1-1-1997

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1.   The Problem

Linguists since the Neogrammarians have stressed the need to examine social factors in the study of language change. However, there is still little consensus regarding the roles that these factors play-- or even what the factors are.[1] Eckert (1989:254), for example, argues explicitly that gender roles differ over time from community to community. Implicitly, there is the suggestion that any social factor may have different effects in different communities and at different times. My question is, would that really be the case if everything else could be held constant?

While many extensive and detailed studies of the interaction of social and linguistic factors have been conducted, each has been undertaken in an independent framework, making comparison across cases difficult or impossible. The root of the problem lies in the fact that, in general, linguists who devote themselves to detailed analysis of particular contact situations do not also propose useful wide-ranging principles for the field as a whole. On the flip side, theoretical linguists who write grand treatises on How Language Changes do not generally report detailed facts regarding particular situations of language change. My aim here is to show how this gap can be bridged.

In order to see whether social factors actually have constant effects, a uniform multi-dimensional approach is necessary. In this paper, I outline a proposal for a large-scale research project to do that in the field of contact-induced language change.

Since Labov's early work, sociolinguists have used a similar paradigm to analyze spontaneous change and variation, calling upon a core group of factors relevant to speakers' social identities, experience and position within their communities. When these factors don't account for all of the variance, other factors such as ethnicity, level of education, and network membership may be added. Such sets of core and peripheral social factors are not recognized in the field of language contact as shown by Table 1.

Table 1 gives an overview of the situation, showing which factors are considered in a quasi-random sampling of 15 case studies. My goal is to show the range of factors which have been called into account, rather than to criticize particular scholars for having ignored certain aspects. My analysis would not be possible if this work had not been completed.

From Table 1, the disparity of social factors reported is evident. In only 15 studies, 26 different factors were cited. On average, each study lists 7 social factors, and no study lists more than 11 of the 26. More than half the studies that I had originally (randomly) selected had to be excluded because effects of social factors were not reported at all.

Abbreviations used in Table 1

IC	Factor which measures intensity of contact
1	Marathi/Hindi contact in Nagpur, India (Pandharipande 1982:97)
2	Brahui-Balochi contact situation (Indic) (Thomason & Kaufman 1988:70)
3	Uzbek-Tadzhik contact in Soviet Union (*ibid* 70-1)
4	French and Norse influence on English (*ibid* 263-303)
5	Asia-Minor Greek (*ibid* 215-222)
6	Uralic interference in Slavic and Baltic (*ibid* 238-250)
7	Ma'a (*ibid* 223-227)
8	Chinook Jargon (*ibid* 256-262)
9	Michif (*ibid* 228-232)
10	Mednyj Aleut (*ibid* 233-237)
11	Afrikaans (*ibid* 251-255)
12	Norman French & medieval English (van Coetsem 1988:129-135)
13	Afrikaans (*ibid* 129-135)
14	Korlai Portuguese creole in India (Clements 1992:41-52)
15	Basque, Gascon, and French interaction (Haase 1992:343-4)

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[1] This is a substantially revised version of Nagy (1996: Ch. 2).

Table 1. Community level factors cited in accounting for variation

	IC?	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	N
Geographic																	
Geographic domain	y	x	x		x		x	x	x	x				x			9
Geographic overlap	y	x			x			x	x					x			5
Contributing geog.	y							x									1
Political																	
Political domain				x			x		x								3
Pol. relation of grps.	y	x		x	x						x	x		x			6
Other grps. present	y						x									x	2
Demographic																	
Size of dom. group	y			x				x									2
Size of subord. grp.	y	x		x			x	x						x			5
Both sexes present?								x	x				x				3
Chronology																	
Period of influence	y											x					1
Period of contact	y		x	x	x	x	x	x	x		x	x	x	x			11
Language use																	
Biling. in dom. group	y	x	x													x	3
Biling. in sub. group	y	x	x	x						x	x					x	6
Unspec. biling.[2]	y		x	x			x		x								4
Other lgs. spoken	y		x			x	x	x					x				5
Ongoing shift	y		x			x										x	3
Domains of use	y	x		x						x						x	4
Cultural																	
Intermarriage	y	x	x				x	x	x					x	x		7
Common culture	y		x		x	x								x	x		5
Common religion	y		x											x			2
Common work/econ.	y							x								x	2
Misc.																	
Cause of contact			x							x	x	x	x	x			6
Personality				x													1
Standardization	y		x									x			x		3
Lg. attitude		x	x						x	x				x			5
Lgs' official status	y								x	x							2

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[2] Author doesn't note which group has bilinguals in it.

2. Motivation for Developing a Method of Computing Social Factors

This project is a response to numerous calls for structured analysis of social factors involved in contact-induced language change, which go back at least to Kiparsky (1938) and Coteanu (1957), cited in Thomason & Kaufman (1988:35). The importance of examining social factors in contact and shift situations has been highlighted in recent work by Mufwene (1996), Mougeon et al. (1985), and Siegel (1995), *inter alia.*

Mufwene (1996), for example, argues, contra Bickerton (1981) that the level of integration (read "intensity of contact") of two populations in contact is more significant than the raw relative sizes of the community. In order to evaluate such competing claims, we need a metric of comparison, rather than just lists of examples.

I respond, in particular, to Thomason & Kaufman's (1988:3) challenge in their book on contact-induced language change. Their goal is "a unified framework... based on substantive claims and a systematic historical investigation of all kinds of contact-induced change." A refrain which is repeated throughout the book is that social factors are very important in determining what types of change occur in a given situation. They write,

> From Meillet, Sapir, and the Prague linguists to Weinreich to the most modern generativists, the heirs of Saussure have proposed linguistic constraints on linguistic interference... And they all fail. As far as the strictly linguistic possibilities go, any linguistic feature can be transferred from any language to any other language; and implicational universals that depend solely on linguistic properties are similarly invalid (*ibid* 13-4).

> ... social factors are so important... that any inhibiting force exerted by linguistic factors would probably be overridden (*ibid* 53).

However, since Thomason & Kaufman are not sociolinguists, they leave the matter of examining social factors aside and hope that someone else will tackle it, as can be seen from the following quotation:

the notion [of cultural pressure] is of course vague; making it more precise–i.e., giving relative weights to various kinds of social factors in an effort to predict structural borrowing–is a task that falls into the domain of the sociolinguist rather than the historical linguist, and is therefore beyond the scope of this book (ibid 77).

2.1. The Need to Analyze Social Factors

Taking up this challenge, I propose a methodology which allows us to find answers to questions of the following type, which appear to be at the forefront of linguistic curiosity:

- What types of change occur in what type of speech community?
- How can each type be characterized?
- What is/are the source(s) of a change?
- What factors encourage or discourage change?
- Where does the change begin?

Denison (1980:335) poses this series of further questions which beg for a codification of contact situation types:

Why will one community cling to its language under circumstances and against odds which lead an apparently comparable case to rapid linguistic assimilation? Why will a seemingly stable and centuries-old state of plurilingualism sometimes give way to monolingualism within the space of a single generation? How do some languages, on the other hand, hang on to a precarious existence for decades–even centuries–after all rational calculation has proclaimed their demise or predicted the imminence thereof?

Although attempts have been made to answer such questions, many sociolinguistic analyses must include disclaimers noting that the results they have found may not necessarily be representative of a wider trend, because social factors may be different in other communities.   Only by examining a large number of individual cases can it be determined if there is variation in the roles played by the social factors. The goal is to be able to predict what types of linguistic influence will be observed in a given situation, once the social factors are known. In order to

move toward the position where this is possible, a more standardized approach is necessary.

Several linguists have begun to develop systematic relations between type of contact and type of language change. Prominent among them is Guy (1990), in which the types of language change are reduced to the following trichotomy: spontaneous (internal) change, borrowing (external cause, recipient language as agent), and imposition (external cause, source language as agent). Guy proposes corresponding social, psychological, and linguistic characteristics of change for each of these types, but does not report on particular contact situations in any detail.

2.2. The Need for a Standard Computation

Many texts refer to the social factors as if there were a standard way of computing them, and there is no such thing. In particular, there have been many proposals of "clines of borrowability" which suggest that in a given social context, certain linguistic elements are more likely to be borrowed than others. Thomason & Kaufman (1988) propose a borrowing scale in which the type and quantity of elements borrowed is determined by the type and quantity of contact between the communities, and they make a very strong prediction: that one can induce the social history of a situation through linguistic facts alone (ibid 225). They provide the scale shown in (1) but unfortunately leave the interpretation of their category names to the readers' imagination.

(1)   Scale of borrowability (Thomason & Kaufman 1988:74-6)

casual contact
slightly more intense contact
more intense contact
strong cultural pressure
very strong cultural pressure

Trudgill (1989:229) and Pandharipande (1982:97) also make reference to intensity of contact without defining terms. Singh (1980) proposes that "[implicational hierarchies of borrowability] are valid for similar contact situations." These works neither address methods of computing intensity of contact nor provide definitions of the social factors mentioned, nor present metrics for determining similarity of contact situations.

Numerous problems arise when one attempts to construct a model for comparing the effects of these factors. First, factors which are mentioned in several studies may be examined and reported in diverse manners. Second, such factors may be perceived differently by different members of the community (not to mention by an outside observer). Third, many of these factors interact. The next section suggests a means to overcome at least the first and third of these problems.

3.   How to Make a Model

This section describes how to construct a quantitatively-accountable model of contact-induced language change. The model of contact-induced language change is similar to the Labovian variable rule model, of the form:

(2) $I = ax + by + cz + ...$[3]

I, the intensity of contact for a particular individual, is determined by a number of factors {x, y, z,...} representing intensity of contact. {a,b,c,...}, the coefficients of each factor, must be determined by simultaneously solving the equations for many individuals. These values indicate the relative importance of each factor. See Sec. 5 for further discussion.

3.1.   The Steps

In order to construct this model, three things are necessary. First, a finite set of factors must be established. Second, metrics must be developed to assign quantitative values to each factor. The third step is to combine the factors into an equation. A consistent set of factors must be developed before the metrics can be designed because, until there are more studies than factors, the factor values cannot be set. That is, if each study is seen as an equation where the sum of the effects of the social factors indexes the amount of contact-induced change, the set of equations cannot be solved until there are as many equations (case studies) as factors. Otherwise the equation set is underdetermined and the value of the factors cannot

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[3] The additive model is used as a first approximation and for ease of exposition. A logistic equation is more appropriate and is discussed in Section 5.

be calculated algebraically.

A simple example involving only two factors and two studies illustrates this. Berruto's (1977) study of the shift to Italian from the Bergamo dialect reports a strong effect of sex, which the author finds surprising, because no such effect was noted in a national study of the Italianization of dialects. However, it turns out that Berruto's sample of females contains predominantly young women, while the sample of males contains predominantly old men, as seen in (3).

(3)   Distribution of speakers in Berruto (1977)

	Female	Male
Old	16	23
Young	27	13

Thus, it may actually be an age effect, rather than a sex effect that was observed. In the bigger picture, the effects of 30 factors cannot be teased apart with fewer than 30 studies. This example highlights the necessity, pointed out in Kerswill (1994:115) of examining a large number of factors in each study, in order to avoid accidentally attributing a trend to the wrong factor because the right one was not examined.

Once the equations are derived, it will be possible to see which individual level factors are significant in most of the studies. This set will point to the set of factors which account for influence at the community level. Adapting Bell's Style Axiom,

> Variation on [any] dimension within the speech of a single speaker derives from and echoes the variation which exists between speakers (Bell 1984:151).

3.2.   Individual Level Factors

Studies since Labov et al. (1968) have shown that it is possible to assign weights to factors at the individual speaker level and thus obtain an accurate description of the variation within a community. Because a finite corpus of speech can be recorded from a representative sample of speakers, and then coded for both linguistic environment and social attributes of the individual speaker, it is possible to develop equations relating the weights of each of the factors to the overall variable distributions.

Therefore, rather than directly attacking the tangle of community level factors listed in Table 1, I examine the more constrained set of factors that show influence at the individual speaker level. Table 2 summarizes the individual level factors considered in 15 studies. More overlap is seen in this set of fators than in the factors called on to account for change at the community level. The factors cited most frequently are at the top of the table.

From this analysis of 15 case studies which examine individual level factors, we see that there is a much more constrained set of factors which are repeatedly called upon for the analysis of contact-induced change at the individual level than at the community level. Although at first blush, 23 factors for 15 studies seems to predict a huge number of factors being called into account if one were to look at all the studies that have been done, this is not the case. Rather, there is an asymptotic function relating the number of studies to the number of factors reported, and the number of factors grows more and more slowly as more studies are examined.

Abbreviations used in Table 2

1   Italian influence on Catanzaro dialect (Saladino 1990)
2   Genovese & other dialects (Còveri & De Nardis 1977)
3   Grico, Romanzo, & Italian (Sobrero & Romanello 1977)
4   Bergamasca-Italian usage in Bergamo (Berruto 1977)
5   Effects of 3 "standard" Italians (Galli de Paratesi 1977)
6   Italian-Croatian contact in Bosnia (Corrà 1980)
7   Spanish influence on Ucieda dialect (Holmquist 1988)
8   Shift from French to English in Ontario (Mougeon, Beniak & Valois 1985)
9   German/Hungarian shift situation in Austria (Gal 1978)
10   Transfer of accent to British English (Tahta, Wood & Loewenthal 1981)
11   Scots Gaelic to English shift (Dorian 1994a)
12   Urban and rural dialects in contact in Bergen, Norway (Kerswill 1994)
13   Honduran Spanish in contact with Northern Mexican Spanish (Amastae & Satcher 1993)
14   Spanish influence on Limon Creole (Herzfeld 1980)
15   Mexican-American bilinguals in Los Angeles (Silva-Corvalán 1994)

*Table 2: Individual level factors cited in accounting for variation*

Indiv. factors	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
age	x		x	x		x	x		x	x	x	x	x	x	x
sex			x	x	x	x	x	x	x	x	x		x	x	*4
occupation	x	x	x	x		x	x					x	x	*	
status	x	x				x		x					x	x	
domains of use			x			x	x	x						x	
neighborhood/ network	x			x		x	x			x	x	x			
amount of school	x	x		x										x	
contact w/L2										x		x	x		x
L1				x						x	x				
parents	x			x		x									
urban/rural									x					x	
political leaning							x							*	
animal ownership							x								
race/ethnicity														x	
amount of travel	x														
intermarriage														x	
proficiency											x				
length of res.	x									x					
# lgs. spoken										x					
age of L2 acq.										x	x				
attitude toward lg.											x				
pressure to change											x				
media contact	x			x											
TOTAL (23)	4	6	4	5	6	2	6	5	5	8	5	7	6	7	1

For the individual level factors, on average, each study cites 5 factors, out of the 23 listed (over 1/5), showing more consensus than the community-level factors in Table 1. The difference between these sets of factors is illustrated in Figure 1, which shows the average number of factors added by each study examined, averaging over 1,000 different possible orderings of the factors (of the 15! or 23! possible orderings).

The solid curve represents the function for these individual level factors. The dotted curve represents the function for the

Figure 1. Correlation of number of studies to number of factors
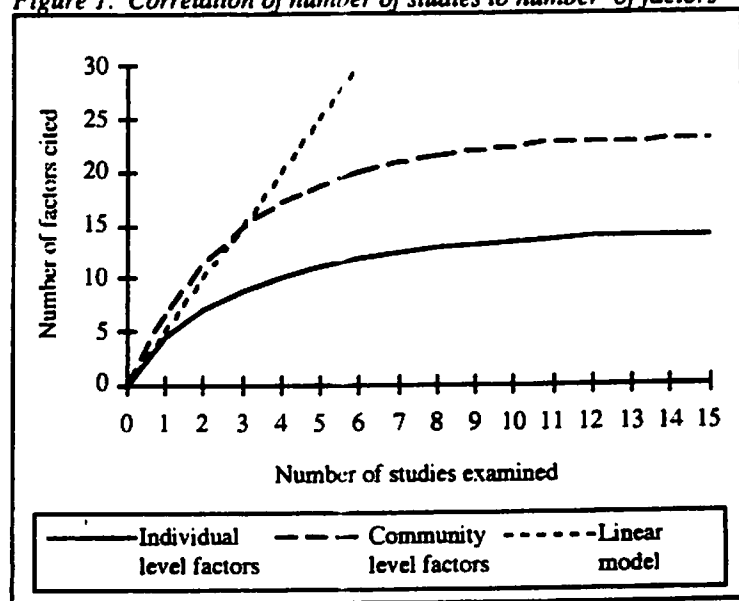
community level factors. (Factors cited by only one study are excluded.) The dashed line represents a hypothetical function linearly relating the number of factors to the number of studies, a situation in which the set of factors is not constrained. Because, in contrast, the actual curves can be modeled as the asymptotic function shown in (4), the model has valuable predictive powers.

$$(4) \qquad F = F_0\left(1 - e^{\left(-\frac{N}{N_o}\right)}\right)$$

The pattern to note is that, after the first nine sample points, the curves rise very slowly, predicting that no matter how many more studies are added to the pool, the total number of factors will not rise above the asymptote F_o, which equals 14.0 for the individual level factors, contrasted with 23.2 for the community level factors.

3.3. Combining the Factors

In order for the field to advance, all sociolinguists making reports on contact-induced language change ought to report on the same set of ~15 factors. Until that occurs, there are too many unknowns in each case study. Factors which haven't been reported on in a given study may very well influence the amount of contact-induced change which occurs. If significant factors are ignored in the equation representing a particular case study, values will be misdetermined for the factors that are reported.

Even 15 factors may be too many to efficiently analyze. To simplify matters, the individual level factors can be grouped by type as in (5). These three subsets can be seen as three axes along which speakers are aligned to show their individual propensity to adopt features of the majority language into their own speech, as shown in Figure 2.

Conspicuously absent are the commonly examined factors age and sex. The strongest version of my proposal would claim that sex- and age-correlated differences are reflections of behavioral differences across generations and genders: there is no need to reify these factors if there are more general behavioral patterns which account for the same effect (thanks to M. Meyerhoff (p.c.) for pointing this out).

Figure 2. Factor groups for intensity of contact
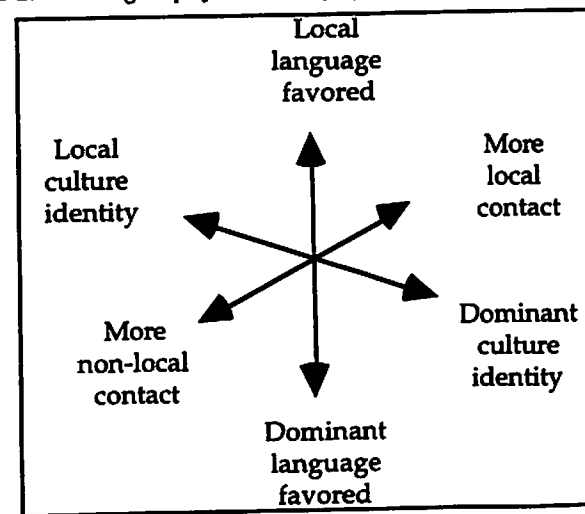
(5) *Types of IC factors*

Linguistic factors
    Language learned first
    Proficiency in each language
    Number of languages spoken
    Parents' language

Amount of contact
    Length of residence in community
    Amount of daily contact with dominant language speakers
    Amount of travel outside the local community
    Intermarriage
    Age of second language acquisition
    Domains of use of each language
    Media contact

Cultural identity
    Neighborhood/network membership
    Urban vs. rural residence
    Occupation
    Status/prestige within each of the two cultures
    Race/ethnicity
    Political leaning
    Ownership of particular types of animals
    Media contact
    Amount of schooling
    Parents
    Domains of use of each language

The position along these three axes shows a person's overall level of intensity of contact (IC). In every study, all three axes must be taken into account, but not every factor listed in Table 2 will be pertinent in every study. There must be some latitude in which particular factors are examined in any one study, but factors representing each of the three axes must be included. This follows Kerswill's (1994:49) program of a subjective "selective" strategy of choosing social factors, as opposed to an all-inclusive strategy: only social factors which are "of importance" are analyzed.

3.4. Expected Effects of Contact Factor Groups

The first factor group (or axis) represents the linguistic profile of the speaker, with respect to the languages spoken in the commuity. Since the language learned first is generally the language of one's family and closest friends, as well as being the language used for the longest period of time (except in cases where people switch to an L2 and stop speaking their L1) it will index IC. In most cases, this will be identical to the parents' language, so they will have similar effects. However, Kerswill (1994) points out that one's first language, or parents' language may not be the most commonly used, or most proficient language for all speakers, especially for immigrants. Therefore, the following factor must also be taken into account. Proficiency in each language may have a different effect depending on whether the source language was learned for affective or instrumental purposes: if affective, the speaker may use more of its features in the L1. If it is learned only for instrumental purposes, it may have less effect on the L1. Number of languages spoken on a regular basis indexes IC in that, the more languages one speaks, the less time one spends speaking each of them.

    The second factor group (or axis) represents the degree of identity with the different cultures in the community. The effect of identity with the local culture has been examined in Labov's (1963) study of Martha's Vineyard, where factors such as occupation, ethnicity, and neighborhood correlate to degree of acquisition of a spontaneous change in progress. Such factors are also relevant in contact-induced change, where there is a direct relation between these factors and the amount of contact with the source language.

    Neighborhood or network membership indexes cultural identity, in many cases even defines it: the people one is in frequent contact with define one's culture, and with it, one's language. More particularly, cultural identity is partially defined by status within the (local and dominant) community so this factor also indexes IC. The urban/rural factor indexes IC along the cultural axis: urban inhabitants generally identify more with the dominant culture and are more likely to have regular contact with the dominant language. Occupation also indexes IC along the cultural axis as described in Gal (19787) and Holmquist (1988). In any community where race is a salient factor for the speakers in determining their social networks, it will play a role in the degree of contact between linguistic groups. Political leanings were

shown to index IC along the cultural identity axis in Holmquist (1988). Likewise, animal ownership as a measure of both wealth and attachment to the traditional lifestyle is correlated to IC. The choice among media forms indicates which aspects of culture one identifies with. Amount of school indexes IC either if the school serves speakers of both languages or if it serves one linguistic group in the language of another. Either way, more school means more contact with the source language. Kerswill (1994) notes that "a high level of education is likely to breed a greater tolerance of non-standard speech as well as greater self-confidence." Finally, parents influence one's cultural identity in numerous ways and so any factor correlated to parents' linguistic patterns may also correlate to their children's.

The third factor group (or axis) represents the amount of contact an individual has with the languages of the community. Length of residence in the community is a direct correlate of the amount of contact with the dominant language: newer arrivals (including young children born in the community) will have had fewer opportunities to hear the dominant language and would be less likely to exhibit any direct influence of the dominant language in their own speech.[5] Amount of daily contact has a similar effect: the more speakers are in contact with a dominant language, the more their language will be influenced. Age of second language acquisition also contributes to the overall amount of contact with the second language. Amount of travel and intermarriage index IC, along the amount of contact axis, in obvious ways. Distribution of domains of use indexes IC along all three axes. The more domains a language is used in, the more likely it is to be in contact with another language. Also, the more domains one uses the local language in, the more likely one is to identify with the local culture. Third, the more domains a language is used in, the more active it is and thus, the more susceptible to change. Another possible effect is demonstrated in Dorian (1994b): much variation is seen in Scots Gaelic even when it is used only in a very

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[5] It is possible that this would not show up as a correlate to the amount of linguistic influence if the speaker is in contact with other speakers who are, in turn, in contact with the dominant language. In that case, the direct influence of the intermediary speakers would be passed on to the more isolated speakers. Such an effect is shown in Chapter 9, where there is no correlation between amount of Italian influence in the lexicon and age.

restricted set of domains. Finally, media contact indexes IC: exposure to media in the majority language entails that much more contact with the dominant language.

4.   Metrics

Once a set of relevant factors has been determined, metrics must be designed for each factor so that a value (coefficient) can be objectively assigned to each factor for each speaker. Several attempts have been made at designing metrics for some factors, and I will not go into them here. Relevant references include Kerswill (1994), D. Sankoff & Laberge (1978), and Nagy, G. Sankoff & Moisset (1996).

5.   The Model

Once metrics are developed for the pertinent social factors, they can be combined in an equation of the form shown in (6).

(6) $I = ax + by + cz + ...$

I represents intensity of contact for the individual speaker. $\{x,y,z...\}$ are the weights of the factors contributing to intensity of contact, such as attending school in the source language or marrying a member of the source language community. Their values can be empirically obtained by a maximum likelihood estimation technique (e.g., the Varbrul package). $\{a,b,c...\}$ are constants indicating the importance of the factor group in a given community. Their values are obtained by simultaneously solving equations for (at least) as many individuals as there are social factors.

Once the values of the coefficients are obtained for many different communities, they can be compared. If the model is to have predictive power, the values of $\{a,b,c,...\}$ must be similar across communities. Otherwise, we learn that different parameters are of different relative importance in different communities.

This method differs slightly from traditional variable rule analysis. This is seen by comparing the equation in (6) to the traditional form of a variable rule, as shown in (7). Each term such as p_i in (7) corresponds to a term like ax in (6).

(7) $p = p_0 + p_i + p_j + p_k \cdots$

By dividing each term into a coefficient and a variable, it is possible to separate the factor weight within one community from the overall effect of the factor across communities. Only in this manner can the coefficients be compared across communities. This distinction is not possible using the current model of GoldVarb, as statistical comparison of factor groups across different calculations (for different communities) is not possible.

One further modification to the model is necessary. Although the additive model is appealing due to its intuitiveness, it has been rejected for variable rule analyses due to technical difficulties. Rousseau & Sankoff (1978:62) propose the logistic model in its place. The form of this model that corresponds to the additive model show in (6) is given in (8).

(8) $$\frac{I}{1-I} = \frac{a}{1-a} x \times \frac{b}{1-b} y \times \frac{c}{1-c} z \times \ldots$$

In order to have greater comparability across studies, the factors may be collapsed into three parameters corresponding to the three axes in Figure 2. This is an appropriate simplification only if there is high correlation among the factors within each of the three subgroups listed in (5).

6.   Summary

This paper has shown how to quantitatively analyze individual level factors relevant to understanding contact-induced language change. Focusing on intensity of contact as the primary correlate of contact-induced change, I have proposed that, in order to make progress in the study of how contact induces language change, a number of comparable case studies is necessary. A paradigm for conducting such studies is set up, building on the factors which have been shown to be pertinent in earlier studies. A set of factors which should be addressed in all studies is established, and I have indicated how the factors are to be aligned along three axes. A method for combining the effects of these factors, using a logistic equation, is proposed. Once a set of such equations is available from a series of similarly conducted studies, the set of equations is, in principle, solvable, and sociolinguists will have a model of how

social factors affect language change in contact communities. In combination with work on linguistic structure effects and typological difference effects, a complete model of language change will be within reach.

I close by requesting suggestions for data sets to be used for testing this model. Appropriate data would be collected from language contact settings where (a) there is a linguistic variable with a clearly defined innovative variant, and (b) data has been collected from a large enough sample of speakers to be able to examine each of the factors listed in (5).

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English Department
225-C Hamilton Smith Hall
University of New Hampshire
Durham, NH 03824-3574

ngn@hopper.unh.edu