor, -ant, -cont] -> [-voice] / #_
      /b/ = [-cor, +ant, -cont] -> [+voice] / #_
      /d/ = [+cor, -ant, -cont] -> [+voice] / #_
      /g/ = [-cor, -ant, -cont] -> [+voice] / #_
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b. word-initial stops in aspiring languages

/p/ = [-cor, +ant, -cont] -> [+spread glottis] / #_
/t/ = [+cor, -ant, -cont] -> [+spread glottis] / #_
/k/ = [-cor, -ant, -cont] -> [+spread glottis] / #_
/b/ = [-cor, +ant, -cont] -> [-spread glottis] / #_
/d/ = [+cor, -ant, -cont] -> [-spread glottis] / #_
/g/ = [-cor, -ant, -cont] -> [-spread glottis] / #_

Under the Multiple Feature Hypothesis, voicing languages and aspirating languages make use of different contrastive features, and differences in VOT between prevoiced, short-lag, and long-lag stops are a result of underlying specifications. In other words, word initial-voiced stops in voicing and aspirating languages have different underlying representations, and thus different phonological rules apply to the phonemes. The same story can be told for word-initial voiceless stops in these languages. In terms of SLA and LC, learners must replace the contrastive feature of their L1 with the contrastive feature of the L2. Another possibility is language learners would be able to acquire a new L2 phonological feature without losing the feature of the L1, however, this solution to the acquisition problem results in the learner’s phonological system being ‘overmarked’, where voiced and voiceless stops would be distinguished by both [spread glottis] and [voice]. Further investigation is needed to sort out the differences between the two paths of acquisition. Crucially, however, both processes of acquisition result in changes in the learner’s underlying systems (competence). The proposed overmarked system can be seen in (12).

12) Overmarked laryngeal stop system of L2 learners

a. word-initial voiceless stops

/p/ = [-cor, +ant, -cont] -> [-voice, +spread glottis] / #_
/t/ = [+cor, -ant, -cont] -> [-voice, +spread glottis] / #_
/k/ = [-cor, -ant, -cont] -> [-voice, +spread glottis] / #_

b. word-initial voiced stops

/b/ = [-cor, +ant, -cont] -> [+voice, -spread glottis] / #_
/d/ = [+cor, -ant, -cont] -> [+voice, -spread glottis] / #_
/g/ = [-cor, -ant, -cont] -> [+voice, -spread glottis] / #_

Van Coetsem (1988) uses the terms code vs. message to describe the competence vs. performance distinction. In reference to the hypothesized Romance/Germanic contact situation, the Romance SL which is linguistically dominant, imposes its system onto the Germanic system. Specifically, the Romance SL code (i.e. competence) becomes part of the Germanic RL message (i.e. performance). Imposition fully shifts to acquisition when the SL code becomes the RL code, in this case, the laryngeal stop system of the Romance language becomes part the competence in the Germanic aspirating system. Regarding the L1 Dutch/L2 English acquisition environment, the Dutch SL which is linguistically dominant, imposes its system onto the English system. Specifically, the Dutch SL code (i.e. competence) becomes part of the English RL message (i.e. performance). In the case of the acquisition data presented in section 4.1, learners have not fully acquired the L2 English aspirating system, and thus are still imposing a portion of the SL competence on the RL system.
Ultimately, in order to link synchronic acquisition findings with diachronic data, a theory must be able to make the same predictions regarding both environments. The brief discussion here shows that traditional generative theories can provide rule-based accounts for both synchronic acquisition data and diachronic contact data, though not without the problem of having to sort out an overmarked system.

6 Exemplar Theory

6.1 An overview of Exemplar Theory

The goal of phonological theory as conceived by generativists (see section 5) is to describe: (i) relations between physically distinct sounds that are taken to be 'the same' in some sense, i.e. allophonic relations; (ii) associations between morpheme variants that exist in a variety of contexts; (iii) phonological units such as features, segments, syllables, feet, etc.; and (iv) universal and language specific properties of phonology (Bybee, 2001). Exemplar Theory (ET) does not make the same assumptions as generative approaches, but arguably accomplishes the same goals while also accounting for facts that generative approaches cannot.

As seen in section 5, traditional structuralist or generativist models suggest that material derived solely by rules does not also appear in the lexicon; ET rejects this notion (Bybee, 2001). Furthermore, generative approaches argue that complexity in language is reduced by extracting regularities and proposing rules, and only idiosyncratic information is stored in the lexicon (Bybee, 2001). Thus, as Bybee (2001) remarks, the goal of linguistic analysis in generative approaches is to determine what material is idiosyncratic and what is predictable by rule. These claims contrast with those of ET which suggest that there is full lexical storage of all phonological material, and phonological forms are not in fact derived by rules.

Humans process linguistic stimuli in the same way we process other external stimuli, and even predictable information is perceived and stored by our brains (Bybee, 2001). In particular, our reactions to predictable features differ from our reactions to unpredictable features; Bybee (2001) also states that predictable properties are mapped onto previously existing similar or identical experiences, and unpredictable properties result in the creation of new representations. Consequently, mental representations are shaped by how frequently words and phrases are used, and how frequently words and phrases are repeated (Bybee, 2001). Since repetition affects cognitive representations, it can be argued that language use changes the grammar (Bybee, 2001). As soon as a language user experiences a phonetically distinct token, it is registered in the exemplar cloud; the first instance of language experience carries with it the potential to change mental grammar, in effect, instituting a language-wide sound change (Bybee, 2001).

Storage in the lexicon is structured and based on regularities and similarities in stored linguistic forms; when a word is activated, phonetically similar words are activated as well (Bybee, 2001). Bybee (1985) proposes a two-dimensional visual representation which illustrates relations between forms as connecting lines, where activation of one item spreads to other items that are connected by the lines. This model can be seen in (13).
13) \([\text{\textperiodcentered\textperiodcentered\textperiodcentered\textperiodcentered\textendash\textendash\textendash\textendash\textendash n d}]\) is a possible syllable rhyme: \([\$\_\text{\textperiodcentered\textperiodcentered\textperiodcentered\textperiodcentered\textendash\textendash\textendash\textendash\textendash n d\$]\)

The structure in (13) can be thought of as an associative network where storage is redundant; words are stored even if they are predictable from morpheme combinations, storage is context dependent with words stored multiple times if they are used in different contexts, and similarities in meaning and form are associated with one another across items (Bybee, 2001). Essentially, lexical storage entails a network of connections between related items making storage more efficient (Bybee, 2001).

ET is subject to frequency effects given that lexical storage is based on usage. That is, how often a linguistic form is used can affect how the item is stored in the lexicon. As previously discussed, subsequent tokens of use map onto existing forms. This means that high-frequency items have stronger connections and become easier to access, and less frequently used items may fade in strength and thus become more difficult to access (Bybee, 2001). Bybee (2001) suggests a result of these claims is that high frequency forms are not prone to regularization because regularization only occurs when forms are difficult to access.

A usage-based model such as ET makes different predictions in terms of language change and language acquisition than a traditional rule-based generative approach. The following section discusses the data presented in this paper from the approach of ET.

6.2 Laryngeal stop systems from an Exemplar Theory approach

Unlike generative approaches, stored representations in ET are not written out in phonemes, but instead contain predictable features (Bybee, 2001). In the previous section, it was noted that in an ET approach, all phonetically distinct items are stored in mental representations. Bybee (2001) points out that discussions of categorical perception are relevant when discussing how items are perceived and stored. Given that items which are phonetically similar are stored together, we would expect short-lag stops to be stored in close proximity to other short-lag stops for instance. This would also be the case for prevoiced stops and long-lag stops. In an ET approach, rather than storing phonemic
representations that are subjected to rules before production, fully specified lexical entries are stored.

In terms of language acquisition and transfer in historical contact situations, more exposure to exemplars of the system which is being acquired will create stronger associations in the lexicon. The acquisition of the English aspirating system by native speakers of Dutch appears to be a gradual process. These data are in concordance with Bybee’s (2001) claim that phonetic change can be gradual and produce variation. The results show that Dutch learners of English have attained target-like production of voiceless stops. This suggests that the lexical representations of such exemplars have strengthened in such a way that the Dutch speakers have overwritten their L1 voicing tendencies, that is, they are no longer imposing their SL voicing system on long-lag stops in the RL. This is not the case for the Dutch productions of short-lag stops in their L2. In particular, they are imposing the prevoicing qualities on the English RL. One possible prediction is that through enough exposure to target-like forms, the representations of the English short-lag stops will strengthen in such a way that learners will produce target-like short-lag stops.3

More data are needed to make claims regarding the speed of change in the hypothesized Romance/Germanic contact situation. However, given that the Romance SL has imposed the voicing system onto the stops of the Germanic RL, we could say that through continued usage, connections in the Romance stop system strengthened and became easier to access, with the opposite process occurring in the Germanic stop system. More investigation needs to be completed in terms of frequency of exposure and speed of change in order to make strong claims regarding the processes involved in the hypothesized Romance/Germanic contact situation.

Importantly, we are not left with the same problem of an overmarked system given that phonemes and voicing rules are not stored in the lexicon. Since all new tokens are stored, and connections relating to recurring tokens are strengthened through usage, there is no need to posit a system that stores phonemes and phonological rules, which means overmarked lexical items simply do not exist. Ultimately, the ET approach seems to be able to make the same predictions regarding synchronic and diachronic processes. Moreover, while more data are needed to make claims about frequency and rate of change, an ET approach appears to resolve the problem of acquisition and LC resulting in overmarked representational systems.

7 Conclusion

The Uniformitarian Principle suggests that the influences we observe today are the same influences that played a role in historical language change. This paper examined the linguistic forces which are taking place when two laryngeal stop systems come into contact in SLA and in LC. The current discussion shows that the SLA data presented in Simon (2009 & 2011) can be better explained by a more detailed account using van Coetsem’s (1988) framework. In particular, simply stating that the acquisition properties are an example of imposition is not enough to connect the findings from SLA data to hypothesized historical

3 I will briefly note here that further investigation should include discussions of bilingual storage of exemplars.
The relationship between synchronic and diachronic linguistic processes

contact situations. Furthermore, an examination of the data from the perspective of both traditional generative theories and Exemplar Theory illustrates that the Uniformitarian Principle holds for language acquisition and LC, and that each approach is able make the theory-internal predictions for both the synchronic and diachronic data. Additionally, the problem of an overmarked system that arises under the Multiple Features Hypothesis in generative approaches is not an issue for Exemplar Theory.

On the surface, it appears as if the theories examined here can account for synchronic SLA data and diachronic LC data showing that the Uniformitarian Principle holds true. However, a more detailed historical dataset would allow for predictions to be made in terms of frequency of tokens and rate of change. Overall, it is clear that investigating the relationship between synchronic and diachronic processes is informative, and bringing together investigations of SLA and historical processes will continue to be a fruitful area of research.

References


Contact Information

Lindsay Hracs
lindsay<dot>hracs<at>ucalgary<dot>ca
University of Calgary
School of Languages, Linguistics, Literatures and Cultures
University of Calgary
Craigie Hall D310, 2500 University Dr. N.W.
Calgary, AB T2N 1N4 Canada