NASALIZATION IN SWABIAN

Studies on the Nasalization Process

Toby D. Griffen

Professor of German

Southern Illinois University at Edwardsville

CONTENTS

CHAPTER 1
INTRODUCTION

1.1 The Swabian Language. Swabian is a collection of Alemannic dialects spoken in the southwestern region of Germany. This region includes most of Baden-Württemberg (with Swabian spoken predominantly in the old state of Württemberg) and the section of Bavaria west of the River Lech. While no statistics are available on the number of speakers, there are probably between six and eight million inhabitants of the region who speak Swabian at least at home.

1.1.a Swabian and its Linguistic Relationships. As recorded by Kauffmann (1890) and in the literary aspect by Krauss (1897/99), Swabian is an off-shoot of Common Alemannic (compare also Heissel 1935), occupying the northeast section of the Alemannic language area (see Bohnenberger 1953). The Swabian branch developed beginning around the year 1200 with a series of vowel changes that culminated in the fifteenth century (see Bohnenberger 1892).

One of the most common misconceptions about Swabian is that it is a dialect of New High German (compare, for example, Ammon and Loewer 1977, which attempts to show Swabians how to "correct" their dialect variants, though it ignores the most complex phonological correspondences and the major morphological differences -- see the verb conjugations in chapter 5 of this monograph). This misconception is supported not only by geopolitical considerations and by the fact that both Swabian and New High German are obviously West Germanic dialects (as is English), but also by the fact that Swabian is a descendant of Middle High German. As pointed out, for instance, by Waterman (1966:107-110), Old and Middle High German are the ancestors of New Upper German, including Swabian;

while New High German is descended not from Old and Middle High German, but primarily from Medieval Middle (or Upper) Saxon.

Perhaps the strongest support for the misconception that Swabian is a dialect of New High German, though, comes from a study of the literature. In literary histories (such as Robertson 1966 and Martini 1968, for example), the student progresses from the literature of Old High German, through that of Middle High German, to that of New High German. The fact is that in the Middle Ages, the Alemannic and Bavarian representatives of Upper German produced the most important literature in Old and Middle High German, but in modern times the focus of attention has shifted to the East Central literature called New High German.

In this and all examinations of the Swabian language, then, we must be careful not to draw too close a connection between Swabian and New High German. While analyses of historical derivations from Middle High German may be adequate, analyses of correspondences with New High German can lead only to confusion.

Within the Swabian language region, there are a number of dialects. These may be grouped into seven major areas, as shown on the map in figure 1.1.a (p. 3), derived from Bohnenberger (1953), who divides the Alemannic region by a number of isophones and isoglosses, including those in the figure (although he himself does not emphasize these particular divisions). These divisions represent the correspondences in Table 1.1 (p. 4 -- see Bohnenberger 1953:301-302).

There are other ways in which the region can be divided (see, for example, Vogt 1979 and Häfner 1951). Again for geopolitical reasons, the division between west and east Swabian is most often considered to correspond to the eastern border of region 3, since this roughly forms the boundary between Baden-Württemberg and Bavaria. Linguistically, however, the division between west and east is usually considered to correspond to the eastern boundary of region 2, as it involves the correspondence between the final [rn] and [rə] (compare Vogt 1979:52).

1.1.b Nasality in Swabian. One of the most distinguishing marks of Swabian is its nasality (compare Kauffmann 1890:8-9, Bohnenberger

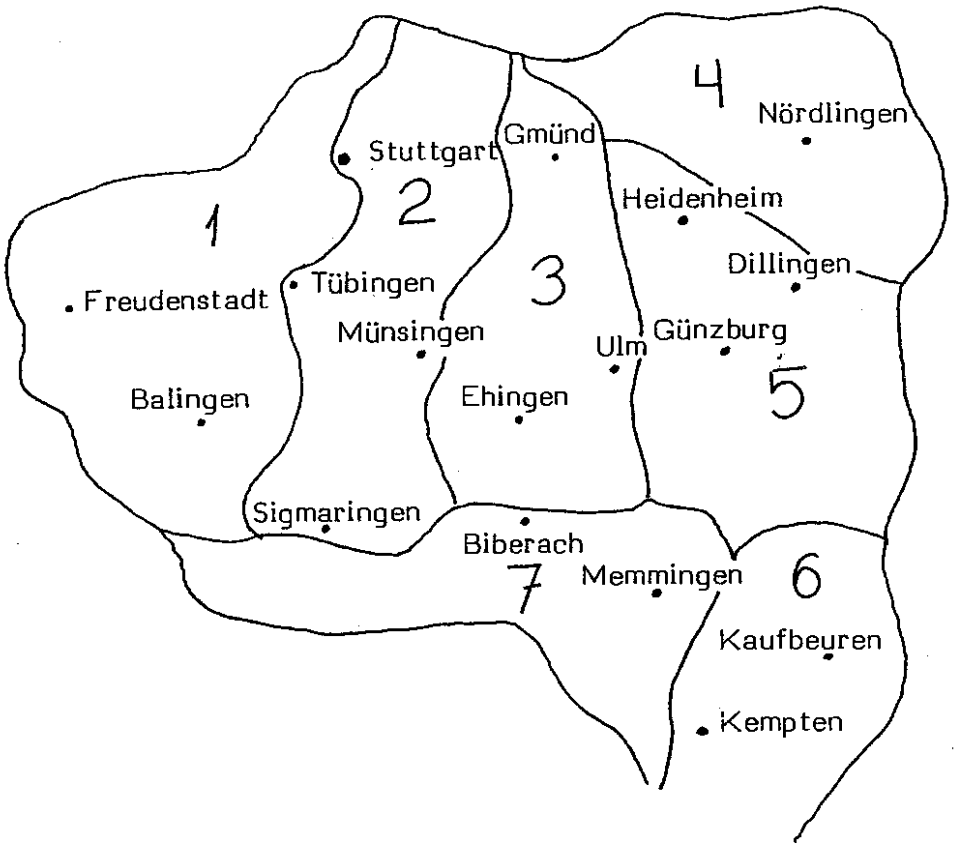

Figure 1.1.a: The Swabian Language Region

Table 1.1: Dialect Correspondences

Region 1 to Region 2

[ǫə] to [ǫi]

[brǫəd] to [brǫid] < MHG breit 'broad'

Region 2 to Region 3

[rn] to [rə]

[garn] to [garə] < MHG gern 'gladly'

Region 3 to Regions 4 and 5; Regions 1, 2, and 3 to Region 7

[ai] to [ę:], [ęə], [ę:]
[au] to [ǫ:], [ǫə], [ǫ:]

[sai] to [sę:], [sęə], [sę:] < MHG se 'lake'
[raud] to [rǫ:d], [rǫəd], [rǫ:d] < MHG rot 'red'

Region 4 to Region 5

[ǫ:] to [au]

[šǫ:f] to [šauf] < MHG sâf 'sap'

Regions 5 and 7 to Region 6

[ǫə] to [ai]

[brǫəd] to [braid] < MHG breit 'broad'

1953:81, and Vogt 1979:38-39). Swabian maintains a system of nasal and nasalized vowels in addition to the oral system. These two systems may be compared as in figure 1.1.b.

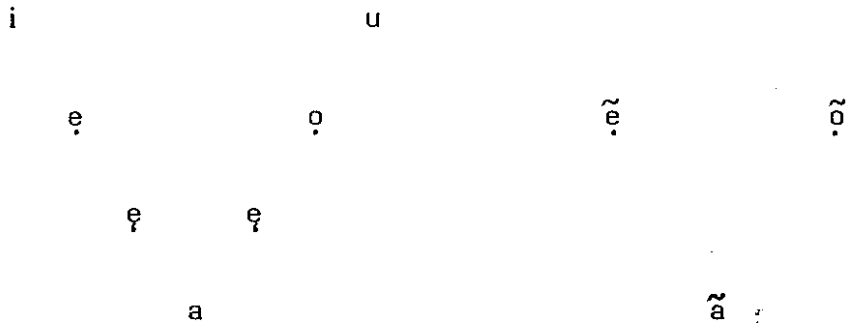

Figure 1.1.b: Oral and Nasal Vowels of Swabian

Typical of Common Alemannic in general, Swabian maintains four distinctive vowel height levels. We should note particularly that the oral vowel system of Swabian has four distinctive (phonologically pertinent) vowel height levels -- high ([i], [u]), high mid ([e̤], [o̤]), low mid ([ę̤], [ǫ̤]), and low ([a]). In the nasal vowel system, however, there are only two distinctive vowel heights -- high mid ([ẽ̤], [õ̤]) and low ([ã̤]). There are also two variants of the mid central vowel [ə] realized in centralization in unstressed syllables only.

The purpose of this monograph is to examine the manner in which nasalization has developed in Swabian and to consider the implications of this development in linguistics in general. In chapter 2, we shall examine how the system of nasal and nasalized vowels came into being; in chapter 3, we shall analyze some vowel nasalizations that have occurred in the absence of nasal features in the environment; in chapter 4, we shall extend this "spontaneous" nasalization from the effect on the vowel to the creation of a nasal consonant from a glide; and in chapter 5, we shall see a less "spontaneous" but otherwise more complicated instance of glide nasalization in the morphological system.

1.2 Dynamic Phonology. In order to analyze these nasalization phenomena and to catch generalizations and insights that have eluded researchers working in traditional models of phonology and segmental phonetics, we shall use the model of dynamic phonology as found, for example, in Griffen (1985a, also 1975a). This model is based not on the old segmental phonetics, but on dynamic phonetics as initiated in Curtis (1954) and especially as developed by Öhman (1966, 1967) and Mermelstein (1973, 1975). Indeed, the model outlined briefly below has largely been shaped by the articulatory model of Mermelstein (1973).

Since particularly the phonetic aspects of the phenomena investigated in the following chapters will be viewed from the dynamic perspective, it is best to have some understanding of the framework. While this can be found in detail in Griffen (1985a, including analyses capturing insights invisible in the segmental tradition) and other works cited among the references, a very brief summary of some of the main principles of this approach are included in this section. Of course, in the analyses of Swabian nasalization, the model will become much clearer.

1.2.a Dynamic Coarticulatory Constraint. The most basic principle of dynamic phonetics and of dynamic phonology is that of dynamic coarticulatory constraint: Certain features and feature types are constrained by other features and feature types with which they are simultaneously articulated.

This principle can perhaps best be conceptualized with reference to the speech event itself. Normally, speech is initiated by air being forced from the lungs and into the larynx. At the larynx, the airflow is constrained, and the result of this constraint is the vibrations of the fundamental frequency. When this fundamental frequency -- the airflow set into vibration -- reaches the oral cavity, the tongue body, jaw, and lips constrain the airflow/fundamental frequency to create resonance chambers of particular dimensions, causing particular formant frequencies to be realized from the fundamental. The formant frequency pattern is further constrained by obstructions of various degrees, from liquid to stop, which further alter the acoustic characteristics of the speech event.

When viewed in this dynamic manner, speech is no longer seen as consisting of sound units strung neatly from left to right and somehow being adjusted to fit together into the phonetic speech event (compare Liberman 1970). Rather, the features of speech can be organized into three divisions of constraint -- the laryngeal division, the syllabic (vocalic) division, and the obstruction (consonantal) division, as illustrated in figure 1.2.a (p. 8). The main features or opposition members of the laryngeal division include the members of the opposition of phonation (the characteristics of the fundamental frequency); those of the syllabic division include tongue-body height and depth (the characteristics of the formant patterns); and those of the obstruction division include the position of obstruction (the characteristics resulting from articulator and point of articulation).

Within each division of features, there are finer distinguishing features that constrain the main division features. These are termed prosodies. For example, the laryngeal division is constrained within itself by intonationally pertinent features of pitch and stress; the syllabic division is constrained by syllabically pertinent features of pitch and stress, nasality and voicelessness; and the obstruction division is constrained by such prosodic features as aspiration, nasality, glottality, and so forth.

Of course, some features are pertinent to a number of divisions simultaneously. For example, whisper can be a feature of the laryngeal division (in whispered speech), a feature of the syllabic division (in a voiceless vowel), and a feature of the obstruction division (as a voiceless aspirated plosive). When this occurs, the features are added to one another in a heightened realization. Pragmatically, this is how we can discern an aspirated plosive constraining a voiceless vowel in whispered speech. Likewise, we can discern a nasal obstruction constraining a nasalized vowel in the speech of an individual with general nasalized speech.

1.2.b The Syllabic Frame. In order to provide a framework within which the features in dynamic coarticulatory constraint may be organized and analyzed, the most natural unit is chosen -- the syllable. This is, after all, the shortest sequential, segmentable unit of speech (compare Mer-

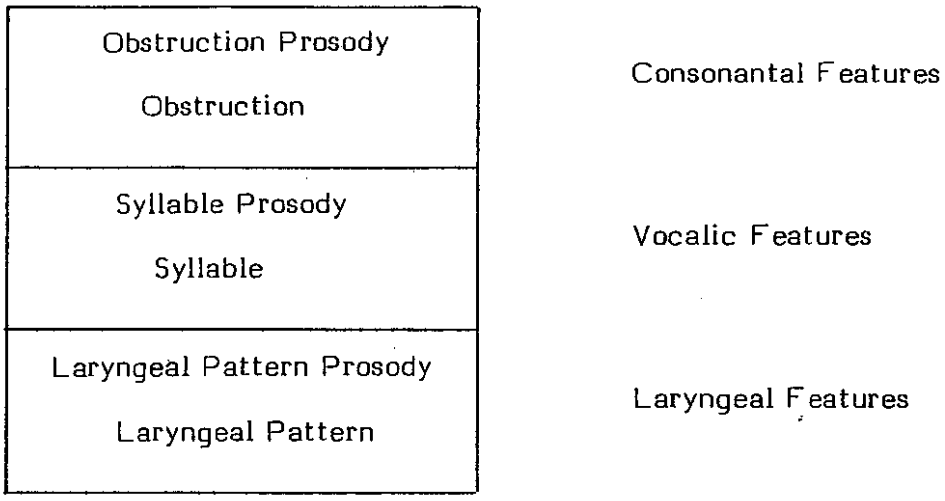

Figure 1.2.a: Dynamic Model

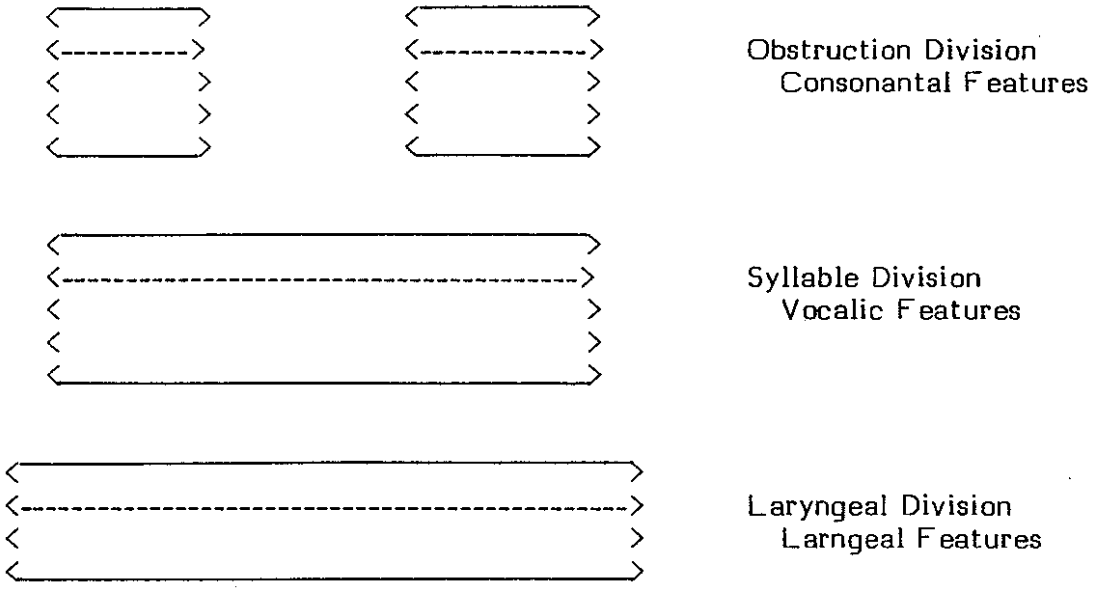

Figure 1.2.b: Syllabic Frame

melstein 1975; also Malmberg 1955, Kozhevnikov and Chistovich 1965).

Rather than removing the features from their natural patterns of constraint in the syllable in order to create segments in the tradition of alphabetic orthography (as in the autosegmental model -- compare Goldsmith 1976), dynamic phonological analysis maintains them in these natural patterns within the syllabic frame, illustrated in figure 1.2.b (p. 8).

This frame is by no means to be considered static or even compulsory in its basic form, but rather as an organizational device to be modified as the data require and to serve as an aid to conceptualization. Once again, its use will be made clear in the analyses that follow.

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CHAPTER 2
DOUBLE NEUTRALIZATION OF VOWEL HEIGHT: THE CENTRALITY PRINCIPLE

2.1 Double Neutralization. One of the most notable aspects of the nasalization of Swabian vowels is the double neutralization of vowel height, affecting both nasalized and nasal vowels. This aspect is shared by all Swabian dialects except for those in some border areas and in the upper Allgäu region in the far southeast (compare Bohnenberger 1953:301) -- most of region 6 on the map in figure 1.1.a (p. 3) -- and is commented upon extensively in the literature (see, for example, Vogt 1979:37-73, especially 38-39; Kauffmann 1890:41-102; Bohnenberger 1928:6-22; Gaiss 1949; Keinath 1930:4-10; Heissel 1935:5-13; and many others).

2.1.a The Phenomenon. Among the front and the back vowels, nasalization lowers the high vowels to the high mid position, as it raises low mid vowels to the high mid position. Thus, there is a double neutralization in which the high mid vowel is realized as the archiphonological representative not only in the neutralization of the high versus high mid distinction, but also in the neutralization of the low mid versus high mid distinction (here applying the neutralization pattern of Case II of Trubetzkoy 1969:80 to the feature level rather than to the phoneme level). Examples of these changes from Middle High German are found in Table 2.1.

The overall effect of this double neutralization pattern should be quite obvious from figure 1.1.b (p. 5) in the introduction and from the data in Table 2.1 (p. 12). Where nasalization occurs, the oral vowel pattern's four-level height distinction is reduced to a two-level height distinction. Moreover, as the low vowel does not participate in the neutralization at all, three vowel height levels are reduced to one.

Table 2.1: Vowel Height Neutralizations

Neutralization	Middle High German	Gloss	Swabian
i - ẹ	brinnen	'to glow'	brẽn
	brennen	'to burn'	
ẹ - ę	krem (NHG)	'cream'	krẽm
	krâ͡ème	'wares'	
i - ę	wind	'wind'	wẽnd
	wände	'walls'	
u - ọ	herumbe	'around'	rõm
	Rom	'Rome'	
ọ - ǫ	so einem	'such a (dative)'	sõm
	sâmen	'seeds'	
u - ǫ	hund	'dog'	hõnd
	hânt	'(they) have'	

In the communicative function of language, such a neutralization pattern is drastic, for it leads to ambiguities over a wide range of vowel height distinctions, as shown in Table 2.1. The significance of so many ambiguities introduced by a very common nasalization ought not to be underestimated. Given the extremely wide range of vowel height distinctions being neutralized and the many ambiguities thus introduced into the language, we must conclude that in the history of Swabian, the phonetic and/or phonological pressure to neutralize in the nasal environment has constituted a tendency for change far more compelling than the maintenance of semantic clarity.

2.1.b The Manner of Investigation. In order to determine how such a compelling tendency for change has developed in the Swabian language, we must examine the phenomenon from the viewpoints of phonology and of phonetics. From phonology and from a preliminary examination of the phonetics as well, we should attempt to achieve an adequate description of the double neutralization. This would involve a review of the effects of nasalization in like circumstances in other languages and in the psychological impact of nasalization in controlled experiments, as found in the literature.

While such a description may provide crucial insights into the working of nasalization in this phenomenon, however, the very fact that the change has occurred in spite of semantic ambiguities would indicate that an explanation for the change lies more deeply within the realm of phonetics. After all, the compulsive nature of the change and its detrimental effect on semantic clarity would certainly lead us to suspect a subconscious, uncontrolled tendency such as we find only in phonetic change.

2.2 The Phonological Trend. One of the basic questions that must be addressed with regard to the double neutralization of Swabian is whether this change is representative of nasalization-effected changes in general. On the one hand, if the pattern of change is a general, or at least a common one, then the underlying phonetic basis for the change would be more evident; while on the other hand, if it is idiosyncratic, then a phonetic

justification for the change would be far less likely.

Of course, from the point of view of linguistics in general, this analysis would be much more significant if the change in Swabian is representative of such changes in other languages. In such a case, insights gained into the Swabian phenomenon would contribute to the general knowledge of nasalization. In determining the degree of generality of this type of neutralization, two areas of investigation should be examined: phonological universals and phonetic observations.

2.2.a Phonological Universals. While the term "universals" may appear to be an inherently strong one, implying conditions and tendencies that necessarily and always occur in all languages, in practice the application of universals is made considerably more flexible and workable through typology (compare Greenberg 1978, Schmidt 1966). In its weaker and more applicable form, a typological universal would state that given a particular condition in a particular type of language, a particular tendency for change may be expected. Indeed, bearing in mind the implications for the unmarked member of an opposition, Trubetzkoy made such observations as the following:

> If the functioning of the phonemic system points to t as the unmarked member of the opposition t-d, the opposition t-d must be considered privative. The tensing of the muscles of the tongue must then be considered an irrelevant side phenomenon, the degree of voicing of t being "zero," so that t is to be regarded as "voiceless" and d as "voiced." But if, on the other hand, in accordance with the functioning of the phonemic system, not t but d is the unmarked member, voicing becomes an irrelevant side phenomenon, and the tensing of the muscles of the tongue the discriminative mark of the opposition. t must then be considered "tense" an d as "lax." (Trubetzkoy 1969:76-77)

In perhaps the most comprehensive study of nasality with the object of determining universals, Ruhlen (1978, see also 1975) examines the oral vowel systems as opposed to the nasal vowel systems of 155 languages. In his conclusions, Ruhlen considers a number of degrees of "natural systems" (that is, which systems occur more or less frequently and are there-

fore more or less expected). Significantly for the double neutralization of Swabian vowels, he concludes the following:

> While information on positional differences between NV's and OV's is quite sparse (and often difficult to interpret) I would hypothesize that high and mid NV's tend to be somewhat lower than their oral equivalents, whereas low NV's tend to be higher than their oral partners (cf. Wright 1975). (Ruhlen 1978:222)

From an overall consideration of how languages tend to change, then, Swabian would appear to be rather representative, not only of languages of its particular type, but also of languages in general (although here we must proceed with some caution). It is therefore more likely that the double neutralization pattern with the general lowering of the high vowel and rising of the low mid vowel is representative of some basic phonetic tendency not very dependent upon the particular language system.

2.2.b Phonetic Observations. As the relative universality of the pattern establishes the likelihood of a basic phonetic tendency underlying the change, we should look for observations of this phonetic tendency. A significant observation can be found in the experimental evidence of Wright, in which:

> An experiment was designed to test whether an auditory raising or lowering of nasalized vowels is in fact perceived. Twelve graduate students in linguistics were asked to make judgments on the quality of nasal and oral test stimuli by locating them on the traditional vowel space. A spectrographic analysis of the test items was then carried out to determine if these judgements systematically correlated with changes in the spectra. (Wright 1975:375)

The results of the experiment are as follows:

> The general findings of this investigation have been that vowel nasalization is accompanied by an auditory lowering of the vowel except for the low vowel [æ̃], which rises, [ɑ̃] which changes very little in quality and [ɔ̃] which

also rises. (Wright 1975:382)

Translating the vowels used in the experiment into the Swabian system, the [æ͡e] would correspond to the Swabian low mid vowel [ɐ̨], the [ɑ] to the low vowel [a], and the [ɔ] to the low mid vowel [ɒ̨]. Indeed, in Wright's figures, these correspondences are borne out, and the general tendency noted in section 2.2.a is verified by this psychoacoustic experiment.

Thus, once more we see that the phenomenon of the double neutralization among the nasal and nasalized vowels of Swabian is a general tendency. Not only does this pattern of change occur among various other languages of the world (even of various types), but it also appears to be rooted in some basic perceptual habits. Such matters of perception would further indicate that the double neutralization is the result of basic phonetic tendencies.

In the same volume with Ruhlen (1975) and Wright (in Ferguson, Hyman, and Ohala 1975), Ohala examines the phonetic literature for observations on the phenomenon. While nasal formants complicate matters, J. Ohala observes that "From the predictions of House and Stevens (1956), House (1957), Fant (1960), Hecker (1962), and Fujimura and Lindqvist (1971) . . . concerning the shifting of the first oral formant during nasalization, one would expect that non-low vowels would appear to be auditorily lowered and low vowels raised" (Ohala 1975:301-302).

While formant frequencies and other phonetic characteristics are treated in detail in section 2.3, it should suffice here to note that phonetic observations do in fact support the phonological evidence of universals research that there is indeed a tendency for the double neutralization pattern found in Swabian to occur in language in general, regardless even of type. Moreover, this general tendency appears to be the result of basic phonetic characteristics, not only on account of its generality, but also on account of the behavior of those phonetic characteristics themselves.

2.2.c Conclusion. We thus see that there is a general trend toward

the double neutralization found in Swabian, in spite of the fact that such neutralization reduces vowel height distinctions and leads to semantic ambiguity. As Ruhlen points out, ". . . nasality, whether allophonic or phonemic, tends to suppress vowel height distinctions. The principle explains why NV systems with fewer height distinctions than OV systems are so common" (1975:340).

While the reduction in vowel height distinctions may occur, and occur with a high degree of generality, though, Ruhlen's principle noted in the previous paragraph, while it does serve to label the phenomenon and to characterize it within the phonological systems of languages, does not really explain anything. We are dealing here with a matter of historical change, and as J. Ohala (1974) pointedly demonstrates, the explanation for the occurrence of this phenomenon within the phonology can be found only in the phonetic facts upon which it is based.

Nonetheless, the evidence collected from phonological universals and phonetic observations points the way toward an adequate phonetic explanation for the double neutralization of vowel height. After all, it has been established that this pattern is general -- common among the world's languages -- and that it is based upon some phonetic characteristic(s). All that must be done to find the basis of the pattern, then, is to isolate and identify the phonetic characteristics that may be involved in nasalization.

2.3 The Phonetic Parameters. In the science of phonetics, be it the traditional segmental or the more modern dynamic, the object examined in any such investigation is the feature as a member of a parameter (or a member of an opposition). In terms of physiology, for example, the four levels of vowel height would each be considered features or members of the parameter of vowel height. The important aspect for study would not be the difference between, for instance, [i] and [e̞], on the one hand, and [u] and [o̞], on the other; but rather it would be the specific feature characteristics of the high position (or feature) as opposed to the high mid.

In this case, physiology plays an insignificant role (if any), for the nasal cavity is a fixed physiological apparatus (compare Fant 1960:139-42). Thus, in the opposition of oral and nasal or nasalized vowels, the sole difference is the absence or presence of the nasal cavity as an acoustic resonator. Accordingly, this particular investigation of the effects of nasality in the double neutralization pattern of Swabian and indeed of a great many other languages as well should concentrate upon the acoustic aspects of speech.

There are three feature parameters that consistently and significantly contribute to the perception of nasalization. These include formant frequency distribution, pitch, and amplitude. These three are examined in detail in this section.

In such an investigation, the anticipated result is the isolation and identification of some salient feature characteristic that precipitates the change in the pattern observed in the previous two sections. Thus, we should look for some peculiarity in the data by which the high mid vowels should deviate from their oral vowel pattern between the high vowels and the low mid vowels in such a way as to suggest an affinity with the features of nasality. That is, we should look for some feature coarticulated with the high mid feature that stands out as anomalous in the oral vowel pattern and that suggests the perception of nasality. This would account for the shift from high vowels and low mid vowels to high mid vowels due to the imposition of nasality. In effect (and in keeping with processes of neutralization), the addition of the nasal resonator would cause the listener to perceive the high mid vowel, even where the high or low mid vowel is produced, thus leading to historical change.

2.3.a Formant Frequency Distribution. Of course, the primary features in the perception of vowel height as well as depth are the frequencies at which the vowel produces formants. This has been well established in the experiments of Peterson and Barney (1952) and Fant (1960) and in the synthesis experiments of Liberman, Ingemann, Lisker, Delattre, and Cooper (1959). Summaries of these and many other findings can be found in Fant (1973), Singh (1976) and Lass (1976), among many.

Insofar as nasalization is concerned, a weakening of the first formant (F_1) is observed along with the addition of two formants, one between 200 and 300Hz, and the other around 2200Hz (compare Delattre 1954, Hattori, Yamamoto, and Fujimura 1956; etc.). We should look, therefore, for a characteristic affinity of the F_1 and F_3 of the high mid vowels toward these frequency levels.

In Fant (1973:87), formant frequency values are given for the vowels of American English (from Peterson and Barney 1952) and for those of Swedish (from Fant 1959). For the vowels in question, the Swedish vowel frequencies are preferred, since they are produced in a consistently more monophthongal manner than are the American English, though the same pattern may be observed in the English system as well. Of course, precise values differ slightly not only among languages, but even among speakers and among different utterances of the same speaker; so the precise values are not as important here as the relative distribution of the frequencies (in keeping with the relativity principle of Jakobson and Waugh 1979:13-18).

The values for the first three formants of the high, high mid, and low mid vowels are given in Table 2.3.a. The notation is consistent with that used throughout this monograph.

Table 2.3.a: Formant Frequencies

	F_1	F_2	F_3
u	310	710	2230
o̝	402	708	2460
o̞	487	825	2560
e̞	438	1795	2385
e̝	334	2050	2510
i	256	2066	2960

Examining the values for the first formant, we should note that it is the high position, not the high mid, that most approximates the fre-

quency range of the added nasal formant. Not only does the high mid position not show any affinity for the nasal frequency, but it does not even stand out through any salient characteristic. Its value is quite simply in between the high and the low mid, offering no explanation at all for the double neutralization pattern.

Turning our attention to the third formant, which comes closest to the second additional nasal formant at about 2200Hz, we note the same relationship as that found at the first formant. Indeed, the data appear all the more perplexing because among the back vowels it is the high vowel that comes closest to the nasal formant, and among the front vowels it is the low mid vowel that comes closest. Not only is there no connection between the high mid vocalic frequencies and the nasal formant at 2200Hz, but there is no pattern at all.

Moreover, observing the data on the F_1 and the F_2, so important for vowel recognition, we must conclude that the frequencies involved in vowel height have no bearing upon the affinity of the high mid vowel and nasality either, at least when taken separately. There is one further possibility, though, and that is in the patterning of the combined F_1 and F_2 values in the usual acoustic vowel triangle.

In his acoustic investigation of clear, nasal, and murmured vowels in Gujarati (a language spoken in western India), Dave (1967) performs a thorough formant analysis. Gujarati differs significantly from Swabian in that the high, high mid, and low mid oral vowels are realized as high and low mid nasal vowels. Nonetheless, an interesting pattern emerges in the acoustic vowel triangle, particularly in the speech of informants RT and SK. Although the individual values for the informants sometimes differ considerably, a basic pattern can be discerned, illustrated schematically in figure 2.3 (p. 21).

In this figure, the nasal equivalents of oral vowels appear to shift outward from the center of the triangle, suggesting some type of peripherality principle at work. Examining the values from Table 2.3.a (p. 19) for the first and second formants, however, we are once again faced with the fact that the high mid vowels do not behave anomalously -- their values, if plotted on an acoustic vowel triangle, show no tendency toward

peripherality that would cause them to be associated with this aspect of nasality.

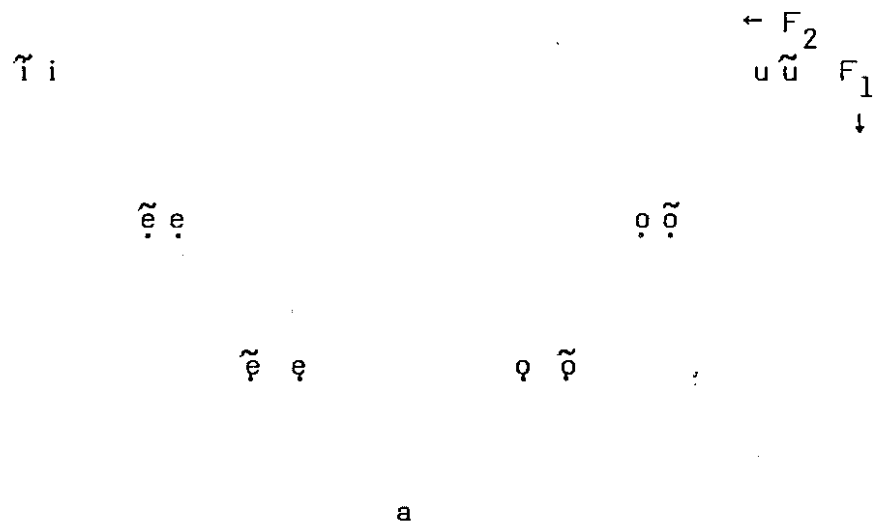

Figure 2.3: Peripherality of Nasal Vowels

No matter how we examine the data, from the standpoint of absolute values, relative values, or combinations and ratios of values (as in chapter 4), the conclusion is always the same. There is simply no evidence in the formant frequency distributions to suggest why the high mid vowels should be favored in nasalization in Swabian and in most other languages with a reduced number of nasal vowels. All attempts to find some salient deviation to support a nasal perception come back to the same conclusion: The frequency features of the high mid position are midway between those of the high and the low mid positions and offer no explanation for the double neutralization of vowel height in nasalization.

2.3.b Pitch. If the absolute values of formant frequencies either in the values themselves or in their relative distribution provide no insights into the double neutralization, then perhaps it is not a matter of absolute acoustic values at all, but one of their perception. After all, historical change such as that involved in Swabian occurs in the transmission of lan-

guage from one generation to the next (compare Anttila 1989:198-99). The older generation produces something perceived in a certain way by the younger generation, and the subsequent production by the younger generation is accepted or rejected on the basis of the older generation's perception.

In matters of perception, then, what we are dealing with is the interaction of the acoustic data received by the ear, as it is perceived and interpreted by the brain. In the phonemic categorization experiments by Scholes (1968), for example, it has been determined that nonnative speakers of English, regardless of their degree of education and knowledge of English as a second language, perceive the vowels of English not in accordance with their absolute frequency values, but rather in accordance with the corresponding vowel system (with its own values) of the subject's native language.

Unlike the subjects in the phonemic categorization experiments, however, the younger generation of Swabians participating in the historical change would not have had a separate native language in which the high mid vowel would be favored in nasalization. Nonetheless, the generality of the double neutralization pattern (as seen in the evidence of phonological universals and phonetic observations in the previous section) might indicate that such a pattern be "natural" (in the terminology of Ruhlen 1975 and 1978). If this be the case, then we would expect that the perceived frequency values might differ from the absolute frequency values in such a way as to afford the high mid position some affinity to nasality that would explain the double neutralization pattern.

In phonetics, the perceived frequency is termed pitch, and it is measured in the mel scale, appropriately developed from psychoacoustic experimentation. As described by Richards (1976 -- see also Ladefoged 1967:86-87):

> Stevens and Volkmann (1940) used the Method of Fractionation to examine further the frequency-pitch relation. Eight standard frequencies ranging from 150-10,000 Hz were used. A standard tone was presented for 2 seconds, followed immediately by a 2-second comparison tone. The frequency of the comparison tone could be adjusted by the subject. Both

> the standard and comparison tones remained at a loudness level of about 55 phons. The subject's task was to adjust the pitch of the comparison tone to one-half that of the standard. . . . The subject could, whenever he desired, turn a knob to introduce a 40-Hz tone. The subjects were told that this tone approximated "zero" pitch and that the fractionations should be made with that in mind. (Richards 1976:109)

In Ladefoged (1967:88-89), a table is presented with the values in mels of the pitch (F_0) and the first three formants (F_1, F_2, F_3) for 31 sets of cardinal vowels produced by eleven subjects. In Table 2.3.b (p. 24), the values of the vowels pertinent to the double neutralization of Swabian are reproduced from the data of subject O'Conner. O'Conner is chosen for the completeness of the data for the vowels under study.

Whether these values are taken by themselves or in conjunction with a pitch-to-frequency conversion chart (as in Ladefoged 1962:79), the result is the same. No feature at all (less a salient one) can be found that will establish an affinity between the high mid vowel and nasality. Once again, the pertinent values for the high mid position lie directly between those for the high position and for the low mid position.

2.3.c Amplitude. Finally, there is a phenomenon involved in nasalization that has been observed widely in the literature -- in fact, Delattre (1954) considers it to be the primary cue for nasalization of a vowel. According to a wide variety of observations since Smith (1951), there is a weakening in amplitude of the first formant.

In order to tie this weakening of the F_1 with the affinity of the high mid position to nasality, we must examine the decibel values of the first formants of the high, high mid, and low mid vowels. Given the weakening of the F_1 in nasalization, we should anticipate a relatively low amplitude for the F_1 of the high mid vowel.

In a chart of the harmonic spectra of sustained vowels, Fant (1973:70) plots the decibel levels of Swedish vowels produced by subject Gj-n. At the point of highest amplitude for the first formant, the [u] is approximately +5.5dB, the [o̞] approximately +5.5dB, and the [ɔ̝] approximately +6dB. Among the front vowels, the [i] is approximately +4.5dB, the

Table 2.3.b: Mel Scale Frequencies (Ladefoged 1967)

	i				e̞			ɐ̞		
set	F_0	F_1	F_2	F_3	F_1	F_2	F_3	F_1	F_2	F_3
5	290	340	1670	1960	640	1635	1860	750	1515	1860
7	300	340	1670	2040	505	1615	1820	690	1510	1820
8	155	240	1650	1930	485	1600	1735	660	1465	1745
			ɵ			ɵ			u	
5		650	880	1720	600	870	1705	325		
7		665	980	1750	515	830	1680	360		1710
8		560	780	1820	485	770	1695	260	655	

[e̞] approximately +6dB, and the [ɐ̞] approximately +5dB. While the high mid back vowel is thus in its usual unremarkable position, the high mid front vowel is salient in this feature, but salient in the wrong direction, being more intense where the anticipated connection with nasality would indicate less intensity.

There is one other consideration of amplitude, though, that might prove more fruitful. Hattori, Yamamoto, and Fujimura (1956) note a selective reduction of spectral intensity at about 500Hz (compare Fant, 1960:149). This antiresonance would provide a further opportunity for establishing some inherent affinity between the high mid position and nasality, if the high mid position should tend toward a lower intensity at 500Hz.

Once again, however, the data fail to bear this out. Returning to the data of Fant (1973:40), we find that at 500Hz [u] is approximately -3.5dB, [o̞] approximately +2.5dB, and [ɔ̞] approximately +6dB. Among the front vowels, at 500Hz [i] is approximately -18dB, [e̞] approximately -16dB, and [ɐ̞] approximately +5dB. This time, both the back vowels and the front vowels maintain the high mid position in between the high and the low mid positions. Thus, no salient feature can be found to explain the double neutralization pattern.

2.3.d The Negative Proof. As pointed out above, an examination of the data on formant frequency distribution, pitch, and amplitude reveals that there is no acoustic feature along any pertinent acoustic parameter that can account for the double neutralization pattern. In each case, the values for the high mid vowel are in between those for the high and the low mid vowels. Nor is this central position at all to be connected with nasality, for the features of nasality favor either a position beyond the values for these vowel height levels or indeed one of the other vowel positions.

As it is, every other phonetic parameter we may examine will yield the same results. For example, the data regarding sound pressure levels in Fant (1973:70) place the high mid vowels in between the high and the low mid vowels along this parameter as well.

If what we are looking for is a salient feature of the high mid vowel position that will demonstrate an affinity to the features of nasality in order to justify the double neutralization pattern, then the evidence cannot support the hypothesis. In fact, since no such feature exists, what we have is a negative proof of the hypothesis, and thence a proof of the negative hypothesis: There is no parameter along which the high mid vowel deviates from the vowel-triangle position in between the high position and low mid position such as to establish a relationship with nasality by which the double neutralization pattern may operate.

The lack of any salient feature within a pertinent parameter, however, is one problem. The degree of inconsistency and confusion in the data is quite another, although one that interacts with it. As noted by Fant, "Nasalization is not an easy feature to study, if detailed data are required, since the acoustic characteristics vary both with speaker and with the particular sound upon which the nasalization is superimposed and with the type of and degree of nasal coupling" (1960:149).

When we examine some major works that compare findings about nasality, inconsistencies abound. Such comparisons are found in Fant (1960:148-49), Dave (1967:21-28), and J. Ohala (1975). For example, the nasal formant at 250Hz is seen by Delattre (1954) as a secondary cue but by Hattori, Yamamoto, and Fujimura (1956) as a primary cue (see Fant ibid.). Moreover, some researchers do not appear to have found certain cues, while others appear to have found anomalous cues. The fact is that the features of nasality and nasalization are varied and imprecise.

From what we do know about nasality, though, there is no evidence, consistent or inconsistent, that would support the hypothesis of the high mid vowel's salient, nasal-like feature. Whatever causes the high mid vowel to be realized in double neutralization, then, is not ascertainable from particular acoustic values.

2.4 The Centrality Principle. Reviewing the evidence from the previous section, we find what appears to be a totally inexplicable pattern of change. With no feature coarticulated with the high mid position that might suggest an affinity with a feature of nasality, there is no common

parameter -- no reason for the double neutralization pattern to occur.

On the other hand, the evidence from section 2.2 indicates that the double neutralization pattern is not some random change peculiar to Swabian. Indeed, the pattern appears to be the most common type of change in the development of nasal vowels from oral. As pointed out in section 2.2.c, this generality would lead us to assume that the change is phonetically motivated. Moreover, the breadth of the range of vowel height levels neutralized and the frequency of semantic ambiguities resulting from the neutralization would further indicate that this phonetic motivation is extremely strong, as pointed out in section 2.1.a.

Thus, we are faced with a dilemma in which no phonetic feature supports the double neutralization, but the double neutralization must be phonetic in nature. Adding to this dilemma the inherent inconsistencies and vagueness surrounding the precise phonetic features of nasality, the problem might appear to be insurmountable.

There is, however, a phonetic explanation for the double neutralization. We should recall the fact that since there is no phonetic feature such as the one sought in the previous section, the neutralization occurs through the very lack of a salient feature. Indeed, the explanation hinges on the absence of a salient feature and is supported to some extent by the apparent imprecision of nasality insofar as precise features are concerned.

2.4.a Ranges, Targets, and Centrality. The dilemma outlined above is merely an illusion brought about by the belief that a single feature must be found with which the high mid position and nasality can be correlated. The negative proof of section 2.3.d, which is a necessary step in the analysis, should lead us to look for a nonfeature -- for a characteristic of the phonetic event that occurs without any specific feature. This characteristic has to do with the distribution patterns of features, rather than with features themselves, and with the grouping of the features into ranges of targets.

One of the most common pitfalls in phonology is taking the actual phonetic detail for granted. For instance, we tend to think of a high mid

vowel as a particular point on the vowel triangle. A cursory glance at such classic works as Peterson and Barney (1952), however, should remind us that reality is far messier. When a number of vowels of the same type is produced, the utterances are scattered around a general area or range in the vowel triangle. Not only is there no single value for each vowel, but the ranges for different vowels overlap. Given the messiness of the actual vowel realizations, what is a high mid vowel?

On the one hand, a high mid vowel is any combination of first and second formant frequencies that falls within the range perceived by the listener as consisting of high mid vowels. In a more abstract sense, the high mid vowel is the range of possibilities itself -- an area (but not a point) of the vowel triangle.

On the other hand, a high mid vowel may be viewed as the center of the range. The speaker aims the tongue body toward the center of the range, and coarticulation and random factors place the precise position somewhere "off the mark" but within the range. In the phonetic literature, the "mark" of this approach is the target or locus, and it is dealt with in detail, especially from the standpoint of synthetic analysis, in such works as Liberman, Ingemann, Lisker, Delattre, and Cooper (1959).

At this point, the analyses of the previous section ought to start looking a bit more promising. In formant frequency distribution, the high mid vowel occupies a central position with regard to the high position and the low mid position. Thus, when the frequency distinctions among the three vowel height levels are neutralized, the formant frequencies of the high mid vowel occupy a central location within the greater, neutralized range. In effect, the features associated with the target of the high mid vowel in the oral vowel system appear to become associated with the target of the entire range of high, high mid, and low mid vowels in the nasal system. Moreover, in pitch as well as in amplitude, the very same phenomenon can be observed.

The fact is that in every pertinent parameter, the target of the high mid vowel is in between those of the high vowel and those of the low mid vowel. While this was taken to be problematical when we were searching for a salient feature, now that the search has been discontinued

and the centrality of the target within a range is considered, the arrangement appears to be quite illuminating. Indeed, the lack of a salient feature ensures the centrality of the high mid vowel target in the neutralization of vowel height in all parameters.

Even the imprecise nature of the nasal features supports the centrality hypothesis. While exact feature values and realizations may be difficult to obtain for nasalization, one fact stands out: The nasalization of vowels reduces vowel distinctions, and it can reduce these distinctions in various ways. No precision is needed, though, to establish the target of a broadened vocalic range as being in the center, and indeed the imprecision of nasality would obviate any other locus for the target.

2.4.b The Centrality Hypothesis. In order better to understand this hypothesis of a centality principle, let us consider the graphic representation in figure 2.4 (p. 30). The three oral vowels -- high, high mid, and low mid -- are represented as ranges, each with the target at the center. The single nasal vowel range represents a neutralization of all three oral vowel ranges, again with the target at the center. While the vast range of the nasal vowel is rather imprecise, the speaker will nonetheless aim toward the central target, and the actual utterances should thus not be expected to deviate any more from this target than they do from the target of the oral vowel. Of course, the high mid oral vowel, due to its central location among the three vowels participating in the neutralization pattern, corresponds in locus to the nasal vowel, and the resulting sound is thus perceived as a high mid nasal vowel.

When the neutralization is viewed this way, the lack of any salient feature correlating the high mid position with nasality is expected. If there were a salient feature, the neutralization would not work, for it operates on the centrality principle -- that the target is at the center of the range.

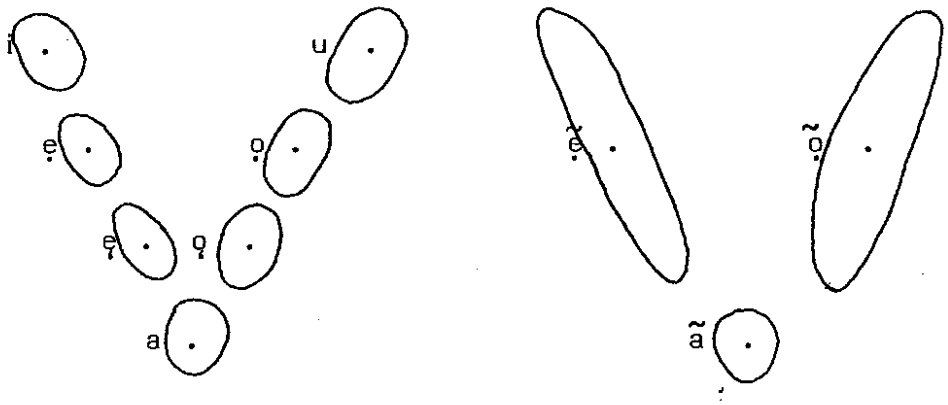

Figure 2.4: Target Centrality

2.5 Conclusion. The centrality principle and its application to the double neutralization pattern in nasalization has implications not only for Swabian, but for the study of language in general. In Swabian, we have a precise, phonetic explanation for the pattern of phonological change in which the oral vowel system developed into the nasal vowel system, as found in figure 1.1.b (p. 5). With the neutralization of vowel height distinctions introduced by the nasalization, the three oral vowel height levels became indistinguishable, and the center of this large range encompassing the ranges of the oral vowels became the target for the nasal realization. Due to the particular organization of the Swabian vowel system, the center coincided with the target for the high mid vowel.

By offering a phonetic approach to the reduction of vowel distinctions, moreover, this centrality principle should certainly help to explain similar phenomena in other languages, since it has often been observed that nasal vowel systems generally have fewer distinctions than oral vowel systems (compare Ruhlen 1975:340, on the phonetic side see also J. Ohala 1975:294, and Mohr and Wang 1968). Just how general this principle is in the development of nasal vowel systems, of course, can be determined only by empirical observations of languages, particularly of those with a history that is reasonably well known.

In the methodology of historical linguistics, moreover, this investigation should have some rather far-reaching implications. In the usual treatment of oral versus nasal vowel systems such as that found in Ruhlen (1975, 1978), the oral system is displayed next to the nasal system at one synchronic stage of the language. While such taxonomies are important, they offer little explanation for the historical processes involved in the development of the nasal and nasalized vowels. An historical change is, after all, a dynamic process with causes and effects, not simply a comparison of a system at one stage and a different system at another.

As we see in this analysis, one phonetic tendency involved in nasalization (and certainly not the only tendency) derives from the reduction of vowel distinctions under the influence of a rather ill-defined nasalization. Under such circumstances, distinctions do not simply change from one state to another, but rather they neutralize, such that two distinct features within two distinct ranges lose their distinction and become realized as a single feature within an extended range. Such neutralization is a dynamic historical process, and its implementation can introduce a host of associated phenomena, one of which is the centrality principle discussed in the previous section.

By admitting this dynamic historical process of neutralization and by examining its ramifications from a phonetic point of view, a problematic phenomenon may be shown to be rather mundane. For example, in section 2.2.b we see that Wright (1975) uses psychoacoustic experimentation to show that the double neutralization pattern is in fact an apparently natural phenomenon. He is apparently surprised to observe the following:

> The high vowels [i], [y], and [u] had a pronounced tendency to lower as did the front vowels [I], [e] and [ɛ]. [o͡e] and [U] also followed the trend, but [o] was clearly lowered in only one case. [a͡e] on the contrary, displayed a pronounced rise, and the oral and nasal productions of [ɑ] were judged as differing little. The single most surprising result was auditory raising of [ɔ] which was aberrant in terms of the expectations engendered by previous studies. (Wright 1975:376-79)

What we see in Wright's findings, however, is far from surprising.

In a process of neutralization, the subjects' vowel height distinctions are losing their distinctiveness and showing a tendency to shift the nasalized target toward the center of the extended range. Thus within the range of the neutralizing vowel height levels, the higher members' ranges appear to shift downward, and the lower members' ranges appear to shift upward. Meanwhile, the low central vowel, as in Swabian, changes little, for it does not participate in the neutralization tendencies affecting the front and back vowels (although we do see a less pronounced drift toward the center among the central vowels).

What makes these changes appear surprising and even aberrant in a phonetic experiment is probably the lack of a salient feature of the target position that would show an affinity to nasality. As demonstrated in section 2.3, such a feature does not exist; and the nonexistence of this feature creates confusion in the traditional and usually quite sufficient feature-correlation approach in phonetics. Once we set the feature-correlation approach aside and examine the data in terms of targets and ranges, however, the results appear far from surprising.

The inclusion of archiphonological neutralization in historical change is certainly not new (compare Griffen 1977). That the effect should be so closely bound up with phonetic detail, however, and that it should displace the feature-correlation approach at least in this case is significant, for it supports the phonetic motivation for general phonological change even where this motivation may not, upon first examination, appear to exist.

CHAPTER 3
SPONTANEOUS NASALIZATION

3.1 Spontaneous Nasalization Patterns. As the term has been used since Diels (1913a, 1913b), spontaneous nasalization refers to the nasalization of an element without any motivating nasal feature in the environment. Whether such developments are indeed unmotivated, spontaneous historical changes, however, is examined in this and the following chapter.

Basically, there are four phenomena in Swabian that could be considered to be spontaneous nasalization. One of these involves the nasalization of a glide and is dealt with in detail in chapter 4 of this monograph. The other three allegedly spontaneous nasalizations affect the nuclear vowel, and these include the affected nasalization, historical nasalization, and spontaneous vowel nasalization.

3.1.a Affected Nasalization. In many cultures, speakers affect nasalized speech under certain circumstances in utterances from a single item in the flow of speech to the entire speech event. For example, when stalling to find a proper word, many speakers will utter a filler such [ə:]. Other speakers (or indeed the same speakers at other times) will nasalize the filler [ə̃:]. Such nasalization is not phonetically motivated, nor even grammatically motivated, but rather motivated by social or semantic factors and is therefore termed here "affected" nasalization.

In Swabian, several affected nasalizations are recorded by Vogt (1979:39). Transcribing Vogt's orthography into phonetic notation, we find among these nasalizations the exclamatory [ãhã] 'ah hah!', an affected nasalization that fits the definition above rather precisely. Vogt also notes the forms [ãsdə] and [ãsəd] corresponding to New High German als 'when, as' when used in such utterances as [ãsdə jõ:ŋ] = NHG solange ich

noch jung war 'as long as I was young, back when I was young' and [ãsdə gãts] = NHG ganz und gar 'entirely'. These latter usages can also be affected by such factors as reminiscence, emphasis, and grandiosity. (In the case of als, palatality also appears to play an important role -- see section 3.4.b.)

Whatever the motivation, though, the fact remains that such nasalizations are far from spontaneous. To be sure, there is none of the usual phonetic motivation that we come to associate with phonological change. Nonetheless, we cannot speak of true spontaneity or of the lack of motivation, for at some level of the language, the nasality has been added for a particular effect, and it is thus affected. (Moreover, as we see in chapter 5, historical change may involve a complex of motivations, including nasalization.)

3.1.b Historical Nasalization. As Diels (1913a, 1913b) points out, some instances of supposedly spontaneous nasalization appear to be spontaneous only from a lack of knowledge of the history of Swabian. Given only the Modern Swabian forms and the appropriate cognates from New High German, nasalization may appear to be spontaneous in Modern Swabian. As pointed out in section 1.1.a, however, Swabian is a descendant of Alemannic, not of New "High" German, which is a mixture of dialects, but mainly Middle (Upper) Saxon (East Central German).

Thus, for example, Diels (1913a:86) includes in a list of items allegedly undergoing spontaneous nasalization the Swabian cognate of New High German faust 'fist', which in some dialects at least is realized as [fo̰ũšd]. As Diels also points out, however, in older sources of High Alemannic, the spelling funst is to be found. The appearance of spontaneous nasalization, then, is due only to the comparison of the Swabian word with the German (Saxon). When the more closely related High Alemannic is consulted, however, we see quite clearly that a nasal existed at one time in Common Alemannic and is doubtless the source of the nasality in the Swabian form.

Likewise, the inclusion in Diels' list of ziestag 'Tuesday' also reflects an historical nasal. While Diels (1913b:329) himself takes the form

back to MHG zins 'fee, tribute', Lexer (1966:336-37) cites the term zins-tac 'Tuesday' as a "corruption" of the form zis-tac, derived etymologically from the 'day of the God Ziu' (compare English Tuesday). Of course, in either case we find nasalization derived from an historical nasal.

Finally, Vogt (1979:39) includes the form [tsə̃ibər] (Zei'ber in his notation) = NHG Ziparte, a plant originating in Cypress. This term probably derives from MHG zein 'twig, rod, reed, staff'. Of course, since this form of the term occurs only in Swabian, the presence or absence of a nasal in the historical form cannot be established with absolute certainty, though the (perhaps folk) etymology suggested here is most likely.

3.1.c Spontaneous Vowel Nasalizations. Once the affected and historical nasalizations are discarded as nonspontaneous (that is, motivated by some level or in the history of the language), there remains a collection of words in which nasal vowels occur apparently with no source for the nasality. Combining the lists in Diels (1913a:86) and in Vogt (1979:39), we find the words in Table 3.1 (p. 36).

The words in Table 3.1 are not subject to any known type of affectation, nor are there historical or other Alemannic forms that might explain the presence of the nasal vowel. If spontaneous nasality should exist, then, it would exist among these forms. As we shall see, however, there is nasal motivation for this phenomenon, though it is not in the form we might expect.

3.2 Description. Given the Middle High German forms, two conclusions should immediately be obvious. First of all, there is no nasalization in the historical forms to support the usual type of development of the nasal vowel from a combination of oral vowel plus nasal consonant. Second, slight differences in the Middle High German words would indicate that the change has taken place in the Swabian reflexes, in which these differences have been neutralized, as described in detail further in this section.

The description of the phenomenon, both in its historical and its

Table 3.1: Spontaneous Vowel Nasalizations

Middle High German	Swabian	New High German	Gloss
geist	gə̃ɪšd	Geist	spirit
dîhsel	də̃ɪs¦	Deichsel	beam
îs	ə̃ɪs	Eis	ice
îsen	ə̃ɪs(ə)	Eisen	iron
lîs(e)	lə̃ɪs	leise	quiet
riuse	rə̃ɪs	Reuse	wicker-trap
zîse	tsə̃ɪsə	Zeisig	greenfinch
zîselîn	tsə̃ɪslə	Zeisiglein	(diminutive)
	ə̃ɪtsə̃ɪslə	umgarnen	to trap

synchronic aspect, can be divided into two components, for there are two characteristics of the environment that are constant throughout the Swabian data in Table 3.1. The first component is the diphthong [əi], and the second is the sibilant fricative [s] (or [š]).

3.2.a The Diphthong. In each case of spontaneous vowel nasalization (where there is no affectation and no historical nasal), the nuclear vowel is the diphthong [əi]. As implied in the notation, this diphthong rises from a mid central-to-front position to the high front position. As such, it represents a movement toward the palatal region, a feature that will prove important in section 3.3.

As for the origin of the diphthong, the most common source is the Middle High German long high front vowel [i:]. The diphthongization of this vowel is one of the marks of Swabian that serves to differentiate the language from Middle High German (compare Kauffmann 1890:65-66, Keinath 1930:7-8, Heissel 1935:10, G. Moser 1936:46-47) as well as from the rest of Modern Common Alemannic (compare Bohnenberger 1953:31, Bohnenberger 1928:15-16, Haag 1946:96-97).

In the development of MHG riuse, the original vowel was probably a long high front rounded vowel [y:] (compare Kauffmann 1890:80-86 and other sources noted above). In most of Alemannic, the front rounded vowels lost their roundedness (see Bohnenberger 1953:121), and the result was the long high front vowel [i:] described in the previous paragraph. Thus, from the stage of a long high front unrounded vowel, the development of the Swabian diphthong [əi] is once again in evidence.

Finally, in the case of MHG geist, we find a simple maintenance of the Middle High German diphthong in Modern Swabian. It should be noted that the diphthong in Middle High German was probably pronounced as [əi] or as [ei] and not as the New High German [ai] (compare Kienle 1969:46, Wright 1955:11,15).

3.2.b The Consonant. As noted above, the Swabian consonant following in the diphthong in each case is the sibilant fricative [s] or its alternative grooved [š]. Once again, it will prove important in the following

section that this pair of fricatives constitutes the only palatal fricatives in Swabian.

The only other fricative in evidence in the Middle High German data is the velar fricative h [x]. In a regular sound change, the combination of the velar fricative and the sibilant fricative from Middle High German results in the loss of the velar fricative where the nuclear vowel is or becomes long (compare Vogt 1979:42). Thus, for example, MHG ahsel 'shoulder', with its short [a], becomes Modern Swabian [a:sl], with its long [a:]. Of course, the form [dɑ̃ːsl] contains a diphthong, which is automatically long, and this allows the palatal [s] to follow (or more precisely, to constrain) the palatal portion of the diphthong.

To the speaker of New High German, the importance of the loss of MHG [x] may not appear obvious. In New High German, the reflex /x/ is a dorsal, rather than a velar fricative, and it constitutes frication between the tongue body and the roof of the mouth wherever the tongue body happens to be positioned for the utterance of the vowel (see Glave 1974). Thus, in New High German, a dorsal fricative constraining a high front vowel would necessarily be the palatal [ç].

Both in Alemannic and in historical stages of the language, however, the fricative in question is not dorsal, but velar (compare Lüdtke 1959). In order for the constraining fricative to be a palatal, then, the [x] would have to be dropped, allowing the palatal sibilant to constrain the high front portion of the diphthong. Indeed, as Diels (1913b:329-30) points out, in dialects in which the fricative has been maintained (as a plosive [k]), the nasalization has been blocked.

3.3 The Phonetic Motivation. When we look at the forms undergoing the allegedly spontaneous nasalization in section 3.1.c in the light of their descriptions in section 3.2, one fact stands out: However spontaneous the nasalization may be, it certainly does appear to be representative of a regular sound change. When the diphthong involves a movement to the palatal position and when this movement is reinforced by a constraining palatal fricative, then nasalization occurs.

Whenever such regularity is to be found on the phonetic feature

level, though, the change can hardly be considered spontaneous or unmotivated, for the very regularity of the phonetic occurrence would indicate a phonetically motivated sound change. That this should appear to be spontaneous is merely a reflection of the fact that there is no nasality in the environment from which the nasal prosody constraining the diphthong may have arisen.

The use of the term "spontaneous," then, reflects the basic dilemma surrounding this phenomenon. On the one hand, nasalization occurs in a specific environment with predictable regularity. On the other hand, there is apparently no source for this nasality anywhere in the environment. As we see in this section, however, there is indeed a source for the nasality, though it is not "nasal" in the traditional approach to the term.

3.3.a The Effects of Palatality. As pointed out in section 3.2, both the diphthong and the fricative are strongly and necessarily marked by palatality. Indeed, in words where the palatality has been blocked or lowered, the nasalization has not occurred. This aspect of the environment is significant in two ways: (1) in the workings of dynamic coarticulatory constraint and (2) in the affinity between palatality and nasality.

In the model of dynamic phonology outlined in section 1.2 of this monograph, the basic principle is that of dynamic coarticulatory constraint -- that certain features and feature types constrain other features and feature types with which they are coarticulated. When both features are of the same phonetic substance, the result is a heightened realization of the feature. This is the basis for such provections as those discussed in detail in Griffen (1985a:chapter 13 and 1985b), in which the addition of one degree of prosodic aspiration to another results in a higher degree of the prosody.

When the two features obtain on different divisions of the speech event, as illustrated by the syllabic frame in figure 1.2.b (p. 8), the result can be fairly drastic, as found in the various realizations of New High German /R/, discussed in Griffen (1982 and 1985a:chapter 4), in which the element may be realized as a consonantal obstruction, a glide, or a vowel.

Applying this principle to nasality, we are faced at once with a

rather obvious observation. In a nasalized syllable, a nasal consonant is readily discernible. For example, in the English word pin [pĩn], the vowel may be oral or nasal; but if it is nasal, the nasality of the consonant will be heightened sufficiently to be understood "over" the vowel. In effect, the nasality of the obstruction prosody is added to that of the syllable prosody (see section 1.2.a).

Let us now apply this principle to palatality. If palatality is a mark of the obstruction (that is, the member of the basic obstruction opposition, in dynamic terms), and the obstruction is constraining a syllabic vowel which also is marked by palatality, then the result is a heightened realization of the palatal feature. Thus, in the problem at hand, nasalization results from this heightened realization of the palatal feature, and we should search for some connection between palatality and nasality.

In their investigation of the perception of nasality, Lintz and Sherman (1961:393) observe that the high front vowel [i] is most likely to be perceived as involving nasality as long as it is articulated without consonantal constraint. Inasmuch as this position represents the most palatal, we have experimental evidence that palatality may indeed involve some element that the listener perceives as nasal.

Turning our attention to the sibilant fricative, we find a rather interesting observation by J. Ohala (1975). In his review of the phonetic literature on nasalization, Ohala notes the following:

> There are intriguing reports in the literature on sound change about vowels being more susceptible to become nasalized in the environment of certain obstruents as opposed to others, even when no nasal consonant is adjacent to it. Hetzron (1969), Ohala (1972 . . .), Matisoff (1975) and M. Ohala (1975) cite evidence that [s], glottal and pharyngeal consonants seem to neighbor vowels that become nasalized "spontaneously". . . .
>
> Although I know of no reason why [s] should induce nasalization on neighboring vowels, it is interesting to note that Lintz and Sherman (1961) found that trained listeners judged vowels in the environment of continuants to be more "nasal" (perceptually) than vowels in the environment of noncontinuants. (J. Ohala 1975:303)

Thus, there is some kind of affinity between the palatal vowel [i]

and the palatal fricative [s], on the one hand, and nasality, on the other. Given the heightening in intensity of a feature through coarticulation, then, it should come as no surprise that the combination of the movement to [i] in the diphthong [əi] with the superimposition of the palatal [s] (or [š]) on the palatal part of the diphthong should lead to the perception of nasality. After all, the movement to this position also heightens the perception of the position dynamically, and this very pronounced palatality should invoke whatever nasality may be appropriate.

While this observation may account for the perception of nasality and thence the historical change, it is nonetheless still only an observation, not an explanation. As J. Ohala (ibid.) points out above, the reason for this affinity is as yet unexplained. Clearly, however, the regularity and even the predictability of the change would indicate that this change is phonetically motivated and open to explanation.

3.3.b The Phonetic Explanation. The correlation between [s] and nasalization may appear to be mysterious because it has not been connected with the affinity for nasalization exhibited by the high front vowel position. In the Swabian data, however, the connection between the vowel and the [s] is so obvious as not to be overlooked. As noted in section 3.3.a, moreover, this connection is made through the feature of palatality.

Whether in the vowel position or in the consonantal, the feature of palatality somehow evokes the perception of nasality on the part of the listener. In determining just how this happens, we should review the features of nasality as described succinctly in Fant (1973, from Fant 1962):

> Nasal: A voiced occlusive nasal (nasal murmur) is characterized by a spectrum in which F2 is weak or absent. A formant at approximately 250 c/s dominates the spectrum, but several weaker high-frequency formants (not always seen in spectrograms) occur, one typically at 2200 c/s. These higher formants are generally weaker than for laterals. The bandwidths of nasal formants are generally larger than in vowellike sounds. Voiced vowellike nasal sounds (nasalized vowels) possess the nasal characteristics as a distortion superimposed on the vowel spectrum. Typical nasalization cues are addition of the first nasal resonance in the region below the

> first formant of the vowellike sound and simultaneous weakening and shift up in frequency of the first formant, F_1. (Fant 1973:27)

In order to see the connection between palatal articulation and nasality, let us also review the formant frequencies as presented in Table 2.3.a of the previous chapter (p. 19). In the values for the first formant, we should note that there is a drop in frequency along the parameter of depth from back to front, velar to palatal. Furthermore, there is a gradual drop in the parameter of height from low to high. In both cases, the lowering of the F_1 culminates in a frequency of 256Hz in the high front or palatal position of articulation. Of course, this value of 256Hz is approximate and well within the range of the nasal formant observed by Fant to be around 250Hz.

In examining the second formant values, we find a rise in frequency along both parameters. This rise culminates in the high front or palatal F_2 frequency of approximately 2066Hz, the closest approximation among the second formant values to the nasal resonance observed at around 2200Hz. Given any nasalization in the speech of an individual, the broadened bandwidth associated with this nasalization could bring this formant value within the range of the second nasal formant.

Recalling that the palatal nature of the vowel is heightened by the palatality of the fricative coarticulated with it and constraining its production, we can arrive at a very plausible explanation for the "spontaneous" vowel nasalization (recognizing that the nasalization is constraining not merely the vowel, but also the consonant -- in keeping with the principles of dynamic coarticulatory constraint outlined in section 1.2).

As vowel nasalization is a distortion of the oral vowel formant frequency patterns, any oral vowel pattern (particularly as influenced in coarticulation by features constraining it) that mimics the nasal distortion is liable to be perceived and interpreted by the listener as nasalized. Certainly, this is one of the major findings of the experimentation by Lintz and Sherman (1961 -- as supported in a broad way by that of Wright 1975). As Fujimura and Lindqvist also point out, "The lowest formant of the coupled system can be either a nasal formant or a shifted oral for-

mant" (1971:552).

The historical change involved in this type of nasalization, then, appears to be the result of the mimicking of the nasalized vowel pattern due to a heightened realization of palatal frequency characteristics. The heightening of the frequencies associable with nasal articulation -- at about 250Hz and about 2200Hz -- in effect brings about a weakening of other frequencies, at least in perception. The result is the perception of nasalization and, in fact, nasalization itself, for the characteristics of the formant patterns produced in the [əis] combination (remembering that the [s] is a palatal constraint on the palatal portion of the [əi] syllabic vowel) happen to coincide to a high degree with the characteristics of the formant patterns perceived in nasality.

3.4 Conclusion. As presented in this chapter, then, the so-called "spontaneous" nasalization is not spontaneous at all, but is the result of observable, measurable acoustic characteristics in the environment. As such, this analysis has some important implications for linguistics, not only in the specific study of the Swabian language, but also for language in general.

3.4.a Change as Effect. First and foremost of these implications is the conclusion that no matter how spontaneous and unmotivated the nasalization traditionally termed "spontaneous nasalization" may appear to be, the fact is that it is not spontaneous, for it is phonetically motivated. While the motivation may not be obvious, especially if we are predisposed toward searching for some preexisting nasal in the environment, it is there, nonetheless, in the form of acoustic features. (For further discussion of nasality from "nonnasal" features, see section 4.5.)

For Swabian, this means that the spontaneous vowel nasalization can be accounted for phonetically in such a way as to be predictable -- a very positive development in the description of the language. In the general study of linguistics, moreover, this analysis should prompt linguists toward a more thorough examination of the phonetic detail upon which such changes are based. In one way or another, phonetically regular

changes (as opposed to those motivated by other aspects of the language, as in sections 3.1.a and 3.1.b -- along with many other types) can be explained by attention to the phonetic detail.

In a broader sense, historical linguistics should be viewed as a science in which at least statistical predictability is sought. After all, changes do not occur spontaneously, without motivation of any kind. Changes are effects for which there are causes. It is the task of the scientist to determine what those causes are.

3.4.b The Case of Lateral/Palatal Nasalization. In conclusion, let us reexamine a case of affected nasalization presented in section 3.1.a. While the nasalization of the exclamatory [ãhã] is clearly a case of affectation, the forms [ãsdə] and [ãsəd] from Middle High German als 'when, as', may in fact represent another case of "spontaneous" vowel nasalization (as presented in the section 3.3) as well as affected nasalization and indeed historical nasalization, all combined into one change.

The historical form contains the lateral [l], which has two attributes that are noteworthy in the light of this chapter. First of all, it is palatal, and even alveopalatal -- taking the palatal feature to an even greater extreme. Second, the lateral pronunciation shows a close affinity to nasality in itself, as noted, once again, by Fant (1973, from Fant 1959) as follows:

> The first formants of the voiced continuants l, m, and n occupy a low frequency position, somewhat lower in m and n than in l. The intensity level of the higher formants of an m or n at about 2,200 c/s and/or higher frequencies is generally but not always below the level of the higher l-formants. . . . (Fant 1973:63)

In terms of nasal mimicking, the formant pattern of the lateral is therefore quite significant, especially when taken in coarticulation with the already-established affinity for nasality found in the [s], which occupies the same position in the syllabic frame as the lateral. Not only do we find the same heightened palatality in the coarticulation of [l] and [s] that brought about "spontaneous" vowel nasalization, but we also find an

inherently close affinity between the lateral and the nasal. In both the added lower formant and the added higher formant, the lateral and the nasal are close enough to bring about a nasal interpretation of the lateral (with heightened palatality), especially with the broader bandwidth and greater degree of variation found in the nasal (compare section 2.3.d).

As for the mechanics of the change, there are several possibilities, but the actual sequence of events is lost in history. For example, the liquid could have changed into the nasalization directly, it could have first changed into an [n], or the nasalization resulting from the environment may have simply rendered it inaudible as a liquid obstruction. In any case, nasalization arose not spontaneously, but from the phonetic characteristics of the environment.

In this instance, then, we may well find a combination of all three types of "spontaneous" vowel nasalization. In affecting reminiscence, emphasis, or grandiosity, the speaker could well affect a nasal pronunciation (much the same as that in [ãhã]). Certainly, the historical [l] presents one form or another of an historical nasalization, as shown above. Finally, the act of historical nasalization shows the same type of "spontaneous" nasalization found in section 3.3.

Whatever the balance between them, though, the change from <u>als</u> to [ãsdə]/[ãsəd] demonstrates the interrelatedness of the causes for the type of nasalization discussed in this chapter. As always, the most important point is that such changes are no more spontaneous or unmotivated than any other changes in language or in nature. No matter how capricious a change may appear to be, something brings it about.

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CHAPTER 4
GLIDE NASALIZATION

4.1 Glide Nasalization Phenomena in Swabian. In chapter 2, we were concerned with instances in which nasalization has occurred in the development of Swabian from Middle High German within the environment of a nasal consonant. As pointed out by Ruhlen (1978:223-27), this is indeed the expected case. On the other hand, the spontaneous nasalization described in chapter 3 involves nasalization from features of the environment that, while not inherently nasal themselves, did create the perception of nasality.

Glide nasalization maintains the same two groups of phenomena. In the majority of cases, nasality has occurred in the environment and has lead to nasalization. However, in one important instance, no nasality can be found in the environment to justify the nasalization of a glide to a nasal obstruction.

4.1.a Assimilative Glide Nasalizations. Glide nasalization involves the historical changes in which the [w] glide developed into the labial nasal [m]. While such changes have taken place with greater or less frequency throughout the Swabian region, the full spectrum of changes occurs with the greatest frequency in the western Swabian dialects (in the old state of Württemberg). One of the richest of these dialects in this sort of nasalization is the dialect of Onstmettingen and vicinity, as described by Keinath (1930:13) -- and further examples can be found in numerous dialect studies (see especially Heissel 1935). (Compare also Bohnenberger 1928 and 1953, Kauffmann 1890, Vogt 1979 for forms from various dialects.)

First of all, as is common to all Swabian dialects, the first person

plural pronoun from MHG wir 'we' has undergone a glide nasalization to /mir/. Treated in detail in chapter 5 of this monograph, this development is the result of assimilation. For example, MHG wir machen 'we make' would be realized in inverted order as machen wir. In this latter order, the Swabian dialects assimilated the [w] to [m] in the fifteenth century, later generalizing the innovation to the noninverted order (and the verbal ending went through a series of changes as well), to yield Modern Swabian /mir maxxəd/. (Compare also Kauffmann 1890:262-63.)

Next, there is a type of glide nasalization typified by the change from MHG winzic 'tiny' to Swabian [mõ̤nzik] (in Keinath's description and notation). Such phenomena are rather routine applications of nasal assimilation, or more precisely of nasal extension. As seen in the example, the nasal nasalizes the vowel, and this nasal prosody simply extends back over the glide as well. Similarly, Keinath's [mũədẹsẽ̤r] corresponding to NHG Wuotans Herr 'Wodan's army', while possibly not a case of simple nasal extension (although this is still quite plausible), certainly indicates the working of a nasal prosody transfer not inconsistent with assimilation.

More transparently a case of assimilation is that found in the change from MHG swelewelîn 'swallow' to Swabian [kšwẹlmle] (compare NHG Schwalben) noted by Kauffmann (1890:262). In cases such as this, the development of the [m] may be attributed to closure assimilation, with the maintenance of continuance in the consonantal articulation (that is, continuance of emission, as this feature is used in traditional functional linguistic analysis -- compare Trubetzkoy 1969:166). Thus, the closed but continuant articulation of the surrounding glides would effect closure with continuance in the labial.

4.1.b The Problem. Finally, there is the most apparently systematic change of all, though admittedly the most restricted in its application. In a considerable number of western Swabian dialects, the MHG interrogative wâ 'where' has changed to [mọ:]. This is by far the most problematic of the glide nasalizations, since there is ostensibly nothing in the environment that would support such a change: There is no nasal for nasal extension (or assimilation) to occur, and there is no closure of any sort to

bring about closure assimilation. Nonetheless, as seen below, this development is systematically motivated and provides insights not only into the historical development of Swabian, but also into the processes of historical change in general.

4.2 Description. While a far more detailed description of the phenomenon is provided in the next two sections, which deal with the environment and the phonetic justification for the change, a cursory and preliminary description at this point is needed in order to provide the background for the environmental and phonetic arguments used below.

There are two very common interrogatives affected by the change. The first and more basic of these is MHG wâ 'where' > Swabian [mọ:]. The second is a derivative of the first -- MHG wâr-umbe 'why' > Swabian [mọ:rõm]. In this latter case, the word is etymologically more accurately translated as 'wherefore', corresponding both to the morphological structure and to the precise meaning of the MHG/Swabian. The compounded nature of this form will prove to be crucial to the analysis, as shown in section 4.3.a.

While one could certainly argue that the paucity of forms undergoing this particular glide nasalization process might indicate that they be handled simply as exceptions in the terminology of Hjelmslev (1970:30-31); nevertheless, there are several factors that would indicate that, in spite of this paucity of forms, this change in fact represents a Hjelmslevian counter-example -- a systematic deviation that must be accounted for within any description of the phonological development of the language. Of course, one indication of this is the extent to which these forms are realized in many of the dialects of Swabian, having developed in each independently of the others. There are, however, more directly, internally systematic arguments for treating these forms as a major historical phenomenon of glide nasalization.

When taken in the overall context of vocalic nasalization in Swabian, this glide nasalization appears at once regularly systematic and nonetheless problematic. In the historical development of Swabian, high oral vowels and low mid oral vowels have nasalized as high mid nasal

vowels, as pointed out in chapter 2. Thus, a movement in the vowel scheme toward this high mid position might be seen as consistent with nasalization. In such a context, the change in the vowel from low [a:] to low mid [ɒ̝:] (which is general in the affected dialects -- Kauffmann 1890:46-49) might be viewed as a systematic cause of the nasalization process. On the other hand, when the vowel originates as a low mid [ɒ̝:], nasalization would bring about a change to the high mid [o̝:] level. While systematicity, then, would appear to be maintained in the vowel change, it is not entirely consistent with the systematic nasalizations occurring productively in the language.

Another factor that would indicate that some significant systematic adjustment is taking place in this glide nasalization can be found in the very fact that there is no nasality in the environment. Particularly in the case of the basic MHG wâ 'where', there is neither nasality within the form itself, nor is there nasality that would regularly be uttered in the vicinity of this form (as in the case of the nasalization of wir 'we' to /mir/, noted above). Nasalization, then, would appear to be brought about by something systematic occurring in the change from [a:] to [ɒ̝:].

Likewise, the change from MHG wâr-umbe 'why, wherefore' to [mɒ̝:rõ̝m], while it may appear at first glance to be a simple case of nasal extension (assimilation), upon close examination fails to reveal any nasality in the environment that could bring about the change. Although a nasal is found in the second element of the compound, the morphological boundary should be enough to block the nasal extension (compare also section 4.3.a).

Whatever the motivation for the change may be, it appears to be systematic. Thus, a closer examination of the environment and of the phonetic detail involved in the change must be conducted in order to determine the precise nature and phonetic justification for the change. Such an examination is conducted in the following sections.

4.3 The Provective Environment. Perhaps the most obvious condition affecting the glide in MHG wâ as well as that in MHG wâr-umbe, is its initial position not only in the word, but also in the utterance, at least in

the word-order one would use most frequently in a direct question. Such a position would be subject to relatively intense amplitude, providing the glide with an intensity level that would be more typical of a more fortis sound. Indeed, the intensity would be all the more heightened by the interrogative nature of the words involved, often calling for more than the natural utterance-initial intensity.

4.3.a The Intensified Position. As demonstrated in Griffen 1983, Swabian maintains a fortis-lenis consonant system based upon the phonetic feature of aspiration. Accordingly, the labial series consists of the obstructions [w] - [b] - [p] - [p^h] from lenis to fortis. In an aspirate system, the relationship among the members of this gradual opposition is described in terms of the ratio of high-to-low frequency emission, with the lenis sound maintaining a low ratio and the fortis a high ratio (see the works on Welsh, cited below). Increased intensity, then, corresponds to an increase in aspiration, as indeed pointed out for the Swabian aspiratae (as in Takt-final position) by Kauffmann (1890:179, 189, 201).

This aspirate fortis-lenis system is quite reminiscent of that found in Welsh (see Griffen 1985a:chapters 5 and 7, also 1975a). In Welsh, when a lenis-most initial is borrowed into the language, the pressures of the phonetic system as well as those of the initial consonant gradation (or the mutation) system conspire to aspirate, or "strengthen," the lenis initial. As described in Griffen 1975b, when a word such as verbum 'word' is borrowed from Latin, there is pressure to strengthen the initial [v] (which systematically corresponds to the initial [w] of Swabian) to the next more fortis sound within the system, rendering the Welsh cognate berf [berv] (note the corresponding weakening of the internal/final consonant).

Within this particular system, provection (the strengthening of a consonant along the fortis-lenis scale) can result either in [b], as in the example, or in [m], as we see in the borrowing of English velvet as melfed [melved]. The possibility of using the nasal obstruction in the labial series exists due to the workings of the mutation system, in which a radical (dictionary form) with the second-degree consonant (media) changes to the lenis initial in the process of "soft mutation" (lenition), given certain

grammatical conditions. Thus, for example, in their feminine forms, the nouns ban 'peak' and man 'where' are both realized after the definite article y as y fan [ə van].

Insofar as the Swabian is concerned, provection in this highly intensified utterance-initial position would certainly be plausible. In fact, the internal stress pattern of the affected words would even increase the plausibility of provection. Of course, in the case of MHG wâ > Swabian [mɒ̣:], we are dealing with a monosyllabic word in which the stress is necessarily on the single syllable.

With MHG wâr-umbe > Swabian [mɒ̣:rɒ̣m], however, it might appear as though the stress would naturally occur on the second syllable, given the nature of the 'where-' compound pattern, which is identical in English and Swabian. A closer examination, though, reveals that the situation with regard to [mɒ̣:rɒ̣̃m] is rather more complex. The other 'where-' compounds in Swabian all maintain the stress on the second (more meaningful) element (although, to be sure, these are rarely used). As pointed out by Fischer and Pfleiderer (1904/36, vol. 6:454), for instance, in the case of [mɒ̣:rɒ̣̃m] the word stress is often placed on the first syllable, rendering the pronunciation ['mɒ̣ rɒ̣̃m]. Evidentally, the development of initial-syllable stress in [mɒ̣:rɒ̣̃m] gave this word the same stress level as that of [mɒ̣:], and this heightened intensity brought about a strong provective condition, leading to the provection from [w] to [m].

Of course, an alternative analysis based upon the shift in stress from the final to the initial syllable in [mɒ̣:rɒ̣̃m] would bypass the need for provection. In this analysis, the shift would accompany a break-down in the morphological boundary (concurrently with the disappearance of other compounds?), allowing the nasality of the final nasal consonant to spread back over the entire initial syllable, nasalizing the glide in absolute initial position. While such an explanation is plausible, however, it is unnecessary in the light of the phonetic analysis in the following section. Indeed, it should even be impossible, since the regressive assimilation would require that the vowel height be changed from mid low to mid high, in keeping with the productive neutralization pointed out in chapter 2.

4.3.b The Provective Possibilities. Now that it is established that the triple intensified position of the glide -- in word-initial, utterance-initial, and stressed interrogative position -- in fact constitutes a highly provective environment, the question arises as to how this provection has taken place. Given the phonetic/phonological system of Swabian, the most likely provection would lead to a change from [w] to [b].

A provection from [w] to [b] is more likely in that it involves the strengthening of the glide to the next more fortis consonant type (that is, the obstruction constrained by the next higher degree of aspiration, perceived segmentally as a change in consonant). The simple fact is, however, that this change did not take place. Perhaps the biggest factor militating against such a change is the relationship between [w] and [b] based upon the feature of transition tempo, that has been demonstrated to be phonologically pertinent in Swabian (see Griffen in press).

In the investigation on transition tempo, it was demonstrated that, in many of the very same dialects that experienced the glide nasalization (such as in Keinath 1930), MHG w was changing to Swabian [b] not in a provective environment, but in a lenitive environment. Thus, intervocalically, MHG w in such forms as MHG bûwen 'to build' changed to [b] as in [bəubə] (Keinath 1930:13). A more detailed examination of the the phenomenon coupled with an examination of several related phenomena revealed that the [w] > [b] change was indeed a "lenition" (or weakening) not of aspiration, but of transition tempo. That is, a shortening of the duration in which the obstruction was pronounced led to a perception of the obstruction as the shorter [b]. (And in similar instances, the glide [j] was realized as the shorter [g].) This relationship of transition tempo is supported by the experimental findings of Liberman, Delattre, Gerstman, and Cooper (1956).

On the one hand, then, the highly intensified environment for the change in MHG wâ (at least) called for a provection, which in tempo is associable with lengthening. On the other hand, the pattern of change from [w] to [b] that would typify such a provection would have run counter to the systematic patterning of the phonology, in which [b] was being created from [w] by virtue of its shorter transition tempo, and hence of

its more lenitive character. Thus, the simplest and most direct provection within the fortis-lenis scale from [w] to [b] would have been unacceptable in the more general phonology of Swabian (at least in its historical development from MHG).

With the development from [w] to [b] thus blocked, the provection from [w] to [m] would have become a viable possibility, given some phonetic justification for the nasalization of the glide. Had Swabian, for instance, had the same type of mutation system in place that we find in Welsh (in which the lenis-most [v] can be derived from lenition both from [b] and from [m], as shown above), then the provection from [w] to [m] would have been likely, and the nasalization could have been attributable to the workings of the system. Not only was such a facilitative system not in place for Swabian, though, but not even the historical kernel that brought about the development of the [v] - [m] relationship in Welsh was to be found at any point in the development of Swabian. In Welsh (during the transition from Brythonic to Old Welsh proper), lenition of [m] most likely took the form of *[β̃], which later changed to [v] (compare Morris Jones 1913:161). Neither the lenitive pattern nor the intermediate form existed in Swabian to bring about a parallel change.

4.3.c The Dilemma. The fact is that at no time was there ever any nasality in the environment in any form to bring about the glide nasalization, and the great dilemma is that glide nasalization did in fact occur. Thus, we have achieved the furthest point toward an explanation that an investigation of the environment will allow: The initial glide was in an extremely provective environment, but one that was totally devoid of nasality. To find the source of the nasality that brought about the nasalization, then, we must look for a justification not in phonology, but in the phonetic detail of those elements that obtained in the environment.

4.4 The Phonetic Basis of Glide Nasalization. What we find occurring in the Swabian data appears to be a case of spontaneous nasalization -- the development of nasality where none had existed either in the phonological or in the apparent phonetic environment (compare chapter 3). Since the

change itself was so systematic, however, there must be some phonetic source for the nasality. As it turns out, there is a great deal more systematic phonetic justification for the nasalization than is immediately apparent.

4.4.a The Vowel. First of all, one salient feature of the change from glide to nasal is to be found in the vowel coarticulated with it and therefore affecting it to a great degree through the "direction of constraint" (compare Griffen 1985a). We can see how crucial the vowel change is by comparing it with other forms that otherwise meet the environmental requisites of glide nasalization but have not undergone the process nor the vowel change. For example, the MHG interrogative was 'what' would appear to parallel wâ, with the difference in vowel length compensated for by the presence or absence of the final obstruction. Because the vowel was short in the former and long in the latter, however, only the latter [a:] underwent the change to [ǫ:], rendering the forms in Swabian as [wa:s] and [mǫ:], respectively (compare Kauffmann 1890:42-49). Once again, this [a:] > [ǫ:] change was general throughout the affected dialects. In the east, however, the [a:] changed in this context to [aǫ̣]/[au], and nasalization did not occur, a fact that further shows the importance of the vowel in the historical process (compare Fischer and Pfleiderer 1904/36, vol. 6:908).

Recognizing that the phonetic change is effected through the reinterpretation of the acoustic signal (compare Anttila 1989:198-99 -- see section 2.3.b, above), we ought to look, then, for the acoustic effects of the [a:] > [ǫ:] change that might support an historical reinterpretation to include nasality. Since it has been demonstrated that vowels are interpreted through the relative distribution of their formant frequences, particularly those of the first two formants (compare Peterson and Barney 1952; Klein, Plomp, and Pols 1970; Fant 1973; among many), our investigation should include an examination of this distribution.

In Table 4.4 (p. 57), first and second formant values are given from a number of sources and languages. In examining these data, we should bear in mind that it is not so much the absolute values that are impor-

tant, but their relative distribution, as the absolute values will vary considerably from speaker to speaker (compare the relativity principle of Jakobson and Waugh 1979:13-18). In the third column of each source, the ratio of the second formant (F_2) to the first formant (F_1) is provided, as this ratio proves to be important.

Preliminary to interpreting these data, the importance of the ratio ought to be stressed. First of all, it is by mean ratios that the absolute values may most readily be interpreted as relative values, preserving the relativity principle so vital in the communicative function of speech. Moreover, languages maintaining basic gradual oppositions such as the fortis-lenis scale appear to make broad use of ratios in their communicative functions. Thus, the phonetic substance that supports the gradual opposition of the aspirate fortis-lenis scale itself can be given form only through the interpretation (by the speaker as well as by the analyst) of the high-to-low frequency (aspirate) energy emission levels.

Examining the data, we are inexorably drawn to the observation that the $F_2 : F_1$ ratio reaches its lowest point with the [ǫ̣], which is taken here to represent the IPA symbol [ɔ], as the [ę] is used to represent the IPA [ɛ]. (The modifications in symbols are intended to reflect the practice in the description of the four-vowel-height system of Swabian.) In relation to nasality, this observation has some rather far-reaching implications.

In the literature on nasality (particularly Fant 1960:chapter 2, Fujimura 1962, J. Ohala 1975), several characteristics of the formant-frequency pattern have been shown to contribute to the interpretation of a nasal or nasalized sound, as opposed to an exclusively oral one. One of these factors is that nasality tends to weaken or obscure the second formant F_2. In a shift from [a:] to [ǫ̣:], there is a reduction of the $F_2 : F_1$ ratio to its lowest degree, and this reduction can very well bring the two formants below the threshold at which the two are distinguished without mutual interference, at least given the choices available within the Swabian vocalic system. In this case, the historical change may be interpreted as obscuring the second formant frequency in much the same way as occurs during a nasalized articulation of the original vowel.

TABLE 4.4: F_1 and F_2 Values for Vowels Found in Swabian

Fant (1973:46)

	F_1	F_2	F_2/F_1
i	250	2300	9.20
e̤	350	2200	6.29
ę̤	450	1900	4.22
a	650	1050	1.62
ǫ̤	500	800	1.60
o̤	400	700	1.75
ṳ	330	650	1.97

Klein, Plomp, and Pols (1970:1000)

i	300	2500	8.33
e̤	430	2300	5.35
ę̤	560	1600	2.86
a	790	1250	1.58
ǫ̤	530	720	1.36
o̤	500	820	1.64
ṳ	320	750	2.34

Peterson and Barney (1952:126)

i	270	2290	8.48
e̤	-	-	-
ę̤	530	1840	3.47
a	730	1090	1.49
ǫ̤	570	840	1.47
o̤	-	-	-
ṳ	300	870	2.90

Gleason (1961:366-67)

i	400	2100	5.25
e̤	500	1800	3.60
ę̤	-	-	-
a	700	1100	1.57
ǫ̤	650	800	1.23
o̤	550	900	1.64
ṳ	450	1000	2.22

Indeed, parallel changes in the vocalic system would support this interpretation. As pointed out in chapter 2 above, nasalization of the low mid vowel [o̞:] brings about a neutralization of the vowel height such that the oral [o̞:] corresponds to the nasal(ized) vowel [õ̞:]. If this reinterpretive change has any basis in the acoustic precision of communication, then it would follow that the close formant pattern of nonnasalized [o̞:] might indeed obscure the second formant sufficiently as to bring about a perception of nasality, and this perception of nasality would make it difficult to maintain an [õ̞:] unambiguously. Thus, the working of the Swabian system would naturally strive to place the intentionally nasalized sound further from the low mid position to clarify the fact that it is indeed a nasalized sound and not a low mid oral vowel with characteristics that might mislead one to perceive nasality where none was intended.

This is to say that the formant pattern of the low mid vowel is interpreted as having so low an $F_2 : F_1$ ratio that one does not identify the second formant with enough clarity properly to place it within the vocalic system given the addition of nasality, which adds to this lack of clarity. In this interpretation, then, historical change toward the low mid vowel could conceivably be perceived as introducing nasal characteristics. Whether or not these nasal characteristics would then be perceived as nasalization itself, would depend on supporting changes in the environment. Such supporting changes are treated further in this section.

In our observation of only those formants that pertain to the low mid vowel itself, we may wish to conclude by bringing in the relative position of the third formant F_3. While the third formant itself does not significantly change from [a:] to [o̞:] (and, indeed, does not significantly vary among the vowels in general), nonetheless the significant drop in the value of the second formant creates more space between the F_3 and F_2 values to support the interpretation of an obscured or weakened F_2. In a change from [a:] to [o̞:] the frequency that one had heard in the original sound at F_2, interpreting that point relative to the value of F_3, would naturally be shifted in the change, such that the listener would hear nothing in the place of the former formant, and this may be interpretable as weakening the F_2. In such a schema, moreover, the sharp narrowing of

the frequency difference between F_1 and F_2 could also be interpreted as the formation of a single formant, a highly plausible development taken further as we consider the effects of the glide itself.

4.4.b The Glide. Turning our attention to the glide itself, we should first reconsider the historical change occurring in this position. In the framework used in dynamic phonological analysis (derived from dynamic phonetic analysis -- see Griffen 1985a), it is not the case that the glide is analyzed as one segment followed in neat sequential progression by the vowel. Rather, in keeping with the principle of dynamic coarticulatory constraint, the vowel is the basis of the syllable, and the glide (and then the nasal) is pronounced not with any full articulatory basis in and of itself, but as a constraint upon the articulation of the vowel. We cannot therefore refer to the "end of the glide" and the "beginning of the vowel," for the features associated with these two concepts are pronounced at the same time within the syllabic frame, as discussed in section 1.2.b.

With this in mind, we should reexamine certain aspects of historical provection, introduced in the previous section. Certainly the starting point for this reexamination is a closer look at what provection is. As the Latin name implies, provection involves some sort of lengthening. In the aspirate fortis-lenis scale, this lengthening is more properly seen as the addition of degrees of aspiration brought about by the coalescence of syllabic positions. To be sure, in the historical perspective, this coalescence is often interpreted as involving a provected, or geminate, obstruction; for example, in the provection (aspiration) of Brythonic esiās cattos 'her cat' leading to Modern Welsh ei chath, Jackson (1953:635) posits an intermediate geminate *i ccatt (compare Griffen 1985b).

In Swabian as well, the provected element may also be seen as the longer element within a particular subsystem of the phonology. As pointed out above, it is for this reason that the [w] > [b] change in such words as MHG bûwen 'to build' > Swabian [bəubə] (Keinath 1930:13, note further sources in Griffen in press) seems to counteract the subsystematic realization of the fortis-lenis scale arranged by aspiration. While we would normally consider such a change to be provection on account of the

heightened degree of aspiration, it is in fact lenition due to the shortening ("unprovecting") of the glide in lenitive intervocalic position.

Applying this concept of provection to the analysis at hand, we should inquire as to the effects of a straight provection of the [w]. Of course, in keeping with the feature characteristics of transition tempo, such a change would bring about the development of the vowel [u] (see Liberman, Delattre, Gerstman, and Cooper 1956). Such a development, however, would involve the overall lengthening of the syllable. What if, on the other hand, the lengthening, or provection, were carried out within the constant time constraints of the syllable in question?

To see the effects of the provection of [w] in a syllable of constant length, we should examine the acoustic characteristics of the [w] in their vocalic properties -- that is, in reference to their formant frequencies. As the glide is lengthened into a more vocalic element, these formant frequencies and their patterns become all the more crucial. When we examine the first formant (F_1) of the glide, we find that its frequency is roughly 240Hz (compare Minifie 1973:277-78). Should the 240Hz be extended into the syllabic/vocalic portion of the syllable, the effect would be the apparent addition of this formant to the formants already in place for the vowel.

At this point, one may well ask how this characteristic of the constraining element be superimposed on the syllabic element on what appears to be the very same level, seemingly contrary to the diagram in figure 1.2.b (p. 8). We must recall, however, that the syllabic frame in the utterance of speech is in reality realized in dynamic coarticulation, with the elements occurring simultaneously. If a formant frequency of a glide should occur simultaneously with that of a vowel, we cannot separate the two from the spectrum -- they must both make use of the same frequency emissions regardless of their function in linguistic speech.

As for the effect of their simultaneous occurrence within the spectrum of frequencies, here we find a clear contributory source for the nasalization. The first formant of the nasalized vowel, as described by the sources cited above, occurs around 250Hz, close enough to the 240Hz of the glide as to be indistinquishable from it, and in many speakers overlap-

ping with it. As provection is realized as an extension of the glide with its 240Hz first formant into the vowel of the syllable of constant length, the effect is the addition of a formant that would be interpreted as a characteristic nasal element. Certainly, such a condition would contribute to the perception of a nasalized vowel, at the very least, for as Fujimura and Lindqvist (1971:552) point out, "The location of the lowest formant of a nasalized vowel is always in between the lowest characteristic frequency of the nasal tract and the first-formant frequency of the nonnasalized vowel. Consequently, the range of frequencies in which this lowest formant of nasalized vowels can be located is much more limited compared with the range of the first formant for different nonnasalized vowels." What the first formant of the glide does, then, is to provide this first-formant frequency precisely in the highly limited nasal range.

That this provection should bring about the obstructive nasal and not simply nasalization -- that is, that we should obtain [mo̰:] and not simply [w̃o̰:] or [õ:] -- is a result of the provection not only in length, but also in intensity. As pointed out in the previous section, the word- and utterance-initial position of a stressed interrogative involves a rather intensified aspirate pronunciation in and of itself (regardless of the actual features involved in the position). With the perception of nasality in the environment, then, this nasality can provide the glide with the opportunity of strengthening to the nasal obstruction, and thus allow it to be realized at its more aspirate degree in the fortis-lenis system.

On the other hand, while the infusion of the glide first formant into the syllabic vowel may neatly bring about the perception and thence the historic reinterpretation of nasality, what is the effect of the other formants? If they should differ greatly, then the result would be a jumble of formants basically unintelligible to the listener. As a matter of fact, though, an examination of the formant patterns and other acoustic characteristics of the transition between (or more precisely, the coarticulation of) [w] and [o̰:] reveals that this particular transition provides the very least deviation possible. Thus, even in this detail, the acoustic characteristics of the syllable in dynamic coarticulation strongly support the glide nasalization.

4.5 Conclusion. Thus, the provection of the glide within a syllable of constant length under the conditions noted above would indeed yield the characteristics of a nasal. As the glide first formant spread into the vowel, it would have been interpretable as the nasal first formant. As the vowel's second formant collapsed toward the first, it would have become interpretable as obscured or weakened, totally consistent with the perception of nasality. Moreover, the extreme closeness of the vowels' first and second formants could as well have led to the interpretation that these two formants constituted one rather ill-defined, broad formant -- an interpretation quite compatible with the obscuring effects that nasality has on the second formant, which in this case would have been taken as the sum of the old first and second vowel formants. All of these environmental conditions and phonetic changes involved in the imposition of the provected glide coarticulation on the initial portion of the syllabic vowel would indeed have resulted in the plausible interpretation of nasality -- and not only the nasality of a nasalized vowel, but that of an "initial" nasal consonant, homorganic with the labial glide.

As change takes place in the reinterpretation of acoustic evidence from one generation to the next, the historical progress of glide nasalization is rather transparent. As the vowel changed from the low [a:] to the low mid [ɒ:], all of the above conditions applied to give the next generation the impression that it heard a nasal. In fact, what it would have heard would have been a combination of features that gave a slightly nasal coloration to the sound. Still it would have been enough nasality that when the new generation interpreted a nasal and produced the pronunciation [mɒ:], the older generation would have accepted the interpretation as close enough not to warrant correction. Thus, the glide would have been nasalized "spontaneously" (though clearly not out of nothing, as shown below).

Of course, such a pattern of change is by any definition systematic, which is why it is treated as such in the introductory section, and not as some random change affecting a very limited number of forms (albeit an important sample). Such change, then, reflects Hjelmslev's concept of the counter-example, as opposed to the exception, and a phonetic justification

must therefore be an integral part of the historic justification of the change.

Returning now to the apparent spontaneity of the glide nasalization, the seemingly inexplicable creation of nasality where none had existed before, we find what appears to be a problem. After all, none of the characteristics and none of the formants were nasal in the transmission of the language from the older to the newer generation during the transition. One may therefore be tempted to question how nasality can originate from nonnasality, for it looks disquietingly like creating something from nothing.

Such a problem, quite simply, does not exist in the acoustic aspect. There is no such thing as a "nasal formant," as opposed to an "oral formant." The fact is that a formant is simply a formant, devoid of any qualitative characteristics that would indicate articulation through the nasal cavity rather than through the oral cavity. The only pertinent characteristic of a formant, then, is not quality, but quantity -- the actual value of the frequency emission. If a formant is emitted at a frequency associated by the listener with the articulation through the nasal cavity, it does not matter where that articulation comes from in reality -- from a human nasal cavity or oral cavity, or indeed from a parrot or a synthesizer. (On this point compare observation (2) from Fujimura and Lindqvist 1971:552.)

Glide nasalization in Swabian provides just such an example of environmental factors coupling with acoustic phonetic characteristics in order to produce sound patterns that -- if viewed segmentally in the usual before-and-after format of historical phonology -- would appear to violate the phonological system in arbitrarily creating nasality. If viewed in accordance with the principles of dynamic coarticulatory constraint used in dynamic phonetics and dynamic phonology, which rely upon detailed and thorough phonetic investigation, then glide nasalization in Swabian is simple, natural, and plausible. The fact that this historical process has indeed occurred would strongly suggest that the latter means of investigation is by far the more reliable.

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CHAPTER 5
THE FIRST PERSON PLURAL: COMPLEX INTERACTIONS

5.1 The Verb Conjugation. One of the most complex series of changes involving nasalization in Swabian is that affecting the first person plural of the present-tense verb and the personal pronoun. As pointed out in section 4.1.a, it is a change involving glide nasalization through assimilation. The following analysis is an altered and slightly reorganized version of a paper appearing in The Eleventh LACUS Forum (Griffen 1985c).

While the various regional dialects and subdialects of Swabian contain many differences, the basic present-tense verb conjugation is quite consistent, as pointed out by Bohnenberger (1928:45-49 -- see also Vogt 1979: 118-46, Dreher 1919: 92-94, Heissel 1935:31-32, H. Moser 1937:67-70). In Table 5.1, the Swabian verb /maxxə/ 'to make' is conjugated along with its Middle High German ancester machen.

Table 5.1: Middle High German machen
Swabian /maxxə/ 'to make'

Middle High German	Swabian
ich mache	i maxx
du machst	du maxxšd
er macht	er maxxd
wir machen	mir maxxəd
ir machet	ir maxxəd
sie machent	si maxxəd

The Middle High German used here is the "normalized" Alemannic version found in Wright (1907, 1955). The Swabian is likewise the broad notation underlying a phonological analysis of Common Swabian currently in progress. As such, it represents a cross-section of Swabian dialects. Moreover, in this matter of the verb conjugation, the precise realization presented here is widespread.

5.2 **The First Person Plural.** Examining the first person plural, we find a major innovation from the Middle High German both in the pronoun and in the verb inflection. Insofar as the pronoun is concerned, the cause of the change from wir to /mir/ is rather transparent. Evidently, the inverted sentence order with the verb preceding the pronoun subject brought the nasal ending into contact with the labial glide, and there ensued an assimilation. Thus, the nasality of the ending in MHG machen wir extended to constrain the initial glide of the pronoun, yielding /w̃ir/. The nasalized labial glide changed to the more familiar nasal /m/, and the form /mir/ was born.

Such a development is not unexpected, especially in High or Upper German (compare section 1.1.a). A similar process in Old High German resulted in the -st in place of the old -s second person singular ending. The inverted order brought together such combinations as OHG nimis du 'takest thou', which was pronounced as the unit /nimistu/. When the pronoun was removed from the inverted order, it left behind (so to speak) a copy of itself permanently attached to the inflectional ending -- du nimist (Wright 1907:214). Indeed, this process occurred throughout the West Germanic languages.

The situation in Swabian, however, is more complicated, for the first person plural verb form changed as well, from machen to /maxxəd/, with a final /d/. This /d/ is derived historically from /t/ and may actually be realized in many Swabian dialects as unaspirated [t̄] or voiceless [d̥] through the word-final neutralization of aspiration accompanying the general shift from tenuis to media.

If all we had to contend with were the Middle High German and the Modern Swabian forms, the analysis of this problem would be simple and

straightforward. We could say that the nasal feature from the /n/ was transferred from the final consonant of the ending to the initial glide. As only the nasal feature was removed, the other features of the consonant could remain intact, yielding simply [d] (or voiceless [d̥], or unaspirated [t⁼]). Such an analysis would particularly be attractive in the dynamic phonological framework outlined in section 1.2 of this monograph, for this approach does allow for the transference of features from one syllabic position to another both by metathesis (Griffen 1981) and by eclipsis (Griffen 1984).

Moreover, this analysis appears to be all the more credible given the development in the infinitive and the other plural endings. Quite clearly, the nasal was lost from the final combination /ən/ (a process we see also in other forms in the language), yielding the infinitive /maxxə/ from machen and the third person plural /maxxəd/ from machent. Had the nasal remained in the first person plural ending, we might argue, the result would have been the form */maxxə/. Inasmuch as this was not the case, and the first person plural is rather identical to the second person plural /maxxəd/ (from machet), we might surmise that the first person plural in fact derived from the loss (through transference) of the nasal feature only, leaving not a nasal consonant in the ending, but rather its weak (nonnasal) member of the archiphoneme.

5.3 Historical Development. While the concept of feature transfer may offer a neat and tidy solution to a curious innovation and may indeed provide the phonologist with an interesting and gratifying problem, we ought to bear in mind that the actual history of a language tends to be rather more messy than tidy and not at all predisposed to providing the phonologist with simple and gratifying solutions. Once again, as J. Ohala (1974) pointedly demonstrates, an explanation for phonological change must rest upon the phonetic evidence (see section 2.2.c) and upon historical facts. A closer examination of these historical facts in the form of intermediate forms as well as of other, irregular verb conjugations in Modern Swabian paints a picture that is far more complex.

5.3.a The Phonetic Source. As we find in Kauffmann (1890:263), the source of nasality in Swabian /mir/ was quite clearly the first person plural ending, as pointed out in the previous section. In the writings of Niclas von Wyle, published in 1478 by K. Fyner in Esslingen, we find such citations as daz wir aber. . . so finden mir 'that we though . . . thus we find' (page 336 of the original). When the pronoun occurred before or separate from the verb, the traditional wir was used; but once it came after the verb in the inverted order, the glide assimilated to the nasal, yielding mir. The existence of the -en ending in the late fifteenth-century work, however, reveals that this was not some case of feature transfer, but rather one of simple assimilation, with no lasting effect on the host nasal. Indeed, this fact can also be observed in modern dialect forms of the verb 'to be' that do not have the /d/ -- for instance [wẹ:rəmr] < wären wir 'were we (subj.)' and [sẹ̃mr] < sind wir 'are we'.

5.3.b The Morphological Change. So where did the /d/ come from? After all, the Swabian does not say */mir maxxən/ or */mir maxxə/ (in the indicative), but /mir maxxəd/. Once again, Kauffmann (ibid.) provides the pertinent data in the form of an undated manuscript known as the cod. theol. et phil. no. 11, also from the fifteenth century (and probably contemporary with Niclas von Wyle). In this manuscript, we find both werdent mir and werdent wir 'shall we'. Furthermore, from Heinrich von Stainhöwel's Aesop, published about 1480 by Johannes Zainer in Ulm, we find the form mir gänd '(should) we go' (page 204 of the original).

Rather than clearing things up, though, finding the source of the /d/ rather muddles the whole affair even more, for we find not a neat, simple loss of the /n/ through the denasalization of the unstressed ending, nor even a replacement of the /n/ by the /t/ (> /d/) through a conspiring archiphonological realization. Rather, what appears to have been happening here was the addition of the historical /t/ to the ending while the /n/ was still present.

Once again, the phonologist would like a direct and simple resolution of this problem by phonetic or phonological means. Such an easy solution might in fact appear promising in the rather widespread practice of

excrescence in Swabian. For example, MHG hanf 'hemp' has become Swabian /hãmpf/. In such an instance as the first person plural, however, the excrescence should be accompanied by labial assimilation, and it would also run counter to assimilation patterns in the language that actually dropped the dental in such cases -- for example, MHG grunt 'ground' + birne 'pear' yields Swabian /krọ̃mbi:r/ 'potato' (Kauffmann 1890:264 -- compare also the form [sẹ̃mr] noted above).

To find the source of the /d/ (from the historical /t/), we must go to the irregular "contracted" verb forms. These forms did not have the MHG e /ə/ in their inflectional endings and consequently did not lose the nasal from the unstressed /ən/ combination. Just what this seemingly unrelated fact has to do with the matter at hand is revealed when we compare the present-tense contracted verb conjugation in Middle High German and Swabian in Table 5.3.

Table 5.3: Middle High German gân
Swabian /gaũ/ 'to go'

Middle High German	Swabian
ich gân	i gọ̃:n
du gâst	du gọ:sd
er gât	er gọ:d
wir gân	mir gọ̃nd
ir gât	ir gọ̃nd
sie gânt	si gọ̃nd

From this conjugation we find that not only did the first person plural add a /t/ after the /n/, but the second person plural added an /n/ before the /t/. What we find here, then, is neither phonetic nor phonological change, but analogic leveling in which the third person plural ending generalized to all plural persons. Thus, the forms werdent wir/mir that coexisted in the fifteenth century reflect the replacement of the first and second person plural verb inflections by the third person plural. (More

data and a discussion of this pattern of change can also be found in Besch 1961:128-32 -- compare also H. Moser 1937:69.)

When we examine the endings involved here in the light of the general tendency in Swabian to shorten the end of words, the choice of the long third person plural ending would appear to be rather problematical. Indeed, from the viewpoint of phonology and morphology alone, such a choice does not appear to make much sense. Nevertheless, that it was the third person plural ending that generalized throughout the plural persons is quite clear from the forms found in Langenargen, an extemely conservative Swabian/Low Alemannic dialect between region 7 (of figure 1.1.a -- p. 3) and Lake Constance. In this dialect, [maxxnt] (compare Bohnenberger 1928:47) is still realized in all persons, clearly maintaining the old third person plural ending. Moreover, from historical records, we also know that the second and third person plural verb endings first fell together throughout Common Alemannic, and then the second/third person plural ending extended to the first person plural in Swabian (Heissel 1935:32).

5.3.c The Sociolinguistic Element. Once again, however, linguistic change can be a rather complicated process, and we should look for the justification for this problematic analogic leveling in the sociolinguistics of address.

In Middle High German, social intimation was expressed in the choice of the singular or of the plural second person. Speakers with an intimate relationship would address each other in the second person singular du, while those with a formal relationship would address each other in the second person plural ir. By the end of the fifteenth century, however, an innovation had taken place. In referring to someone as eure gnaden 'your graces' or similar highly polite plural forms, one could not then refer to the person directly as ir 'you', but had to use sie 'they', referring to the graces (compare Wright 1907:219). In the seventeenth century, the use of Sie (capitalized in writing) supplanted ir as the polite form of address altogether in Early New High German and extensively in Upper German as well.

In the historical development of these forms of address, then, the speakers and writers of the fifteenth century found themselves in a period of transition. Quite conceivably, it was due to social pressures to refer to a nonintimate person directly as a plural and (in this newer type of reference) as a plural attribute that the distinction between second person plural and third person plural came to be somewhat confused. This confusion lead to the conjunction of the second person plural pronoun with the third person plural verb form. With two persons agreeing in their inflection, it was only a small step to generalize the second/third person plural ending to the first person plural.

5.4 Conclusion. Now that we have taken this seemingly neat and tidy nasalization through the bothersome little details of morphology and sociolinguistics, let us summarize the meandering path of change that lead from MHG wir machen to Swabian /mir maxxəd/:

1. Syntactically Motivated Phonetic Assimilation: In inverted sentence order, the nasality of the first person plural verb ending prosodically extended to the (enclitic) personal pronoun, changing MHG wir through /w̃ir/ to Swabian /mir/.

2. Sociolinguistically Motivated Analogic Leveling: Due to confusions between the second person plural and the third person plural in formal address, the third person plural verb ending generalized to the second person plural. Simultaneously with the assimilation, the common second/-third person plural ending generalized to the first person plural.

3. Phonetically/Morphologically Motivated Denasalization: After the first two steps were complete, the /ən/ combination in all weakly stressed inflectional endings underwent a simple loss of the nasal. Judging from other forms in the language, this would have been accomplished through an intermediate stage with a nasalized vowel /ə̃/, leading to the simple loss of the nasal prosody.

Thus, MHG wir machen /wir maxxən/ 'we make' would have been realized as /maxxən wir/ in inverted word order, leading to the assimilation through /maxxən w̃ir/ to /maxxən mir/. While this process was taking

place, the form /maxxənt/ would have come into competition with /maxxən/, eventually winning out. Finally, the form /maxxənt/ would have been realized with a nasalized schwa in /maxxə̃t/, and the nasalization would have been lost due to its lack of stress in /maxxət/. With the lenition from tenuis to media, the form would ultimately have been realized as /maxxəd/ in Modern Swabian. All of this would have gone into making the change from /wir maxxən/ to /mir maxxəd/, as summarized in Table 5.4.

Table 5.4: Summary of Changes

MHG wir machen	-	maxxən wir	>	w̃ir	>	mir
	>	maxxənt				
	>	maxxə̃t				
	>	maxxət (maxxəd)				
				Swabian /mir maxxəd/		

In the general view of historical linguistics, the tortuous development of the Swabian first person plural should have some rather sobering implications. In section 5.2, an analysis was suggested involving feature transfer -- a perfectly legitimate concept in phonetic/phonological change. If all we had were the Middle High German and the Modern Swabian forms from the principal dialects, the contracted verbs could easily be swept aside as anomalies (which, indeed, they are considered to be -- compare Write 1955:53), and the nasalization of the feature-transfer analysis would stand in all of its simplicity and tidiness -- and inaccuracy.

For those of us concerned with the analysis of old dialects and of languages with sparse written evidence and especially for those of us concerned with reconstruction, the Swabian first person plural should be a disquieting lesson indeed. On the one hand, we see that what might appear to be simple phonetic change may in fact involve many different levels and aspects of language in a complex of change. On the other hand, it may very well be that all we have available to us is the bare result of change, allowing only the simplest and most direct solution.

That this complex change should involve glide nasalization is also interesting. As pointed out in section 4.1.a, this glide nasalization is the result of simple assimilation, rather than the more complex nasalization dealt with in chapter 4. Nonetheless, even simple nasal assimilation can take part in changes that deal with different aspects of language in a way that yields complex change. Insofar as nasalization itself is concerned, the change is direct; but in matters of nasalization, as in all matters of historical linguistics, we must take into consideration all other contributing factors as well.

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