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FINAL DEVOICING AND
ORTHOGRAPHICAL INTERFERENCE
IN GERMAN

By

Jonathan Blaine Abuhl

A THESIS

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ABSTRACT

FINAL DEVOICING AND ORTHOGRAPHICAL INTERFERENCE IN GERMAN

By

Jonathan Blaine Abuhl

The final devoicing rule of German is somewhat difficult for American students to learn. This thesis reviews the theory of markedness and how it relates to final devoicing and reports two experiments which examine the relationship. The participants in both experiments were American students of German. The second study had more participants and produced significant results. Two main factors were analyzed: task and class level of subjects, who were presented with pictures, words and a text to recognize or read accordingly. The subjects were recorded and their responses were checked for final devoicing. The responses in the picture phase were more likely to be devoiced than those in the word-reading phase. The responses in the word-reading phase were also more likely to be devoiced than those in the text-reading phase.

TO LAURA

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Introduction

To aid in the understanding of foreign language acquisition, it is useful to examine certain recurring phenomena which students typically encounter in learning a foreign language. Each foreign language has its own unique obstacles which present themselves to the native English speaker. The German language is no exception. One troublesome phenomenon in German is what is commonly known as final devoicing. Acquisition of the rule of final devoicing of obstruents by American students is relatively problematic.

There are two main foci in this thesis: First is the markedness of the rule of final devoicing. Second is the presentation of an experiment that will give support for the hypothesis of orthographical interference in a native English speaker's acquired final devoicing of German. The hypothesis is that the final devoicing rule, as acquired by native English speaking students of German, is influenced by German orthography. This influence is manifested in different degrees depending on the task which is used to elicit the students' verbal responses. Each task used to get a response focuses on a different variable to influence devoicing: markedness, orthographical interference and monitoring. There are three predictions that can be made based on these variables. When recognizing a picture, students will be most likely to devoice. When reading a

word-list students will be less likely than with the picture presentation to devoice properly. When reading a text students will be the least likeliest to devoice properly. The reasoning for these predictions can be found in chapters two and three. Hypotheses are formalized in chapter four.

A brief explanation of the German language concerning the problem of devoicing is presented in Chapter 1. Chapter 2 introduces the theory of markedness and the relationship between devoicing and markedness. Language learnability is discussed in Chapter 3, where it is argued that final devoicing is relatively easier to learn by native English speakers than final voicing is by native German speakers. Orthographical interference and response time are also dealt with in this chapter. Chapter 4 introduces a pilot study, examining the effects of orthography on those native English speakers who have acquired the final devoicing rule. Because of the unrefined nature of the pilot study, a more in depth look at this subject was warranted. Thus, Chapter 5 describes the modified experiment, and Chapter 6 its results and the statistical interpretation of those results. Chapter 7 is reserved for the author's post-experiment comments, and additional remarks, including the realization that the final experiment was inconclusive and that the hypothesis is worthy of further research.

Chapter 1

Final devoicing in German

1.0 German, as well as other languages including Russian and Turkish, has devoicing of final obstruents. All voiced obstruents are devoiced in final position. The obstruents are the fricatives and the stops. Final position is before a word or syllable boundary. The controversy concerning the syllable boundary, while briefly mentioned, will not be examined in this thesis.

1.1 Final devoicing in German

The relationship between German spelling and pronunciation is quite straightforward, leaving the student with few exceptions to learn. However, one exception concerns final devoicing. In final position, although obstruents are pronounced without voice, the orthography may show a voiced grapheme. That devoicing is word-final is uncontroversial. Whether devoicing is syllable-final (Benware 1986:66) is, however, the focus of some debate. Vennemann (1972:13) shows how some German words can be "resyllabified"; the final phoneme of one syllable can re-attach itself to the beginning of the following syllable. This would result in the voicing of the otherwise devoiced obstruent. The author has also observed this phenomenon with a pausal schwa: a native German speaker said the normally devoiced und /unt/, but followed by a pausal schwa. This created the bisyllabic phonological word /undə/.

Only word-final devoicing is considered here. The controversy surrounding syllable-final devoicing and the definition of the syllable are not dealt with in this study.

In the first of the examples below, the German word for day, /tak/, is pronounced /tagð/, with the plural inflection. These words are just a few examples that point to the fact that German has no final voiced obstruents, and that some final voiceless obstruents correspond to voiced obstruents followed by suffixes, e.g. the plural inflection. Attention must be given to the final obstruent phoneme with and without inflection in order to recognize the final devoicing phenomenon. The last three examples show that the rule is of final devoicing, not prevocalic voicing.

Table 2-1 Examples of Final Obstruents

<u>English</u>	<u>German</u>	<u>without inflection</u>		<u>with inflection</u>
day	Tag	/tak/	Tage	/tagð/
half	halb	/halp/	halbe	/halbð/
child	Kind	/kint/	Kinder	/kindâ/
forest	Wald	/valt/	Wälder	/veldâ/
house	Haus	/haus/	Häuser	/hoyzâ/
nerve	Nerv	/nerf/	Nervös	/nervö:s/
bed	Bett	/bet/	Betten	/betðn/
casual	salopp	/zalop/	saloppe	/zalopð/
cupboard	Schrank	/šrank/	Schränke	/šrenkð/

1.2 Theories concerning final devoicing

The following is a short introduction of theoretical aspects of final devoicing, including formalizations and other considerations. Brakel (1983:4) gives his version of an acceptable representation of the final devoicing phenomenon. He uses two different words as examples: bund 'colorful' /bunt/ and Berg 'mountain' /berk/.

Using distinctive features and the generative approach, a rule such as

$$[+occlusion] \rightarrow [+surd] / __\#$$
 could be written and interpreted as either a phonotactic constraint of certain Germanic and Slavic languages or as a rule converting voiced stops to voiceless ones in word final position.

Employing more main-stream terminology, Eckman (1981:197) presents the rule:

$$[-sonorant] \rightarrow [-voice] / __\#$$

Many introductory linguistic textbooks use German final devoicing as the prime example of neutralization. Neutralization refers to the suspension of a phonemic contrast. "If a phonemic contrast generally observed is not found in a given environment, it is invariably a two-way opposition that is involved and normally it is the unmarked member of such an opposition that occurs in the PLACE OF NEUTRALIZATION" (Katamba 1989:39). Neutralization is influenced by markedness. "The concept of markedness which thus appears for the first time in Prague school phonology is tied directly to the nature of neutralization" (Anderson, 1985:110). Markedness will be discussed further in Chapter

two.

Recently, Dinnsen (1985:267) has disputed the claim that German devoicing is neutralization, and he notes research by Port, Mitleb & O'Dell (1981) and O'Dell & Port (1983) to support his claim

that the underlying distinctions are preserved phonetically. In particular, it was found that a comparison of vowel durations before underlying voiced and voiceless obstruents word-finally showed longer vowel durations (by approximately 10%) before underlying voiced obstruents.

Moulton (1962:50) implies that orthography, i.e. voiced graphemes, might be the cause of certain phonetic distinctions, the voicing of a devoiced grapheme. However, Dinnsen and Charles-Luce (1984) have shown by their study that this is not the case in at least one language. Catalán exhibits final devoicing of obstruents without the representation of the voiced grapheme, e.g. <t> is written instead of <d> for devoiced /d/. Conversely, German words with underlying voice do exhibit the voiced grapheme. The study by Dinnsen and Charles-Luce in no way draws into question the existence of the phenomenon studied in this thesis. The auditory difference of voice in the word-final stop in German is measured in this thesis. Exact acoustic measurements and their interpretation are left for those who have the necessary apparatus. The equipment used in these experiments consists of a tape recorder and the human ear.

Chapter 2

Markedness

2.0 Introduction

Trubetzkoy postulated the construct of markedness which has survived almost 50 years of testing and examination. Many areas of Grammar have been considered that give support to his original construct which can be seen in even the most recent publications. The way a child learns his/her first language as well as the way an adult learns a second language gives evidence that final obstruent devoicing is unmarked. The Katakana orthographical system of Japanese points to the voiced obstruent character as being more marked than its voiceless counterpart. Statistical tendencies and implicational universals in languages of the world also show support that final devoicing is less marked and the "voice contrast hierarchy" gives evidence that voice is more marked. Finally, the physiological simplicity of devoicing points to the fact that voiced stops are more marked than voiceless stops. The study of markedness and its relationship with final devoicing are vital to this thesis. Since final devoicing is less marked, without the introduction of any other intervening variables, its acquisition could be assumed to be relatively easy. This chapter defines markedness and gives many examples that support this assumption.

2.1 Markedness

Trubetzkoy first adopted the term Markedness.

The question whether the 'strong' or the 'weak' opposition member of a correlation based on the manner of overcoming an obstruction of the second degree is unmarked can, in the final analysis, be determined objectively only from the functioning of the particular phonemic system. However, in any correlation based on the manner of overcoming an obstruction a 'natural' absence of marking is attributable to that opposition member whose production requires the least deviation from normal breathing. The opposing member is then of course the marked member. (Trubetzkoy 1969:146)

There are two different forms of markedness: logical and natural. A logically marked phoneme receives its "status for reasons internal to the phonological system of the language, and cannot be determined by phonetic criteria" (Anderson 1985:110). Anderson uses the final devoicing of German and Russian as an example of logical markedness. The devoicing is not obligatory because of any phonetic characteristic, e.g. the preceding phoneme or consonant harmony, but because of a boundary. A naturally marked phoneme is that phoneme of a pair that possesses a phonetic quality that distinguishes it from its partner, e.g. has a further deviation from normal breathing. For example, the voiced phoneme of a voice/voiceless pair is the marked phoneme. Normal breathing takes place without voice. The phoneme with the most phonetic characteristics, i.e. distinctive features, is the marked phoneme.

In 1962 Roman Jakobson, in an article on Ancient Greek Prosody, gave his definition of markedness: "a marked

category tends to be interpreted in relation to the unmarked one as a compound, complex category opposed to a simple one" (p. 266). The similarity in their definitions and the fact that Jakobson and Trubetzkoy were colleagues is just more evidence that Trubetzkoy positively influenced Jakobson and many other linguists with his time-tested theory.

Trubetzkoy's influence can be seen in even the most recent publications. For example, Katamba (1989:89) employs a definition of markedness as follows: "what is NATURAL can be said to be UNMARKED and what is not natural can be said to be MARKED, i.e. in some sense unusual." He also says that markedness is relative, i.e. dependent on circumstances.

2.1.1 Child language acquisition

More support for the markedness of final voiced obstruents can be found in the field of child language acquisition. Ingram observed the speech of children from 1;6-4;0 years of age. Although he discovered a wide range of variation among the children, he was able to conclude that the obstruents tended "to be...devoiced at the end of a syllable." (1986:227) For example, a child might say /bit/ instead of /bid/ for bead. We are not sure, however, whether this is for physiological or other reasons.

2.1.2 Adult learners of English

Altenburg and Vago (1987) also support final devoicing as a less marked phenomenon by their observation of the

speech of two adult Hungarians who were learning English.

Subject A occasionally devoiced a word-final obstruent even if the next word began with a voiced sound. Thus, we find examples like *band increases* (S16) and *end of* (S6), where the last consonant of the first word is phonetically voiceless. This process is not obligatory... The converse, i.e., word-final voicing before a following voiceless sound, is not found. (p.153)

The important factor in this example is that neither English nor Hungarian has final devoicing. Nevertheless, these speakers often devoiced. This lends credence to the theory that final voicing is more marked.

2.1.3 Japanese writing system

In the Japanese writing system Katakana, the voice/voiceless distinction is made apparent in the orthographical system by the addition of a diacritic, i.e. ". The /V/ represents all possible vowels that can follow that consonant, e.g. /ka/, /ki/, /ku/, /ke/, /ko/, etc. The voiced counterpart of /kV/, i.e. /gV/, is achieved by the addition of ". Likewise /tV/ becomes /dV/ and /sV/ becomes /zV/. This makes perfect sense in light of Jakobson's definition of a markedness as a "compound, complex category". The voiced category is the one with the additional element, making it orthographically more complex. This distinction is not made with the spelling of /bV/ and /pV/. Both of these bilabial characters receive different diacritics, which makes them both more complex than the underlying unmarked character of /hV/. The /bV/ receives " and the /pV/ receives '.

2.1.4 Universals

Greenberg (1963:xix) noted that there are implicational universals, of which:

It is asserted universally that if a language has a certain characteristic, (σ), it also has some other particular characteristic (μ), but not vice versa. That is, the presence of the second (μ) does not imply the presence of the first (σ).

Concerning voicing of obstruents, if a language has voiced obstruents, it has voiceless obstruents, but not vice versa (Eckman 1984:79). Eckman goes on to give one example of a non-implicational universal: "In all languages, there are least two color terms." There is no implication here. This is simply a fact about the languages of the world.

An example from syntax concerning agents in passive constructions: some languages, such as Persian and Arabic, have no expressed agents in their passive voice construction. Other languages, such as English and German, have the option of expressing the agent. If a language has expressed agents in the passive, it will also have passive constructions without an expressed agent. A [+agent] construction implies the [-agent] construction, but not vice versa.

more marked-----	less marked
expressed agent -----	no expressed agent

Regarding phonology, a language such as Korean has no voiced

stop phonemes; other languages, like English, do. If a language has voiced stops, it will have voiceless ones. The reverse is, however, not true. A [+voiced] obstruent implies the presence of a [-voiced] obstruent.

more marked-----less marked

[+voiced] obstruent-----[-voiced] obstruent

2.1.5 Voice contrast hierarchy

In 1977 Eckman conveyed an additional universal that points to the voiceless obstruent of a voice/voiceless pair as being the more marked, the "voice contrast hierarchy." If a language has word-initial voiced obstruents, it will have word-initial voiceless obstruents, but not necessarily voiced obstruents in the medial or final positions. Similarly, if a language has word-medial voiced obstruents, it will also have a word-initial voiced obstruents as well as word-medial and word-initial voiceless obstruents. Finally, if there are word-final voiced obstruents, there are word-initial and word-medial voiced obstruents as well as voiceless obstruents in all three positions. He clarifies this markedness phenomenon with the following diagram (p.322).



This shows that the word-final position is more marked because the existence of a voiced consonant in this position predicts the existence of voiced and voiceless consonants in all the other positions.

2.1.6 Physiological support

Support for the markedness of final voicing can also be found in the explanation of what happens to a person physically during voicing as opposed to not voicing. Flege (1982:118) claims that English speakers have to learn to suppress their (learned) final voicing, if they wish to accurately acquire a language such as German. He explains devoicing from a physiological perspective.

Speech researchers generally agree that devoicing is a "natural" consequence of aerodynamic factors tending to extinguish the transglottal pressure difference necessary for glottal pulsing during the closure interval of final stops. To produce fully voiced stops an English speaker may need to learn some means of diminishing the rate at which pressure increases during stop closure intervals.

From this description we can say that devoicing is more natural, easier and therefore less marked.

2.2 Conclusion

The concept that final devoicing is less marked than final voicing is overwhelmingly supported by the previous

sections. Each section illustrates the fundamental definition of markedness. Since final devoicing is less marked, the prediction is that English-speaking students of German will have little problem learning to devoice properly. This prediction is based on the assumption that if something that is simpler and less complex than an already existing ability, it will be quite simple to learn. This phenomenon is tested in the first task of both experiments, i.e. the students are asked to name a picture. Some of the pictures employ the final devoicing rule. Although this is not observed here, the voluntary German speech of the students could be predicted to be appropriately devoiced because of the main influence of markedness, when no other variables are introduced.

Chapter 3

Language Learnability

3.0 Introduction

The contrastive analysis hypothesis (CAH), although both logical and controversial at the same time, is very helpful when making predictions about the difficulties that second language learners will experience. Many theorists have attempted to predict the relative degree of difficulty of a certain language to be learned. The relative markedness of one language in comparison with the other would reasonably play an important role in its learnability by speakers of the other language. The markedness differential hypothesis (MDH) (Eckman 1977) combines both the concepts of the contrastive analysis hypothesis and markedness to produce a highly productive, insightful construct. Stockwell and Bowen's (1965) hierarchy of difficulty can give conflicting predictions concerning the ease of final devoicing acquisition. Orthographical interference and monitoring are also major factors in final devoicing acquisition. These theories and phenomena are discussed in this chapter.

3.1 The Contrastive Analysis Hypothesis (CAH)

Lado (1957:1) said, "in the comparison between native and foreign language lies the key to ease or difficulty in foreign language learning." Acceptance of the CAH is quite easy, since it appears very logical. Since German has no

final voiced obstruents and English does, according to the CAH, a native German would have difficulty learning to voice the final obstruents of English and a native American would have difficulty learning to devoice the final obstruents of German. However, the CAH makes no prediction about the relative degree of difficulty from one certain language being learned to the other; neither language learner would be said to have a more difficult task. As will shortly be discussed, the final voicing that must be learned by the former group is theoretically more problematic than the final devoicing that must be learned by the latter. This does not suggest, however, that final devoicing is easy, rather it is easier when compared to the task of final voicing encountered by native Germans learning English.

3.2 Language similarity

"An 'interlanguage' may be linguistically described using as data the observable output resulting from a speaker's attempt to produce a foreign norm, i.e., both his [sic] errors and nonerrors" (Selinker 1969:69). Corder (1978:86) sees the interlanguage process as one that is affected by the relative difference or similarities of target and native languages. Depending on the languages' nearness, the interlanguage will be formed by either a "restructuring" or a "recreating" strategy.

If we believe that another language is only distantly related structurally to our own (e.g., Chinese-English) we may opt for a recreative strategy, starting from scratch, on the grounds that the path to the target will be shorter, while if we believe that the target is closely related, (e.g., Danish-English) we may prefer a restructuring strategy as being more economical.

Regardless of the strategy, he believes that the language learner acquires simplified forms of the target language first. The two pairs of German phonemes listed below exemplify the simple and difficult distinction. The phonemes on the right are simpler than on the left.

/ü/-----/i/

/d/-----/t/

The /ü/ has every feature that the /i/ has plus lip-rounding. Similarly, the /d/ has every feature that the /t/ has plus voice. This is based on the assumption that lip-rounding and voicing are always more "marked". In fact, the more complex items are learned later than those that are simpler. This assumption might be argued, depending on the languages in question. In an imaginary language with all rounded vowels except one, the unrounded vowel could be argued in one sense as marked. This shows that the concept of markedness is often "relative" (Katamba 1989:89). Since I will be dealing with two Germanic languages, it is safe to assume that in the voice/voiceless distinction the voiced phoneme is marked.

3.3 Hierarchy of difficulty

Stockwell and Bowen (1965:10) have noted a "Hierarchy of Difficulty" based upon "the conditions of negative, positive, and zero transfer". They compare English and Spanish but their system can easily be adapted to apply to English and German. They have set up a three-way correspondence using the conditions of Op optional, Ob obligatory, and 0 zero. These conditions refer to the occurrence of certain phonological phenomena in the languages under contrast. The same phenomena are considered to predict whether there is negative, positive or zero transfer. Their hierarchy is written as follows:

Table 3-1: Stockwell and Bowen's Hierarchy of Difficulty

DIFFICULTY		COMPARISON	
Magnitude	Order	L1	L2
I	1	0	Ob
	2	0	Op
	3	Op	Ob
II	4	Ob	Op
	5	Ob	0
	6	Op	0
III	7	Op	Op
	8	Ob	Ob

An example of the most difficult correspondence, English 0 and German Ob, would be the phoneme /x/. English does not employ this velar fricative while German does. This would

cause negative transfer at its extreme and would theoretically be the most difficult to learn.

This hierarchy of difficulty lacks the ability to make unambiguous predictions concerning magnitude of difficulty relating to one phenomenon. For example, if our comparison looked at the graphemic presentation of both languages, we might say that English (L1) is obligatory in its representation of final stops by their graphemic counterparts, e.g. the voiceless velar stop is always represented by <k>, however this same stop is represented by either <g> or <k> in German (L2). For English this is obligatory, but for German this is optional. This analysis would put the final devoicing rule in the II magnitude, 4th order of difficulty. However, a manipulation of the formula can put the results in magnitude I, 1st order, e.g. English has no final devoicing = 0, German has obligatory final devoicing = ob.

3.4 Orthographical interference

A major problem studied in this thesis is the fact that native English speakers have to devoice a final stop, even though the final grapheme continues to show voice. In English the final graphemes , <d> and <g> are all pronounced with voice. In German they are devoiced. Lado (1957) pointed out this problem as follows:

the student transfers the habits from his [sic] native language to the foreign one, he [sic] will have difficulty both in reading and in writing the foreign language whenever a symbol the same as one in his [sic] own language represents a different sound in the foreign language.

More recently, Brown and Haynes (1985:20) say:

the skills of L1 reading may interact with the acquisition of L2 reading skills, with the possibility that transfer or interference may occur as a function of the pattern of similarities and differences between the two languages.

3.5 The Monitor

The Monitor hypothesis (Krashen and Terrell, 1983) was postulated to account for some variation in performance in the area of second language acquisition. The monitor is used as an "editor" of a second language learner's output when this output is not spontaneous or initiated by the speaker. A student is able to monitor his/her output when three criteria are met. First, the performer has to have enough time. Second, the performer has to be thinking about correctness, or be focused on form. Finally, the performer has to know the rule. The Monitor hypothesis has elicited both support as well as opposition. Support can be found in *Variation in Interlanguage* (Tarone 1988:70).

Still other studies have followed from the Labovian approach (cf. pp. 39-44, in which 'attention paid to speech' plays a crucial role in causing the individual to shift from a casual to a more careful speech style).

Opposition can be found in Hulstijn and Hulstijn (1984). They found that the Monitor played no role in reducing the amount of grammatical errors of second language learners.

Their findings do not, however, affect the hypotheses or results of this thesis, since their focus was grammatical errors and not pronunciation errors. I assume that the Monitor functions, or fails to function, differently depending on which area of SLA is being observed.

3.6 The voice warp

Merritt Ruhlen (1986:18) points to an interesting phenomenon that he calls the "Voice Warp". He says that the contrasts between voiceless and voiced stops is one of the most common among the languages of the world. The following shows the usual pattern:

p	t	k
b	d	g

Gamkrelidze (1975), as quoted by Ruhlen, "observed, however, that if there is a gap, or hole, in the system it is far more likely to be p or g than any of the other four". Place of articulation may have an almost obvious role. The stop phoneme with the largest area between the point of articulation and the vocal cords may be more readily voiced, i.e. the bilabial stop. Conversely, the phoneme with the smallest area, i.e. the velar stop, may be more readily voiceless. A stop can only be voiced prior to its release. After its release, it takes on the acoustic characteristics of the following phoneme. The bilabial stop has a greater tendency to be voiced because it has a larger cavity into which this prereleased-voiced air can be released than the

velar stop which has a smaller cavity. This is not contrary to Eckman's "voice contrast hierarchy". Eckman makes no reference to place of articulation.

3.7 Direction of difficulty

Moulton (1962:50) made some interesting observations regarding direction of difficulty. Moulton refers to the final devoicing phenomenon among the German speakers as a "habit".

This habit is so firmly fixed that when [a speaker of German] learns a foreign language, he [sic] finds it very difficult to pronounce voiced obstruents in one of these positions.

Later Moulton expresses the major hinderance of the native English speaker learning German, i.e. orthographical differences. This problem area also turns out to be one focus of my experiment.

Fortunately, if the student refuses to let himself [sic] be misled by the spelling, the German alternation of voiced and voiceless obstruents is not hard to learn.

His hypothesis of direction of difficulty is based on the fact that German has no final obstruents with voice, while English does. We can see this in the following examples:

German→ No final voicing	-----
English→ Final voicing	<u>m</u> ob /mab/
	<u>d</u> eed /did/
	<u>l</u> eague /lig/

Without stating it directly, he laid a basis for what was later to be called the Markedness Differential Hypothesis (MDH).

3.8 Markedness Differential Hypothesis (MDH)

Now that we are familiar with the devoicing phenomenon in German along with the role of markedness, we can accept an amendment to the contrastive analysis hypothesis which is the markedness differential hypothesis (MDH).

The areas of difficulty that a language learner will have can be predicted on the basis of a systematic comparison of the grammars of the native language, the target language and the markedness relations stated in universal grammar... (Eckman 1977:321)

With this construct, the prediction can be made that the native German speaker would have more difficulty learning to voice final obstruents than the native English speaker would have learning to devoice the final obstruents. The more marked the phenomenon is, the more difficult it is to learn (all other things being equal). Such a claim is supported by a study by Dinnsen and Eckman (1975) as cited by Eckman (1977:321).

3.9 Conclusion

The difficulty that native German speakers have when trying to learn to voice the final obstruents of English has already been established (Eckman 1977). As a teacher of German to native English speakers, I have also noticed that the final devoicing rule of German remains somewhat problematic. In Table 2-1 the obvious difference between

German orthography and German pronunciation concerning final obstruents was pointed out. In much the same way, the plural <s> might seem difficult to a native speaker of German when Americans pronounce it as /s/ or /z/.

The voice warp might predict that some stops are more difficult to devoice than others. The /g/ might lend itself to easier devoicing because of the small area into which the prereleased, postglottal air can flow. Conversely the /b/ might be more difficult to devoice because of its large cavity. The assumption here is that the /b/ is easier to make than the /g/. Spelling, however, offers a complication. A native speaker of English has learned to always read the final voiced grapheme with voice. However in German all final voiced obstruent graphemes are to be read without voice.

After this chapter, some conflicting predictions might be made concerning the acquisition of the final devoicing rule of German by American students. The CAH and its modification, the MDH, would predict its ease of acquisition by American students because final devoicing is less marked than final voicing. Those theories supporting the orthographical interference explanation would predict a disruption in the theoretically easy acquisition of final devoicing. The hierarchy of difficulty could predict the ease of difficulty depending on the wording of the formula. The monitor model also plays a part in whether a student

will correctly devoice the obstruents in the final position.

I believe that all theories represented above can be combined to make clear predictions about possible responses concerning final devoicing. When a student is asked to give a verbal response without any written stimulus, he/she will more than likely devoice properly. This can be predicted on the basis of the markedness differential hypothesis and the availability of time to focus on form. When a student is asked to read a word that employs the final devoicing rule, he/she will not devoice as often as in the earlier phase, because of the orthographical interference, but will continue to devoice some. The student will voice some of his/her previously devoiced phonemes because of the presence of the final voiced graphemes. The reason some final devoicing continues could be explained by the monitor model. With the single word the students have the time to focus on form and to remember the rule of final devoicing. When a student reads a text with words that employ the final devoicing rule, he/she will decrease the number of devoiced phonemes further yet. This can be explained by the presence of the orthographical interference and the absence of the time to monitor. When the students read a text, the flowing speed that is used when reading sentences out loud precludes any chance to focus on form, i.e. to monitor.

For this thesis, there was no experiment performed on native German speakers learning English, It is therefore

impossible at this time to define what is "relatively easy" and "relatively difficult". The following two chapters will show, however that after two years of instruction, approximately 88% of the English-speaking students observed may have acquired some ability to devoice final obstruents in German.

Chapter 4

The pilot study

4.0 Introduction

In order to show the difficulty of final devoicing acquisition and to give a brief glimpse of the situation concerning orthographical interference a pilot study was conducted in the spring quarter of 1991. It also provided an impetus for further study. The hypothesis was as follows: In the beginning stages of language development native English speaking American students learning German will begin to devoice some final obstruents. However, when presented with a printed text, they voice some of the previously devoiced obstruents.

The null hypothesis is: German orthography has no effect on the "Final Devoicing Rule" that has been acquired as part of the interlanguage of an American learner of German. The results suggest that Americans' ability to devoice the final obstruent is interfered with or hindered when they read text as opposed to picture recognition.

4.1 Methodology

The subjects consisted of eight American students in the third quarter of the first year of German at Michigan State University. There were two parts to the experiment: picture recognition and the reading of a text. Each student was first presented with eight unlabelled pictures of simple vocabulary items. The student was required to recognize the

picture and give the German name for the pictured item. This task was implemented to see if any acquisition of final devoicing had occurred. Only three pictures had items that employed the final devoicing rule. The other five pictures were used as distractors. The following is a list of the German words for the pictures used along with the corresponding English glosses. The starred words are those which require final devoicing.

Zug*	train
Katze	cat
Mann	man
Hund*	dog
Ball	ball
Frau	woman
gelb*	yellow
Buch	book

After the recognition exercise, each student was given a short text to read aloud. The text contained simple vocabulary, interspersed with words employing the "Final Devoicing Rule". This task was given to observe any possible orthographical interference. The following is a copy of that text and its translation:

Ich kenne ein Verb,* das 'kaufen' heißt. Ich kenne auch eine Frau, die etwas kaufen will. Sie möchte ein Fahrrad* kaufen, weil sie auf dem Berg* wohnt. Sie möchte auch einen Apfel kaufen, weil sie Hunger hat.

I know of a verb that is called 'buy'. I also know a woman who wants to buy something. She would like to buy a bike because she lives on the mountain. She would also like to buy an apple because she's hungry.

Each student was tape recorded to avoid experimenter bias. Only one-syllable words were focused on, so only word

final devoicing was tested as opposed to syllable final. Only words with voice/voiceless distinction of the stops /b/-/d/, /d/-/k/ and /g/-/k/ were used. The occurrence of the underlying /v/ and /z/ in German is relatively rare when compared with the stops. I did not feel that the students' vocabularies were advanced enough to expect the recognition of pictures of items that end in either underlying voiced fricative /v/ or /z/.

4.2 The results

The following table shows the frequency of word-final devoicing (signified by the Y for yes) and the failure to devoice (signified by the N for no). The judgements concerning the success or failure to devoice were made by Jonathan Abuhl. The dashes mean that the student did not know this word or needed prompting.

Table 4-1: Pilot Test Results

Subject	Recognition			Reading		
	b/p	d/t	g/k	b/p	d/t	g/k
1.	--	Y	Y	N	N	N
2.	Y	N	N	N	N	N
3.	N	N	N	N	N	N
4.	--	Y	N	N	N	N
5.	--	N	N	N	N	N
6.	Y	N	N	N	N	N
7.	--	Y	N	N	N	N
8.	N	N	N	N	N	N

It is apparent in the recognition phase, that many of the students had not acquired/learned the final devoicing rule. Those that did show some devoicing tendency failed to perform correctly for every voice/voiceless distinction. However the surprising data appeared during the reading phase. Not one student was able to hurdle the orthographical discrepancy. Every student voiced the stop in the final position.

The data of this pilot study are too few to do any in-depth statistical analysis. However, the tendency to lose any devoicing during the reading of a text is apparent enough to launch another slightly modified test with more subjects, to gain some significant data.

4.3 Hypotheses

The considerations of markedness predict that final devoicing would be relatively easy. The considerations of orthographical interference predict difficulty in final devoicing. Considerations of monitoring predict variation in devoicing depending on the task. I hypothesize, then, that:

Final devoicing will occur when there is no graphemic presentation (because devoicing is unmarked and acquired). With the presentation of words, the occurrence of devoicing decreases (because of orthographical interference), less so with single words (because monitoring is

possible).

Three tasks were developed to observe the above mentioned factors, i.e. markedness, interference and monitoring. These tasks are outlined in the next chapter.

Chapter 5

The Final Experiment

5.0 Introduction

The pilot study was just a springboard for a more complex study that would provide more convincing evidence. The mistakes and shortcomings in the pilot study were revised in order to reduce the number of variables that might have an effect on the data. The second study (spring 1992) took into account three different factors: subject's level of study, task, and place of articulation.

5.1 Subjects

There were 42 subjects in two groups. One group consisted of 25 students from two different German 103 classes. These students were in the final quarter of the first year of German. The second group consisted of 17 students from three different German 203 classes. These students were in the final quarter of the second year of German.

Each subject was given the same instructions and test items in the same order. Each subject was recorded in the recording booth at the Wells Hall language lab. The cassette recorder was a Yamaha K-1020 and the microphone was an Electric voice, model 676. The judgements as to whether final devoicing had taken place were made by Jonathan Abuhl. After the student sat down, he/she was asked to read the following directions out loud:

-No grade will be given for your performance.

-For the first task you will be shown some sketches. The first two cards are colors. Try to recognize the pictures and give the German word which represents them. If you don't know a word, I will try to make the item in question clearer, but don't worry if you don't know some.

-For the second task you will have to read some words that I have printed on some cards.

-For the third task you will read a short passage.

There were two reasons for such a formal presentation of the instructions. First, each subject received the same instructions to avoid possible experimenter influence. Second, while the student read, the lab technician was able to set the recorder to the optimum peak levels to insure a near-perfect sound recording. After the instructions, I asked if there were any questions and we proceeded.

5.2 Tasks

For the first task, each student was presented with 14 pictures of simple vocabulary items. As in the pilot study, this task was given to elicit responses without having to introduce orthography. This allows for a closer study of the acquired final devoicing rule without much interference.

Each subject was also given ample time to focus on form. The names of six pictures employed the final devoicing rule, two for each devoiced stop. These words end with the grapheme , <d> or <g>. The other eight words were used to disguise the experiment's purpose from the subjects being tested. Some changes have been made in the words/pictures that were chosen in the pilot study to avoid any possible English cognates. I avoided words which had obvious English cognates with final voiced obstruents, e.g. Hund, English hound. In the picture recognition task, approximately four seconds were allotted for each picture and response. The following is a list of the pictures that were presented, in the order in which they were presented to all subjects.

rot	red
gelb (devoiced)	yellow
Mann	man
Straße	street
Geld (devoiced)	money
Stirn	forehead
Berg (devoiced)	mountain
Buch	book
Ball	ball
Rad (devoiced)	tire
Frau	woman
Zug (devoiced)	train
Katze	cat
Staub (devoiced)	dust

The second task introduced orthographical interference but continued to allow time for the student to focus on form and recall previous word final devoicing instructions. For this task the students read words out loud from cards. The words were written on cards to avoid the reductions and assimilations that might take place if the words were read

too quickly from a list or a text as in the pilot study. All of the words which were presented in the picture recognition task and required final devoicing were also presented in the one-word reading task. The distractor words were different to avoid subjects' detection of the experiment's agenda. Two of the new distractor words also required final devoicing. I did not consider these words in the data analysis because of their absence in the picture recognition task. The following is a list of the words in the order that they were presented in the word-reading task.

blau	
Stuhl	
Staub	(devoiced)
Baum	
Geld	(devoiced)
Zeit	
Wand	
Hund	
Berg	(devoiced)
Vogel	
gelb	(devoiced)
Tisch	
Post	
Zug	(devoiced)
Stern	
Schrei	
Rad	(devoiced)

After the word-reading task, each student was given a short text to read aloud. I predict orthographical interference in this task, without the time to focus on form. The text had 6 words that employed the final devoicing rule. The following is a copy of the text and its translation. The words with final devoicing are Jörg, Tag, halb, Freund, gesund and lieb.

Mein Name ist Jörg. Ich spiele gern Fußball. Es macht mir Spaß. Ich stehe jeden Tag um halb sechs auf, um Fußball zu spielen. Mein Freund und ich spielen oft zusammen, um gesund zu bleiben. Ich habe auch eine Freundin, die Sabine heißt. Sie ist sehr lieb.

My name is George. I like to play soccer. It's fun. I get up every day at five thirty to play soccer. My friend and I often play together in order to stay healthy. I also have a girlfriend named Sabine. She is very kind.

Only words with the voice/voiceless distinction of the stops /b/-/p/, /d/-/t/ and /g/-/k/ were tested. As in the pilot study, I did not believe that the two groups of students had vocabularies which warranted the study of the /v/-/f/ and /z/-/s/ distinction.

5.3 Place of Articulation

The place of articulation is the third factor that I considered when testing the data. I also wanted to see if this played a role as to whether the final devoicing rule was utilized. A difference in the amount of devoiced velar stops (more devoicing) as compared to the bilabial stops (less devoicing) would be quite revealing. A significant difference in this area would support the presence of the articulatory factor presumed to be reflected in Ruhlen's "voice warp". A larger percentage of devoiced velar stops would suggest that the size of the cavity into which the prereleased, postglottal, pressurized air is released, plays a role in determining whether certain stops will be easier to devoice.

Chapter 6

Results

6.0 Introduction

The results are mainly reported in Tables 6-1 and 6-2. The 'x' represents the voicing of the final phoneme. The 'o' represents proper devoicing. The '*' represents either a failure to respond or an incorrect response. Table 6-1 presents the data from the beginning-level students and Table 6-2 those from intermediate-level students

6.1 Data

Table 6-1 Beginning Level Results

Student	Picture						Word						Text					
	B	B	D	D	G	G	B	B	D	D	G	G	B	B	D	D	G	G
1	*	*	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
2	o	*	o	x	x	x	x	x	x	x	x	x	o	x	x	x	x	x
3	x	*	x	*	*	x	x	x	x	x	x	x	x	x	x	x	x	x
4	o	o	o	x	o	x	x	o	x	x	x	x	o	o	x	x	x	x
5	*	*	x	*	*	x	x	x	x	x	x	x	x	x	x	x	x	x
6	o	*	o	*	o	o	o	o	x	o	o	o	o	o	x	o	o	x
7	x	*	x	x	x	x	x	x	o	x	x	x	x	x	x	x	x	x
8	x	x	x	x	x	*	x	x	x	x	x	x	x	x	x	x	x	x
9	x	*	x	x	o	x	x	x	x	x	x	x	x	x	x	x	x	x
10	x	*	x	x	o	x	x	x	x	o	x	x	x	x	x	x	x	x
11	*	*	x	*	x	*	x	x	x	x	x	x	x	x	x	x	x	x
12	*	*	x	*	o	*	x	x	x	x	x	o	x	x	x	x	x	x
13	*	*	x	*	x	x	x	x	x	x	x	x	x	x	x	x	x	x
14	*	*	x	*	x	x	x	x	x	x	x	x	x	x	x	x	x	x
15	*	*	x	*	x	*	x	x	x	x	x	x	x	x	x	x	x	x
16	x	*	x	x	*	*	x	x	x	x	x	x	x	x	x	x	x	x
17	x	*	x	x	x	*	x	x	x	x	x	x	x	x	x	x	x	x
18	x	*	x	x	x	*	x	x	x	x	x	x	x	x	x	x	x	x
19	o	*	x	x	*	x	x	o	x	x	x	x	x	x	x	x	x	x
20	*	*	x	x	x	*	x	x	x	x	x	x	x	x	x	x	x	x
21	x	*	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
22	o	*	o	x	x	*	o	x	o	o	o	x	x	x	x	x	x	x
23	o	*	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
24	*	x	x	x	x	x	x	o	o	x	x	x	x	x	x	x	x	x
25	x	*	x	*	o	x	x	x	x	x	x	x	x	x	x	x	x	x

Table 6-2 Intermediate Level Results

Students	Picture						Word						Text					
	B	B	D	D	G	G	B	B	D	D	G	G	B	B	D	D	G	G
1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
2	x	*	x	x	o	x	x	x	x	o	x		x	x	x	o	x	
3	o	*	o	x	o	o	o	o	x	o	o		o	o	o	o	o	o
4	o	x	x	o	x	x	x	x	o	o	x	x	x	o	x	x	x	x
5	x	o	o	o	o	x	x	x	o	o	o	x	o	x	o	x	x	x
6	o	o	o	x	o	x	x	x	x	x	x	x	o	x	x	x	x	x
7	x	*	x	x	x	x	o	o	x	x	o	x	x	o	x	x	x	x
8	o	*	o	o	o	o	o	x	o	o	o	o	o	o	o	x	x	o
9	x	*	x	x	x	x	x	x	x	x	o	x	x	x	x	x	x	x
10	*	*	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
11	*	*	o	o	o	o	o	x	o	o	o	x	o	o	x	x	o	x
12	*	*	x	x	o	x	x	x	x	x	x	x	x	x	x	o	x	
13	x	x	o	x	o	*	o	x	o	o	o	o	x	x	x	x	o	x
14	o	*	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
15	x	*	x	x	x	*	x	x	x	x	x	x	x	x	x	x	x	x
16	*	*	o	x	x	x	o	x	x	x	o	x	o	o	x	x	x	x
17	o	*	o	o	o	o	x	o	o	x	x	o	o	o	x	x	x	o

A quick glance at the data shows that, even for the intermediate level students, the acquisition of the final devoicing rule was incomplete. Two intermediate level students, numbers one and fifteen, showed no evidence of any knowledge of the final devoicing rule. Thus, over 88% of the students showed some evidence of final devoicing. The results from the beginning level students showed only 12 students out of 25 giving evidence of final devoicing, which is just below 50%. These percentages can be misleading because in both cases there were some students that devoiced properly in only one or two instances. If we were to ascribe stages to the acquisition of the final devoicing rule, we would find that these students with the low rate of success in devoicing have only begun to acquire the rule.

They would be in the beginning stages of acquisition. The following tables show the correlation between the number of correct responses and the number of students that achieved those responses. The numbers on the X axis of both tables do not represent the total number of students in that level, but rather the number of subjects that responded correctly the indicated number of times.

Table 6-3 Beginning Level Frequency

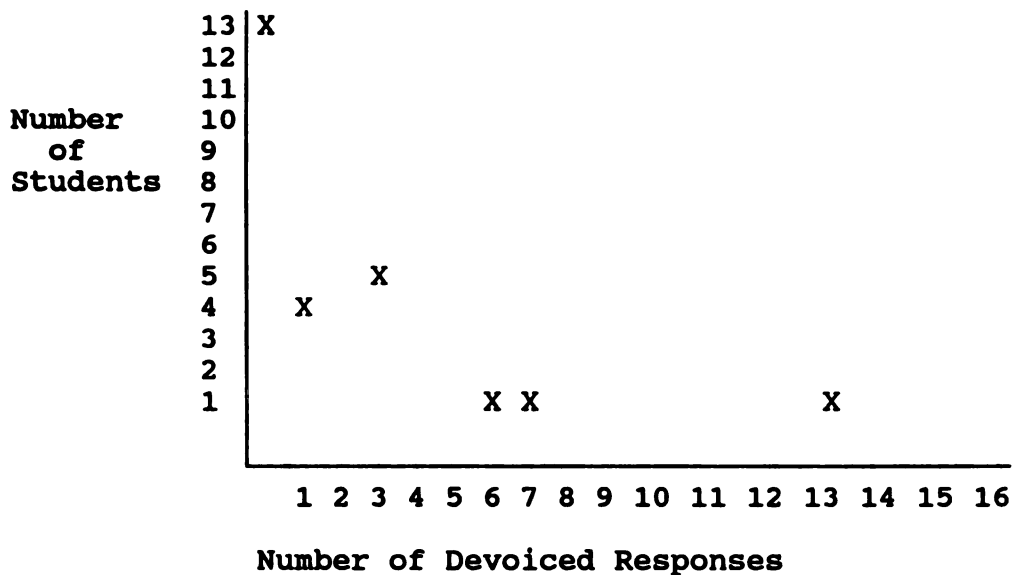
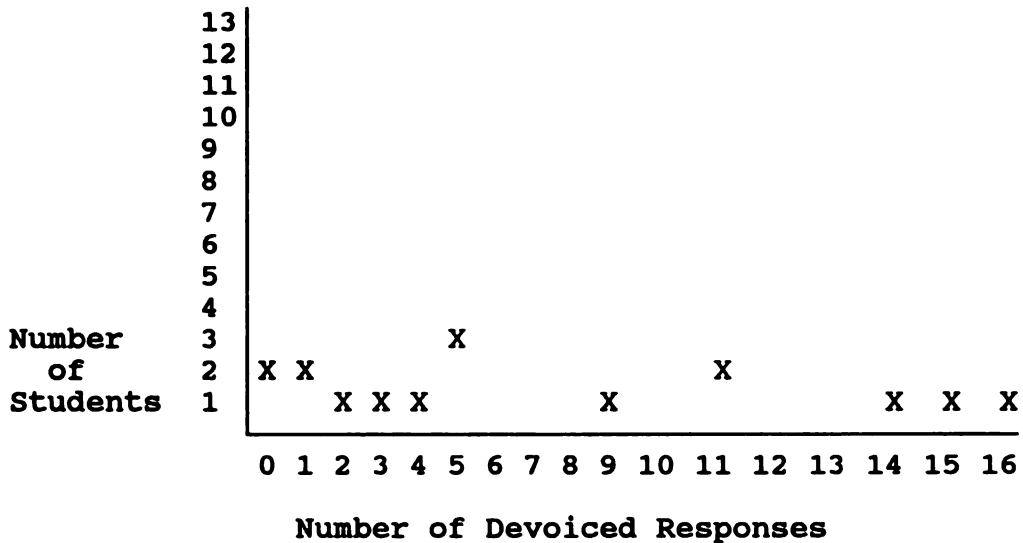


Table number 6-3 shows that the students in the beginning level German class generally have not acquired the final devoicing rule. Table 6-4 shows the intermediate level students spread very evenly over the scale, showing that most have at least begun to acquire the final devoicing rule.

Table 6-4 Intermediate Level Devoicing Frequency

6.2 Statistical Interpretation

6.1.0 Introduction

An initial glance at the data suggests the presence of significant differences or interaction between the factors task, students' year of study, and place of articulation. A multivariate analysis (including chi-square and probability tests) was done on all the above data. Notice that factor group #1 (Task) refers to the manner of presentation. Factor group #2 (Level) is the students' year of study. Factor group #3 (Item) refers to the place of articulation.

6.1.1 STEPWISE VARIABLE RULE ANALYSIS: Three Factor Groups

Table 6-6 First VARBRULE Data

Factor group # 1 Task
 P = picture cue
 W = word
 T = text

Factor group # 2 Level
 X = German 103
 Y = German 203

Factor group # 3 Place
 B = bilabial
 D = alveolar
 G = velar

Number of cells: 18 Total no. of factors: 8

Group # 1 p: 0.615 w: 0.503 t: 0.382
 Group # 2 x: 0.300 y: 0.700
 Group # 3 b: 0.566 d: 0.436 g: 0.498
 Log likelihood = -314.791

Cell	Total	Apps	Expected	Error
pxb	20	7	3.893	3.079
pxd	41	4	5.151	0.294
pxg	37	7	5.752	0.321
wxb	50	5	6.648	0.471
wxd	50	6	4.177	0.868
wxg	50	5	5.228	0.011
txb	50	5	4.272	0.136
txd	50	1	2.631	1.067
txg	50	1	3.321	1.738
pyb	18	8	10.224	1.120
pyd	34	15	14.917	0.001
pyg	32	15	16.011	0.128
wyb	34	11	15.463	2.363
wyd	34	14	11.271	0.988
wyg	34	15	13.208	0.397
tyb	34	16	11.457	2.717
tyd	34	6	7.889	0.589
tyg	34	10	9.487	0.038

Total Chi-square = 16.326 Chi-square/cell = 0.907

According to VARBRULE, factor group 3, place of articulation, has no effect in raising or lowering the probability of proper final devoicing. Notice that the probability weights conglomerate around the 0.5 score. The furthest deviation was 0.066. It was, therefore, deleted. While this does not support the hypothesis that the larger area between the place of articulation and the vocal cords might be instrumental as to which stops are easier to devoice, it does not show negative evidence in contradiction of the "voice warp", which is simply a description of a fact about many of the languages of the world.

After the 3rd factor group was deleted, a second VARBRULE analysis was performed on the data. The factor groups for this analysis (mode and level) are identical to the factor groups 1 and 2 of the first run.

6.1.2 STEPWISE VARIABLE RULE ANALYSIS: Two Factor Groups

Table 6-7 Second VARBRULE Data

Group # 1 p: 0.609 w: 0.511 t: 0.381

Group # 2 x: 0.298 y: 0.702

Log likelihood = -314.367

Cell	Total	Apps	Expected	Error
px	98	18	14.590	0.936
wx	150	16	15.749	0.004
tx	150	6	9.721	1.523
py	84	38	41.380	0.544
wy	102	40	40.224	0.002
ty	102	32	28.335	0.656

Total Chi-square = 3.666

Chi-square/cell = 0.611

The results on probability were very similar to the first run but error scores were lower (.907 vs .611), which removed any suspicion of interaction between the variables. The different probability weights in group one continue to show that a student, regardless of the level, who receives stimulus in the picture mode, is more likely to devoice properly (p:.609). The same item presented in the word mode has about equal chances of being devoiced properly. In other words, the student is as likely to devoice as not to devoice (w:.511). In the text stage the student has the greatest probability to not devoice properly (t:.381). A probability weight of around 0.5 would show that the mode of presentation has no effect on the phenomenon being tested. Any score higher than 0.5 would show that the mode of presentation plays a part in eliciting the correct response. Conversely, any score lower than 0.5 would show that the mode of presentation plays a part in eliciting the incorrect response. Students from the first year of German study will more than likely not devoice properly (x:.298). Students from the second year of German study will more than likely devoice properly (y:.702). Factor group #2 is "heavier" than #1. This means that there is a greater distance between the factor weights. The factor difference from beginning level (.298) to intermediate level (.702) is 0.4, whereas the difference of the extreme factor weights in group 1 is only .228, from .609 in the picture recognition

mode to .381 in the text reading mode.

The results give evidence for the relative difficulty in acquiring the final devoicing rule. Only about 12% of the students from the intermediate level German class failed to show any evidence of final devoicing in their responses, whereas over 50% of the students in the beginning level failed to devoice in all three tasks. These last two percentages show that what is statistically predicted is also the case individually.

Some pedagogical advice that might stem from these results is that, in order to acquire the final devoicing rule, it is quite important to study German for at least a year. One question is whether the explicit teaching of the final devoicing rule is helpful in the acquisition of German as a second language? It might be helpful to give the students some visual representations along with the formal rule. For example: When introducing the word Tag, the phonemic transcription could be presented simultaneously, i.e. Tag /tak/. The final grapheme, <g> could then be explained as one of those letters that loses its voice in the word-final position. A follow-up study could then be done to determine the benefits of such instruction.

The results show that there is no significant interaction between the variables, i.e. the chi-square score was insignificant. The intermediate students make mistakes in the same pattern as the beginning students. They just

don't make them as often.

The difference in probability weights by task might suggest that the amount of time a student has to think about an item is a possible variable that needs to be considered. During the word-recognition phase each student has more time to think about the proper pronunciation than during the text-reading phase. Although not universally accepted, Krashen's (1983) Monitor Hypothesis might be applicable here. Only one factor in the Monitor hypothesis is known for certain to be involved, i.e. the amount of time each subject has to respond. Whether each individual subject was focusing on form and whether he/she knew the rule of final devoicing were not part of the evaluation.

Chapter 7

Conclusions

7.0 Introduction

After the pilot study, I changed certain things in the test format to make up for certain factors that could influence the outcome of the study. For example, I discarded the words that were both finally devoiced and had English cognates. I also introduced a new phase into the study, word reading, to isolate the variables being tested. After the second experiment, more shortcomings and different phenomena, as well as possible research areas in the future were discovered.

7.1 Suggestions for Future Research

First, a variable accounted for in the word-recognition phase was ignored in the text-reading phase. Each word presented initially in the picture-recognition phase was also introduced in the word-recognition phase. However, for the text-reading phase different words with underlying final voiced phonemes were used to elicit the voiced/devoiced response. I propose two different modifications for future studies in this area. First, different words employing the final devoicing rule could be selected and used randomly throughout the experiment. The other possibility would be to use the same words in each phase to insure exact comparison. The danger with the second modification is that it might be difficult to measure how extensive the final

devoicing rule has been learned.

Second, there was no control group in this experiment. I assumed that none was needed and tested only American students of German. However, for reasons of scientific integrity and result generalizability I would recommend a control group for any future study. I would recommend two control groups: one group of native English speakers and the other group of native German speakers. The English speaking group would be to make sure the population studied was not beginning to devoice English. Thomas Veatch (1989:AB) has evidence that the final devoicing of fricatives is a "pan-English" phenomenon. The German group would be used to study the extent of final devoicing of the words in the experiments.

Third, all words must be closely examined to make sure that they employ the final devoicing rule. In retrospect, I see no reason except for spelling to say that the word Jörg ends in an underlying voiced stop. There are no alternates of this word, e.g. with vocalic suffixes in which a voiced stop appears. No inflections can be attached to the name to bring about a voiced velar stop.

While I still believe that the text-reading task is valuable, certain aspects should be changed. All words requiring final devoicing need to be strategically placed in order to expect even a native German speaker to devoice them, i.e. they should be followed by a pause or a word that

begins with a voiceless consonant. After the text is prepared, trial runs should be made with native German speakers to make sure the predicted obstruents appear.

Part of the proper acquisition of the final devoicing rule is the ability to retain voicing of the obstruents of the devoiced words when certain inflections are added. If a speaker were to devoice certain obstruents regardless of the presence of an inflection, we could not say that he/she has acquired final devoicing but rather considered the underlying form of certain lexical obstruents to be voiceless.

7.2 Additional observations

As I was compiling the data, I made a point to observe other phonological phenomena that are unique to German. The observations I made can be split into two categories: those that don't involve orthographical interference and those that do. Only 2 students made an attempt at the velar /r/ of 'rot'. No students had yet acquired the light /l/ of 'Ball' and 'Gelb'. For these two examples there is no orthographical interference. The <r> is still an /r/ and the <l> is still an /l/. The only difference from the English version is in the place of articulation. The most interesting observations are found in the examples where orthographical interference is involved. All students who did not produce the initial /ts/ of Zug also did not devoice final stops. The initial /š/ of 'Stern' and 'Straße' were

also quite elusive. Of these two examples the first one proves to be most intriguing. The <z> of German is pronounced without voice while the <z> of English is pronounced with voice. There are other differences, but the difference of voice is of special interest to the author. By observing which German phonological rules have been acquired, we might be able to postulate some order of acquisition. In order to make some attempt at postulating a rate or an order of acquisition, the most proper form of research would be a longitudinal study.

Altenburg & Vago (1987:154) gave another reason for pronunciation errors: "Spelling Pronunciation errors".

Since Hungarian spelling is phonetic in character, it is particularly natural that some Hungarian speakers should look to English spelling to aid them in pronunciation.

Although English letters have complex phonetic correspondents (Lado 1957:94), it is reasonable to assume that beginning students would pronounce their German according to English spelling rules. There were five students who pronounced the picture of a cat as /kats/ instead of /katsə/ Katze. It could possibly be explained, post hoc, that they were pronouncing this word as they had seen it written, even though this was in the picture recognition stage. These students failed to devoice in every situation.

Another variable that might be considered is whether particular subjects are "letter readers" (phonological) or

"word readers" (global) (Goswami and Bryant:1990). The letter reader might be more prone to reading each letter, therefore failing to devoice or continuing to voice as the grapheme would dictate. The word reader might be more likely to devoice correctly. I did not consider this to be a factor in my research. I assumed that since all students were studying at the university, there were none that were still using the phonological strategy. The phonological strategy is theoretically one that children might adopt only when learning to read.

7.3 Conclusion

I proposed in this thesis to achieve some insight into a unique area of linguistics, one that has caused frustration for many students of German as a foreign language. For me personally, the writing of this thesis has two results.

First, as a former instructor of German as a foreign language, the findings with respect to final devoicing and orthographical interference have provided me with a better understanding of what to predict in the classroom. In addition, some thoughts about how to overcome the obstacle of final devoicing have emerged and can be tested in future German classes for which I may be responsible.

The experiment, while perhaps still inconclusive, did clearly show an effect of orthography on the acquisition of final devoicing by American students. Thus, the second

result is an impetus for me to continue research in this area, expanding my focus to include a comparison of native English speakers learning German and native German speakers learning English. I predict that such study will provide even more valuable insight into final devoicing and the area of orthographical interference.

LIST OF REFERENCES

LIST OF REFERENCES

- Altenburg, Evelyn and R. Vago. 1987. Theoretical implications of an error analysis of second language phonology production. In G. Ioup et al. eds., *Interlanguage Phonology*. 148-164. Cambridge: Newbury House Publishers.
- Anderson, Stephen R. 1985. *Phonology in the Twentieth Century*. Chicago: University of Chicago Press.
- Benware, W. A. 1986. *Phonetics and Phonology of Modern German*. Washington D.C. Georgetown University Press.
- Brakel, A. 1983. *Phonological Markedness and Distinctive Features*. Bloomington, Indiana: Indiana University Press.
- Brown, T. and M. Haynes. 1985. Literacy background and reading development in a second language. In T. H. Carr. ed., *The development of Reading Skills*. (New Directions for Child Development, no. 27.) 19-34. San Francisco: Jossey-Bass
- Dinnsen, D. A. 1985. A re-examination of phonological neutralization. *Linguistics* 21:265-279.
- Dinnsen, D. A. and Jan Charles-Luce. 1984. Phonological neutralization, phonetic implementation and individual differences. *Journal of Phonetics* 12:49-60
- Dinnsen, D. A. and F. R. Eckman. 1975. A functional explanation of some phonological typologies. In R. Grossman et al. eds., *Functionalism*, 126-134. Chicago: Chicago Linguistic Society.
- Eckman, Fred. 1977. Markedness and the contrastive analysis hypothesis. *Language Learning* 27:315-330.
- Eckman, Fred. 1981. On the naturalness of interlanguage phonological rules. *Language Learning* 31:195-216.

- Eckman, Fred. 1984. Universals, typologies and interlanguage. In W. Rutherford (ed.), *Language Universals and Second Language Acquisition*, 79-104. Philadelphia: John Benjamins Publishing Company.
- Flege, James. 1982. English speakers learn to suppress stop devoicing. In K. Tuite, R. Schneider and R. Chametzky (eds.), *Papers from the Eighteenth Regional Meeting Chicago Linguistic Society (18)*, 111-122. Chicago: Chicago Linguistic Society.
- Gamkrelidze, T. 1975. On the correlation of stops and fricatives in a phonological system. *Lingua* 35:231-262
- Goswami, Usha and Peter Bryant. 1990. *Phonological Skills and Learning to Read*. East Sussex, United Kingdom: Lawrence Erlbaum Associates Ltd., Publishers.
- Greenberg, Joseph H. (ed.) 1963. *Memorandum concerning Language Universals, Universals of Language* xv-xxvii. Massachusetts: The M.I.T. Press.
- Hulstijn, J.H. and W. Hulstijn. 1984. Grammatical errors as a function of processing constraints and explicit knowledge. *Language Learning* 34:23-43
- Ingram, David. 1986. Phonological development: production. In Paul Fletcher and Michael Garman (eds.), *Language Acquisition*, 223-229. Cambridge: Cambridge University Press.
- Jakobson, Roman. 1962. On ancient Greek prosody. In *Selected Writings*, 262-271. Netherlands: Mouton & Co.
- Katamba, Francis. 1989. *An Introduction to Phonology*. New York: Longman Inc.
- Krashen, Stephen D. and Tracy Terrell. 1983. *The Natural Approach*. Hayward, California: Alemany
- Lado, R. 1957. *Linguistics Across Cultures*. Ann Arbor, Michigan: The University of Michigan Press.
- Moulton, W. 1962. *The Sounds of English and German*. Chicago: The University of Chicago Press.
- O'Dell, M and R. Port. 1983. Discrimination of word-final voicing in German. Paper presented at the Acoustical Society of America, Cincinnati.

- Port, R., F. Mitleb & M. O'Dell. 1981. Neutralization of obstruent voicing in German is incomplete. Paper presented at the Acoustical Society of America, Miami.
- Ruhlen, M. 1986. The voice warp: A phonological universal. In Joshua A. Fishman et al. *The Fergusonian Impact*, 17-19. New York: Mouton de Gruyter.
- Selinker, L. 1969. Language transfer. *General Linguistics* 9:67-92
- Stockwell, Robert and D. Bowen. 1965. *The Sounds of English and Spanish*. Chicago: University of Chicago Press.
- Tarone, E. 1988. *Variation in Interlanguage*. London: Edward Arnold.
- Trubetzkoy, N. 1958. *Grundzüge der Phonologie*. Göttingen: Vandenhoeck & Ruprecht. [Translation]: C. Baltaxe, 1969. *Principles of Phonology*. Berkeley, Univ. of California Press.
- Veatch, T. 1989. Final devoicing of fricatives of English. Paper presented at the Annual Meeting of the Linguistic Society of America. Washington, DC.
- Vennemann, T. 1972. On the theory of syllabic phonology. *Linguistische Berichte* 18:1-18

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