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Investigating the Spatial and Statistical Dimensions of Mortuary Choice in the Historical-Period Old City Cemetery in Roslyn, Washington

Sarah Rain Hibdon
Central Washington University, sarah.hibdon@cwu.edu

INVESTIGATING THE SPATIAL AND STATISTICAL DIMENSIONS OF MORTUARY CHOICE IN THE HISTORICAL-PERIOD OLD CITY CEMETERY IN ROSLYN, WASHINGTON

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by

Sarah R. Hibdon

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We hereby approve the thesis of

Sarah R. Hibdon

Candidate for the degree of Master of Science

APPROVED FOR THE GRADUATE FACULTY

______________ ______________________________
Dr. Sterling Quinn, Committee Chair

______________ ______________________________
Dr. Robert Hickey

______________ ______________________________
Dr. Nicole Jastremski

______________ ______________________________
Dean of Graduate Studies

ABSTRACT

INVESTIGATING THE SPATIAL AND STATISTICAL DIMENSIONS OF
MORTUARY CHOICE IN THE HISTORICAL-PERIOD
OLD CITY CEMETERY IN ROSLYN, WASHINGTON

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The historical-period Old City Cemetery in Roslyn, Washington contains individuals from diverse social backgrounds and exhibits considerable variation in mortuary expression. As such, the Old City Cemetery offers a unique opportunity to explore potential differences in social group mortuary practices spatially and statistically. Using burials in Roslyn's Old City Cemetery, this project developed a methods framework to assess mortuary practice through demographics, burial location, and monument/plot attributes. I tested correlations between demographics and mortuary expression using spatial-statistical cluster analysis (Ripley's *K*-Function), spatial density analysis (Kernel Density Estimation), and non-spatial statistical significance assessments (Factor analysis and Pearson's R), and identified several demographic-based mortuary trends. Similarities in some ages and nationalities were significantly associated with choice in burial location and monument/plot attributes in the Old City Cemetery, suggesting social dynamics in historical-period Roslyn valued these demographic designations. I did not identify any significant trends in choice between similar occupations or causes of death. Cemetery chronology and known decade-based norms

appeared partially responsible for burial location siting and choice in monument or plot attributes.

This project serves to recommend the viability and importance of incorporating both spatial and statistical dimensions into mortuary analysis of historical-period cemeteries, and I offer that this framework can be applied in such contexts to investigate mortuary expression and social dynamics.

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CHAPTER I

INTRODUCTION

In some cases, cemeteries may be the only piece remaining of bygone cultures, presenting an important link between the past and present. Within archaeological or historical contexts, human choice was integrated into every facet of burial practice. This includes burial location, marking, and memorialization. These choices are often derived from social norms, social interactions, belief systems, and perhaps also other intangible aspects of culture or environment. As such, cemetery contexts provide excellent opportunities to explore physical remains of human choice and behavior. Cultural resource managers can interpret statistically and spatially significant choices and behaviors to understand human interaction and belief.

According to established mortuary theory, assessing trends in mortuary expression may illuminate unique beliefs and practices within and between social groups in cemeteries. These beliefs may then be used to assess social dynamics and social structure. In many cases, efficient procedures to protect, preserve, and manage cultural resources like cemeteries should be based partially on interpretation and significance. Traditional archaeological or anthropological interpretation alone may sometimes be sufficient, but researchers should incorporate analysis and interpretation of the spatial dimension when it contributed to behavioral choice. Significance of mortuary trends requires additional incorporation of statistical methods. This concept has often been explored through analysis of archaic[1] cemeteries (see Chapter III). However, very few studies of historical-period[2] cemeteries (Streb et al., 2019) have incorporated a spatial *and* statistical dimension into analyses and there is currently no consensus on analysis methods. Similarly, few studies have assessed mortuary choice both in terms of locational choice and choice in physical mortuary expression via monument and plot attributes. The historical-period Old City Cemetery in Roslyn, Washington (Cemetery) contains individuals from diverse social backgrounds and exhibits considerable variation in burial siting and mortuary expression. As such, the Old City Cemetery offers a unique opportunity to test a framework exploring potential differences between social group mortuary practices spatially and statistically. Exploring mortuary choice serves to add towards anthropological knowledge of historical-period social structure and social interaction between demographic groups.

RESEARCH PROBLEM

Currently, there is no consensus in the literature on what methods are best used to identify human choice in mortuary behavior. Previous studies (see Chapter III) have used a combination of spatial and statistical methods to assess burial distributions and

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[1] The term "archaic" here refers to cultures and groups that fall temporally outside of the archaeologically designated "historical-period." This term is intended to replace terminology such as "prehistoric" or "ancient" commonly seen in in reference to past Old World cultures, but also includes "precontact" groups within the United States.

[2] Here, the historical-period includes post-medieval cultures in Europe (after ca. 1500 CE) and post-contact period in the United States (after ca. 1600-1700 CE) that are commonly associated with more familiar burial practices. The contact period in the United States is generally identified by the convergence of Native groups and European migrants and varies within the country, being closer to the 1800s in the Pacific Northwest.

expression, but few have focused on the integration of both methods and both aspects of mortuary behavior. Analyses of historical-period cemeteries exhibit a distinct lack of spatial assessment, and instead tend to focus heavily on statistical assessments of monument chronology or motif usage. Analyses of archaic cemeteries tend to focus more on spatial distribution of burials, sometimes incorporating a statistical measure of significance. While monuments and chronology are not always easily assessed in archaic contexts, historical-period analysis should incorporate the spatial dimension of mortuary choice. Investigating both locational and monument attribute choice allows researchers to explore more nuanced social interaction and behavior. Archaeologists and historians have compiled much demographic information on historical-period individuals, although this component is not always incorporated into analyses. However, mortuary analyses of historical-period cemeteries could greatly benefit from assessing the interplay between demographics and mortuary choice. A framework including both spatial and statistical assessments of demographics, locational choice, and monument/plot attribute choice in historical-period cemeteries can be employed to make full use of such data. Incorporating these attributes allows a more holistic view of mortuary choice and behavior.

Burial trends and the associated spatial layout of burials in Roslyn’s historical-period Old City Cemetery (Cemetery) have not been previously analyzed. Based on its size, diversity, non-linear layout, and availability of demographic data, the Cemetery provides an excellent opportunity to develop and test such a spatial and statistical analysis framework. Although much is already known about historical-period social structure in Roslyn, exploring mortuary choice adds towards this archive of information.

PURPOSE AND OBJECTIVES

The purpose of this project is to explore historical-period Roslyn burial practices and social dynamics through spatial and statistical assessment of burials in the Old City Cemetery. I also sought to assemble previously used spatial and statistical methods into a cohesive framework that can be used for mortuary analysis in historical-period cemeteries. Specifically, this framework identifies *to what degree* statistically significant correlations exist between demographics and both locational choice and physical mortuary expression. This project assesses locational choice between social groups using spatial-statistical cluster, density analysis, and statistical correlation. I based analysis of mortuary expression on statistical correlations between demographics and monument or plot attributes. I present a key research question.

> *Considering historical-period Roslyn's cultural and social diversity, to what degree are significant trends in mortuary behavior within and between social groups in the Old City Cemetery identifiable by spatially and statistically analyzing demographic data?*

Existing studies of Roslyn history (see Chapters II and IV) have identified some evidence of inequalities in social group treatment, perception, and identity (Chenoweth, 1978; Meisner, 1994; Onufer, 2008; Pitts et al., 2016; Shideler, 1986; Trimble, 2008; Ware, 2005). Roslyn's fraternal lodges were predominantly separated by ethnic affiliation. In Roslyn, historical-period immigrants tended to reside near others with similar social identity, and public perception and treatment of an individual was largely based on appearance, behavior, or perceived status (Onufer, 2008). Based on what is currently known about Roslyn social structure (see Chapters II and IV), I was interested in the degree of statistically significant spatial similarities of burials *within* social groups, and/or if the spatial distributions of burials vary *between* social groups. My preliminary visualization of burial distribution showed that the Cemetery exhibits a non-linear layout, suggesting choice in location was influenced by some other non-chronological factor. Similarly, my preliminary perusal of Cemetery burials revealed extreme variation in monument and plot attributes. Considering Roslyn's historical-period diversity and general mortuary theory emphasizing social status-based disparity in mortuary choice and elaboration (Bartel, 1982; Chapman et al., 1981; Parker Pearson, 1982; Tainter, 1975), I wanted to investigate the degree to which demographic association impacted monument and plot attribute choice.

Creating and implementing a spatial and statistical framework allows investigation of locational choice and monument/plot attribute choice between social groups. The following objectives present steps to construct and implement a framework. Specific framework development and implementation are explained in Chapter V.

1) Create a spatial and qualitative database of burial locations, demographic attributes, and monument/plot attributes for all burials in the Cemetery. Target demographic attributes include *date of death*, *age*, *nationality*, *occupation*, and *cause of death*. Monument and plot attributes include *monument type*, *monument material*, *monument size, plot size, motifs,* and overall *elaboration*.
2) Within the dataset, classify demographic and plot/monument attributes into broader groups based on shared or similar characteristics. To accurately assess general trends in group behavior, social groupings was based on historical-period ideation of similarity. Monument/plot classes are based on general

typologies and variation within the Cemetery. Broad groups and classes allow broad assessment of behavior. All individuals fall into designated group for all demographic and monument/plot attribute categories.

3) To identify the degree of statistical correlation between demographic classes and correlation between demographic and monument/plot attribute classes, run Pearson's R correlation on the dataset. The resulting correlation matrix is used in later steps.
4) To assess locational choice based on demographics, apply spatial-statistical methods Ripley's *K*-Function and kernel density estimation to all classes within each demographic category. Using the resulting statistics and spatial visualization, identify which class distributions may be significantly influenced by membership within the demographic class. Use Pearson's R to further contextualize patterns and assess whether patterns are influenced by other correlated attributes.
5) To assess how likely mortuary expression was influenced by demographics, apply factor analysis to the dataset and use Pearson's R to assess statistical significance of correlations between demographics and monument/plot attributes.

While usage of quantitative methods has been critiqued as an attempt to simplify qualitative human behavior (Supernant, 2017; Voorrips & O'Shea, 1987), using spatial and statistical methods may still be used identify trends and patterns in human choice (Cannon et al., 1989). Group-based mortuary choices would suggest demographic-based identity, economic disparity between certain social groups, and differences in social expectations. A lack of group-based mortuary choice would suggest homogenization of social practice despite considerable demographic diversity and variation. Chapter VI explores results and interpretations of significant mortuary trends in historical-period Roslyn.

SIGNIFICANCE

This project seeks to explore further social dynamics in historical-period Roslyn using a framework of mortuary analysis incorporating both spatial and statistical methods to assesses mortuary behavior in terms of locational choice and mortuary expression. By including statistical tests of significance into spatial analyses, this research focuses on spatial patterns likely influenced by human choice and on those attributes most likely contributing to the resulting spatial pattern. This project supplements the body of historical-period mortuary analyses (Bell, 1990; Binford, 1971; Deetz & Dethlefsen, 1971; Dethlefsen & Deetz, 1966; Lane, 2013; Saxe, 1970; Sayer & Wienhold, 2013; Tainter, 1975) and ethnographic and cultural research within Roslyn (Bogachus, 2005; Chenoweth, 1978; Fridlund, 2017; Meisner, 1994; Musso et al., 1955; Onufer, 2008; Pitts et al., 2016; Prater, 1994; Shideler, 1986; Ware, 2005). The framework developed in this project may be adapted for use in other historical-period cemeteries.

Like many other historical-period mining towns, Roslyn's modern economy has shifted towards tourism. Mortuary practices and behaviors identified using spatial and statistical analyses increases knowledge of Roslyn's unique history and may provide opportunities for further touristic interests, museum exhibits, and interpretive signage. Resource managers and Cemetery advocates may use this information to strengthen Roslyn's case for further funding options from state cemetery preservation programs, which target “outstanding examples of the state’s historical heritage” (Department of Archaeology and Historic Preservation, 2018; Onufer, 2008; Washington Trust for Historic Preservation, 2018). Public support is necessary when governing agencies cannot oversee nor monetarily maintain all historic resources, and a portion of the day-to-day stewardship must be carried by volunteers or other interested parties. Staffed by volunteers, the Roslyn Cemetery Committee has worked towards restoration and preservation of the Old City Cemetery as monuments continue to show evidence of degradation.

OUTPUTS AND DATABASE DISTRIBUTION

To provide open access to my compiled data and improve genealogical research, I updated information found on several genealogical research websites, including Find A Grave and FamilySearch (see Chapter V). Within Find A Grave, I updated name spellings and birth/death dates where necessary and included additional information and familial ties when known. I also uploaded additional photos of the monument within the Cemetery as well as copies of any historical records downloaded from online document collections. I did not update or add information to individual profiles on FamilySearch, as many records are currently not editable after original transcription.

I also gave a copy of my completed spatial and qualitative database, all photos, and all documents to the Roslyn Cemetery Committee. The database and records will be archived at the Roslyn Museum and integrated into the Committee’s upcoming interactive cemetery kiosk project. As of June 2020, the kiosk database project was still in progress. The Committee seeks to provide visitors, descendants, and researchers with information and biographies for each individual buried in the cemetery complex. An online version of the working database can be found at http://roslyn.akiosks.com/.

Knowledge of overall Cemetery style and layout, monument types or materials, and particularly intriguing spatial patterns may help the Roslyn Cemetery Committee develop specialized procedures and treatments for cemetery preservation and upkeep, as well as direct visitors interested in certain mortuary trends or social groups. The onset of online mapping services allows public connection to cemeteries and visitors to remotely access Roslyn's unique history (Brewer, 2016; Liebens, 2003).

CHAPTER II

HISTORY OF ROSLYN, WASHINGTON

Roslyn is located on the eastern edge of Washington's Northern Cascades at 2,222 ft. in elevation, just 3.5 miles north of the town of Cle Elum and Interstate (Prater, 1994; Washington State Department of Natural Resources, 2018) (Figure 1). Roslyn's cemetery complex is located just to the southwest of the urban core, and includes 26 separate subsections (Figure 2). The Old City Cemetery (Cemetery) on a slight hill in the western sector of this area.

Coal mining was extensive in the late 19th century Washington Territory with large mines operating in King, Pierce, Kittitas, and Lewis counties. Smaller mines were also founded in Skagit, Thurston, and Whatcom counties (Green, 1943; McCarty, 2003). Established along the railway, Roslyn attracted miners from many locales and quickly became the most ethnically diverse town in the historical-period Washington Territory (Shideler, 1986, p. 62).

HISTORICAL-PERIOD ROSLYN (CA. 1886-1963)

The lands around Kittitas County were unoccupied by Euroamerican settlers until ca. 1860, although government surveyors and the Hudson's Bay Company had partially explored the region previously. In 1867, the first Euroamerican settlers entered lands inhabited by the Kittitas Band of the Yakama Nation (Caveness, 2012, p. 11; Sturtevant, 1998) and established agricultural operations just south of current-day Ellensburg (Shideler, 1986).

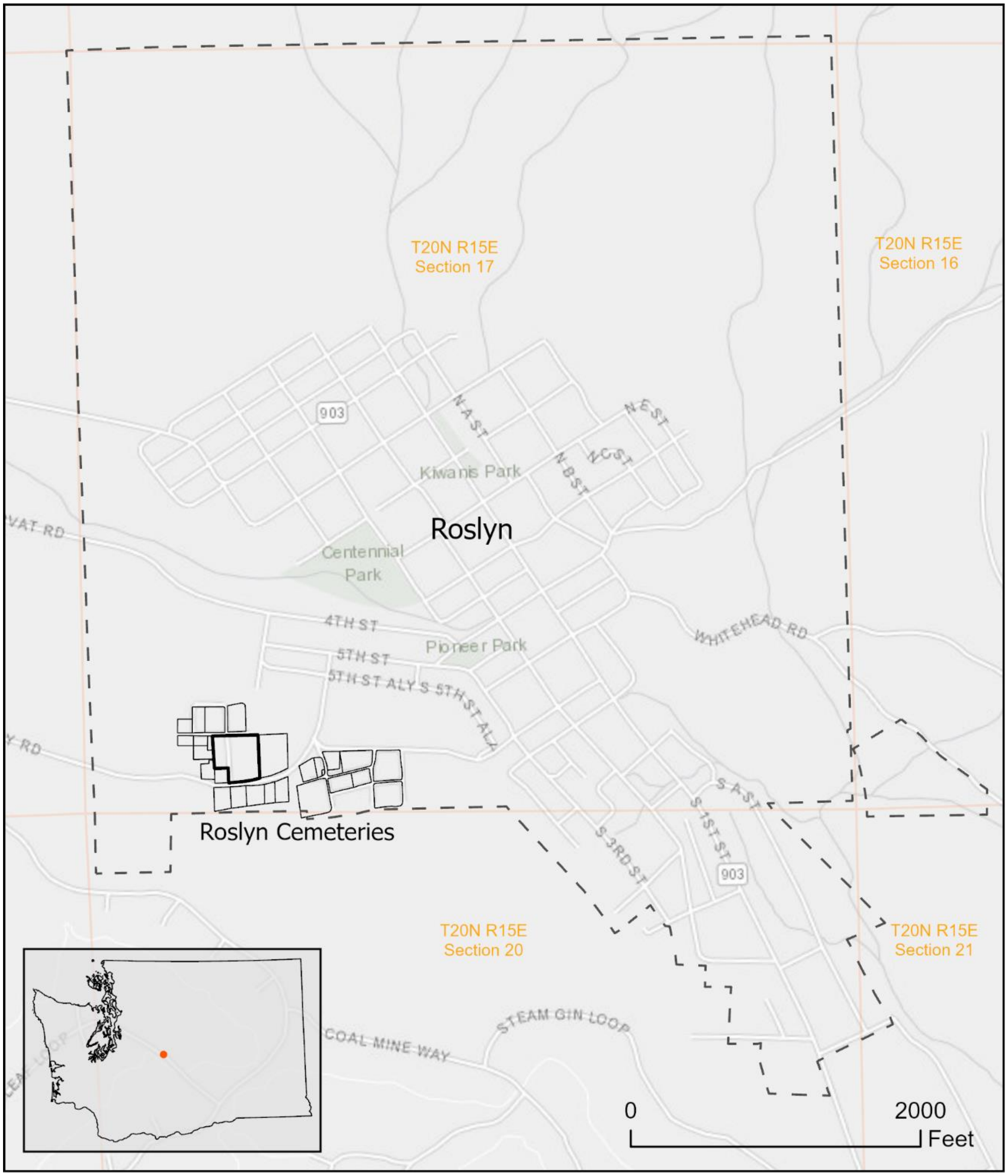

Figure 1. Roslyn Location. Cemeteries in southwest corner, Old City Cemetery bolded. Roslyn City Boundary Data from Kittitas County Open GIS.

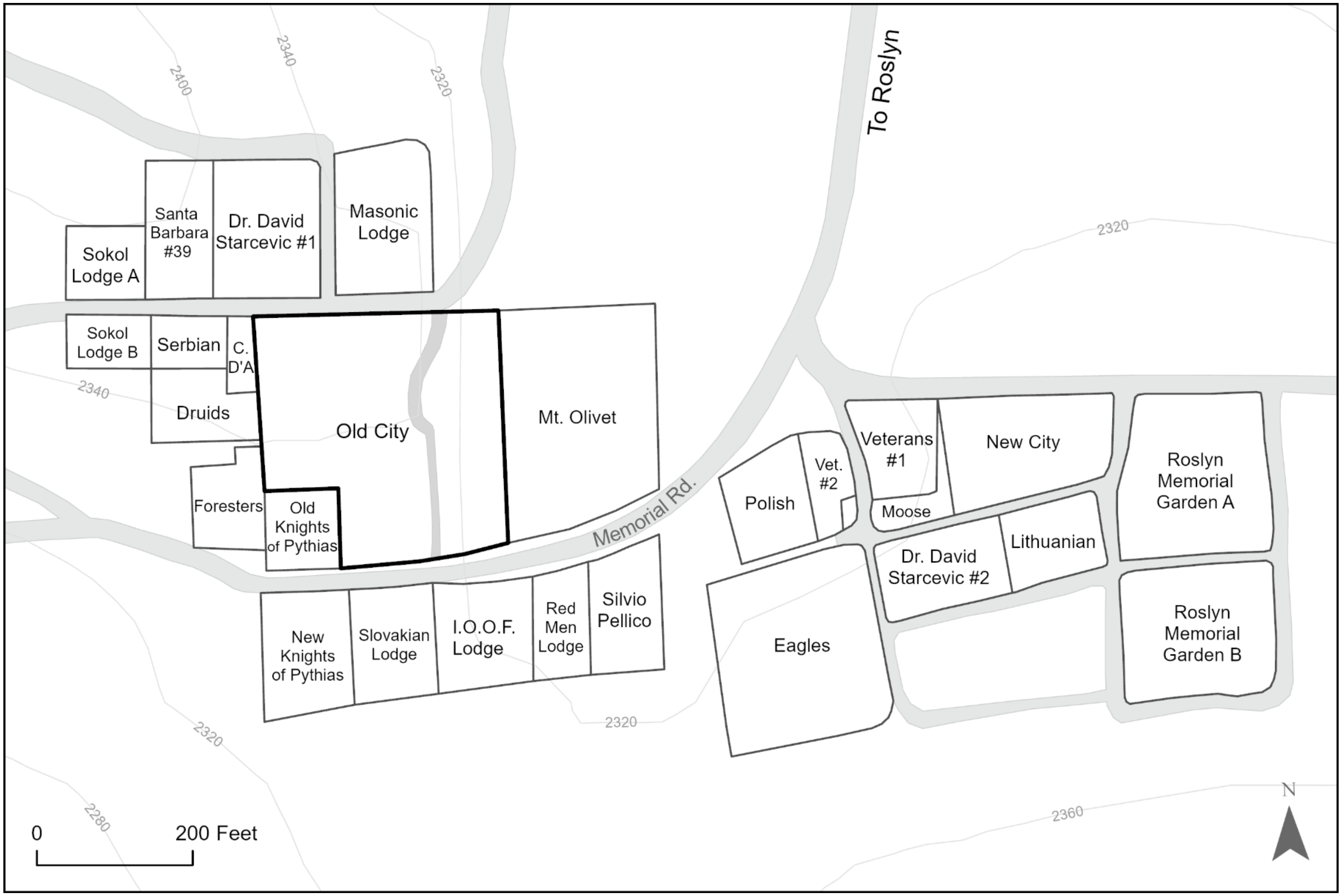

Figure 2. Roslyn Cemetery Complex, Contours in Meters (adapted from data in Ware 2005).

Prospectors discovered Eocene deposits of high-quality bituminous (soft) coal in the area around Roslyn, Ronald, and Cle Elum as early as the 1870s. One of the first homesteaders and prospectors, Nez “Cayuse” Jensen, built a log cabin in the area in 1880 and established mining claims (Shideler, 1986). He was soon followed by Thomas Gamble and Walter Reed, who arrived in the area in 1883 and placed coal claims the following year (Musso et al., 1955; Onufer, 2008; Shideler, 1986).

Railway prospectors confirmed the extensive coal deposits in 1886. Swayed by the promise of prosperity, the Northern Pacific Railway (NPR) built the Cascade line connecting Ellensburg to the western side of the state directly through the general area (Bogachus, 2005; Shideler, 1986; Washington State Department of Natural Resources, 2018). Inspired by the abundance of coal, the NPR began plans to build a railway segment linking coal-rich Roslyn and Cle Elum to the main line. In 1886, the NPR officially platted both towns. Cle Elum functioned as the temporary NPR headquarters for the Stampede Pass Tunnel Project, while Roslyn served as the base for coal mining activities (Shideler, 1986; Trimble, 2008).

In 1887, the newly formed NPR subsidiary—the Northern Pacific Coal Company (NPCC)—recruited and brought over 550 American and immigrant laborers to the area (Onufer, 2008). While the coal field was relatively small, its production capacity exceeded all other contemporaneous coal mines in the state (Prater, 1994, p. 2). Roslyn’s population swelled to nearly 1,200 residents by the following year (Shideler, 1986).

Despite the abundance of work, many laborers were enraged by a small group of 25 Chinese immigrants who, as they claimed, “undercut” labor opportunities by accepting less compensation for more work (Trimble, 2008, p. 68). Tensions and hostility built, resulting in discrimination, violence, and riots. The conflict reached a climax in 1887 when a group of laborers murdered nearly all the Chinese workers (Onufer, 2008; Shideler, 1986; Trimble, 2008). Insufficient pay and poor working conditions continued to upset miners and a labor strike occurred in 1888. The NPCC quickly brought in a group of 400 African American strikebreakers to avoid lost profits. This action initially caused extreme tension and conflict between residents and resulted in several hostile encounters (see Social Variation and Inequality section below). Many miners eventually returned to work, although unsatisfactory working conditions and compensation remained an issue for years to come.

On May 10, 1892, mining lamps ignited a gas pocket deep within Roslyn's No. 1 Mine, causing a massive explosion that killed 45 miners. The event shook Roslyn's foundation to the core (details are provided in Fridlund, 2017; Prater, 1994). Nearly 30 women were left widowed and 70 children fatherless (Fridlund, 2017; Prater, 1994). The NPCC assisted with funeral and burial expenses, and because men were typically the sole income earner, provided families with settlements to compensate for the loss of income. Wives received $1,000 for the loss of their husband, and an additional $100 for each dependent child under 12 years of age. Some mothers and fathers of unmarried miners were given compensation, although the majority received nothing for the loss of their child (Fridlund, 2017). Families had to wait over three years for compensation, and many widows had to remarry or turn to other sources of income for survival. In the wake of the disaster, many residents left Roslyn, and economic conditions were poor through the mid-1890s (Prater, 1994). Despite the devastation, the most disastrous mining incident in Washington history brought Roslyn residents together in an unprecedented way. Local shops provided favors and discounts to struggling widows, and recovery fundraising sustained those in need (Prater, 1994). Brought together by a shared tragedy, hardship united the community as a singular unit, regardless of social diversity.

Roslyn's industry slowly recovered by 1897 and experienced an economic boom and population surge as the demand for coal increased countrywide (Shideler, 1986; Trimble, 2008). Two years later, Roslyn was officially incorporated as a town, and a community water system was installed (Shideler, 1986). Despite its rough beginnings, life in Roslyn was considered "favorable" compared to other coal towns in the country in terms of economic opportunity, the range of available trades and services, and general living conditions around the turn of the century (Shideler, 1986, p. 74). Roslyn again experienced rapid population growth between ca. 1900-1915 as coal production increased to meet World War I demands (Shideler, 1986).

A series of disease outbreaks occurred in Roslyn between 1896 and 1920 with varying degrees of severity (Table 1). Water sanitation ordinances installed in 1908 and increasing healthcare options dramatically decreased outbreak frequency, although several severe events occurred in 1918. Isolated mining accidents occurred nearly every year of mining operations, with an increased frequency between 1907-1911, and only decreased after ca. 1950 (Figure 3).

After 1920, Roslyn's coal production fluctuated but generally decreased as cheaper coal became available in Utah and Wyoming and mechanical mining equipment replaced manual labor nationwide (Shideler, 1986, pp. 81–83). Logging and other activities contributed to the economy through this period, but mining continued to be Roslyn's main economic driver. In the decades following ca. 1930, Roslyn was rife with labor strikes, demands for labor laws, and economic uncertainty as nationwide demands for coal continued to decline (Shideler, 1986).

Table 1. Roslyn Epidemics and Outbreaks (adapted from Chenoweth 1978).

Date	*Event*	*Recorded Fatalities*
1896	Diphtheria outbreak	3
1900, Fall	Smallpox outbreak	Unknown
1902, Fall	Cholera and Typhoid outbreaks	3
1902, Winter	Typhoid outbreak	1
1903, January	Whooping cough outbreak	Unknown
1903, Spring-Winter	Measles outbreak	Unk. (many cases)
1903, Summer	Cholera and Diphtheria outbreaks	5
1903, November	Diphtheria outbreak	1
1905, Spring	Scarlet Fever and Diphtheria outbreaks	Unknown
1905, March	Typhoid outbreak	1
1905, May	Diphtheria outbreak	1
1906, January	Chickenpox outbreak	Unknown
1906, February	Typhoid outbreak	Unknown
1906, September	Typhoid and Malaria outbreak	Unknown
1906, October	Typhoid outbreak	3
1908, January	Scarlet Fever and Diphtheria outbreaks	Unknown
1908	Ordinance for water sanitation	
1917, December	Diphtheria outbreak	Unk. (1+ case)
1918, January	Measles outbreak	Unk. (150+ cases)
1918, October	Spanish Flu outbreak	Unk. (14+ cases)
1920, January	Smallpox and Scarlet Fever outbreaks	Unknown

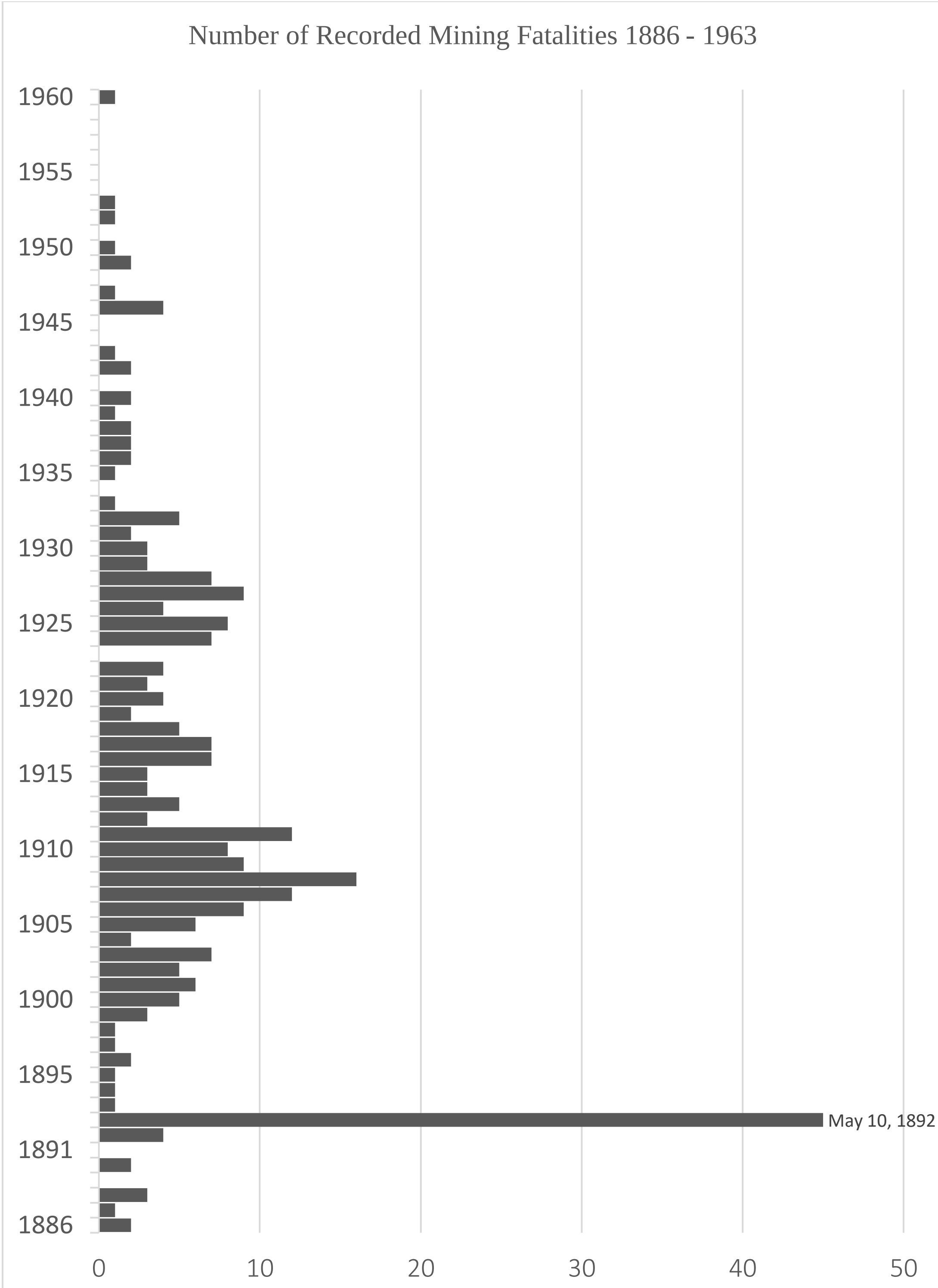

Figure 3. Roslyn Mining Fatalities (adapted from Fridlund 2017).

MODERN-DAY ROSLYN (1963-PRESENT)

Industrial mining in Roslyn officially ended in 1963 with the closure of Mine No. 9, leaving many people jobless. The city appealed the closure and applied for a government loan to reopen the mine but was denied as working conditions were deemed too dangerous (Trimble, 2008). Left without further prospects, Roslyn's economy quickly turned toward recreation and eventually tourism.

After 1960, Roslyn provided an attractive outlet for recreation opportunities, and many tourists flocked to the area for skiing, hiking, and other outdoor activities (Prater, 1994). In the 1990s, Roslyn was transformed into the fictional town of Cicely, Alaska for television show *Northern Exposure*. The show's phenomenal success over five years of filming attracted fans from all over the world and has brought in millions of tourist dollars since ending in 1995 (Trimble, 2008).

In 2004, the Suncadia Resort was built immediately southwest of Roslyn and today attracts a constant stream of annual visitors with its extensive lodging, accommodations, trails, and golf courses. In addition to its alluring location in the Cascades, the resort lists Roslyn as a source of visitor intrigue, entertainment, and exploration. While the resort has brought considerable tourism to the area, it has also prompted an influx of employee commuters and transplants from Western Washington. As a result, Roslyn's modern culture has slowly drifted away from its historical roots and has adopted a more progressive atmosphere that is uncommon in the surrounding area. But despite shifting lifestyles, visitors and residents continue to be captivated by Roslyn's historical charm.

Cultural resource managers listed Roslyn as a historic district in the National Register of Historic Places in 1978, and archaeologists have since recorded the cemeteries as archaeological sites with the Washington State Department of Archaeology and Historic Preservation. Today, visitors and residents alike can rediscover and celebrate Roslyn's past within its architecture, landscape, cemeteries, and museum. Restoring, preserving, protecting, and maintaining the city's historical resources will continue to endorse Roslyn's economic future.

SOCIAL VARIATION AND INEQUALITY IN HISTORICAL-PERIOD ROSLYN

Tensions originally existed between various ethnic groups and manifested a mentality of discrimination in the early historical-period, although Roslyn's society slowly shifted towards a more impartial view (Onufer, 2008; Pitts et al., 2016; Shideler, 1986). Intolerance of Native Americans, anti-Chinese sentiments, and discrimination toward African Americans were pervasive attitudes in the early historical-period and resulted in outward expressions of hostility and sometimes violence. Resident attitudes were exacerbated by further immigrant arrivals, but resentment faded with time. While Chinese individuals avoided the Roslyn area for fear of another incident, Roslyn's African American population became a familiar part of the community and labor force, despite community enforcement of a separate cemetery and questionable salary discrepancies (Chenoweth, 1978, p. 41; Shideler, 1986; Trimble, 2008).

As the Roslyn saying goes, "everyone was equal in the mines" (Shideler, 1986; Trimble, 2008, p. 46). Dangerous conditions, tragedy, shared goals, and public betterment brought together individuals of all nationalities and ethnicities into a cohesive community. However, to suggest Roslyn was a true "melting pot" would be erroneous

(Shideler, 1986, pp. 63–64). To have a united community did not preclude the preservation, celebration, and expression of individual cultural traditions amongst immigrant groups. At least 24 nationalities were present in Roslyn by 1913 (Pitts et al., 2016), and various ethnographic studies have suggested that cultural identity was an important social factor that affected many facets of daily life (Meisner, 1994; Onufer, 2008; Shideler, 1986).

The early historical-period in the United States was generally marked by ethnic suppression, but Roslyn residents enjoyed the presence of ideological "micro-communities" wherein cultural traditions, languages, and practices flourished (Shideler, 1986, pp. 63–64; Thernstrom et al., 1980, p. 760). These communities were not significantly separated geographically, but tended to reside in close proximity to others of similar heritage (Onufer, 2008). Upon moving to the Roslyn area in the late 19th century and early 20th century, a variety of European groups established fraternal lodges, many of which were targeted towards specific nationality and ethnic groups and were designed as a support system providing encouragement and preservation of cultural heritage and traditions (Pitts et al., 2016; Ware, 2005). Nearly every nationality and ethnicity belonged to a fraternal lodge, and each lodge reportedly had their own saloon, stores, neighborhood section of town, and cemetery block (Trimble, 2008).

ROSLYN'S FRATERNAL LODGES AND CEMETERIES

The majority of Roslyn's ethnic and nationality groups had established their own fraternal lodges by 1890, only several years after the town was officially platted (Trimble, 2008, p. 59). Within a few years of establishment, every lodge acquired its own cemetery block in the complex, and the majority of cemeteries were platted prior to 1910.

Roslyn’s cemetery complex is made of 26 individual cemetery blocks (27 if including the Old County cemetery, now part of Veterans #2) (Figure 2 and Table 2). Nearly all cemeteries within the complex are affiliated with a fraternal lodge, with only a few unassociated with any particular social group.

Fraternal lodges were membership-based private social clubs intended to provide financial support and companionship for individuals of similar background or disposition. In Roslyn, these lodges were organized based on shared values or cultural expression and generally drew in members of similar ethnicity or nationality, religion, or general worldview. Although they did not impede cultural assimilation or intercultural interaction between diverse groups, these lodges effectively preserved and encouraged survival of individual cultural heritage, traditions, and practices (Trimble, 2008). A detailed look at Roslyn’s lodges can be found in Ware (2005).

In addition to social support, members often joined lodges to acquire monetary benefits and death insurance (for a small fee) not offered by the Northern Pacific Coal Company (NPCC) (Pitts et al., 2016; Trimble, 2008). Because the lodge benefits generally covered funeral costs, members and their families were commonly buried within the lodge’s cemetery. Some individuals were members of multiple lodges and had multiple cemeteries to choose from. In these cases, lodge affiliation motifs were sometimes placed upon the individual’s headstone or monument to denote these varied associations (Chenoweth, 1978; Pitts et al., 2016).

Table 2. Roslyn Cemeteries (adapted from Ware 2005 and Pitts et al. 2016).

Use Dates	*Cemetery Name*	*Lodge Affiliation*	*Ethnicity*
1886-2010	Old City	NA	NA
1886-2003	Masonic Lodge	St. Thomas Masonic Lodge No. 54 Free & Accepted Masons	Welsh, English
1890-2003	Mount Olivet	NA	African American
1891-1995	Red Men Lodge	Improved Order of the Red Men, Hiawatha Council #4 (Degree of Pocahontas)	Native-Born American
1892-2004	Old Knights of Pythias	The Order of Knights of Pythias #30	NA
1894-1992	Foresters	Ancient Order of the Foresters	NA
1888-1992	I.O.O.F. Lodge	Independent Order of Oddfellows, Rebekah Lodge	NA
1898-1967	Druids	Druids Lodge, Druidessas' Lodge Prosperity Circle No. 2	Italian
1902-2009	Slovak	Slovakian Lodge	Slovak, Croatian
1902-2003	St. Barbara	Fraternal Union of St. Barbara #39	Croatian
1904-2001	Dr. David Starcevic #1	Croatian Fraternal Union (Dr. David Starcevic Lodge #56)	Croatian
1904-1940	Silvio Pellico	Societa's Silvio Pellico Lodge	Italian
1905-1977	Polish	Polish and Lithuanian Lodges	Polish
1907-2000	Lithuanian	Lithuanian Lodge	Lithuanian
1907-1960	Serbian	Serbian Lodge	Serbian
1908-2004	Eagles	Fraternal Order of Eagles Aerie 696	NA
1911-1924	Sokol Lodge	Sokol Lodge No. 11	Croatian, Slovak
1912-1998	Dr. David Starcevic #2 (Nat. Croatian)	Croatian League of Illinois, National Croatian Lodge, Dr. David Starcevic Lodge #56	Croatian
1912-2000	New City	NA	NA
1916-2000	Cacciatori D'Africa	Cacciatori D'Africa	Italian
1917-1938	Old County	NA	NA
1917-1989	Moose Lodge	Loyal Order of Moose (#1644)	NA
1944-1995	New Knights of Pythias	The Order of Knights of Pythias #30	NA
1949-2004	Veterans #1	Robert H. Brooks Post 4125	NA
1977-2004	Memorial Gardens	NA	NA
1988-2003	Veterans #2	Robert H. Brooks Post 4125	NA

A variety of lodges were affiliated directly with certain ethnic or nationality characteristics (Table 3). The Dr. David Starcevic Lodge #56 was established in 1887 and provided and outlet for “loyalty” to Croatian heritage in the wake of cultural assimilation in the early to mid 1900s (Thernstrom et al., 1980, pp. 247–255; Ware, 2005, p. 44). The lodge was originally a branch of the Croatian Fraternal Union (Pitts et al., 2016; Ware, 2005, p. 57). The lodge held three cemeteries, all of which displayed identifiably old-world Croatian burial customs in terms of locational consideration and monument expression. Individuals tended to be buried next to their in-life neighbors; infants were buried in a separate isolated section of the grounds (Ware, 2005). Monuments tended to include photos of the deceased, although the extremely poor were not able to afford monuments at all. The same year, the Slovokian Lodge was established which catered specifically to Croatian and Slovakian individuals. Sometime later in 1902, the Fraternal Union of St. Barbara No. 39, another Croatian lodge, was established to further reinforce Croat heritage (Ware, 2005).

The Improved Order of the Red Men Lodge (est. 1898) was only open to white native-born American individuals who sought to preserve Native American traditions, although individuals of actual Native American descent were not permitted to join (Ware, 2005). Members valued temperance and did not permit tavern owners, saloon keepers, or bartenders to be buried within their cemetery boundaries (Chenoweth, 1978, p. 47).

Several Italian lodges, the Cacciatori D’Africa lodge (est. 1900) and Societa’s Silvio Pellico Lodge (est. 1900), were focused on upholding Italian heritage and customs, although it is unclear if these individual traditions are manifest in the associated cemeteries (Ware, 2005). Other ethnic-based lodges were similarly focused on heritage, including the Serbian Lodge (est. early 1900s), the Sokol Lodge No. 11 (est. 1904), and Lithuanian Lodge (est. 1907). These lodge cemeteries exhibit more contemporary burial treatment although some instance of old-world tradition are visible (Ware, 2005).

Table 3. Roslyn Fraternal Lodges (adapted from Ware 2005 and Pitts et al. 2016).

Establish Date	*Lodge Name*	*Number of Cemeteries*	*Ethnic Affiliation*
1887	Dr. David Starcevic Lodge #56	2	Croatian
1887	Slovakian Lodge	1	Slovak, Croatian
1887	The Order of Knights of Pythias No. 30	2	NA
1888	St. Thomas Masonic Lodge No. 54 Free and Accepted Masons	1	Welsh, English
1888	Independent Order of Oddfellows and Rebekah Lodge	1	NA
1890s	Ancient Order of the Foresters (Foresters of America)	1	NA
1898	Improved Order of the Red Men and Hiawatha Council #4 (Degree of Pocahontas)	1	Native-Born American
1900	Societa's Silvio Pellico Lodge	1	Italian
1900	Cacciatori D'Africa	1	Italian
1900	Druids Lodge and Druidessas' Lodge Prosperity Circle No. 2	1	Italian
1900s	Serbian Lodge	1	Serbian
1902	Fraternal Union of St. Barbara No. 39	1	Croatian
1904	Sokol Lodge No. 11	1	Croatian, Slovak
1904	Fraternal Order of Eagles Aerie 696	1	NA
1907	Polish Lodge	1	Polish
1907	Lithuanian Lodge (Suivienijima Lietuviu)	1	Lithuanian
1926	Loyal Order of Moose (Moose Lodge #1644)	1	NA
1945	Robert H. Brooks Post 4125 (Veterans Lodge)	2	NA

Yet other lodges were established based on shared principles and ideologies, and not necessarily shared cultural background. In 1887, the Order of the Knights of Pythias No. 30 lodge was established. The lodge was not reportedly affiliated with any particular ethnic or nationality group, but members bonded over shared values in friendship and benevolence. The lodge provided sick pay to members when they were unable to work, and burial insurance came with membership fees (Ware, 2005). The lodge developed two cemeteries within the complex; the original was first used in 1892 and it filled up, a second was established in 1944. The Loyal Order of the Moose (Moose Lodge No. 1644) was established in 1911 and valued social responsibility.

The St. Thomas Masonic Lodge No. 54 was established in 1888 and was frequented by individuals whose religious ideals lay in benevolence and charity. However, despite an absence of specific entry requirements, members tended to be affluent and of overwhelmingly English and Welsh descent (Ware, 2005). Many other wealthy individuals were members of the Fraternal Order of Eagles Aerie 696 lodge (est. 1904), whose charitable outlook made unthinkable the idea of unmarked "pauper's" graves (Ware, 2005, p. 79). As a result, the Eagles lodge allowed members to claim a burial location for free and encouraged usage of traditionally elaborate monuments. Similar in ideals yet different in expression, the Roslyn chapter of the Independent Order of Oddfellows (I.O.O.F.) lodge was established in 1888 and held ideals aimed at social union and mutual aid between class divisions (Ware, 2005).

Yet another similar lodge, the Ancient Order of the Foresters, was established in 1890s and although ethnic or nationality affiliation is unknown, many individuals of German and Italian descent lie in its cemetery. Similarly, the Druids Lodge (est. 1900) seems to have been overwhelmingly Italian, although other chapters of the lodge nationwide were traditionally frequented by individuals of English descent (Ware, 2005).

The Robert H. Brooks Post 4125 (the Veterans Lodge) was the last lodge to be established in Roslyn in 1945 and was restricted to veterans. The lodge's two cemeteries permit only standardized military headstones and exhibit rigid burial requirements.

A handful of cemeteries in the complex are not associated with any lodge, although some are directly associated with specific social groups. The New City Cemetery was established in 1912 after the Old City Cemetery (see Old City Cemetery section below) began to fill up. While the last burial is from 1977 and the grounds are now largely abandoned, the New City Cemetery represented a city-provided burial option for individuals who did not belong to a lodge. The more recent Memorial Gardens replaced the New City Cemetery, and is currently still in use (Ware, 2005). The Mt. Olivet cemetery (originally called the Black Miner's Cemetery) was established in 1890 as Roslyn's African-American burial ground. Originally, African-American individuals were not granted burial in the Old City Cemetery or lodge cemeteries, although burial in Mt. Olivet later became a tribute to ethnic heritage and pride (Ware, 2005).

The Old County Cemetery, once known as the Pauper's Cemetery, is not often differentiated as its own cemetery block, as it contains only three burials and the surrounding area was incorporated into the Veterans #2 Cemetery in 1988. The Pauper's Cemetery was retained for individuals "unable or unwilling to care for themselves" in terms of burial preparation and expenses (Ware, 2005, p. 203). One of Roslyn's red light district workers, "Big Minnie," was buried here, suggesting that the historical-period public valued some degree of spatial separation between individuals with different perceived social statuses. It is possible that there are more instances of considerable spatial separation based on some social attribute, but it is difficult to decipher due to the infilling of cemetery space later purchased and utilized by lodges. For example, the Masonic Lodge was established in 1888, but the earliest burial within the lodge's cemetery area is dated to 1886, two years earlier. This suggests that the area was used as a burial locale outside of the established Old City Cemetery boundaries, and this burial may be associated with a social trait inciting exclusion from the public grounds. Similarly, burials from 1917 are located in the current Moose Lodge cemetery area; because the Lodge's official establish date is 1926, these burials may suggest spatial exclusion, although an unofficial organization may have existed prior (Ware 2005, p. 154). It is unknown if this occurred elsewhere in the cemetery complex, as both burial records and cemetery deed records were not well-kept prior to the turn of the century. Most records that existed were kept in the Knights of Pythias Hall on 2nd street, which burned down in 1943, destroying all paperwork and records therein (Ware, 2005).

These lodge affiliations resulted in ethnic and ideological segregation between blocks within the cemetery complex. However, it is unknown to what degree burial inequalities or differences exist *within* each cemetery section, especially those unaffiliated with particular social groups. The Old City Cemetery is not affiliated with any lodge or specific social or ethnic group. Because inequalities and segregation existed in Roslyn's society and cultural heritage was celebrated, it is possible that detectible differentiations in mortuary practices exist between social groups in this location.

THE OLD CITY CEMETERY

Established by the NPCC in 1886, the Old City Cemetery was Roslyn's first cemetery and first *public* burial ground (Figure 4). The City of Roslyn took over management in 1926 from the NPCC (Roslyn Cemetery Beneficial Association, 2010).

Figure 4. Old City Cemetery Plot Locations, Digitized from point data. Note the potential overlap zones with the Cacciatori D'Africa and Druids blocks.

The Old City Cemetery was established and utilized several years before any individual lodge cemeteries were constructed and was not affiliated with any specific lodge, ethnicity, or religious group. The Cemetery contains interments ranging from the late 19^{th} century to the mid-20^{th} century with several more recent outliers in family plots.

The earliest known monument dates to 1887[1]—although earlier burials may be unmarked—and the majority of burials occurred prior to 1930.

Based on monument inscriptions, individuals buried within the Cemetery boundaries exhibit a variety of ethnic/nationality, religious, and organizational affiliations. The garden-style cemetery block also contains a variety of monument and plot styles, synonymous with the individuality and lack of standardization within Roslyn's early social matrix. Considering the diversity found within, the Old City Cemetery has been called one of Washington's "most unique" historical-period cemeteries (Prater, 1994, p. 48). I identified 279 visible plots within the Cemetery which contain at least 433 individuals. Some plots contained multiple people, while others held an unknown number of individuals but were assumed to contain at least one.

However, the Cemetery contains more than miners and children. As evidenced by genealogical research and monument inscriptions, individuals exhibited a variety of ethnicities/nationalities, organizational affiliations, ages, and occupations. It is unclear how individuals were assigned plot locations, as no Cemetery deed has been found. If any burial records were originally kept, they were likely destroyed in the 1943 fire in the Knights of Pythias Hall (Ware, 2005).

The Old City Cemetery was added to Roslyn's Register of Historic Places in 2004 and is currently under the direction of the City of Roslyn. However, scarce cemetery

[1] Pitts et al. (2016) erroneously noted 1880 as the earliest burial date, belonging to Sanford C. Jones. My own scrutiny of the degrading monument revealed this date was instead 1890. Ware (2005) also erroneously noted 1880 as the earliest burial, belonging to Paulina Jadro. However, this is her birth date, rather than death date (which is instead 1907). The next earliest burial date is 1887, shared by multiple individuals.

funds mean that the Old City Cemetery is maintained only via volunteer labor. As a result, the Cemetery is currently overgrown and many of the monuments and plots need repair. Since 2015, renewed interest in and proposed improvements to the cemetery complex have resulted in preliminary surveys and data collection in anticipations of an electronic interactive kiosk for visitors. The kiosk will provide visitors with information about individuals buried within the 26 cemeteries. It will also allow descendants to contribute additional information and stories to the database.

A notable point regarding plot location is linked to the defined boundaries of the Old City Cemetery itself. While the north, east, and south extents of the Cemetery are well-defined by two roads and a fence, most of the western edge is not delineated. Previous researchers have created various depictions and perceptions of this boundary edge. Pitts et al. (2016) suggests a less-inclusive configuration than those seen in other sources (see Ware, 2005), and my personal visual inspection of the Cemetery suggests yet a more inclusive shape along the northwestern edge (Figure 4). In old hand-drawn maps, directly abutting the Old City Cemetery to the west lay the Cacciatori D'Africa, Druids, and Foresters Cemeteries, with the former two slightly cutting into the modern interpretation of the Old City area. However, visual inspection during fieldwork shows a clearly defined area without burials separates these cemeteries from the Old City area, suggesting that Old City burials may extend further west than suggested in Pitts et al. (2016) or Ware (2005). Up to 25 plots are within this potential overlap zone; however, historical cemetery register records, while sparse, place some of the affected individuals in *both* the Old City and Cacciatori D'Africa or Druids rosters, further enforcing that the western boundary of the Cemetery is disputed and not well-defined[2]. Pitts et al. (2016) originally recorded all burials within this zone. The Roslyn Cemetery Committee operates under the general consensus that these overlap areas do indeed belong to the Old City Cemetery (Brandi Taklo, personal communication 2019; Lynda Solter, personal communication 2020). I retained these burials for my work, although I did remove some burials that clearly fell outside of the Old City boundaries. The general configuration of cemeteries within Ware (2005) seems to be the most accurate. While I updated the Old City Cemetery boundaries to reflect visible breaks in burials, I used the depiction in Ware (2005) in conjunction with aerial imagery to digitize the boundaries of other surrounding cemeteries. I included burials within the disputed zone within analyses, although exclusion may suggest slightly different spatial and statistical results.

[2] The Cacciatori D'Africa cemetery is noted as only consisting of one row of graves in Ware (2005), which was clearly identifiable during fieldwork as separate from the Old City Cemetery. These burials were excluded from data collection. The disputed zone is largely in contention with the Druids cemetery only, although the Cemetery Committee believes this area is indeed part of the Old City Cemetery.

CHAPTER III

MORTUARY THEORY

Cemeteries contain the deceased but are constructed *by* and *for* the living. Some scholars believe that mortuary analysis is the single greatest way to interpret and reconstruct social systems of bygone peoples, as mortuary traditions leave behind some of the only physical remains of cultures (Tainter, 1975, p. 1). Theories established to generate explanations for mortuary behavior assume that mortuary treatment, interment styles, and burial location reflect social status, cultural beliefs, ideologies, and worldview of both the interred and living (Binford, 1971; Cannon et al., 1989; McGuire, 1988; Payner & McGuire, 1991; Saxe, 1970; Tainter, 1975).

This chapter discusses mortuary theory as it relates to archaeology and anthropology, cemetery studies, and spatial analysis. I first introduce mortuary theory and its history and usage in archaeology and anthropology, then present a variety of cemetery studies. Following is an overview of spatial analysis methods previously used to assess cemetery distribution. Completing this chapter is an explanation of how these theories and methods were applied to analysis in the Old City Cemetery.

HISTORY OF MORTUARY THEORY IN ANTHROPOLOGY AND ARCHAEOLOGY

Cemeteries first became of interest to researchers in the 1800s as antiquarians hunted after grave goods and other artifacts from "primitive" burials (Mytum, 2004). Anthropologists in the late 19th century noted that burial customs of these "primitive" societies seemed to vary between cultures and between individuals depending on age, gender, form of death, and/or social standing (Crooke, 1899; Yarrow, 1880, p. 5). Early 20th century researchers expanded upon the trend and suggested that social standing may be a more significant contributor to mortuary treatment than previously anticipated (Bendann, 1930; Griffin, 1930; Hertz, 1960; Radcliffe-Brown, 1922; Van Gennep, 1960; Wallis, 1917; Wedgwood, 1927). Despite similarities in treatment between individuals, marked differences in treatment and behavior were also noted between *cultures* that were believed to derive from culturally specific norms and ideologies. Dissidents like Kroeber (1927) rejected this notion as misleading, stating that mortuary customs are instead fluid and unstable products of inherent desires, needs, and limitations within the environment. In short, he believed mortuary behavior was not influenced by expressions of emotional or cultural decision. However, this sentiment was largely rejected in favor of earlier hypotheses; further studies assessing social attributes and burial practices confirmed the association between status and expression, as well as between culture and behavior (Goodenough & Banton, 1965; Hertz, 1960; Service, 1962; Van Gennep, 1960).

In the 1970s, archaeological and anthropological scholars led by Saxe and Binford further strengthened mortuary theory with a processual approach. They asserted that cultural differences can be observed within mortuary behaviors arising from cultural belief . These behaviors can be identified, categorized, and compared between cultures and individuals to further understand and reconstruct social structure (Binford, 1971; Saxe, 1970). Saxe reviewed mortuary behavior in prehistoric populations and suggested that mortuary treatment reflects an individual's social status within the parent society (Saxe, 1970). Saxe used age, gender, pathology, treatment of the body, and mode of interment to test patterning amongst burials and found that differences between these attributes suggests a clear social system (Saxe, 1970). Following Saxe's theory, Binford asserted that differences in mortuary treatments within a culture are directly linked to the individual’s social status in terms of economic and social power. As a result, Binford asserted that mortuary differences between societies do in fact derive from cultural beliefs. He hypothesized that mortuary behavior is a direct proxy for social structure learned and transferred between peoples based on temporal, spatial, and genetic proximity. By comparing mortuary treatment between individuals, researchers can identify social stratification. And by comparing patterns between cultures, genetic or cultural linkages can be made (Binford, 1971). Binford examined a variety of case studies over temporal scales showing the relative stability of mortuary behaviors within cultures. He suggested that this stability indicates cultural tradition rather than random variability. Overall, Binford asserted that social affiliation was a strong indicator of burial treatment and that social status seemed to drive differences in mortuary rituals within a society. Similarly, varying scales of intricacy mirrored societal complexity (Binford, 1971, p. 22). He argued that within “simple” societies, mortuary rituals will be based on “simple” characteristics such as age, gender, and perceived skills. But for “complex” societies, mortuary rituals may be based upon less tangible, and perhaps more symbolic, social characteristics and individual status (Binford, 1971, p. 18).

Subsequent researchers like Tainter (1975) condemned Binford’s approach and argued that traditions as complex as mortuary behavior cannot be understood easily with such a small sample size, with so little information, or by using so few attributes. Although still following a processual framework, Tainter suggested expanding interpretation to include burial elaboration as an indicator of energy expenditure. He argued that this expenditure represented a proxy for perceived social ranking, and incorporated 18 attributes relating to burial method, orientation/position, burial structure, and grave goods to approximate this factor (Tainter, 1975). He assessed correlations between these attributes using spatial and statistical techniques, and identified distinction between similar burials to suggest social connection as a sign of overarching cultural norms. Further processualist studies expanded on Tainter's approach and supported this theory (Bartel, 1982; Chapman et al., 1981).

Yet, the idea that elaborate mortuary behavior mirrors a high social status has been critiqued by post-processual archaeologists and anthropologists (Abercrombie, 1980; Cannon et al., 1989; McGuire, 1988; Payner & McGuire, 1991; Rakita et al., 2005). These scholars assert that these linkages may not be associated only with actual social status, but could also occur for other perhaps intangible reasons. Expanding on the notion of complexity, they suggest that social norms and ideology plays a more important role in mortuary customs than previously thought. Opposing Binford and Saxe's idea that differences in burial procedures are derived directly from the individual's *actual* social position or characteristics, these post-processual scholars suggest that instead, these actions may be partially based on society's *perception* of social status (Abercrombie, 1980; Parker Pearson, 1982).

In short, society is formed from social constructs into which individuals are grouped. These constructed groups may not be based on differences between individuals (like occupation, nationality, or age), but instead idealized—and perhaps abstract—views of where and how these individuals fit within the context of society. Under this presumption, if a society's mortuary system is based on religious ideology, two individuals sharing religious affiliation may exhibit identical burial treatment even if they differ in economic power, occupation, or some other demographic attribute.

The above post-processual archaeologist and anthropologists provided the groundwork for the theory of dominant ideologies, which adopts a Marxist lens to suggest that mortuary practices are implemented onto the powerless, and are idealized, shaped, and enforced by the powerful (McGuire, 1988; Payner & McGuire, 1991). Those in power vary by context, but this distinction may be dictated by economic dominance or cultural majority. Because mortuary differences between individuals are theorized to derive from *perceived* variation between peoples—based on the ideological framework of the dominant group—mortuary treatment may not visibly vary between individuals despite differences in demographic attributes (McGuire, 1988). Some researchers like Cannon et al. (1989) suggest that without cultural context, aspects such as social status and economic organization may not be necessarily identifiable. As a result, interpretation of mortuary practices requires a careful cultural lens be applied to capture nuances in culturally specific ideologies.

Payner & McGuire (1991) further suggest that while norms and ideals may change over time, the act of change is characterized by an inherent power struggle between those demanding change and those that must adhere to it. These post-processual scholars suggest mortuary practices perpetuate ideology, whereas processual scholars suggest that mortuary practices are simply responses to ideology (Rakita et al., 2005). Changes to cemetery layout and structure, as well as general mortuary customs, are therefore suggested as forms of influence upon society's perception of death.

Although processualists Saxe and Binford have long been regarded as the fathers of modern mortuary theory, some debate persists regarding the principles underlying their original arguments. Post-processualists like Arnold & Jeske (2014) and Cannon et al.

(1989) largely believe that processualist logic is inherently flawed and that patterns between cultural and mortuary practices are subjective. They assert that culture is a dynamic entity that is not well described or defined by an empirical system. These post-processual scholars maintain that identifiable patterns may be arbitrary and heavily biased without attempting to incorporate relevant ideology carefully into the study. Some assert that certain burial practices are inherent to humankind and cannot be well-defined in relation to a specific culture.

Others like Arnold & Jeske (2014) and Sayer & Wienhold (2013), while in agreeance, have critiqued Binford's seemingly exclusive hypothesis in that there does not exist a one-to-one relationship between culture and mortuary behavior. Instead, they believe that other intangible factors or undefinable attributes will undoubtedly play a part in mortuary decisions and actions. As such, a culturally based system will never operate fully within a formulaic schema. To base interpretations solely off a fully structured approach will be inherently flawed and can suggest patterns that may not exist (Arnold & Jeske, 2014, p. 327; Sayer & Wienhold, 2013, p. 73). Some processualists, on the other hand, assert that Binford's logic is sound and in a realm so culturally significant as death, mortuary behavior is inherently linked with cultural beliefs and actions (Arnold & Jeske, 2014; Ashmore & Gellar, 2005; L. Goldstein, 1981; Rakita et al., 2005; Saxe, 1970; Sayer & Wienhold, 2013). However, these beliefs and actions cannot be fully identified or interpreted outside of the context from which they derive.

Despite the debate, anthropologists generally agree that patterns between culture and mortuary practices exist, and that these patterns may be partially identified using scientific methods. However, this approach requires careful attention to cultural bias else any patterns may be subjective and arbitrary (Ashmore & Gellar, 2005; Saxe, 1970; Sayer & Wienhold, 2013). Many researchers urge analysis consideration on multiple scales to more fully assess and interpret the mortuary patterns and their potential meanings, as mortuary space is considered a "multidimensional" entity (Ashmore & Gellar, 2005; Binford, 1971). These contexts include, within a cemetery, amongst the landscape, and within a broader cultural context.

MORTUARY ANALYSIS IN HISTORICAL-PERIOD CEMETERIES

Early archaeological mortuary analysis focused on archaic burials. Researchers (Bartel, 1982; Binford, 1971; Pader, 1982; Rothschild, 1979; Saxe, 1970; Stoodley, 2000; Tainter, 1975, 1976) used physical attributes such as gender, skeletal pathology, orientation, arrangement, and grave goods to assess social structure as generally little was known about the interred individuals beyond skeletal attributes, associated objects, and/or observed treatment. These studies followed a processual Saxe-Binford framework but incorporated the assumption that mortuary elaboration suggests social complexity. This factor represents the key takeaway from these studies, as elaboration has been incorporated into assessment of historical-period cemeteries.

In the late 19th century, research on historical-period interments and cemeteries was limited to recording monument and memorial epitaphs (Mytum, 2004). The early 1900s brought more scholarly interest to detail-oriented monument documentation. However, until the 1960s, historical-period burials were largely still viewed as too recent to yield information and were frequently excavated (and discarded) only to access artifact-rich archaic burials underneath (Mytum, 2004). After this time, the resurgence of mortuary studies influenced archaeologists to conduct more structured studies. These studies focused on the categorization and analysis of plot size, monument markers, iconography, and inscriptions as proxies for social affiliation and expressions of cultural norms and ideologies (Anthony, 2016; Bell, 1990; Cannon et al., 1989; Deetz & Dethlefsen, 1971; Dethlefsen & Deetz, 1966; Lane, 2013; McGuire, 1988; Mytum, 2004; Rainville, 1999).

With the advent of widespread Cultural Resource Management (CRM) regulation in the 1970s, excavation and mitigation of historical-period cemeteries became more common. However, mortuary analysis still emphasized monument art and design due to policies and laws protecting human remains (Arnold & Jeske, 2014; Mytum, 2004). More recent studies, discussed below, follow a post-processual framework and mortuary analysis in historical-period cemeteries continues to shift towards a broader-scale approach. Monument motif and inscription analysis is still well-regarded, and researchers continue to identify and test mortuary paradigms such as the presence of dominant ideologies. However, scholars like Rainville (1999)and Lane (2013) have suggested that cemeteries must be viewed on a broader spatial and cultural scale. Termed "deathscapes," mortuary space expands beyond individual graves and includes geographical features, plot areas, walkways, and vegetation. This approach hints at the idea of incorporating an empirical spatial dimension into mortuary analysis to further assess ideology and paradigm shifts. In the past several decades, mortuary analysis has slowly begun to move away from a one-dimensional, monument-based analysis.

Archaeology of historical-period cemeteries differs from archaic cemeteries in terms of the attributes assessed, data availability, and interpretation. Historical-period mortuary practices differ from archaic practices in terms of ideology, expression, and general practice. Historical burials tend to be located in designated areas or enclosures while archaic burials may be scattered and uncontained. Burial type and form also differ between the two periods although considerable variation exists within both. In place of grave goods, monuments and plot decoration were sometimes used to reflect economic, political, or social power and influence in the historical-period (Lane, 2013). Even in homogenized societies, social and economic distinctions are still visible through differences in price-dependent plot location, monument type and upkeep, or other funerary customs. Many studies, summarized in Lane (2013, pp. 46–52), suggested clear patterns between monument type, burial plot metrics, and ideologies or social structure.

While analyzing monument form, style, and decoration may provide indications about social structure or ideology as it relates to cultural norms, it is not a direct or sole indicator of these factors. The role of dominant ideologies has potential to skew mortuary expression (McGuire, 1988; Payner & McGuire, 1991). Some studies (Lawson, 2011; Mallios & Caterino, 2007) have emphasized the continued usage of gender and age into assessments of ideology. However, few have assessed the correlation between monument attributes and demographics such as age, ethnicity/nationality, cause of death, religion, occupation, or organizational affiliations to further explore ideology and social structure (Higgins, 1998; Lane, 2013; Lawson, 2011; Little et al., 1992; Thomas, 1994). Where archaic burials suggest some of these attributes by proxy (or by skeletal analysis), historical-period burials are supplemented by extensive archival information detailing social attributes. This data may be incorporated into studies assessing monument types or inscriptions to assess broader patterns and trends in mortuary practice and belief. As post-processual archaeologists (Ashmore & Gellar, 2005; Cannon et al., 1989; McGuire,

1988) suggest, researchers should use a wider lens and incorporate historical ethnography and knowledge where possible, else interpretations may be subjective and arbitrary. Social ideology may be based upon intangible, unquantifiable, or perhaps symbolic factors. As such, researchers should include as many variables as possible in attempts to identify correlations between mortuary practices which may hint at these intangibles (Ashmore & Gellar, 2005).

Cemeteries and Western Attitudes toward Death

Prior to the 17th century, death carried negative connotations in Western cultures and was a concept to be feared. Before the incorporation of townships, many American families were nomadic and treated their dead to frontier-style interments: quick burials with simplistic markers near the site of death (Onufer, 2008, p. 33; Sloane, 1991). As settlers became more sedentary in the 1700s, families buried their dead in designated areas near their homestead or in a church burial yard for the purpose of visitation and mourning (Onufer, 2008). In the 1790s, James Hillhouse designed the first city cemetery in New England which allowed citizens to bury their dead in a permanent designated location near their homes that wouldn't be sold off with private property (Onufer, 2008; Sloane, 1991). This trend was quickly adopted across America.

The shift was followed by a new sentiment termed the "Great Awakening," in which new attitudes redirected fear of the unknown towards joy of an eternal life. Wurst (1991) suggests this paradigm shift was associated with increasing manufacturing and business interests in America, and suggests business owners perpetuated an ideology of morality driven salvation to improve working relations amongst diverse employees.

Whereas monuments once featured macabre designs such as death's heads, monuments now emphasized beauty and salvation and incorporated motif symbols like cherubs or flowers (Dethlefsen & Deetz, 1966; Lane, 2013; Wurst, 1991).

The "Beautification of Death" movement followed shortly thereafter. Death in the late 1700s and early 1800s was marked by lengthened public mourning periods, elaborate mortuary rituals, and mass-production of embellished monuments and coffin adornment (Bell, 1990; Lane, 2013). Cemetery spaces adapted to mimic romanticized sentiments of a heaven-like afterlife; the "garden" style cemetery contained elaborate monuments interspersed with natural scenery of flowers, trees, and water features (Onufer, 2008).

During this time, funeral management became a profitable business venture, and death was successfully commodified (Bell, 1990; Woodthorpe, 2011). The trend continued into the early 1900s, when fondness again reverted to fear. Cemeteries were deemphasized as a place of congregation, and "lawn" or "park" style cemeteries became popular. Monuments became less extravagant and more standardized, and the layout of the cemetery itself shifted focus towards ease-of-maintenance and upkeep while maintaining some form of aesthetics and social appeal (Onufer, 2008). Despite increased access to mortuary services, commodification had again created burial inequalities between people of differing financial ability, as sustained maintenance required payment (Woodthorpe, 2011). Shortly thereafter, cemetery layouts shifted away from a family emphasis and towards a more individualistic, yet standardized form (Onufer, 2008). The "memorial park" style cemetery has persisted into the modern period. Modern attitudes towards death vary between individuals and social groups, but commodification has proven persistent and has in some cases resulted in concerns about historic cemetery management and preservation.

Historical-Period Case Studies

Many scholars have used monument type, form, iconography, and grave decoration to interpret ideological change and dominant mortuary customs in Europe (Bennet, 1994; Cannon et al., 1989; J. P. Clarke, 1965; Longfield, 1948; McCormack & McCormick, 1979; McCormick, 1976; Mytum, 2004; Parker Pearson, 1982), America (Bell, 1990; Clark, 1989; Deetz & Dethlefsen, 1971; Dethlefsen & Deetz, 1966; Francaviglia, 1971; Gorman & DiBlasi, 1981; Lawson, 2011; Mallios & Caterino, 2007; McGuire, 1988; Pritsolas & Acheson, 2017; Rainville, 1999), and New Zealand (Edgar, 1995; Hurley, 1998; Lane, 2013).

Historical-period burials are unique in that many include a precisely inscribed date, placing the burial chronologically within an ideological paradigm. Following the idea that historical-period mortuary practices are largely influenced by dominant ideological paradigms, scholars (Clark, 1989; Dethlefsen & Deetz, 1966; Gorman & DiBlasi, 1981; Hurley, 1998) have compared categories of religious symbols and other iconography, motifs, and patterns over time to identify how closely iconography is linked to these ideologies. Similarly, studies have investigated ideological correspondence to monument morphology and material, although with mixed results (Cannon et al., 1989; Francaviglia, 1971; McGuire, 1988; Robinson, 2018). Yet other works have incorporated both iconography and monument form (Edgar, 1995; Mallios & Caterino, 2007; Parker Pearson, 1982).

However, many of these studies have focused only on identifying larger chronological cultural trends. As cautioned by Mallios & Caterino (2007), analyzing mortuary trends on a larger cultural scale—while important—may obscure more localized mortuary expression. Few studies have attempted to address comparisons between demographic attributes and monument/plot attributes to assess if dominant ideologies do indeed obscure differences between social groups in more localized settings, or if there do exist even small differences in mortuary expression between social groups. Some scholars (Bell, 1990; Cannon et al., 1989; Little et al., 1992) have suggested that relying on plot or monument decoration to assess social affiliation can lead to misguided interpretations. They assert that as lower social classes have been known to adopt and emulate mortuary behavior of higher social classes, cyclical changes in group trends are difficult to assess. Bell (1990) analyzed the usage of coffin hardware. Noting the onset of mass production during the 18th and 19th centuries, Bell realized that elaborate coffin hardware once reserved for upper class individuals became accessible to those in lower economic levels during this time. He identified extensive usage of elaborate hardware amongst all social classes as a result, and cautioned the sole usage of such mortuary decoration in assigning demographic or social groups to burials.

Other researchers expanded on this notion. Little et al. (1992) compared demographic information compiled from skeletal analysis to burial elaboration, inscriptions, and iconography in a 19th century cemetery. Striking similarities between perceived social classes suggested a similar scenario of emulation.

In both cases, dominant ideologies appear to obscure differences between social classes. However, scholars such as Lane (2013) have identified that even in cases where dominant ideologies play a significant role in mortuary behavior, differences between social groups may be identifiable. Lane assessed social status and ideology in a 19^{th} century religious cemetery in New Zealand. She used historical records detailing price points for standardized plot sizes to assign a socioeconomic class for each plot, and compared plot and monument characteristics to this control variable to investigate if social class divisions were clearly identifiable based on physical characteristics. While Lane addressed the presence of dominant ideologies, some attributes appeared more consistent with specific economic classes suggesting a degree of differentiation between social groups. Many other studies, summarized in Lane (2013, pp. 46–52), have suggested clear patterns between monument type, burial plot metrics, and ideologies or social structure. Others have merely discussed potential differences in mortuary behavior between identifiable ethnic, occupational, or other social groups in historic cemeteries without conducting structured investigations of attribute correlations (Lawson, 2011).

SPATIAL ANALYSIS IN CEMETERIES

Placement of burials within cemeteries or cemeteries amongst landscapes has implications for ideology and social attitudes towards death (Anthony, 2016; Binford, 1971; Onufer, 2008; Sayer & Wienhold, 2013). In addition to grave goods, monument type, symbology, or interment type, grave location is also a heavily symbolic attribute of mortuary behavior. Scholars (Cottle, 1997; Francaviglia, 1971; Lane, 2013; Woodthorpe, 2011) have noted that cemeteries tend to be located in “spiritually important” places or areas chosen for logical or practical reasons. Assessing burial location and the spatial dimension of mortuary behavior can provide another lens through which to understand cultural beliefs and ideologies. Binford (1971, p. 22) noted that perceived or actual social, cultural, and religious affiliation is sometimes strongly linked to burial location, both upon the landscape and amongst other interments.

A variety of scholars have identified spatial segregation, partitioning, or differentiations of social groups by researching differences in monument type (Bennet, 1994; Curet & Oliver, 1998; Francaviglia, 1971; Lane, 2013; Lipsey, 1989; Little et al., 1992; Thomas, 1994). Bennet's (1994) study focused on a historical-period Greek cemetery and found that burials were physically segregated based monument type and elaboration. Bennet used Tainter's (1975) hypothesis that elaboration is a proxy for social status and as a result, classified monument type and elaboration to explore the symbolic spatial layout of the cemetery between perceived social status groups. Further anthropological research suggested that the community was structured in a similar way. Class divisions were apparent and poorer individuals were treated and viewed differently than the affluent. Monument type was highly linked to elaboration (and thus social status), but spatial segregation of these monuments further guided Bennet's interpretation of historical-period social relations. Without incorporating the spatial dimension, differences between monument types may simply have been attributed to differences in economic wealth, and the scholar may not have noticed the extreme segregation and class discrimination that it represented. However, no quantitative spatial analyses—or statistical analyses—were conducted, which may have illuminated further patterns.

Thomas (1994) conducted a similar study of an 18th century North Carolina cemetery and observed spatial separation between community "insiders" and "outsiders." However, no tests of spatial significance were conducted. The burials included individuals of various ethnicities but exhibited exceedingly similar monument and burial types. Without usage of archival research and spatial investigation, Thomas may not have identified this segregation and may have suggested that the society did not differentiate between social groups (Thomas, 1994). A more recent study in New Zealand by Lane (2013) focused on three cemeteries segregated by religious denominational boundaries. She sought to study the social dimension of mortuary behavior as proxied by plot metrics, monument type, and iconography. Lane determined that graves of particular size and extravagance classes tended to be grouped together in specific locations within the cemetery, but she did not use empirical spatial methods in her examination (Lane, 2013).

Gravesite accessibility within cemeteries may also play a key role in deciphering social status (Higgins, 1998; Lane, 2013). Accessibility factors may include slope, elevation, surrounding vegetation, or proximity to pathways. For example, graves placed at the top of a steep hill may not be as accessible as ones placed at the base of the hill. Burials placed in inaccessible or unkempt locations may indicate lack of desire to visit the grave in the future (Cottle, 1997), perhaps due to social stigma. Individuals alienated from society are not likely to be buried in the communal cemetery (Binford, 1971, p. 14). On the contrary, graves placed in accessible, visible, and well-kept locations may be reserved for those of a revered social status.

However, environmental factors have also been noted as potential limitations in burial location choice (Binford, 1971). Seasonal ground freezing may limit burial accessibility for those who perish in winter; some societies keep their dead above ground until the soils thaw, while others turn to alternate forms of burial including scaffolding burials, tree burials, or cremation. Still others bury their dead in alternate locations when original burial areas are unavailable during these times (Binford, 1971). This trend has been noted in historical-period Roslyn's Eagles Cemetery, in which burials occurred in more accessible areas during winter months (Ware, 2005, p. 79). The physical limitations of space availability may also have an effect on placement. High elevation interments may originally be chosen based on visibility factors, but later interments may be forcibly shifted downslope or to another location as the area fills and is no longer available (Binford, 1971). Topography and geology may also limit accessibility, in that it may be difficult to transport and bury an individual at the top of a hill. Underlying soil structure may preclude interments. As a result, choice in burial location may be affected by external factors and not all variability may be explained by perceived social factors.

Spatial Analysis in Cemeteries: Case Studies

Because relatively few studies have incorporated spatial analysis into assessment of historical-period cemeteries, I discuss below mainly instances of spatial analysis in archaic cemeteries. However, considering the structural and content differences between cemeteries from the two periods, it is important to consider how these methods can be applied to historical-period cemeteries by also discussing spatial analysis in these contexts. Researchers have reached no formal consensus on what spatial methods are the most appropriate for assessing mortuary space. While usage of quantitative methods has been critiqued as an attempt to simplify human behavior, scholars such as Supernant (2017) and Voorrips & O'Shea (1987) have used spatial and statistical methods to assess and approximate trends in human mortuary behavior and choice.

Spatial analysis was first used by Tainter (1975, 1976) to investigate clustering of archaic burials—and thus social ranking of interred individuals—in the Illinois River

Valley and Hawaii. He used nearest neighbor and cluster analysis to establish grouped patterns, and a variety of scholars (D. L. Clarke, 1977; Hietala, 1984; I. R. Hodder & Orton, 1976; Johnson, 1977; Orton, 2006; Šmejda, 2004) expanded upon the work with techniques of their own. Later scholars (Ashmore & Gellar, 2005; Emery, 2016; Sayer & Wienhold, 2013; Voorrips & O'Shea, 1987) caution that usage of such techniques may provide a skewed or narrow view of actual spatial patterning and have broadened their methods to include statistical techniques such as Ripley's *K*-Function and spatial autocorrelation to further assess pattern significance.

Inspired by Tainter, Voorrips & O'Shea (1987) sought to look beyond simple *absolute* approaches to nearest neighbor analysis by presenting a *conditional* spatial method. As the determination of spatial clustering is highly dependent on the number of neighbors used, this study represented an important exercise in parameter selection within research design. It underlines how choice of the number of neighbors—conditional upon the dataset and individual categories—can lead to considerable variation in how clusters are statistically identified and how patterns are interpreted. As such, Voorrips & O'Shea suggested testing clustering on multiple scales, although this approach must also be cautioned as it allows researchers to bend the results to their expected interpretations. If researchers hypothesize a certain artifact type will be clustered, simply increasing the number of neighbors may reveal such a result, albeit likely at a lower probability level. In general, the higher the number of neighbors incorporated, the more diffuse the patterns may be and the less likely data location may be influenced by an underlying factor.

Scholars recognized the need to incorporate a statistical component into this approach, and the issue was revisited by researchers like Sayer & Wienhold (2013). They conducted a study addressing the statistical significance of spatial clustering previously studied within several Anglo-Saxon cemetery sites. Using Ripley's *K*-Function and kernel density estimation (KDE), they discuss cemetery organization as a function of social development. They ultimately asserted that usage of statistical methods are not only helpful, but necessary to address misleading patterning within cemeteries (Sayer & Wienhold, 2013). Kernel density estimation (KDE) has been used in archaeological contexts to demonstrate spatial patterning. But because this technique is only visual in nature and no statistical validity is assigned, Sayer & Wienhold incorporated the usage of Ripley's *K*-Function into their approach. They used this statistical measure to determine to what degree clusters of similar burials found by KDE were statistically significant. This method also allows for pattern exploration on various scales: an issue identified by previous researchers like Voorrips & O'Shea (1987). Since cemeteries are highly variable in terms of size and burial count, this flexibility is ideal. However, this also represents a potential method weakness, as it identifies significant clustering if a large enough search distance is used, although the patterning may be more diffuse and less representative of actual intentional clusters.

Also using KDE, Streb et al. (2019) compared chronological development and grave type distribution in a 20th-21st century cemetery in Luxembourg. The researchers sought to determine to what degree extant monuments may have influenced and inspired people as a "silent advertisement" to update nearby monuments to adopt a similar, contemporaneous style in attempts to blend in (Streb et al., 2019). Comparing observed monument attributes, known cemetery chronology, and established trends in monument type, material, and décor for decades between 1900 and 2010, Streb et al. (2019)

incorporated kernel density estimation (KDE) into typical monument analyses to further understand human choice in monument elaboration as a function of chronology and influence. However, the researchers did not incorporate a measure of statistical significance into their study, which may have been beneficial to examine the likelihood these clusters were influenced by an underlying system of choice.

More recent studies have used techniques like KDE to assess the degree of clustering within cemeteries, but have incorporated other types of statistical analyses to contextualize interpretations. Duffy et al. (2019) focused their study on subsurface burials and surface artifacts scatters in a Bronze Age cemetery. The researchers compared excavated burial locations to possible burial locations suggested by artifact spatial density analysis using Pearson's R correlation (Duffy et al., 2019). Within the case study, using a statistical measure like Pearson's R effectively assessed the correlation between observed phenomena. Duffy et al. were able to use these indicators of correlations (or lack thereof) between artifacts and burials to inform important archaeological management and assessment decisions. While they did not incorporate a statistical measure assessing patterns of clustering suggested by KDE, their usage of other correlational methods provided another way to assess similarities between mortuary attributes.

Other types of statistical correlation methods, like factor analysis, have been used to identify correlations between artifact or burial types that may have originated from discrete mortuary practices. Researchers like Šmejda (2004) and Tainter (1975) theorized that burials exhibiting similar artifact frequencies or interment types may be associated with similar underlying practices, which may be interpreted as belonging to a distinct group of individuals. Šmejda (2004) focused his study on the layout and social organization of a prehistoric cemetery in the Czech Republic, which contained a total of 430 burials belonging to various time periods and cultural affiliation within the Early Bronze Age. While some burials included graves goods identifiable to specific date ranges, archaeologists were unable to assign chronology to the majority of burials and were left with an incomplete understanding of the cemetery's organization (Šmejda, 2004). The researcher used factor analysis to identify significant correlations between artifacts and mortuary attributes, suggesting discrete mortuary trends, behaviors, or paradigms.

Sayer & Wienhold (2013) summarized a variety of other spatial and statistical analyses used in archaic cemeteries, although the majority focus on cluster analysis and spatial distinctions between graves (Evison, 1987; L. G. Goldstein, 1976; Pader, 1982; Ravn, 2003; Voorrips & O'Shea, 1987).

I was unable to find any studies that holistically assessed space, demographic attributes, and mortuary attributes together in historical-period cemeteries using spatial and statistical techniques. However, an unpublished undergraduate thesis from the University of Auckland appears to have attempted a similar task (Higgins, 1998). Described in Lane's work, the study focused on investigating cemetery space in relation to plot size, occupancy, gender, and kinship ties of the interred to better understand the community's attitude towards death. As Lane notes, this "had not been attempted before" (Lane, 2013, p. 9). The study looked at monument types and the demographic makeup of the cemetery and attempted to quantify temporal change; physical attributes included plot size and occupancy, and social attributes included gender, age, kindship, and religious affiliation (Lane, 2013, p. 10). She noted that the study utilized spatial analysis to determine how topography, accessibility, terrain, and slope may have affected burial location decisions, but actual spatial analysis methods are unclear. Higgins (1998) also appears to have incorporated historical information to understand burial practices of the time, although it is unknown whether these records are genealogical or some other form of information (Lane, 2013, p. 9). Lane incorporated some elements of this study into her own, assessing differences in monument features between social status groups. However, she based these group designations off plot sizes and did not incorporate genealogical research or spatial analysis into her study.

Since historic cemeteries tend to be accessible and mortuary expression is visible without excavation, some scholars (Diserens, 2013; Guney & Celik, n.d.; Iacotucci & Pellegrino, 2004; Lee & Kim, 2010; Liebens, 2003) suggest that future mortuary studies incorporate carefully developed attribute databases with the intent of usage in analysis, maintenance, and preservation. While no actual spatial analysis was conducted, a study by Liebens (2003) focused on the importance of compiling accurate spatial and empirical information for historical-period cemeteries for the express purpose of both research opportunities and resource management strategies. Suggestions for future research included compilation of as many social attributes as possible for historical-period burials for use in both mortuary analysis and cemetery management (Liebens, 2003). Following this recommendation, Titus (2008) created a framework for data collection focused on using both cemetery features and historical records. However, Titus only provided a framework for data collection, and did not conduct any spatial or statistical analyses. Creation and implementation of databases—either online or as proprietary information belonging to the cemetery itself—will serve to keep all attributes in a central location and allow easy access for future analyses. Spatial information—outside of mortuary analysis—can be utilized to locate areas for new burials, identify potentially unmarked graves, and plan siting of other cemetery features such as walkways, benches, or maintenance of outbuildings (Liebens, 2003; Titus, 2008).

MORTUARY ANALYSIS IN THE ROSLYN OLD CITY CEMETERY

As historical-period Roslyn experienced considerable diversity in resident occupation, nationality, and other social affiliations, the Old City Cemetery (Cemetery) provides a unique potential to explore cultural and social dynamics. Early processual mortuary theories can be supplemented by later ideological shifts towards a post-processual framework to investigate the role of cultural norms more comprehensively in mortuary choice and behavior in historical-period Roslyn. Here, I combine frameworks and hypotheses from both processual and post-processual arguments to investigate mortuary choice. Scholars like McGuire & Payner (1991) have noted that in many cases, social groups (economic, cultural, religious, or otherwise) tend to exhibit discrete trends in mortuary practice *but* these trends may be influenced or overshadowed by broader cultural norms or expectations. Exploring the degree to which various social groups exhibit unique or unequal behavior has implications for broader cultural investigation in terms of social stratification, treatment of non-conforming groups, and general attitudes towards death.

Social structure may be further assessed using the correlation between each social group and expressed mortuary attributes. Following Tainter's (1975) hypothesis, increased elaboration may suggest higher social standing, although later scholars suggest that elaboration may alternately belong to a lower social class emulating more affluent practices (McGuire, 1988). Elaboration instead may be indicative of standardized norms and increased economic availability for all social groups (Payner & McGuire, 1991).

Treatment of non-conforming groups refers to society's level of acceptance towards social groups expressing mortuary behavior in a non-standardized way. Depending on cultural affiliation and/or place of origin, an individual may express mortuary behavior differently than other groups. And as Onufer (2008) synthesizes, many nationality groups in the historical-period exhibited discrete mortuary practices. Evidence of these distinguished practices in historical-period cemeteries may suggest an emphasis on, or indifference towards, individualized cultural expression, rather than a paradigm of dominant cultural conformity. It may suggest cultural inequality or segregation between these groups (especially if this trend occurs spatially). In the Old City Cemetery, I will assess this using statistical comparisons between demographics and mortuary attributes such as *monument type*, *material*, *size*, *elaboration*, and *motifs*.

Previous studies assessing the spatial dimension of mortuary trends have identified patterns between location and social structure (Bennet, 1994; Higgins, 1998; Lane, 2013; Tainter, 1976), cause of death (Binford, 1971; Crooke, 1899; Yarrow, 1880), nationality or ethnicity (Christopher, 1995; Thomas, 1994), occupation (Graves, 1993), and monument types (Streb et al., 2019). Of Roslyn's 26 cemeteries, nearly all—except the Old City Cemetery—are affiliated with certain social groups (lodge affiliation, nationality, or ethnicity), suggesting that locational differences may exist between social groups within the city's oldest cemetery. Spatial partitioning and distinction between social groups has important implications for relations and ideologies, and can be interpreted through a historical lens to further understand historical-period group social dynamics. And while I did not assess grave proximity to paths or other topological features (as seen in Higgins, 1998; Lane, 2013), spatial clustering of social groups within the Cemetery may suggest notable trends in group relations.

Statistical correlation has been applied to assess chronological changes in monument type (Lane, 2013; Streb et al., 2019), material (Streb et al., 2019), and motifs (Dethlefsen & Deetz, 1966), but may be applied to other variables as well. Statistically assessing the degree of correlation between demographics and mortuary expression allows researchers to identify similarities or differences between social groups that may not otherwise be immediately visible. This approach also serves to contextualize spatial patterning of burials, as some attributes may be correlated together and suggest misleading patterns when only viewed spatially.

To assess mortuary behavior in the Old City Cemetery, I incorporated spatial and statistical methods used specifically by Sayer & Wienhold (2013), Šmejda (2004) and Duffy et al. (2019) including Ripley's *K*-Function, kernel density estimation, Pearson's R correlation, and factor analysis. I used these methods to assess locational choice and monument/plot attribute choice between social groups.

CHAPTER IV

PREVIOUS WORK IN ROSLYN AND THE OLD CITY CEMETERY

Although historical records are inconsistent and scattered, previous researchers have attempted to compile a comprehensive history of Roslyn and its residents (Bogachus, 2005; Chenoweth, 1978; Fridlund, 2017; Meisner, 1994; Musso et al., 1955; Onufer, 2008; Pitts et al., 2016; Prater, 1994; Shideler, 1986; Ware, 2005).

Previous work within the Roslyn cemetery complex has focused on documentation and preliminary demographic and attribute descriptions. No formal analyses have been done assessing the spatial or statistical dimensions of these factors.

In 1978, Anne Chenoweth conducted original research in the Roslyn cemeteries for the purpose of compiling information to further assist with cemetery planning (Chenoweth, 1978). She compiled sparse death records and plot attributes, took plot photos, and preliminarily hand-mapped several of the cemetery sections (including the Old City Cemetery). However, she did not include any of these documents or detailed records in the final text report, and she admitted the maps were not entirely accurate. As a later study compiled more precise information (see Pitts et al. 2016 below), I did not consider Chenoweth's early mapping attempts in my own study although these data are likely on file at the Roslyn Museum. As a final result of her work, Chenoweth (1978) provided an overview of ethnography and monument types between the cemetery blocks and addressed some ethnically specific burial trends visible in several lodge cemeteries. Between Mt. Olivet and several of the other lodge cemeteries, she also noted that social status was partially visible through monument elaboration and "embellishment" as compared to known historical inequalities (Chenoweth, 1978, p. 42). However, she based these statements on general observation rather than systematic analysis.

In 1994, Jennifer Meisner conducted an ethnic landscape survey in Roslyn, although her focus was on architecture and property ownership in town (Meisner, 1994). Just over a decade later, Jennifer Onufer (2008) revisited Roslyn's architectural landscape and expanded upon Meisner's work with the aim to suggest future preservation policies and procedures of cultural landscapes. Onufer conducted ethnographic research in Roslyn and compiled descriptions of ethnically identifiable traits within existing buildings, public spaces, and the cemetery complex. A portion of Onufer's fieldwork included a short survey of the cemetery complex, in addition to her discussion of building architecture. Onufer briefly considers types of ethnic modifications, indicators, and traditions present in several of the ethnic cemeteries (especially the National Croatian and St. Barbara cemeteries). She noted a variety of monument and plot features in terms of association with certain nationality groups, lodges, or religious sects. However, these observations were based on general inspection and she conducted no further analysis or investigations (Onufer, 2008). Although little empirical data is provided in her final work and her research only briefly mentions the cemeteries, she suggests that there *do* exist differences and inequalities in burial practices. She also suggests norms *between* cemeteries based on fraternal lodge affiliation (and in many cases, ethnicity or nationality). However, her work does not explore the variations and spatial distributions *within* any of the cemeteries. I used some of Onufer's descriptions of ethnically based burial traditions and traits to contextualize spatial and statistical patterns identified in the Old City Cemetery.

More recently, Central Washington Anthropological Survey (CWAS) conducted a cultural resource survey within the Old City and Slovak cemeteries as the groundwork for future cemetery improvements (Pitts et al. 2016). Pitts et al. (2016) surveyed and recorded plots and monuments within the Old City Cemetery and compiled a preliminary database of plot location, monument description, and other identifying information found directly upon the monuments themselves. One GPS point was taken for each plot, even if the plot contained multiple individuals.

The authors recorded the following attributes for each burial: *plot coordinates* (taken at the northwest corner of each monument or plot); *first*, *middle*, and *last names* of the deceased; *birth* and *death dates*; *birth* and/or *death locations*; *place of origin*; *language* used on the monument (other than English); *parents*, *spouse*, or *children* of the deceased; *occupation* or *military affiliation* of the deceased; *resident address* within Roslyn; *monument description* (general description of attributes, little consistency); *epitaph* text; *plot measurements* (some consistency); *monument damage*; and *surrounding vegetation*. While the majority of the data was recorded only if found on the monument itself, Pitts et al. (2016) appeared to have conducted some sparse background research on a variety of individuals, as some additional information was included in the dataset that was not contained on or within the physical plot. The premise for this additional information is unclear, and there was little consistency in this extra data.

I built upon the Pitts et al. (2016) dataset to compile a more complete database of demographic and monument attributes, create more accurate spatial data, and conduct analyses within the Cemetery. My methods and approaches are detailed below.

CHAPTER V

METHODS

DATA COLLECTION AND DATABASE DEVELOPMENT

While the original Pitts et al. (2016) dataset contained a wealth of information, the authors left many fields with null values. Personal information such as *place of origin, occupation*, or *familial ties* were sparsely provided on monuments themselves and collecting such data would require extensive background research. However, the *names* and *birth/death date* fields provided enough preliminary information for me to begin genealogical research on each individual (see Genealogical Research section below). Attribute categories such as *place of origin*, *language*, and *familial ties*, when present, helped narrow search results and validate information I found. Pitts et al. only sparsely filled in data for other categories such as *occupation* and *monument description*, but these fields helped me envision what types of information may be helpful in investigating mortuary choice and behaviors.

As plot coordinates and data accuracy in the original dataset had a great potential to influence my analysis, I implemented additional research and quality assurance methods to both expand the current dataset and investigate the integrity of the previously recorded data. Pitts et al. (2016) reportedly gathered monument location data based on the northwest corner of each plot or monument with a Trimble GPS and Hurricane Antennae with 4-10 cm accuracy (Sarah Steinkraus, personal communication 2019). However, visual inspection of the Old City Cemetery (Cemetery) itself suggested some coordinates were erroneous and skewed from the monument’s actual location, both in terms of physical location and relative location to other nearby plots. Multipath error due to extensive tree cover in the Cemetery is likely the source of the discrepancy.

Details regarding other data collection methods also required further investigation; misspellings and misplaced information in the dataset suggested a need for careful quality assurance, and inconsistencies between descriptions and measurements required additional research and exploration. When multiple individuals shared a plot, the authors originally placed information belonging to all individuals in a singular row in the dataset, with personal information separated by a "/" within each cell. Upon preliminary inspection and subsequent exploration, I found some information to be mixed between individuals, and information was not always present for all persons. This occasionally resulted in unclear associations between information and individual in multi-plots. The authors sometimes recorded *plot measurements* inconsistently, using a variety of units interchangeably and recording length, width, and height in various order. In some cases, extraneous, missing, or misplaced numbers suggested incorrect plot sizes.

The data was originally stored as an Esri shapefile with an associated data table. For ease of access and workflow, I exported the data table using Esri's ArcGIS Pro 2.4.0 to Microsoft Excel. The dataset included calculated coordinates for each plot location point, allowing uncomplicated re-integration of the completed database back to a spatial format after extensive disconnected editing. For analyses requirements and better organization, data rows containing multiple individuals (shared plots) were expanded into multiple rows to accommodate one individual per row. While a number of rows now shared the same point coordinates—resulting in duplicated points and some potential limitations in analysis interpretation (see Chapter VI)—each row/point now contained a singular individual and allowed for their distinct information to be used in analysis. To remedy discrepancies and compile additional data for each individual, I conducted extensive genealogical research and visited the Old City Cemetery, expanding the original dataset into a working database usable in geospatial and statistical analyses.

Genealogical Research

Data Sources

Using the preliminary dataset provided by Pitts et al. (2016) as a foundation, I conducted comprehensive genealogical research between January and September 2019 for each individual within the Old City Cemetery. I used a variety of online sources, printed text, and information contained directly on monuments to compile and review social and demographic attributes including, *birth* and *death date*, *cause of death*, *birth location*, *parent birth locations*, *occupation*, familial ties, and any other information relevant or useful for subsequent genealogical research. Online resources included monument transcriptions and photographs on "Find a Grave" (FindAGrave, 2019), document collections on FamilySearch (FamilySearch, 2019) and in the Washington State Digital Archives (Washington Secretary of State, 2019), as well as general information on the Kittitas County Genealogy website (Kittitas County Genealogy, 2019). Print sources included *The Tragedy of May 10th, 1892* (Fridlund, 2017), *The Historical Cemeteries of Roslyn, Washington* (Ware, 2005), and *Spawn of Coal Dust* (Musso et al., 1955), as well as a previous fieldwork report entitled *Roslyn Cemetery* (Chenoweth, 1978). To ensure reproducibility, I did not use paid services such as

Ancestry.com or GenealogyBank, although these resources could be considered for future work. All resources I used were open-source and available to a wider audience.

I used information provided on “Find A Grave” to assess *birth* and *death dates*, *birth location*, *familial ties*, and any additional information provided by volunteer genealogists, much of which was often transcribed directly from attached photos of monuments. Prior to fieldwork, I used these volunteer-provided photos to compile preliminary monument attribute information and any additional visible/legible information on the monument itself. In a few cases, members had linked additional documents to individuals’ pages, including death records, census records, marriage certificates, or other newspaper articles or obituaries, and several included biographies written by descendants (although these cases were rare). The Washington State Digital Archives Old City Cemetery Index provided similar information transcribed directly from monuments, but did not include additional information or photographs (Washington Secretary of State, 2019). Also transcribed directly from Old City Cemetery monuments and from “records” is a list of *names* and *birth/death dates* within *The Historical Cemeteries of Roslyn, Washington* (Ware, 2005). However, no further information exists within this source and it is unclear what “records” the author used to provide ancillary information not found on monuments.

To compile census records, death records, marriage records, and birth records, I used extensive document collections found on FamilySearch, many of which had been previously indexed by volunteers and were therefore searchable by names, dates, and places. This site houses ample census, birth, death, and marriage records and provided the majority of data I collected. The Washington State Digital Archives Kittitas County

Auditor Death Records 1892-1907 collection provided death records prior to 1907, none of which existed within the FamilySearch collections (Washington Secretary of State, 2019). A sparse three pages of general Roslyn death records spanning 1891-1905—incomplete but alphabetized—can be found in a 1978 fieldwork report (Chenoweth, 1978). The records were consolidated from originals kept in the Kittitas County Courthouse, suggesting that some had been lost or destroyed prior to their transcription, and that those transcribed are all that remain. Contained in *The Tragedy of May 10th, 1892* are lists of mining-related accidents and victims. Comparing these lists to information found on monuments, I was able to verify *occupation*, *cause of death*, and *death date* for some individuals not noted in early Roslyn death- or census records.

Kittitas County Genealogy's online records were used to supplement information and records found elsewhere, and relevant utilized materials were confined to death records. The site also contained Kittitas County census records from 1900, as well as birth records searchable by name. However, all records here were found to be duplicates of those available on FamilySearch and in the Digital Archive collections, and were considered confirmation of consistent information. Roslyn family biographies contained within *Spawn of Coal Dust* (Musso et al., 1955) supplemented general data regarding *familial ties*, *birth location*, and *occupation*, sometimes in the absence of this information elsewhere, but were generally inconsistent in description and did not exist for many individuals within the Old City Cemetery.

Records Studied

Within the assessed document collections and information found in the above sources, key records (in the order of usefulness) included death records, census records, birth records, and marriage records. The occasional biography, obituary, newspaper clipping, or historic photograph provided a wealth of information, but these records were too infrequent and sporadic to be considered key sources. Official death records were arguably the most important type of document I assessed and often contained all target social attributes desired in this study, including *birth date*, *death date*, *cause of death*, *nationality/birth location*, *parent nationalities/birth locations*, *occupation*, and *familial ties*. Official death records prior to 1907 were not kept as consistently as those after, as not all deaths (or births, for that matter) were officially registered with the local government—a trend especially prominent in infant and young child deaths at the time. After the State took over official record-keeping in 1907, death records became more commonplace and standardized, resulting in better recording of Roslyn deaths after this period. Obituaries were inconsistently available and were often volunteer-provided.

Of secondary, but essential, utility were census records (both U.S. and English/Welsh) spanning from 1850 to 1940. While the format and information recorded in these documents changed over time, they generally contain the majority of target social attributes, including *birth date*, *nationality/birth location*, *parent nationalities/birth locations*, *occupation*, and *familial ties*. Due to the census's decade-only schedule, some individuals were not captured on the Roslyn census. People who were born, died, or emigrated away from Roslyn (or any combination of these events) between the census year may not have been recorded. In these cases, I attempted to trace the individual's genealogical trail to census records of other towns in Washington, other states in America, or in some cases, to their original country of origin with varying degrees of success. Unfortunately, extensive fires in 1921 within the Washington D.C. Commerce Department Building destroyed nearly all U.S. census records from 1890, leaving Roslyn (and most other U.S. cities) without details from this key historical period (Blake, 1996).

Birth records and marriage records were used as available to compile attributes such as, *birth date*, *nationality/birth location*, *parent nationalities/birth locations*, *occupation*, and *familial ties*. However, while birth records may include parent information and the individual's *birthplace* (America) and *nationality* (based on birthplace and parent birthplace), the individual's *occupation* is not included for obvious reasons. The father's occupation is often listed and was recorded if the individual was found to have died before adulthood, or had no job listed in other sources. This data was not used in analysis, but was compiled for potential future work and context. Information stored on marriage records varies between documents; marriage licenses, affidavits, and certificates contain sparse data, but returns and index rosters (compilations for local record-keeping) tend to include most, if not all, the above attributes.

Data Issues

Issues with data collection revolved around spelling issues in the original documents, erroneous volunteer-provided transcriptions, missing information, and discrepancies in an individual's social attributes between various documents. In many cases, disparities exist between name spellings and birth/death dates found on monuments and those in the above records, usually occurring from misinformation given to the document recorder or a misreading by modern volunteer transcribers. This issue was especially problematic when using search functions in online collection databases, but searching alternate spellings, date ranges, perusing all potential matches, as well as surveying other records from Roslyn tended to yield results. In some cases, I observed discrepancies between birth and death dates significant enough to suggest the record may not be associated with the target individual. These were therefore rejected as correct matches. In other situations, previously identified information—especially familial ties—were used to narrow searches and pinpoint correct matches. When inconsistencies in attributes such as *nationality/birth location, occupation, or birth/death dates* were found between different records (census, death records, etc.), the most frequent attribute entry was used. Scholars have noted that *occupation* recorded on some census records may sometimes be simplified and already placed into larger categories with little differentiation (Wurst, 1991). But in the absence of other information, data gathered from census records is assumed to be correct.

When assessing *occupation*, the last job held by the individual (usually found on death records) was used, unless denoted as "retired." In those cases I recorded the previous or most frequent job found in other records. However, only a few individuals had additional records that could be used for corroborating attributes.

As mentioned previously, records do not exist for every individual, and in some cases proxy information was recorded instead. Approximately fifteen percent of the burials within the Old City cemetery are without a monument, or monuments are either unmarked or contain unreadable information. In these cases, I only recorded and classified monument and plot attributes as I was unable to research the individual.

Fieldwork

I visited the Old City Cemetery in August 2019 to collect monument attribute data and visually assess the burial spatial distribution and relation between plots. Written monument descriptions in the Pitts et al. (2016) dataset were crucial to pre-fieldwork data compilation; I used this information along with images available online to compile preliminary monument attribute data (see Classifications of Mortuary Feature Attributes section below). However, I encountered inconsistencies within the monument descriptions and issues with linking these descriptions to singular individuals within multi-plots, thus requiring independent review of this information. Photos of monuments and plots were used prior to fieldwork to conduct quality assurance and additional data collection of monument attributes, but not all photos showed the entirety of the plot nor did each allow a clear view of monument details. During fieldwork, I took multiple photos of each monument within the Old City Cemetery, focusing attention on capturing the entirety of the plot and monument itself, closeups of any minute details, and the plot's spatial association with nearby plots. Capturing photographs served several purposes. First, to compile a more consistent and extensive range of photos of every monument and plot within the Cemetery; second, to capture the current state of each monument with the intent to update images available online (as previous photos were not all taken during the same temporal period and some were outdated); and third, to decrease required time in the field. Any information and attributes not easily deciphered through photos were recorded during the Cemetery visit, and attributes easily identifiable and documented through photos were recorded and cross-checked with original monument descriptions post-fieldwork.

As monument attributes such as *plot size* and *monument size* are not directly assessable from photographs, I gathered and recorded this empirical information during the Cemetery visit. While the final classifications used in analysis were nominal in nature, informed transformation into classifications required accurate dimensions. Measurements originally taken during the 2016 survey contained enough inconsistencies to warrant re-assessment (Pitts et al., 2016).

For each interment, I collected dimensions from monuments (headstones) and the entire visible extent of the plot. Measurement techniques are shown in Figure 5. Measurements of monuments included standard length, width, and height, but were taken with the following approach for consistency. Monument length corresponded to the extent of the monument's flat side—usually the façade with inscription facing the burial itself—and was measured at the longest portion (including the base component when present). I measured monument width similarly. This dimension corresponded to the monument's depth between flat sides—usually parallel with the plot's length. Monument height was measured from the ground surface to the tallest portion of the monument. While this dimension may change over time as vegetation or soils build around the monument base, measurements taken here provide adequate approximation. For monuments flush with the ground, I recorded the height as 1 centimeter. In cases where monuments were partially disassembled, I recorded the total measurement of all components to approximate the feature's original dimensions. Measurements of disintegrated or incomplete monuments was recorded as-is in the absence of further components or were approximated if the full dimensions were discernible beyond a reasonable doubt.

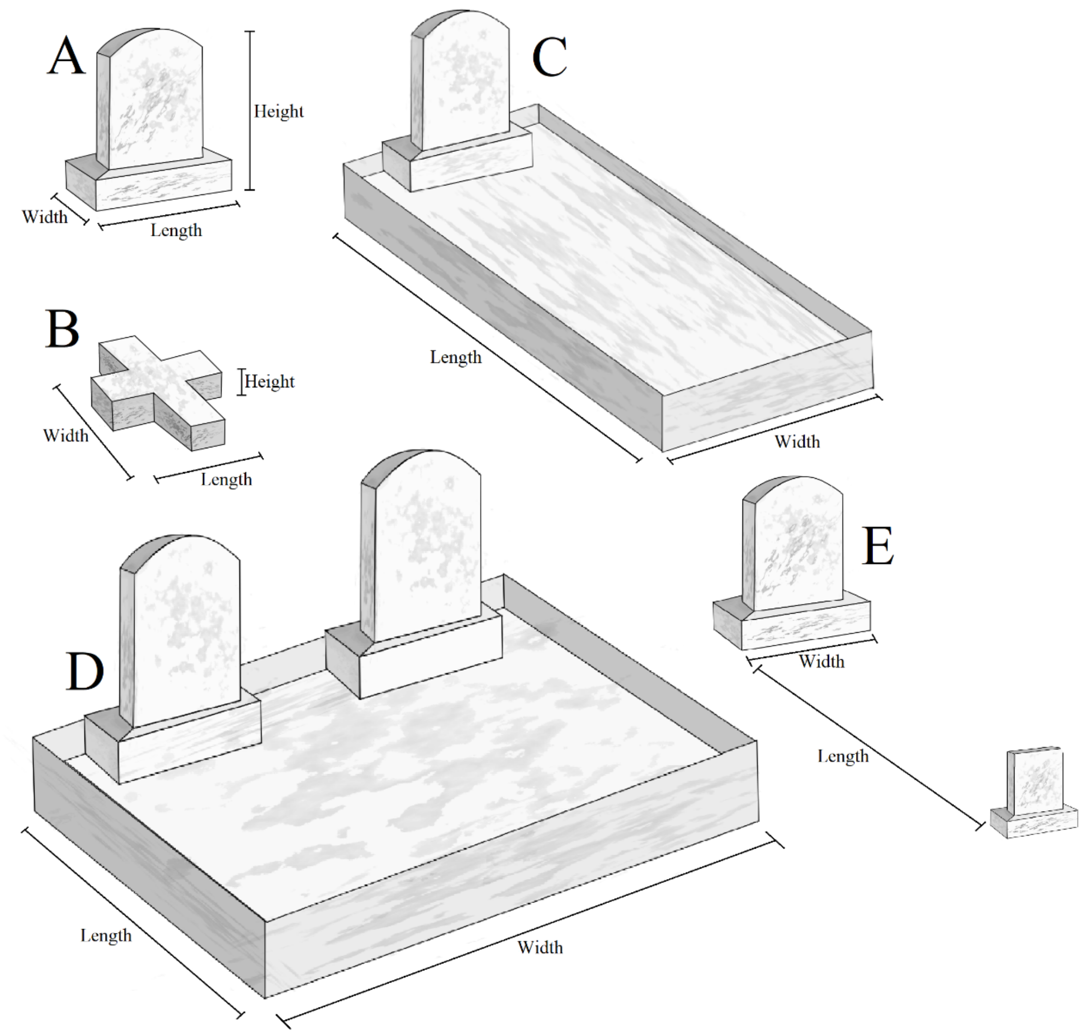

Figure 5. Monument and Plot Measurement Methods. A) Standard Monument, B) Flat Monument, C) Standard Plot with Curbing, D) Multiplot with Curbing, E) Plot with Footstone.

Plot dimensions consisted of simply length and width. Plot length was denoted as the length between a monument and footstone, or between monument and foot-end of any curbing. For interments that only included a monument, I did record plot length. Instead, only monument dimensions were denoted. I recorded plot width as indicated in Figure 5. When only a footstone existed to denote burial area extent, I used the monument's flat side length as a proxy. Plot height was not recorded for a variety of reasons. As the

Cemetery rests upon a sloped hill, curbed plots are often benched into the hillside with concrete or rock exposed on the downslope side. However, not all plots show this dimension in meaningful way, especially those flush with the current ground surface or those only with a footstone, and issues of erosion and vegetation buildup may impact this dimension. Height of the monument could be used here as a proxy for plot height and therefore total plot volume, but was not used due to variation in plot type.

During fieldwork, I visually assessed spatial relations between monuments and plots to determine whether the original point locations correctly portrayed the spatial layout of interments within the Cemetery. When comparing actual spacing and alignment between nearby plots, I observed differences between the point data and reality ranging anywhere between 0-6 meters. During the August trip, I did not take any additional GPS data. But on October 23, 2019, I returned to the Cemetery with a class group to address these potential inaccuracies. Using Collector for ArcGIS, students were asked to take GPS points in the middle of monuments or plots around the Cemetery as part of an experiment. I personally collected GPS points for many of the same interments, as well as control points around the Cemetery edges to compare accuracies between devices and the original point data. Subsequent investigation of the points suggested that device accuracy and consistency varied, and tree cover highly affected receiver accuracy. Based on this exercise and visual investigation, I determined that point data would benefit from manual adjustment. I gathered additional photographs and measurements of plot spacing and relations and subsequently adjusted the point data to better represent reality and allow for more accurate spatial analyses. To maintain consistency, I adjusted each point but retained location on the northwest corner of each plot. Using measurements and photographs taken during fieldwork, I digitized polygons of each plot for additional context and assistance while further adjusting the points (Figure 4, page 28).

CATEGORIZATIONS AND CLASSIFICATIONS OF VARIABLES

In order to analyze broader potential mortuary behavior between social groups, I consolidated individuals' raw demographic attribute data into groups based on shared characteristics. Similarly, mortuary attributes were organized into discrete classes to identify broader trends in expression. This task was easier than classifying social attributes due to the physical nature of mortuary remains, although there existed great variation between monuments and plots themselves. See Table 4 for a summary of categories and classifications used in analyses. Each is discussed in detail below.

Classifying social attributes into larger social groups may be subjective due to the prevalence of potential cultural bias, and this action may be misinterpreted as an exercise in stereotyping and discrimination. This is not the intent of the project or researcher, nor is the intent to insist that individuals with shared traits—such as *birth location* or *nationality*—are entirely homogenous in thought, belief, or practice as researchers have noted (Bower, 1991). Instead, when shared traits are grouped into larger classifications, they are expected to potentially reveal broader trends in mortuary choice based on shared cultural background. Previous studies have identified disparities between cultural background and expression as especially prevalent during the late 19th and early 20th centuries (Bell, 1990; Chenoweth, 1978; Dethlefsen & Deetz, 1966; McGuire, 1988, 1991; Onufer, 2008; Rakita et al., 2005). I designed grouping methods with attention to historical context and contemporary standards of classification, with the intent to represent these larger potential trends rather than suggest cultural homogeneity.

Table 4. Demographic and Monument Attribute Categories, Classifications, and Counts.

Social and Demographic Attributes		Monument and Burial Attributes	
Decade Block		**Monument Shape**	
1880-1889	14	Obelisk	75
1890-1899	70	Upright Standard	32
1900-1909	96	Upright Domed	61
1910-1919	39	Upright Slant	44
1920-1929	41	Bevel	53
1930-1939	28	Flat	59
1940+	54	Upright Cross	22
Unknown	91	Irregular	18
Age Category		None	69
Child 0-13	98	**Monument Material**	
Young Adult 14-30	45	Concrete	24
Adult 31-60	105	Granite	132
Senior 61+	114	Marble	189
Unknown	71	Metal	13
Cause of Death		None	66
Accident	48	Wood	7
Disease	145	Sandstone	2
Chronic Illness	201	**Monument Motifs**	
Old Age	109	Vegetation	172
Unknown	115	Animals	22
Nationality		Religious	71
America	53	Lodge	28
Northern Europe	197	Geometry	109
Eastern Europe	31	Nature	17
Southern Europe	32	**Plot Size**	
Western Europe	34	NA	40
Middle East	4	Small	102
Canada	7	Medium	63
Unknown	75	Large	228
Occupation		**Monument Size**	
Miner-Laborer	88	NA	63
Laborer	27	Small	83
		Medium	
Proprietor	20	128	
Professional	14	Large	159
Housewife	86	**Burial Elaboration**	
None	111	Low	68
Unknown	87	Medium	205
		High	160

Classifications of Social and Demographic Attributes

The target demographic attribute categories are based loosely on formats used in previous studies in archaic and historical-period cemeteries (Binford, 1971; Higgins, 1998; Lane, 2013; McGuire, 1988; Saxe, 1970; Tainter, 1976), but are tailored more towards attributes that are detectable and recorded in historical-period documents. I expect them to represent those that may potentially influence mortuary choice according to mortuary theory. Target demographic attributes include *death date/decade block*, *age*, *cause of death*, *nationality*, and *occupation.* Within each attribute category, I classified data into broader groups based on distinct or fundamental similarities with the intent to identify potentially distinct social groups. When possible, I based classifications of variables within each category on defined historical-period norms or perceptions, as well as the observed spread of attributes within the dataset (Table 4).

Decade Block

Historical-period cemeteries are sometimes organized sequentially over time, but this is not the case in the Old City Cemetery (Cemetery) based on visual analysis. This suggests alternate trends in organization. However, there may be distinct chronological patterns within specific parts of the Cemetery distinguishable in the form of clustering, dispersion, or statistical correlations between time period and mortuary attributes. In order to capture potential differences in mortuary practices and choice over time, I created a *decade block* category. Data in the *death year* category was reclassified into standard *decade block* classes to condense individual years into broader potential paradigms, ranging from 1880 through 1930 (see Table 4). All *dates* of 1940 and above were placed into one category, as there were few burials from each subsequent period. Scholars (McGuire, 1988; Trimble, 2008, p. 59; Wurst, 1991) have noted that mortuary customs became more standardized and homogenized after the onset of widespread industrialization, mass-production, and cultural homogenization around this time. If *death date* was unknown, individuals were placed in the *decade unknown* category.

Age Class

As seen in previous mortuary studies in archaic contexts, age at death may have a significant effect on mortuary choice and/or treatment (Binford, 1971; Saxe, 1970). Individuals of various ages exist within the Old City Cemetery, ranging from infants to the elderly, and may vary in terms of burial location and associated mortuary attributes. Older individuals will have likely amassed more wealth and status in the community than younger persons, suggesting that more elaborate burials—in the form of *total elaboration*, *plot* and *monument size*, or *motifs*—may be more affordable and commonplace for older age groups. It should be noted that parents or other immediate family likely funded and influenced burial of infants or young children, suggesting that mortuary choice for these age groups may be partially guided by older age groups. However, cultural norms, trends, and societal beliefs and attitudes towards childhood death have led to well-established patterns in mortuary components (such as *monument type* and/or *motifs*) associated with this age group (Chenoweth, 1978). This suggests there still may be identifiable differences between children and other age groups in terms of burial location and/or mortuary attributes.

I determined *age* either from precise age notation or suggestion (i.e. “baby,” “infant,” “grandfather”) on the monument itself, or from the difference between *birth* and *death dates*. In cases where *birth date* was absent and no other information was available or recoverable, I considered *age* as *unknown* unless the burial was so small it could only belong to a child. I classified *age* data based on historical and current definitions and included *child*, *young adult*, *adult*, and *senior* (see Table 4).

I treated the *child* classification as individuals ranging from 0-13 years of age, as persons aged 14 and over are indicated to be of working age in some Roslyn historical-period documents (Shideler, 1986; Trimble, 2008; United States Census Bureau, 1940). My *young adult* classification includes ages from 14-30 since there is currently no formal consensus on what constitutes this age group, nor was I able to find clear historical-period definitions. Currently, the World Health Organization (2014) and United Nations (1982, p. 3) define *young adults* or *young people* as those between 10-24 years old, whereas the Society for Adolescent Health and Medicine considers this group as 18-25 (2017). To capture a broader potential age group, I increased this fluid definition to age 30. My *adult* classification is the broadest group from ages 31-60, meant to capture all individuals between young adulthood and old age. I classified the *senior* group as those individuals 60 and older, although variation exists in the accepted definition of this group. Many Western countries suggest the lower range of seniority begins at age 65 (United Nations, 1982, p. 3; World Health Organization, 2015, p. 16), whereas the United Nations has proposed age 60 as the lower range worldwide (World Health Organization, 2002, 2018). To conform with lower life expectancies in the late 19^{th} and early 20^{th} century, I adopted the lower range for classification in the Old City data.

Cause of Death

Previous mortuary studies suggest that in archaic contexts, the cause of an individual's death—whether it be disease, accident, or natural causes—may influence mortuary treatment (Binford, 1971; Wedgwood, 1927, p. 395). In the Old City Cemetery, individuals appear to have experienced a variety of afflictions and ailments, and *cause of death* ranges from *accident*, *disease*, *chronic illness*, and *old age/natural causes*. Location within the Cemetery and choice of mortuary attributes may vary depending on this factor. For example, individuals who died of *disease* may be located away from the Cemetery core as in archaic studies (Binford, 1971). Those who suffered an *accident* may exhibit increased burial *elaboration* as a grief-driven choice, or may display the opposite due to lack of funds saved for the unforeseen and untimely circumstance. Those associated with *old age* may exhibit greater *elaboration* for similar reasons.

I determined an individual's *cause of death* through a variety of methods, although I collected the majority of data from standardized death records. For some individuals, no such records exist. In some cases, the date noted on the monument itself suggested *cause of death*; for example, an inscribed *death date* of May 10, 1892—commonly seen in the Cemetery—is linked to the infamous mine explosion. In other cases, I used best guesses to assign classification when *cause* was beyond a reasonable doubt based on age (see Age Class section above). However, some *causes of death* were completely unknown and I could not assign a best guess.

I classified *cause of death* data into broader categories based on affliction type (see Table 4). I placed instances of untimely death—other than disease—into the *accident* classification, which includes mining accidents, car accidents, gunshot wounds, rattlesnake bites, hemorrhaging after abortions, or suicide. These types of events were likely interpreted as tragic and shocking, and it is possible that cultural norms led to differentiation in mortuary expression. In Roslyn, mining accidents are noted as heartbreaking incidents causing considerable grief to the entire community, and in some cases, victims were treated with heroic reverence (Fridlund, 2017). It is possible that individuals in the *accident* category may exhibit increased *elaboration* or other identifiable patterns as a result.

Similarly, I placed instances of contagious or infectious conditions such as tuberculosis, pneumonia, bronchitis, diphtheria, meningitis, skin rashes, or in some cases carcinomas into the *disease* category. Outbreaks of diseases were commonplace in Roslyn prior to 1908, after which sanitation conditions improved, although several considerable disease events occurred after this time (Table 1). Perceptions of disease may influence where individuals were buried in the cemetery and may be correlated with various other attributes.

Chronic illness is similar to *disease*, but I considered these as instances of developed illness and chronic problems associated with genetic disorders or general ageing, such as heart disease, kidney disease, or diabetes, among others. This classification represents those deaths not necessarily caused solely due to old age and those that tend to be associated with untimely death or clearly caused by lingering issues. *Chronic illness* deaths were likely interpreted and treated differently that other types of untimely death, as the afflictions are generally not contagious, nor are they always visible to the community.

I reserved the *old age* classification for deaths denoted as caused by "senility," "old age," or those of individuals over the age of 70 in the absence of other information.

I noticed some overlap between *chronic illness* and *disease,* as well as *chronic illness* and *old age*. I assigned some individuals both classifications when *cause of death* was difficult to differentiate or was generally assignable based on age. In the absence of other information, I placed infant deaths into the former as they likely succumbed to sweeping epidemics or illnesses present since birth, while some senior deaths were assigned to the latter for issues clearly related to the ageing process. In these cases, I used both categories and represented them individually in analysis. In cases where no information is available, I assigned best-guesses to individuals where *cause* was beyond a reasonable doubt. Others, especially those in the *young adult* or *adult* group, were left *unknown* as there are many potential *causes* for average healthy individuals. As mentioned above, these classifications are partially subjective and are flexible in interpretation but were designed here in attempts to potentially capture community attitudes towards the causes of an individual's death.

Nationality

The definition of *nationality,* as opposed to *ethnicity,* used in this study is intended to proxy cultural background based upon similarities in behavior and norms, oftentimes deriving from shared country of origin (Onufer, 2008; Raitz, 1979; Upton, 1986). This practice has been critiqued in previous demographic studies (Onufer, 2008; Sollors, 1981), as simply using nationality sometimes obscures differentiations between distinct and recognized groups from the same nation. For example, African Americans or

Native Americans may be broadly designated as simply “American” if using the country-of-origin-approach, whereas these groups exhibit significant cultural and behavioral differences as compared to other American groups (Onufer, 2008; Sollors, 1981; Warner & Lunt, 1941). In some cases, the idea of an ethnic group is socially constructed based on how behaviors, beliefs, and expression are perceived to deviate from the cultural norms. Historical documents record cultural background in the form of “country of origin,” “place of birth” or “nativity,” and in the absence of other consistent information, these designations will be used instead of *ethnicity*.

Mortuary studies have identified and explored behavioral differences between cultural groups, and have suggested that an individual’s practices and beliefs tend to be more closely aligned with people sharing a similar cultural background (Binford, 1971; McGuire, 1988; Onufer, 2008; Saxe, 1970). “Similar” here referring to both spatial proximity and temporal alignment. And while individuals vary inherently based on a multitude of factors, larger cultural trends are expected in groups with shared cultural background (see disclaimer about homogeneity above). At least 24 nationalities were present in Roslyn by 1913 (Pitts et al., 2016), and an ethnographic study of historical-period architectural layout concluded that neighborhoods tended to be grouped by *nationality*, where individuals sharing a country of origin generally lived in close spatial proximity to one another (Onufer, 2008). This suggests societal importance on shared backgrounds Similarly, many of Roslyn’s fraternal lodges were targeted towards specific nationality groups and were intended as a support system to provide encouragement and preservation of cultural heritage and traditions (Pitts et al., 2016). A portion of Roslyn’s other cemeteries are organized by lodge affiliation and tend to house individuals of specific ancestry. As a result, it is possible that despite a lodge connection, the Old City Cemetery may be organized spatially in a similar fashion, and individuals buried within may exhibit discrete mortuary traits associated with choices related to *nationality*.

I compiled individuals' *nationality* from multiple pieces of information, including the individual's *birth location* or "nativity" (found in historical records) to indicate the person's immediate potential cultural affiliation, as well as parent(s) *birth location(s)*. I considered parental "nativity" here because it can be reasonably assumed that an individual, even if born in the United States, may likely be shaped by these alternate cultural influences in childhood. I considered *nationality* to be a combination of these two factors; if an individual and their parents were born in the United States, I assigned the person to the *American* classification. If the individual was born in the United States but their parents were born/lived in England, for example, I noted the individual as *American-English*. Similarly, if the individual was born in England with Swedish parents, I recorded *English-Swedish*. In situations where parental or close family information was available but the individual's *birth location* was unknown, I used known familial *nationality* as a proxy when it could be assumed beyond a reasonable doubt. I used a combination of genealogical connections, immigration dates, and birth/death dates and locations when available to make these assumptions.

I classified base *nationality* into even broader groupings based on regional proximity and generally accepted classifications in order to identify potential larger trends. Since precise "nativity" and "country of origin" are noted in various historical records instead of broader groupings, I used more modern classification methods to approximate these designations (United States Census Bureau, 2018). My *nationality* classifications include *America* (includes instances where both the individual and their parents were born in the United States); *Canada*; *Eastern Europe* (includes individuals associated with Croatia, Montenegro, Poland, Russia, Slovakia, and Yugoslavia); *Northern Europe* (includes individuals associated with England, Finland, Ireland, Norway, Scotland, Sweden, and Wales); *Southern Europe* (Italy); *Western Europe* (Austria, France, and Germany); and *Middle East* (Syria). I placed those with unknown heritage into the *unknown* classification (see Table 4).

I employed several methods to place individuals into these larger individual *nationality* groups. If an individual was noted as American-English (first generation American, born in America with parental lineage to England), I placed them into the *Northern Europe* classification, rather than the *America* category, with the intent to preserve potential cultural characteristics associated with the latter. I placed individuals into the *American* classification only if both the individual and parents were born in the country. In some instances, individuals fell into two classes within the same classification; for example, an English-Swedish person was easily placed into the *Northern Europe* classification since both England and Sweden belong to the same broader group. In other cases when there existed regional discrepancies between *birth location* and *parent nativity*, classifying *nationality* was more complex. For example, a Canadian-English-Italian person may fall into the *Canada*, *Northern Europe,* or *Southern Europe* classification; when such discrepancies existed, I used the father's *birth location* for consistency. I did not attempt to differentiate *nationality* classifications based on how long an individual—or their parents—lived in a specific country, and instead based this information solely off of birth location. Deciphering the complex nature of dominant cultural norms for each individual would be inconsistent, difficult to assess, and unnecessarily subjective. It is possible that there exist scenarios where an individual's parents, born in England, may have moved to the United States at a young age and therefore were more culturally aligned with generalized American norms than English. Under my classification, the individual would still be noted of *Northern Europe* descent, since the parents were born in England. This approach may be critiqued as too clinical to accurately capture all variation that exists, but because culture is inherently difficult to assess based such little information available in the relevant historical documents, a simplified approach may yield the most consistent results.

Occupation

Social status has long been researched in archaeology and mortuary theory, and many researchers have suggested that this factor plays a significant role in society's perception of an individual, as well as in associated burial customs and choice (McGuire, 1988, 1991; Wurst, 1991). In the historical-period—and modern times, for that matter—social status may be proxied by *occupation*, both in terms of the associated financial ability and a community's attitude towards such individuals. Roslyn, while a mining-dominant town, was home to a variety of businesses and jobs, and it is possible that individuals of various *occupation* groups exhibit identifiable differences in burial location or mortuary choice.

I compiled raw *occupation* data from a variety of historical documents and classified it into broader groups based on general job type. Broad classifications included *miner-laborer*, *general laborer*, *professional*, *proprietor*, *housewife*, and *no occupation* (see Table 4). I included all individuals associated with mining activities, from general mine laborers, mining engineers, mining mechanics, or otherwise into the first class. While some job titles within this category may have held more status than others (i.e. laborer vs. engineer), it is difficult to know if these disparities presented meaningful differences in status perception in Roslyn at the time, or if there were considerable differences in pay. I kept *miner-laborers* separate from *general laborers*, as Roslyn's livelihood rested on the former, and perhaps not as much on the latter. I considered *general laborers* as those individuals who made a living outside the mines with manual labor, which is comprised of several sub-classes including, *laborer-carpentry* (builders, painters, decorators, woodworkers), *laborer-general* (odd jobs laborers, janitors, truck drivers, general engineers), and *farmer*. *Professionals* included individuals with learned specialties that were likely of high value in historical-period society, such as those in *administration* (office workers, law enforcement, union or teamster administration), *health* (doctors, pharmacists), *firemen*, or those with a *military* career. I distinguished *proprietors* from *professionals* as individuals who owned or worked in established businesses or those who were self-employed and earned a living with other various skills. Sub-classes in the *proprietor* classification include *retail* (shoemakers, dressmakers, general store employees, merchants, or salesman), *general proprietor* (boarding house/hotel keepers, grocery store owners, bar owners/bartenders, sawmill owners, or dairy owners), and *entertainment* (one individual, a snake charmer for the travelling circus). My *housewife-housekeeper* category includes married women noted as such, as well as household cooks, married or unmarried housekeepers, or married women with no occupation listed. When available, I recorded the husband's *occupation* separately for additional context and for use in future studies, but I used the individual's own occupation in analyses. Some younger individuals had no occupation listed as they were too young to formally work, and as a result I placed them in the *no occupation* class. Similarly to the *housewife* category, I recorded the father's *occupation* separately as available, but did not use this extra data in analyses. When *occupation* was unknown or unlisted, I placed individuals either in the *unknown* category or the *no occupation* class if age was noted as *child*.

For a variety of job types, potential overlap exists between classifications. In the *farmer* sub-class, no distinction is made between farmhands and farm owners in historical records; one may argue that farmhands may fall into the *general laborer* class, while farm owners may be placed into the *proprietor* classification based on farm ownership. However, in the absence of this information, I considered all *farmers* as part of the former since farm owners were likely also perceived as laborers. Similarly, the terms *professional* and *proprietor* are subjective, and some jobs types may fit into both. In cases where an individual's *occupation* was not consistent between records, I used either the most frequent job or last-held job, except when this was noted as "retired."

Classifications of Mortuary Feature Attributes

Mortuary attribute categories included *monument type*, *monument material*, *monument size*, *plot size*, *motifs*, and overall burial *elaboration* (Table 4). I based classification of variables within these groups on frameworks established in previous studies and general mortuary theory (Binford, 1971; Edgar, 1995; Lane, 2013; Mallios & Caterino, 2007; McGuire, 1988; Parker Pearson, 1982; Tainter, 1976). Monument attributes were recorded for all interments present in 2019, even if no demographic attributes were identifiable.

Monument Type

Monuments, commonly referred to as headstones, are more than just a physical marker of a burial location. Monuments represent a tribute to a person's memory and as such, monuments are usually chosen carefully either by the individual themselves prior to death or by close family and friends after-the-fact. They can be analyzed to understand more about mortuary choice and social perception. Attributes associated with monuments may be correlated with demographic data and may reveal larger trends in burial customs when correlated with other mortuary attributes. Choice of a *monument type* may be linked to demographics through cultural norms (i.e. *nationality* and/or *age*), chronological trends (i.e. *decade of death*), the grieving process (i.e. *cause of death*), or financial ability to purchase different types of markers (as proxied by *occupation* and/or *age*). It is likely that similarities existed between individuals within the same social groups. Previous studies have also suggested that monument choice may be partially driven by spatial factors, influenced by nearby monuments (Streb et al., 2019), although I did not assess this in the Old City Cemetery.

Many styles and shapes of monuments are present in the Old City Cemetery, as there existed little standardization and regulation in late 19th and early 20th century cemeteries. However, in order to capture broader trends in monument choice, I designated *monument type* towards standard categories relating to general type, including *bevel*, *flat* (includes flat rectangles, squares, and shapes), *obelisk*, *upright cross*, *upright* *domed* (includes gothic domes), *upright slant* (includes pulpit style), *upright standard*, and *irregular* (a catch-all for other non-standard types) (see Table 4 and Figure 6). I also created a *no monument* category for those plots that do not contain a monument, but are represented by other mortuary components.

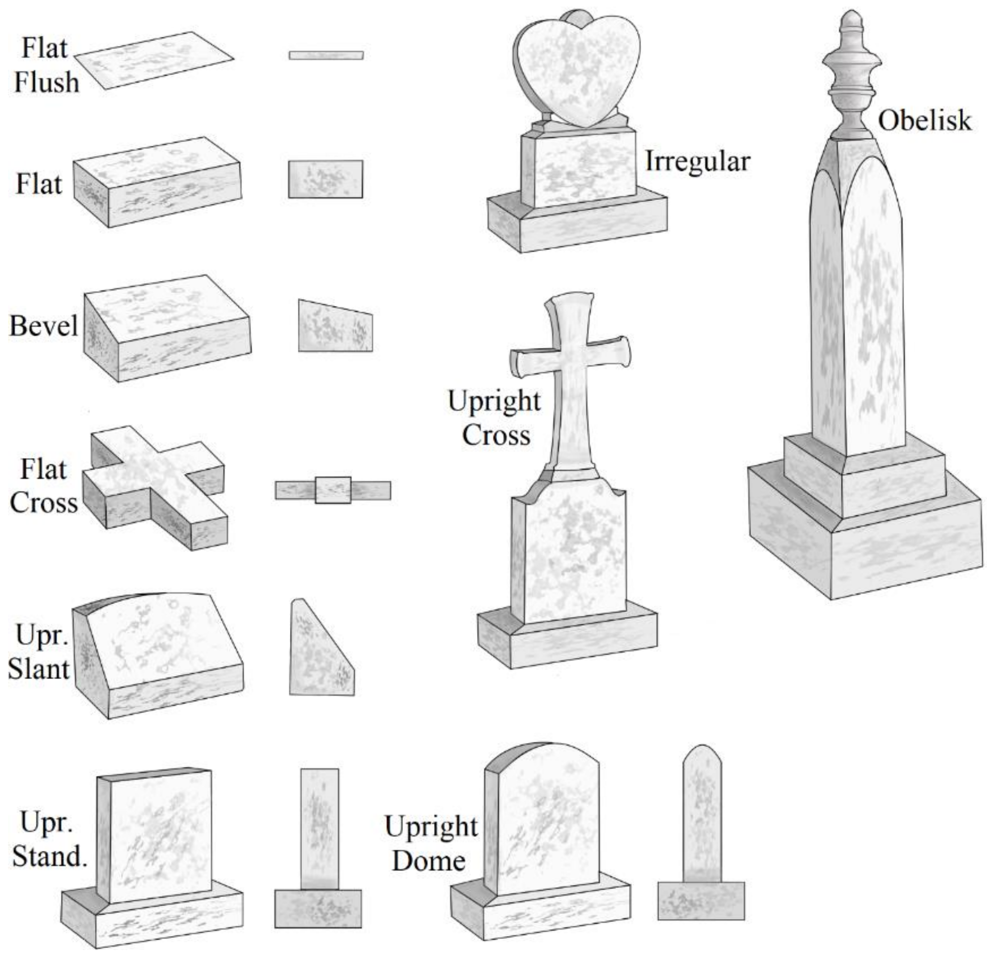

Figure 6. Monument Types.

If a monument was considerably "fancy" or more decorative than others within the category, I gave these burials an extra point towards *elaboration* (see Burial Elaboration section below) (Figure 7). I determined this factor based on whether or not a monument included more beveling, architecture, or contouring (other than engraved motifs) than the average marker in the category that would suggest a more expensive purchase. I tended to consider monuments in the *irregular* category as “fancy,” as they generally include additional detailing by nature. While some duplicate standardized monuments exist—with personalized engraving—considerable variation exists within general categories (Figure 8). This approach is subjective, but *type* was generally identifiable when comparing monuments.

Figure 7. Headstone Variation Examples, Regular vs. Fancy. Taken July 2019.

Figure 8. Obelisk Variation Examples. Taken July 2019.

Monument Material

Not all monuments are created equal, even within the same *monument type* category. Monuments are intended to last, but durability and life expectancy of the monument is based on the *material* it is composed of. As a result, variation in *material* may suggest difference in a monument's price, and therefore may be correlated with an individual's economic status. For example, a quickly cut wooden marker is less costly than one of manufactured stone, although the former may not last as long as the latter. Similarly, sandstone tends to have less fundamental stability over time than wrought-iron or granite, and may have been cheaper to purchase. Certain manufactured *monument types* tended to be made out of standardized *materials*, but variation in *material* preference between social groups may also suggest deeper social trends. My *material* classes represent all types present in the Old City Cemetery, and include *concrete*, *granite*, *marble*, *metal*, *sandstone*, and *wood* (see Table 4).

Based on *material* type, I added additional *durability* scores towards *elaboration* (see Burial Elaboration section below). Friable materials such as wood or sandstone were given a score of 1, while tougher materials such as concrete, granite, marble, or metal were given a score of 2. Those plots without monuments did not receive a *durability* score. While it is true that *materials* such as marble are softer than metal and in some cases exhibit more degradation, monuments of this style are in notably better shape than those of the lower score class in the Cemetery.

Monument *material* information can also be used by resource managers to form preservation and restoration plans within cemeteries. Indicating this information spatially can also help identify potential localized hazards more detrimental to certain materials, and as a result, construct management policies to minimize additional risks.

Motifs

Similar to *monument type*, additional inscriptions, designs, and patterns on monuments are not only indicators of specific paradigms of mortuary belief (Chenoweth, 1978; Dethlefsen & Deetz, 1966; Onufer, 2008), but they may also be correlated with mortuary norms between various social groups. In some cases, *motifs* may be standard for various manufactured *monument types*. *Motifs* represent expressions of mortuary beliefs and ideologies. In the Beautification of Death era (ca. late 1700s-early 1900s), these designs tended depict nature (in the forms of flowers, vegetation, or nature scenes), religious iconography (cherubs, crosses, pearly gates), or other images or expressions of happiness, affection, and beauty (Bell, 1990). As many Old City Cemetery burials fall within the latter range of this period, these types of *motifs* may be more linked to broader chronological mortuary paradigms than to individual mortuary choice. However, there may exist identifiable differences in *motif* types or inclusions between social groups. In some cases, manufactured monuments came pre-engraved with *motifs*, and perhaps the *monument type* category is more apt to capture potential differences between social groups. However, choice of *monument type* may have been heavily influenced by included *motifs*, and this element of design may have been considerably important. Some *motif* types are generally more associated with certain social groups than others; a *child's* monument is more likely to include images associated with purity and innocence, whereas older *adults* are more likely to have patterns associated with other social sects (such as *lodge affiliation*). Chronology (*decade of death*) is likely to have an effect on *motif* choice since mortuary trends and beliefs change over time. Even though the majority of Old City Cemetery burials fall squarely within the above paradigm, there may exist variation between *motifs* on smaller temporal scales within this range.

For each monument within the Cemetery, I recorded types of *motifs* and classified them into broad design groups, which included *vegetation*, *lodge affiliation or specific religious sect, religious*, *geometric, nature*, and *animal* (see Table 4 and Figure 9).

Figure 9. Motif Examples. Vegetation (top), Lodge, Religious, Geometric, Nature, and Animal (bottom right). Taken July 2019.

The *animal* class included instances of elk and doves, but does not include lambs or beehives—the former is closely linked with *general religious* iconography, while the latter is an image used by the Latter-day Saints (a *specific religious sect*). G*eneral religious* imagery observed in the Old City Cemetery is largely associated with general Christianity, and includes cherubs, angels, crosses, harps, crowns, pearly gates, foundations, and lambs. Doves may be placed in this class, although the *motif* tends to be more heavily associated with general feelings of peace than specific religion (Haveman, 1999; Snyder, 1989). My *lodge affiliation or specific religious sect* class contains masonic images, lodge insignia, coats of arms, hunting and/or weaponry, and beehives. I separated *nature* from *vegetation* as it contains images of landscapes or broader scenes, and include elements such as suns, moons, mountains, lakes, and trees. On the contrary, I confined *vegetation* to independent designs of ivy, trees, flowers, olive branches, leaves, or ferns. My *geometric* class is broader and encompasses other types of symbols not immediately associated with other designations, and includes hearts, drapery, scrolling lines, and other abstract designs.

I recorded the above *motifs* in binary format for each monument, expressing either a presence or absence of the particular design group. For simplicity, I did not record the relative amounts of motifs from each category on each monument or the total area coverage of the design. A monument with an excessive amount of a particular *motifs* class was not recorded differently than those with a single motif from the same class. I intended and interpreted the number of design classes present on the monument to represent the complexity of cultural and mortuary beliefs. The more types of designs included, the more expansive the mortuary paradigm. I put the total number of *motif* classes extant on a monument towards the *elaboration* category (see Burial Elaboration section below). Future studies may analyze total number of individual motifs or total area covered by motifs to further identify potential complexity or *elaboration*.

Monument Size

Just as *material* and *motifs* may affect a monument's cost and desired aesthetic, *size* is an important mortuary choice. Based on differences in *size*, differentiations may exist between norms or financial abilities of various social groups. Similarly, certain *monument types* are likely associated with certain sizes. For example, *obelisk* monuments tend to be tall, while *upright standard* headstones can range widely in terms of height and width. I took precise measurements of each monument during fieldwork (see above), and then placed each monument into general size groups determined by total volume. I used volume measures to classify *size* as it can be argued that a tall skinny monument has the same visual impact as a short wide monument. I considered *small* monuments as those ranging between 1-25,000 cm^3, *medium* from 25,001-120,000 cm^3, and *large* as those above 120,001 cm^3 (see Table 4). Because *size* is a subjective designation, I based the above classifications on the general spread of volumes within the Cemetery. I tested these classes against photographs of monuments to ensure the classifications matched visual perception. I also assigned scores to each *size* class to use towards the *elaboration* category (see Burial Elaboration section below), with larger sizes for higher scores.

Plot Size

My classification of *plot size* followed the same method and rationale as *monument size*. In addition to potential differences between social groups, *plot size* may decrease over time as less area remains available in the Cemetery and mortuary norms shift. This category is intended to denote the total amount of space used by the interment and is used here as a proxy for visual impact, financial means, and *elaboration*. I calculated total plot area using *plot measurements*, and then classified plots into size categories. I considered *small* plots as those ranging from 1-30,000 cm^2, which tended to represent single individual or child-sized plots. I considered *medium* plots as those spanning between 30,001-60,000 cm^2, which either represented large single individual plots or small multi-plots. I considered *large* plots as any feature above 60,001 cm^2 that represented multi-plots and fenced plots (see Table 4). I placed burials with no *plot measurements* into the *no plot* category. As was done with *monument size*, I compared class designations against plot photographs to ensure adequate groupings. *Size* scores were also used in *elaboration* (see Burial Elaboration section below).

Burial Elaboration

Scholars have suggested that burial *elaboration* is closely linked to social status (Binford, 1971; Chenoweth, 1978; Lane, 2013; Onufer, 2008; Saxe, 1970; Tainter, 1975). In archaic contexts, elaboration is interpreted to proxy social status by the amount of effort required for the burial, and in historical-period contexts may be interpreted in a similar manner. According to previous studies, groups with higher economic ability or perceived social status tend to exhibit higher burial *elaboration*. However, with the advent of manufactured monuments, increased financial accessibility, and narrowing cemetery requirements, it is possible that the linkage between social status and *elaboration* is not as prominent in the historical period. As a result, *elaboration* may not be associated significantly with particular social groups. However, considering the high diversity in monument and plot attributes in the Cemetery, I suspected there may be linkages between demographics and *elaboration*.

In this study, I created an *elaboration* category to identify if certain social groups tended to have more embellished or complex burials that would suggest differences in mortuary traditions, practices, or cultural norms. I created this category based on an aggregation of scores assigned to variances in mortuary attributes, some of which are mentioned above. I recorded and classified a variety of other attributes with the intent to include in the *elaboration* category, but these were not independently analyzed. I compiled scores for *plot statistics*, *size classes*, *total motifs*, and *epitaph statistics* (Table 5), and I then classified the total summed scores from all categories into either *low*, *medium*, or *high elaboration* groups informed by quantile distributions. I confirmed that these classes represented logical breaks with photos of monuments.

I composed *plot statistics* based on general inclusions within each burial, and included several sub-categories of attributes: fence statistics, curbing statistics, monument/headstone statistics, and footstone statistics. I designed the first sub-category, fence statistics, to capture added *elaboration* associated with this additional feature. To keep the designations simple, I did not differentiate between fences of different material types (i.e. metal vs. wood), although this may be addressed in further studies.

Generally, curbing was historically associated with individuals of higher financial ability (Lane, 2013). My curbing statistics were based off curb fill type. This ranged from concrete fill, alternate material fill (gravels, carpeting, etc.), or simple dirt fill.

Table 5. Elaboration Scoring System.

Plot Stats				
Category	*Sub-Category*	*Classification*	*Score Present*	*Score Absent*
Fence			3	0
Curbing Stats				
	Curbing Type			
		Concrete/Full Curb	3	0
		Alternate Material Fill	2	0
		Dirt Fill	1	0
Monument Stats				
	Present		1	0
	Fancy		1	0
	Components		1-4	0
	Engraved		1	0 or -1
	Finishing		1	0 or -1
	Durability		1-2	0
	Plaque		1	0
Footstone Stats				
	Present		1	0
	Engraved		1	0
Size Stats				
Category		*Classification*	*Score Present*	*Score Absent*
Monument Size				
		Small	1	0
		Medium	2	0
		Large	3	0
Plot Size				
		Small	1	0
		Medium	2	0
		Large	3	0
Other Inclusions				
Category			*Score Present*	*Score Absent*
Total Motifs			1-6	0
Epitaph Present			1	0

Curbing outlining material was not considered here and was recorded in a similar way for typical a concrete curb or a line of rocks mimicking a curbed plot. Curbs usually fell only into the concrete or dirt class, but I witnessed instances where a plot contained multiple curbing fill types (for example, gravels over dirt fill or carpeting over full concrete). In these cases, I assigned scores from both categories to indicate an increased effort.

I compiled *monument statistics* from several sub-categories: monument presence, fanciness (explained above), number of components, engraving, finishing, plaque presence, and material durability. I recorded the number of components comprising the entire monument which included base stones, main stones, and any topper stones. Some monuments were clearly missing components (especially toppers); in these cases, I assigned a best guess to record the total number of components. I recorded engraving type (machine-cut vs. hand-carved) and finishing type (polishing vs. rough-cutting) to differentiate between manufactured (a more expensive addition) and hastily made monuments (which decreased the overall category score). In some cases, no engraving existed within the monument and a plaque was placed instead, which I noted and added to the score in lieu of the engraving score. I also added monument material durability to the overall score, as mentioned prior. I recorded *monument type* for every plot, but did not used it the final category score, as I analyzed this detail separately.

I based *footstone statistic* scores on presence vs. absence and whether the feature was engraved or left plain. Some plots include both curbing and footstones, resulting in additional points towards their full score. I did not weight this category heavily towards *elaboration* as footstones are often stolen. Absence of the feature within a plot may be an outcome of such an event, rather than a discrete mortuary choice.

Size classes included *monument size* and *plot size*, as explained above. Larger size classes were given higher scores towards the total, as higher *elaboration* is immediately linked to these *size classes* through financial ability. The total number of *motif* classes present on a monument also contributed to the total *elaboration* score. *Epitaph statistics*, although not used independently in this study, also contributed. Epitaphs were considered engravings other than the standard name and date information, and include statements of familial affiliations (“wife of…,” “infant son,” etc.), poetic rhymes, or other expressions of grief or memory (“in memory of…,” “gone but not forgotten”). The nature of the epitaph was recorded but not considered in this study. Future work may include analysis of epitaph type or style as seen in various previous studies.

With all above scores combined, I classified *elaboration* into simplified classes: *low* (score 0-8), *medium* (score 9-16), and *high* (score 16+). I based these classifications off score quantiles within the dataset. In some cases, I made minor adjustments to these categories when comparing against photographs to ensure groupings matched perception.

Information Not Used in Analysis

I compiled some additional information and included it in the dataset, but did not use it in analyses or development of the *elaboration* score as they have little bearing on mortuary choice. These additional categories include first and last *names* of the deceased, full *birth/death dates* (including day and month), *familial ties*, *shared vs. person*al monument, *burial orientation*, and *monument age/condition*.

Some of these attributes may hold potential for future studies, while others provide little potential past genealogical research. Exploring mortuary differences between *shared vs. personal* monuments may reveal patterns associated with economic purchasing power or cultural norms, although it is unknown whether this factor may affect the perceived *elaboration* of a burial. A shared headstone may be evidence of lower economic ability to purchase a new stone for each individual, or may simply represent chronological trends in family-style burials.

Seasonality of death using *death date* month information may reveal more finely grained temporal and spatial trends, although this information was not provided in historical documents consistently. I noticed some discrepancies between historical records and monument engravings for both date types, suggesting that analyzing this type of data may not be reliable. Future studies may integrate this type of data into analysis.

Investigation of *burial orientation* may provide interesting mortuary patterns, although the majority of plots in the Old City Cemetery faced east. East-facing burials represent a common European-dominant norm (Liebens, 2003; Onufer, 2008). Several burials faced other directions, although these instances were rare and likely represented modifications based on the availability of space, rather than intentional trends.

The *monument age/condition* category may also be incorporated into further work. Here, it was recorded with the intent to be used in future preservation and restoration planning, but also highlights an important limitation of the current study. Where monuments had been replaced, I could not assess original monument attributes.

I did not compile some social attributes such as religious affiliation, but this information may have a significant effect on the perception of mortuary trends and choice in the Old City Cemetery. This information is not recorded in census records, death records, or birth records, but future studies may attempt to compile this information from other types of documents, if available.

DATA COLLECTION AND PREPARATION LIMITATIONS

Despite careful contemplation, some notable considerations and limitations exist regarding how data was collected and grouped. Regardless of these constraints, the general framework suggested by this study provides a potential for future research and application in other contexts. Analysis and interpretation-based limitations will be addressed in Chapter VI.

The most pronounced issue with data collection regards *when* the mortuary attribute data was compiled. I recorded plot and monument attributes from features as they currently stand within the Old City Cemetery (Cemetery), which may differ from original feature attributes. Some monuments and plots were updated or replaced over time. In some cases these updates are difficult to detect. In others, I was able to identify updated monuments based on general monument type and temporal norms. A new or updated monument may be vastly different from the original, and may not include the same attributes. This effectively removes indication of a potential linkage between the individual and mortuary attributes, and skews or obscures potential trends in mortuary choice. Similarly, monument or plot degradation, damage, and vegetation overgrowth have occurred over time, perhaps obscuring or removing indication of some attributes. Theft is a pervasive problem for many historical-period cemeteries (Brandi Taklo and Richard Watts, personal communication 2019; Ware, 2005), and some features—such as footstones, obelisk toppers, and even sometimes full headstones—may now be absent, suggesting different burial components and attributes than the original burial held. More friable materials such as wood may have disintegrated and headstones of this material may appear underrepresented in the Cemetery today. Some families may have been financially unable to purchase any sort of monument, leaving the plot unmarked (Prater, 1994; Ware, 2005). However with a large enough sample size, I anticipated that larger general trends remain identifiable, even despite these discrepancies.

As mentioned previously, spatial and statistical results may vary based on how data is classified into social groups. Changing classification may suggest alternate patterns than those presented in this study, as cautioned by previous studies (Arnold & Jeske, 2014; Pader, 1982; Tainter, 1975). The classifications used in this study are meant to represent best-guess groupings. While guided by historical perceptions and modern accepted classifications, these classifications are subjective and do not inherently represent "reality." These approximations of social groups are similarly not intended to homogenize individuals with shared attributes as scholars have cautioned (Bower, 1991), but instead are used in attempts to identify broader trends. Even so, these social groups may not share similar mortuary practices, as people are neither algorithmic nor entirely formulaic, and make their choices and decisions based on personal reasoning, personal experiences, and a multitude of other imperceptible factors.

In short, this project is working with an incomplete dataset with the general absence of recorded information, change in the Cemetery over time, and human complexity. People are complicated and simple computational analyses of narrow classifications cannot entirely predict or explain human behavior, choice, and beliefs. However, archaeological and anthropological investigations are moving towards using more empirical methods in attempts to identify broader cultural trends, and these types of approaches—when constructed with cultural complexity in mind—should not be disregarded. While imperfect by nature, the framework of data collection, classification, and methods described below are useful other contexts to investigate mortuary choice.

GEOSPATIAL AND STATISTICAL ANALYSES

Introduction

Spatial analysis methods allow researchers to visually identify clusters of point data based on the proximity to other similar points. While these methods may suggest spatial patterning, many do not provide statistical valuation and may mislead researchers into constructing interpretations based on statistically non-significant results. While visual representations of patterns provide important context, incorporation of statistical methods are required to both validate significance and allow comparability between datasets. Further non-spatial data patterns benefit from comparing outputs to trends suggested by standalone statistical methods.

I had to consider the data types of the compiled attributes when choosing adequate analysis methods. In some studies, database and analysis design guide data collection principles, but in this study, certain data types collected were of an inherent format, and informed and limited analyses methods. To limit the number of data types considered in analyses, I grouped all attributes into nominal classes, even if the original data was in ordinal or numeric format.

Following spatial-statistical methods outlined in Sayer & Wienhold (2013) specifically, I used a combination of Ripley's *K*-Function and kernel density estimation (KDE) to assess and visualize at what distances clustering becomes statistically significant for each of the demographic categories (including *decade block*, *nationality*, *age*, *cause of death*, and *occupation*). In other words, using a statistical measure helps assess how likely the spatial distribution of classes are to have been influenced by underlying intentional choice rather than random chance. However, I implemented these methods in an alternate way. Sayer & Wienhold (2013) used only the smallest significant distance suggested by Ripley's *K* to visualize individual patterns within different cemeteries, as cemetery patterns were independent of one another and did not need to be on a comparable scale. I worked with a single cemetery with a multitude of classes that, for interpretation purposes, needed to be comparable on the same scale.

To remedy this, I visualized the patterns using KDE with a standardized search distance of 13 meters and normalized the output density symbology scale for each KDE surface, allowing for visual comparison between datasets. See the Kernel Density Estimation Analysis Parameters section below for more information. This procedure suggests that a 13 meter search radius distance is optimal to capture variation within the Cemetery's extent (96 m east-west x 91 m north-south). A larger search distance would decrease clustering density patterns within the Cemetery, while a smaller distance would suggest highly localized hot spots and may fail to capture broader-scale trends. Here, using the same search distance *with* a normalized density scale allows for visual comparability between classes and eliminates the potential for misleading patterning. Using significance values from Ripley's *K* further informed my interpretation of patterns.

I also incorporated standalone statistical methods similar to those outlined in Šmejda (2004) to assess the degree to which demographic and mortuary attributes correlate to suggest underlying trends in mortuary customs. Because I originally placed the classified data into nominal categories, I re-coded the dataset into a binary and ordinal format, and used factor analysis as conducted by Šmejda (2004) to further explore correlations between attributes that may not otherwise be identified spatially.

Ripley's K-Function Analysis

Ripley's *K*-Function is a spatial-statistical method used to assess clustering or dispersion of point distributions over a range of distances, and indicates at what scale patterns become statistically significant (Conolly & Lake, 2006; Esri, 2019b, 2019c). The function compares observed frequencies of data (observed *K*) against randomly generated distributions expected to approximate complete spatial randomness (expected *K*). Because the function uses a L(d) transformation, the expected K also represents the search distance for each scale. Using a simulated Monte Carlo approach with a chosen number of iterations, the function creates a significance envelope by assessing the highest deviation between the simulated point distributions. Comparing the observed distributions to this simulation, Ripley's *K* distinguishes at what distances observed distributions become significantly clustered, dispersed, or remain random (Esri, 2019c; Sayer & Wienhold, 2013; Thatcher et al., 2017). While useful to identify significance of a spatial pattern in tabular format, Ripley's *K* does not provide a visual output and does not identify the relative *location* of clustering or dispersion within the dataset, nor which data points may be contributing to the pattern.

Parameters

I utilized the Multi-Distance Spatial Cluster Analysis (Ripley's *K*-Function) tool in ArcMap 10.5 to calculate Ripley's *K* values for each of the data classifications individually with identical parameters to ensure comparability between datasets (see

Appendix A). I calculated the expected and observed values using 10 distance bands and 999 permutations to achieve the highest confidence interval, as suggested in previous studies (Sayer & Wienhold, 2013; Thatcher et al., 2017). I ran the function using the entire Old City Cemetery extent as a forced constraint (using the "user-provided study area feature class" study area method option), resulting in the same search distance iterations (expected *K*) tested for each dataset, regardless of the actual spread of points within each class. Simply running the tool on each dataset's extent would result in different search distances and significance levels between attribute classes. But since the discrete boundary of the Cemetery is known and constrained the available burial area, search distances encompassing the entire extent is necessary. As stated in the tool documentation, clustering and dispersion significance returned by Ripley's *K* is highly sensitive to scale and may return misleading patterns if the total search area varies between categories (Esri, 2019b, 2019c). I did not use a weight field, as each point location represented a singular individual instead of representing a count. Nor were beginning distance or distance increments used because the extent was standardized to the Cemetery boundary. I did not enable boundary correction, as the distribution of burials within the Cemetery are confined to and shaped by the discrete area, and burials in nearby cemeteries are not considered in this study.

While this tool exists in both ArcMap and ArcGIS Pro, I chose to use the former as it still retains the ability to produce a line graph for each output, providing an additional visual useful for interpretation. Both programs produce the same tabular output, and either can be used to produce results for Ripley's *K*.

Interpreting Ripley's K*-Function Outputs*

Ripley's *K* assumes that if a pattern is completely random, both expected and observed events will be equal. If the observed number of points (transformed with the function and represented by the observed *K* value) is higher than the study area average within a certain search distance, the pattern is more clustered than would be expected in a random distribution (Esri, 2019c). If observed point distributions fall above the high confidence threshold for a certain distance interval (expected *K*)—i.e. if the observed *K* value is above the high confidence value (HiConf)—the data is *significantly* clustered at the distance interval. If below the lower confidence value (LwConf), data is significantly dispersed at the specific distance (Esri, 2019b). For observed *K* values between the envelope intervals, the pattern may be partially clustered or dispersed but does not differ significantly from a random distribution.

Kernel Density Estimation Analysis

Kernel density estimation (KDE) is a spatial method used to create a smoothed density surface visualizing spatial locations and intensities of patterns within a dataset. KDE calculates density at any given location using the number of points falling within in circular a distance from that location (Conolly & Lake, 2006; Esri, 2011, 2019a; Krause, 2013; O'Sullivan & Unwin, 2010). Calculated density values can vary greatly depending on the input search radius, as the function calculates density by dividing the number of points in the radius by the radius' search area. A large search radius washes out overall density, while a smaller search radius increases this value. When a search radius distance (bandwidth) is not specified by the user, the KDE function uses Silverman's Rule of

Thumb Bandwidth Estimation function to calculate a default based on the mean center of input points and mean, median, and standard distances from this center (Esri, 2016, 2019a; Silverman, 1986). Used in combination with statistical methods like Ripley's *K*, visualization of density can reduce user subjectivity in pattern interpretation[1].

Parameters

I used the Kernel Density tool in ArcGIS Pro 2.4 to calculate a density surface for each of the data classifications individually with identical parameters to ensure comparability between datasets. I used the full extent of the Cemetery as a constraint regardless of the full spread of points in each classification dataset, forcing the function to calculate density over the entire area. Because a standardized search distance is necessary to compare densities between class distributions, I set the search radius (bandwidth) for all classes to 13 meters regardless of each class's spatial distribution. To identify a standardized, optimal search radius distance necessary to capture variation within entire Cemetery (96 m east-west x 91 m north-south), I ran the Kernel Density tool without a specified search radius on multiple datasets distributed over the Cemetery's full extent and noted the default bandwidth used for these distributions. Because the Silverman's Rule of Thumb bandwidth estimation function is robust to spatial outliers and works best on normal distributions (Esri, 2016), I ran this test on multiple datasets

[1] For Ripley's *K* and KDE analyses, I used the points located on the northwestern corner of each plot (or monument if no clear plot) as these methods both work on point patterns. To visualize Cemetery layout more clearly, I symbolized the resulting KDE maps with plot polygons instead of these points. Resulting density values represent the number of burial points divided by the search area (roughly 530 square meters for a search radius of 13 meters).

with varying numbers of points and configurations (although all extended throughout the Cemetery) to get a general idea of a suitable bandwidth to use. The resulting radii represented general bandwidth values appropriate for the whole Cemetery, which were all around 13 meters. Similar to Ripley's *K*, density values calculated in KDE are sensitive to scale. Simply using default search distances for each classification would return density values on various non-comparable scales, because default search radii would vary between datasets. Providing a predetermined search distance of 13 meters placed all density surfaces upon the same scale, lowering the density surface for classes not significantly clustered at the 13 meter level, and increasing the density for those at and above this level. I normalized the resulting density surfaces between classes and symbolized them using the same scale representing their respective density values and allowing comparable visual representation of density.

Interpreting Kernel Density Estimation Outputs

As density values represent points per square search area, density ranges from 0.0 and above. The higher range represents a greater number of points within the search area in that location (Esri, 2019a; Krause, 2013). The density values are intended to represent a scale of intensity within a search area. As an alternative to density values, the expected count within a search radius can be calculated, based solely on the observed values within the search radius (Krause, 2013). I did not use expected count here, as the dataset is not predictive towards where future burials may be placed, nor is raw count as meaningful as overall density within an area. Because I used a standardized bandwidth informed by

Ripley's *K*, datasets with lower density values correspond to those patterns less statistically significant overall in burial patterns and choice in the Cemetery.

Principal Factor Analysis

Principal factor analysis describes the statistical correlation and variability between dataset variables and unobserved latent processes, illuminating possible processes underlying dataset creation (Rahn, 2019; Šmejda, 2004). Resulting factors represent the possible causes or patterns underlying dataset trends, and factor loadings within the factor suggest the degree to which various attributes are associated with the trend. Using a transformation of Pearson's R, the function creates factor loadings representing a correlation between variables by the total variance over the whole dataset, which the function calculates by dividing the sum of each factor loading (correlation) by the total number of variables (Rahn, 2019). Variables with factor loadings closer to zero indicate a low level of correlation to the factor, i.e. the variable is unlikely to be a meaningful part of potential underlying patterns. In this study, burials exhibiting similar social and mortuary attributes may be associated with similar underlying practices.

Factor analysis functions also automatically create correlational matrices using a transformation of Pearson's R. Pearson's R correlation measures the strength of the linear relationship between two variables and identifies the degree of covariance between data categories (Lund Research Ltd, 2018). The output includes correlation values between two variables plotted onto an X-Y graph, which determines how changes in one dataset reflect changes in another. A line-of-best-fit placed within the scatter to estimate the general direction and strength in covariance. The function calculates Pearson's R by dividing the dataset's standard deviation and the average distance from each point to the line. While factor analysis produces a Pearson's correlation matrix, it does not provide a measure of significance attached to the covariance. To remedy this, I also ran the Correlation Test function in XLStat on the same data to identify which correlations were statistically significant at a p=0.05 level.

Parameters

Using the Factor Analysis functionality in XLStat, I generated factor loadings and a Pearson's correlation matrix assessing the covariance between all social and mortuary attributes. As mentioned above, my original classified data was in nominal format, so to conform to the assumptions of factor analysis, I re-coded the dataset into a binary and ordinal configuration. I applied a varimax rotation with Kaiser normalization, and set correlation type to Pearson's. By default, factor analysis does not provide a measure of significance attached to the Pearson's covariance. I used a significance level of p=0.05 (significance level = 5%). Although this level is not the highest resolution possible, the dataset is incomplete and includes a variety of "unknowns"; as such, using the p=0.05 level allows a broader view of potential patterns in attribute correlation.

Multiple Correspondence Analysis (MCA) is a nominal data alternative to factor analysis, but was not used here. To test the similarity between the two methods, I also ran the Multiple Correspondence Analysis (MCA) functionality in XLStat with the original nominal dataset and compared the suggested factor patterns to those output by factor analysis. Both methods appeared to provide very similar factor patterns, suggesting that although the original data is nominal in nature, re-coding into binary and ordinal formats achieves the same output. However, MCA does not provide a clear correspondence matrix to further investigate correlation between factors, while factor analysis provides this measure. For both of these reasons, I chose to use factor analysis over MCA to assess correlations between attributes.

Interpreting Principal Factor Analysis Outputs

Each identified factor represents overall variance in the attributes, and suggests the degree to which correlated variables were influenced by underlying latent variables. The strength of each factor is represented by an eigenvalue, a measure of total variance a factor explains. The function calculates eigenvalues from the lowest amount of cumulative variability between combinations of factors, and assumes that the identified factors tend to occur together significantly. Any eigenvalue above 1 signifies the factor includes multiple attributes explaining more variance than a single attribute. The function assigns factor loadings to each attribute that represents the attribute's correlation to the underlying factor that ranges between -1 and 1. Attributes with similar factor loadings are more likely to be closely correlated together. A factor loading closer to 0 suggests that the attribute is unlikely to be strongly associated with the latent factor, and thereby is unlikely to be part of the distinct cultural trend possibly affecting the correlations. A factor loading approaching 1 is more likely to be associated with the underlying factor, and those closer to -1 are more likely to be directly alternate to the factor. When assessing factors, I focused on the highest eigenvalues (approximately 0.5 and above).

Interpreting Pearson's Matrix Outputs

The Pearson's correlation matrix holds covariance values for each combination of attributes. The covariance result varies between 0 and 1, and can be either positive or negative. A value closer to 0 indicates low covariance, whereas a value closer to 1 indicates high covariance. However, only those indicated as statistically significant at the p=0.05 level are likely to have been influenced by underlying mortuary trends or choices. The significance level (p=0.05) is compared to the p-values of each attribute correlation coefficient; those with p-values at or below 0.05 are considered statistically significant. Significance values do not indicate the strength of the relationship between variables; a weak correlation may be indicated as significant, suggesting only that the weakness is less likely to have been caused by random chance.

CHAPTER VI

RESULTS AND DISCUSSION

This chapter contains the results and discussion of Ripley's *K*-Function tests, kernel density estimation (KDE) visualization, factor analysis, and Pearson's R correlations for each attribute category and classifications therein. I first describe the results and interpretations of group spatial differences in terms of locational choice. I then further explore mortuary choice through non-spatial statistical correlations between demographics and mortuary attributes. Conclusions, interpretive limitations, and recommendations for future work follow at the end of this chapter.

I used Ripley's *K* to assess trends in group burial placement on a broad Cemetery-wide scale *and* those trends perhaps introduced and practiced only by individual social groups (localized clusters). Using Ripley's *K*, I assessed the relative search distances at which patterns of demographic group burials became significantly clustered for each class in all categories. However, I considered only those patterns indicated by Ripley's *K* to be significantly clustered at or above a 13 meter[1] radius as significant enough to suggest prevalent trends in choice. These patterns were skewed into certain areas of the Cemetery and would have required purposeful choice and acknowledgement by other groups. Classifications that were significant below the 13 meter threshold were associated with finer-scale personal choice. In these cases, burials were grouped together in pockets

[1] I determined the 13 meter threshold based a rounded version of an auto-generated bandwidth size for datasets extending to all edges of the Cemetery. This approach served to identify the search radius distance sufficient to capture variation within the Cemetery's extent. See the Kernel Density Estimation Introduction and Parameters sections in Chapter V for more information.

but spread throughout the Cemetery, suggesting intentional choice on a smaller scale. Comparing these statistics to distributions using Kernel Density Estimation (KDE), burial patterns of classes significant at and above the 13 meter break point appear denser and more concentrated, while those noted as not significant at the cutoff point appear washed out, denoting low density. I did not assess spatial distributions of monument and plot attributes.

While Ripley's *K* suggests the scale of clustering, I used Kernel Density Estimation (KDE) to visualize *where* within the Cemetery significant clusters appeared and further explore and contextualize locational choice. In some cases, large family plots may have artificially skewed the density towards a localized cluster; I assessed these scenarios on a case-by-case basis to understand if localized clusters were derived from multiple independent burials (indicating a broader form of choice) or if they were skewed from these family associations (suggesting location was instead based on familial ties).

In some other cases, KDE patterns of multiple classifications overlapped, suggesting that the underlying factors creating these patterns were correlated. Simply based on visual density, it was difficult to assess how heavily each attribute may have affected locational choice, or if attribute patterns were based on or influenced by a correlated attribute. To further assess locational choice, I used Pearson's R to identify correlated attributes. I assessed the spatial distributions of these correlated attributes to determine which attribute likely contributed more towards choice.

To assess non-spatial mortuary choice, I used factor analysis and resulting Pearson's R values to explore correlation between demographics and mortuary attributes.

I identified several spatial trends in locational choice, as well as correlations between demographics and mortuary attribute choice. These spatial trends and significant correlations suggested differences in group expression within the Old City Cemetery. Even for non-lodge members, membership in the assessed demographic groups appeared paramount in personal expression, ideology, and cultural and social identity. However, some social groups did not exhibit unique trends in mortuary expression, whether spatial nor non-spatial. For these groups, this suggests cultural assimilation and homogeneity, even despite inequality, differentiations, or unique cultural practices identified within other groups. But as social and cultural expression is inherently complex, statistically significant spatial and non-spatial group trends in mortuary behavior are merely suggestions of shared behavior and social structure. The identified trends largely support what is already known about Roslyn social structure. As such, I offer this model for usage in other historical-period cemeteries to assess differences in group expression. The spatial and statistical results for each category are expressed below.

LOCATIONAL CHOICE: SPATIAL DISTRIBUTIONS OF DEMOGRAPHIC ATTRIBUTES

In this section, I investigate the spatial patterns and the statistical correlations between demographic attributes to assess locational choice. For each demographic category, I first explore the Ripley's *K* and Kernel Density Estimation (KDE) results for each classification to identify which classes were significantly clustered either locally or on a Cemetery-wide scale. For these classes, I then assess Pearson's R correlations with other demographic attributes to further interpret these spatial patterns.

To consider a specific demographic attribute a driver or influencer of locational choice, I expected the distribution of the selected burials to be significantly clustered and ideally skewed to one area of the Cemetery. Otherwise, I assumed the random distribution suggested membership within the specific class was unlikely a factor in locational choice. I also expected the distribution of these burials to be relatively stable over time. Otherwise, this may suggest locational choice was significantly influenced by chronology or some other correlated attribute. To further understand group choice over time and general chronological trends, I also assessed significant patterns across *decades*.

Because some demographic attributes were correlated, some spatial patterns were similar between categories. I assumed that correlated demographic attributes may have reasonably contributed to or influenced the distributional pattern observed for each significantly clustered class. As a result, I assessed these correlated attributes to understand how likely other demographic categories were to have contributed to locational choice.

Decade Blocks and Chronology-Based Locational Choice

While the *decade block* category represents a different kind of demographic attribute as compared to the other categories, I assessed the spatial layout of *decade* classes to visually to understand Cemetery chronology. I also used this category to contextualize spatial and statistical patterns within other categories and identify if these patterns were more likely caused by change over time or general chronological trends rather than membership within each classified group. Based on my assessment of the *decade* classes, Cemetery chronology appears to generally move south over time regardless of other correlated attributes. And since various demographic classes exhibited southward-trending distributions, chronology may have been highly influential in some of these spatial trends. These instances are discussed in subsequent sections.

Decade Ripley's K and Kernel Density Estimation

Ripley's *K* analyses indicated that the *1900-1909*, *1910-1919*, *1920-1929*, *1930-1939*, and *1940+* classes were significantly clustered in the Cemetery at a variety of distances, while the *1880-1889*, *1890-1899*, and *unknown decade* classes were not significantly clustered at any distance (Table A1; Figure 10). The *1920-1929* and *1940+* classes were significantly clustered at and above the 13 meter threshold, suggesting these spatial trends were more widespread.

The distribution of burials from *1880-1889* was not statistically significant according to Ripley's *K*. These burials represent the earliest interments in the Cemetery and include individuals who died between 1887 and 1889. Because this class only spans several years, relatively few burials were included. As a result, the significance level of this spatial trend was unable to be assessed with confidence[2]. Despite this discrepancy and while the density was low overall in the dataset, the raw locations of burials were skewed to the north. Similarly, the *1890-1899* class was not significantly clustered at any distance, and burials appeared accordingly distributed over the Cemetery's spatial extent.

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[2] To accurately assess confidence envelopes and suggest dependable distributions, the Ripley's *K*-Function advises using at least 30 data points or inputs. Some demographic classes included less than 30 individuals. These statistical distributions were not well-defined. For these classes, I visually assessed their spatial trends on a case-by-case basis. These patterns were unlikely influenced by intentional choice.

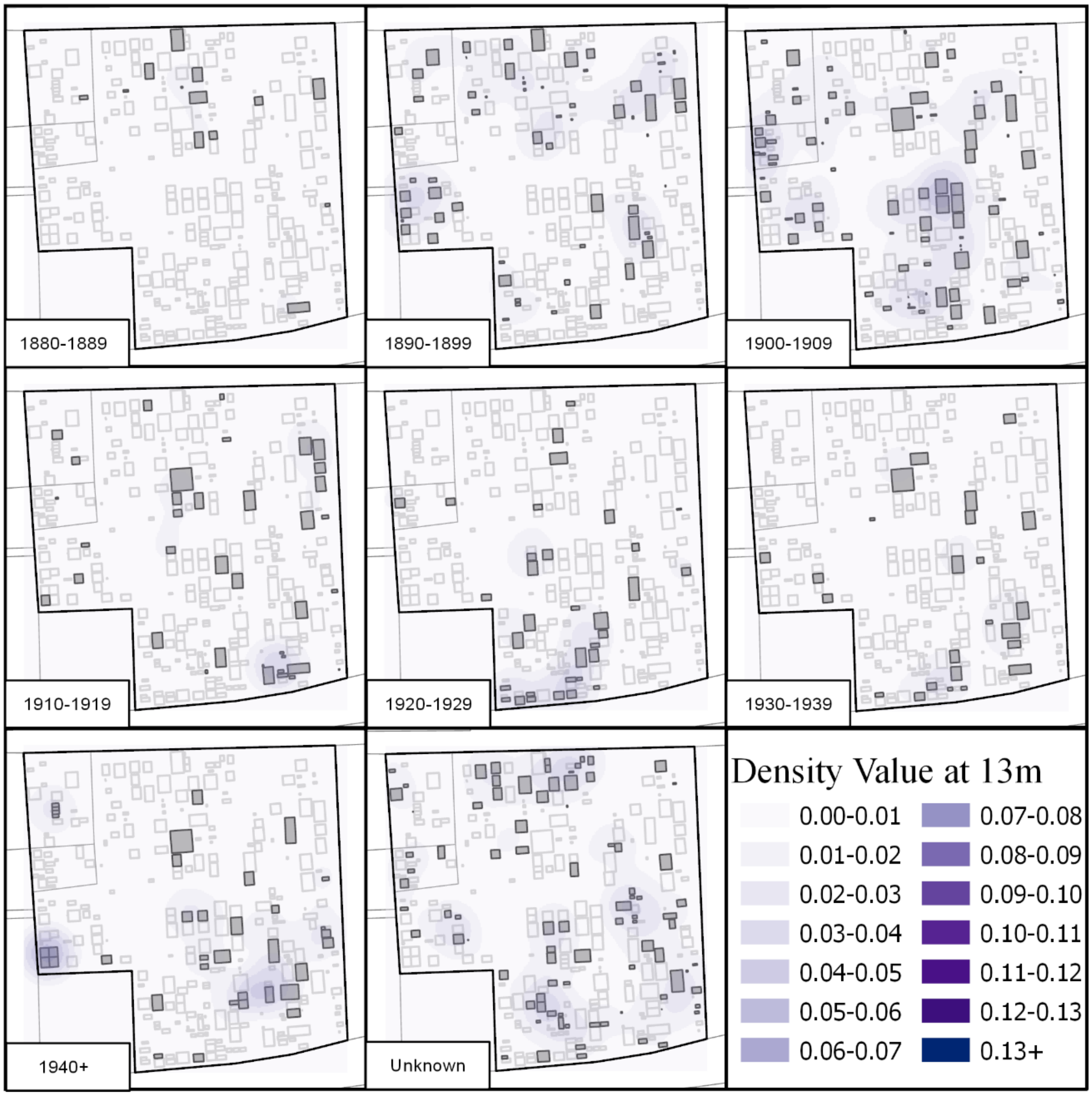

Figure 10. Decade Class KDE Maps.

The *1900-1909* group was significantly clustered below the 13 meter threshold[3], suggesting more localized clusters. Burials in this class appeared densest in the center of the Cemetery, but raw distribution extended throughout the area. Family plots utilized

[3] For the *1900-1909* class, the observed *K* values were only slightly above the high confidence intervals, suggesting these distributions were nearly random. A break in significance occurred at the 7.5 meter iteration, suggesting that the significance designation at 10 meters was due to very slight variation in the randomly generated distribution and may not represent a significant confident level.

during this period likely increased density in these areas. Other correlated attributes may have also influenced this distribution and will be assessed below.

Burials in the *1910-1919* class were only significantly clustered at one interval (7.5 meters), suggesting that burials from this *decade* were far enough apart that they were not considered clusters in closer spatial proximity. However, this also meant that there were no Cemetery-wide clusters. Burials were visually spread throughout the Cemetery with the densest portion in the southeastern corner.

Clustering of *1920-1929* burials were significant above the 13 meter threshold, and were densely clustered in the southern extent. A few burials extended towards the northern portion of the Cemetery, but these instances were more sporadic. The *1930-1939* class was similarly south-trending, although Ripley's *K* suggested this distribution was only significant at the 12.5 meter level and was not significantly skewed towards any one area in the Cemetery. However, this class contained less than 30 individuals and as a result, this significance value was not credible (see footnote 2, page 118).

The *1940+* class was significantly clustered at and above the 13 meter threshold, suggesting that burials were statistically skewed towards a particular area in the Cemetery. Visually, this appeared to be the case. Burials were densest in the southern portion of the area, with several more sporadic burials in pre-existing family plots in the north. While some burials in the south were also placed into existing family plots, the majority were newly placed in the area.

Unknown decade burials were expectedly not significantly clustered at any distance within the Cemetery. However, there did appear to be several denser areas in the north and south. A portion of these plots in the north were simple fenced areas without monuments; the inclusion of fencing is an older norm to prevent animal disturbance of burials (Ware, 2005, p. 190) and suggests that a portion of these burials may have been placed during early years in the Cemetery. These patterns were due to a concentration of burials with missing monuments in these areas, and therefore a lack of demographic information. As a result, I disregarded the spatial patterns of *unknown decade*—while not significant—as a function of absent data rather than choice. I treated *unknown* classes in other categories in a similar way.

Conclusion: Chronology-Based Choice

While there is no clear linear chronological development of the Cemetery, new burials appear to have generally shifted southwards over time regardless of other associated demographic attributes (Figure 11). The earliest burials in the *1880-1889* class are largely located in the northern portion of the area, although interments quickly disperse to all corners of the Cemetery during the following decade. In the later years ranging from 1920 onward, the majority of new burials are in the southern portion of the Cemetery although additional burials occurred in pre-existing family plots elsewhere. However, considering the non-linear distribution of plots over time, it is unlikely that locational choice was based solely upon time period.

Several classes in various demographic categories exhibited southward-trending distributions that may be associated more with Cemetery chronology rather than membership within the attribute class. I explore these below.

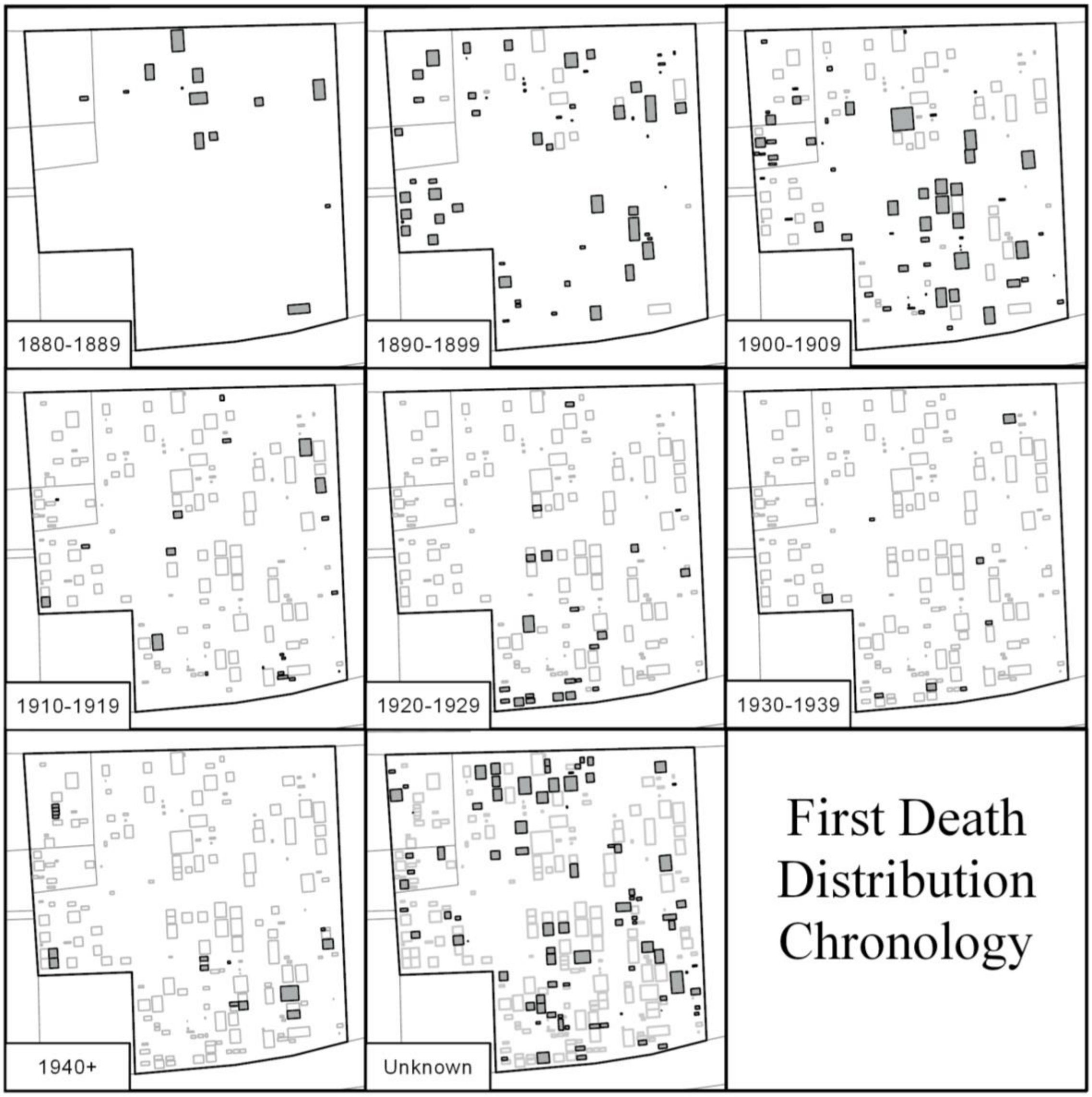

Figure 11. Cemetery Distribution of the First Death in each Plot over Time.

Nationality-Based Locational Choice

Some *nationality* classes—*Southern Europe* and *Eastern Europe*—appeared to exhibit choice in burial location based on this categorical attribute rather than Cemetery chronology or other demographic correlations. For these groups, heritage likely played a significant factor in cultural identity and social interaction. Other *nationality* classes, while noted as statistically significant according to Ripley's *K*, appeared influenced by chronology or were randomly distributed, suggesting that shared heritage was unlikely a significant factor in locational choice for those groups.

Nationality Ripley's K and Kernel Density Estimation

Ripley's *K* analyses indicated that the *America*, *Eastern Europe*, *Northern Europe*, *Southern Europe*, and *Western Europe* classes were significantly clustered in the Cemetery at a variety of distances, while only the *unknown nationality* class was not significantly clustered at any distance (Table A2). I disregarded the spatial and statistical distribution of several other classes—*Canada* and *Middle East*—due to issues regarding confidence calculation. The *America*, *Eastern Europe*, *Northern Europe, Southern Europe*, *and Western Europe* classes were significantly clustered at and above the 13 meter threshold, suggesting these spatial trends were more widespread in nature.

The spatial trends visible in the KDE maps generally followed these figures (Figure 12). Burials in the *Southern Europe* class were significantly clustered at and above the 13 meter threshold, suggesting that this group was skewed towards one area of the Cemetery. The visual distribution of graves and the density scale followed this indication, as burials were grouped almost entirely in a tight locale along the northwestern edge of the area. Several small isolated plots were located in the east and north, but the majority were located in close proximity to one another. Due to the high skewedness clustering and significance, it is likely that membership within the *Southern Europe* group may have influenced locational choice. I further investigated this spatial trend by assessing correlations with other attributes below.

Figure 12. Nationality Class KDE Maps.

According to Ripley's *K*, burials in the *Eastern Europe* class were significantly clustered at and above the 13 meter threshold. Visually, these burials appeared clustered in a small portion of the southern-central portion of the Cemetery, with only one instance in the north. This trend suggests that membership within this *nationality* class may have significantly influenced locational choice. To test this assumption, I assessed correlations between the *Eastern Europe* class and other attributes below.

Northern Europe burials were significantly clustered throughout the Cemetery extent until approximately 21 meters. However, when assessing the visual density patterns, burials appeared distributed over the whole Cemetery with dense clusters dispersed throughout. A denser cluster appeared in the western-southwest corner, although these burials were associated with family plots derived from familial ties. As a result, it is unlikely that this denser area was chosen simply because of shared *nationality*, meaning that the distribution was less significantly skewed towards any specific region within the Cemetery. Considering this, *Northern Europe* burials appear more or less evenly distributed—although with larger clusters—and the Ripley's *K* suggestion of significant skewing was likely influenced by this family clustering. Relying only on the Ripley's *K* values in this case indicated a much higher importance on this shared attribute, but incorporating a visual component suggested the opposite. It is therefore unlikely that choice in burial location was based on membership into the *Northern Europe* class, considering this group represented the largest *nationality* class. Practices associated with this group may have been considered "norms" in Roslyn's early years.

The *America* class was significantly clustered to approximately 13 meters, just at the threshold cutoff, which suggested the distribution of these burials was partially skewed towards a specific area in the Cemetery but more localized clusters also existed. Visually, burial distribution and density followed this statistical implication. Burials were more concentrated in the southern extent, but some smaller clusters of *America* burials were visible in the northern vicinity. As such, it is possible that membership in the *America* class influenced burial location to a degree. However, other demographic correlations may have had a stronger influence (see America section below).

Ripley’s *K* values for the *Western Europe* group were significantly clustered up to approximately 11 meters and after 20 meters, but not in between these search distances. Assessing the distribution visually, there were several distinct clusters split between the north and south portions of the Cemetery but neither area was especially dense. Burials were slightly skewed towards the eastern portion of the area, although they appeared somewhat randomly distributed. The presence of family plots likely influenced this statistical pattern, suggesting more localized clusters than visually suggested. Despite the significant clustering over the extent, this randomized distribution suggests membership in the *Western Europe* group was unlikely an influence on locational choice.

Burials in the *Canada* class and *Middle East* class were not significant at any distance. However, these classes contained very few individuals (n=7 and n=4, respectively) and as a result, I was unable to assess the significance level of these datasets with confidence (see footnote 2, page 118). Visually, a small cluster of *Canada* burials were present in the northwest corner of the Cemetery and the *Middle East* burials were composed of one discrete family unit buried in two conjoined multi-plots. However, these groupings were created by familial ties rather than potential heritage-based choice. As such, I disregarded membership within the *Canada* and *Middle East* groups as potential factors influencing locational choice on either Cemetery-wide or localized scales. *Unknown nationality*, as the other unknown categories, was not significantly clustered at any distance and burials appeared randomly distributed.

Southern Europe

The *Southern Europe* class was significantly correlated with several other demographic attributes in a positive way, including *1900-1909*, *1910-1919*, and *adult* (Table C2). I explore distributions of these correlated attributes and compare them to the distribution of the *Southern Europe* class below. Overall, it is unlikely that either *decade block* or this *age group* contributed significantly to locational choice for the *Southern Europe* group, and this group appears to have chosen burial location based on shared heritage and proximity to *Southern Europe* lodge cemetery blocks. Familial ties are unlikely to have entirely dictated this distribution, as numerous individual family groups were within the cluster. However, with a relatively low number of individuals in this class (n=32), confirming patterns identified here may require additional exploration in other Roslyn cemetery blocks.

Assessing the overall spatial distribution of the above *decades*, both appeared generally randomly dispersed throughout the Cemetery, and neither were significantly clustered on a Cemetery-wide scale (Figure 10). Burials in the *1900-1909* class overall appeared regularly distributed throughout the Cemetery. Those in the *1910-1919* class occurred slightly more frequently in the eastern portion of the area, but this distribution was still generally random and was not significantly skewed towards any particular portion of the Cemetery (Figure 10). Densities of these *decade* classes are greatest in the central and southeast corners, respectively. Considering these more dispersed distributions and densities in alternate areas of the Cemetery, it is unlikely that simple inclusion within this *decade block* resulted in the observed cluster of *Southern Europe* burials. Furthermore, *Southern Europe* burials were not entirely confined to these *decade* *blocks*. While the majority of these interments occurred between 1900 and 1909, other *Southern Europe* burials were placed in the nearby vicinity both prior to and following this period (although some outliers exist) (Figure 13). Considering these patterns, it is therefore unlikely that locational choice for this *nationality* group was influenced or created by chronology, and more likely that shared heritage guided siting of these burials.

The correlation between *Southern Europe* and the *adult* class[4] also required a second look. Burials within this *age* group were not significantly clustered according to Ripley's *K* past 2.5 meters (see Age-Based Locational Choice section below), and appeared visually dispersed throughout the Cemetery. Based on the dispersal of *adult* burials overall, it is unlikely that the distribution of *Southern Europe* burials was influenced by membership within this *age* class. *Southern Europe* burials included multiple *age* classes in the clustered area, further suggesting that *age* was likely less important than shared *nationality* in terms of locational choice for this group.

I did not identify any other demographic correlations with the *Southern Europe* class. Similarly, no other spatial distribution approximated the group's distinct spatial cluster. Despite the relatively low number of individuals in this class, it appears that membership within the *Southern Europe* class influenced locational choice in the Cemetery and that the cluster of burials was created based on this shared heritage. The dense cluster appeared in the potential overlap zone with the Cacciatori D'Africa and Druids cemeteries, which were largely associated with individuals of Italian descent.

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[4] The correlation between these classes indicates only that *Southern Europe* burials tended to belong to the *adult* class, but does not indicate that all *Southern Europe* burials are within this *age* group. This also does not preclude *adult* association with other *nationality* groups, only that correlation with this specific group is significant.

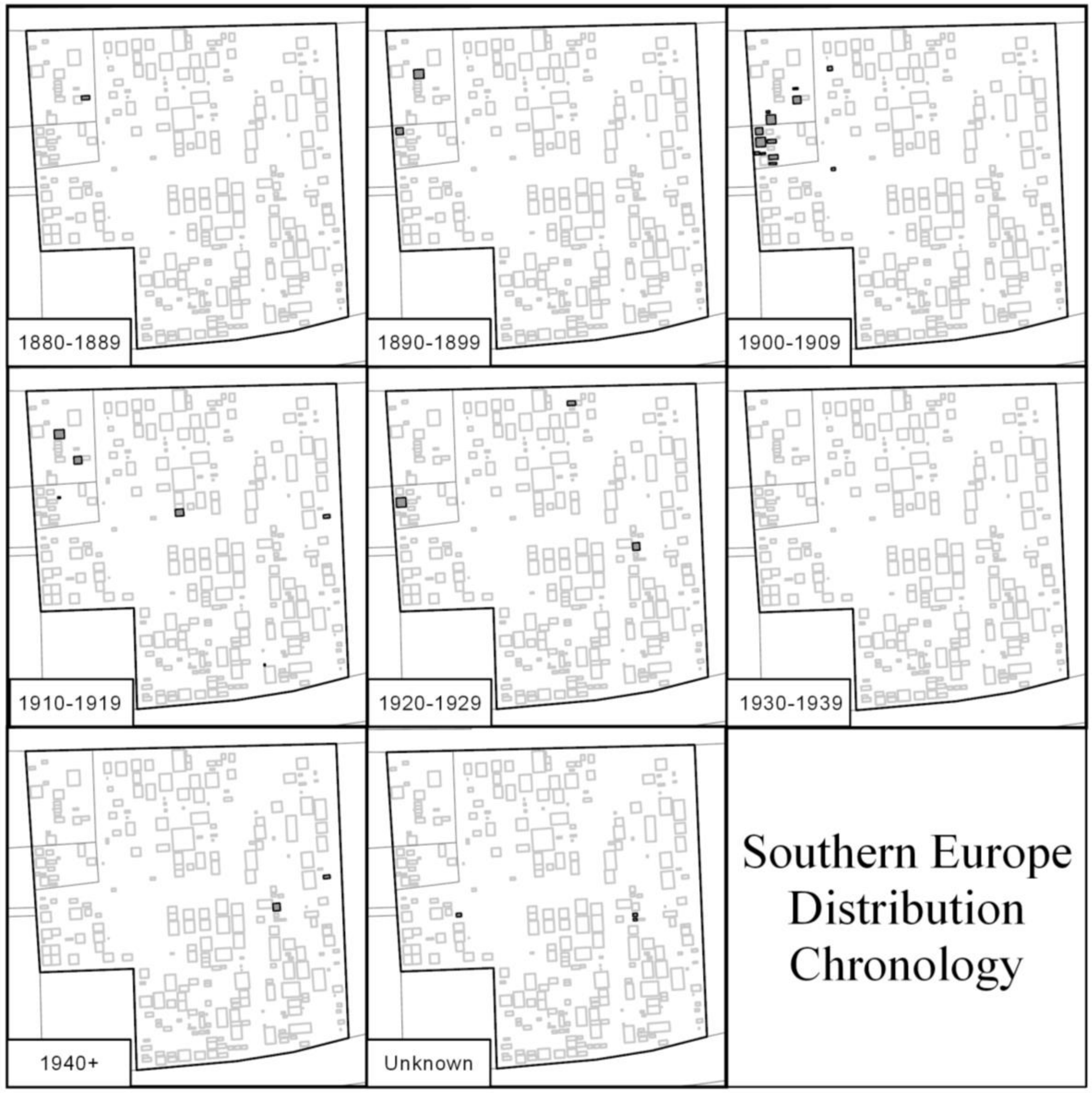


Figure 13. Southern Europe Burial Chronology.

However, because the Cacciatori D'Africa cemetery has been noted as only one distinct row of plots (identified to the west, and excluded during fieldwork) (Ware, 2005, p. 40), this particular overlap zone is likely indeed part of the Old City Cemetery. The Druids cemetery boundaries are more unclear, but are believed to be further west than the overlap zone (Brandi Taklo, personal communication 2019; Lynda Solter, personal communication 2020). As such, individuals of *Southern Europe* descent may have chosen this distinct spatial location within the Old City Cemetery by proximity to these Italian lodges. This further suggests that shared *nationality* influenced social identity and affected locational choice for this group.

Eastern Europe

The *Eastern Europe* class was significantly correlated with several other demographic attributes in a positive way, including *1900-1909*, *child*, *disease*, and *no occupation* (Table C2). I assess correlated attribute distributions below and compare to the *Eastern Europe* pattern. Overall, it is unlikely that membership in any of the above classes resulted in the *Eastern Europe* group clustering, and more likely that shared heritage influenced choice in location. Familial ties unlikely dictated this distribution, as numerous individuals and family groups created the cluster. However, considering the relatively low number of individuals in this class (*n*=31), additional exploration of *Eastern Europe* lodge cemetery burials may provide further context.

Chronologically, burials in the *1900-1909* class were regularly distributed over the entire area, although new plots tended to be slightly further south than the full distribution (Figure 10, Figure 11). This *decade* class was densest in the southern-central region of the Cemetery, overlapping with the *Eastern Europe* class cluster. However, considering the spread of *1900-1909* burials elsewhere in the Cemetery, this distribution appeared densest in this area because of the prevalence of correlated *Eastern Europe* burials. The majority of *Eastern Europe* burials occurred during this period, although several burials were placed in this location in the decade prior. Further interments following this period were also placed in this general south-central area (Figure 14).

Considering the general southward-trending chronology of the Cemetery after 1920, time period may have influenced the location of these later burials. However, because *Eastern Europe* burials were clustered in this discrete location during the generally dispersed *1900-1909* period, it is more likely that locational choice for this group was indeed based on shared *nationality* traits, even for later burials.

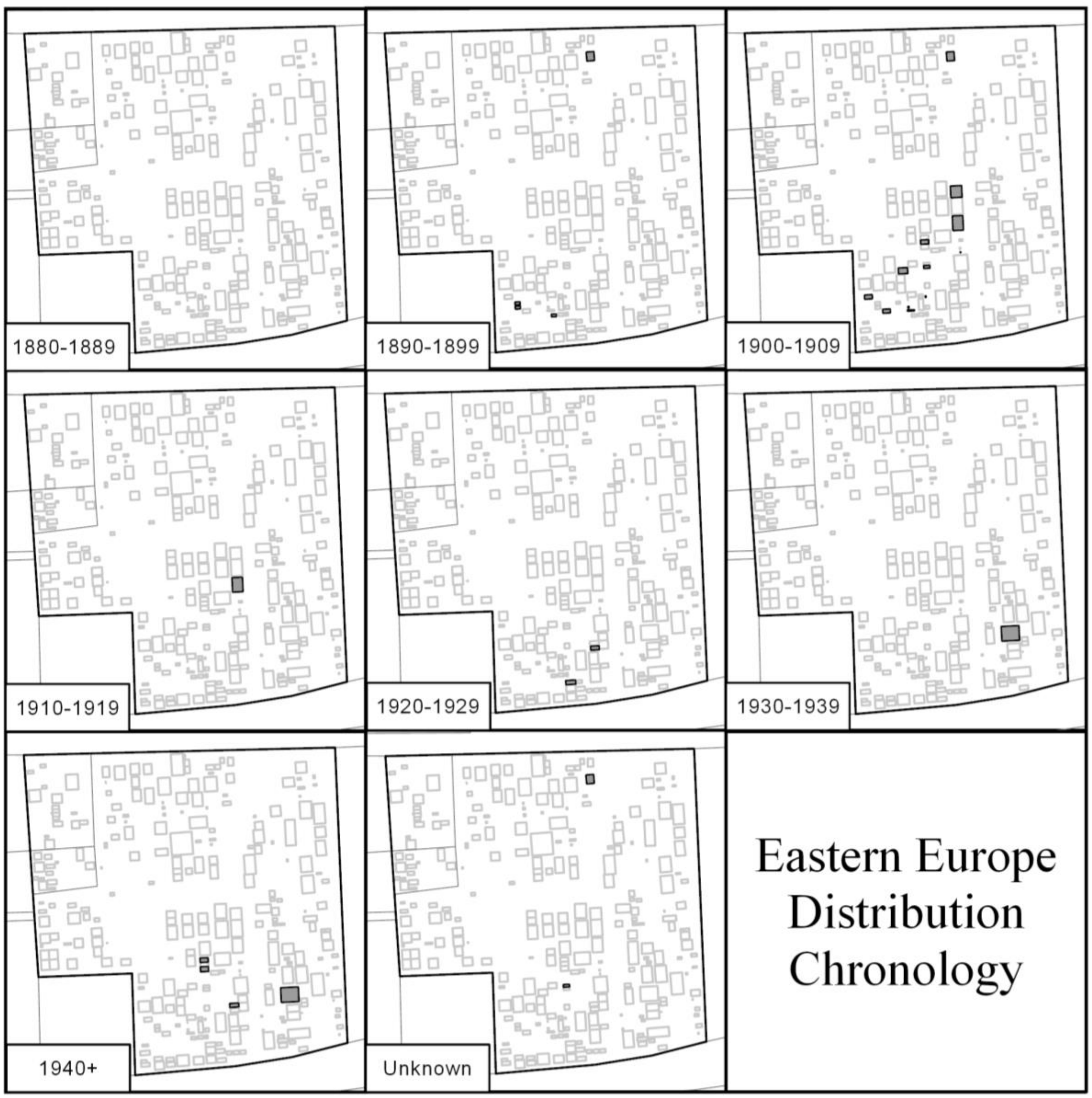


Figure 14. Eastern Europe Burial Chronology.

The overall distribution of all *child* burials was likewise dispersed throughout the Cemetery with a slightly higher density in the south-central area (see Age-Based Locational Choice section below). Even within the *1900-1909* class, in which most of the *Eastern Europe* burials belonged, *child* plots were dispersed throughout the Cemetery. The greater prevalence of this *age* group in the south-central area was a product of the *Eastern Europe* correlation. Considering the distribution of all *child* burials around the Cemetery throughout this *decade* (and within others), it is unlikely that membership within this *age* class alone resulted in the significant cluster of *Eastern Europe* plots.

While the majority of burials in the *Eastern Europe* group fell within the *child* age range, individuals from all other *age* classes also belonged to this *nationality* group. As identified by Ware (2005), several of Roslyn's Croatian cemeteries set aside discrete areas for burial of children and infants. Considering the prevalence of this *age* group in the *Eastern Europe* class, I investigated if this tradition was also present in the Old City Cemetery to further explore to what degree *age* may have affected locational choice within this particular *nationality* group. I did not identify any clear sub-clusters of *child* burials within the *Eastern Europe* class (Figure B1). However, it is unclear whether this tradition was indeed emulated in the Old City Cemetery due to the sheer number of *child* burials and lower number of other *age* classes in this *nationality* group.

While *age* may have played a role in distribution *within* the *Eastern Europe* group, it is unlikely that *age* was a sole determinant of locational choice for this group. Rather, choice based on shared *nationality* appeared more influential.

I disregarded *disease* and *no occupation* as contributors to *Eastern Europe* burial distribution. These attributes are correlated as a result of association with the *child* class (see the Child section in Age-Based Locational Choice section below). *Disease* was most prevalent during the *1900-1909* decade, and greatly affected younger people. As a result, it is not surprising that *disease* burials are more common during this period for these individuals. Children, being below the working age, did not have *occupations*. Because *Eastern Europe* burials tended to be *child* aged, there is an inherent correlation with *disease* and *no occupation* because of the correlation with the *child* group.

No other demographic correlations were identified with the *Eastern Europe* class. Similarly, no other spatial distribution approximated the group's distinct spatial cluster other than those mentioned above. Overall, it is likely that membership within the *Eastern Europe* class influenced locational choice in the Cemetery, despite the relatively low number of individuals in this group.

America

The *America* class was significantly correlated with several other demographic attributes in a positive way, including *1920-1929*, *young adult*, *disease*, and *laborer-general* (Table C2). While chronology appears to have influenced the distribution of this class, it is unlikely that the other correlated attributes contributed to locational choice for this *nationality* group. Based on the distribution and significance of the *America* group, it is unknown to what degree membership within this *nationality* itself may have affected choice. Choice based on familial and relationship ties may have contributed to the distribution.

Assessing the spread of *America* burials over time (Figure 15), there was no clear continuity in location within or between time periods that would indicate a continual *nationality*-based trend in choice. *America* burials only became more localized in the south as time progressed. Because of the generally southward trending Cemetery distribution over time, and significant correlation with southern-skewed *1920-1929* period, I could not rule out the effect of chronology on this distribution.

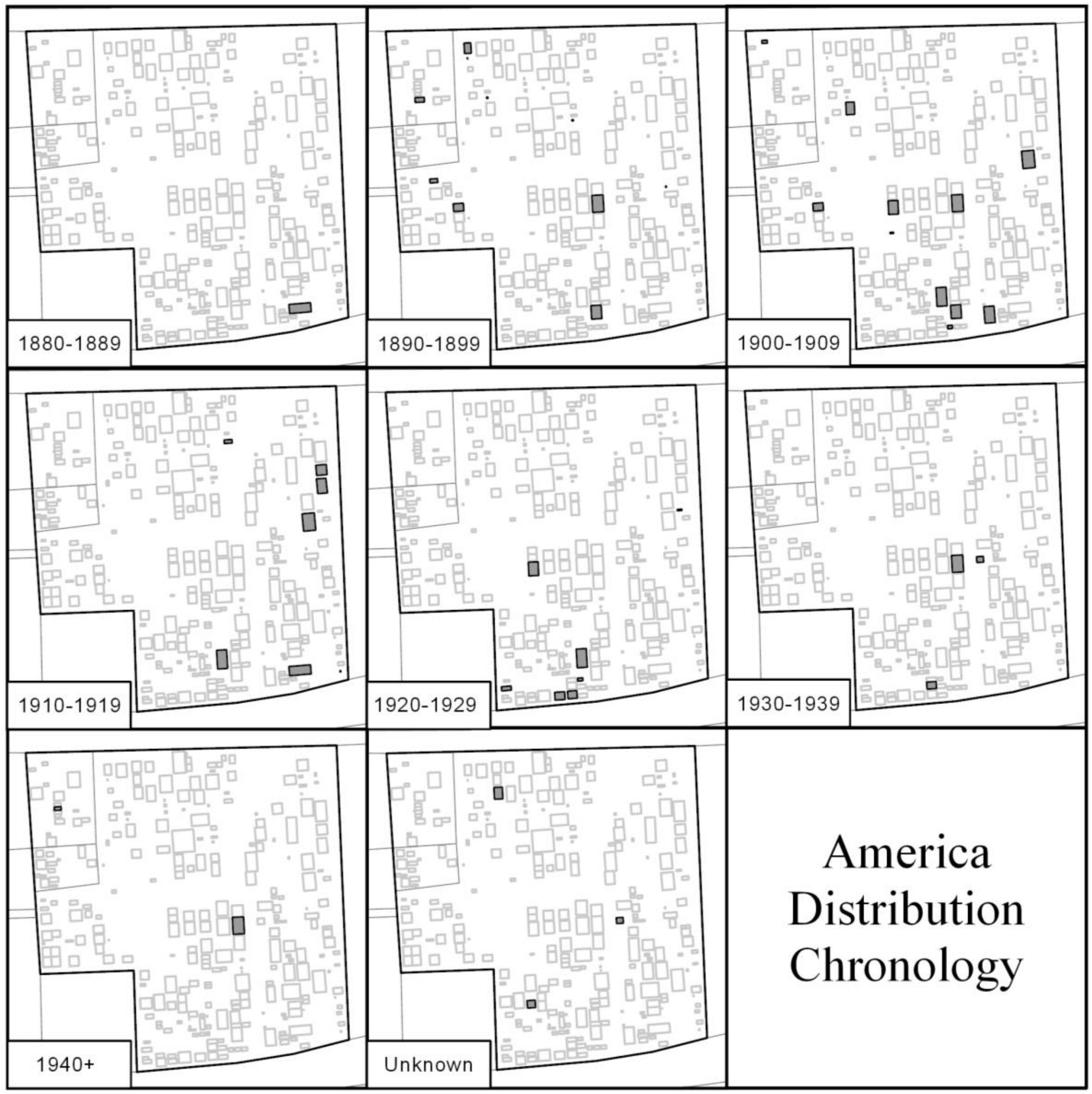


Figure 15. America Burial Chronology.

The distributions of other correlated attributes were not significantly clustered past minor localization and these spatial patterns approximated random distributions, although the *disease* distribution was partially skewed southwards (see Age-Based Locational Choice, Occupation-Based Locational Choice, and Cause of Death-Based Locational Choice sections below). As such, it is unlikely that *America* locational choice was influenced by either *age* class, these *occupation* classes, or this *cause of death*. Comparing the spatial distribution of *age* classes (Figure B2), *occupation* classes (Figure B3), and *cause of death* classes (Figure B4) within the *America* group, there were similarly no clear patterns that would suggest choice based on these other attributes even within this *nationality* group.

Overall, because it was not highly skewed towards one portion of the Cemetery, membership in the *America* class may not have provided significant reasoning for locational choice and chronology may have played a role in later periods. While burials were denser in the south, dispersal throughout the Cemetery suggested a less specific trend in burial location choice. Visual investigation of localized clusters suggested that the presence of many family plots may have artificially increased Ripley's *K* values (see Project Analysis and Interpretive Limitations section below).

Other Nationality Groups

I could not make any declarations on the degree to which membership within the other *nationality* classes affected locational choice. But because these patterns did not vary widely from a random distribution, it is unlikely that these groups based locational choice off a shared heritage. Burials in the *Northern Europe* class were identified as significant according to Ripley's *K* due to the sheer number of individuals. However, these burials were widespread throughout the entire Cemetery extent and there were no distinct locations associated with this group. *Western Europe* individuals were randomly dispersed, suggesting that shared heritage was not a significant locational driver for this group. Lack of clear chronological trends within both of these classes suggests these burials were either randomly placed, or were sited based on other unidentifiable factors (Figure B5 and Figure B6). Both *Canada* and *Middle East* burials represented discrete family units and as such, were sited based on close familial ties instead of broader shared heritage. It is unclear to what degree these groups would have exhibited locational choice with a larger sample size.

Conclusion: Nationality-Based Locational Choice

Of all the demographic categories I assessed, membership within *nationality* groups appeared to have the greatest potential bearing on locational choice within the Old City Cemetery. However, not all *nationality* groups shared the same potential.

Both *Southern Europe* and *Eastern Europe* burials were spatially significant, and their distributions appeared independent of other correlated attributes. As such, it is likely that these individuals were sited based on or influenced by a shared heritage and valued this trait in both life and death. This trend suggests that individuals in these *nationalities* may have set themselves apart culturally and socially from other *nationality* groups in historical-period Roslyn, or were considered separate by others in Roslyn.

Other *nationality* classes appeared scattered throughout the Cemetery, both significantly and non-significantly, suggesting that membership within those *nationality* classes unlikely had much role in this decision. While significant spatially, I could not rule out the influence of Cemetery chronology on the *America* class distribution. As such, it was unclear to what degree shared heritage affected choice for members in this group. Similarly, the *Northern Europe* group did not exhibit a clear spatial pattern that would suggest mortuary or social importance on shared heritage. It is possible that because these *nationality* groups were dominant in historical-period Roslyn (both in number and permanence), members did not place high value on this shared trait. Practices associated with these groups may have been considered the "norm" during early years. Burials in the *Western Europe* class were not spatially significant, and appeared randomly distributed, even chronologically. It is therefore unlikely that locational choice was based off this shared heritage. Two classes—*Canada* and *Middle East*—were so sparse that I could not assess broader spatial trends outside of familial ties.

The spread of fraternal lodge affiliations in Roslyn largely supports these trends. I assess these significant patterns within the context of Roslyn in the Locational Choice Discussion section below.

Age-Based Locational Choice

While there were no areas within the Cemetery that appear reserved for certain *age* groups, two of the classes—*child* and *senior*—presented potentially intriguing significant spatial patterns. However, assessing these distributions overall suggested that membership within an *age* group was unlikely to have significantly influenced locational choice in the Old City Cemetery. Although assessing more localized clusters, while not Cemetery-wide trends, still suggested a minute degree of choice based on *age*.

Age Ripley's K and Kernel Density Estimation

Ripley's *K* analyses indicated that the *child*, *adult*, and *senior* classes were significantly clustered in the Cemetery at a variety of distances, while the *young adult* and *age unknown* classes were not significantly clustered at any distance (Table A3). However, none of the classes were significantly clustered at or above the 13 meter threshold, suggesting that clustering was more localized in nature.

The *child* class appeared visually denser in the southern portion of the Cemetery, and also included several smaller significant clusters in the north and west. However, as *child* burials were not significant above the 13m threshold, this pattern was not statistically skewed into any portion of the area despite this visualization (Figure 16). This suggests that while children were often be buried next to others in this age class, there were not specific sections of the Cemetery significantly set aside for children as was done in the Dr. Starcevic lodge cemeteries (Ware, 2005). I further assess this localized clustering below.

Considering that *young adult* burials were not significant at any distance, I expected a randomized distribution of burials spread over the Cemetery. Density was very low for this class, indicating these interments were unlikely sited based on distinct *age*-based mortuary behaviors.

Adult burials were similarly dispersed throughout the Cemetery extent. These burials were significantly clustered only at a very small search distance. Despite a nearly non-significant pattern, *adult* burials were somewhat dense throughout the study area. This discrepancy was due to the sheer number of adult-aged individuals within the Cemetery demographic. Relying solely only on a visual pattern may misleadingly suggest this age group contributed to mortuary choice. But since this pattern was not significant past very tight local clusters according to Ripley's *K*, it is unlikely that belonging to the *adult* group influenced this decision. Additionally, those in the *adult* group appeared to be largely associated with family plots, suggesting that a portion of the Ripley's *K* significance value may have been influenced by familial ties rather than *age*-based choice.

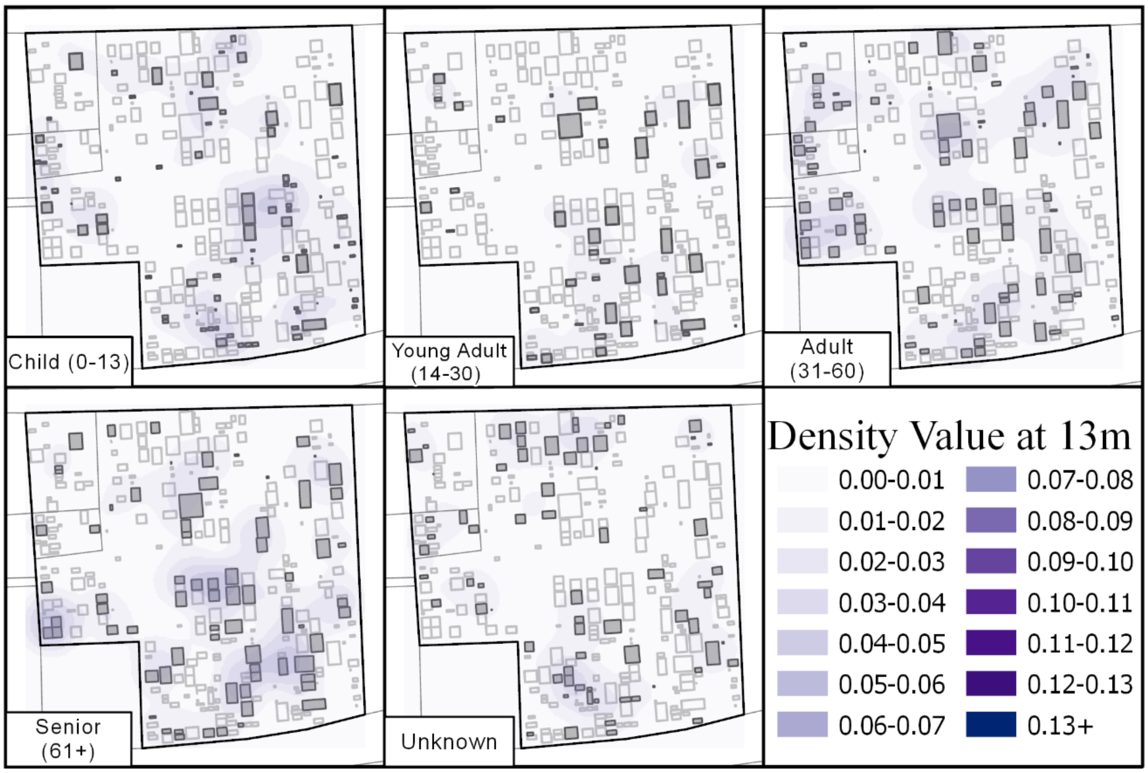


Figure 16. Age Class KDE Maps.

Out of the *age* classes, *seniors* were significantly clustered at the largest distance, suggesting the most widespread trend within this group. While not significant at or above the 13 meter threshold, clusters of *senior* individuals are denser and more skewed toward the southern portion of the Cemetery. Below, I discuss correlations with other attributes that may have affected this distribution.

Burials of *unknown age* were not significant.

Child

The *child* class was significantly correlated with several other attributes, including *1880-1889*, *1890-1899*, *1900-1909, disease, chronic illness, Eastern Europe,* and *no occupation* (Table C3). Considering the distribution and clustering of *child* burials, membership in this *age* group may have partially influenced locational choice, although chronology may have also affected this decision.

Child burials were correlated with the three earliest *decade blocks*, since young individuals were common (and largely dominant) in the Cemetery during these times. Living conditions were more difficult in Roslyn's early days, with poor healthcare and many disease outbreaks prior to 1920. Even though *child* burials decreased drastically after 1909 (Figure 17), *child* burials appeared to move southwards over time (Figure 18). As a result, chronology may have played a role in this distribution.

Two *cause of death* classes were correlated with *child* burials: *disease* and *chronic illness*. Because the latter is a conglomerated group (see Cause of Death-Based Locational Choice section), I focused on the former. *Child* and *disease* were highly correlated because of the numerous disease outbreaks prior to 1920 (Table 1, page 16). As a result, nearly all children in the Cemetery died of *disease* or some other *chronic illness*. However, not all those who died of *disease* were in this *age* group and since *disease* burials were more significantly clustered than *child* plots according to Ripley's *K*, this *cause of death* likely affected locational choice more than *age*. *Disease's* significant scale may have been increased by family plots (see *Disease* section below).

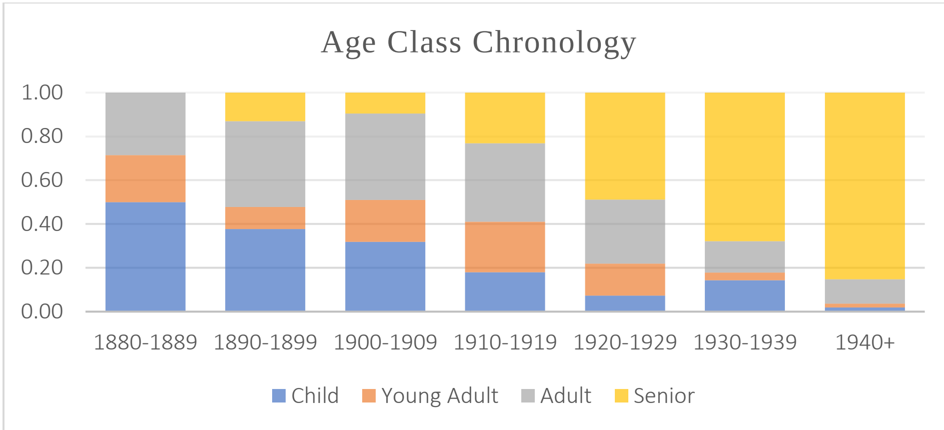


Figure 17. Age Class Chronology. Percentage of each known age class per decade.

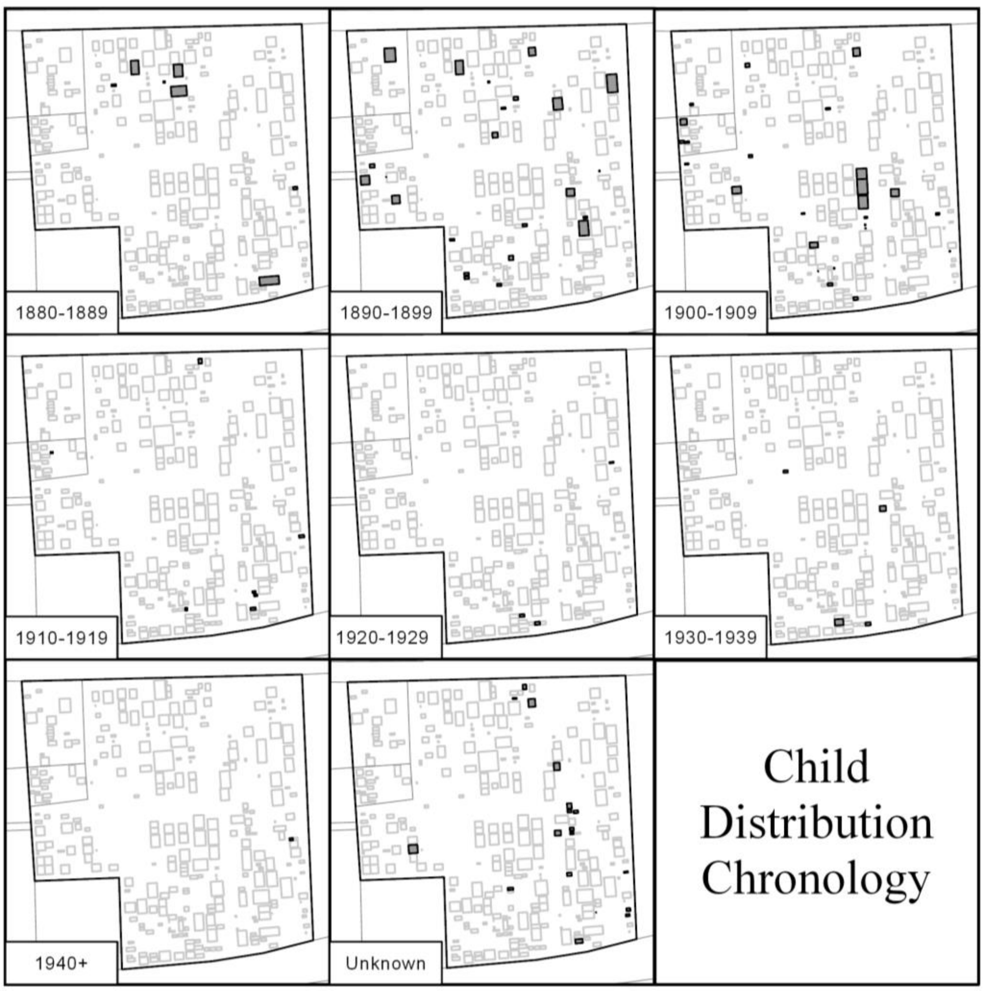


Figure 18. Child Burial Chronology.

The *no occupation* class was also very highly correlated with the *child* group because children inherently did not have jobs.

Correlation with the *Eastern Europe* class is explored above. While there was a concentration of *child* burials overlapping this distribution, shared *nationality* appeared to be more significantly influential on locational choice. Many of the *Eastern Europe* burials were within the *child* group. But because overall burials in this *age* class were more dispersed overall, it is more likely that this dense area of *child* burials existed because of the concentration of *Eastern Europe* plots instead of vice versa. The *child* class's significance scale was influenced by this distribution, suggesting membership in the *child* class was less potentially important in choice than indicated just by Ripley's *K* and KDE.

However, there were areas within the Cemetery that contained localized clusters of *child* burials regardless of other correlated attributes. It appeared that in some cases, children may have been buried next to other children specifically, suggesting some smaller degree of locational choice based on *age*. However, this may have been a product of practical decision-making rather than ideological choice. In Roslyn's early years, childhood mortality was high. Some parents buried infants in wooden spaghetti boxes as an alternative to more expensive options (Ware, 2005, p. 7), and many were placed in unmarked graves as a cost-saving measure. *Child* plots in the Cemetery were often small, and as a result, multiple families may have placed children in the same confined area to save space and additional plot fees. Familial ties may have played some role in locational choice, but this did not appear to always be the case.

Overall, membership in the *child* class may have played a small role in locational choice, albeit on a localized scale. There were no discrete portions of the Cemetery reserved for children, although small clusters of children were visible throughout the extent. Chronology may have influenced the perceived distribution in later *decades*, but provided an unknown degree of influence in earlier periods.

Senior

The *senior* class was significantly correlated with *1920-1929*, *1930-1939*, *1940+*, *chronic illness*, *old age*, *Northern Europe*, *Middle East*, *miner-laborer*, *general laborer*, *professional*, and *housewife* (Table C3). Based on the spread of these burials over time, it is likely that chronology played a small role in locational choice for *senior* burials and less-so on shared demographics. Overall, it is unlikely that membership within this *age* class itself contributed significantly toward choice.

Over time, the average age at death increased as healthcare, sanitation, and living conditions improved in Roslyn. Childhood and untimely deaths decreased overall, and *senior*-aged individuals became the most common *age* group after ca. 1920 (Figure 17, page 141). Spatially, *senior* burials were dispersed throughout the Cemetery, even when assessed chronologically (Figure 19). As there were no clear clusters of *seniors* even within *decade blocks*, it is unlikely that membership in this *age* class affected locational choice. However, many *senior* burials in the northern area were placed in pre-existing family plots, suggesting an emphasis on familial ties instead (see Figure 11, page 122). New burials were sited in the southern portion of the Cemetery, likely influenced by chronology.

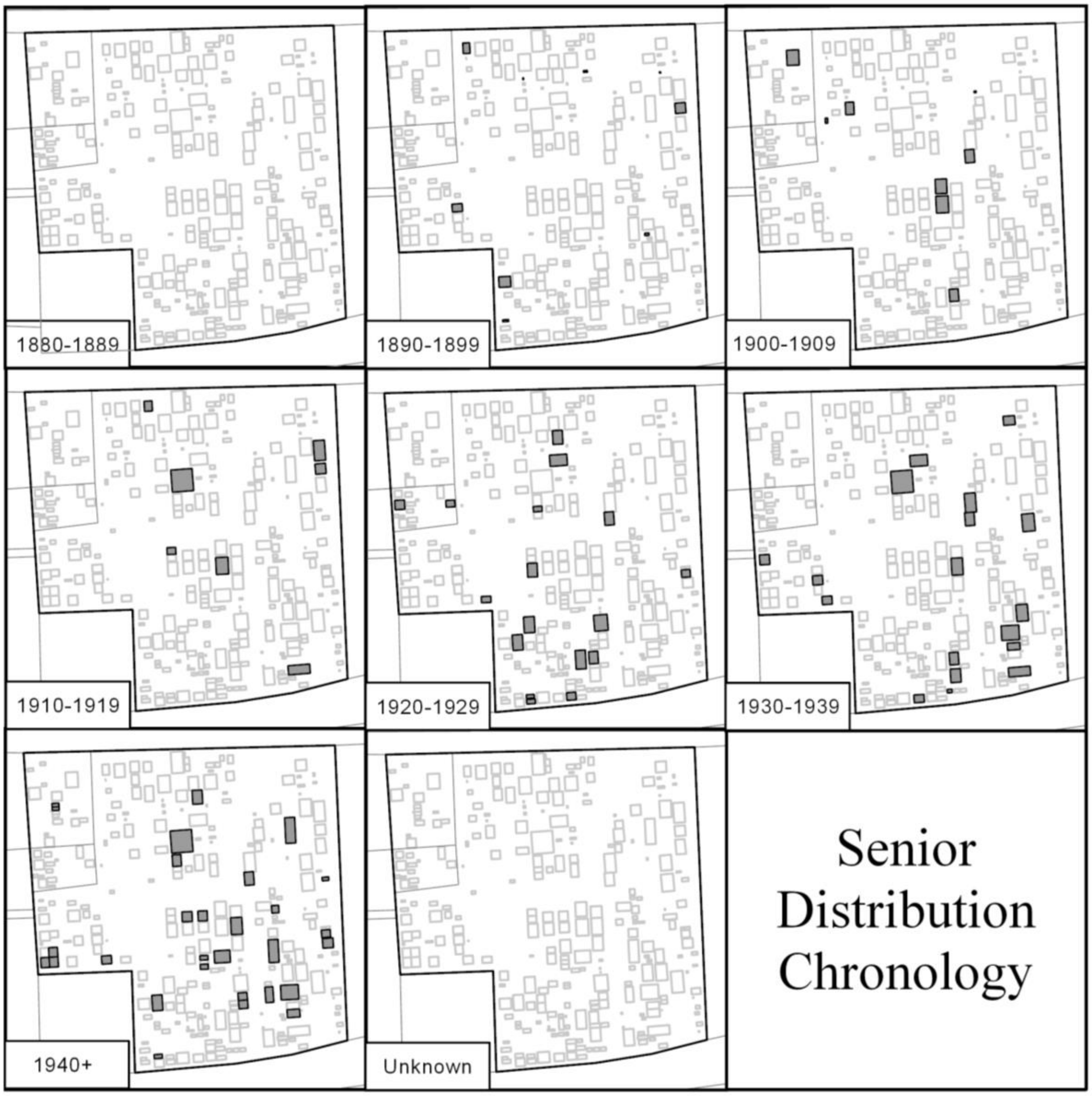


Figure 19. Senior Burial Chronology.

The correlated *Middle East* and *Northern Europe nationality* classes were unlikely influencers in locational choice. Similarly, their associated *occupation* groups were not significant enough to suggest an influence on distribution.

Overall, membership in the *senior* class unlikely played a role in locational choice. Chronology may have slightly influenced burial location, although placement in scattered family plots suggests familial ties were the most important attribute.

Other Age Groups

For the other *age* classes, *young adult* and *adult*, I could not make any declarations on the degree to which membership affected locational choice. Because these patterns did not vary widely from a random distribution, it is unlikely that membership within an *age* group significantly influenced locational choice for *young adult* and *adult* individuals. Instead, both classes appeared to be at least partially influenced by chronology, as new burials in both the *young adult* and *adult* classes moved southwards over time (Figure B7 and Figure B8). Localized clustering in the *adult* class was likely due to the sheer number of these burials, and the prevalence of family plots, rather than choice based on shared *age*.

Conclusion: Age-Based Locational Choice

Despite significant clustering and skewing suggested by Ripley's *K* for the *child* and *senior* classes, it is unlikely that membership within any *age* class significantly influenced locational choice. While membership in the *child* class may have been partially influential, this trend occurred on a small scale. Cemetery chronology appeared to play a slight role in *senior* distribution, although familial ties were likely responsible for many siting decisions instead. The other *age* classes were randomly distributed and independent of other correlated patterns, suggesting shared *age* was unlikely a significant factor in burial patterns.

Overall, *age* may have influenced locational choice to a minor degree. Only children's siting decisions appeared affected by this trait, although perhaps due to economic practicality rather than shared ideology. Lack of *age*-based mortuary choice suggests that this demographic attribute was unlikely a determinant of personal identity or social position in Roslyn society, nor did different *age* groups necessarily share similar ideology based on this trait alone. However, general treatment may have actually varied between age groups, as children are almost always treated differently than adults. Variation between *age* groups' monument and plot attribute choice will further be assessed in the Non-Spatial Mortuary Choice section.

Cause of Death-Based Locational Choice

While there were no areas within the Cemetery that appear confined to certain *cause of death* groups, two of the classes—*disease* and *old age*—presented potentially intriguing significant spatial patterns. However, assessing these distributions overall suggested that membership within any *cause of death* groups unlikely had a significant influence on locational choice in the Old City Cemetery.

Cause of Death Ripley's K and Kernel Density Estimation

Ripley's *K* analyses indicated that the *chronic illness*, *disease,* and *old age* classes were significantly clustered in the Cemetery at a variety of distances, while the *accident* and *unknown cause* classes were not significant at any distance (Table A4). Only the *disease* and *chronic illness* classes were significantly clustered at and above the 13 meter threshold, suggesting that these spatial trends were Cemetery-wide trends. I address the statistical and spatial distributions of individual classes below (Figure 20).

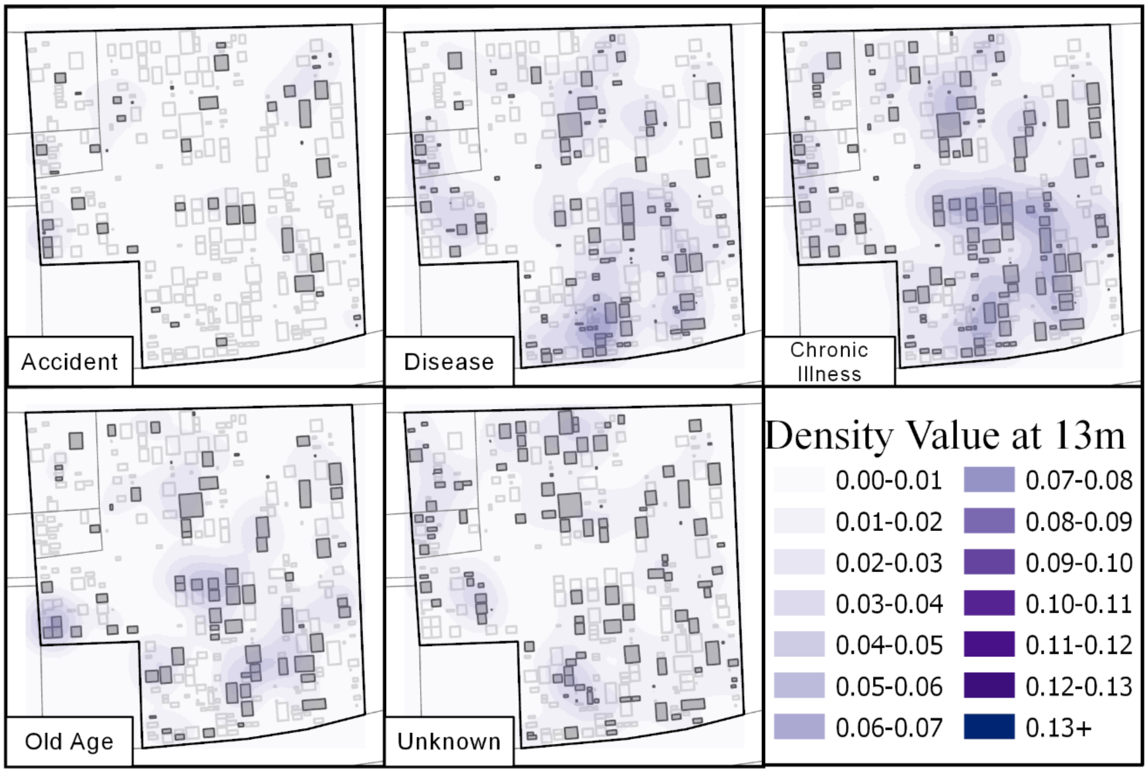


Figure 20. Cause of Death Class KDE Maps.

Significant up to an approximate 16 meters search distance but not after, *disease* burials were visually denser in and partially skewed towards the southern portion of the Cemetery. However, plots were spread over the extent and there were several smaller localized clusters in the northern and western areas. This trend follows the Ripley's *K* values, including clusters skewed towards certain areas in the Cemetery as well as local clustering throughout the area. *Disease* in discussed more in depth below.

The *old age* class was significantly clustered up to a moderate search distance, although below the 13 meter threshold. The visual density distribution followed this suggestion and was nearly identical to the *senior* age class, since the two attributes were highly correlated together. In this case, simple visual assessment of these nearly identical spatial distribution did not suggest which, if either, of these social groups may have been associated with locational choice. I further attempt to decipher this pattern below.

I did not identify any significant clusters via Ripley's *K* for the *accident* class. The *unknown cause* class similarly did not exhibit clear spatial or statistical patterns. Because I recorded some burials with both *chronic illness* and either *disease* or *old age* due to the unclear nature of some deaths, this distribution may be better explored via these classes.

Disease

The *disease* class was significantly correlated with several other demographic attributes, including *1890-1899*, *1900-1909*, *child*, *young adult*, *America*, *Eastern Europe*, and *no occupation* (Table C4). Based on the spread of these burials over time, chronology likely played a small role in *disease* burial distribution, although the spatial distribution of this class suggested randomized placement regardless of this shared attribute. Overall, it is unlikely that membership within this *cause of death* class itself contributed significantly towards choice.

Spatially, *disease* burials were dispersed throughout the Cemetery, even when assessed chronologically (Figure 21). Localized clusters throughout the *decades* indicate there was no clear area reserved for *disease* burials in the Cemetery. It is overall unlikely that this *cause of death* significantly affected choice.

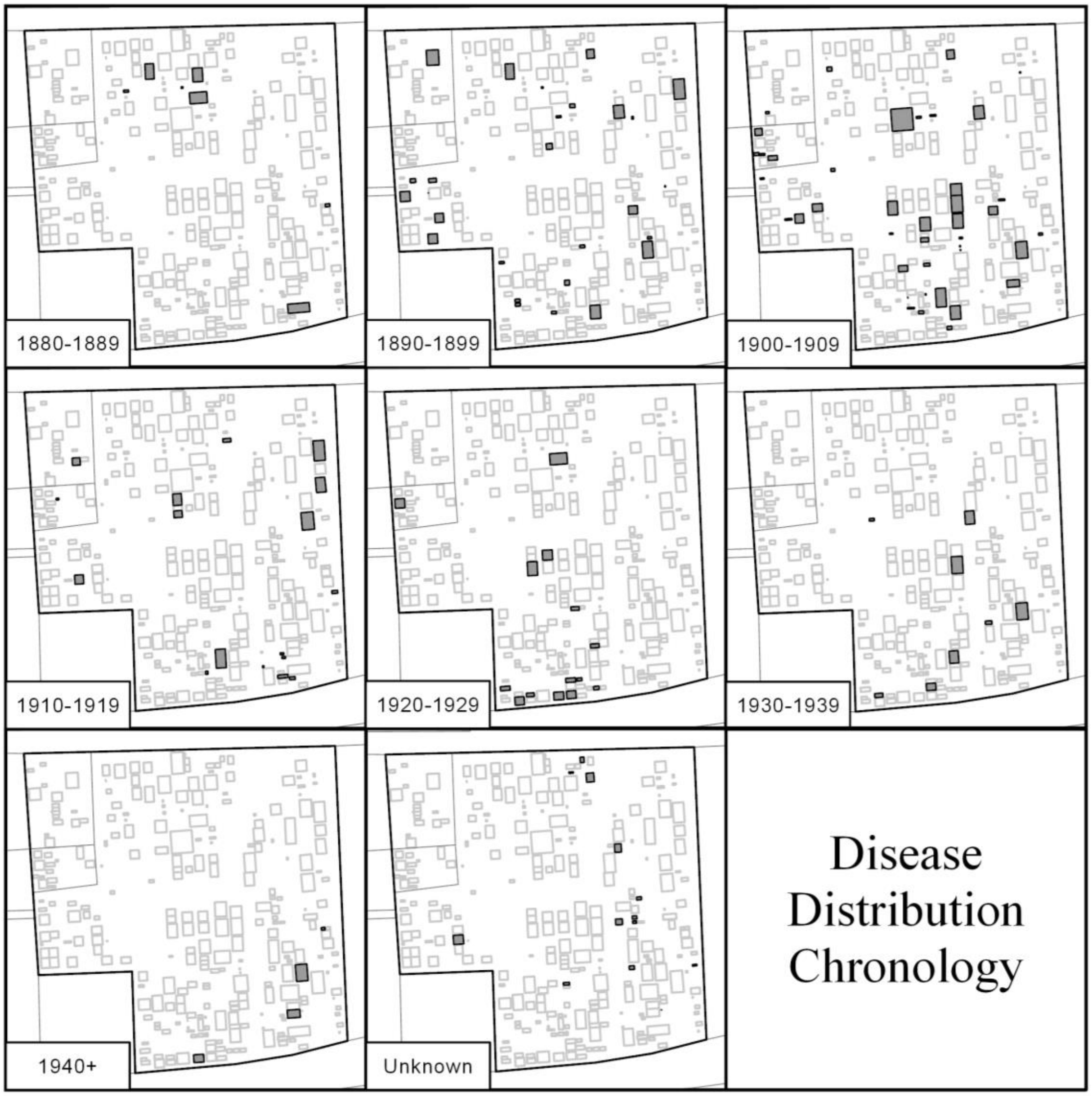


Figure 21. Disease Burial Chronology.

D*isease* burials appeared to trend southwards after ca. 1920, with a more pronounced skewing after ca. 1930. Compared to general Cemetery chronology, these later burial siting appears influenced by time-based trends rather than *cause of death*-based choice. As *disease* largely decreased after ca.1920 in Roslyn, this *cause of death* was rarer and more unexpected in later decades. If an important locational factor, I would expect burials in this class to be treated in a comparable fashion based on their rarity. However, this does not appear to be the case in these later periods.

Disease represented the most common form of *cause of death* for the *young adult* class. Despite this correlation, it was more likely that this *cause of death* influenced locational choice than the specified *age* group, as the *young adult* class appeared randomly distributed in the Cemetery. Correlation with the *child* class is explored above and suggests a greater importance on *disease* than the *child* status. The correlation with *no occupation* is a product of the *child* class, and presented little potential influence.

The two correlated *nationality* groups—*America* and *Eastern Europe*—are explored above. Since the former class did not appear to be distributed in a significant way, this was an unlikely contributor to this distribution. The correlation with *Eastern Europe* was tied to the high linkage to the *child* class. As examined previously, membership in this *nationality* group likely influenced locational choice. Considering the more dispersed spread of *disease* burials elsewhere, *disease* was more likely a result of this sub-demographic than a contributor to overall choice.

Overall, membership in the *disease* class did not appear to play a role in locational choice. Chronology may have played a role in siting decision, although this was the most prominent in later years.

Old Age

The *old age* class was extremely correlated with—and indeed a product of—the *senior* group and most of the other associated attributes are direct products of this correlation (see Age-Based Locational Choice section above). Chronology appears to have influenced both the *senior* class and the *old age cause of death* group.

Other Cause of Death Groups

No other *cause of death* classes appeared to affect locational choice as their patterns did not vary widely from a random distribution. Ripley's *K* identified *chronic illness* burials as significant due to the overlapping designations between *chronic illness-old age* and *chronic illness-disease*. Understanding this pattern was better assessed through *old age* and *disease* distributions to avoid double-counting. There were no distinct locations associated with these groups that would suggest choice based on *chronic illness*. *Accident* individuals were randomly dispersed, suggesting that this shared trait was not a significant locational driver (Figure B9).

Conclusion: Cause of Death-Based Locational Choice

Despite significant clustering and skewing suggested by Ripley's *K* for the *disease* and *chronic illness* classes, it is unlikely that membership within any *cause of death* class significantly influenced locational choice. Chronology appeared to play a slight role in the *old age* distribution based on changing healthcare. The other *cause of death* classes appeared randomly distributed and independent of other correlated patterns, suggesting that this shared trait was unlikely a significant factor in choice. Shared *cause of death* is further explored in the Non-Spatial Mortuary Choice section below.

Occupation-Based Locational Choice

As none of the *occupation* classes were significantly clustered on a Cemetery-wide scale, membership within the associated classes were unlikely influencers of locational choice. Instead, I assessed localized patterns and the degree to which correlated demographic attributes may have influenced these distributions. Some appeared potentially influenced by chronology. Other *occupations* appeared randomly distributed even while considering correlated attributes, suggesting shared *occupation* had little to no influence on locational choice.

Occupation Ripley's K and Kernel Density Estimation

Ripley's *K* analyses indicated that the *miner-laborer* and *no occupation* classes were significantly clustered in the Cemetery at a variety of distances, while the *housewife*, *laborer-general*, *professional*, *proprietor*, and *unknown occupation* classes were not significantly clustered at any distance (Table A5). However, none of the classes were significantly clustered at or above the 13 meter threshold, suggesting that these spatial trends were more localized in nature.

Burials in the *miner-laborer* class were significantly clustered up to about 6 meters, indicating localized groupings. Visually, there were small clusters spread over the Cemetery, although this *occupation* class was not skewed towards any specific portion visually or statistically (Figure 22). The northern southwest corner represented the densest area, although this skewing is attributed to a large family plot. As such, it is likely that this particular density area was influenced by familial ties rather than shared *occupation*. Within the Cemetery overall, it is unlikely that membership in the *miner-laborer* class influenced locational choice. I explore localized clusters more below.

Figure 22. Occupation Class KDE Maps.

The *no occupation* class was also significantly clustered up to approximately 6 meters. Similarly, small clusters were spread over the Cemetery extent, although density appeared slightly higher in the southern portion. Correlations with other attributes may have affected this distribution (see No Occupation section below).

The distribution of *housewife* burials was not significantly clustered at any distance, and plots appeared consistently dispersed. Many *housewife* burials were attached to family plots, a common practice prior to World War II (Onufer, 2008). It is likely familial ties informed siting decisions for this group.

The *general laborer*, *professional*, and *proprietor* classes were not significantly clustered at any distance. All these classes were composed of less than 30 individuals each, presenting a non-ideal calculation of significance (see footnote 2, page 118). Burials all appeared randomly distributed within the Cemetery, suggesting that membership within these classes was unlikely an influence upon locational choice.

As seen with other unknown classes, *unknown occupation* was not significantly clustered at any distance and appeared randomly distributed throughout the Cemetery.

Miner-Laborer

The *miner-laborer* class was significantly correlated with several other demographic attributes, including *1890-1899*, *1930-1939*, *adult*, *senior*, *accident*, and *Northern Europe* (Table C5). However, because this distribution was only minorly more clustered than a random distribution, this *occupation* itself is unlikely to have influenced locational choice. Victims of mining accidents were not clustered in any particular fashion, despite being larger-scale death events. Chronologically, new *miner-laborer* plots moved generally southwards (Figure 23) and were likely influenced by general Cemetery chronology. No other correlated attributes appeared independently significant influencers of locational choice and are unlikely to have impacted the distribution of *miner-laborer* burials. There were likewise no clear patterns of *age* classes (Figure B10) or *cause of death* classes (Figure B11) within the *miner-laborer* group.

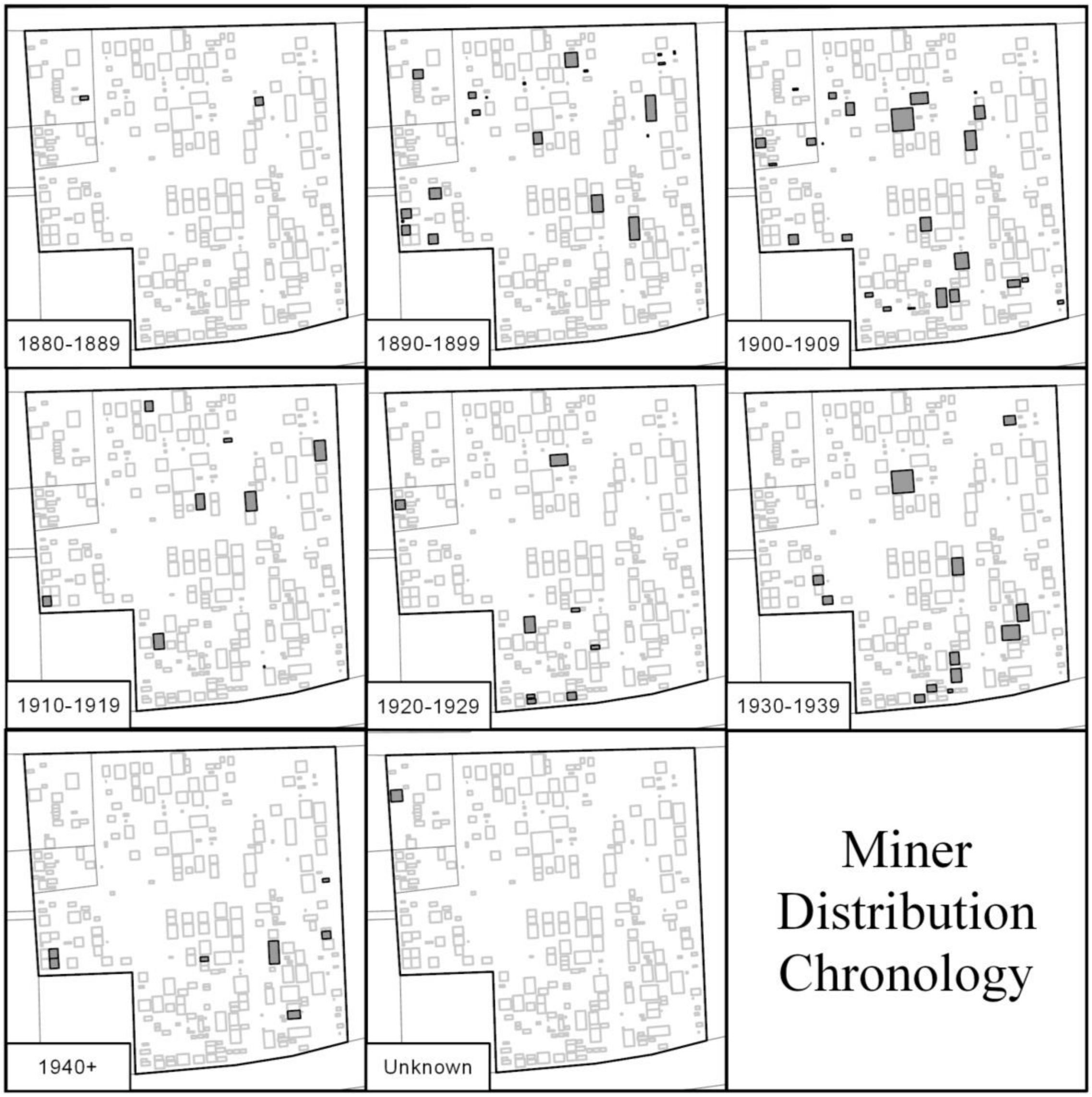


Figure 23. Miner Burial Chronology.

No Occupation

The *no occupation* class was extremely correlated with—and indeed largely a product of—the *child* group since children were naturally unemployed. All the other associated attributes are direct products of correlation with the *child* group (Table C5). As mentioned prior, *age* likely played a more significant role in locational choice than *occupation*, since *no occupation* plots were more distributed than *child* burials despite the correlation.

Other Occupation Groups

For other *occupation* classes, I could not assess the degree to which membership affected locational choice. These other *occupation* classes, other than the *housewife* class, did not contain enough individuals to robustly assess significance.

Conclusion: Occupation-Based Locational Choice

Overall, the distribution of *occupation* groups were the least spatially significant of all demographic categories. As a result, shared *occupation* appeared to play an inconsequential role in locational choice. However, this does not mean shared *occupation* did not affect any aspect of mortuary choice. As *occupation* can be used as a proxy for social class and economic flexibility, I assessed the variability between *occupation* and physical mortuary expression (see Non-Spatial Mortuary Choice section below).

Discussion: Locational Choice in the Old City Cemetery

Of the demographic categories I assessed, shared *nationality* appeared to be the greatest contributor to intentional attribute-based locational choice in the Old City Cemetery. With some minor exceptions, shared *age*, *occupation*, and *cause of death* did not appear to play significant roles in locational choice. Some of the patterns identified for these demographic categories appeared influenced more so by Cemetery chronology and general *decade*-based use patterns. Yet other patterns appeared spatially randomized suggesting little to no locational importance on these shared demographics.

This conclusion is not altogether surprising. Based on historical Roslyn's diversity, I would expect that the greatest shared mortuary trends would be based on shared cultural beliefs derived from heritage. Not all cultural groups necessarily treated characteristics—like *age*, *occupation*, or *cause of death*—in a similar manner in life or death. For these traits to be treated or perceived similarly in a mortuary context would presumably require cultural homogeneity or a community consensus. Despite Roslyn's emphasis on cohesivity, distinct heritage-based identity and belief still persisted as evidenced by the ethnic lodges, separate facilities, and services available to each *nationality* group. This division may also be supported by emphasis on *nationality*-based locational choice in the Old City Cemetery, and the homogenized treatment of other demographic groups.

While shared heritage seems to have affected intentional locational choice the most, not all *nationality* groups placed the same emphasis on this shared trait. Based on their spatial distributions and correlated patterns, I can only reasonably say that the *Southern Europe* and *Eastern Europe* groups emphasized this trait the most in mortuary contexts and societal interaction, by proxy. Roslyn's fraternal lodges follow this pattern.

The majority of affiliated lodges are ethnically associated with either *Southern Europe* (Italian) or *Eastern Europe* (Croatian, Lithuanian, Polish, Serbian, Slovak) groups. These lodge affiliations suggest a potential for emphasis on shared beliefs, traditions, and worldviews for these groups even outside the lodge sphere. As such, significant trends based on cultural pride and shared practices for these groups even outside the lodge affiliated cemeteries is not surprising. In historical-period America, Italian attitudes towards assimilation into the American experience was split between eagerness to adapt and steadfastness to cultural tradition (Thernstrom et al., 1980, p. 555). In Roslyn, the presence of several Italian-based lodges suggests the latter, and clear locational choice based on shared heritage further indicates that this may be the case (Matturri, 1993, pp. 17–18). *Eastern Europe* groups largely followed a similar attitude in historical-period America. Polish groups were noted for strongly retaining cultural identity until as late as the 1940s (Thernstrom et al., 1980, p. 796). Other groups, including Croats and Slovaks, maintained a strong sense of cultural pride until the turn of the century, although the establishment of cultural organizations upheld many traditions for longer (Thernstrom et al., 1980, p. 933). In Roslyn, the presence of affiliated lodges and cemeteries, as well as distinct burial trends within them, suggests a high social importance on cultural identity for these groups. Clustered burial locations in the Old City Cemetery further indicate this attention to shared heritage in a community-wide fashion, even outside of a lodge environment.

As one lodge (the Red Men Lodge) was affiliated with Americans, I anticipated some degree of *nationality*-based shared practices for the *America* class. This heritage did not appear to play a significant role in burial location in the Old City Cemetery. Celebrating and emphasizing American heritage appeared important for those in the Red Men Lodge, although may not have extended significantly to individuals outside the lodge based on the absence of clearly shared practices in the Old City Cemetery.

Other *nationalities* did not have ethnically affiliated lodges. The Masonic Lodge tended to favor individuals of Welsh and English descent, but did not bar entry for other people. Other lodges contained a variety of *nationalities*. These lodges recruited based on shared ideals, worldview, and in some cases religious belief, but did not restrict access to certain heritage groups. Based on a lack of ethnically affiliated lodges and assimilation into belief-based lodges, I did not anticipate other *nationality* groups to exhibit significant heritage-based trends in the Old City Cemetery, nor Roslyn society by proxy. Nationwide, Austrian immigrants around the turn of the century notably did not have a well-established national identity, and tended to “deemphasize their national origin,” leading to a quicker cultural assimilation (Thernstrom et al., 1980, p. 165). Similarly, preservation of German heritage waned after 1900 as many immigrants adapted to the American experience (Thernstrom et al., 1980, p. 416). Immigrants of French descent, on the other hand, largely emigrated to seek a cultural change specifically, and quickly replaced heritage-based tradition for newfound American life (Thernstrom et al., 1980, pp. 380, 385). These national-scale trends are suggested in the lack of defined lodges, and the presence of these *nationality* groups in a variety of other belief-based organizations. This is echoed in the lack of significant locational trends in the Old City Cemetery for these *nationality* groups, and suggests these individuals may have placed less importance on heritage in their social identity.

NON-SPATIAL MORTUARY CHOICE: MONUMENT AND PLOT ATTRIBUTES

In this section, I address demographic group choice in mortuary expression, including *monument type*, *monument material*, *monument size*, *plot size*, *motifs*, and overall *elaboration*. I first explore potential trends between demographics and expression using factor analysis, then look more closely at group-based choice using Pearson’s R correlation matrices. Using the latter, I explore each monument or plot attribute category in relation to demographic classes to identify the degree to which groups may have specifically chosen mortuary attributes. I simultaneously assess the raw distribution of mortuary attributes within demographic classes to contextualize the patterns and further interpret these statistical correlations.

To consider a specific demographic category a driver or influencer of monument or plot attribute choice, I expected at least some of the classes to be significantly correlated with these attributes, independent of other correlated distributions, and ideally maintained over time. Otherwise, I assumed the attribute was not specific to the social group and represents choice based either on chronologic norms or randomness. To further understand group choice over time, I assessed significant attribute patterns across *decade* groups and compared these to known changes in nationwide mortuary expression trends.

Lack of group-based choice suggests less societal importance on differences between social groups, while significant similarities in group choice suggests group differentiation. Randomness in monument and plot attribute choice within and between groups may suggest a form of cultural homogeneity.

Factor Analysis and Broad Trends in Monument and Plot Choice

Factor patterns here represent possible underlying paradigms in physical mortuary choice and expression. I focused on the first three resulting factors (F1-3) as they contributed the majority of variation within the dataset and represented the most significant monument and plot attribute trends. Further factors (F4-44) each contribute decreasing marginal variation and represented tenuous trends in mortuary choice.

The first factor (F1) represented the most significant trend in the data, and was characterized by correlations between unknown demographic and physical attributes (Figure E1). In short, those burials with missing monuments tended to have low *elaboration* overall and tended not to have associated demographic attributes. This trend was not surprising, as I was unable to compile demographic attributes without a name, date, or any other monument-based information. Burials with *no monument* were nearly always given *unknown* designations for each associated demographic attribute, resulting in significantly high correlations between these attributes and expression. Along the same lines, burials with high *elaboration* tended to be those with monuments, and these burials included enough information to conduct genealogical research. Even though this factor represents the most significant latent trend within the dataset, it serves merely as a confirmation of data collection methods.

The second factor (F2) presented a more informative trend. This factor suggests that *age* may be the most influential demographic attribute regarding monument and plot attribute choice (Figure E2). On one end of the spectrum, *children* (who had *no occupation,* and tended to die of *disease*) were associated with smaller *monument* and *plot sizes*, as well as medium *elaboration*. On the other end, higher *elaboration* and larger *monument* and *plot sizes* were more associated with *adults*. I further explore this potential trend in the Age-Based Monument and Plot Choice section below.

Factor three (F3) indicated that *age*, as well as some monument attributes, may have been a function of *decade* association (Figure E3). *Seniors* tended to have *granite* monuments in a later period, while *children* tended to have *marble* monuments in an earlier period. To further investigate this potential trend in choice, I assessed chronological norms and *age* (see Decade Blocks and Chronology-Based Monument and Plot Choice, and Age-Based Monument and Plot Choice sections below).

Conclusion: Factor Analysis and Suggested Trends in Monument and Plot Choice

Overall, the largest three factors suggested that choice in monument and plot attributes may have been largely influenced by differences in *age* and *decade*. Just based on these factors, demographic categories such as *nationality*, *occupation*, and *cause of death* appeared to play a minimal role in monument and plot attribute choice. To further assess these possible trends, I continue this section with a closer assessment of demographic-mortuary attribute correlations and raw distributions.

Decade Blocks and Chronology-Based Monument and Plot Choice

I used the *decade block* category to assess monument choice in terms of chronological changes or shifts in norms. Here, I assessed chronology to identify how likely monument and plot attribute choice were influenced by these norms, rather than membership within another classified demographic group. Just as the general Cemetery layout shifted spatially as time progressed, I identified some changes in common plot and monument attributes over time regardless of changes in other correlations. These changes indicate chronological norms may have influenced monument and plot attribute choice.

As synthesized by McGuire (1988) and Lane (2013), plot and monument norms closely followed cemetery structure in historical-period America and were characterized by a general loss of individuality over time (see Western Attitudes Towards Death section in Chapter III). In the late 1800s, many American communities acknowledged social and economic inequalities; in many cemeteries, these differences were manifest in a great variety in *monument types*, *materials*, *size*, and *elaboration* (McGuire, 1988, p. 457). Larger monuments and plots (family plots) were expensive and therefore represented individuals of greater economic ability. Expensive stone such as *marble* were often foregone in favor of more accessible materials. However, after the turn of the century, commercialization and manufacturing expansion allowed greater access to more "expensive" features for those of lower economic ability. As a result, general *plot* and *monument size* increased after the turn of the century and *marble* became frequently used. Many people could afford more *elaborate* monuments nationwide. However, mortuary ideology shifted again in the following decades with the development of "park" cemeteries, a precursor to maintenance-oriented "memorial" cemeteries. *Monument type* variety decreased, as did *plot* and *monument size*, as cemeteries required more uniform features. *Monument types* shifted away from tall, ornate features towards flatter, more regular objects that allowed for easier grounds maintenance. *Monument materials* also shifted towards more uniformity, with *granite* outpacing older, more varied materials such as *marble*, *wood*, and *sandstone*. These dynamic shifts in monument and plot features have been observed in cemeteries nationwide.

In the Old City Cemetery, shifts in observed *monument types* over time generally followed these national norms. Monuments in the Cemetery's earlier periods are diverse and tend to be in the *obelisk*, *irregular*, *cross*, *slant*, or *standard* classification (Table C6 and Figure 24). However, Cemetery monuments became more standardized in later periods (after ca. 1920) and became dominated by *bevel* and *flat* types. Decreasing monument diversity closely follows known ideological and economic shifts during the early 1900s, and is not a product of change in Roslyn's demographic composition.

Monument material also closely followed this ideological shift. While *marble* remained dominant until ca. 1920, *granite* quickly surpassed it as the most common *material* (Table C7 and Figure 25). Other types such as *concrete*, *wood*, and *sandstone* also decrease over time as *granite* became more accessible and available, although both *wood* and *sandstone* were sparse in the dataset. *Metal* increased slightly over time with the growing usage of metal plaques in lieu of stone. In the Cemetery, *material* appears to be a function of *monument type* (Figure 26); older *types* are nearly entirely composed of the older *marble*, while newer *types* are dominated by *granite*.

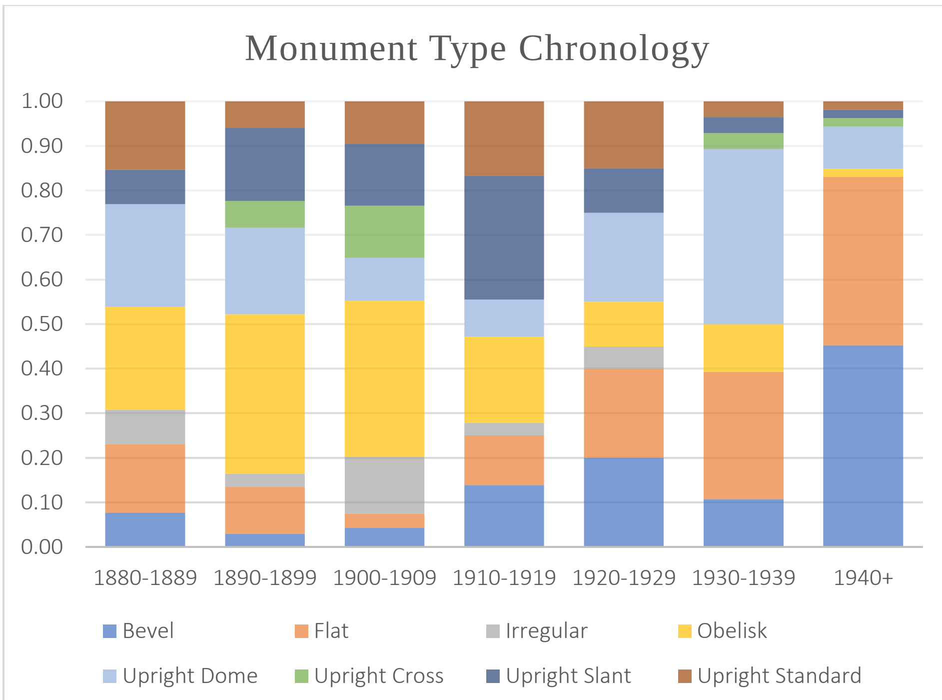


Figure 24. Monument Type Chronology. Percentage of Monument Type per Decade.

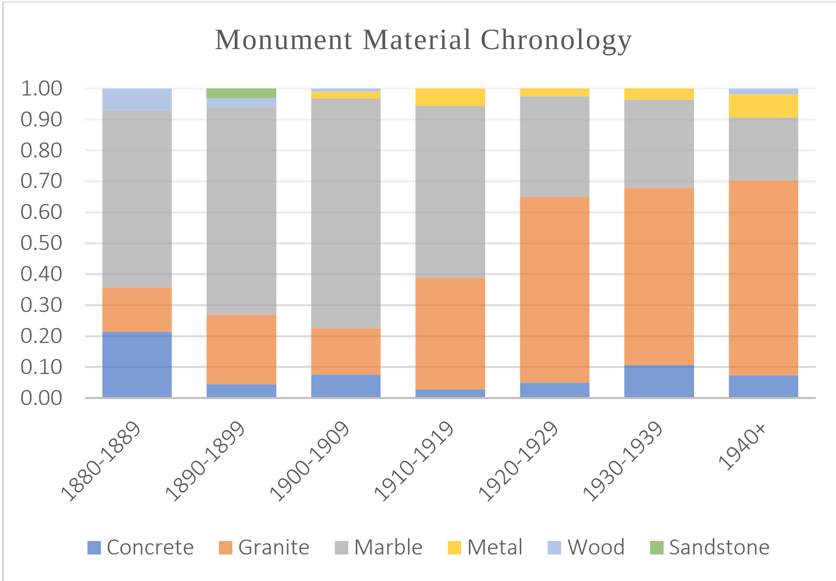


Figure 25. Monument Material Chronology. Percentage of Material per Decade.

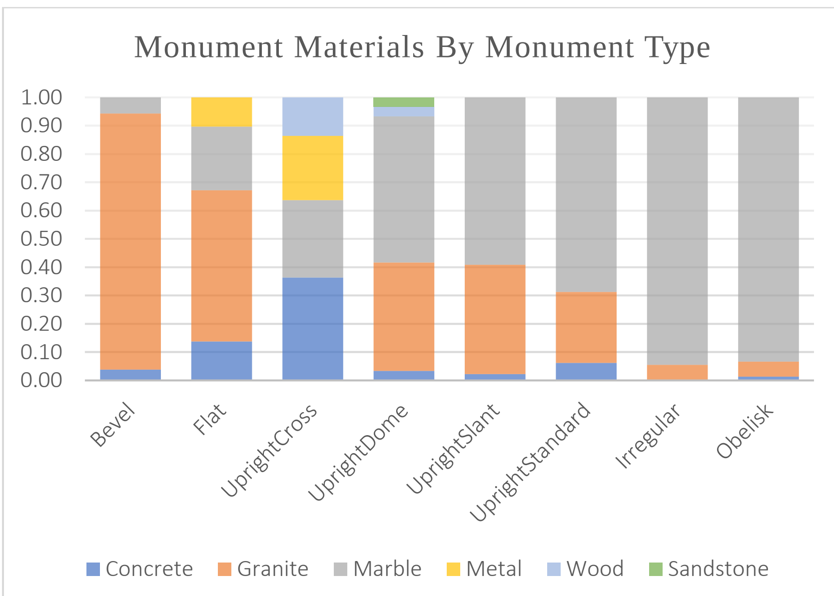


Figure 26. Monument Materials per Monument Type. Percentage of Material per Type.

As expected, *monument size* statistically decreased over time as *types* shifted towards more standardized shapes (Table C8). When assessing the percentages of *monument sizes*, they appeared to shift only slightly over time (Figure 27). Although there were many small (usually *child*) monuments in the earlier periods, their usage was only significant in later decades. Larger monuments decreased over time as national norms suggested.

Interestingly, *plot size* skewed towards a larger average in later periods, directly contrary to the national norms (Table C8 and Figure 27). However, this is explained by the continual re-use of pre-existing large family plots over time. Smaller plots were common in earlier periods due to the prevalence of children interspersed between larger family plots, but *new* plots in later periods tended to have smaller *sizes*.

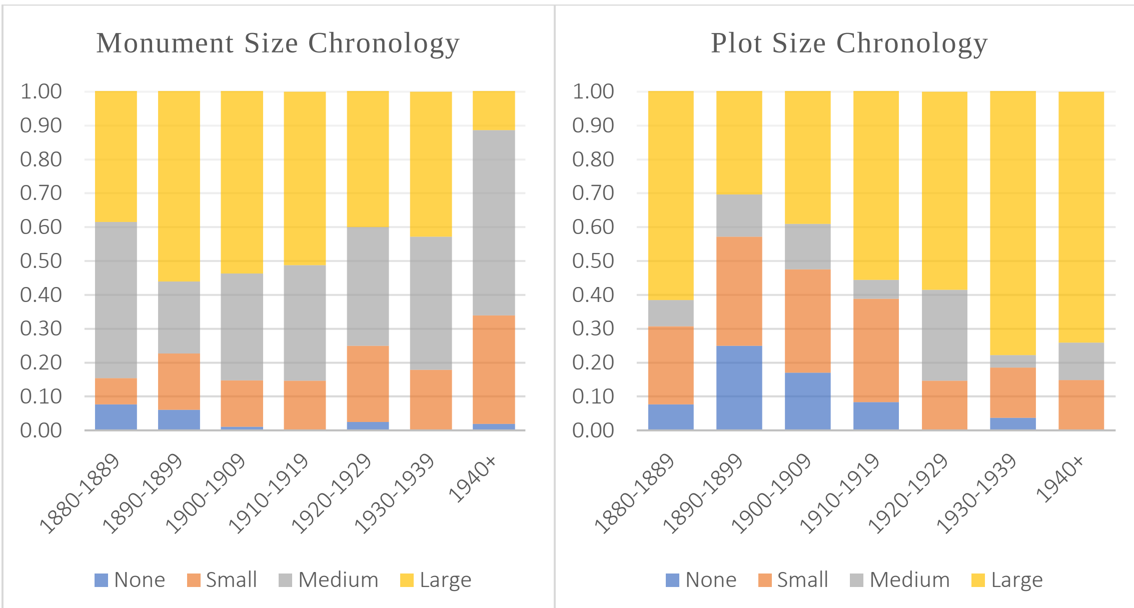


Figure 27. Monument and Plot Size Chronology. Percentage Size by Decade.

Many scholars have studied *motif* chronology (Deetz & Dethlefsen, 1971; Dethlefsen & Deetz, 1966; I. R. Hodder & Orton, 1976; Mallios & Caterino, 2007; Parker Pearson, 1982; Wurst, 1991), but these studies tend to focus on *motifs* that are not in the Old City Cemetery. It is therefore unclear if changes in *motif* composition follow national trends. The percentage of monuments with *motifs* is relatively stable over time (around 50-60%), decreasing slightly in later periods when *elaboration* waned nationally

(Table C9 and Figure 28). *Motif* types used fluctuates slightly over time. Incorporating the above attributes, overall *elaboration* expectedly decreases over time, being highest in earlier periods (Table C10).

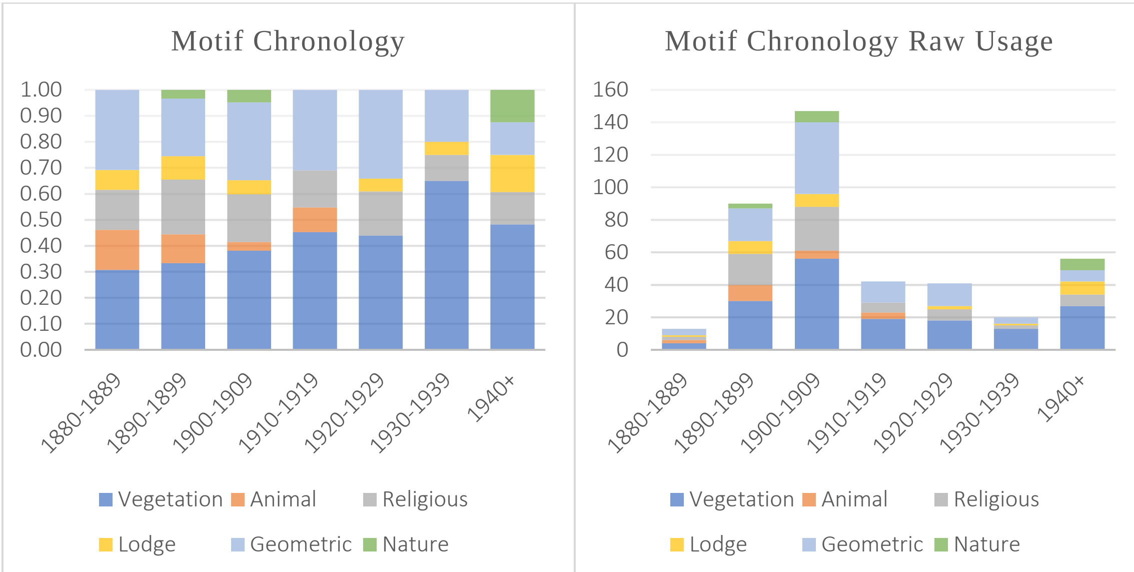


Figure 28. Percentage and Raw number of Motifs per Decade.

Conclusion: Chronology-Based Monument and Plot Choice

Overall, changes in plot and monument attributes in the Old City Cemetery appear to correspond with historical-period national trends. While I identified some minor exceptions, these similarities suggested that monument and plot choice may have been more influenced by chronologic norms than personal demographic attributes. Correlations between demographic and monument attributes are discussed below.

Nationality-Based Monument and Plot Choice

Based on my assessment of correlations and comparisons between *nationality* groups, only the *Eastern Europe* and *Southern Europe* class appeared to have potentially chosen attributes based on shared heritage, although only partially. Other *nationalities* appeared influenced more by chronology or randomness, suggesting that shared heritage had minimal bearing on monument and plot attribute choice overall. Correlations between *nationality* and monument attributes are outlined in Table C12.

The highest correlation between *nationality* and *monument type* occurred between *Eastern Europe* individuals and *upright cross* types. This also represented the dominant *monument type* for this group. Both classes were the most common in the *1900-1909* period, quickly decreasing in popularity after this time (Figure 24, page 164; Figure 29). As discussed below, the *child* group is also significantly correlated with this *monument type* (see Age-Based Monument and Plot Choice section below).

However, not all *child*-aged individuals were buried with *upright cross* monuments. Assessing the chronological spread of *upright cross* types within the *Eastern Europe* group (Figure 29), the prevalence of this *monument type* ceases just as the prevalence of *children* does. When comparing *child* burial *monument type* by *nationality* (Figure 30), *Eastern Europe* was dominated by *upright cross* usage during a time period with considerable *type* diversity, suggesting that this *monument type* may have been specifically chosen for children within this group. But considering the relatively low number of individuals in the *Eastern Europe* class and those that had *upright cross* types, additional studies in lodge cemetery blocks are required to confirm this trend. However, because *upright cross* types were not used for all *children* in the Cemetery, but all *upright cross* types were associated with *children* and *young adults*, it is likely that choice in this *monument type* was based on a combination of both *age* and *nationality*. Other correlations appeared influenced by known changes in attribute chronology, or appear randomly distributed. Overall, *nationality* was an unlikely factor in *monument type* choice (Figure D1, Figure D2, Figure D3).

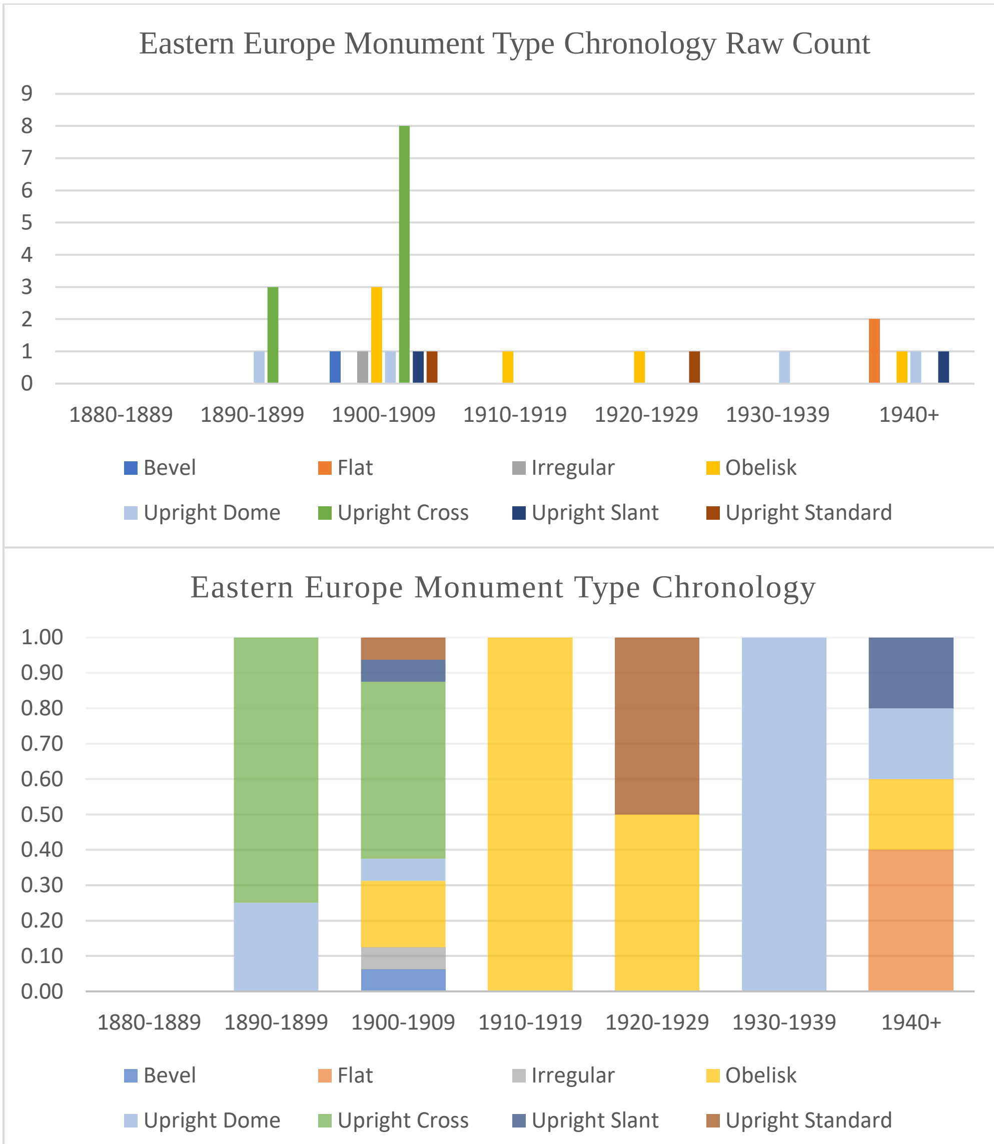


Figure 29. Eastern Europe Monument Type. Raw Count and Percentage per Decade.

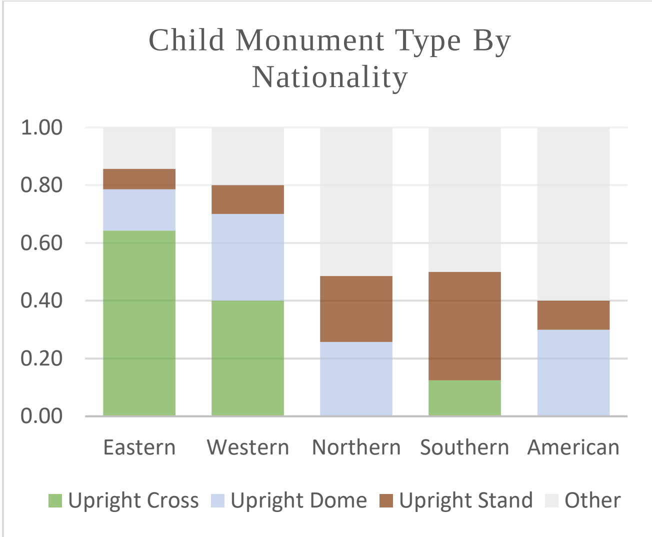


Figure 30. Child Monument Type by Nationality. Percentage of Type per Nationality.

As discussed above, *monument material* was largely a function of *monument type* and chronology. Assessing correlations between *material* and *nationality*, this appeared to be the case, suggesting that choice in *material* was not a factor of *nationality*.

Monument size appeared overall unaffected by *nationality* group past chronological correlations. While *Western Europe* burials had statistically smaller *sizes*, and *Northern Europe* slightly larger *sizes* than others, the distribution of all *monument sizes* appeared similar within *nationality* groups (Figure 31). The latter significance factor was likely driven by the sheer number of members in the *Northern Europe* class in earlier *decades*. Overall, it is unlikely that *monument size* choice was influenced by *nationality*.

The prevalence of family plot reuse in the Cemetery increased average *size* over all groups (Figure 31). While *plot size* did not follow nationwide trends, I only identified one potential *nationality*-based trend in *size* choice. *Southern Europe* burials in the Old City Cemetery were less commonly placed in large family plots, even during early periods when this trend was common, suggesting predisposition towards single plots.

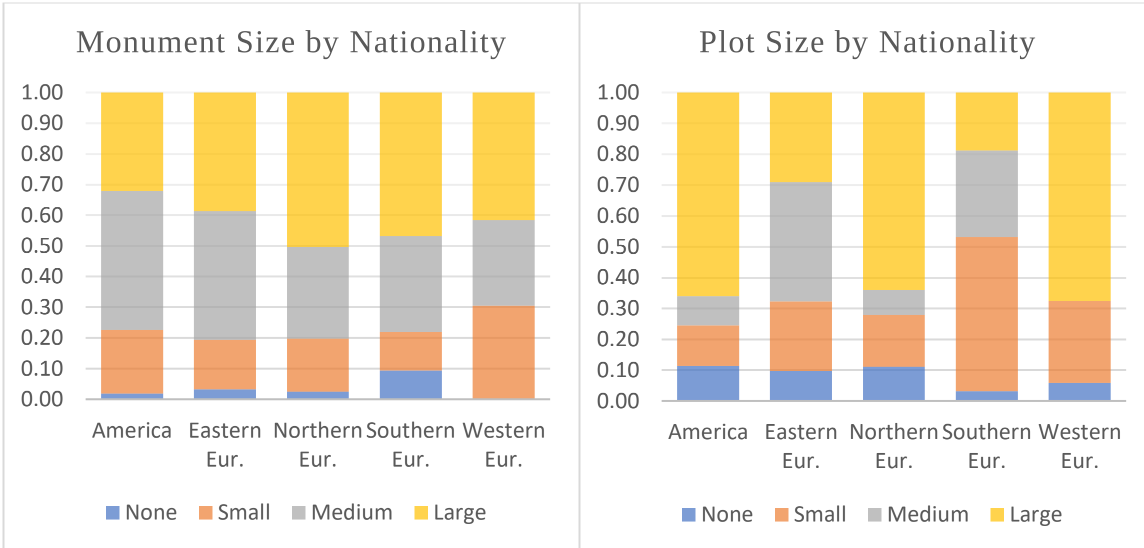


Figure 31. Monument and Plot Size by Nationality. Percentage by Nationality.

This choice may have been based on general economic ability of this group rather than specific mortuary norms, or may have derived simply from the fact that these were singular individuals—instead of families—buried in this area. However based on the relatively small sample size (*n*=32), this trend requires additional studies in other Roslyn cemetery blocks to confirm. Comparing average plot size between *Southern Europe* lodge cemeteries and other heritage-based lodge blocks may provide further information. *Eastern Europe* burials were also placed less often in larger family plots, but this trend is likely a factor of *age* rather than *nationality* as these individuals were predominantly unrelated *children*.

Correlations with *motif* classes did not hint at any clear *nationality*-based trends (Figure 32). *Motif* usage appears relatively stable between most *nationality* groups, although *Eastern Europe* only exhibited several categories as a function of *age*, with *children* having fewer motif types (see Age-Based Monument and Plot Choice below).

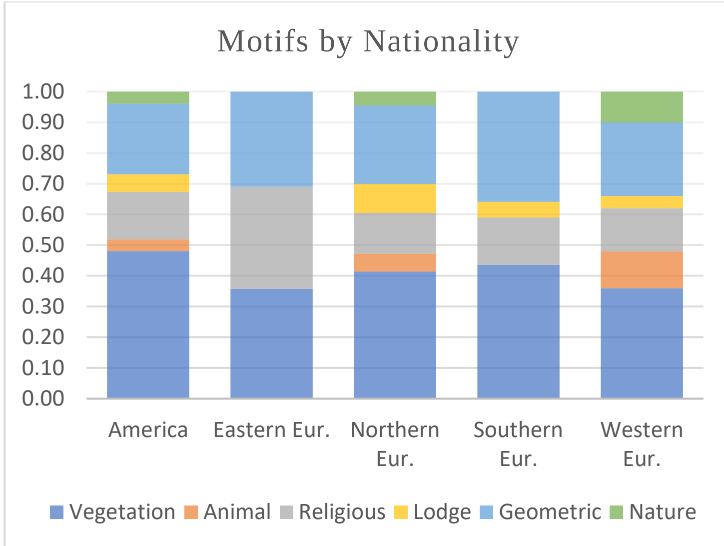


Figure 32. Motif Usage by Nationality. Percentage of Motif per Nationality.

Based on the above attributes, overall *elaboration* did not vary wildly between *nationality* groups. *Northern Europe* was statistically higher, although this was because individuals tended to have chronologically informed larger *monument sizes* and *plot sizes*, more *motif* categories expressed, and an emphasis on sturdier *monument materials*.

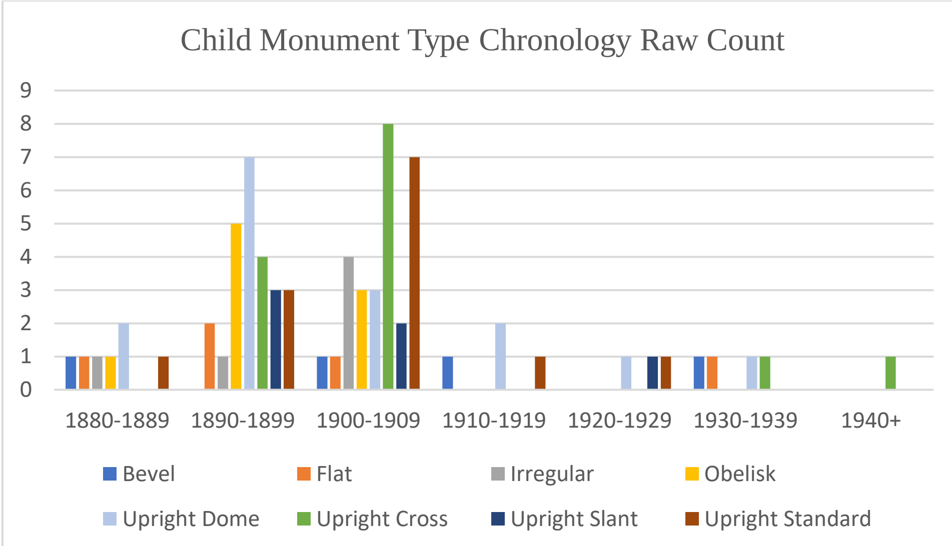
Conclusion: Nationality-Based Monument and Plot Choice

Overall, some *nationality* groups may have chosen monument and plot attributes based on shared heritage traditions, although chronological norms likely guided choice for most. *Eastern Europe* burials were similar enough to suggest a possible choice in *monument type* based on shared heritage. This trend also appeared confined only to *children* in this group, further suggesting a clear mortuary choice, although further analysis in Roslyn's other cemeteries is required to confirm this pattern. I further explore this pattern in the Discussion section below. Another, less clear trend involved *small plot size* and *Southern Europe* burials, which may be a factor of economic ability, heritage-based choice, or a lack of *Southern Europe* family units in the Cemetery. Assessment between other cemetery blocks is required to assess this further. Other *nationality* groups appeared to choose monument and plot attributes based on chronological norms.

Age-Based Monument and Plot Choice

Based on my assessment of correlations and comparisons between *age* groups, only the *child* class appeared to have specifically chosen attributes based on *age*. Other burials were likely influenced more by chronology or randomness, suggesting that shared *age* had little to no influence on monument and plot attribute choice for these groups. Table C13 contains correlations of *age* and monument attributes.

The most notable trend between *age* and *monument type* involves the *child* and *upright cross* classes. However, *upright cross* monuments were only the second most common *type* within this *age* class. *Upright dome* types were more highly represented overall (Figure 33). However, the latter *type* was also common in other *age* groups, while *upright crosses* were used only for younger people. *Upright crosses* are most common in earlier *decades* (Figure 33) within which the *Eastern Europe* group was most common (Figure 30, page 170). Selecting an *upright cross* may have been based on a combination of *nationality* and *age*. Other *monument types* in the *child* group, as well as within the other *age* groups, appeared largely influenced by chronological norms.



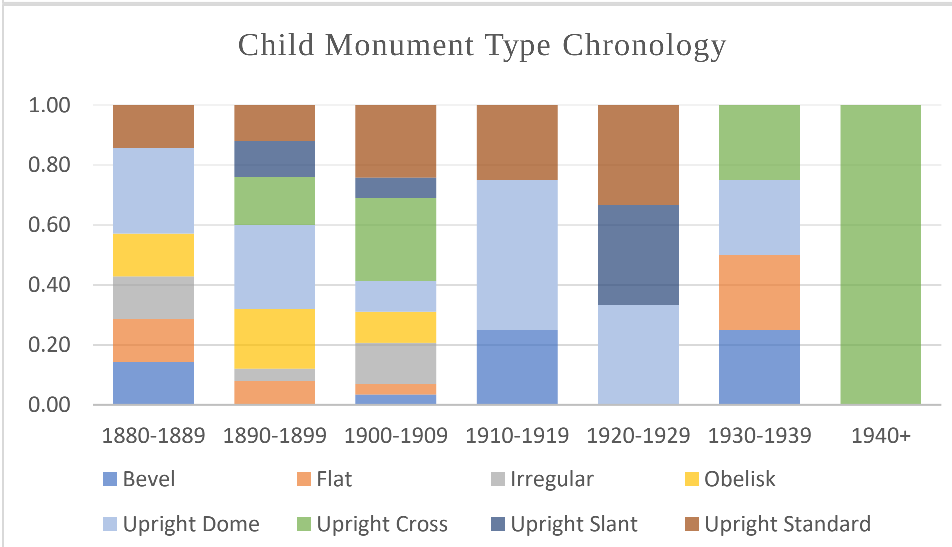
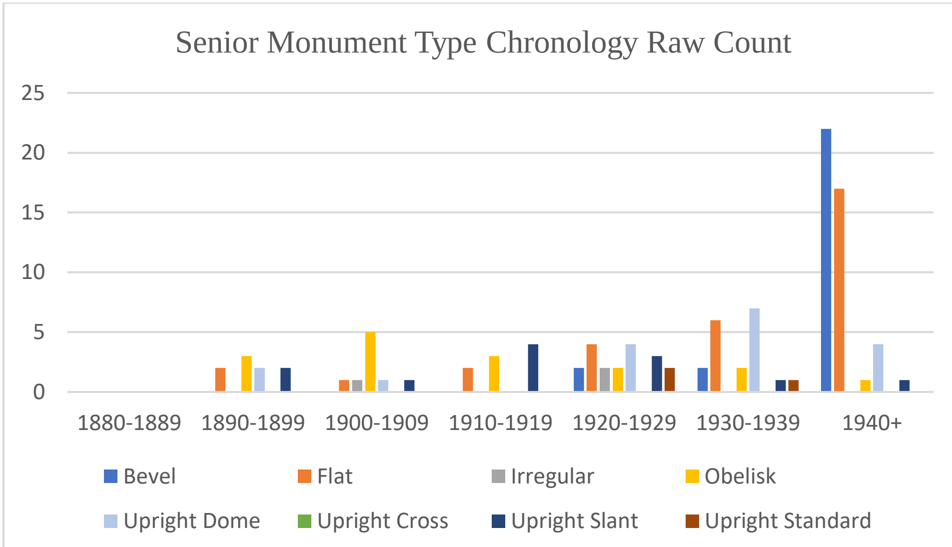


Figure 33. Child Monument Types. Raw Count and Percentage per Decade.

Seniors significantly correlated with *bevel* and *flat*, as these *types* were most common in later *decades* in which *seniors* dominated (Figure 34). However if this represented an *age*-based choice, I would expect *bevel* and *flat* to be the most common for *seniors* even in these earlier periods, rather than older *monument types* (like *obelisks*). This is not the case. *Young adults* and *adults* also largely followed chronology-based trends in *monument type*, dominated by older, more varied *types* in earlier periods and transitioning to *bevel* and *flat* later (Figure D4and Figure D5). For these oldest three *age* groups, shared *age* itself unlikely contributed to *monument choice,* although choice against *upright crosses* represents some form of *age*-based decision.



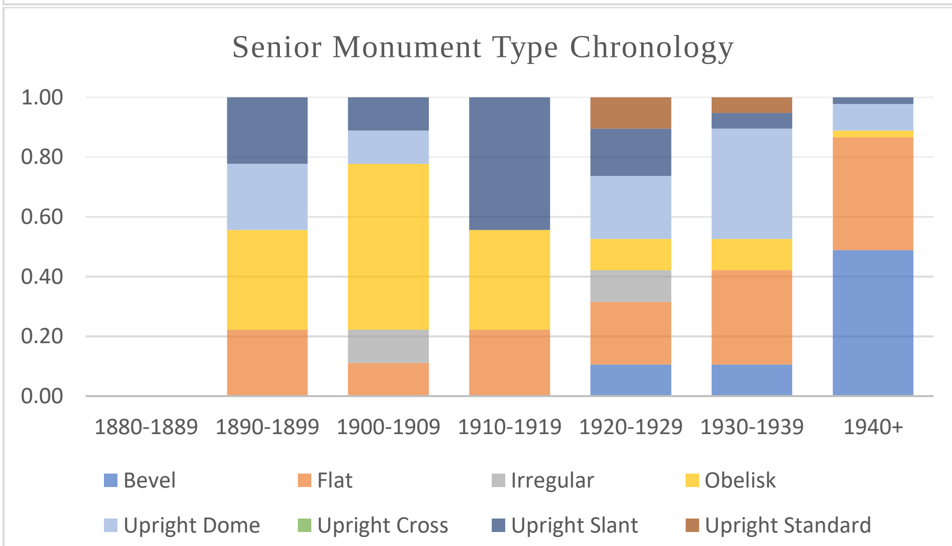


Figure 34. Senior Monument Types. Raw Count and Percentage per Decade.

For the *age* category, *monument material* appeared a function of *monument type* and chronology with *granite* dominating later *types* and *marble* associated with *obelisk*-heavy periods. The most notable *material-age* correlation was with *child* and more friable *materials* like *concrete* and *sandstone*. *Children* also had monuments made of *wood* and *metal*. These four classes represent cheapest and most accessible *materials*, which implies that *age* may have influenced *material* (and the *types* they comprised) in economic terms. See Discussion section below for more information.

Monument size skewed smaller for *children*, and larger *sizes* increased with *age* (Figure 35). Since *monument size* generally decreased over time nationwide, I would expect *children* to have larger *sizes* if this trend was chronologically based. However, it appeared as though *children* were assigned smaller *sizes* and older individuals larger *sizes* in the early periods, suggesting a degree of *age*-based choice. This too is likely a function of affordability. Some previous studies have also identified smaller *monument sizes* for *children*, while others have found little to no difference between *age* groups (see Haveman, 1999, p. 270). *Seniors* skewed smaller as well, but this was more likely a factor of chronological norms in later periods than an *age*-influenced decision.

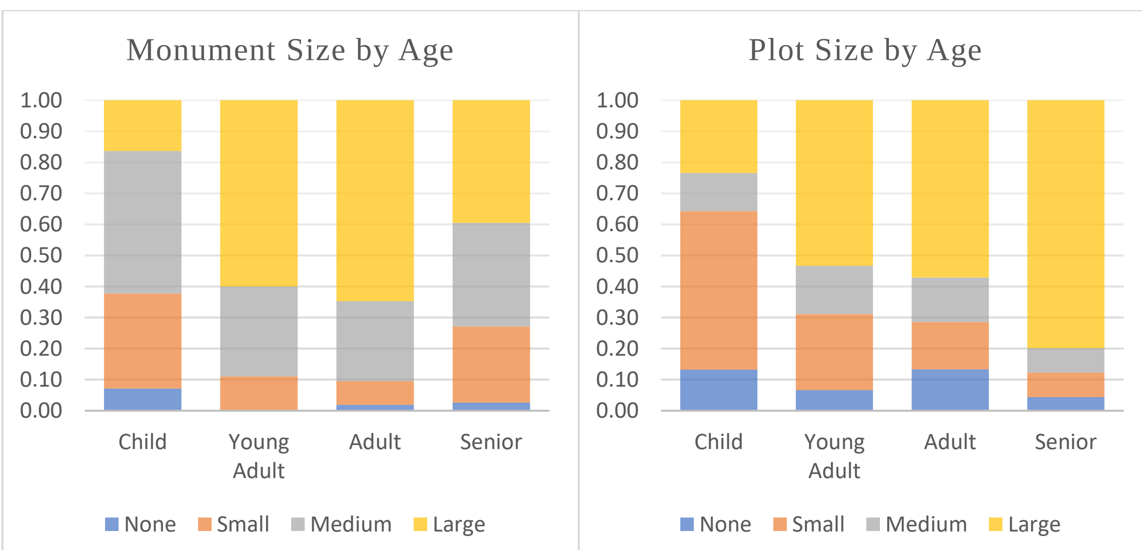


Figure 35. Monument and Plot Size by Age. Percentage by Age.

Similarly, *plot size* increased with *age* (Figure 35). This trend was influenced by physical body size, but also by the general exclusion of *children* from large family plots. The older an individual was, the more likely they were to be included in the family plot. Although debated, some researchers suggest that prior to the early 1900s, families did not consider children as legitimate members of the family until they reached a certain age, and were not always included in family plots (Chenoweth, 1978, pp. 42–43; Haveman, 1999, p. 267). It is unclear to what degree this occurred in Roslyn, although exclusion from larger family plots may have been a financial decision. Nationwide *plot size* generally decreased in later *decades*. In the Cemetery, burials in entirely new locations were rare after ca. 1940, but tended to skew towards *smaller* sizes. Burial in the Cemetery appeared predominantly based on familial ties after this time.

Motif usage increases slightly with *age*. *Children* exhibited fewer *motif* types than the other groups (Figure 36). *Lodge* and *nature* designs increase with *age*, but only the latter increased over time (Figure 28, page 167). The former is present throughout the Cemetery's chronology, common with older individuals. This suggests that while *nature* may be a chronologically based choice, *lodge* is tied more to *age*. This is logical, as *children* and *young adults* did not belong to lodges. *Religious motifs* are most common in *child* burials; these patterns are relatively stable over time despite a decreased prevalence of *children*, suggesting only a slight inclination towards *age*-based choice. Previous *motif* studies in historical-period cemeteries have found that children's monuments often exhibited religious symbols intended to represent the ideological belief in children's fundamental purity and innocence (Haveman, 1999; McKillop, 1995; Smith, 1987; Snyder, 1989). *Geometric* patterns are least common in *children* despite heavy representation in earlier periods, further suggesting that *children* tended to have less decoration, and of different styles, than older individuals.

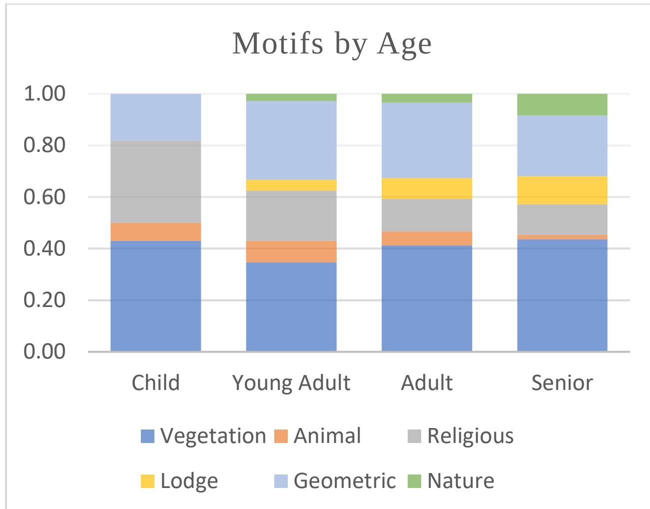


Figure 36. Motif Usage by Age. Percentage of Motif per Age.

Accounting for the above trends, *children* expectedly have slightly lower *elaboration* scores than older individuals. S*eniors* also have slightly lower scores, driven by decreasing *monument size* over time, that fit with decreasing *elaboration* nationwide.

Conclusion: Age-Based Monument and Plot Choice

Overall, monument and plot attributes appeared influenced by both *age* and chronology, and sometimes a combination of both. Of the *age* classes, membership in the *child* group most influenced choice in attributes, perhaps mainly as a factor of economic ability (see Discussion section below). Other *age* groups appeared to choose monument and plot attributes mainly based on chronological norms.

Cause of Death-Based Monument and Plot Choice

None of the *cause of death* classes appeared to have influenced monument of plot choice. Instead, the statistical patterns visible between *cause of death* and monument attributes appeared influenced more by *age*-based death patterns and chronology-based norms. Correlations between *cause of death* and monument attributes are contained within Table C14.

Monument type followed both *age*-based death patterns and chronological norms. Both *accidents* and *disease* were most common in older *decades*. The former generally affected *adults* and the latter greatly affected *children*. As a result, the *accident-obelisk* correlation is likely a result of both classes being heavily represented in earlier periods. In the *accident* class, *obelisks* decrease with time as predicted by chronological norms, with a slight transition towards more standardized *types* (Figure D6). The *monument type* distribution in the *disease* class followed a less clear pattern, but appeared to follow similar chronological trends (Figure D7). Statistical correlation between *disease* and *upright cross* is a result of the *child* class. As the *old age* class is a function of the *senior* class, the distribution and significances with *monument type* are associated with this *age* group (Figure D8). I disregarded the spread of *chronic illness* deaths based on the designation overlap with *disease* and *old age*.

The spread of *monument material* correlations and distributions for all *cause of death* groups similarly followed chronological and *age*-based trends, as these appeared as a function of *monument type*.

Assessing *monument size*, those in the *accident* class tend to be larger and those in the *disease* class tend to be smaller (Figure D9). These correlations too are functions of time and *age*-based trends. In the Cemetery, *monument sizes* tended to be larger overall in older *decades* following nationwide norms; *accidents* were most commonly sustained by *adults* in these periods. *Children* were the most affected by disease and tended to have smaller monuments. Small *plot size* for *disease* resulted from similar correlations (Figure D9). *Senior plot size* followed immediately from chronological trends with *size* decreasing overall.

Motif trends were driven by similar correlations. Those associated with the *accident* class were most common in earlier *decades*, and those associated with the *disease* class appeared most common in *children* (Figure D10). Overall *elaboration* followed from the above correlations and matched that suggested by *age*.

Conclusion: Cause of Death-Based Monument and Plot Choice

Overall, monument and plot attributes choice appeared unaffected by *cause of death* itself. Patterns in choice followed both *age*-based trends and chronological norms.

Occupation-Based Monument and Plot Choice

None of the *occupation* classes appeared to have influenced monument or plot choice. Instead, the statistical patterns visible between *occupation* and monument attributes appeared influenced more by chronology-based norms. Correlations between *occupation* and monument attributes are contained within Table C15.

Monument type appeared more heavily influenced by chronology than *occupation* designations with few exceptions. The *no occupation* class—and the correlation with *upright cross*—was a direct product of the *child* class. The *laborer* group was significantly correlated with *bevel* and *flat*; while this demographic group was indeed most common in later *decades*, more common usage of *flat monument types* in earlier periods suggests perhaps this *type* was possibly chosen for *occupation*-based reasons (Figure D11). However, the degree to which this *occupation* influenced choice is unclear, considering this group also used other, more elaborate *monument types*. Further studies in other Roslyn cemeteries would be required to address this potential trend further, considering the relatively low number of individuals in this *occupation* (*n*=27). The observed correlations between other *types* and *occupations* were largely driven by chronology as more diverse *types* transitioned into predominant usage of *bevel* and *flat* in later periods (Figure D12, Figure D13, Figure D14, Figure D15, Figure D16).

Correlations with *monument material* similarly followed these *type*-based chronological trends. The association between *proprietors* and *metal* was due to a slight increase in *metal* plaque usage in later *decades*.

Monument size also appeared to largely follow chronological trends. *Miners* were more likely to have larger *sizes* since early *decades* were *obelisk*-dominated, just as *laborers* and *proprietors* tended to have slightly smaller *sizes* in later periods (Figure D17). *Housewives* were associated with larger *monument sizes*, although this was likely a function of shared family monuments. Just as *housewives* were often buried in family plots prior to World War II (Onufer, 2008), many shared monuments with husbands or other family members. As such, this practice represented more of a gender-based and family dynamic norm than an *occupational* one. Assessing the distribution of *sizes* by *occupation*, there do not appear any other significant differences between groups, with an expected exception of the *no occupation* class (associated with *children*).

Plot size was statistically and distributionally similar between *occupation* groups (Figure D17). *Miners* tended to have smaller *sizes* than other groups, due to a higher usage of single plots and lesser inclusion in family plots. This likely resulted from the many mining accidents in Roslyn's early years; many widows promptly moved away from Roslyn or remarried. In many cases, family plots were never established for these *miners*. However, this did not result from *occupation* itself. *No occupation* plots skewed small as expected. Overall, it is unlikely *occupation* directly influenced *plot size*.

Motif trends were generally stable between *occupation* groups, with the exception of *no occupation* (Figure D18).

Conclusion: Occupation-Based Monument and Plot Choice

Overall, I did not identify any clear patterns or trends in monument and plot choice based on *occupation*. While the *no occupation* patterns were better explored through *child* correlations, other patterns were more influenced by general chronologic shifts in norms than *occupation* designation.

Discussion: Monument and Plot Choice in the Old City Cemetery

Of the demographic categories I assessed, shared *age* appeared to be greatest contributor to intentional group-based attribute choice in the Old City Cemetery. With some minor exceptions, shared *nationality*, *occupation*, and/or *cause of death* did not appear to play significant roles in attribute choice. Many of the patterns identified for these demographic categories were influenced more so by chronologic norms and general *decade*-based use patterns. Yet other patterns seemed randomized suggesting little to no importance on these shared demographic characteristics. These trends are suggested by both factor loadings and independent assessment of significantly correlated attributes.

Shared *age* seems to have affected intentional attribute choice the most, but not all *age* groups seemed to place emphasis on this trait. I can only reasonably say that monument and plot choice were significantly affected by membership in the *child* class.

But while the *child* class shared many attributes regardless of other demographic association, *children* in the *Eastern Europe* class appeared treated with more homogeneity in *monument type* and *material*. This suggested at least some importance on *nationality* for this particular group. *Southern Europe* tended towards slightly smaller *plot sizes* regardless of *age*, although it was unclear if this trend was based on shared heritage, financial differences between this group and others, or some other factor. Interestingly, these two *nationality* groups also exhibited some form of locational choice. However, because of the relatively small sample size, verification of these trends requires additional exploration in other cemeteries in the Roslyn complex, and perhaps in other historical-period cemeteries in the vicinity.

In Roslyn, differing monument and plot attributes for *children* were likely based on the parents' financial unpreparedness in addition to ideology. *Child* monuments tended to be crafted from friable, more easily attained *material types* such as *concrete*, *metal*, *sandstone*, and *wood*. In many cases, these *concrete* monuments were poured, engraved, and erected by the families themselves to save on costs (Onufer, 2008, p. 53). Similarly, metal monuments were crafted specifically in Roslyn's own mining forges as a low-cost option (Richard Watts, personal communication 2020). Smaller *plot* and *monument sizes* were likely a function of both average body size and parents' financial inability to purchase larger features, which tended to cost significantly more (Lane, 2013; McGuire, 1988). In times of hardship, many Roslyn families could not afford burial expenses and instead buried infants and *children* in wooden spaghetti boxes they attained for free from the local grocer's (Ware, 2005, p. 7). In Roslyn's early years, parents often lost multiple children to *disease* or other *chronic illnesses*, sometimes in a short period of time (Chenoweth, 1978, p. 37). In many cases, using smaller *monument sizes*, less curbing, fewer decorations, and perhaps also sharing general plot location (see Discussion: Locational Choice above) constituted a financial necessity. More substantial burial features were likely more affordable for older individuals based on financial readiness, personal insurance payouts, lodge affiliation, or inclusion in a family plot as an established family member. Nationwide, infants and *children* may not have been granted this same familial inclusion until they were considered their own individual (Chenoweth, 1978, pp. 42–43; Haveman, 1999, p. 267).

While it is currently unknown how many other unmarked burials exist in the Old City Cemetery, there are likely more *children* in the area. Visible *child* burials represent those whose families could afford some form of physical marker (Chenoweth, 1978; Onufer, 2008). The prevalence of *Eastern Europe child* burials suggests that perhaps this group was one of the more financially well-off *nationality* groups in historical-period Roslyn. However, it is also possible that this group placed a higher ideological importance on *child* mortuary treatment, as this *nationality* group tended to be relatively poor nationwide (Nicole Jastremski, personal communication 2020). In the Dr. David Starcevic cemeteries are delineated areas reserved for *children*, many of which exhibit a unique low-cost *monument type* and *material*. This unique trend represents an old world tradition (Ware, 2005, p. 44) and presents an interesting comparison to the Old City Cemetery, where these discrete choices in *monument type* and *material* are also found. In Onufer's (2008) work, she presents a photograph of *child* burials in the Dr. David Starcevic No. 1 Cemetery, many of which exhibit *concrete upright cross* monuments (Figure 37). Several *Eastern Europe child* burials in the Old City Cemetery share a similar style. Many *Eastern Europe* groups belonged to the Roman Catholic faith nationwide and in Roslyn specifically (Onufer, 2008, p. 28; Nicole Jastremski, personal communication 2020), and may have chosen this religiously affiliated *monument type* form for ideological reasons (Lane, 2013, p. 19; Onufer, 2008; Pitts et al., 2016, pp. 26, 31).

Figure 37. Photograph of Child Graves with Concrete Upright Cross Monuments in the Dr. David Starcevic No. 1 Cemetery (Onufer 2008, Figure 7, Page 54.)

With the wide availability of low-cost options for *child* burials, I would expect more similar burials from this *age* group within other *nationality* groups. However, *child* mortuary rites may have been viewed differently between groups in historical-period Roslyn. Based on the similarity of burials within and between cemeteries, the *Eastern Europe* group appears to have expended a different level of effort on *child* burials and treated them in discrete ways that other groups did not. While some other *child* burials used costlier *materials* in the Cemetery, these *Eastern Europe* burials exhibited hand-crafted features that may have required more ideology-driven effort. However because

Eastern European children were relatively few in the Old City Cemetery, further studies are needed to confirm this.

During her original glance at the Roslyn Cemeteries, Chenoweth suggested that *Southern* and *Eastern Europe* lodge cemeteries exhibited the most elaborate burials when compared to the other lodge cemeteries (1978, p. 42). Based on my own assessment of *elaboration*, it was unclear if this was the case in the Old City Cemetery. It is possible that individuals buried in the Cemetery exhibited less representative *nationality*-based mortuary attributes, and may have instead lived life less influenced by shared heritage identity on an individual level. However, these two groups exhibited the most identifiable intentional choice between *nationality* groups. Although tenuous, *Southern Europe* burials tended to be slightly smaller in *plot size* than expected from general chronology or *age*, suggesting perhaps an ideological or financial choice. This also may have resulted from single individuals, rather than family units, placement in the Old City Cemetery. *Eastern Europe*, as explored above, appeared to place additional thought into *child* burials similarly seen in other *Eastern Europe* lodge cemetery blocks.

While *age*-based differences were not surprising, I expected shared *nationality* to have played a more significant role in monument and plot attribute choice, and that shared cultural beliefs derived from heritage would result in the greatest shared mortuary trends. I also expected that shared *occupation* would have influenced monument and plot attribute choice to some degree, as I used this demographic characteristic as a potential proxy for economic ability. While the former may have played a small role in attribute choice, monument and plot attribute choice appeared more homogenized than I would have anticipated overall. The lack of mortuary emphasis on these shared traits suggests historical-period Roslyn society enjoyed less financial disparity than one may expect. Additionally, social groups may have been perceived as more equal in terms of social standing, status, and treatment than one may expect based on the diversity of social groups. Rather, homogeneity in perception and treatment between these social groups is suggested by the prevalence of *age*-based choice, *decade*-based choice, and seemingly randomized choice in monument and plot attributes.

CONCLUSION

Although the majority of mortuary choices appeared based on chronological norms or apparent randomness, shared *nationality* and *age* appeared to play a role in intentional group-based mortuary choice in the Old City Cemetery. *Nationality* contributed the most towards locational choice, while a combination of *age* and *nationality* were the most associated with monument and plot attribute selection. However, only some classes within these demographic categories appeared to exhibit significant group-based choice, including *nationality* groups *Eastern Europe* and *Southern Europe*, and the *child age* group. Following nationwide immigration and assimilation trends (Thernstrom et al., 1980), these groups appear to have preserved cultural heritage on a large scale while still integrating into the American experience.

While I expected more pronounced group-based patterns in the Old City Cemetery, the relative homogenization of locational and attribute choice suggests that historical-period Roslyn may have maintained a more unified social structure than is suggested by the separated lodge cemeteries. Mortuary choice implied relative financial equality between social groups, as well as similar ideology surrounding social group treatment. In addition to the presence of lodge cemeteries, the significance of *nationality*-

based mortuary choice in the Old City Cemetery indicates that while unified, Roslyn society still held a degree of heritage-based lifestyle and cultural identity in high regard.

However, it is possible that burials in the Old City Cemetery represented those individuals that did not have strong ideological ties to their heritage and were therefore more willing or likely to adopt “standardized” or dominant mortuary ideology and choice. For some, burial in the public Old City Cemetery may have been a financial decision. Considering the emphasis on heritage and *nationality*-based features elsewhere in Roslyn, inclusion in an ethnic lodge cemetery may have been alluring or ideal for those strongly connected to their heritage. Placement in the Old City Cemetery may alternately represent individuals who did not feel a strong tie to their heritage; in that case, I would expect mortuary expression to be more homogenized. As such, and with so few group-based trends in choice, it is difficult to confidently determine whether this is a more likely scenario. Overall interpretation of choice must be placed in context with the relatively small sample size of classes these statements are based on. Expanding analysis to other cemeteries in Roslyn, or others in Washington, may further contextualize behavior.

PROJECT ANALYSIS AND INTERPRETIVE LIMITATIONS

Some demographic classifications included a low number of individuals. When possible, I grouped similar classes together to increase the sample size. In other cases, classes were too fundamentally different to group together and were left as smaller samples, which resulted in unreliable statistical and spatial patterns for these classes. While I addressed these instances on a case-by-case basis, a larger sample size would provide a better understanding of mortuary choice. This may be addressed by assessing locational choice and mortuary expression choice in other historical-period Washington cemeteries, or even by comparing choice between Roslyn's other lodge-based cemeteries.

Some plots contain multiple individuals (family or multi-plots), and instead of retaining one entry for all persons, I gave each individual their own data entry to contain their discrete social and mortuary attributes. As a result, there are instances of overlapping points in the dataset. In these cases, if multiple individuals belong to the same social group (such as *nationality*, common in family plots), Ripley's *K* and visual clustering will appear higher in these locations as there are more points in close proximity than is expected by chance, or expected between it and nearby plots. Some may argue that this approach artificially increases significant clustering in these locations. For example, this may falsely suggest that *nationality* was the key factor in burial location choice, whereas burial location may instead be more based on familial ties. However, I attempted to identify these instances when possible to avoid this misinterpretation. Here, this required an additional look with visual methods like KDE. In future studies, analysts may use attributes associated only with the *first* buried in a multi-plot to remove this potential issue, although this also limits broader interpretation of locational choice.

Demographic categories like *nationality* and familial ties may both denote a shared cultural background, and therefore may not truly suggest a false positive. However, because familial ties appeared an important part of locational choice, the difficulty of discerning extended familial ties between separate plots may have affected my interpretation of spatial distribution and locational choice. Beyond shared surname, familial ties were difficult to assess in this study, as these relationships are not always clear in historical documents. Some forms like marriage records or birth records may hint at familial ties, but there is no consistent way of denoting or classifying these intangible relations aside from shared surname. Similarly, close friendships or neighborly ties are unlikely to be recorded in documents, although they may hold similar importance in burial location or other mortuary attributes (as seen in the Dr. David Starcevic cemeteries, according to Ware, 2005).

FUTURE WORK

More research is required to determine if burials lying outside of the Old City Cemetery boundaries—in either marked or unmarked graves—are truly associated with other cemeteries or if these burials are instead Old City Cemetery outliers. Some burials within other cemetery blocks were placed before these cemeteries were established. Perhaps based on social stigma, these individuals may have been deliberately excluded from burial nearby other people, only to be surrounded later by interments once other cemeteries were established. This may have interesting implications for social interaction in historical-period Roslyn. If perceived negative traits (disease, low social standing, etc.) determined where individuals were placed within the *landscape* rather than just within the Old City Cemetery boundaries, there may be more homogeneity within the Old City Cemetery itself. In short, exclusion from the Cemetery boundaries may indicate social stigma and segregation, and should be explored.

Expanding the analyses to the entire Roslyn cemetery complex would provide a clearer understanding of mortuary patterns within Roslyn over time. Assessing only the Old City Cemetery limits understanding of choice and variation between social groups, even though this cemetery includes the greatest diversity of individuals. While many lodge cemeteries determined inclusion based on cultural affiliation, further expanding mortuary analyses to these cemeteries may yield additional mortuary trends. Because the *Southern Europe* and *Eastern Europe* groups held relatively few individuals (*n*=32 and *n*=31, respectively), addressing locational choice and monument/plot attribute choice in Roslyn's lodge affiliated cemeteries may further test whether the patterns I identified are significant. For example, comparing *monument types* for *children* between the lodge cemeteries may further illuminate whether *Eastern Europe children* tended to have *upright cross* monuments more often than *children* in other groups. Assessing average *plot size* between *Southern Europe* lodge cemeteries and others may further indicate whether the potential trend identified in the Old City Cemetery represented a more substantial choice. Further assessing locational choice in Roslyn, on the other hand, may prove more difficult. Because many of Roslyn's lodge affiliated cemeteries are associated with specific *nationality* groups, assessing heritage-based locational choice may be confined to the lodge cemeteries blocks not built upon shared heritage.

Expanding analyses to other historical-period Cemeteries in Washington may help contextualize both historical-period Roslyn mortuary behavior (and social dynamics), as well as further explore regional behavior in the historical-period. This approach may be applied to nearby historical-period cemeteries around Cle Elum or Ellensburg, or expanded throughout Washington, the United States, or even to international locations.

CONCLUDING STATEMENT

In short, mortuary behavior and practices are complex. However, using spatial and statistical methods, I identified several group-based mortuary trends in Roslyn's Old City Cemetery. While these resulting trends were not surprising as much is already known about social dynamics in historical-period Roslyn, I identified trends suggesting some degree of social structure through mortuary expression. As such, this project serves to recommend the viability and importance of incorporating spatial and statistical dimensions into mortuary analysis of historical-period cemeteries. I offer that this framework can be applied towards other historical-period cemeteries to investigate social dynamics and mortuary expression.

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APPENDIXES

APPENDIX A—RIPLEY'S K-FUNCTION SIGNIFICANCE TABLES

Table A1. Decade Class Ripley's K Tables.

Decade 1880-1889				
Obs. K	*Exp. K*	*Hi Conf*	*Lw Conf*	*Type*
5.4	2.5	9.4	0.0	Cluster
9.4	5.0	15.3	0.0	Cluster
10.8	7.5	16.2	0.0	Cluster
12.1	10.0	17.1	0.0	Cluster
14.3	12.5	20.9	0.0	Cluster
20.2	15.0	22.9	0.0	Cluster
21.6	17.5	25.3	7.6	Cluster
24.8	20.0	27.0	9.4	Cluster
29.1	22.5	30.1	12.1	Cluster
30.1	25.0	31.5	14.3	Cluster

Decade 1890-1899				
Obs. K	*Exp. K*	*Hi Conf*	*Lw Conf*	*Type*
3.9	2.5	4.2	0.0	Cluster
5.6	5.0	6.6	2.8	Cluster
8.8	7.5	9.3	5.5	Cluster
11.2	10.0	11.7	7.9	Cluster
13.5	12.5	13.6	9.8	Cluster
15.9	15.0	16.1	12.1	Cluster
17.8	17.5	18.3	13.9	Cluster
19.6	20.0	20.7	16.0	None
20.9	22.5	22.8	18.0	None
22.4	25.0	24.8	19.9	None

Decade 1900-1909				
Obs. K	*Exp. K*	*Hi Conf*	*Lw Conf*	*Type*
4.0	2.5	3.6	0.8	Sig Clust.
6.1	5.0	6.1	3.8	Sig Clust.
8.6	7.5	8.8	6.0	Cluster
11.0	10.0	10.9	8.5	Sig Clust.
13.5	12.5	13.6	10.6	Cluster
15.8	15.0	16.2	12.5	Cluster
17.8	17.5	18.2	14.5	Cluster
19.8	20.0	20.8	16.5	None
22.1	22.5	22.9	18.3	None
24.3	25.0	24.8	20.1	None

Decade 1910-1919				
Obs. K	*Exp. K*	*Hi Conf*	*Lw Conf*	*Type*
4.2	2.5	5.4	0.0	Cluster
8.0	5.0	8.3	1.9	Cluster
11.4	7.5	10.7	4.2	Sig Clust.
12.6	10.0	12.7	6.3	Cluster
13.9	12.5	15.1	8.7	Cluster
14.4	15.0	17.3	10.5	None
16.1	17.5	19.6	13.0	None
17.6	20.0	21.6	15.1	None
19.4	22.5	24.3	17.0	None
22.1	25.0	26.6	18.8	None

Decade 1920-1929				
Obs. K	*Exp. K*	*Hi Conf*	*Lw Conf*	*Type*
6.5	2.5	4.8	0.0	Sig Clust.
10.5	5.0	8.1	0.0	Sig Clust
12.3	7.5	10.0	4.0	Sig Clust.
14.8	10.0	12.3	7.0	Sig Clust.
16.6	12.5	14.8	9.0	Sig Clust.
18.9	15.0	17.5	11.5	Sig Clust.
21.6	17.5	19.6	13.0	Sig Clust.
23.4	20.0	22.4	15.1	Sig Clust.
26.3	22.5	25.0	16.5	Sig Clust.
28.7	25.0	27.2	18.4	Sig Clust.

Decade 1930-1939				
Obs. K	*Exp. K*	*Hi Conf*	*Lw Conf*	*Type*
5.3	2.5	5.3	0.0	Cluster
7.5	5.0	8.8	0.0	Cluster
10.6	7.5	11.6	2.7	Cluster
13.5	10.0	13.5	5.3	Cluster
16.3	12.5	15.9	7.5	Sig Clust.
17.8	15.0	17.8	9.9	Cluster
19.1	17.5	20.0	11.2	Cluster
21.9	20.0	22.5	13.0	Cluster
23.3	22.5	25.2	15.7	Cluster
25.6	25.0	26.8	17.8	Cluster

Decade 1940+				
Obs. K	*Exp. K*	*Hi Conf*	*Lw Conf*	*Type*
8.6	2.5	4.7	0.0	Sig Clust.
13.4	5.0	6.9	2.7	Sig Clust.
13.5	7.5	9.9	4.7	Sig Clust.
15.1	10.0	12.0	7.3	Sig Clust.
16.4	12.5	14.4	9.9	Sig Clust.
18.8	15.0	16.5	11.6	Sig Clust.
21.2	17.5	19.3	13.8	Sig Clust.
22.8	20.0	21.2	15.8	Sig Clust.
24.5	22.5	23.4	17.3	Sig Clust.
26.2	25.0	26.0	19.4	Sig Clust.

Table A2. Nationality Class Ripley's K Tables.

Nationality America				
Obs. K	*Exp. K*	*Hi Conf*	*Lw Conf*	*Type*
8.4	2.5	4.4	0.0	Sig Clust.
9.9	5.0	7.1	2.4	Sig Clust.
11.5	7.5	10.2	5.2	Sig Clust.
13.5	10.0	12.7	7.2	Sig Clust.
15.3	12.5	14.5	9.8	Sig Clust.
16.5	15.0	17.1	11.8	Cluster
17.5	17.5	19.7	13.7	Cluster
19.9	20.0	21.7	15.8	None
21.2	22.5	23.9	17.4	None
23.3	25.0	26.1	19.4	None

Nationality Canada				
Obs. K	*Exp. K*	*Hi Conf*	*Lw Conf*	*Type*
15.9	2.5	19.5	0.0	Cluster
19.5	5.0	19.5	0.0	Cluster
19.5	7.5	27.6	0.0	Cluster
19.5	10.0	29.8	0.0	Cluster
19.5	12.5	39.0	0.0	Cluster
19.5	15.0	43.6	0.0	Cluster
19.5	17.5	47.7	0.0	Cluster
19.5	20.0	49.0	0.0	None
19.5	22.5	50.3	0.0	None
19.5	25.0	51.5	0.0	None

Nationality Eastern Europe				
Obs. K	*Exp. K*	*Hi Conf*	*Lw Con*	*Type*
11.0	2.5	5.9	0.0	Sig Clust.
12.4	5.0	8.3	0.0	Sig Clust.
14.3	7.5	10.7	2.4	Sig Clust.
18.8	10.0	14.3	5.3	Sig Clust.
23.2	12.5	16.4	7.9	Sig Clust.
26.8	15.0	18.7	10.1	Sig Clust.
30.1	17.5	20.7	12.4	Sig Clust.
32.3	20.0	23.2	14.3	Sig Clust.
34.9	22.5	25.0	16.0	Sig Clust.
37.6	25.0	26.8	17.4	Sig Clust.

Nationality Northern Europe				
Obs. K	*Exp. K*	*Hi Conf*	*Lw Conf*	*Type*
4.8	2.5	3.5	1.9	Sig Clust.
7.2	5.0	5.8	4.3	Sig Clust.
9.3	7.5	7.9	6.5	Sig Clust.
11.3	10.0	10.4	8.9	Sig Clust.
13.4	12.5	12.7	11.0	Sig Clust.
15.5	15.0	15.1	13.2	Sig Clust.
17.5	17.5	17.3	15.2	Sig Clust.
19.4	20.0	19.3	17.1	Sig Clust.
21.1	22.5	21.3	18.8	None
22.9	25.0	23.4	20.7	None

Nationality Southern Europe				
Obs. K	*Exp. K*	*Hi Conf*	*Lw Conf*	*Type*
9.0	2.5	5.7	0.0	Sig Clust.
15.2	5.0	8.0	0.0	Sig Clust.
18.7	7.5	10.6	4.0	Sig Clust.
21.7	10.0	14.1	6.1	Sig Clust.
23.9	12.5	15.7	8.0	Sig Clust.
25.8	15.0	19.9	10.1	Sig Clust.
28.2	17.5	21.2	12.7	Sig Clust.
30.3	20.0	23.6	14.1	Sig Clust.
32.6	22.5	25.1	16.5	Sig Clust.
33.5	25.0	26.9	18.4	Sig Clust.

Nationality Western Europe				
Obs. K	*Exp. K*	*Hi Conf*	*Lw Conf*	*Type*
11.9	2.5	6.2	0.0	Sig Clust.
12.1	5.0	8.4	0.0	Sig Clust.
12.9	7.5	10.7	3.8	Sig Clust.
14.1	10.0	13.6	6.5	Sig Clust.
15.8	12.5	16.1	8.7	Cluster
17.5	15.0	18.6	10.9	Cluster
19.5	17.5	20.2	12.5	Cluster
22.7	20.0	22.6	14.6	Sig Clust.
24.6	22.5	24.5	15.7	Sig Clust.
27.9	25.0	26.3	18.2	Sig Clust.

Table A3. Age Class Ripley's K Tables.

Age Child				
Obs. K	*Exp. K*	*Hi Conf*	*Lw Conf*	*Type*
4.4	2.5	3.6	1.1	Sig Clust.
6.6	5.0	6.3	3.6	Sig Clust.
8.8	7.5	8.7	6.2	Sig Clust.
10.9	10.0	11.0	8.4	Cluster
13.0	12.5	13.5	10.7	Cluster
15.2	15.0	15.6	12.6	Cluster
17.3	17.5	18.1	14.5	None
19.3	20.0	20.1	16.4	None
21.3	22.5	22.6	18.3	None
23.6	25.0	24.7	19.9	None

Age Young Adult				
Obs. K	*Exp. K*	*Hi Conf*	*Lw Con f*	*Type*
3.7	2.5	5.2	0.0	Cluster
5.2	5.0	8.2	1.6	Cluster
7.3	7.5	10.5	4.0	None
9.8	10.0	12.9	7.1	None
12.5	12.5	16.0	9.4	None
14.8	15.0	18.1	11.6	None
17.0	17.5	21.2	13.3	None
19.4	20.0	23.4	15.5	None
21.6	22.5	25.2	17.2	None
23.4	25.0	27.0	19.0	None

Age Adult				
Obs. K	*Exp. K*	*Hi Conf*	*Lw Conf*	*Type*
3.8	2.5	3.5	1.4	Sig Clust.
5.7	5.0	6.2	3.9	Cluster
8.0	7.5	8.6	6.2	Cluster
10.1	10.0	10.9	8.3	Cluster
12.6	12.5	13.0	10.4	Cluster
14.3	15.0	15.4	12.6	None
16.3	17.5	17.8	14.5	None
18.2	20.0	19.9	16.6	None
19.8	22.5	22.0	18.6	None
21.6	25.0	24.0	20.2	None

Age Senior				
Obs. K	*Exp. K*	*Hi Conf*	*Lw Con f*	*Type*
5.3	2.5	3.4	1.4	Sig Clust.
7.9	5.0	6.1	3.8	Sig Clust.
9.3	7.5	8.6	6.0	Sig Clust.
11.1	10.0	10.9	8.5	Sig Clust.
12.6	12.5	13.2	10.5	Cluster
15.2	15.0	15.4	12.4	Cluster
17.2	17.5	17.6	14.7	None
19.2	20.0	19.8	16.5	None
21.1	22.5	21.9	18.4	None
23.3	25.0	24.1	20.0	None

Table A4. Cause of Death Class Ripley's K Tables.

Cause Death Accident				
Obs. K	*Exp. K*	*Hi Conf*	*Lw Conf*	*Type*
4.1	2.5	4.6	0.0	Cluster
6.3	5.0	7.2	1.5	Cluster
9.1	7.5	10.3	4.6	Cluster
10.5	10.0	12.1	7.2	Cluster
12.5	12.5	14.5	9.6	None
13.9	15.0	16.7	11.9	None
16.3	17.5	19.2	13.6	None
18.2	20.0	21.4	15.7	None
19.6	22.5	23.6	17.4	None
20.9	25.0	25.6	18.8	None

Cause Death Chronic Illness				
Obs. K	*Exp. K*	*Hi Conf*	*Lw Conf*	*Type*
3.7	2.5	3.0	1.9	Sig Clust.
6.0	5.0	5.5	4.2	Sig Clust.
8.2	7.5	8.0	6.7	Sig Clust.
10.3	10.0	10.3	8.9	Sig Clust.
12.7	12.5	12.6	11.1	Sig Clust.
15.2	15.0	15.0	13.1	Sig Clust.
17.3	17.5	17.3	15.0	None
19.5	20.0	19.4	17.1	Sig Clust.
21.6	22.5	21.5	19.0	Sig Clust.
23.8	25.0	23.6	20.7	Sig Clust

Cause Death Disease				
Obs. K	*Exp. K*	*Hi Conf*	*Lw Conf*	*Type*
3.8	2.5	3.4	1.7	Sig Clust.
6.4	5.0	5.7	4.2	Sig Clust.
8.9	7.5	8.2	6.4	Sig Clust.
11.1	10.0	10.6	8.6	Sig Clust.
13.4	12.5	12.9	10.9	Sig Clust.
15.8	15.0	15.4	13.0	Sig Clust.
17.8	17.5	18.0	15.0	Cluster
19.7	20.0	20.0	17.0	None
21.7	22.5	22.2	18.8	None
23.9	25.0	24.2	20.6	None

Cause Death Old Age				
Obs. K	*Exp. K*	*Hi Conf*	*Lw Conf*	*Type*
5.2	2.5	3.6	1.5	Sig Clust.
7.9	5.0	6.1	3.7	Sig Clust.
9.5	7.5	8.3	6.0	Sig Clust.
11.1	10.0	10.7	8.3	Sig Clust.
12.8	12.5	13.2	10.7	Cluster
15.2	15.0	15.8	12.5	Cluster
17.3	17.5	17.9	14.6	None
19.2	20.0	20.3	16.7	None
21.3	22.5	22.5	18.4	None
23.4	25.0	24.5	20.3	None

Table A5. Occupation Class Ripley's K Tables.

Occupation Miner-Laborer				
Obs. K	*Exp. K*	*Hi Conf*	*Lw Conf*	*Type*
4.3	2.5	3.7	1.2	Sig Clust.
6.2	5.0	6.2	3.6	Sig Clust.
8.3	7.5	8.7	6.2	Cluster
10.2	10.0	11.2	8.2	Cluster
12.4	12.5	13.4	10.6	None
14.7	15.0	15.7	12.5	None
16.4	17.5	18.0	14.5	None
18.3	20.0	20.3	16.3	None
20.6	22.5	22.8	18.0	None
21.9	25.0	25.3	19.8	None

Occupation Laborer-General				
Obs. K	*Exp. K*	*Hi Conf*	*Lw Conf*	*Type*
5.5	2.5	6.7	0.0	Cluster
7.3	5.0	9.1	0.0	Cluster
9.1	7.5	13.2	2.8	Cluster
10.3	10.0	16.7	4.8	Cluster
12.0	12.5	19.3	7.3	None
15.1	15.0	21.1	9.9	Cluster
16.3	17.5	21.8	12.0	None
20.2	20.0	23.2	13.8	Cluster
21.1	22.5	26.0	15.3	None
22.5	25.0	27.8	17.6	None

Occupation Housewife				
Obs. K	*Exp. K*	*Hi Conf*	*Lw Conf*	*Type*
3.1	2.5	3.7	1.2	Cluster
5.8	5.0	6.3	3.6	Cluster
8.1	7.5	8.5	5.7	Cluster
10.1	10.0	11.2	8.3	Cluster
12.2	12.5	13.4	10.4	None
14.2	15.0	15.6	12.2	None
16.4	17.5	18.1	14.1	None
18.2	20.0	20.6	16.0	None
19.9	22.5	22.8	18.2	None
21.8	25.0	24.8	20.2	None

Occupation None				
Obs. K	*Exp. K*	*Hi Conf*	*Lw Conf*	*Type*
3.9	2.5	3.6	1.5	Sig Clust.
6.1	5.0	6.0	4.0	Sig Clust.
8.2	7.5	8.3	6.4	Cluster
10.4	10.0	10.7	8.6	Cluster
12.6	12.5	13.0	10.6	Cluster
14.8	15.0	15.3	12.7	None
16.8	17.5	17.8	14.9	None
19.0	20.0	19.8	16.6	None
20.9	22.5	22.0	18.5	None
23.4	25.0	24.1	20.2	None

Occupation Professional				
Obs. K	*Exp. K*	*Hi Conf*	*Lw Conf*	*Type*
0.0	2.5	9.4	0.0	None
5.4	5.0	13.2	0.0	Cluster
5.4	7.5	17.9	0.0	None
5.4	10.0	20.2	0.0	None
10.8	12.5	23.6	0.0	None
12.1	15.0	25.3	5.4	None
12.1	17.5	27.0	7.6	None
16.2	20.0	29.1	10.8	None
16.2	22.5	31.0	12.1	None
17.1	25.0	33.7	13.2	None

Occupation Proprietor				
Obs. K	*Exp. K*	*Hi Conf*	*Lw Conf*	*Type*
8.4	2.5	11.2	0.0	Cluster
9.2	5.0	13.5	0.0	Cluster
10.6	7.5	13.5	0.0	Cluster
13.5	10.0	16.3	0.0	Cluster
16.7	12.5	17.9	3.7	Cluster
17.9	15.0	20.8	8.4	Cluster
20.1	17.5	23.1	10.6	Cluster
21.8	20.0	26.7	11.8	Cluster
24.8	22.5	28.2	13.0	Cluster
27.7	25.0	29.4	14.5	Cluster

Figure B1. Eastern Europe Age Distributions.

Figure B2. America Age Distributions.

Figure B3. America Occupation Distributions.

Figure B4. America Cause of Death Distributions.

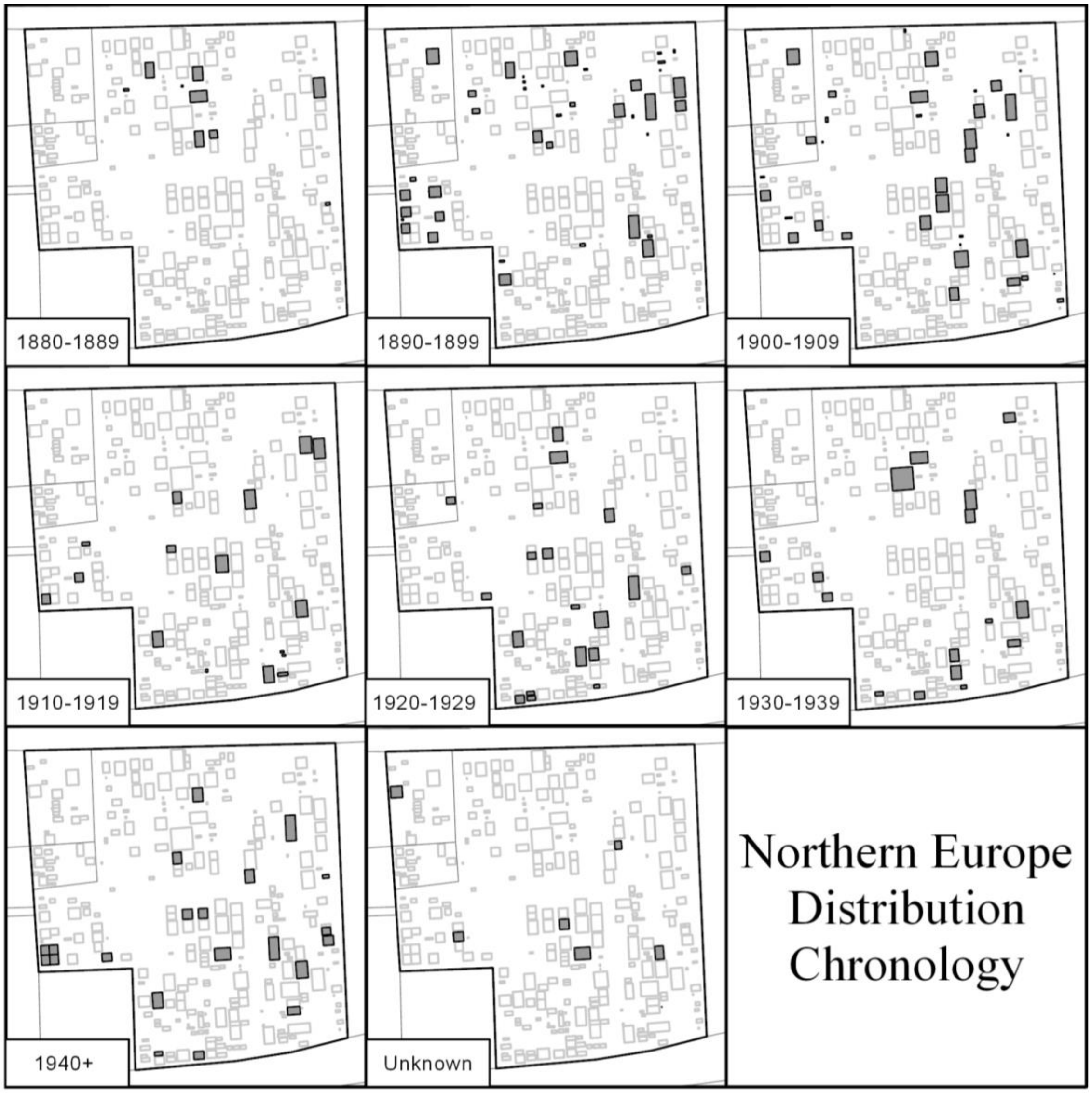


Figure B5. Northern Europe Burial Chronology.

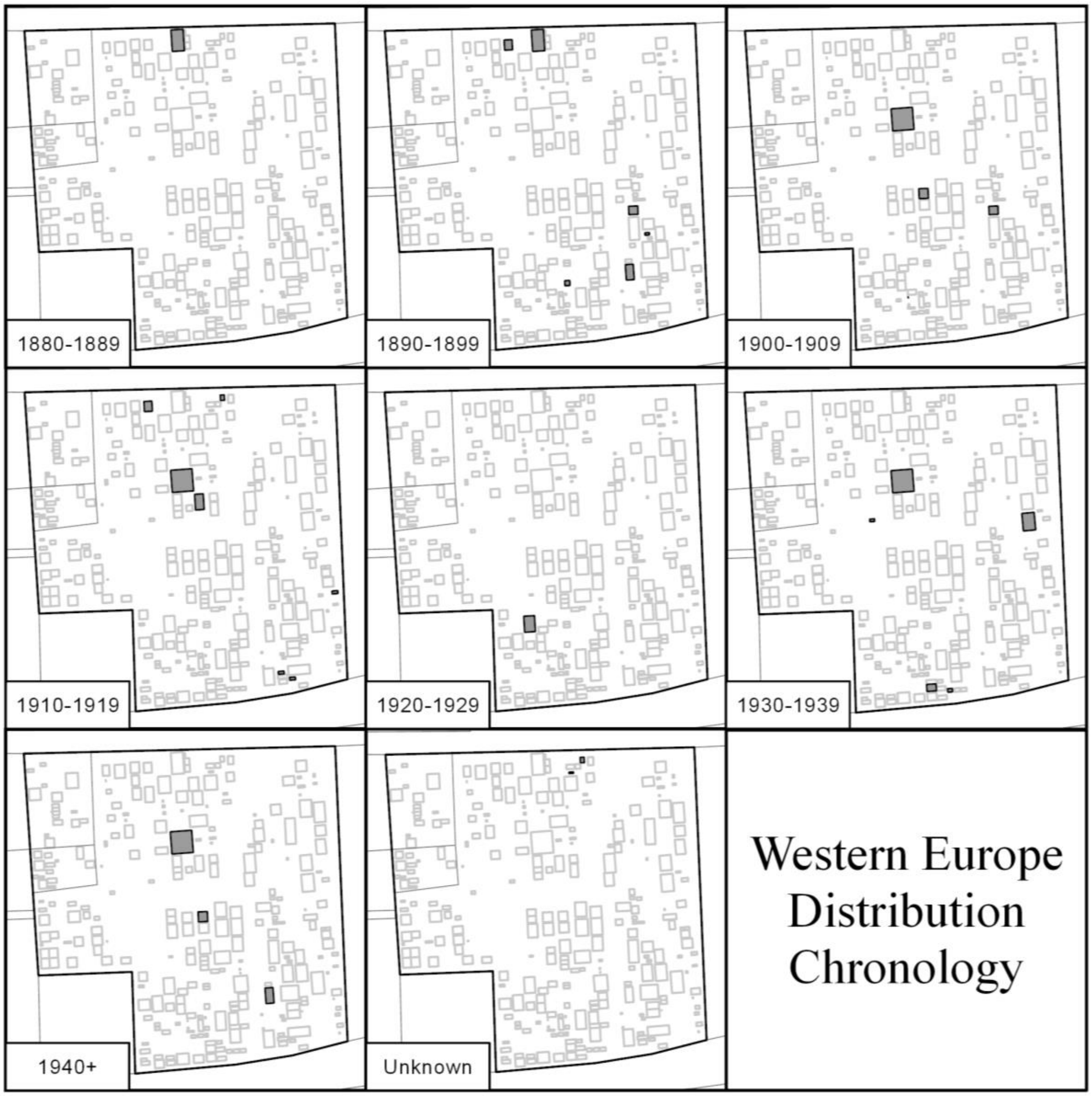


Figure B6. Western Europe Burial Chronology.

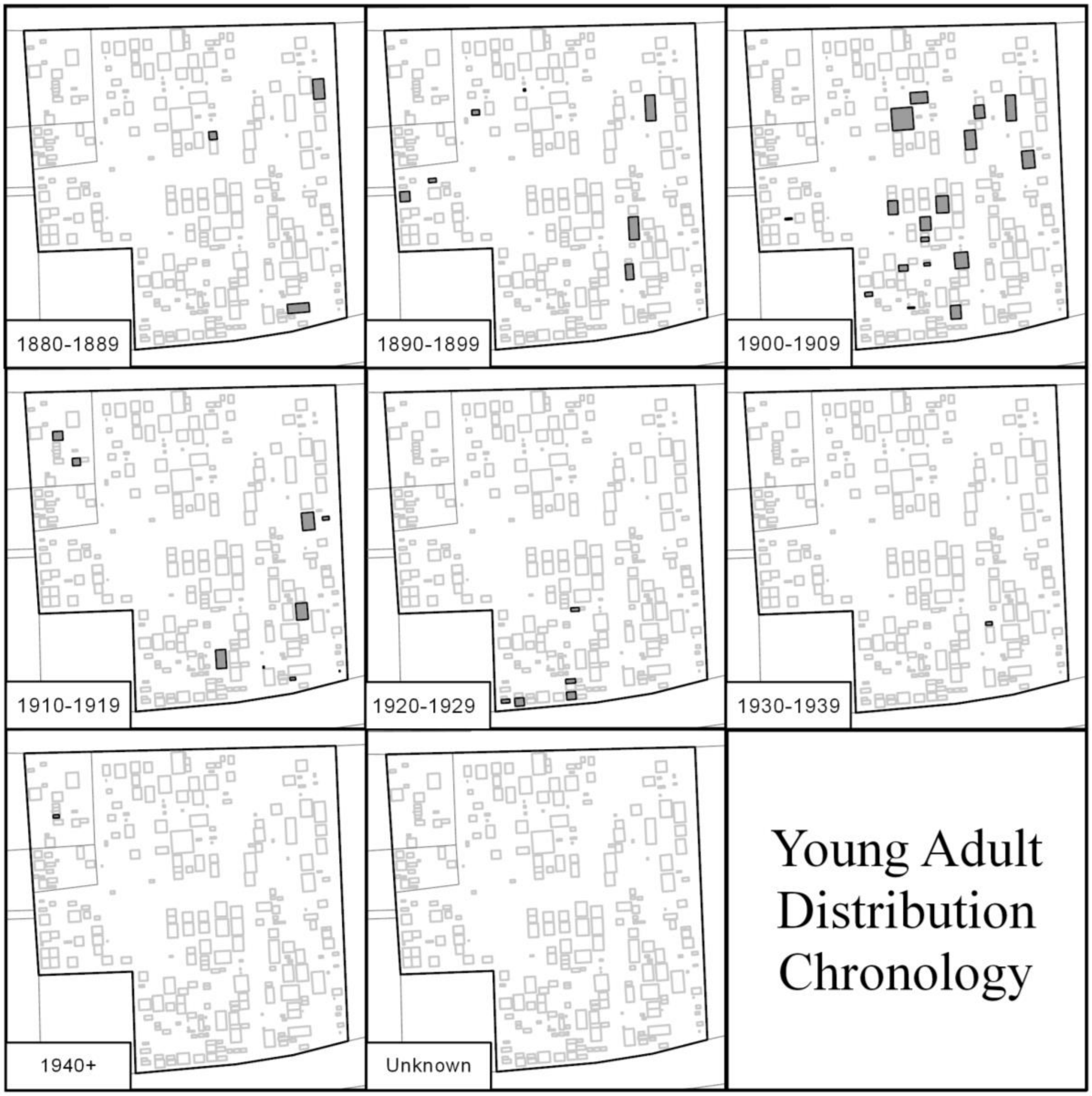


Figure B7. Young Adult Burial Chronology.

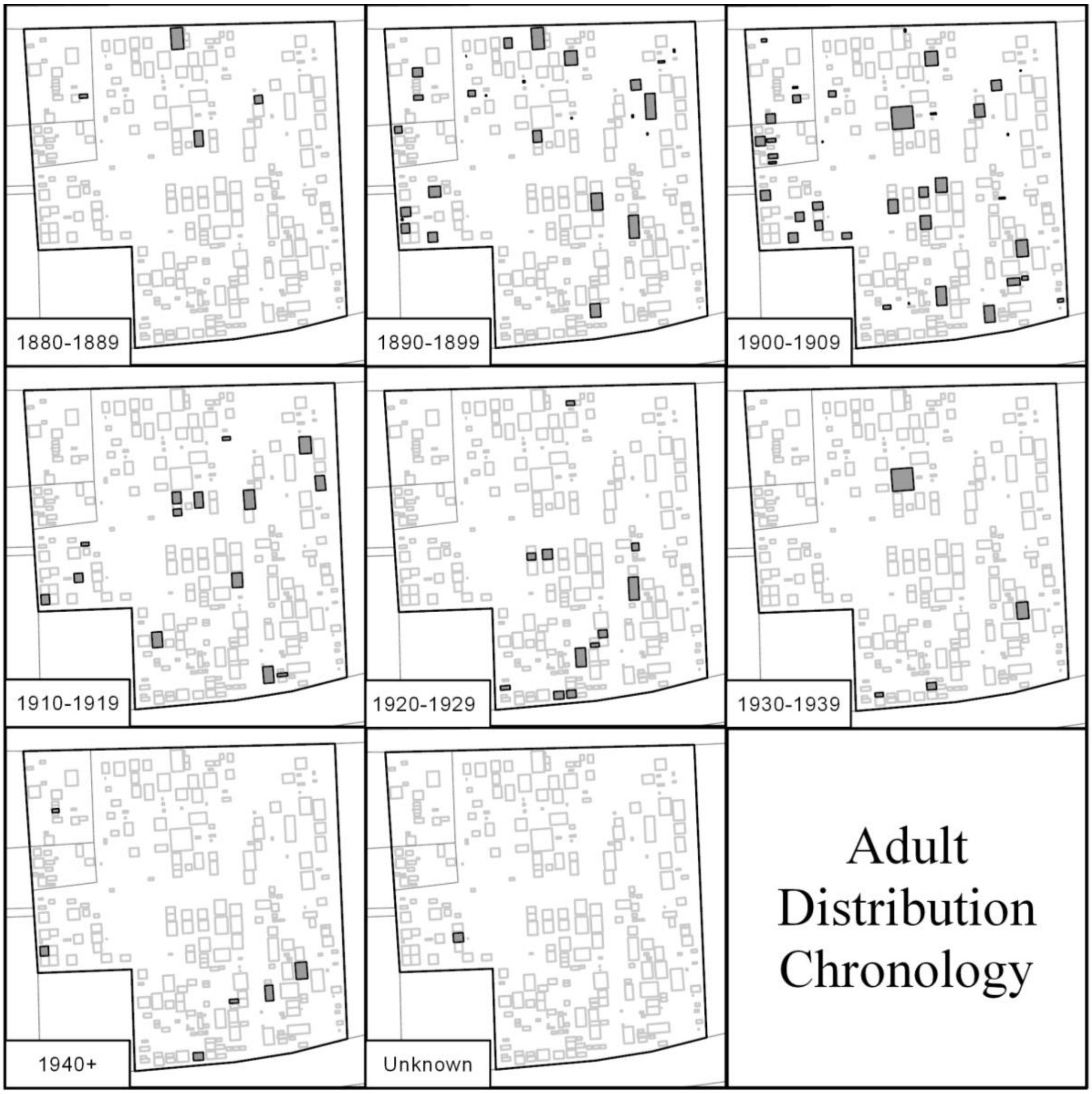


Figure B8. Adult Burial Chronology.

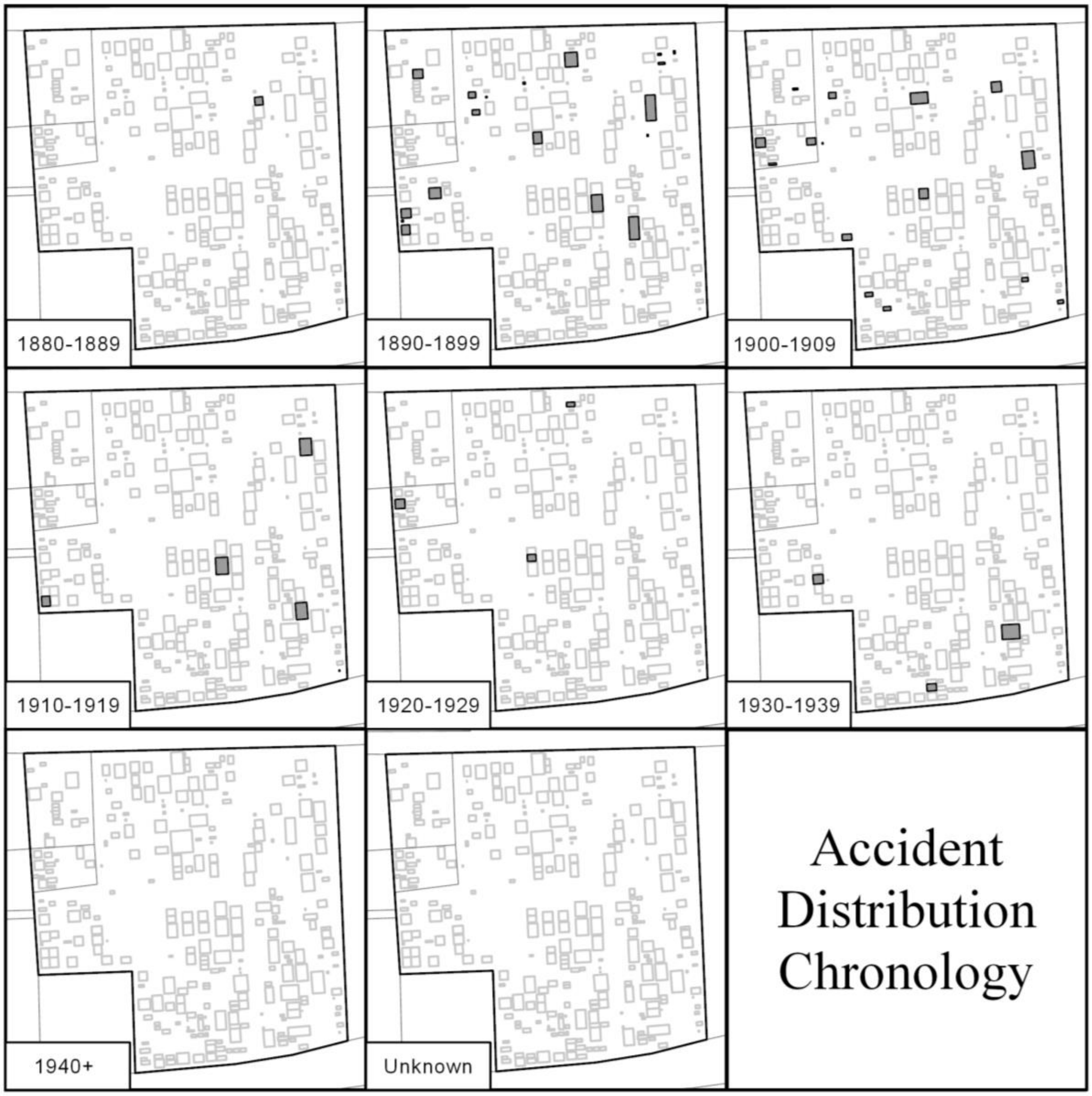


Figure B9. Accident Burial Chronology.

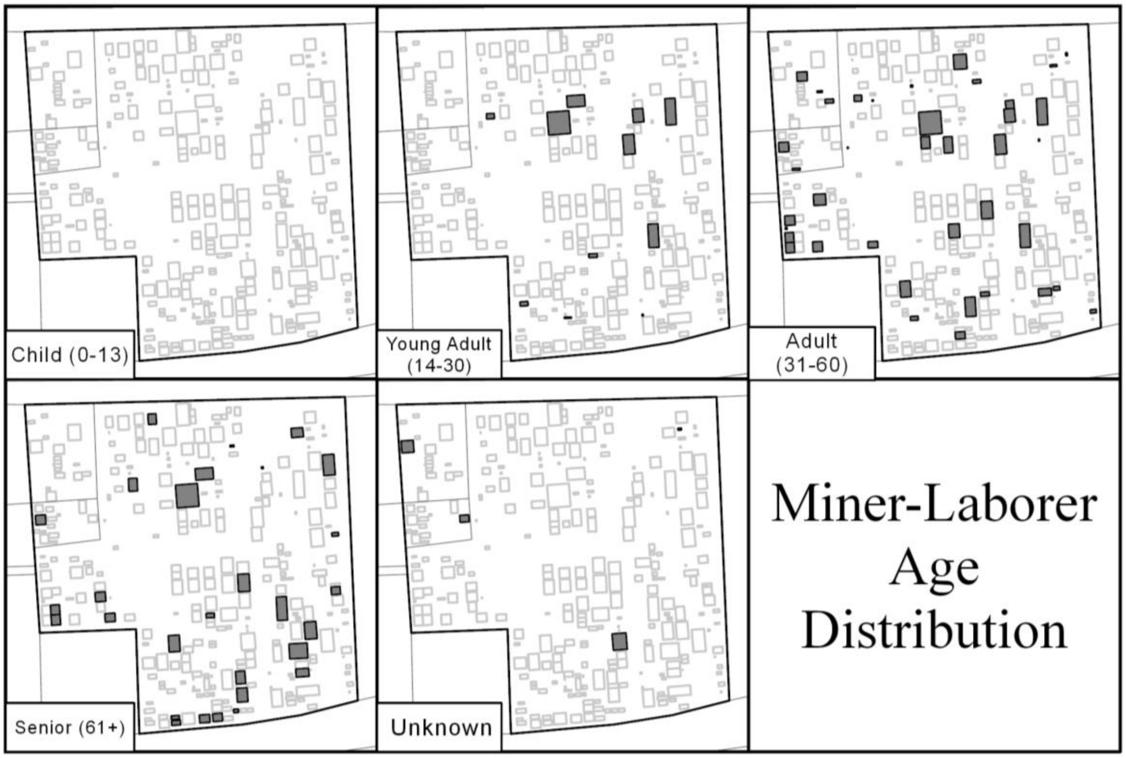


Figure B10. Miner-Laborer Age Distributions.

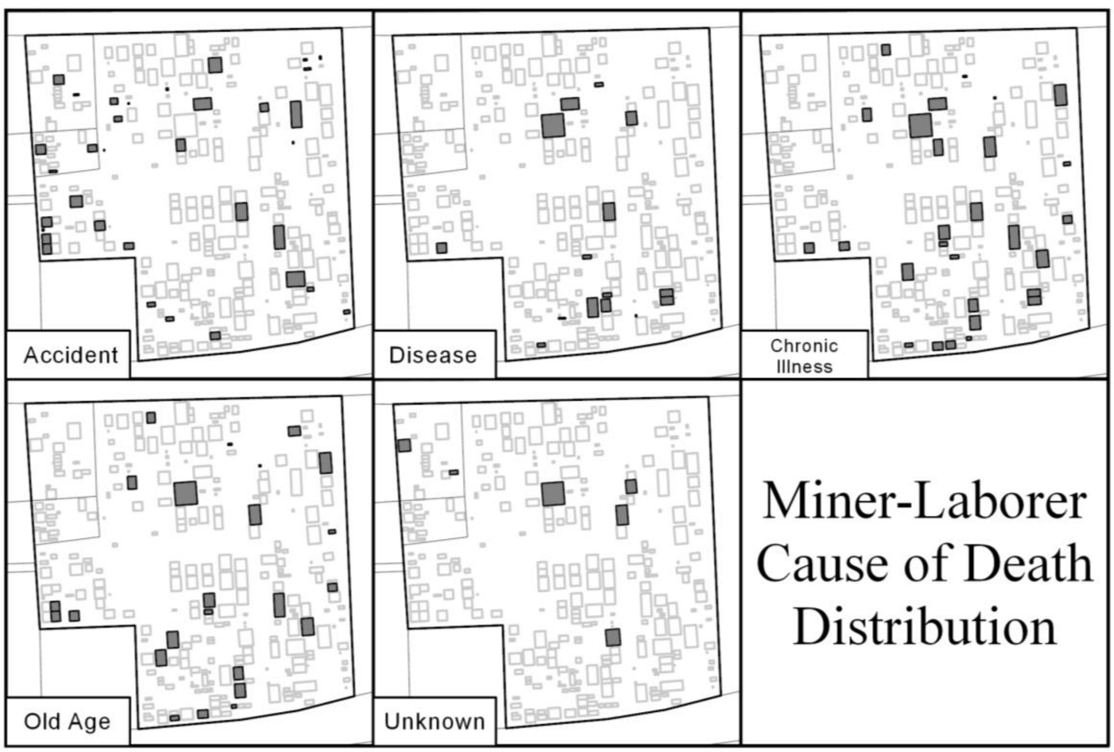


Figure B11. Miner-Laborer Cause of Death Distributions.

APPENDIX C—DEMOGRAPHIC ATTRIBUTE CORRELATION TABLES

Table C1. Decade-Demographic Correlation Table.

Decade-Demographic Correlation Matrix (Pearson (n)):								
Variables	*1880-1889*	*1890-1899*	*1900-1909*	*1910-1919*	*1920-1929*	*1930-1939*	*1940+*	*Unknown Decade*
Child	**0.120**	**0.152**	**0.110**	-0.035	**-0.118**	-0.052	**-0.187**	-0.008
Young Adult	0.066	-0.006	**0.146**	**0.131**	0.045	-0.059	**-0.106**	**-0.176**
Adult	0.018	**0.147**	**0.178**	0.086	0.038	-0.061	**-0.116**	**-0.279**
Senior	**-0.109**	**-0.134**	**-0.205**	-0.023	**0.165**	**0.248**	**0.504**	**-0.283**
Unknown Age	-0.081	**-0.178**	**-0.206**	**-0.139**	**-0.143**	**-0.116**	**-0.167**	**0.813**
Accident	-0.022	**0.250**	0.082	0.020	-0.037	-0.001	**-0.132**	**-0.180**
Disease	0.064	**0.100**	**0.175**	0.067	0.038	-0.027	**-0.209**	**-0.186**
Chronic Ill.	0.013	0.044	-0.040	-0.018	**0.110**	**0.151**	**0.153**	**-0.287**
Old Age	**-0.106**	**-0.110**	**-0.143**	-0.015	0.085	**0.150**	**0.522**	**-0.273**
Unk. Cause	0.067	**-0.136**	-0.082	**-0.134**	**-0.159**	**-0.158**	**-0.195**	**0.640**
America	0.011	0.027	0.072	0.055	**0.096**	0.016	**-0.098**	**-0.141**
Canada	-0.023	-0.056	0.020	-0.040	0.021	0.041	**0.118**	-0.066
Northern Eur.	0.069	**0.191**	-0.041	0.004	0.069	0.080	0.090	**-0.335**
Western Eur.	-0.005	0.012	-0.052	**0.118**	-0.065	**0.098**	0.072	**-0.108**
Eastern Eur.	-0.051	-0.025	**0.197**	-0.056	-0.029	-0.037	0.031	**-0.099**
Southern Eur.	-0.002	-0.076	**0.147**	**0.096**	0.029	-0.074	-0.053	-0.081
Middle East	-0.018	-0.042	-0.052	-0.030	0.051	-0.025	**0.183**	-0.050
Unknown Nat.	-0.049	**-0.184**	**-0.200**	**-0.144**	**-0.148**	**-0.120**	**-0.154**	**0.797**
Miner Laborer	-0.027	**0.121**	0.090	0.001	-0.007	**0.147**	-0.034	**-0.246**
Laborer Gen.	0.007	-0.087	0.069	-0.014	0.080	-0.029	**0.134**	**-0.133**
Professional	-0.033	-0.009	**-0.098**	**0.125**	0.075	0.005	0.089	**-0.094**
Proprietor	-0.040	-0.067	0.068	**0.123**	0.004	-0.058	0.083	**-0.114**
Housewife	-0.058	-0.030	-0.001	0.025	**0.155**	0.081	**0.127**	**-0.228**
No Occupation	**0.102**	**0.159**	**0.107**	0.000	-0.063	-0.047	**-0.158**	**-0.095**
Unknown Occ	0.006	**-0.173**	**-0.240**	**-0.138**	**-0.162**	**-0.132**	-0.085	**0.760**
Values in bold are different from 0 with a significance level alpha=0.05								

Table C2. Nationality-Demographic Correlation Table.

Nationality-Demographic Correlation Matrix (Pearson (n)):								
Variables	*America*	*Canada*	*North. Europe*	*West. Europe*	*East. Europe*	*South. Europe*	*Middle East*	*Unknown Nat.*
1880-1889	0.011	-0.023	0.069	-0.005	-0.051	-0.002	-0.018	-0.049
1890-1899	0.027	-0.056	**0.191**	0.012	-0.025	-0.076	-0.042	**-0.184**
1900-1909	0.072	0.020	-0.041	-0.052	**0.197**	**0.147**	-0.052	**-0.200**
1910-1919	0.055	-0.040	0.004	**0.118**	-0.056	**0.096**	-0.030	**-0.144**
1920-1929	**0.096**	0.021	0.069	-0.065	-0.029	0.029	0.051	**-0.148**
1930-1939	0.016	0.041	0.080	**0.098**	-0.037	-0.074	-0.025	**-0.120**
1940+	**-0.098**	**0.118**	0.090	0.072	0.031	-0.053	**0.183**	**-0.154**
Unk. Decade	**-0.141**	-0.066	**-0.335**	**-0.108**	**-0.099**	-0.081	-0.050	**0.797**
Child	0.000	-0.069	-0.051	0.047	**0.171**	0.058	-0.052	-0.087
Young Adult	**0.104**	0.076	-0.007	-0.015	0.082	0.020	-0.033	**-0.156**
Adult	0.068	0.056	0.078	0.015	-0.053	**0.108**	0.002	**-0.230**
Senior	-0.031	0.007	**0.244**	0.059	-0.064	-0.089	**0.107**	**-0.260**
Unknown Age	**-0.127**	-0.057	**-0.317**	**-0.129**	**-0.123**	**-0.101**	-0.043	**0.803**
Accident	-0.040	-0.045	**0.143**	-0.047	-0.011	0.072	-0.034	**-0.140**
Disease	**0.123**	-0.013	-0.010	-0.025	**0.183**	0.080	-0.069	**-0.234**
Chronic Illness	0.006	0.064	**0.126**	**0.124**	0.083	0.003	0.007	**-0.340**
Old Age	-0.087	0.052	**0.250**	**0.108**	-0.058	**-0.123**	**0.111**	**-0.251**
Unknown Cause	-0.065	-0.036	**-0.318**	-0.078	**-0.106**	-0.010	-0.058	**0.637**
Miner Laborer	-0.066	-0.065	**0.219**	0.002	-0.007	0.033	-0.049	**-0.216**
Laborer General	**0.166**	0.043	0.033	-0.004	-0.072	-0.036	-0.025	**-0.118**
Professional	0.051	-0.023	0.043	-0.005	-0.051	-0.002	**0.119**	-0.084
Proprietor	0.086	0.059	-0.091	**0.140**	-0.018	0.022	0.094	**-0.101**
Housewife	-0.009	0.074	**0.161**	-0.038	-0.004	0.014	0.012	**-0.213**
No Occupation	0.023	0.009	-0.016	0.045	**0.165**	0.057	-0.057	**-0.171**
Unknown Occ.	**-0.117**	-0.064	**-0.354**	-0.082	**-0.095**	**-0.098**	0.012	**0.776**
Values in bold are different from 0 with a significance level alpha=0.05								

Table C3. Age-Demographic Correlation Table.

Age-Demographic Correlation Matrix (Pearson (n)):					
Variables	*Child*	*Young Adult*	*Adult*	*Senior*	*Unknown Age*
1880-1889	**0.120**	0.066	0.018	**-0.109**	-0.081
1890-1899	**0.152**	-0.006	**0.147**	**-0.134**	**-0.178**
1900-1909	**0.110**	**0.146**	**0.178**	**-0.205**	**-0.206**
1910-1919	-0.035	**0.131**	0.086	-0.023	**-0.139**
1920-1929	**-0.118**	0.045	0.038	**0.165**	**-0.143**
1930-1939	-0.052	-0.059	-0.061	**0.248**	**-0.116**
1940+	**-0.187**	**-0.106**	**-0.116**	**0.504**	**-0.167**
Unknown Decade	-0.008	**-0.176**	**-0.279**	**-0.283**	**0.813**
Accident	**-0.189**	0.076	**0.374**	**-0.141**	**-0.114**
Disease	**0.634**	**0.111**	-0.093	**-0.324**	**-0.314**
Chronic Illness	**0.371**	**-0.226**	**-0.213**	**0.358**	**-0.412**
Old Age	**-0.314**	**-0.180**	**-0.204**	**0.837**	**-0.257**
Unknown Cause	**-0.263**	0.018	-0.011	**-0.348**	**0.708**
America	0.000	**0.104**	0.068	-0.031	**-0.127**
Canada	-0.069	0.076	0.056	0.007	-0.057
Northern Europe	-0.051	-0.007	0.078	**0.244**	**-0.317**
Western Europe	0.047	-0.015	0.015	0.059	**-0.129**
Eastern Europe	**0.171**	0.082	-0.053	-0.064	**-0.123**
Southern Europe	0.058	0.020	**0.108**	-0.089	**-0.101**
Middle East	-0.052	-0.033	0.002	**0.107**	-0.043
Unknown Nat.	-0.087	**-0.156**	**-0.230**	**-0.260**	**0.803**
Miner Laborer	**-0.273**	0.035	**0.263**	**0.115**	**-0.162**
Laborer General	**-0.139**	0.037	0.077	**0.128**	**-0.114**
Professional	**-0.099**	0.066	-0.042	**0.158**	-0.081
Proprietor	**-0.119**	0.033	**0.107**	0.068	**-0.097**
Housewife	**-0.269**	-0.037	**0.218**	**0.254**	**-0.220**
No Occupation	**0.871**	0.043	**-0.320**	**-0.327**	**-0.260**
Unknown Occ	**-0.216**	**-0.114**	**-0.216**	**-0.195**	**0.821**
Values in bold are different from 0 with a significance level alpha=0.05					

Table C4. Cause of Death-Demographic Correlation Table.

Death-Demographic Correlation Matrix (Pearson (n)):					
Variables	*Accident*	*Disease*	*Chronic Illness*	*Old Age*	*Unknown Cause*
1880-1889	-0.022	0.064	0.013	**-0.106**	0.067
1890-1899	**0.250**	**0.100**	0.044	**-0.110**	**-0.136**
1900-1909	0.082	**0.175**	-0.040	**-0.143**	-0.082
1910-1919	0.020	0.067	-0.018	-0.015	**-0.134**
1920-1929	-0.037	0.038	**0.110**	0.085	**-0.159**
1930-1939	-0.001	-0.027	**0.151**	**0.150**	**-0.158**
1940+	**-0.132**	**-0.209**	**0.153**	**0.522**	**-0.195**
Unknown Decade	**-0.180**	**-0.186**	**-0.287**	**-0.273**	**0.640**
Child	**-0.189**	**0.634**	**0.371**	**-0.314**	**-0.263**
Young Adult	0.076	**0.111**	**-0.226**	**-0.180**	0.018
Adult	**0.374**	-0.093	**-0.213**	**-0.204**	-0.011
Senior	**-0.141**	**-0.324**	**0.358**	**0.837**	**-0.348**
Unknown Age	**-0.114**	**-0.314**	**-0.412**	**-0.257**	**0.708**
America	-0.040	**0.123**	0.006	-0.087	-0.065
Canada	-0.045	-0.013	0.064	0.052	-0.036
Northern Europe	**0.143**	-0.010	**0.126**	**0.250**	**-0.318**
Western Europe	-0.047	-0.025	**0.124**	**0.108**	-0.078
Eastern Europe	-0.011	**0.183**	0.083	-0.058	**-0.106**
Southern Europe	0.072	0.080	0.003	**-0.123**	-0.010
Middle East	-0.034	-0.069	0.007	**0.111**	-0.058
Unknown Nat.	**-0.140**	**-0.234**	**-0.340**	**-0.251**	**0.637**
Miner Laborer	**0.525**	**-0.176**	**-0.125**	0.051	**-0.226**
Laborer General	-0.059	-0.062	0.086	**0.159**	-0.069
Professional	-0.022	-0.019	0.065	**0.165**	**-0.110**
Proprietor	0.065	-0.063	-0.006	0.075	-0.058
Housewife	**-0.118**	**-0.108**	0.071	**0.245**	-0.063
No Occupation	**-0.205**	**0.659**	**0.355**	**-0.292**	**-0.293**
Unknown Occ	**-0.175**	**-0.356**	**-0.409**	**-0.185**	**0.729**
Values in bold are different from 0 with a significance level alpha=0.05					

Table C5. Occupation-Demographic Correlation Table.

Occupation-Demographics Correlation Matrix (Pearson (n)):							
Variables	*Miner-Labor*	*Laborer-General*	*Prof.*	*Prop.*	*Housewife*	*No Occ.*	*Unknown Occ.*
1880-1889	-0.027	0.007	-0.033	-0.040	-0.058	**0.102**	0.006
1890-1899	**0.121**	-0.087	-0.009	-0.067	-0.030	**0.159**	**-0.173**
1900-1909	0.090	0.069	**-0.098**	0.068	-0.001	**0.107**	**-0.240**
1910-1919	0.001	-0.014	**0.125**	**0.123**	0.025	0.000	**-0.138**
1920-1929	-0.007	0.080	0.075	0.004	**0.155**	-0.063	**-0.162**
1930-1939	**0.147**	-0.029	0.005	-0.058	0.081	-0.047	**-0.132**
1940+	-0.034	**0.134**	0.089	0.083	**0.127**	**-0.158**	-0.085
Unk. Decade	**-0.246**	**-0.133**	**-0.094**	**-0.114**	**-0.228**	**-0.095**	**0.760**
Child	**-0.273**	**-0.139**	**-0.099**	**-0.119**	**-0.269**	**0.871**	**-0.216**
Young Adult	0.035	0.037	0.066	0.033	-0.037	0.043	**-0.114**
Adult	**0.263**	0.077	-0.042	**0.107**	**0.218**	**-0.320**	**-0.216**
Senior	**0.115**	**0.128**	**0.158**	0.068	**0.254**	**-0.327**	**-0.195**
Unknown Age	**-0.162**	**-0.114**	-0.081	**-0.097**	**-0.220**	**-0.260**	**0.821**
Accident	**0.525**	-0.059	-0.022	0.065	**-0.118**	**-0.205**	**-0.175**
Disease	**-0.176**	-0.062	-0.019	-0.063	**-0.108**	**0.659**	**-0.356**
Chronic Illness	**-0.125**	0.086	0.065	-0.006	0.071	**0.355**	**-0.409**
Old Age	0.051	**0.159**	**0.165**	0.075	**0.245**	**-0.292**	**-0.185**
Unk. Cause	**-0.226**	-0.069	**-0.110**	-0.058	-0.063	**-0.293**	**0.729**
America	-0.066	**0.166**	0.051	0.086	-0.009	0.023	**-0.117**
Canada	-0.065	0.043	-0.023	0.059	0.074	0.009	-0.064
Northern Eur.	**0.219**	0.033	0.043	-0.091	**0.161**	-0.016	**-0.354**
Western Eur.	0.002	-0.004	-0.005	**0.140**	-0.038	0.045	-0.082
Eastern Europe	-0.007	-0.072	-0.051	-0.018	-0.004	**0.165**	**-0.095**
Southern Eur.	0.033	-0.036	-0.002	0.022	0.014	0.057	**-0.098**
Middle East	-0.049	-0.025	**0.119**	0.094	0.012	-0.057	0.012
Unknown Nat.	**-0.216**	**-0.118**	-0.084	**-0.101**	**-0.213**	**-0.171**	**0.776**
Values in bold are different from 0 with a significance level alpha=0.05							

Table C6. Monument Type-Demographic Correlation Table.

Monument Type-Demographic Correlation Matrix (Pearson (n)):									
Variables	*Bevel*	*Flat*	*Upr. Cross*	*Upr. Dome*	*Upr. Slant*	*Upr Stand.*	*Irreg.*	*Obelisk*	*No HS*
1880-1889	-0.028	0.004	-0.042	0.039	-0.018	0.048	0.027	0.020	-0.044
1890-1899	**-0.126**	-0.046	0.013	0.057	0.081	-0.028	-0.029	**0.197**	**-0.140**
1900-1909	**-0.131**	**-0.163**	**0.155**	-0.072	0.060	0.040	**0.223**	**0.241**	**-0.202**
1910-1919	0.006	-0.031	-0.073	-0.058	**0.161**	**0.096**	-0.025	0.005	-0.071
1920-1929	0.072	0.055	-0.075	0.050	-0.004	0.090	0.012	-0.065	**-0.119**
1930-1939	-0.012	**0.115**	-0.018	**0.190**	-0.057	-0.038	-0.055	-0.046	**-0.114**
1940+	**0.371**	**0.258**	-0.056	-0.052	-0.081	**-0.107**	-0.079	**-0.154**	**-0.145**
Unk. Dec.	-0.089	-0.089	0.010	-0.062	**-0.136**	-0.059	**-0.107**	**-0.236**	**0.674**
Child	**-0.101**	**-0.102**	**0.302**	**0.114**	-0.072	**0.185**	0.053	**-0.116**	-0.085
Yng. Adult	-0.035	-0.025	0.025	-0.073	-0.039	0.020	0.043	**0.244**	**-0.148**
Adult	0.019	-0.068	**-0.131**	0.003	**0.166**	0.005	0.044	**0.168**	**-0.217**
Senior	**0.225**	**0.252**	**-0.138**	0.029	0.007	**-0.109**	-0.046	-0.052	**-0.232**
Unk. Age	**-0.146**	-0.085	-0.046	**-0.108**	-0.087	**-0.101**	-0.092	**-0.203**	**0.745**
Accident	-0.017	**-0.095**	-0.047	0.029	0.055	0.015	0.039	**0.135**	**-0.111**
Disease	-0.086	-0.068	**0.215**	0.078	-0.028	**0.155**	**0.097**	-0.001	**-0.202**
Chronic Ill.	0.048	**0.103**	0.080	**0.142**	-0.068	0.073	0.085	-0.047	**-0.317**
Old Age	**0.189**	**0.235**	**-0.134**	-0.021	0.034	**-0.103**	-0.041	0.002	**-0.223**
Unk. Cause	**-0.129**	**-0.102**	-0.044	-0.093	-0.012	**-0.130**	**-0.099**	-0.068	**0.553**
America	**0.119**	0.037	-0.086	-0.009	-0.009	0.002	0.028	0.053	**-0.143**
Canada	0.064	**0.109**	-0.030	0.001	-0.043	-0.036	-0.027	-0.010	-0.056
North. Eur.	0.083	0.056	**-0.211**	0.017	**0.123**	0.043	0.042	**0.133**	**-0.309**
West. Eur.	-0.057	0.059	0.089	0.079	0.015	0.016	0.025	-0.043	**-0.127**
East. Eur.	-0.076	-0.058	**0.425**	-0.009	-0.034	-0.010	-0.013	0.015	**-0.096**
South. Eur.	-0.025	-0.061	-0.025	0.063	-0.037	0.055	0.030	0.034	-0.027
Mid. East	**0.185**	0.032	-0.022	-0.039	-0.032	-0.027	-0.020	-0.044	-0.042
Unk. Nat.	**-0.171**	**-0.111**	0.033	**-0.098**	-0.093	-0.083	**-0.095**	**-0.209**	**0.734**
Miner	0.022	-0.050	-0.091	0.059	0.001	-0.011	0.010	**0.178**	**-0.157**
Labor Gen.	**0.108**	**0.148**	-0.060	-0.050	0.008	-0.036	0.090	-0.068	**-0.112**
Prof.	0.051	0.004	-0.042	0.039	0.068	-0.002	0.027	-0.049	-0.080
Prop.	-0.015	**0.169**	-0.051	-0.089	-0.074	0.022	0.009	**0.103**	**-0.096**
Housewife	**0.114**	0.005	-0.089	-0.002	**0.158**	-0.074	-0.017	0.078	**-0.201**
No Occ.	-0.074	-0.064	**0.274**	0.082	-0.075	**0.198**	0.037	-0.073	**-0.140**
Unk. Occ	**-0.135**	-0.065	-0.037	-0.087	-0.073	**-0.120**	**-0.104**	**-0.169**	**0.664**
Values in bold are different from 0 with a significance level alpha=0.05									

Table C7. Monument Material-Demographic Correlation Table.

Monument Material-Demographic Correlation Matrix (Pearson (n)):							
Variables	*Concrete*	*Granite*	*Marble*	*Metal*	*No Material*	*Wood*	*Sandstone*
1880-1889	**0.127**	-0.064	0.051	-0.032	-0.078	0.080	-0.012
1890-1899	-0.024	-0.086	**0.185**	-0.077	**-0.136**	0.043	**0.155**
1900-1909	0.041	**-0.184**	**0.306**	-0.029	**-0.182**	-0.024	-0.036
1910-1919	-0.041	0.019	0.066	0.039	-0.090	-0.040	-0.021
1920-1929	-0.009	**0.197**	-0.076	-0.011	**-0.117**	-0.041	-0.022
1930-1939	0.059	**0.152**	-0.079	0.009	**-0.112**	-0.034	-0.018
1940+	0.031	**0.266**	**-0.176**	**0.097**	**-0.162**	0.007	-0.026
Unk. Dec.	**-0.100**	**-0.169**	**-0.303**	0.009	**0.688**	0.024	-0.035
Child	**0.110**	**-0.154**	**0.127**	0.034	-0.094	0.018	**0.126**
Young Adult	0.017	-0.078	**0.190**	-0.016	**-0.146**	-0.044	-0.023
Adult	-0.043	0.094	**0.113**	-0.068	**-0.212**	0.013	-0.039
Senior	0.016	**0.288**	**-0.100**	0.048	**-0.241**	-0.035	-0.041
Unk. Age	**-0.107**	**-0.212**	**-0.312**	-0.005	**0.759**	0.042	-0.030
Accident	-0.020	0.011	**0.099**	-0.061	**-0.108**	0.014	-0.024
Disease	0.063	-0.087	**0.188**	0.019	**-0.209**	-0.013	**0.096**
Chronic Ill.	**0.098**	0.068	**0.110**	0.053	**-0.334**	-0.009	0.073
Old Age	-0.001	**0.217**	-0.046	0.085	**-0.233**	-0.032	-0.040
Unk. Cause	-0.054	**-0.194**	**-0.200**	-0.045	**0.567**	0.047	-0.041
America	0.033	0.089	0.042	-0.066	**-0.140**	-0.048	-0.025
Canada	**0.289**	-0.045	-0.038	-0.023	-0.055	-0.016	-0.009
North. Eur.	**-0.140**	**0.201**	**0.135**	-0.079	**-0.301**	-0.080	0.075
West. Eur.	0.004	-0.063	**0.125**	0.049	**-0.125**	0.031	-0.020
East. Eur.	**0.128**	**-0.106**	0.046	**0.161**	-0.094	0.035	-0.019
South. Eur.	0.009	0.024	0.002	0.002	-0.048	0.034	-0.019
Middle East	-0.023	**0.146**	-0.085	-0.017	-0.041	-0.012	-0.007
Unk. Nat.	-0.031	**-0.263**	**-0.302**	0.027	**0.732**	0.086	-0.031
Miner	0.003	0.052	0.090	-0.055	**-0.153**	-0.019	-0.034
Labor Gen.	0.063	**0.120**	-0.033	-0.045	**-0.110**	-0.033	-0.018
Prof.	-0.044	**0.106**	-0.002	-0.032	-0.078	-0.023	-0.012
Prop.	-0.053	-0.026	0.074	**0.155**	-0.094	-0.028	-0.015
Housewife	0.006	**0.198**	-0.016	-0.054	**-0.197**	-0.018	-0.034
No Occ.	0.089	**-0.136**	**0.158**	0.052	**-0.149**	0.009	**0.116**
Unk. Occ	**-0.096**	**-0.207**	**-0.265**	0.013	**0.662**	0.073	-0.034
Values in bold are different from 0 with a significance level alpha=0.05							

Table C8. Monument and Plot Size-Demographic Correlation Table.

Monument and Plot Size-Demographic Correlation Matrix (Pearson (n)):								
Variables	*Mon. Sm.*	*Mon. Med.*	*Mon. Large*	*No Mon.*	*Plot Small*	*Plot Medium*	*Plot Large*	*No Plot*
1880-1889	-0.055	0.053	0.023	-0.039	-0.009	-0.038	0.043	-0.013
1890-1899	-0.036	-0.092	**0.199**	**-0.112**	0.022	-0.057	-0.074	**0.163**
1900-1909	-0.074	0.020	**0.193**	**-0.207**	0.031	-0.047	-0.051	**0.099**
1910-1919	-0.029	0.008	**0.112**	**-0.131**	0.034	-0.084	0.040	-0.017
1920-1929	0.025	0.032	0.032	**-0.112**	-0.068	**0.113**	0.038	**-0.103**
1930-1939	-0.007	0.056	0.033	**-0.110**	-0.057	-0.082	**0.136**	-0.051
1940+	**0.121**	**0.200**	**-0.186**	**-0.138**	-0.078	-0.037	**0.162**	**-0.120**
Unk. Dec.	0.040	**-0.185**	**-0.358**	**0.680**	0.074	**0.173**	**-0.169**	-0.028
Child	**0.161**	**0.194**	**-0.229**	**-0.116**	**0.350**	-0.035	**-0.316**	0.075
Young Adult	-0.068	-0.005	**0.164**	**-0.142**	0.007	0.010	0.005	-0.030
Adult	**-0.163**	-0.048	**0.329**	**-0.205**	**-0.111**	-0.004	0.051	0.080
Senior	0.086	0.049	0.034	**-0.205**	**-0.221**	**-0.113**	**0.325**	**-0.100**
Unk. Age	-0.039	**-0.219**	**-0.299**	**0.729**	-0.011	**0.171**	-0.092	-0.034
Accident	-0.093	-0.080	**0.227**	**-0.103**	-0.071	0.024	0.004	0.068
Disease	0.069	**0.173**	-0.053	**-0.227**	**0.240**	-0.057	**-0.190**	0.044
Chronic Ill.	**0.129**	**0.178**	-0.046	**-0.309**	0.040	**-0.121**	0.057	-0.009
Old Age	0.073	0.032	0.055	**-0.197**	**-0.222**	-0.073	**0.284**	-0.075
Unk. Cause	-0.090	**-0.206**	**-0.133**	**0.545**	-0.001	**0.137**	-0.090	-0.011
America	0.017	**0.129**	-0.036	**-0.136**	-0.091	-0.054	**0.100**	0.027
Canada	-0.015	**0.158**	**-0.098**	-0.053	**0.145**	-0.053	**-0.099**	0.022
North. Eur.	-0.039	0.008	**0.257**	**-0.315**	**-0.147**	**-0.167**	**0.207**	0.061
West. Eur.	**0.100**	-0.001	0.009	**-0.122**	0.020	**-0.120**	0.088	-0.034
East. Eur.	-0.020	0.075	0.011	-0.090	-0.006	**0.190**	**-0.131**	0.004
South. Eur.	-0.046	0.010	0.060	-0.043	**0.176**	**0.109**	**-0.192**	-0.060
Middle East	0.015	**0.096**	-0.074	-0.040	-0.054	**0.097**	-0.005	-0.031
Unk. Nat.	0.012	**-0.256**	**-0.311**	**0.738**	**0.105**	**0.140**	**-0.165**	-0.041
Miner Labor	-0.068	-0.088	**0.258**	**-0.162**	-0.064	-0.062	0.088	0.017
Labor Gen.	-0.076	**0.147**	0.002	**-0.107**	**-0.121**	-0.079	**0.149**	0.017
Prof.	0.045	-0.033	0.050	-0.076	-0.071	-0.001	**0.095**	-0.058
Prop.	0.090	-0.022	0.015	-0.092	**-0.096**	0.003	**0.098**	-0.032
Housewife	**-0.122**	0.020	**0.209**	**-0.175**	**-0.154**	0.008	**0.147**	-0.039
No Occ.	**0.175**	**0.211**	**-0.217**	**-0.170**	**0.322**	-0.032	**-0.291**	0.068
Unk. Occ	-0.022	**-0.224**	**-0.262**	**0.668**	0.020	**0.136**	**-0.102**	-0.021
Values in bold are different from 0 with a significance level alpha=0.05								

Table C9. Motif-Demographic Correlation Table.

Motif-Demographic Correlation Matrix (Pearson (n)):

Variables	*Vegetation*	*Animal*	*Religious*	*Lodge*	*Geometry*	*Nature*
1880-1889	-0.042	0.077	-0.010	0.005	0.014	-0.037
1890-1899	0.028	**0.184**	**0.127**	0.089	0.034	0.008
1900-1909	**0.203**	0.003	**0.169**	0.041	**0.254**	0.092
1910-1919	0.058	0.074	-0.009	-0.083	0.059	-0.064
1920-1929	0.028	-0.075	0.006	-0.021	0.067	-0.065
1930-1939	0.036	-0.061	-0.066	-0.031	-0.066	-0.053
1940+	0.079	-0.087	-0.035	**0.128**	**-0.106**	**0.176**
Unk. Dec.	**-0.361**	-0.094	**-0.213**	**-0.136**	**-0.260**	**-0.104**
Child	-0.089	0.001	**0.103**	**-0.142**	**-0.148**	**-0.109**
Young Adult	**0.110**	**0.128**	**0.135**	0.003	**0.186**	0.009
Adult	**0.223**	0.065	0.026	**0.114**	**0.218**	0.024
Senior	0.072	-0.091	-0.066	**0.120**	-0.008	**0.149**
Unk. Age	**-0.334**	-0.074	**-0.179**	**-0.116**	**-0.228**	-0.090
Accident	**0.142**	0.088	-0.034	0.089	**0.174**	0.044
Disease	0.014	0.014	**0.122**	**-0.127**	-0.017	-0.093
Chronic Ill.	0.049	-0.068	0.088	-0.056	-0.017	0.074
Old Age	**0.127**	-0.062	-0.027	**0.150**	0.044	**0.184**
Unk. Cause	**-0.264**	-0.020	**-0.097**	-0.073	**-0.120**	**-0.095**
America	0.057	-0.022	-0.013	-0.012	-0.022	-0.003
Canada	0.008	-0.030	-0.007	-0.034	-0.032	-0.026
North. Eur.	**0.121**	0.063	-0.041	**0.156**	0.068	0.054
West. Eur.	0.079	**0.167**	0.033	-0.007	0.068	**0.162**
East. Eur.	0.049	-0.064	**0.216**	-0.073	**0.107**	-0.056
South. Eur.	0.077	-0.065	0.018	-0.002	**0.121**	-0.057
Middle East	-0.078	-0.022	**0.218**	-0.025	-0.056	-0.020
Unk. Nat.	**-0.334**	-0.078	**-0.170**	**-0.120**	**-0.251**	-0.093
Miner Labor	**0.141**	0.040	-0.053	**0.147**	**0.157**	0.075
Labor Gen.	0.044	-0.016	0.015	0.088	0.048	-0.003
Prof.	-0.042	-0.042	-0.046	**0.111**	-0.046	-0.037
Prop.	**0.136**	-0.001	-0.008	-0.013	-0.001	**0.125**
Housewife	**0.187**	0.017	0.045	0.010	**0.125**	0.048
No Occ.	-0.077	0.033	**0.140**	**-0.154**	**-0.109**	-0.091
Unk. Occ	**-0.325**	-0.064	**-0.129**	-0.085	**-0.171**	-0.072

Values in bold are different from 0 with a significance level alpha=0.05

Table C10. Elaboration-Demographic Correlation Table.

Elaboration-Demographic Correlation Matrix (Pearson (n)):			
Variables	*Elab. Low*	*Elab. Medium*	*Elab. High*
1880-1889	-0.079	0.036	0.022
1890-1899	**-0.138**	-0.027	**0.132**
1900-1909	**-0.230**	0.040	**0.133**
1910-1919	**-0.136**	0.089	0.010
1920-1929	**-0.118**	0.057	0.030
1930-1939	-0.088	-0.005	0.071
1940+	**-0.163**	**0.146**	-0.028
Unk. Dec.	**0.759**	**-0.251**	**-0.313**
Child	-0.082	**0.217**	**-0.163**
Young Adult	**-0.147**	-0.050	**0.163**
Adult	**-0.244**	-0.040	**0.226**
Senior	**-0.229**	**0.095**	0.075
Unk. Age	**0.769**	**-0.270**	**-0.300**
Accident	**-0.130**	-0.093	**0.194**
Disease	**-0.199**	**0.180**	-0.036
Chronic Ill.	**-0.300**	**0.221**	-0.003
Old Age	**-0.221**	0.068	**0.096**
Unk. Cause	**0.560**	**-0.225**	**-0.190**
America	**-0.142**	**0.126**	-0.023
Canada	-0.055	**0.135**	**-0.098**
North. Eur.	**-0.318**	-0.021	**0.261**
West. Eur.	**-0.102**	0.033	0.043
East. Eur.	-0.071	0.042	0.010
South. Eur.	**-0.098**	0.050	0.021
Middle East	-0.042	**0.102**	-0.074
Unk. Nat.	**0.759**	**-0.238**	**-0.325**
Miner Labor	**-0.186**	-0.065	**0.208**
Labor Gen.	**-0.111**	0.062	0.020
Prof.	-0.079	0.062	-0.005
Prop.	**-0.095**	**0.122**	-0.054
Housewife	**-0.199**	-0.055	**0.207**
No Occ.	**-0.137**	**0.217**	**-0.121**
Unk. Occ	**0.687**	**-0.245**	**-0.264**
Values in bold are different from 0 with a significance level alpha=0.05			

Table C11. Decade-Monument Correlation Table.

Decade-Monument Correlation Matrix (Pearson (n)):								
Variables	*1880-1889*	*1890-1899*	*1900-1909*	*1910-1919*	*1920-1929*	*1930-1939*	*1940+*	*Unknown Decade*
Bevel	-0.028	**-0.126**	**-0.131**	0.006	0.072	-0.012	**0.371**	-0.089
Flat	0.004	-0.046	**-0.163**	-0.031	0.055	**0.115**	**0.258**	-0.089
Upright Cross	-0.042	0.013	**0.155**	-0.073	-0.075	-0.018	-0.056	0.010
Upright Dome	0.039	0.057	-0.072	-0.058	0.050	**0.190**	-0.052	-0.062
Upright Slant	-0.018	0.081	0.060	**0.161**	-0.004	-0.057	-0.081	**-0.136**
Upright Standard	0.048	-0.028	0.040	**0.096**	0.090	-0.038	**-0.107**	-0.059
Irregular	0.027	-0.029	**0.223**	-0.025	0.012	-0.055	-0.079	**-0.107**
Obelisk	0.020	**0.197**	**0.241**	0.005	-0.065	-0.046	**-0.154**	**-0.236**
No HS	-0.044	**-0.140**	**-0.202**	-0.071	**-0.119**	**-0.114**	**-0.145**	**0.674**
Concrete	**0.127**	-0.024	0.041	-0.041	-0.009	0.059	0.031	**-0.100**
Granite	-0.064	-0.086	**-0.184**	0.019	**0.197**	**0.152**	**0.266**	**-0.169**
Marble	0.051	**0.185**	**0.306**	0.066	-0.076	-0.079	**-0.176**	**-0.303**
Metal	-0.032	-0.077	-0.029	0.039	-0.011	0.009	**0.097**	0.009
No Material	-0.078	**-0.136**	**-0.182**	-0.090	**-0.117**	**-0.112**	**-0.162**	**0.688**
Wood	0.080	0.043	-0.024	-0.040	-0.041	-0.034	0.007	0.024
Sandstone	-0.012	**0.155**	-0.036	-0.021	-0.022	-0.018	-0.026	-0.035
HS Small	-0.055	-0.036	-0.074	-0.029	0.025	-0.007	**0.121**	0.040
HS Medium	0.053	-0.092	0.020	0.008	0.032	0.056	**0.200**	**-0.185**
HS Large	0.023	**0.199**	**0.193**	**0.112**	0.032	0.033	**-0.186**	**-0.358**
No HS	-0.039	**-0.112**	**-0.207**	**-0.131**	**-0.112**	**-0.110**	**-0.138**	**0.680**
Plot Small	-0.009	0.022	0.031	0.034	-0.068	-0.057	-0.078	0.074
Plot Medium	-0.038	-0.057	-0.047	-0.084	**0.113**	-0.082	-0.037	**0.173**
Plot Large	0.043	-0.074	-0.051	0.040	0.038	**0.136**	**0.162**	**-0.169**
No Plot Size	-0.013	**0.163**	**0.099**	-0.017	**-0.103**	-0.051	**-0.120**	-0.028
Motif Veg	-0.042	0.028	**0.203**	0.058	0.028	0.036	0.079	**-0.361**
Motif Animal	0.077	**0.184**	0.003	0.074	-0.075	-0.061	-0.087	-0.094
Motif Religion	-0.010	**0.127**	**0.169**	-0.009	0.006	-0.066	-0.035	**-0.213**
Motif Lodge	0.005	0.089	0.041	-0.083	-0.021	-0.031	**0.128**	**-0.136**
Motif Geom	0.014	0.034	**0.254**	0.059	0.067	-0.066	**-0.106**	**-0.260**
Motif Nature	-0.037	0.008	0.092	-0.064	-0.065	-0.053	**0.176**	**-0.104**
Elab Low	-0.079	**-0.138**	**-0.230**	**-0.136**	**-0.118**	-0.088	**-0.163**	**0.759**
Elab Medium	0.036	-0.027	0.040	0.089	0.057	-0.005	**0.146**	**-0.251**
Elab High	0.022	**0.132**	**0.133**	0.010	0.030	0.071	-0.028	**-0.313**
Values in bold are different from 0 with a significance level alpha=0.05								

Table C12. Nationality-Monument Correlation Table.

Nationality-Monument Correlation Matrix (Pearson (n)):								
Variables	*America*	*Canada*	*North. Europe*	*West. Europe*	*East. Europe*	*South. Europe*	*Middle East*	*Unknown Nat.*
Bevel	**0.119**	0.064	0.083	-0.057	-0.076	-0.025	**0.185**	**-0.171**
Flat	0.037	**0.109**	0.056	0.059	-0.058	-0.061	0.032	**-0.111**
Upright Cross	-0.086	-0.030	**-0.211**	0.089	**0.425**	-0.025	-0.022	0.033
Upright Dome	-0.009	0.001	0.017	0.079	-0.009	0.063	-0.039	**-0.098**
Upright Slant	-0.009	-0.043	**0.123**	0.015	-0.034	-0.037	-0.032	-0.093
Upright Standard	0.002	-0.036	0.043	0.016	-0.010	0.055	-0.027	-0.083
Irregular	0.028	-0.027	0.042	0.025	-0.013	0.030	-0.020	**-0.095**
Obelisk	0.053	-0.010	**0.133**	-0.043	0.015	0.034	-0.044	**-0.209**
No HS	**-0.143**	-0.056	**-0.309**	**-0.127**	**-0.096**	-0.027	-0.042	**0.734**
Concrete	0.033	**0.289**	**-0.140**	0.004	**0.128**	0.009	-0.023	-0.031
Granite	0.089	-0.045	**0.201**	-0.063	**-0.106**	0.024	**0.146**	**-0.263**
Marble	0.042	-0.038	**0.135**	**0.125**	0.046	0.002	-0.085	**-0.302**
Metal	-0.066	-0.023	-0.079	0.049	**0.161**	0.002	-0.017	0.027
None	**-0.140**	-0.055	**-0.301**	**-0.125**	-0.094	-0.048	-0.041	**0.732**
Wood	-0.048	-0.016	-0.080	0.031	0.035	0.034	-0.012	0.086
Sandstone	-0.025	-0.009	0.075	-0.020	-0.019	-0.019	-0.007	-0.031
HS Small	0.017	-0.015	-0.039	**0.100**	-0.020	-0.046	0.015	0.012
HS Medium	**0.129**	**0.158**	0.008	-0.001	0.075	0.010	**0.096**	**-0.256**
HS Large	-0.036	**-0.098**	**0.257**	0.009	0.011	0.060	-0.074	**-0.311**
No HS Size	**-0.136**	-0.053	**-0.315**	**-0.122**	-0.090	-0.043	-0.040	**0.738**
Plot Small	-0.091	**0.145**	**-0.147**	0.020	-0.006	**0.176**	-0.054	**0.105**
Plot Medium	-0.054	-0.053	**-0.167**	**-0.120**	**0.190**	**0.109**	**0.097**	**0.140**
Plot Large	**0.100**	**-0.099**	**0.207**	0.088	**-0.131**	**-0.192**	-0.005	**-0.165**
No Plot	0.027	0.022	0.061	-0.034	0.004	-0.060	-0.031	-0.041
Motif Veg	0.057	0.008	**0.121**	0.079	0.049	0.077	-0.078	**-0.334**
Motif Animal	-0.022	-0.030	0.063	**0.167**	-0.064	-0.065	-0.022	-0.078
Motif Religion	-0.013	-0.007	-0.041	0.033	**0.216**	0.018	**0.218**	**-0.170**
Motif Lodge	-0.012	-0.034	**0.156**	-0.007	-0.073	-0.002	-0.025	**-0.120**
Motif Geom	-0.022	-0.032	0.068	0.068	**0.107**	**0.121**	-0.056	**-0.251**
Motif Nature	-0.003	-0.026	0.054	**0.162**	-0.056	-0.057	-0.020	-0.093
Elab Low	**-0.142**	-0.055	**-0.318**	**-0.102**	-0.071	**-0.098**	-0.042	**0.759**
Elab Medium	**0.126**	**0.135**	-0.021	0.033	0.042	0.050	**0.102**	**-0.238**
Elab High	-0.023	**-0.098**	**0.261**	0.043	0.010	0.021	-0.074	**-0.325**
Values in bold are different from 0 with a significance level alpha=0.05								

Table C13. Age-Monument Correlation Table.

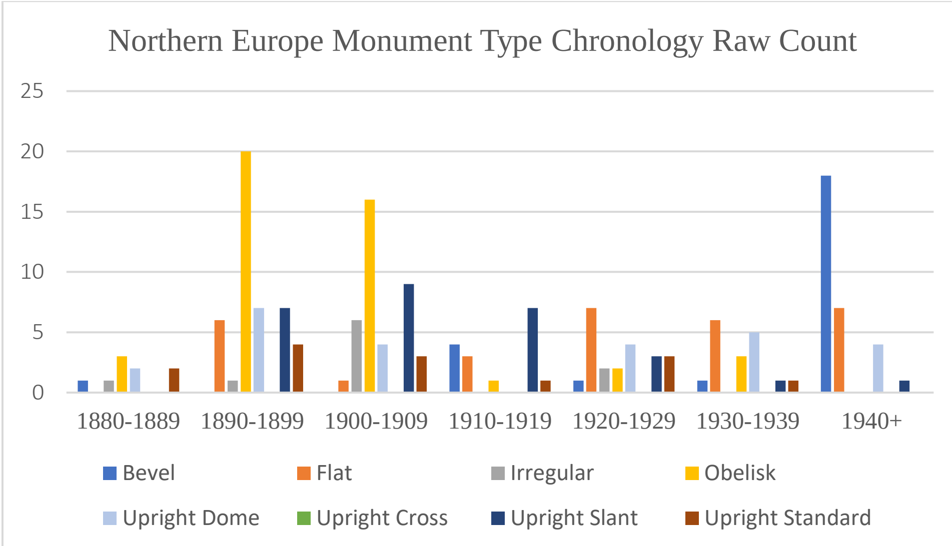
Age-Monument Correlation Matrix (Pearson (n)):					
Variables	*Child*	*Young Adult*	*Adult*	*Senior*	*Unknown Age*
Bevel	**-0.101**	-0.035	0.019	**0.225**	**-0.146**
Flat	**-0.102**	-0.025	-0.068	**0.252**	-0.085
Upright Cross	**0.302**	0.025	**-0.131**	**-0.138**	-0.046
Upright Dome	**0.114**	-0.073	0.003	0.029	**-0.108**
Upright Slant	-0.072	-0.039	**0.166**	0.007	-0.087
Upright Standard	**0.185**	0.020	0.005	**-0.109**	**-0.101**
Irregular	0.053	0.043	0.044	-0.046	-0.092
Obelisk	**-0.116**	**0.244**	**0.168**	-0.052	**-0.203**
No HS	-0.085	**-0.148**	**-0.217**	**-0.232**	**0.745**
Concrete	**0.110**	0.017	-0.043	0.016	**-0.107**
Granite	**-0.154**	-0.078	0.094	**0.288**	**-0.212**
Marble	**0.127**	**0.190**	**0.113**	**-0.100**	**-0.312**
Metal	0.034	-0.016	-0.068	0.048	-0.005
No Material	-0.094	**-0.146**	**-0.212**	**-0.241**	**0.759**
Wood	0.018	-0.044	0.013	-0.035	0.042
Sandstone	**0.126**	-0.023	-0.039	-0.041	-0.030
HS Small	**0.161**	-0.068	**-0.163**	0.086	-0.039
HS Medium	**0.194**	-0.005	-0.048	0.049	**-0.219**
HS Large	**-0.229**	**0.164**	**0.329**	0.034	**-0.299**
No HS Size	**-0.116**	**-0.142**	**-0.205**	**-0.205**	**0.729**
Plot Small	**0.350**	0.007	**-0.111**	**-0.221**	-0.011
Plot Med	-0.035	0.010	-0.004	**-0.113**	**0.171**
Plot Large	**-0.316**	0.005	0.051	**0.325**	-0.092
No Plot	0.075	-0.030	0.080	**-0.100**	-0.034
Motif Veg	-0.089	**0.110**	**0.223**	0.072	**-0.334**
Motif Animal	0.001	**0.128**	0.065	-0.091	-0.074
Motif Religion	**0.103**	**0.135**	0.026	-0.066	**-0.179**
Motif Lodge	**-0.142**	0.003	**0.114**	**0.120**	**-0.116**
Motif Geom	**-0.148**	**0.186**	**0.218**	-0.008	**-0.228**
Motif Nature	**-0.109**	0.009	0.024	**0.149**	-0.090
Elab Low	-0.082	**-0.147**	**-0.244**	**-0.229**	**0.769**
Elab Medium	**0.217**	-0.050	-0.040	**0.095**	**-0.270**
Elab High	**-0.163**	**0.163**	**0.226**	0.075	**-0.300**
Values in bold are different from 0 with a significance level alpha=0.05					

Table C14. Cause of Death-Monument Correlation Table.

Death-Monument Correlation Matrix (Pearson (n)):					
Variables	*Accident*	*Disease*	*Chronic Illness*	*Old Age*	*Unknown Cause*
Bevel	-0.017	-0.086	0.048	**0.189**	**-0.129**
Flat	**-0.095**	-0.068	**0.103**	**0.235**	**-0.102**
Upright Cross	-0.047	**0.215**	0.080	**-0.134**	-0.044
Upright Dome	0.029	0.078	**0.142**	-0.021	-0.093
Upright Slant	0.055	-0.028	-0.068	0.034	-0.012
Upright Standard	0.015	**0.155**	0.073	**-0.103**	**-0.130**
Irregular	0.039	**0.097**	0.085	-0.041	**-0.099**
Obelisk	**0.135**	-0.001	-0.047	0.002	-0.068
No HS	**-0.111**	**-0.202**	**-0.317**	**-0.223**	**0.553**
Concrete	-0.020	0.063	**0.098**	-0.001	-0.054
Granite	0.011	-0.087	0.068	**0.217**	**-0.194**
Marble	**0.099**	**0.188**	**0.110**	-0.046	**-0.200**
Metal	-0.061	0.019	0.053	0.085	-0.045
None	**-0.108**	**-0.209**	**-0.334**	**-0.233**	**0.567**
Wood	0.014	-0.013	-0.009	-0.032	0.047
Sandstone	-0.024	**0.096**	0.073	-0.040	-0.041
HS Small	-0.093	0.069	**0.129**	0.073	-0.090
HS Medium	-0.080	**0.173**	**0.178**	0.032	**-0.206**
HS Large	**0.227**	-0.053	-0.046	0.055	**-0.133**
No HS	**-0.103**	**-0.227**	**-0.309**	**-0.197**	**0.545**
Plot Small	-0.071	**0.240**	0.040	**-0.222**	-0.001
Plot Medium	0.024	-0.057	**-0.121**	-0.073	**0.137**
Plot Large	0.004	**-0.190**	0.057	**0.284**	-0.090
No Plot	0.068	0.044	-0.009	-0.075	-0.011
Motif Veg	**0.142**	0.014	0.049	**0.127**	**-0.264**
Motif Animal	0.088	0.014	-0.068	-0.062	-0.020
Motif Religion	-0.034	**0.122**	0.088	-0.027	**-0.097**
Motif Lodge	0.089	**-0.127**	-0.056	**0.150**	-0.073
Motif Geom	**0.174**	-0.017	-0.017	0.044	**-0.120**
Motif Nature	0.044	-0.093	0.074	**0.184**	**-0.095**
Elab Low	**-0.130**	**-0.199**	**-0.300**	**-0.221**	**0.560**
Elab Medium	-0.093	**0.180**	**0.221**	0.068	**-0.225**
Elab High	**0.194**	-0.036	-0.003	**0.096**	**-0.190**
Values in bold are different from 0 with a significance level alpha=0.05					

Table C15. Occupation-Monument Correlation Table.

Occupation-Monument Correlation Matrix (Pearson (n)):							
Variables	*Miner-Laborer*	*Laborer-General*	*Prof.*	*Prop.*	*Housewife*	*No Occ.*	*Unk. Occ.*
Bevel	0.022	**0.108**	0.051	-0.015	**0.114**	-0.074	**-0.135**
Flat	-0.050	**0.148**	0.004	**0.169**	0.005	-0.064	-0.065
Upright Cross	-0.091	-0.060	-0.042	-0.051	-0.089	**0.274**	-0.037
Upright Dome	0.059	-0.050	0.039	-0.089	-0.002	0.082	-0.087
Upright Slant	0.001	0.008	0.068	-0.074	**0.158**	-0.075	-0.073
Upright Standard	-0.011	-0.036	-0.002	0.022	-0.074	**0.198**	**-0.120**
Irregular	0.010	0.090	0.027	0.009	-0.017	0.037	**-0.104**
Obelisk	**0.178**	-0.068	-0.049	**0.103**	0.078	-0.073	**-0.169**
No HS	**-0.157**	**-0.112**	-0.080	**-0.096**	**-0.201**	**-0.140**	**0.664**
Concrete	0.003	0.063	-0.044	-0.053	0.006	0.089	**-0.096**
Granite	0.052	**0.120**	**0.106**	-0.026	**0.198**	**-0.136**	**-0.207**
Marble	0.090	-0.033	-0.002	0.074	-0.016	**0.158**	**-0.265**
Metal	-0.055	-0.045	-0.032	**0.155**	-0.054	0.052	0.013
No Material	**-0.153**	**-0.110**	-0.078	-0.094	**-0.197**	**-0.149**	**0.662**
Wood	-0.019	-0.033	-0.023	-0.028	-0.018	0.009	0.073
Sandstone	-0.034	-0.018	-0.012	-0.015	-0.034	**0.116**	-0.034
HS Small	-0.068	-0.076	0.045	0.090	**-0.122**	**0.175**	-0.022
HS Medium	-0.088	**0.147**	-0.033	-0.022	0.020	**0.211**	**-0.224**
HS Large	**0.258**	0.002	0.050	0.015	**0.209**	**-0.217**	**-0.262**
No HS Size	**-0.162**	**-0.107**	-0.076	-0.092	**-0.175**	**-0.170**	**0.668**
Plot Small	-0.064	**-0.121**	-0.071	**-0.096**	**-0.154**	**0.322**	0.020
Plot Medium	-0.062	-0.079	-0.001	0.003	0.008	-0.032	**0.136**
Plot Large	0.088	**0.149**	**0.095**	**0.098**	**0.147**	**-0.291**	**-0.102**
No Plot	0.017	0.017	-0.058	-0.032	-0.039	0.068	-0.021
Motif Veg	**0.141**	0.044	-0.042	**0.136**	**0.187**	-0.077	**-0.325**
Motif Animal	0.040	-0.016	-0.042	-0.001	0.017	0.033	-0.064
Motif Religion	-0.053	0.015	-0.046	-0.008	0.045	**0.140**	**-0.129**
Motif Lodge	**0.147**	0.088	**0.111**	-0.013	0.010	**-0.154**	-0.085
Motif Geom	**0.157**	0.048	-0.046	-0.001	**0.125**	**-0.109**	**-0.171**
Motif Nature	0.075	-0.003	-0.037	**0.125**	0.048	-0.091	-0.072
Elab Low	**-0.186**	**-0.111**	-0.079	**-0.095**	**-0.199**	**-0.137**	**0.687**
Elab Medium	-0.065	0.062	0.062	**0.122**	-0.055	**0.217**	**-0.245**
Elab High	**0.208**	0.020	-0.005	-0.054	**0.207**	**-0.121**	**-0.264**
Values in bold are different from 0 with a significance level alpha=0.05							



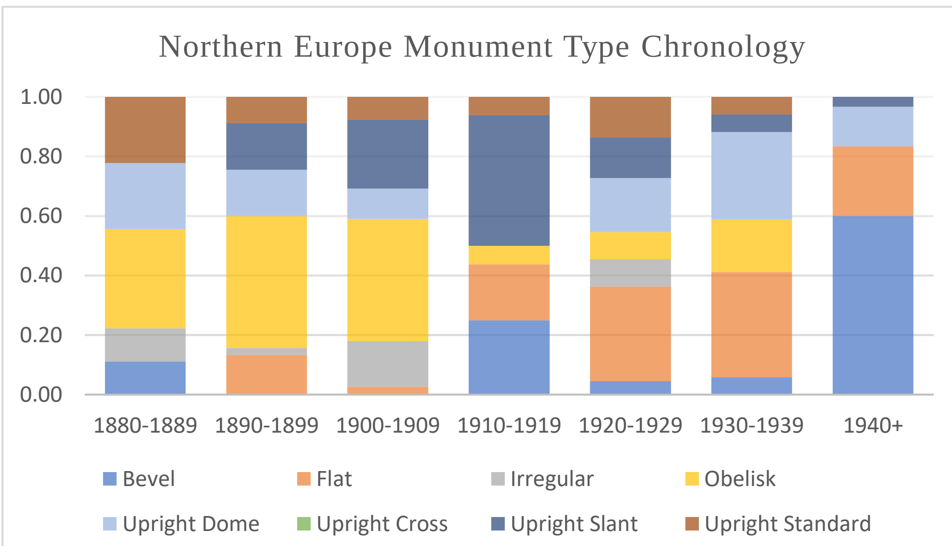
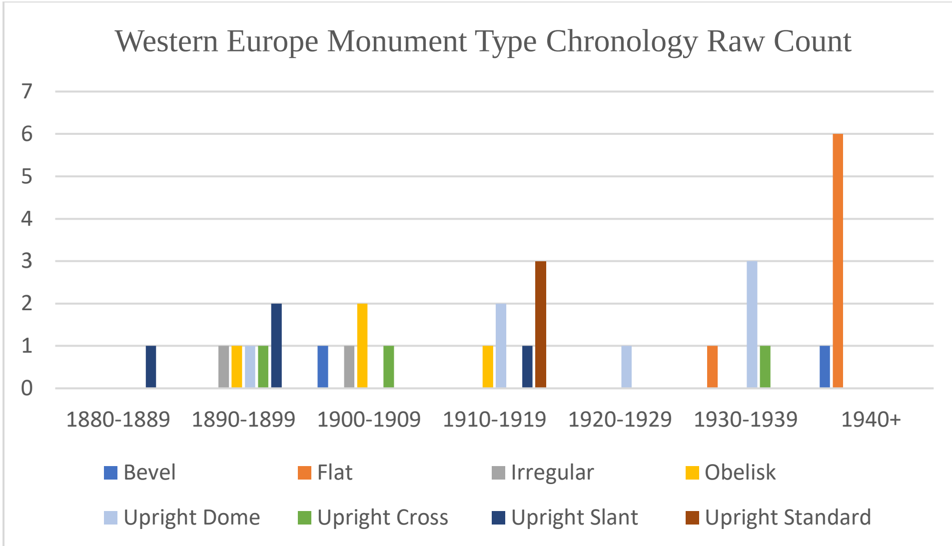


Figure D1. Northern Europe Monument Type. Raw Count and Percentage per Decade.



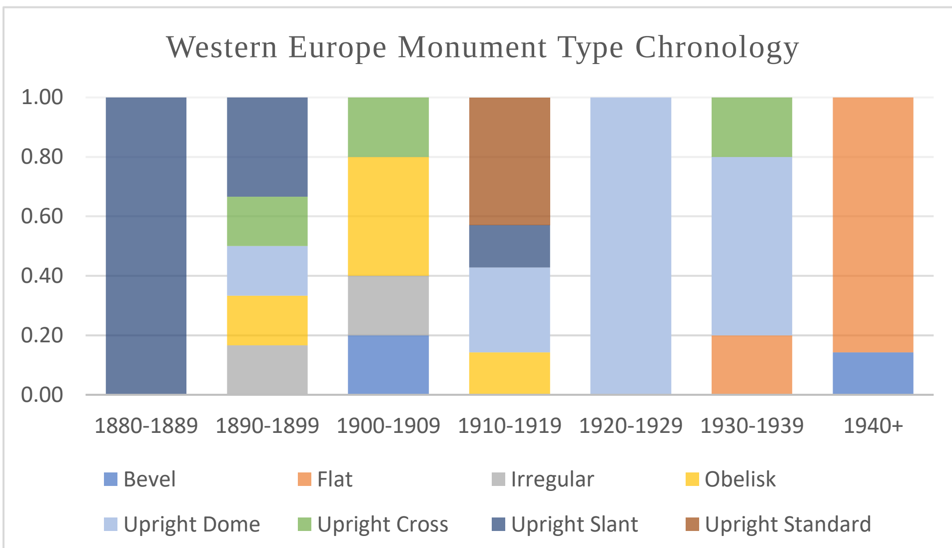
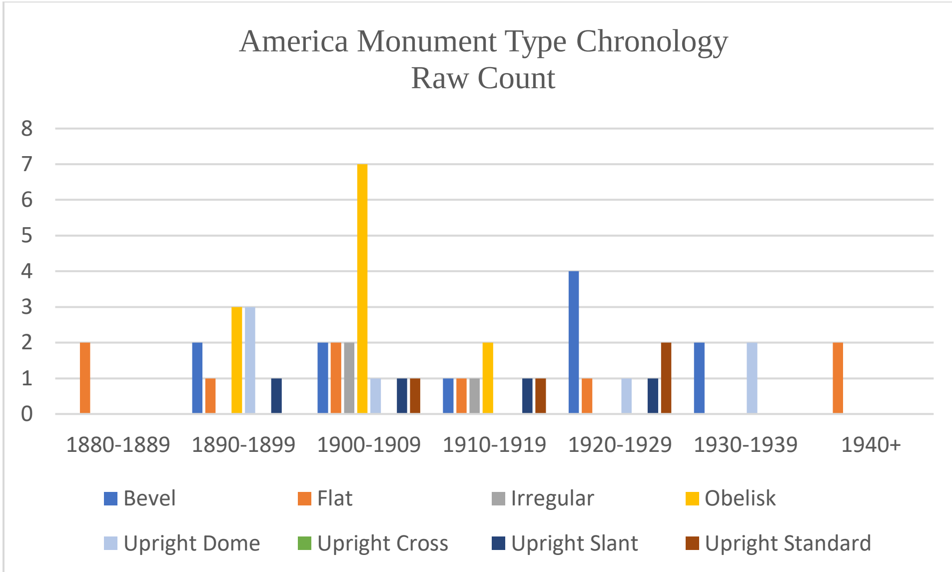


Figure D2. Western Europe Monument Type. Raw Count and Percentage per Decade.



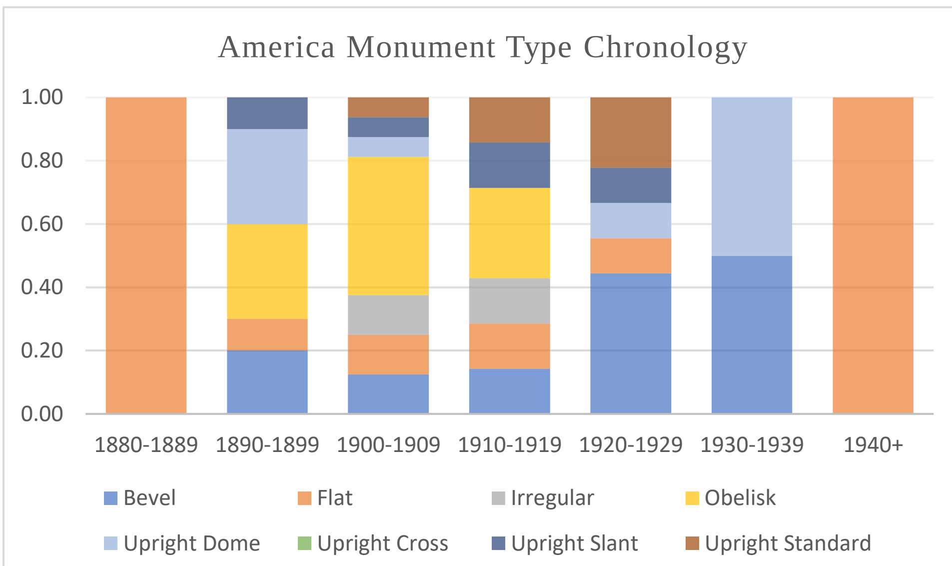
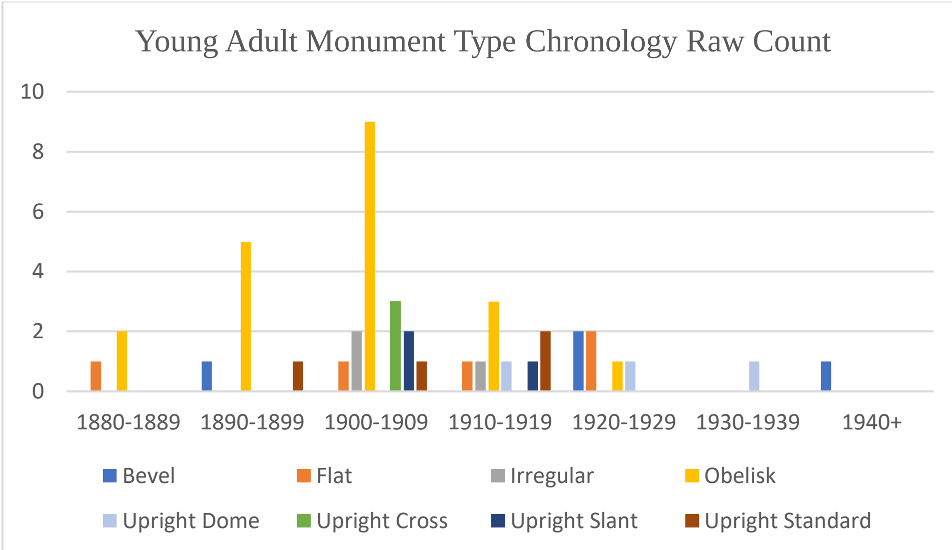


Figure D3. America Monument Type. Raw Count and Percentage per Decade.



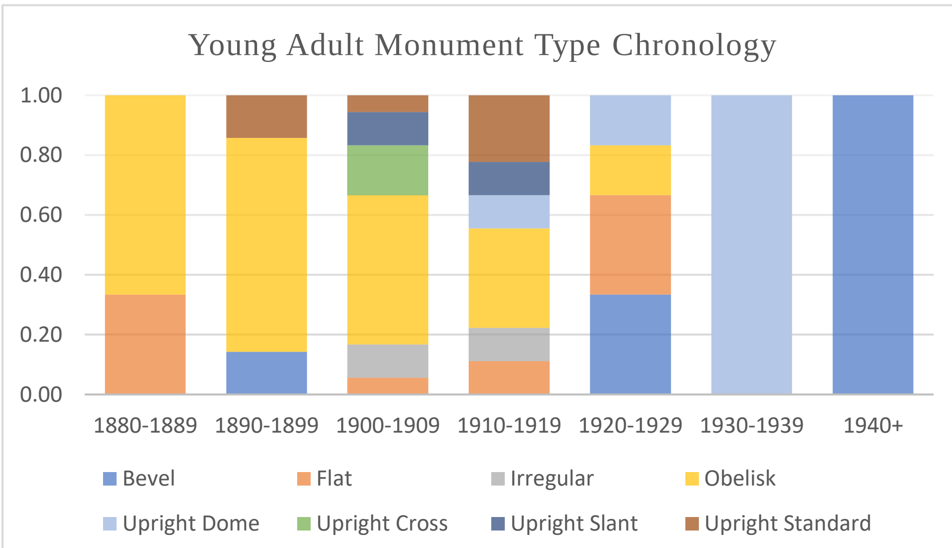
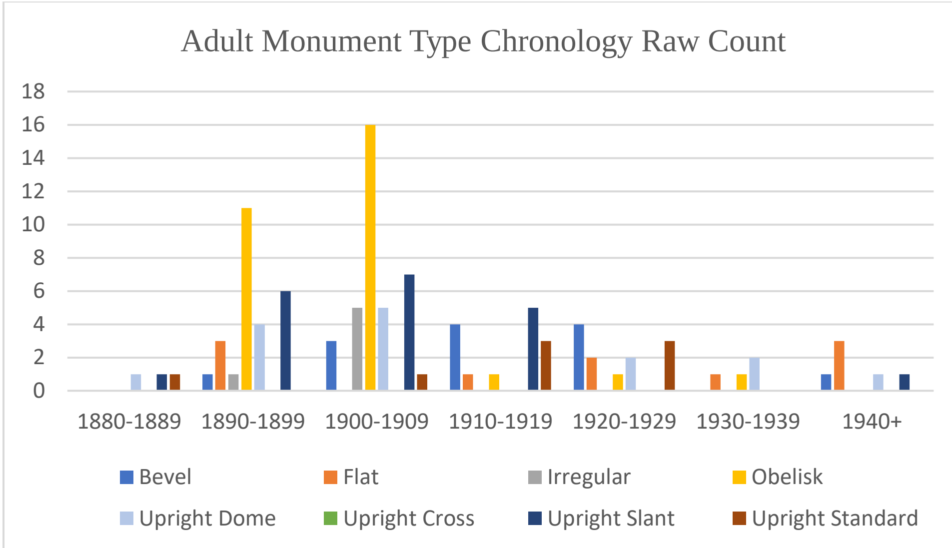


Figure D4. Young Adult Monument Type. Raw Count and Percentage per Decade.



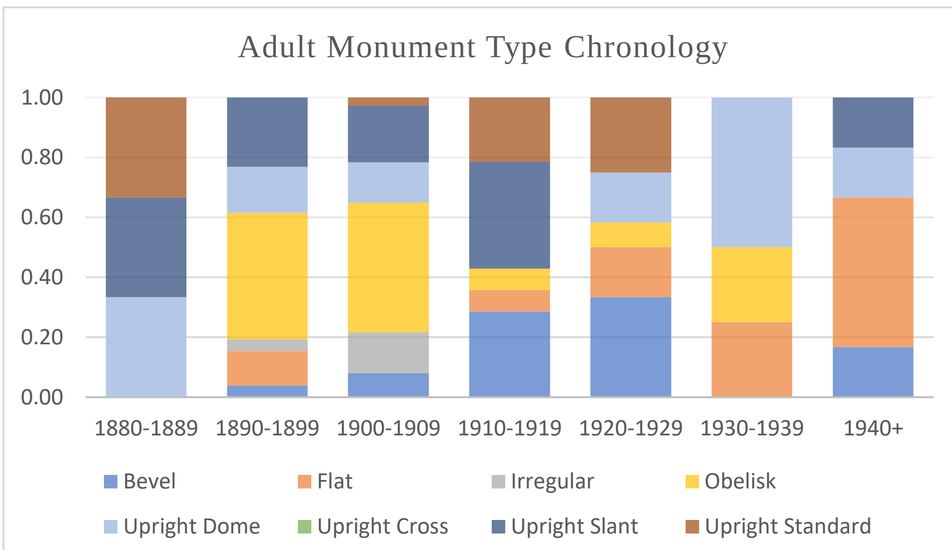
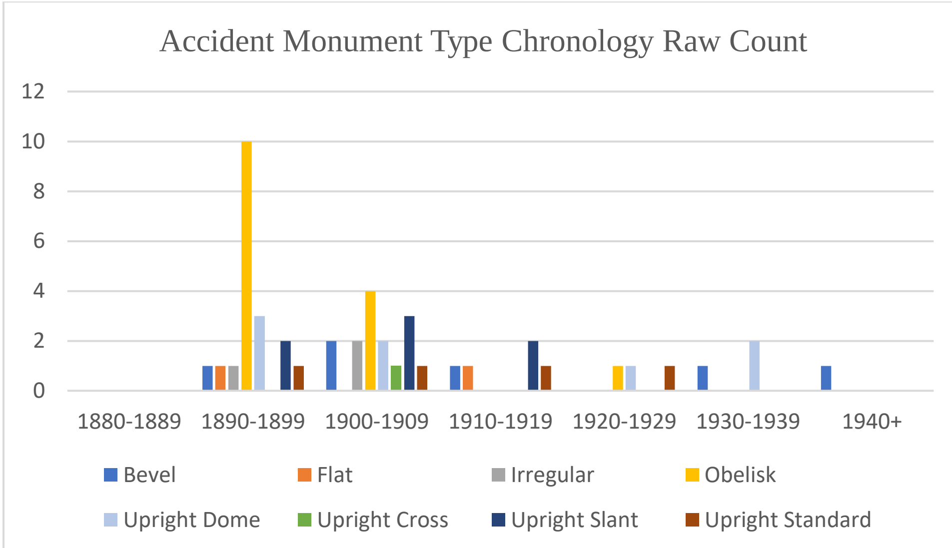


Figure D5. Adult Monument Type. Raw Count and Percentage per Decade.



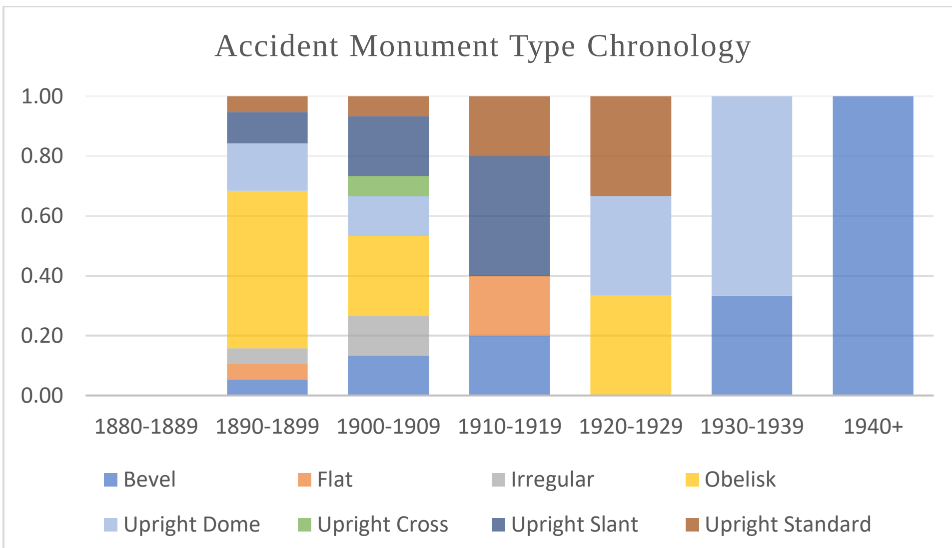
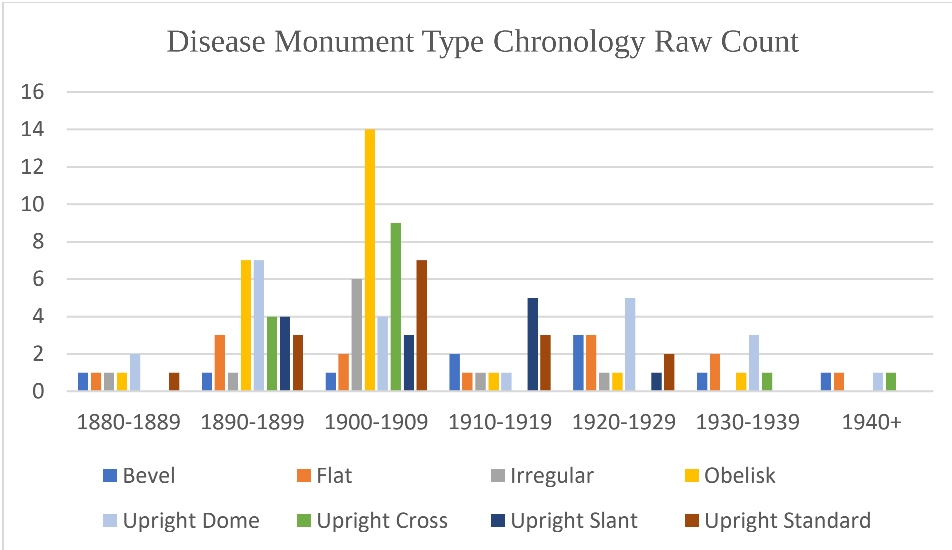


Figure D6. Accident Monument Types. Raw Count and Percentage per Decade.



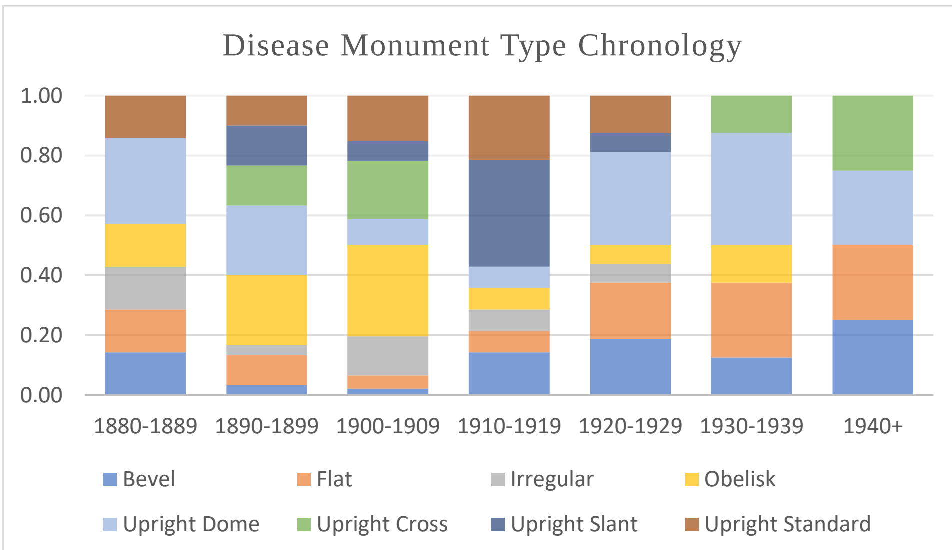
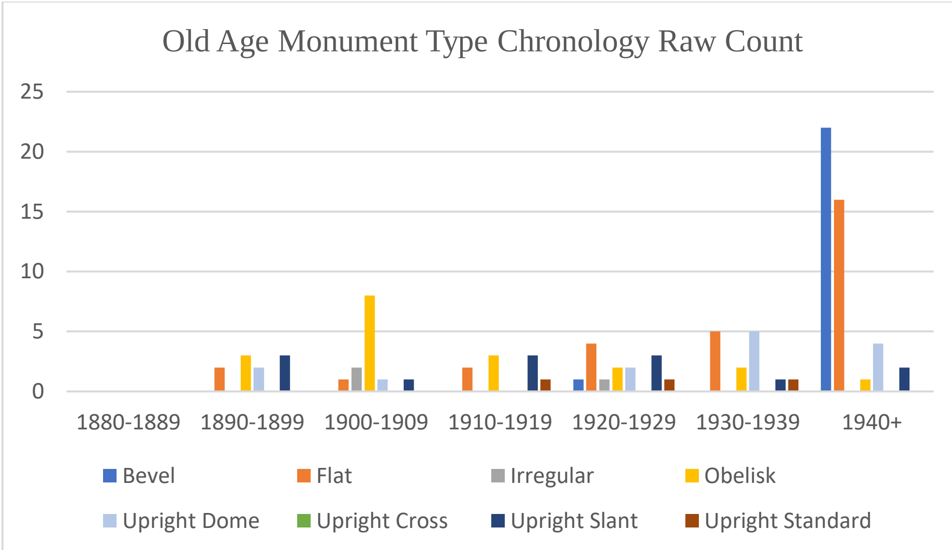


Figure D7. Disease Monument Types. Raw Count and Percentage per Decade.



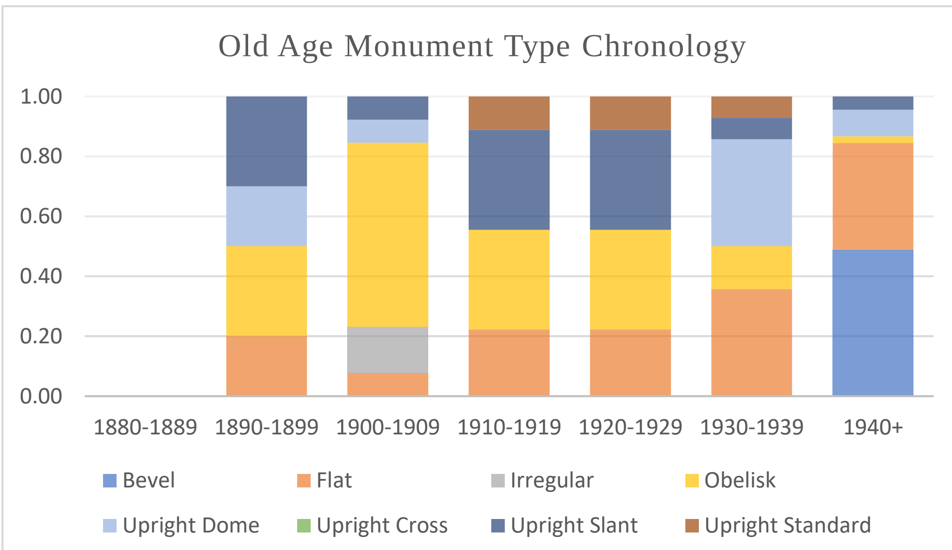


Figure D8. Old Age Monument Type. Raw Count and Percentage per Decade.

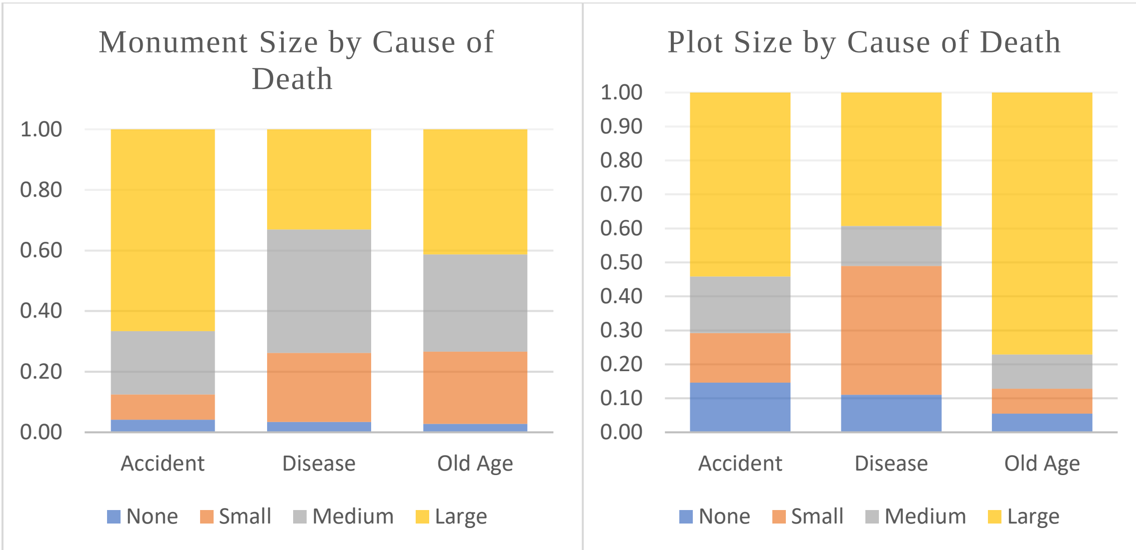


Figure D9. Monument and Plot Size by Cause of Death. Percentage by Cause.

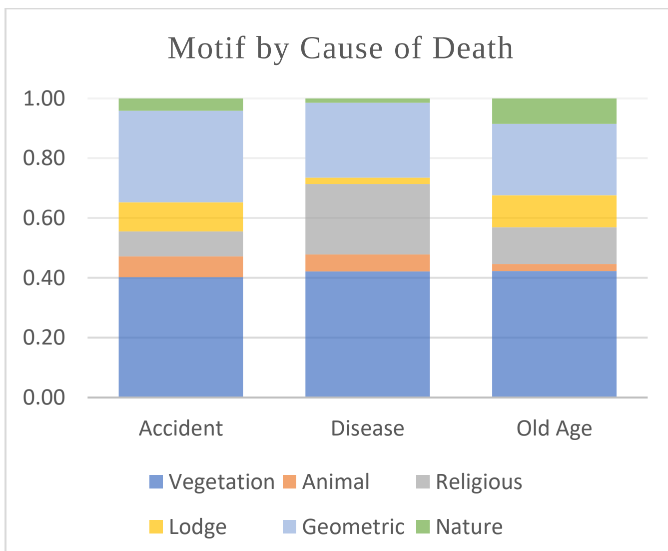
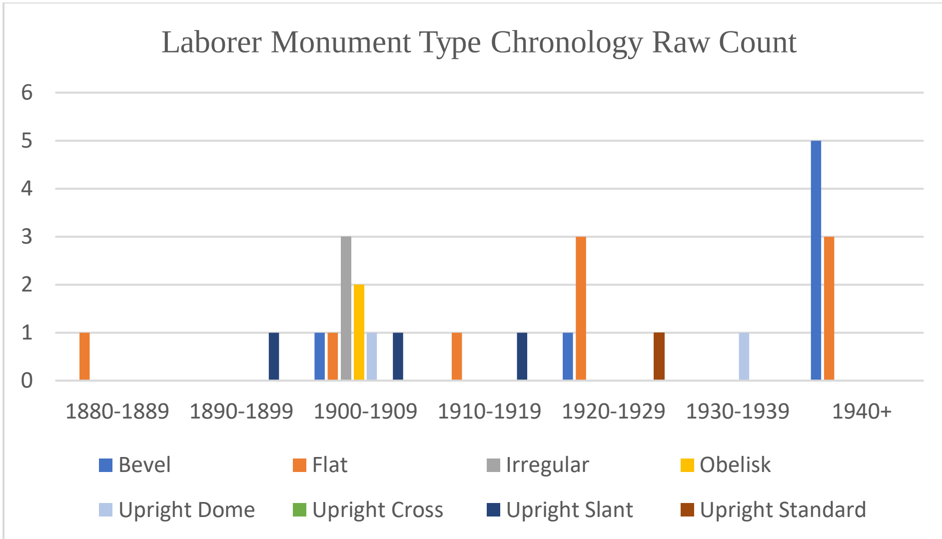


Figure D10. Motif Usage by Cause of Death. Percentage of Motif per Cause.



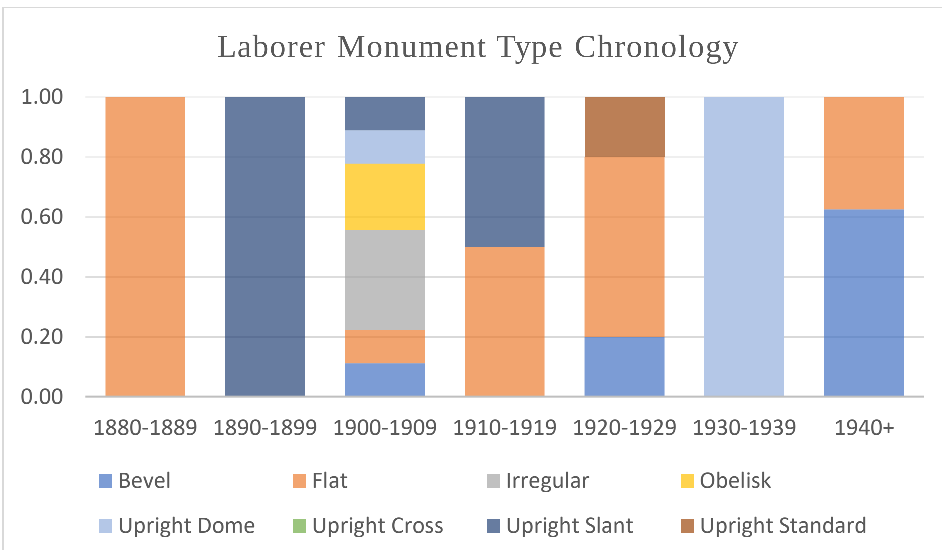
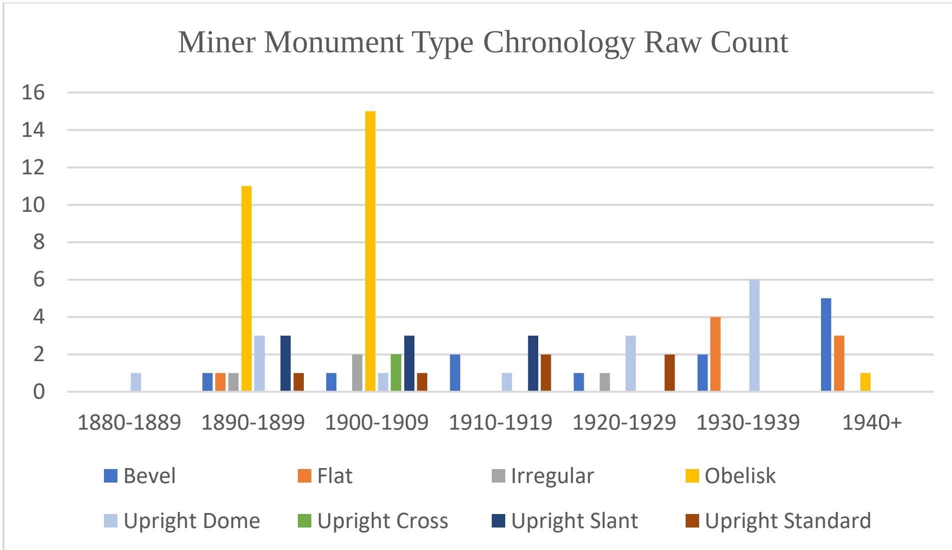


Figure D11. General-Laborer Monument Types. Raw Count and Percentage per Decade.



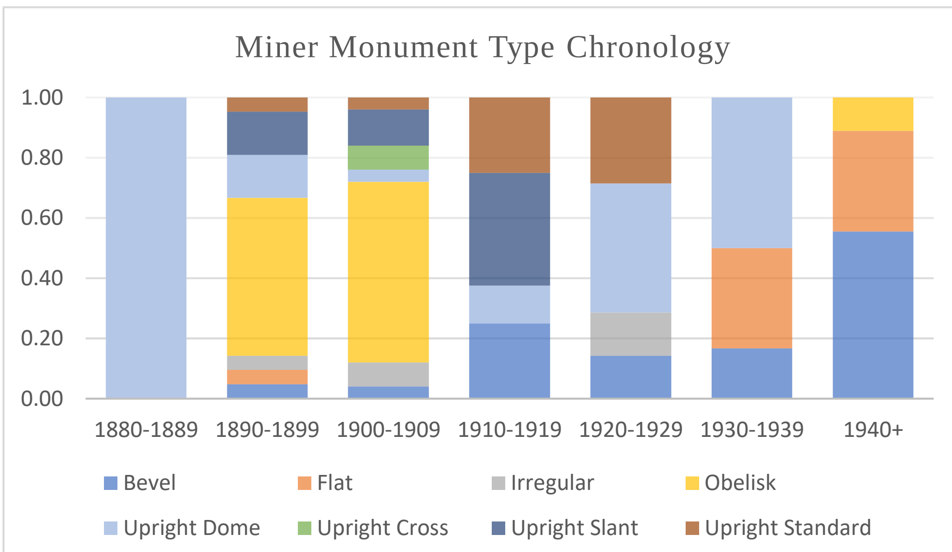
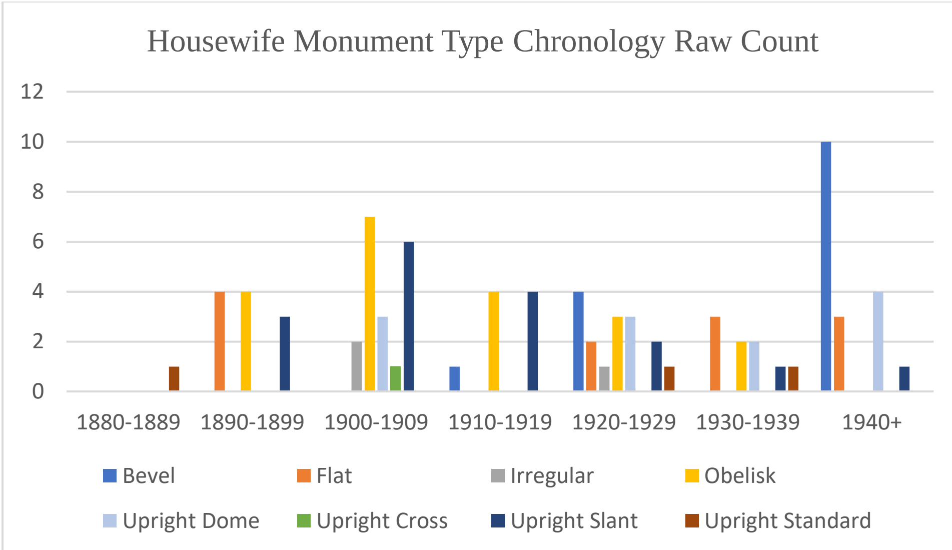


Figure D12. Miner Monument Type. Raw Count and Percentage per Decade.



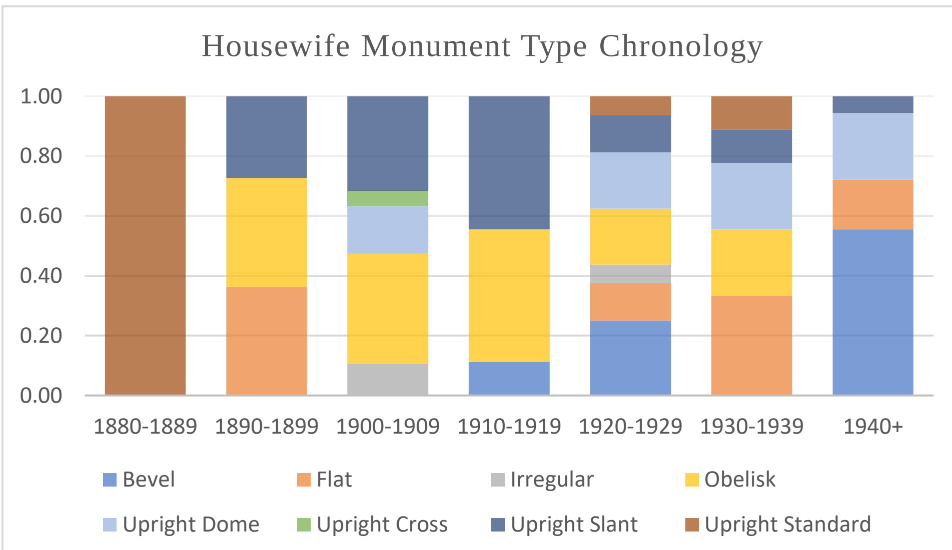
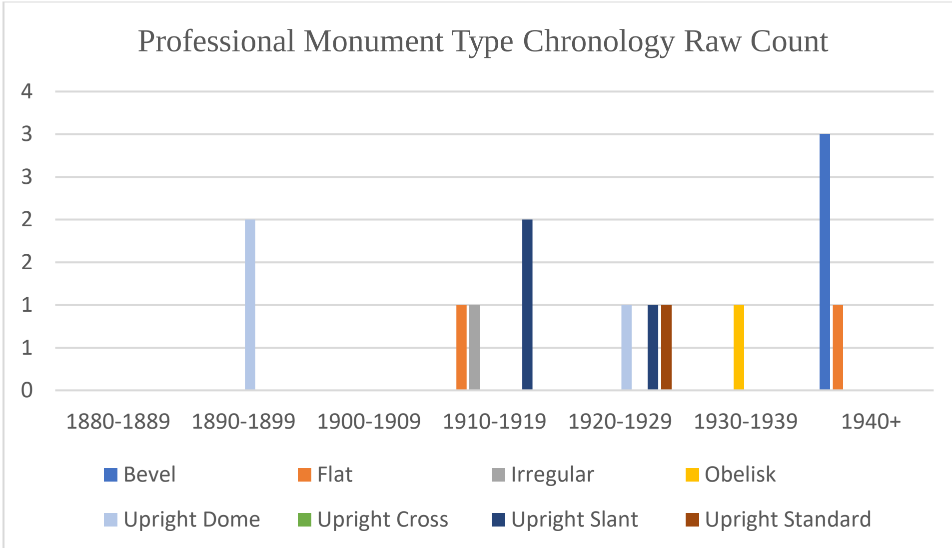


Figure D13. Housewife Monument Type. Raw Count and Percentage per Decade.



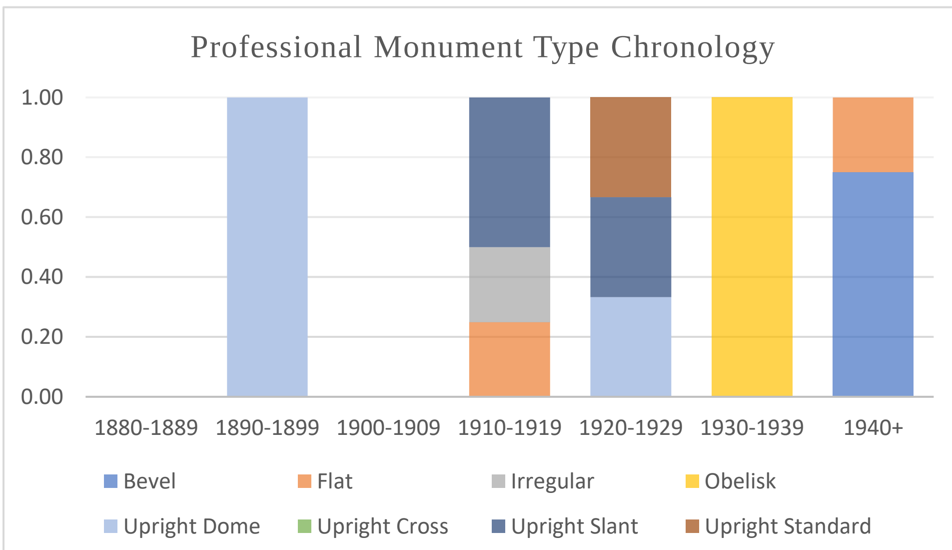


Figure D14. Professional Monument Type. Raw Count and Percentage per Decade.

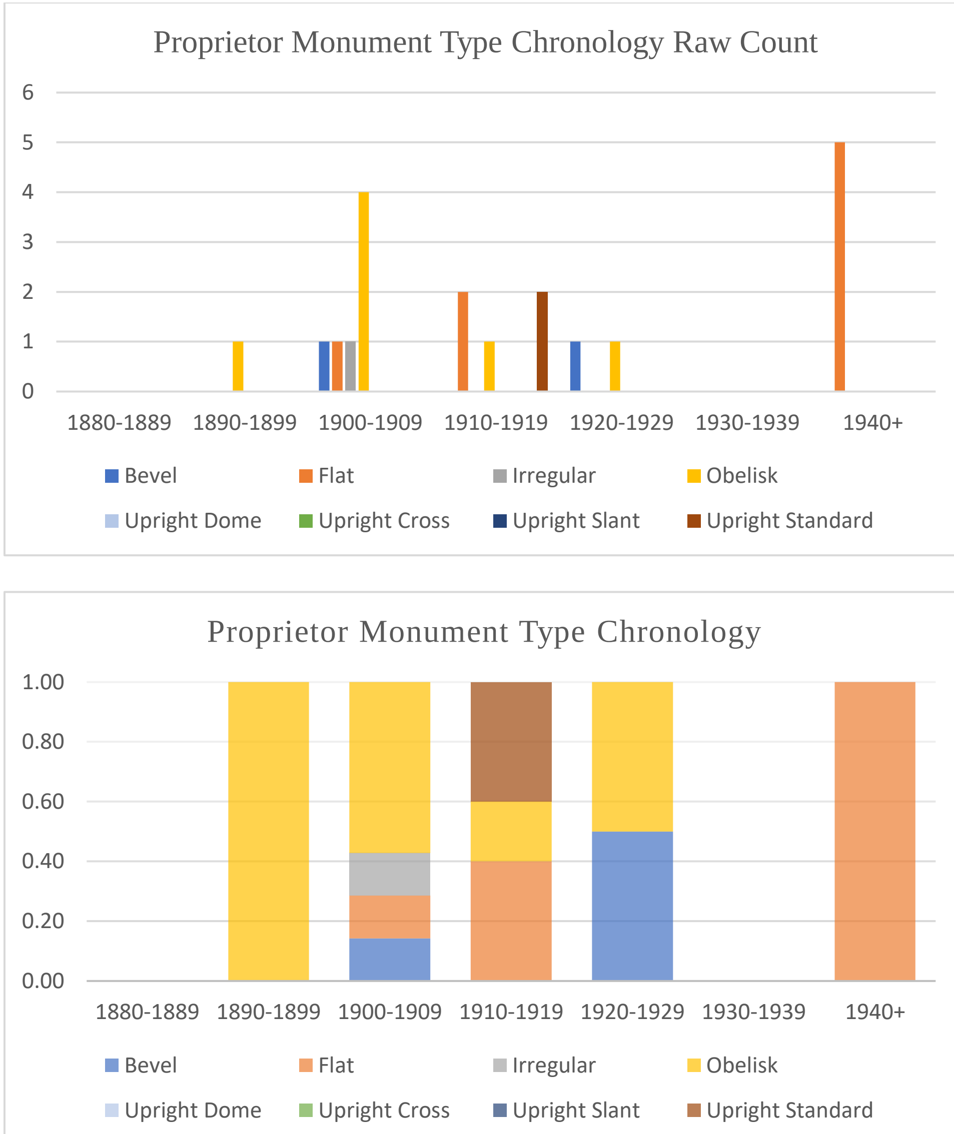
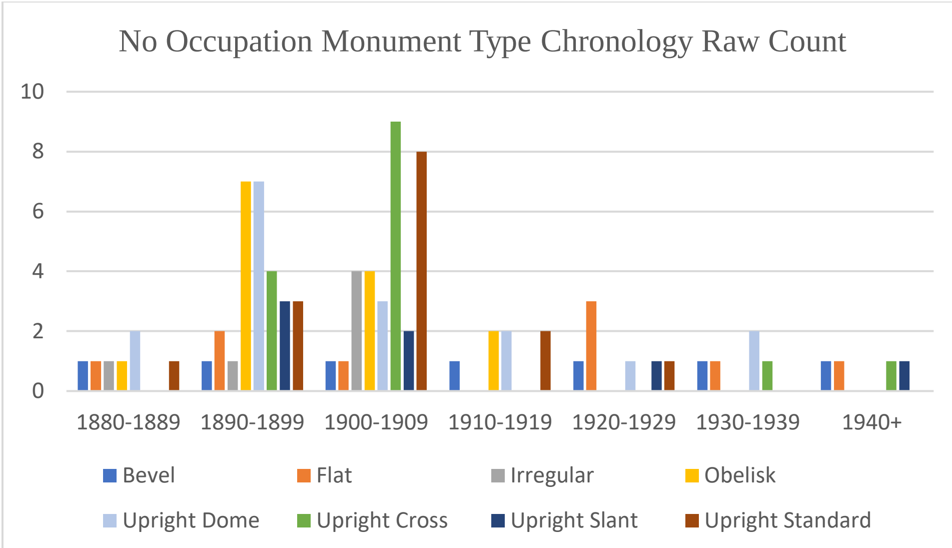


Figure D15. Proprietor Monument Type. Raw Count and Percentage per Decade.



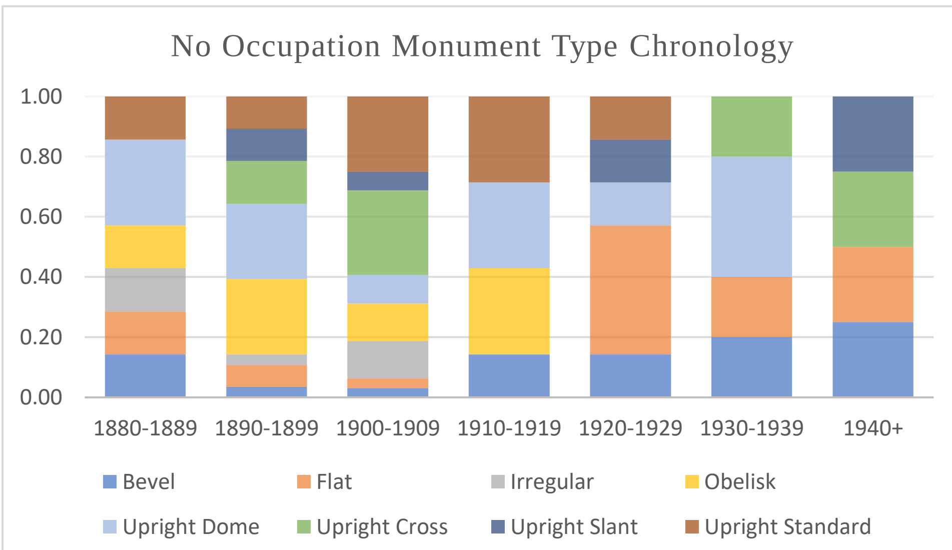


Figure D16. No Occupation Monument Type. Raw Count and Percentage per Decade.

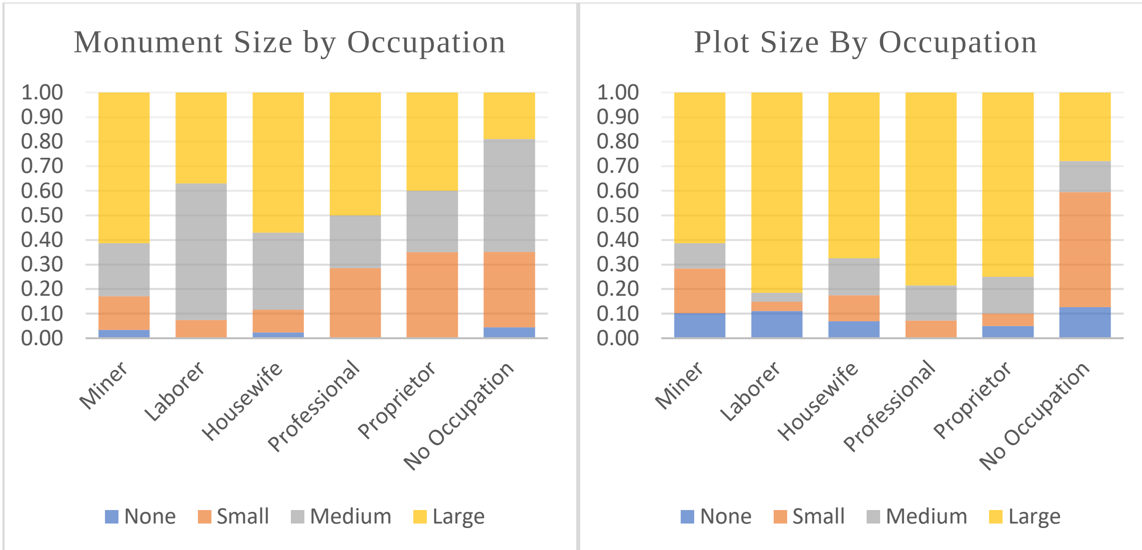


Figure D17. Monument and Plot Size by Occupation. Percentage per Occupation.

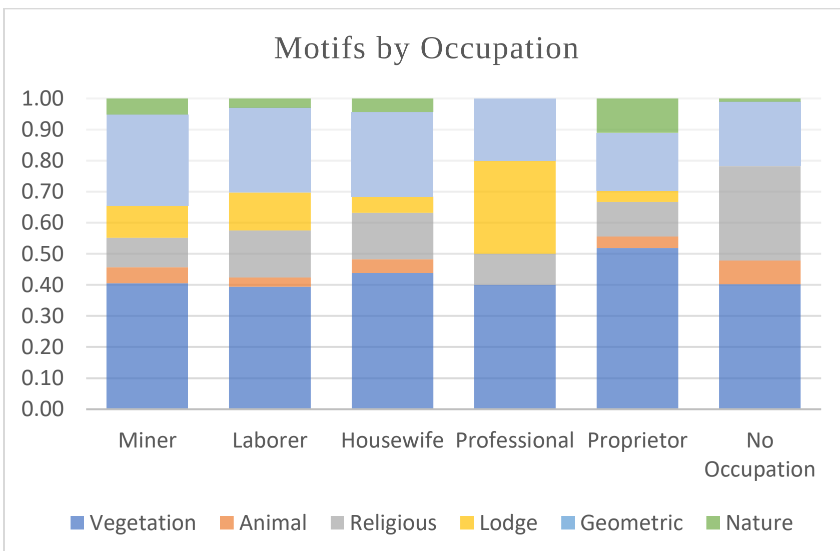


Figure D18. Motif Usage by Occupation. Percentage of Motif per Occupation.

APPENDIX E—FACTOR ANALYSIS FACTOR LOADINGS

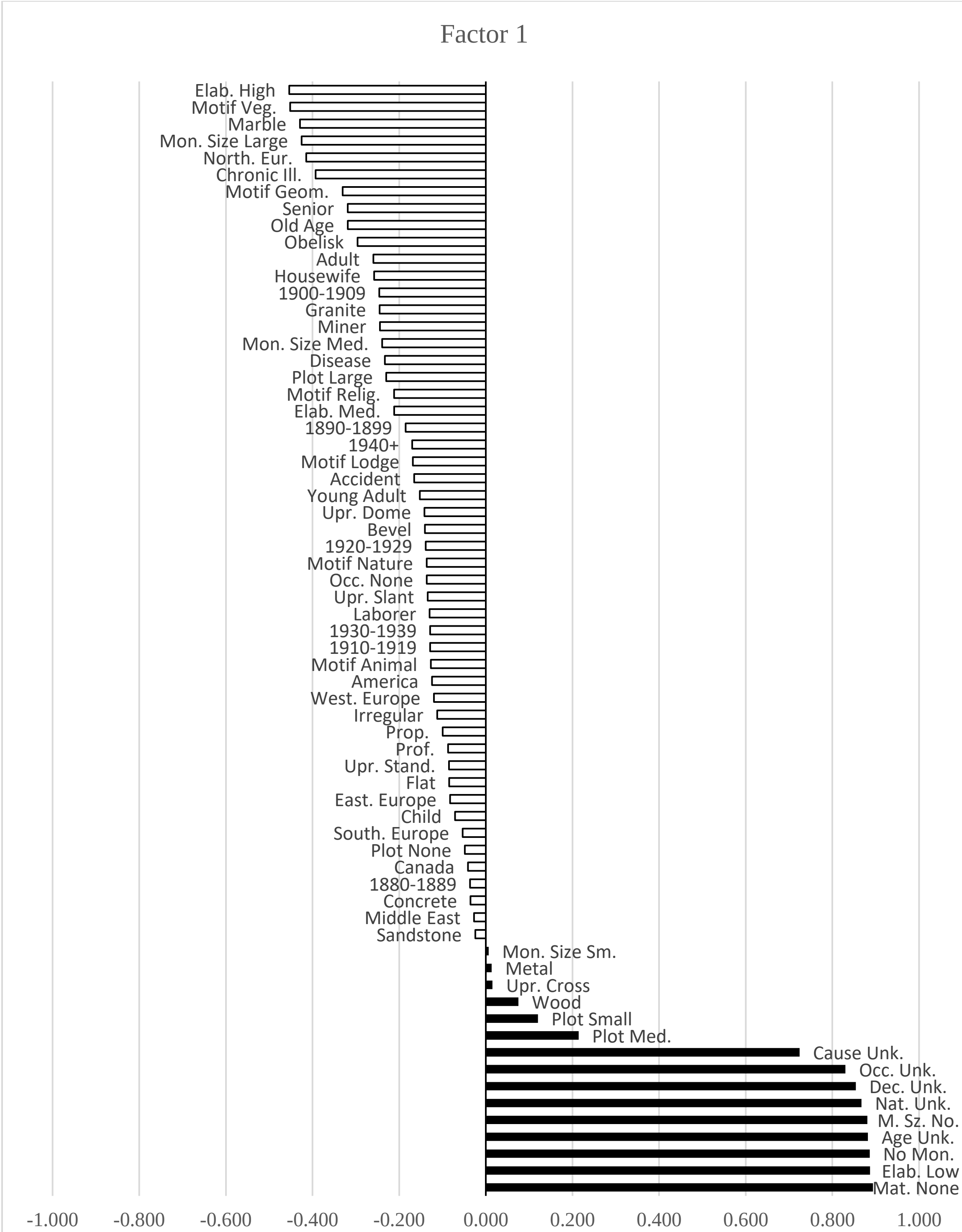


Figure E1. Factor 1 Factor Loadings.

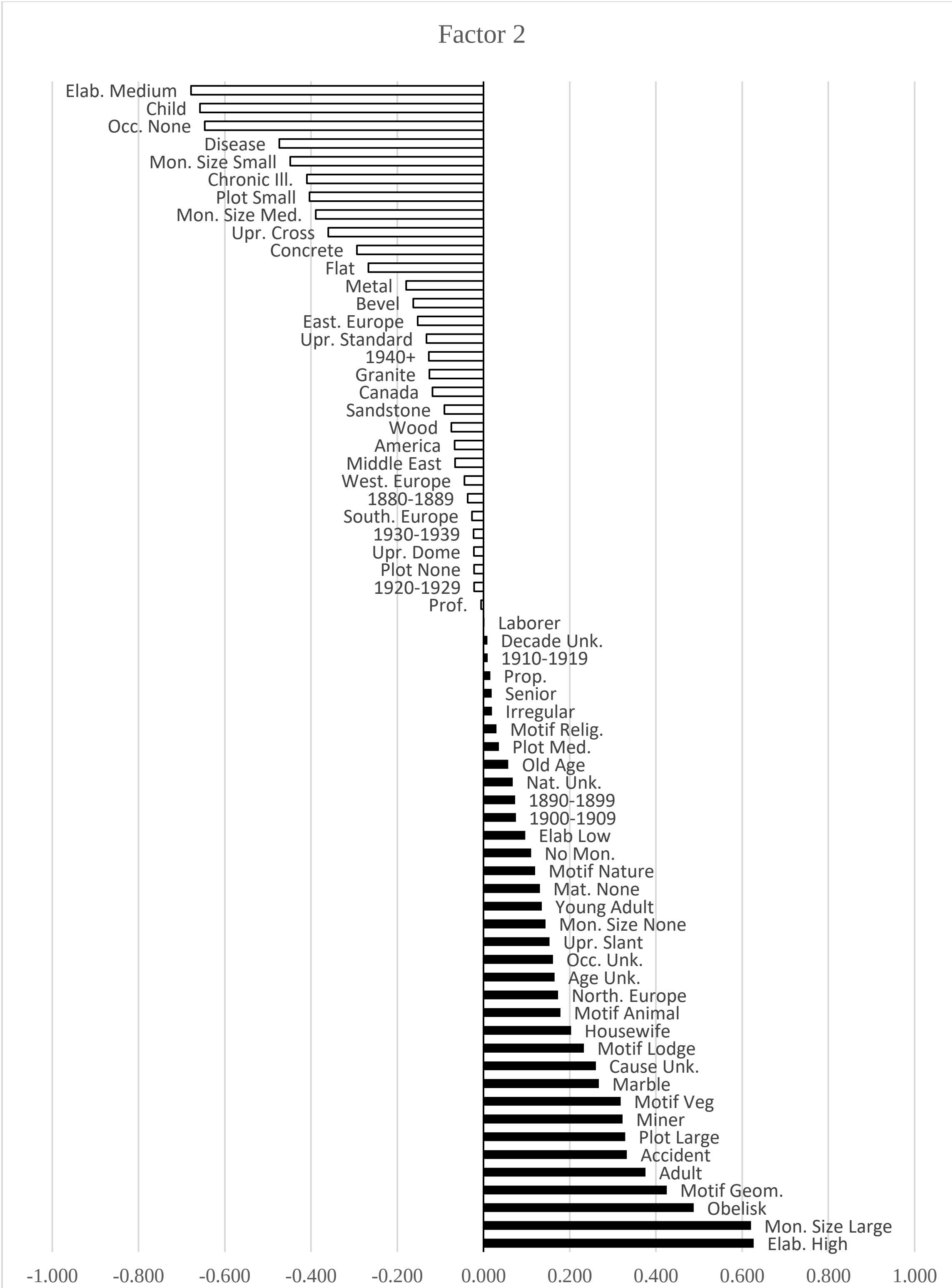


Figure E2. Factor 2 Factor Loadings.

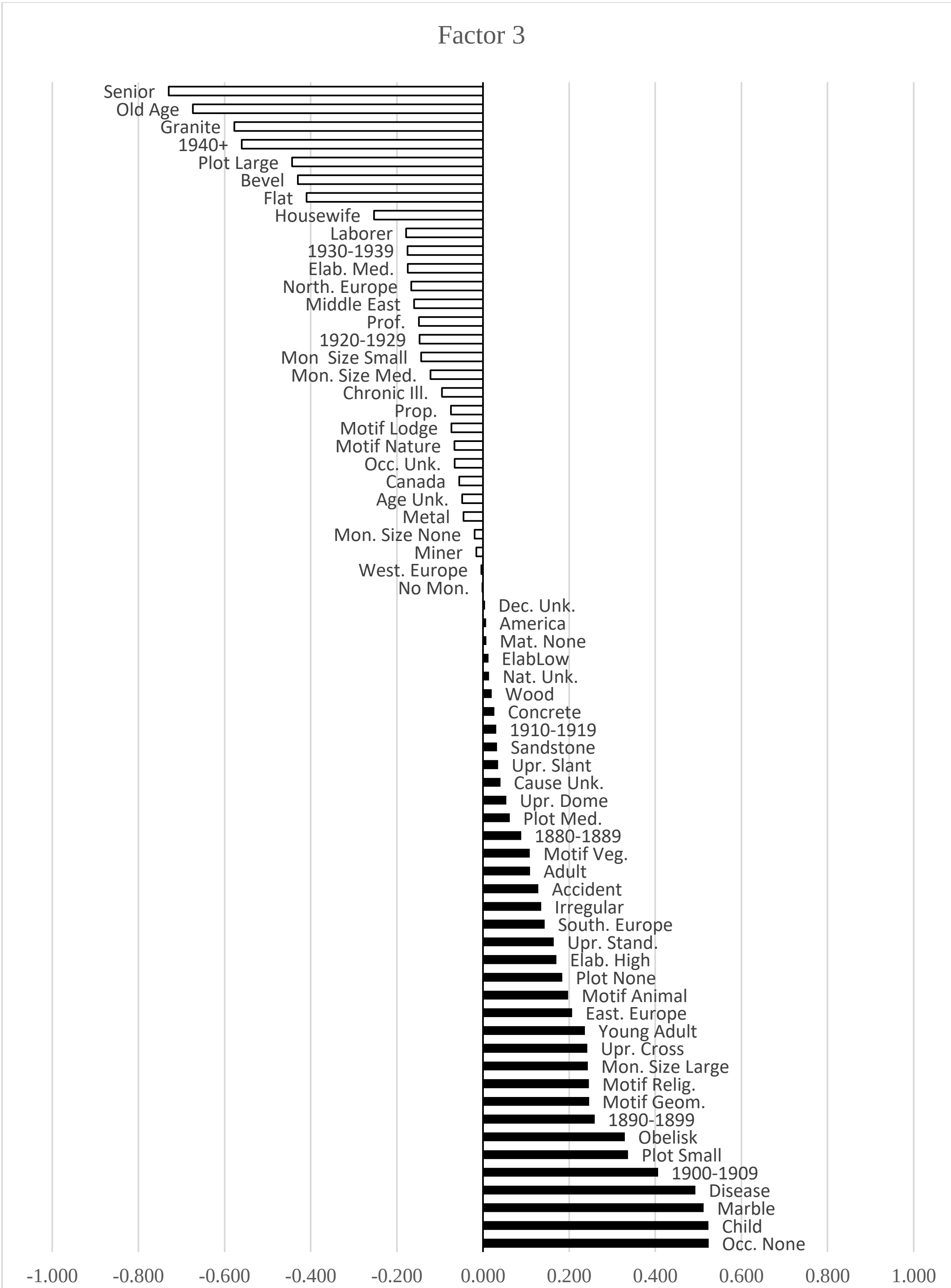


Figure E3. Factor 3 Factor Loadings.