The Geography of Language Shift: A Quantitative Cemetery Study in the Texas Czech Community

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Abstract

Considerable scholarly information exists on ethnic immigrant communities in Texas, including language use, but little research has been conducted to measure regional language shift longitudinally. The purpose of this study is to map the geographic pattern of language shift and its rate of change, and to determine which factors affected local variations. The results of 9,267 inscription observations in forty-seven historical Texas Czech communities indicate differences in the rate of change of language shift and variations based on a location's characteristics. The methodology we devised is a viable measure of language shift, worth testing against other locales and languages.

Keywords: Language shift, ritual language, Texas-Czech geography, Historical GIS, cartographic animation.

Introduction

Like other ethnic communities in Texas, Texas Czechs are amply represented in both popular and scholarly publications (Hudson and Maresh 1934; Machann and Mendl 1983; Gallup 1998; Eckert 2006). As early as the 1850s immigrants from Bohemia, Moravia, and Silesia were settling the fertile farmlands of central Texas. Immigration steadily increased after the Civil War and peaked in the 1910s before declining sharply. Czech settlements were centered in Fayette and the adjacent counties of Lavaca, Colorado, and Austin, and extended to every direction, especially along the Blackland Prairie (Figure 1). Along with their customs, the immigrants brought the Czech language to Texas.

This study aims to map the transition of language usage from Czech to English—language shift, which is discussed further in the literature review. We will attempt to answer these questions regarding the adult Texas Czech community. What is the geographic pattern of language shift over time? Specifically, does it model the wave theory of language change? What is the directionality and rate of language shift? Do the cultural characteristics of a place

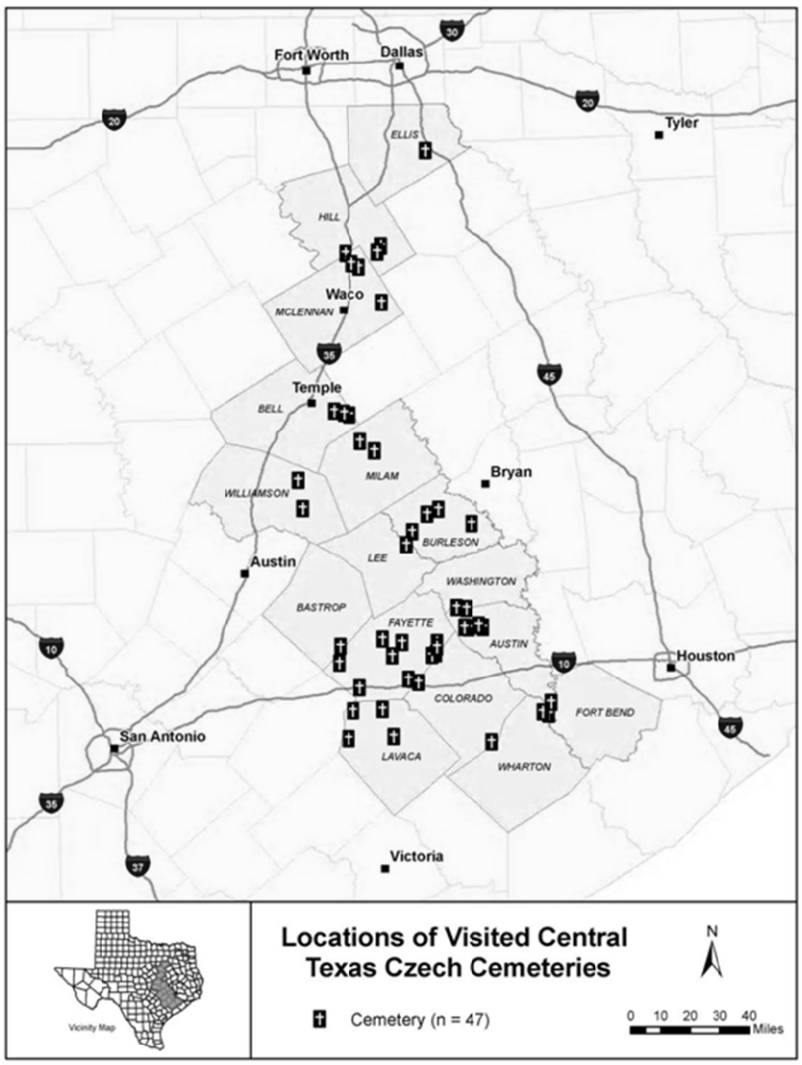

Figure 1. Study area.

(religious denomination, urban or rural designation, and homogeneous versus heterogeneous communities) affect the rate of language shift?

Initially we expected areas of high density homogeneous Czech settlement and areas of rural isolation to resist language shift the longest and areas near larger urban centers with more cultural interaction to undergo shift faster. We also expected to find practical modeling of hierarchical geographic diffusion

moving from cities to hinterlands, consistent with linguistic wave theory. Within a clear directionality from Czech to English, small reversals within the larger context were deemed possible, such as the post-World War II era when patriotic sentiments temporarily outshone community identification, then reverted to ethnic affiliation.

This research identifies language shift in a historical, post-occurrence setting. Much of the research involving Texas Czech ethnic heritage has been anecdotal or otherwise qualitative (Hannan 2007; Dutkova 1999, 2003; Gallup 1998). This study approaches the topic quantitatively, using grave marker inscription data to support statistical and geovisualization methods. We aim to expand the literature on the presence of Czech in Texas and propose a methodology for similar studies elsewhere.

For this study, the term 'inscription' includes any text on a grave marker such as epitaphs and month names. Markers with only personal names and numbers were omitted because they do not establish language use. Tombstones judged to have been replaced or out of place when compared to contemporaries were either rejected or assigned at the researcher's discretion. This study concerns only adults' inscriptions since minors' grave markers exhibited special language usage patterns that warrant a separate study.

Background

A review of the literature concerning each of the disciplines involved in this research is necessary to address methodological questions. This section is divided into three parts: cemeteries, linguistic processes, and Historical GIS and geovisualization.

Cemeteries

Cemeteries form "a cultural landscape that, more than any other, represents the totality of the locale or region in which it is located" (Hannon 1989, 237) and serve as enduring records of human activity, culture, and beliefs. A grave marker represents a specific time, and a cemetery is a collection of points in time that, collectively, provide an invaluable primary source of field data. As Hannon (1989, 256) points out, "as regions or smaller geographic units move through periods of cultural transition, the nature of these changes can often be read in the changing faces of their cemeteries and the artifacts they contain." He further notes (256) that "elements of particular importance in assessing these changes range from cemetery location and morphology to a whole host of factors involving the markers placed upon individual graves" including "*inscriptional data indicative of ethnicity and a large number of other cultural and statistical items*" (emphasis ours). This last item confers the possibility of quantitative analysis.

Well noted for his studies on the material culture of Texas cemeteries, Terry Jordan (1982) describes how different ethnic groups laid out, decorated, and cared for cemeteries, but omits the language of marker inscriptions. Jordan

notes that cemeteries are for the living, not the dead; they reflect the living culture at the time of the burial. Thus the etched inscriptions represent not just the will of the deceased, but the consent and approbation of the community.

As specifically concerns Czech cemeteries in the US, a study conducted in Nebraska (Kiest 1993) on material culture considers cemeteries' locations, layout, plantings, etc., to demonstrate the settlers' changing attitudes and goals—their place within the American community. The cemetery was closely linked to Czech nationalist pride, the reasons for which greatly diminished after the 1920s. Kiest claims that after the 1920s all the inscriptions are in English with headstones low to the ground, paralleling national trends. A complete absence of Czech inscriptions after the 1920s seems unlikely, but Midwest Czech immigrants differed from Texas Czech immigrants. Midwest Czechs were predominantly of Bohemian origin, aligned with the humanistic Freethinker's movement, and translated their ideas of Czech nationalism to America. After World War I, the reasons for their cause were diminished by the separation of church and state in the new Czechoslovakia. The 1920s also saw reductions in immigration to the US, ending the influx of fresh Czech speakers. Texas Czechs, meanwhile, were primarily of Moravian origin and spoke such dialects as traditional Lachian and East Moravian (Hannan 2007). A Praha, Texas, study used cemeteries to trace language change (modifications and variants, not to be confused with language shift) found on tombstone inscriptions (Eckert 1993). The findings show that variants in the Texas community differ markedly from Standard, or Literary, Czech. Religion was also central to the Texas Czech community. Between 70-90 percent of Czech immigrants were Catholic, most of the rest belonging to the Brethren church. Another distinguishing characteristic is the number of exclusively Texan organizations and social clubs (Machann and Mendl 1983).

Language shift

Language shift is the abandonment of one language in favor of another. Depending on the circumstances, language shift may have a number of consequences. When a language has relatively few speakers, as with many Native American languages, the result can be language extinction, the complete loss of native speakers. When a high birth rate and/or continuing immigration provides new speakers, as with Spanish in the US, the shift of some speakers to another language may not reduce the local vitality of the language. Finally, language shift in immigrant communities may cause the loss of immigrant dialects, despite continuing robust usage elsewhere. Languages threatened with dialect loss in immigrant communities include Catalan in l'Alguer, Sardinia (Juge 2007), and Czech in Texas.

Cooper (1982) identifies three characteristics of studies on language maintenance and shift. First, they usually focus upon the threatened language rather than the advancing language. Second, they differ from studies in language spread in their concern with patterns of language use, not proficiency,

awareness, etc. Third, they are often carried out in immigrant settings. All three characteristics are true for this study. Rural, isolated areas lacking in formal education are expected to associate with a declining language for longer periods of time (Wardhaugh 1987), while language sustainers such as newspaper and radio are found more frequently in cities. Languages are also far more likely to be replaced than other cultural elements, such as music and festivals, and this is certainly true with Texas-Czech, where folk culture is still strong.

The wave hypothesis in linguistics views language change as originating at a specific time and place and diffusing spatially and temporally along social borders. Developed by Schuchardt (1866-1868) and Schmidt (1872) to address patterns of linguistic change not explained by the traditional family tree model, the wave model is consistent with seeing each speaker as "a specific coordinate along various continua" (Hannan 2007, 149). This important principle mirrors the geographic concept of spatial diffusion of ideas, people, etc. (Mayhew 1997, 130). According to the wave model, changes may spread, like the ripples created by a stone thrown into a pond, across language varieties without regard to their genetic relationship. This study examines the possibility that a similar pattern might occur not with lexical or grammatical changes but rather in the use of languages in the specific domain of the gravestone inscriptions. Language shift can be expected to occur when a minority group lives in conjunction with or in close proximity to a dominant tongue. As a monolingual generation gives way to a bilingual generation, the dominant language assumes a more central role in daily life and precipitates language shift (Eckert 1980).

Contact situations may differ in what areas of life are associated with a given language. Perhaps the most striking type division of functional domains by language is found in what is called DIGLOSSIA, described by Ferguson (1964, 435) as "a relatively stable language situation in which, in addition to the primary dialects of the language…, there is a…superposed variety, the vehicle of a large and respected body of written literature, either of an earlier period or in another speech community, which is learned largely by formal education and is used for most written and formal spoken purposes but is not used by any sector of the community for ordinary conversation." Ferguson describes two varieties, designated high (H) and low (L), that are variants of a single language, as in the well-known examples of Greek and Arabic, though they could be unrelated languages.

It might be tempting to characterize the Texas Czech situation as diglossia, but a key distinction is that English and Czech did not occupy complementary positions in the communities. For example, they were both languages of instruction in parts of Texas during the late 19th and early 20th centuries (Blanton 2004, 40). Rather, in such cases, language use tends to correlate with other factors, such as ethnicity. Nonetheless, the notion of functional domain may apply here since the language of tombstone inscriptions may not correspond directly to the primary spoken language of an individual or a community. As

such, this study may contribute more to the analysis of the functional usage of the Czech language than it does as an indicator of primary spoken language.

Another valuable term for this study is RITUAL LANGUAGE. Our methodology calls for the observation of tombstone inscriptions. Burials and cemeteries are the result of a highly ritualized system of customs that include ritual language, "that set of utterances which is intimately and essentially connected with the action context of a ritual" (Wheelock 1982, 50). Because it is ritualized, it communicates less the individual involved in the ritual and more the norm for the situation established by the community. In etched form the inscriptions represent a ritual language of death that has been created over many generations, and so may not easily be disrupted. For this study that does not represent a large problem because we are concerned with language shift at the community level and not the individual level, but it does represent a small problem since there may be a lag between changes in vernacular language and changes in ritual language. We must therefore characterize the results not as a measure of spoken language shift, but of ritual language shift.

Historical GIS and cartographic animation

GIS is recognized as an effective historical research method because it can handle the thematic, spatial, and temporal components of datasets (Ell and Gregory 2001). Recently, the term HISTORICAL GIS has been applied to historical research using GIS and other Geographic Information Technologies, spatial analytical techniques, and geovisualization (including dynamic mapping) to explore the spatiality of historical events (Kennedy et al. 1999; Diamond and Bodenhamer 2001; Cunfer 2002; Knowles 2008). Our project included the design and creation of a Historical GIS of Texas Czech cemeteries and the analysis and visual exploration of the data collected using spatial analytical geovisualization techniques, including cartographic animation. Animations differ from static time-series maps in their "narrative character. They tell a story" (Kraak and Ormeling 1996, 197). Animations communicate content more effectively than static maps and create a more appealing visualization that may add a dimension of interactivity (Koussoulakou and Kraak 1992). Effective use of temporal animation requires clear temporal questions. Animations become more problematic with complex data, and studies have explored the strengths and weaknesses of cartographic animation as exploration and communication devices (e.g., Harrower and Fabrikant 2008). MacEachren (1994) identified at least six dynamic visual variables that manipulate an animation group: display date, duration, order, rate of change, frequency, and synchronization. Some may be fixed while others are variable to guide the map user through the data. Of particular interest to this project are rate of change, which very effectively communicates temporal order in a spatio-temporal dataset (Kobben and Yaman 1995), and especially synchronization, which proved to be the key visual variable in extracting spatio-temporal patterns from our dataset, as will be shown later.

Methodology

We designed a technique to quantitatively measure evidence of language shift. We use the term "evidence" because the burial ritual should not be used as a proxy to verbal language usage. Cemeteries in historical Texas-Czech communities were visited and the language of grave marker inscriptions observed. A diversity of cemetery types were sought for the group, including rural, urban, Catholic, Brethren, ethnically unified, and ethnically mixed. The research was also interested in isolated geographic outlier communities.

At each observation two variables were collected: the year of death and the language of inscription, according to which the ritual language most strongly identified with at the time of death was assigned. Each cemetery's observations were recorded on a field log sheet. Then, the data were aggregated to produce quinquennial averages, providing a breakdown of language use for both languages. The data for each time period were split into percentages, based on which each period was placed into an equal interval classification scheme with nine classes representing a continuum of language shift for visualization purposes.

The Latitude-Longitude coordinates of the cemeteries were imported into ESRI's ArcMap 9.2 along with attribute information to produce a series of quinquennial representations that demonstrated language shift over time. Frame-by-frame animation was used to visualize the data, with one frame per five-year average. The commonly used alternative method of interpolating between "key frames" to produce tween animation is not as desirable because it assumes a consistent rate of change, an assumption that could not be made for this study. Each frame was then symbolized according to the assigned percentage of Table 1.

Results

Over four months, forty-seven cemeteries in sixteen counties of Texas were visited and 9,267 individual observations collected (Table 1). Besides spatial information, three characteristics of the cemeteries were collected: type, population, and homogeneity. Of the forty-seven cemeteries, nine were classified as belonging to the Brethren denomination, twenty-nine were of the Catholic denomination, and nine were community cemeteries unaffiliated with churches. A few community cemeteries that were not adjacent to churches but represented monolithic religious communities were placed into a religious category, including Snook and Nelsonville (Brethren) and Shiner (Catholic). Currently, forty-one of the cemeteries are rural and six are urban according to the current U.S. Census definition of an urban place (a populated place of more than 2,500 persons). While the six urban places have not always technically qualified as urban, historically they have served as important centers of interaction and cultural exchange, including three of them as county seats. Twenty-six of the cemeteries represented homogeneous (unified) cemeteries, and twenty-one, heterogeneous (mixed) cemeteries. In homogeneous cemeteries, nearly all

Table 1. Cemetery listing with location and study variables.

	Name	Lat N	Long E	Inscrip-tions	Denom-enations	Homo-geniety	Pop.
1	Caldwell	30.535	96.7025	120	Catholic	Mixed	Urban
2	Cameron	30.8519	96.9869	170	Catholic	Mixed	Urban
3	Cistern	29.8176	97.2206	53	Catholic	Unified	Rural
4	Cyclone	31.0325	97.1239	94	Catholic	Mixed	Rural
5	Deanville	30.4522	96.7873	104	Community	Unified	Rural
6	Dime Box	30.3882	96.8225	94	Catholic	Unified	Rural
7	Dime Box	30.3894	96.8234	77	Community	Unified	Rural
8	Dubina	29.7287	96.8362	310	Catholic	Unified	Rural
9	East Bernard	29.5339	96.0592	327	Catholic	Mixed	Rural
10	East Bernard	29.5454	96.0896	116	Community	Unified	Rural
11	Elk	31.5792	96.9211	108	Community	Unified	Rural
12	Ellinger	29.851	96.6783	256	Catholic	Mixed	Rural
13	Ellinger	29.843	96.7	29	Community	Unified	Rural
14	Ennis	32.3178	96.6425	609	Catholic	Unified	Urban
15	Fayetteville	29.9052	96.6705	656	Catholic	Mixed	Rural
16	Fayetteville	29.883	96.671	116	Brethren	Unified	Rural
17	Flatonia	29.6941	97.1098	138	Catholic	Mixed	Rural
18	Granger	30.718	97.426	93	Brethren	Mixed	Rural
19	Granger	30.719	97.4261	311	Catholic	Mixed	Rural
20	Hallettsville	29.4503	96.9264	332	Catholic	Mixed	Rural
21	Hostyn	29.8469	96.9214	262	Catholic	Unified	Rural
22	Industry	29.9726	96.4887	86	Catholic	Mixed	Rural
23	Industry	29.9737	96.5133	59	Brethren	Mixed	Rural
24	Kovar	29.9014	97.2129	31	Catholic	Unified	Rural
25	Krasna	29.5892	96.0425	61	Community	Unified	Rural
26	La Grange	29.91	96.8655	117	Community	Mixed	Urban
27	Latium	30.0711	96.5547	61	Catholic	Unified	Rural
28	Marak	30.9014	97.0661	206	Catholic	Unified	Rural
29	Moravia	29.5836	96.985	223	Catholic	Unified	Rural
30	Moulton	29.5806	97.1503	331	Catholic	Mixed	Rural
31	Nada	29.4075	96.3797	214	Catholic	Mixed	Rural
32	Nelsonville	29.9709	96.4077	33	Community	Mixed	Rural
33	Nelsonville	29.9819	96.4305	170	Brethren	Unified	Rural

	Name	Lat N	Long E	Inscrip-tions	Denom-enations	Homo-geniety	Pop.
34	New Tabor	30.5577	96.6374	82	Brethren	Unified	Rural
35	Penelope	31.8556	96.916	60	Catholic	Mixed	Rural
36	Penelope	31.8282	96.9371	97	Catholic	Unified	Rural
37	Plum	29.9311	96.9739	205	Catholic	Unified	Rural
38	Seaton	31.0539	97.2114	275	Brethren	Unified	Rural
39	Shiner	29.4458	97.18	659	Catholic	Mixed	Rural
40	Snook	30.4808	96.4519	299	Brethren	Unified	Rural
41	Taylor	30.58	97.4044	175	Catholic	Mixed	Urban
42	Tours	31.7561	97.0451	76	Catholic	Mixed	Rural
43	Weimar	29.7111	96.78	184	Catholic	Mixed	Rural
44	Wesley	30.0658	96.4983	104	Brethren	Unified	Rural
45	West	31.8247	97.1188	47	Commu-nity	Unified	Rural
46	West	31.7742	97.0872	841	Catholic	Unified	Urban
47	Zabcikville	31.0425	97.1536	196	Brethren	Unified	Rural

the graves are of Czech heritage. Heterogeneous cemeteries have a significant number of graves from other cultural groups, including German, Anglo, Spanish, and Irish.

Except for one (Figure 2), dual tombstones for husband and wife were always inscribed in the same language, regardless of the difference in years of death. Over time, inscriptions tended to progress from full Czech epitaphs to short Czech phrases. A particularly common phrase on later markers is "Odpočívej v pokoji" ("rest in peace"), found on many markers (Figure 3).

Spatial analysis

The first performed analysis was designed to illustrate any patterns of language shift in Texas Czech communities. In several instances, multiple cemeteries from the same town were aggregated to produce a location average. Aggregation was also performed for cemeteries with fewer than an average of ten samples per five-year period. This was done to smooth the data for smaller cemeteries with a high degree of variability in individual time periods. The four cemeteries of Elk, La Grange, Latium, and Wesley were excluded from location analysis for insufficient observations and lack of proximity to other qualified cemeteries. The earliest measurable quinquennial period was 1885, with four qualifying cemeteries visited in Fayette and Austin counties. In each successive period, more cemeteries qualified for measurement up until 1915, when Granger, Penelope, and Moravia were the last added. The latest date with enough Czech inscriptions to record was 1980 (Plum and Marak in Fayette and Milam counties). The data from each cemetery were processed to compute the

Figure 2. Exception to the rule in Granger, Texas. Note: 48 year difference in dates of death.

Figure 3. Moravia, Texas grave of Tillie Till, 1906-2007. The epitaph reads "Odpočívej v pokoji".

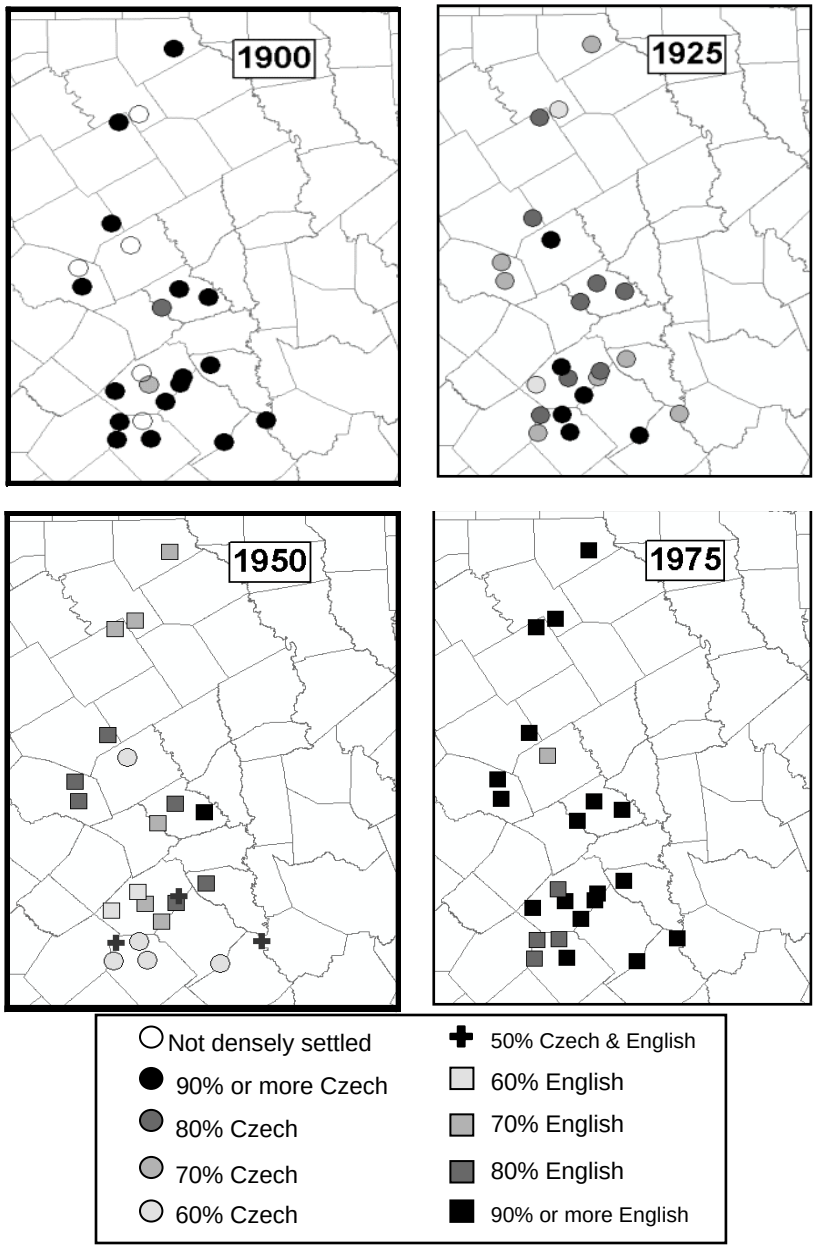

Figure 4. Animation 1. Run from the first five year period a community qualified. No definitive patter observable from visualization.

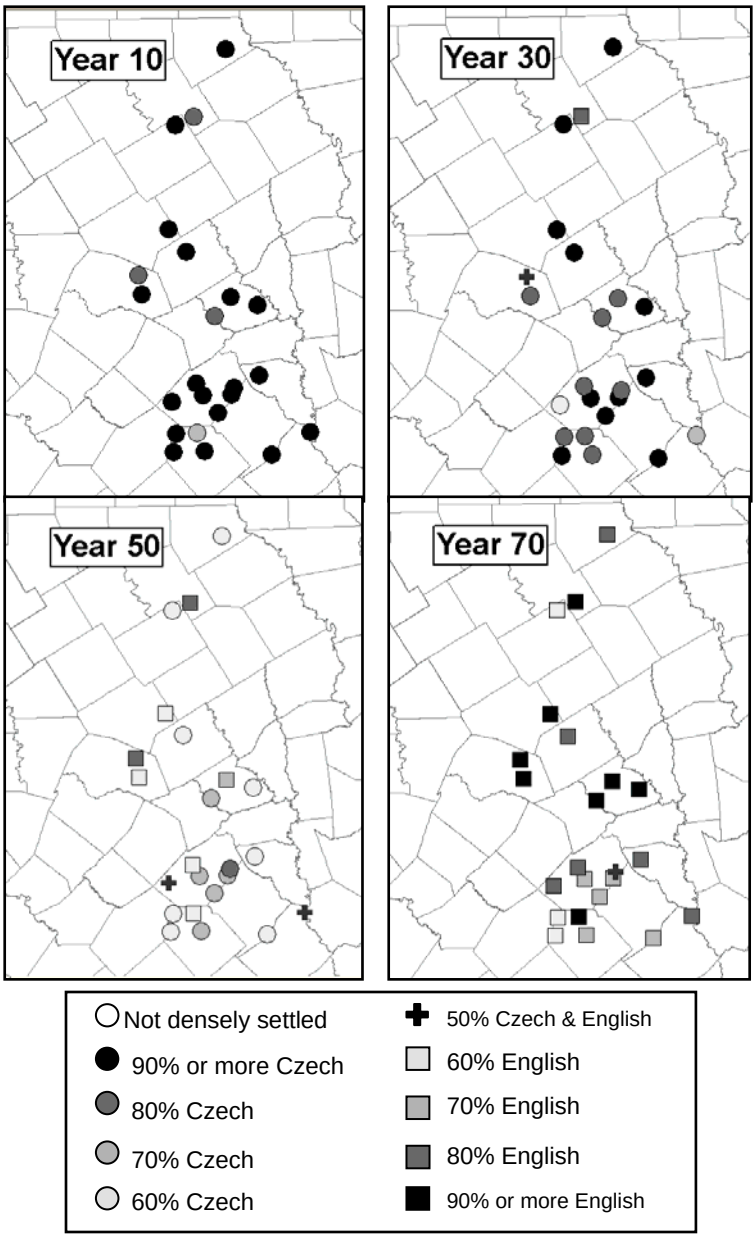

Figure 5. Animation 2. Run synchronously from the time of the first qualified observation. North/south differences are more evident.

percentages of Czech and English inscriptions per quinquennium from 1885 to 1985.

Regarding the first research question, loading the results into a time-series animation failed to reveal a clear spatial pattern to language shift in Texas Czech communities as measured by grave marker inscriptions. In fact, the language of inscriptions appeared to be a highly localized phenomenon (Figure 4). As such, we considered how adjusting one of the visual variables would affect the visualization. A second animation synchronized the study locations according to the earliest date of measurable observations. In this 'out of phase' animation (Figure 5), all locations began at the same frame and successive fiveyear additions to the starting frame were analyzed. From this viewpoint the tendency of northern cemeteries to transition more quickly than southern cemeteries emerged.

The core settlement area (Fayette, Austin, and portions of Lavaca County), resisted language shift for a longer period of time. The geographic location of the cemetery did not greatly affect the language of grave marker inscriptions. The "life span" of Czech cemetery inscriptions was longest where it was oldest—in the early Czech settlements of Fayette County—and shortest where it was youngest—in the Blackland Prairie belt towns of Granger and Penelope.

Directionality and rate of language shift

The second research question sought to describe the directionality and rate of language shift. In all cases, the percentage of Czech inscriptions decreased over the entire study period, as expected. However, there were small hiccups of time with non-linear progression of language shift at individual locations, none lasting longer than a decade.

To measure the rate of change, the data for all forty-seven cemeteries were aggregated and examined by decade. From the earliest measured decade of the 1880s through the 1900s, the use of Czech as part of the burial ritual stayed consistently in the high 90 percent range (Table 2). Not until the 1910s is there

Table 2. Percentage of Czech inscriptions by decade.

	1880s	**1890s**	**1900s**	**1910s**	**1920s**	**1930s**	**1940s**	**1950s**	**1960s**
All	98	98	96	90	78	63	45	30	17
Rural	98	100	96	90	78	65	48	33	18
Urban	100	90	98	89	76	58	41	26	11
Brethren	100	100	97	90	75	60	32	13	5
Catholic	97	98	99	90	80	66	49	35	20
Unified	97	98	94	91	77	64	43	28	14
Mixed	100	99	99	88	79	63	48	33	20

a measureable decrease to 90 percent. From the 1920s through the 1960s the rate of change was remarkably consistent, with an average of 15 percentage points per decade. After the 1960s, the negligible number of Czech inscriptions (approximately less than 5 percent of the total from the same time period) made patterns more difficult to identify. It is evident, however, that over the aggregate, from the 1970s forward, Czech language use in the burial ritual is minuscule.

Place characteristics

A third research question sought to classify the locations and discover any differences in language shift according to cemetery typology. While some cemeteries were excluded from the spatial analysis, all were included in the characteristic analysis. The first variable examined was rural places vs. urban places. Both types follow similar paths until the 1920s, with the exception of the urban setting in the 1890s. Possible reasons for this anomaly will be explained in the discussion section. From the 1930s—1960s, the percentages diverge, with a consistent gap between rural and urban locales. Rural cemeteries' inscriptions shift at 7 percentage points slower than their urban counterparts during this period. Within groups, the period 1910s—1930s exhibits slower change for rural areas than 1930s—1960s. For urban areas, the rate of change is greater in the periods 1920s—1940s than 1940s—1960s. From the 1940s—1960s, both rural and urban places experience a 15 percentage point shift per decade.

The second variable concerns religious affiliation. Brethren and Catholic cemeteries show similar percentages through the 1910s, but each successive decade exhibits an accelerating percentage gap until the 1960s. The Catholic cemeteries show much slower change than the Brethren cemeteries. Within groups, Catholic inscriptions decline 10 percentage points from the 1910s to the 1920s, and then settle into a 15 percentage point average shift rate in successive decades. The Brethren church averages 15 percentage point shift from the 1910s—1930s but then doubles in the 1940s, declining to a mark of 5 percent Czech inscriptions in the 1960s.

Homogeneity of cemeteries did not produce differences as with the other two variables. The greatest gap between the two designations is 6 percentage points in 1960. From the 1940s forward, heterogeneous places had at least a 5 percentage point higher percentage than homogeneous places. Previously, they were usually within 3 percentage points per decade, with reversals of the high percentage occurring. For unified cemeteries, the rate of change averaged 14 percentage points from 1910s—1960s, except for the period 1930s—1940s, when it jumped to over 20 percentage points. For mixed cemeteries, the rate averaged 10 percentage points from 1900s—1920s, and accelerated to an average of 15 percentage points from the 1920s—1960s.

Discussion

The data reveal no evidence for a connection between language shift in gravestone inscriptions and the wave model of language change. It is not currently possible to establish a reason for this lack of correlation, but this finding may indicate that the kinds of language change that the wave model was initially developed to address differ in kind from language shift. On the positive side, consistency in the overall rate of language shift was an unanticipated finding. Whereas from the 1880s to the 1910s there was little shift, the 1920s through the 1960s saw a fifteen percentage point shift per decade. This was a repeated measure for different time periods in each tested variable (Table 2). While the reasons for this specific figure cannot be easily pinpointed, a brief description of events during the decades of the 1920s—1950s may provide insight on why shift was occurring. In 1918, the end of World War I resulted in the creation of the Czechoslovakian state. The reasons for Czech nationalism in the US, then, ceased to produce such a rallying point for cultural solidarity, the Czech language being a manifestation of nationalist sentiment (Kiest 1993). That year, Texas passed an English-only law for public schools. National immigration policy tightened during this period, limiting the influx of new Czech speakers. In the 1940s World War II and patriotic sentiments further strengthened the position of English as the language of survival. Finally, mass media impacted the Texas-Czech community in the 1950s. Czech language programming ceased and the new medium of television gradually replaced radio as the primary form of media communication. The experience of Texas Germans during the same period is instructive. The effects of two World Wars along with systematic strengthening of English in education hastened the shift from German in some very important domains including the written and religious ones (Salmons 1983). Perhaps the same is true of Texas Czechs. If these events had any effect on Texas Czech communities it is unclear why they would affect certain locations more than others, even areas in relatively close proximity to each other.

Other variables of individuals in Texas Czech communities may have affected the rate and execution of language shift. Fraternal organizations like the SPJST (Slavonic Benevolent Order of the State of Texas), KJT (Catholic Union of Texas), and Sokol ("falcon") were a large part of the social structure of Czech communities. The SPJST was formed in La Grange in 1897 as a fraternal benefits society providing insurance products and social activities. The KJT was formed in 1888 in Hostyn for the same reasons. The first Sokol in Texas, an organization that stressed the physical, mental, and cultural development of its members, was organized in Ennis in 1909. These organizations' seals were often etched on the grave markers of former members. The SPJST even founded cemeteries for its membership, and three were visited for this study in Deanville, East Bernard, and Elk. However, this variable was not measured due to the high likelihood of errors of omission in light of inconsistent membership indications on grave markers in other cemeteries. If membership rolls for local

lodges could be obtained, this variable may yield interesting results showing the high importance these organizations placed upon culture and heritage.

Rural areas exhibited a slower shift and lower rate of change. It is noteworthy that 87 percent of the cemeteries in the study were rural, and the urban sites were by no means large cities. The largest, Ennis, has a current population of just under 20,000. While the visited locations were in no way exhaustive of all Czech settlements, they do represent the traditional agrarian occupation of Czech immigrants. These areas had little incentive to drop Czech, as they were situated on the peripheries of cross-cultural interaction. An interesting phenomenon of the urban places before 1900 is the appearance of grave inscriptions in both Czech and English. This was especially prominent in Ennis, where obelisk-style tombstones have Czech on one side and English on the other.

The religious subplot reveals additional information. In his study of language death in Czech-Moravian Texas, Hannan (2007, 158) is surprised at how long the language of Texas Czechs has survived as compared to other American immigrant contexts, noting that "the Texas community's support for organized religion has distinguished it from most Czech communities in other states. Czech-Moravians whose religious practices were closely linked to the ancestral language and culture were more successful than their non-religious fellow ethnics in resisting assimilation." Grave marker inscriptions are an expression of symbolic (ritual) value. The Brethren church exhibits a much higher tendency to use English earlier and more often than Catholic Czechs, whose slower shift may come from sheer numbers. The impetus to shift ritual language use may not have been as acute, as approximately 80 percent of Czech immigrants were Catholic.

Unified cemeteries were fairly straightforward, and a high degree of confidence is given to the observations in them, but mixed cemeteries presented several obstacles. First, there was a bias toward Czech inscription observations. There existed no ambiguity to which group Czech inscriptions belonged, but English inscriptions were viewed more scrupulously to avoid erroneously assigning a grave marker to the Czech community that in reality did not belong. Another complication concerns intermarriage. A third issue is the possibility of a unified cemetery in a town with a mixed population, as in Ennis and Penelope. This bias may have surfaced when the decadal aggregation showed mixed communities with a 5 percentage points slower rate of shift from the 1940s forward. Nonetheless, any further attempts to distinguish differences in homogeneous vs. heterogeneous communities should correct for these possible error sources. Another source of error found in mixed cemeteries is surnames. It is possible to find three different markers of the same time period for a "Wagner" written in German, Czech, and English. In some cemeteries, family burial plots were of great assistance here, often serving as self-contained family trees complete with instances of language shifting between generations (Figure 6).

Animation was an effective means to visualize the spatio-temporal dataset. In some instances, multiple cemeteries of different types in a location were

combined to create one point per town, as in Fayetteville, where Brethren and Catholic Church cemeteries were evaluated and combined for location analysis. In a study area of this size, nearby cemeteries do not permit an appealing visualization due to overlap and clutter. Besides a lack of observations, this was the other reason that several towns were combined. Dynamic mapping was advantageous since it allowed synchronizing the data from a standard starting point. This animation exhibited the tendency towards slower language shift in South Texas Czech cemeteries than in Central Texas Czech cemeteries, which traditional paper time series maps would have revealed only after much manipulation and labor.

Conclusions

In summary, the progression from the starting point to the ending point of the times included in the study shows no clear pattern of written language shift. However, when the study sites are synchronized from a standard origin, the visualization reveals a pattern in which the northern communities shifted more quickly than their southern counterparts. The results support previous findings that indicate rural areas experience the processes of language shift less quickly than urban areas. In addition, even greater disparity emerged between Catholic

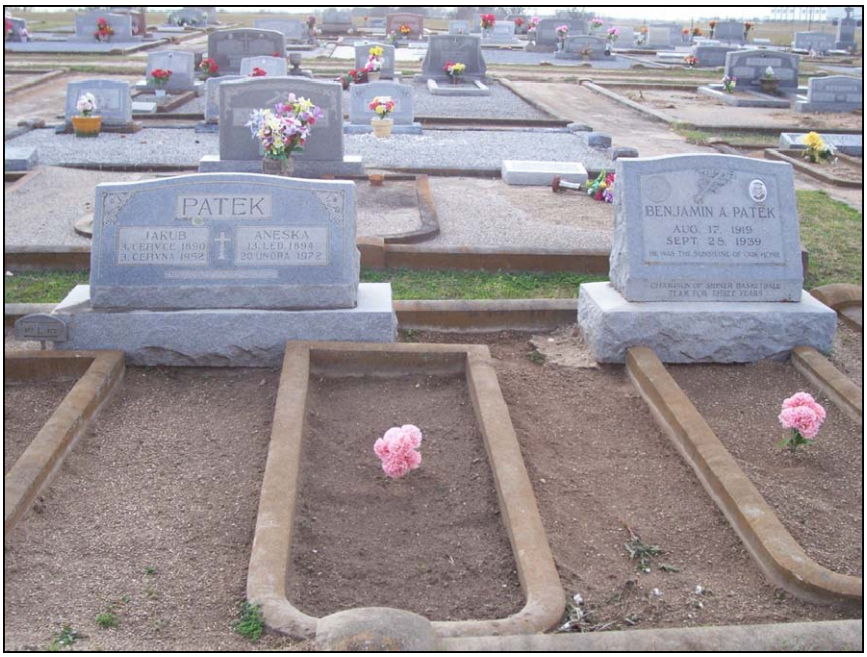

Figure 6. Family plots in Shiner, Texas, Jakub and Aneska, dates of death 1952 and 1972, respectively, in Czech with epitaph. Son Benjamin, picture right, dated 1939 in English with English subscription.

and Brethren denominations, suggesting that ritual language usage in religion may be more important in the language shift of Texas Czechs than place population or homogeneity. One of the best predictors of inscriptional language appears to be the date of birth in conjunction with age at death of a sample. It was not unusual for someone who lived from 1880 to 1970 to have a Czech inscription. It was just as likely for someone who lived from 1910 to 1940 to have an English inscription. That is, the age of a community may significantly affect the results.

Our results add to the body of knowledge concerning Texas ethnolinguistics and historical Texas Czech immigrant communities. Ritual language usage is more than just rote duplication of traditional practices. It contains meaning worthy of attention because it accomplishes an end in ritual behavior, a sense of connection and belonging to previous generations. When it changes, it reflects larger cultural shifts in ethnic identification. Therefore, inscriptions on grave markers serve as viable evidence of language behavior within a community. This study gives geographers and linguists alike a valuable methodological tool to conduct historical research in other locales and languages. It leaves open certain questions about language change in a community, but it also offers evidentiary commentary on ritual language domain usage. Furthermore, the study shows how cartographic animations can contribute to unearthing spatio-temporal trends that might not be easily discernible otherwise.

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