THE TAU OF DOORS: THE FOOTPRINTS OF THE PAST

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ABSTRACT

THE TAU OF DOORS: THE FOOTPRINTS OF THE PAST

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T-shaped doors are an enigmatic architectural feature. These features were built in the US Southwest and Mexican Northwest (SW/NW) first at Chaco Canyon around 1020 CE, then expanding throughout the region. T-shaped doors interest archaeologists because of their apparent sudden appearance and potential connection to structures in Mesoamerica. Lekson (2015) has used these features in his argument for the "Chaco Meridian," a singular social and political group began at Chaco and later migrated to two monumental sites along a North-South Meridian in the SW/NW, first Aztec, New Mexico, then Paquimé, Chihuahua. His argument is bolstered by a perceived scarcity of T-shaped doors outside of this north-south corridor. T-shaped doors do occur outside that corridor in what is now Arizona but have not been systematically identified and counted prior to this research. Callis (2021) has further argued T-shaped doors originate in Mesoamerica because of the similarity of Maya symbols to the T-shape in the SW/NW. This paper addresses the following research questions. What are T-shaped doors? Where do T-shaped doors occur in Arizona? Is there a connection between the Chaco Canyon and Arizona T-shaped doors? To address these questions, I created a data set to systematically identify and count T-shaped doors in Arizona. Based on the following research, T-shaped doors in Arizona do not coincide with Lekson's and Callis's theories, and instead Bernardini's Indigenous Hopi framework as presented in *Becoming Hopi* (2021) is a far better explanation of this enigmatic feature.

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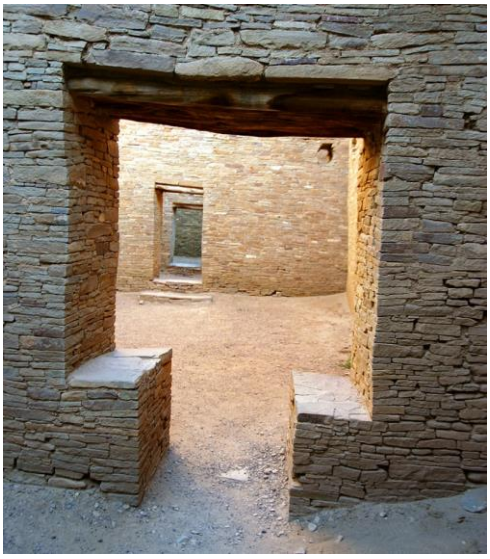

Figure 1: T-shaped door in Chaco Canyon (Williamson 2004)

Chapter 1 - Introduction

The T-shaped door is an architectural feature which first appeared in the Southwest and Mexican Northwest (SW/NW) around 1020 CE with the rise of Chaco Canyon (Lekson 2015:84; Plog 1997). T-shaped doors are characterized by a wide opening in the upper two thirds of the frame and a narrow opening in the lower third. The T-shape door is also described as notched (Mindeleff and Mindeleff 1891). According to SW/NW archaeologists, there are multiple variations of what archaeologists call a T-shaped door. Many archaeologists and anthropologists, including Mindeleff (1896), have described a half T-shaped door shaped like an upside-down L. These doors were constructed of masonry, adobe, or a combination of both. Despite the various descriptions of T-shaped doors, this feature has puzzled researchers for centuries with the following questions: Where do they occur? What is their origin? Why do they occur across the SW/NW? (Callis 2021; Lekson 2015; Love 1975; Mindeleff and Mindeleff 1891). This thesis focuses on T-shaped doors found in Arizona and their relationship to T-shaped doors found elsewhere in the SW/NW. It attempts to fill a gap in current research by documenting and analyzing the distribution of T-shaped doors quantitatively. For the purposes of this paper, the

term SW/NW refers to the United States of Arizona, New Mexico, parts of southern Utah and Colorado and the northernmost sections of the Mexican states of Sonora and Chihuahua.

The Archaeological Feature

Both researchers and the public have been interested in T-shaped doors since the late 19th century (Judd 1964; Lekson 2020; Mindeleff and Mindeleff 1891). Public interest is still evidenced by replications of this symbol across the modern SW/NW in buildings such as the Tuzigoot National Monument Visitor Center, Wupatki National Monument entrance sign, *Museo de las Culturas del Norte's* entrance sign at Paquimé, and even shopping mall billboards. Despite public popularity and visibility of the T-shaped door, research regarding this feature has been sparse. Empirical research has been especially minimal. Mindeleff and Mindeleff (1891) and Judd (1964) were the first to describe these doors, but Marion Love's "A Survey of the Distribution of T-shaped doorways in the Greater Southwest" (1975) was the first broad review of T-shaped doors. After Love (1975), literature only briefly mentioned T-shaped doors until Stephen Lekson (2015) and Marc Callis (2021).

Figure 2: Overhead view of Pueblo Bonito (NPS)

Research Goals

To develop a data set of T-shaped doors, I focused on gathering data compiled in the decades of excavation and survey of the region. Furthermore, I conducted a limited field survey of T-shaped doors in Arizona to supplement the previous literature.

Next, I analyzed and interpreted the data to create a quantitative foundation and to test current T-shaped door hypotheses. These tests were run using IBM SPSS, ArcGIS, and oral tradition.

This research will answer the following questions: Where do T-shaped doors originate and where do they last occur in Arizona? Are T-shaped doors in Arizona related to Chaco Canyon? What is the most relevant explanatory framework to understand T-shaped doors in Arizona? These questions will be answered using the new data set of T-shaped doors in the

SW/NW. I will contextualize the answers to said questions using the theories of interaction, connectivity, movement, and a communities of practice model.

Why Does This Research Matter?

Why is this research relevant to archaeology? This can be explained using the *Grand Challenges for Archaeology* as described by Keith Kintigh et. al (2014). Kintigh presents important future directions for research, and what foundational questions should be answered by the next generation of archaeologists.

One challenge identified by Kintigh and others is "How do people form identities, and what are the aggregate long-term and large-scale effects of these processes?" (2014:14). This thesis focuses on the identities of people in Arizona at a pivotal period of the SW/NW when movement was constant and major centers of population experienced significant shifts in population (Elson and Clark 2007; Reese et al. 2019). This research demonstrates how identity may be understood in archaeology and how the identity of social groups changes over time.

Another relevant challenge is "Why does migration occur and why do migrant groups maintain identities in some circumstances and adopt new ones in others?" (Kintigh et. al 2014:14). My research will attempt to explore this question in Arizona during a period of major migrations from areas like Chaco Canyon, Mesa Verde, and even Northeastern Arizona (Bernardini 2005; Mills and Fowles 2017; Plog 1997). By identifying the people who constructed T-shaped doors, we can also begin to understand the identity of migrant groups in the region. Are T-shaped doors an example of a migrant group constructing features akin to Chaco Canyon? Alternatively, are T-shaped doors evidence of Chacoan influence and an emulation of Chacoan T-shaped doors? This research will contribute to the understanding of these "grand challenges" as well as the many questions surrounding the T-shaped door.

Outline

The background chapter focuses on providing the necessary context for understanding this research. I begin with the current history of the SW/NW and the origins of T-shaped doors. I will detail the history of research regarding T-shaped doors in the SW/NW. I also discuss the nature of research within the SW/NW, from its troubling beginnings to the present day. I conclude with my own research and its place in the history of the SW/NW and overall archaeological inquiry.

The theory chapter will discuss the theory that is used to conduct and discuss this research. What are communities of practice, and how can they relate to T-shaped doors? What is interaction and connectivity?

The methods chapter will detail the methods I used to construct my data set of T-shaped doors and relay the importance of legacy data and collections research. This section explains my decision-making in choosing each research method in addition to prefacing what will be discussed in the results, discussion, and conclusion.

The results and discussion chapter will be combined in the following section. The results section will present what I have researched in an unbiased and clear manner and the discussion section will take the results provide my interpretation based upon my research. I will reintroduce my original questions on the origin of T-shaped doors and summarize how my research has added to the understanding of SW/NW archaeology. I offer my conclusion on what relationship T-shaped doors in Arizona have to T-shape doors throughout the SW/NW. I discuss possible future research and how others should consider proceeding.

Following the results and discussions chapter, I provide my conclusions. What should the future of this research entail? Specifically, what is the relevance of the data, and how do my conclusions relate to my hypotheses? Are T-shaped doors a Chacoan feature?

Chapter 2 - Background

This section will provide the larger context necessary for understanding T-shaped doors and their narrative in the SW/NW. Following the history of people in the SW/NW this section will detail the history of SW/NW archaeologists and their research. I begin in the Pueblo I period (PI), since this is the first period in which above ground architecture is constructed and therefore may be when the evolution of T-shaped doors appears to begin (but see Cambron 2012, who argued for evolution from Basketmaker III pithouse entryways).

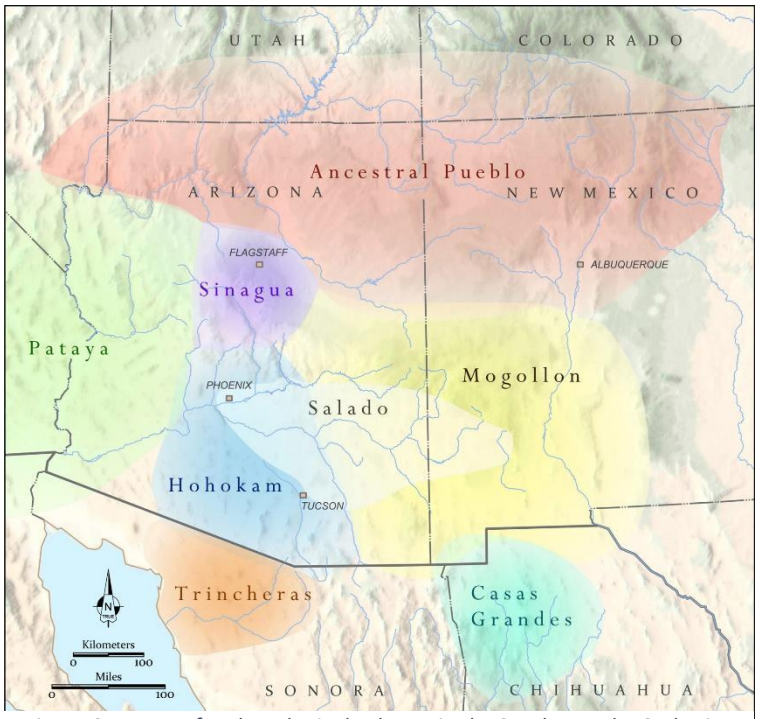

Figure 3: Image of archaeological cultures in the Southwest, by Catherine Gilman, updated by Kathleen Bader. Courtesy of Desert Archaeology, Inc. (2013)

The Early Pueblo Period

The Pueblo I period (PI) begins around 750 AD, in parts of Arizona, New Mexico, and Colorado (Plog 1997). PI is evidenced by larger aggregating communities and unit pueblos, an above ground unit of rooms, usually around a circular ceremonial subterranean structure called a

kiva (Gilman 1987). There is also greater agricultural intensification of the three sisters (maize, beans, and squash) and greater development of ceramic technologies.

Centered around the modern-day cities of Phoenix and Tucson, the Hohokam are a culture that thrived from around 200 AD to 1400s AD (Crown 1990). Separate from the Ancestral Pueblo, the Hohokam culture constructed oval ballcourts, and additionally experienced greater aggregation of communities, and further agricultural intensification. The introduction and development of ballcourts are a distinct appearance in the archaeological record due to their connection to the Mesoamerican world. Like T-shaped doors, oval ballcourts are one of a handful of possible Mesoamerican features seen in the SW/NW despite the form and origin of oval ballcourts is still being debated (Callis 2021; Crown 1990; Fish et al. 2008). Therefore, if ballcourts and T-shaped doors in the SW/NW originated in Mesoamerica, the distribution of ballcourts could be compared with the distribution of T-shaped doors (Callis 2021). Pueblo II period (PII) following the PI in the Pueblo world began with the further intensification of agriculture and the development of larger aggregated communities, most notably at Chaco Canyon.

PII & The Chacoan World

The PII period began around 900 AD (Plog 1997) and is marked by the continued aggregation of unit pueblos founded around a large community center (great houses) and surrounded by local farming clusters. These great houses often included great kivas. Great kivas are similar to earlier kivas of the same size, but instead located within great house community sites. These structures are distinguished by their size, as they were often built to accommodate growing communities, of more than 100 square meters in total area (Gilpin and Benallie 2000).

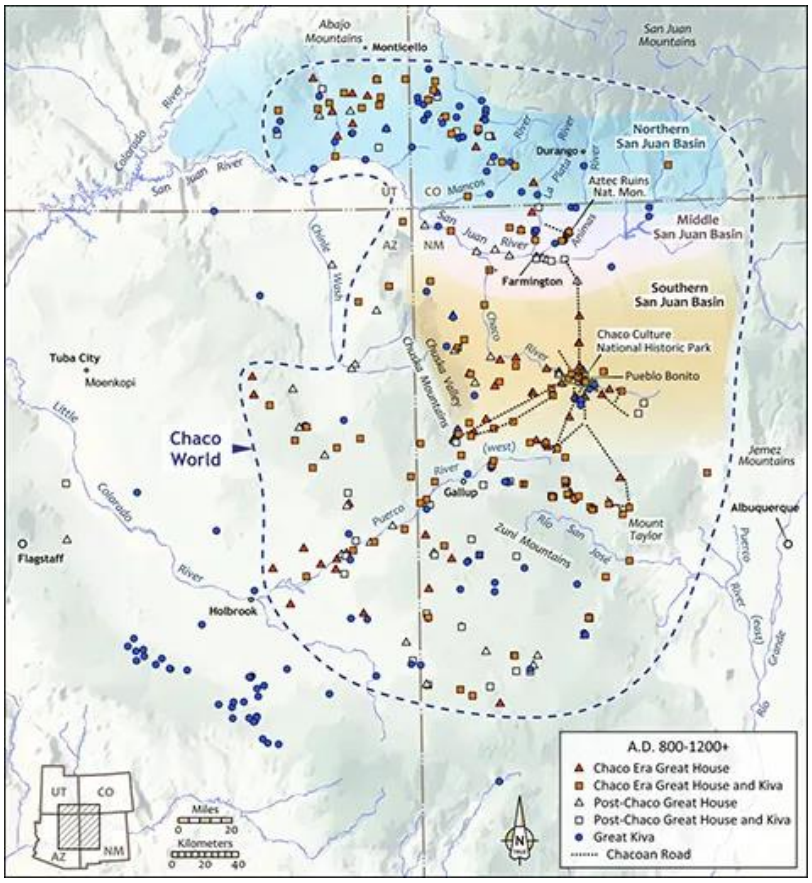

Figure 4: Image of the Chacoan World (Tada 2020)

Chaco Canyon, located in the San Juan Basin in the Northwest of New Mexico, developed in the PII period. Numerous great house communities were constructed here at a higher concentration than anywhere else in the SW/NW. Chaco Canyon's development centered in the canyon, but also occurred throughout the four corners region, known as the Chacoan World. The Chacoan world is defined by great house communities in the four corners region, which demonstrates this place's influence across the SW/NW. The T-shaped door first appears in the Canyon around 1020 AD (Lekson 2020; Love 1975; Mindeleff and Mindeleff 1891). Once constructed in Chaco Canyon, the

T-shaped spread to other places in the Chacoan world, at places like Aztec Ruins, Salmon Pueblo, and Mesa Verde.

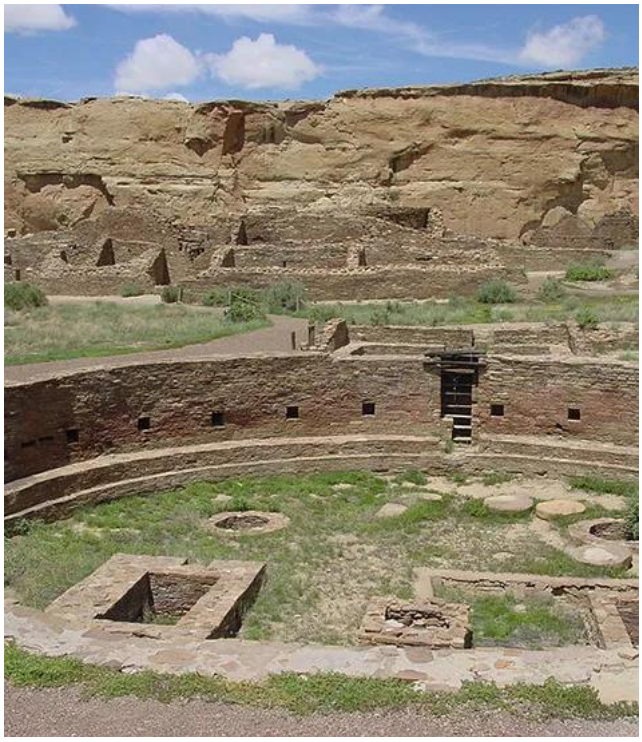

Figure 5: Great kiva at Chetro Ketl in Chaco Canyon (Tada 2020)

Further to the south, the Hohokam world continued to develop separate distinctive population centers, separately from Chaco Canyon. The Chaco and the Hohokam cultural patterns dominate the Four Corners region and Phoenix and Tucson Basin, respectively. There is little evidence of their interaction despite these two regional influences (Crown et al. 1991; Douglas 2007; Elson and Clark 2007). The Hohokam, in the equivalent of the PII period, constructed more distinctive architectural forms, developed complex ceramic styles, and experienced increased population aggregation (Crown 1990: 234).

The Mimbres Mogollon culture also flourished in the same period as the Chacoan World. The Mimbres-Mogollon archaeological culture was located at the edge of the Colorado Plateau, on the border between the Puebloan World on the plateau and the Hohokam world in the desert below

(Hegmon 2002; Hegmon and Nelson 2007). Due to its location, the Mimbres-Mogollon culture was influenced by both the Hohokam and Chacoan world. This is evidenced by the early ceramic and settlement styles that resemble those of the Hohokam, and later ceramic and settlement styles that resemble the Chacoan world (Lekson 2006). By PII, people living in the Mimbres River Valley developed their own distinct Classic Mimbres culture, defined by the Classic Mimbres style ceramics. The Mimbres Classic period lasted until about 1130 AD. There is a large T-shaped door located in the Mimbres River Valley at the Gila Cliff Dwellings, however this T-shaped door was built around the late 1200s, much later than the Classic Mimbres period.

PIII & Movement

The Pueblo III period (PIII) saw migrations resulting in the end of the Chacoan World. By 1150 AD, Chaco Canyon reduced in both population and power. As a result, other surrounding communities grew. First the great house sites in Aztec National Monument and at Salmon, near Farmington, New Mexico, grew in influence. These communities began earlier in the PII period as a part of the outlying network of Chacoan sites. Aztec and Salmon's influence were short lived and as they declined, Mesa Verde grew in influence. This is understood through the increase of Mesa Verdean sites in addition to the tree-ring data that has been found in this area (Kohler and Reese 2014). Mesa Verde's influence also waned after a population peak of 20,000 in 1250 AD (Schwindt et al. 2016; Varien et al. 2007). This population decline and major migratory event occurred not just in Mesa Verde, but across the Chacoan World.

Mesa Verde, Aztec, and Salmon are a continued expression of the Chacoan world. At each of these sites there are large great houses and great kivas in addition to evidence for a significant amount of aggregation. The degree of aggregation that occurred in the Chacoan world was not seen again in this region until the fifteenth century.

Figure 6: T-shaped door and half T-shaped door at Tonto National Monument (Sadler 2023)

PIII is defined by the large number of migrations. The Salado Phenomenon is the best example of this occurrence. The Salado people were likely an amalgamation of Kayenta people who migrated from the four corners area and moved south into areas along the Mogollon Rim and joined with upland Hohokam and Mogollon communities. Archaeologists understood the movement of this Kayenta group by following this path through their ceramics. By investigating multiple sites in these resettled areas, archaeologists additionally understood how newly migrated peoples interacted with those who were already there (Clark 2001; Haury 1989; Lyons 2003). T-shaped doors also occur after these migrations across the SW/NW, in places like Canyon de Chelly, Navajo National Monument, Glen Canyon, and Casas Grandes (Paquimé). T-shaped doors continued to be constructed through these major cultural changes in the SW/NW world until the European

colonization of the Americas. Like the Salado phenomenon, perhaps T-shaped doors could be used as evidence of major migrations.

Previous Research

The first European account of T-shaped doors is likely from the personal description of Diego Perez de Luxan, a member of the Spanish expedition of Martin de Pedrosa in the late 1500s. He first describes a pueblo where "The doors are shaped like a tau so as to allow only one person to go through" (Callis 2021; Luxan 1602:73–74). Mindeleff further detailed the potential uses of these doorway notches, for example to restrict access by placing a slab over the door to restrict access, or to use as a hand hold for entering through the doorway (1891:192). Although these explanations for T-shaped doors are still discussed to this day, they are not widely accepted as the reason for the construction of these doors.

In the "Architecture of Pueblo Bonito" (1964), Neil Judd first describes the T-shaped door as an "enigma." Judd does not give a detailed interpretation of this doorway form, but he does explain possible connections to other major sites in the SW/NW that have T-shaped doors. Di Peso and others (1974) first detailed the architecture at the site of Paquimé, whose T-shape doors have been the subject of similar discussion to those at Chaco Canyon. Michael Whalen and Paul Minnis (2009) note that in Di Peso's excavation at Paquimé "Doorways numbered 569 in the 282 rooms excavated at Casas Grandes… Of these, 234 (41.1 percent) were rectangular, and 335 (58.9 percent) were T-shaped…" (Whalen and Minnis 2009: 77). Di Peso postulated that these doorway forms were one of the distinctive symbols of the Casas Grandes region (Whalen and Minnis 2009).

While these publications peripherally mention T-shaped doors, Love's (1975) is the first report that focused solely on T-shaped doors. This publication discussed locations of T-shaped doors and their distribution in the SW/NW. Love also tracked the T-shape outside of architecture; for

example she mentioned a T-shaped bone ornament from Quarai, New Mexico, a T-shaped pictograph in San Mateo, New Mexico, and even some worked sherds that have been made into a T-shape at Pueblo Bonito. Love presents the possibility T-shaped doors were purely functional, but alternatively discusses a correlation between the T-shape and Hopi cloud symbols. The intention of Love was to synthesize the research and theories surrounding T-shaped doors, and therefore she did not conclude with her own interpretations.

The most relevant research that followed is Stephen Lekson's "The Chaco Meridian*"* (2015), first published in 1999. This work defined what Lekson believed was a clear connection between three major archaeological places in the region: Chaco Canyon, Mesa Verde, and Casas Grandes. He believed not only that the three regional archaeological centers were related, but that there is a deliberate physical meridian line that connects them. In the appendices, Lekson discussed T-shaped doors as an isolated topic, in context with his Chaco meridian hypothesis. Further, in a Crow Canyon Archaeological Center presentation, Lekson postulated that T-shaped doors are evidence of a specific in-group of people across the SW/NW. He explained that T-shaped doors appeared on the exteriors of buildings and were seen from far away; therefore, perhaps they existed to indicate social and political identity (Lekson 2020). T-shaped doors may have indicated a social and political identity because they are widespread in the SW/NW, appearing at the three Chaco meridian centers. Lekson explains why T-shaped doors first occurred at Chaco Canyon and continued to be built at Mesa Verde and Casas Grandes regions, however his theory doesn't fully detail why T-shaped doors exist across the SW/NW and not just in these centers.

The last significant publication on T-shaped doors was published by Marc Callis (2021), "Ik' Way: The Mayan Origin of T-shaped doors in the North American Southwest". This article connects the iconography of the T-shaped door to the Mesoamerican god Tlaloc and the Maya *Ik'* glyph for

wind and rain. Callis discusses the relevance of the T-shape as a symbol throughout Mesoamerica and found it in a variety of locations including the palace complex at Palenque. Using this storied iconography, he explains that the T-shape occurs contemporaneously with Mesoamerican *Ik'* and Tlaloc imagery. Callis additionally discusses evidence for a connection between both regions due to the presence of colonnades, ballcourts, cacao, and the hero twins story. Callis then explains, "the people of Chaco would have desired to participate… in the same broad architectural movement then sweeping through both the Maya world and Central Mexico. To that end, the people of Chaco Canyon constructed doors modeled after the T-shape of the *Ik'* (Callis 2021:19). Despite Callis's assertion of this relationship, it has yet to be determined if T-shape doors are a Chacoan trait evidencing a Mesoamerican relationship (Callis 2021; Di Peso 1974; Judd 1964; Lekson 1974). Callis's theory explains the deep connections of the SW/NW to Mesoamerica however his theory only details the diffusion of Maya elements to the SW/NW and doesn't explain why T-shaped doors occur mainly in the SW/NW. Why would T-shaped doors occur in the Maya region and SW/NW but not take hold in areas in between?

Figure 7: T-shaped window at Palenque (Short 2009)

Reviewing research by Love (1975), Lekson (2015), and Di Peso et. al. (1974) , I conclude that T-shaped doors occur throughout the SW/NW, from the Four Corners region at Pueblo Bonito and into the Casas Grandes region at Paquimé and even in the Sierra Madre Occidental (Lekson 2020; Love 1975). Despite this history of research on this feature not one explanation of their use and significance is widely accepted. The most compelling theories on the T-shaped door are those of Lekson and Callis. These two interpretations focus on cultural connection and expression between the Maya region and Chaco Canyon through the T-shaped door. In spite of these prominent theories there has not been strong quantitative research studying T-shaped doors.

History of Archaeology

The history of archaeology is rife with complications and troublesome decisions by our predecessors. I describe this history as troublesome because the exclusion of native people, and the excavation of their ancestors has permanently darkened the work of archaeologists. Wherever possible, archaeologists should detail the history of research, and confront how archaeology has dealt with minority communities in the past and present.

Archaeology of the SW/NW in the public and in museums began with the U.S. Army in 1846, when the first European Americans first laid eyes on the archaeological sites of the region (Fowler 2000). The issue with this period of archaeology is its vandalism or rampant "unskilled exploration" (Hough 1901:357). These unskilled explorations were conducted by pioneers, herders, museum professionals, and archaeologists. The first forays into archaeology were far too often focused on gathering objects desired by museum collections rather than research.

The first scientific investigations into the SW/NW with a research design began in the late nineteenth and early twentieth centuries with Jesse Walter Fewkes and Frank Hamilton Cushing (Fowler 2000). Cushing's and Fewkes's research was focused on moving from ethnology to

archaeology, tracing those stories to a physical place. Following Cushing's research design, Cosmos and Victor Mindeleff studied Puebloan architecture and migrations in their work titled "A Study of Pueblo Architecture: Tusayan and Cibola, 1886-1887" (1891).

In the 1920s a new era began, focused on organized scientific inquiry based on the works of Nels Nelson and A. V. Kidder (Fowler 2000:22). This new archaeology was defined using inventive methods of stratigraphy, seriation, and typology. These new scholars rejected a foundational premise of the earlier archaeologists: oral tradition (Fowler 2000; Echo-Hawk 2000; Whiteley 2002). They rebuked oral tradition because its foundation is outside western scientific thought and because oral traditions can change based on the needs of the community. This was not palatable for the increasingly western scientific researchers, and oral tradition was excluded.

In the late 1950s, Lewis Binford, Gordon Willey, and Phillip Phillips all sought to define the goals of archaeology. Wiley and Phillips stated "American archaeology is anthropology, or it is nothing" and followed with their assumptions that "anthropology is more science than history and that the subject matter of anthropology is both society and culture" (1958:2). The foundation of Willey and Phillips paved the way for processual archaeology, which was focused on redefining archaeology to "the furtherance of the aims of anthropology" (Binford 1962:224). To execute these ideas, processualists focused on the process of cultural development through adaptations to the environment, which they believed could be used empirically to understand culture (Trigger 1989).

Ian Hodder was in opposition to Binford and processualism (Hodder 1982; Hodder et al. 1988). From Hodder's point of view, processualism neglected important parts of culture; "processualists gave insufficient attention to cultural and noncultural agents, events, and processes…" (Watson 2009:7). They disagreed that an objective truth could be determined in archaeology and "denied that direct, unproblematic, unbiased access to 'the real past' was possible"

(Watson 2009:9). From these critiques developed an alternative method of archaeology called post-processual archaeology. Following the post-processualist movement, archaeologists looked to include previously excluded groups in the context of archaeological investigation, research, and scholarship (Colwell 2016; Colwell-Chanthaphonh et al. 2010; Conkey and Spector 1984; Gero and Conkey 1991).

The next development in the history of archaeology that I will discuss was defined by legislation; first with the National Historic Preservation Act (NHPA) in 1966 and Native American Graves Protection and Repatriation Act (NAGPRA) in 1990. The NHPA has played a crucial role in the growth of Cultural Resource Management (CRM), a field defined by compliance projects mandated by the NHPA. With the NHPA, archaeology has shifted from a primarily academic lens to private and government agency lenses. Today, most archaeological work is done through the field of CRM, which has changed the ways in which the history of archaeology should be understood (Colwell 2016; Colwell-Chanthaphonh et al. 2010; Watson 2009).

Following the NHPA, the introduction of NAGPRA dramatically changed archaeology once more by legally mandating the repatriation of people and their associated artifacts from graves that had been excavated in the past. This mandate resulted in a steady growth of interactive discussion between natives and archaeologists (Colwell 2016).

Often unbeknownst to archaeologists, the story of the SW/NW has been passed down by indigenous people through detailed oral histories. Oral history far predates the Euro-Western research that began in the mid to late nineteenth century, and yet it has just begun to be included in archaeology. Archaeology's complicated path has defined the many approaches, connections, and relationships of the present day. Using this framework, this thesis attempts to learn from this past and use that knowledge to continue the process of learning.

Chapter 3 - Theory

The scientific process and theoretical foundation are critical to separate past errors in archaeological research design from current research. The goal of this research was to provide the archaeological community with a foundational data set on T-shaped doors in Arizona. In addition to the data set, introductory analyses were conducted based on the theoretical framework of communities of practice and interaction and connectivity.

Communities of Practice:

The communities of practice approach has its foundations in Pierre Bourdieu's practice theory (1977). Bourdieu theorized that society and culture have a pronounced effect on human agency. He believed the consequences of individual decisions and actions are directly related to culture. In archaeology, practice theory has been extended to the construction and creation of artifacts and buildings. For example, Van Dyke has detailed the construction of great houses in Chaco and used them as a cultural identifier because of the intricate construction required to make such a building (Van Dyke 1999, 1998).

Communities of practice, first described by Lave and Wenger (1991), are "formed by people who engage in a process of collective learning" (Wegner-Trayner 2015). Specifically, a community must be a group in which "members engage in joint activities and discussions, help each other, and share information." (Wegner-Trayner 2015).

Much like Chacoan great houses, T-shaped doors are a unique construction whose practice has been studied. Research has theorized that they are informed by culture as described by practice theory (Callis 2021; Lekson 2015; Love 1975). Despite these theories, this conclusion has not been quantitatively tested. Although there is a pattern that has been identified and described, the definition of community will be applied quantitatively to the construction of T-shaped doors.

Interaction and Connectivity

This research uses the lens of connectivity and scale because the T-shaped door has often been understood through cultural connections and interactions (Callis 2021; Lekson 2015; Love 1975). Callis and Lekson note the presence of T-shaped doors in the SW/NW are direct evidence of cultural connections, like at Palenque and Chaco Canyon. These theories become complicated when applying theories of connectivity to T-shaped doors. Kantner notes that "archaeologists are good at empirically demonstrating some forms of connectivity, especially economic ones, while other undoubtedly important ways in which connections were built are somewhat elusive" (Kantner 2011: 370). T-shaped doors fall under the latter type of connectivity, and therefore evidence of their connections is elusive. Given the fact that T-shaped doors appear in places all over the SW/NW, in regions that are culturally different, there are two main possibilities for their creation: first, multiple independent evolutions across the SW/NW to solve a practical need. It is possible there was an independent need for T-shaped doors that resulted in their development in isolation from one another. The second possibility is T-shaped doors were spread throughout the SW/NW as a result of movement, and cultural relationships. Despite the potential they were independently created, it is more likely there is something connecting these different places and people.

Kanter's description indicates that artifacts, places, and people are often seen in archaeology through a clouded and reductive manner. This reductive thinking has become one of the foundational cruxes of Lekson's Chaco Meridian theory (Lekson 2015; Lekson 2011). Although the Chaco Meridian theory has not been widely accepted, the critique within his argument stands. Stated precisely, "the social political, linguistic, and intellectual barriers erected during the Mexican War still structure the way we view ancient North America" (Lekson 2011:461). The world in the past was not disparate, but instead interconnected and constantly changing as evidenced by traded

material objects (Crown et. al. 2015; Gilman et. al. 2014; Gilman et. al. 2019; Schwartz 2020) and vibrant oral traditions (Bernardini 2005; Bernardini et al. 2021; Kelley 2020). It is therefore important to see these artifacts, places, and people through a vibrant and dynamic environment.

Another factor of interaction and scale is identity. Specifically, the landscape of identity was fluid given the constant human movement in the SW/NW (Bernardini 2005; Ferguson 2004; Van Dyke 2011). Van Dyke demonstrates this concept using architecture, "architecture shapes and is shaped by human activities and perceptions" (Van Dyke 1999). Understanding how identity may have played a role in the construction of T-shaped doors could help to reveal their origin and evolution. For example, how did T-shaped doors play into identity and how does their presence represent peoples' identities?

This concept is applied to the landscape and distribution of T-shaped doors in Arizona. This research investigated one possible angle of interaction as determined through the evolution of T-shaped doors. Do T-shaped doors follow a path of migration, or something far less visible in the archaeological record?

Chapter 4 - Methods

This chapter will detail the process of developing and compiling the data set of T-shaped doors. Additionally it will explain the statistical process of analyzing T-shaped doors and their relationships with other architectural features. Finally, this portion will detail the methods used to collect critical information on indigenous ideology and epistemology regarding the story of the T-shaped door.

Collections Research

There is an ongoing crisis with artifact collections that were gathered in archaeology's earlier eras (Cordell and Fowler 2000:112). As a result of preservation, those resources have been held in stasis for decades. Collection has created a curation crisis, in which there is not enough space for artifacts currently held in collections. Despite this lack of space, artifact collection continues. Although this aspect is primarily focused on physical collections, the overwhelming catalog of artifacts and reports has also created a crisis in digital collections.

There are countless data reports that need to be synthesized into accessible databases. Synthesis is more relevant in research with growing publicly accessible data from places like the Digital Archaeological Record (tdar.org), Chacoan Research Archive (chacoarchive.org), and cyberSouthwest (cyberSW.org). Creating accessible data for researchers and communities alike will only strengthen archaeology, therefore this project will create a data set synthesized from multiple sources and will be published to the Digital Archaeological Record following completion.

Data Collection

This process began by reviewing sources on T-shaped doors within libraries, databases, and archives/museum collections to attempt to collect all locations. To date, T-shaped doors have been primarily researched in Chaco Canyon, Mesa Verde, and Paquimé (Callis 2021; Lekson 2015). The

San Juan Basin in New Mexico is the region with the most available research on T-shaped doors, due to the large amount of accessible data in the Chaco Research Archive (CRA) and the Salmon Research Archive (salmonproject.org). The work in those regions has been aided immensely by those databases however outside those regions, data is sparse. Therefore, this project limits the collection of T-shaped doors to the region of Arizona, mainly using research by Lekson (2015), Callis (2021), and Love (1975). The lack of data outside Northern New Mexico isn't due to absence of this feature in other regions, but instead most data outside the CRA is incomplete or not accessible.

Table 1

Variables Collected from T-shaped doors

Variables Collected	Variable Description
Site Name	The ascribed common and vernacular name for the site based
Site Number	The site number based of the main recording system used: AZ site, MNA, NMCRIS, etc.
Associated Artifacts	Artifacts that were found in the correspond room with the T-shaped door
Region	The region in which the T-shaped door was found
Door Width	The maximum width of the T-shaped door based off the excavation report
Number of T-shaped doors	The number T-shaped door at the site
Directional Facing	The direction the door is facing in the context of the archaeological site
Beginning of Occupation	Beginning of the site's occupation based on ceramic and tree ring data
End of Occupation	End of the site's occupation based on the ceramic and tree ring data
Interior or Exterior Door	Where the T-shaped door faces in relation to the larger room block and plazas

The variables collected in the beginning of research were based on various theories on T-shaped doors (See Table 1). For example, collected information about associated artifacts was intended to determine what these doors could indicate about various room uses. This research

collected information on the placement of the door in relation to the outside of the room block. This was based on Lekson's theory that T-shaped doors could be a cultural signal to those moving around the landscape (Lekson, 2020). Given this project's focus on the future, the goal of these data points was to be broad and provide some introductory statistics that could lend insight to T-shaped doors.

For many of the T-shaped doors indicated by the sources, there were only one or two of the desired variables available. The key variables in the data set are the beginning and ending of occupation ranges and the number of T-shaped doors at each site. The dates of occupation occurred within the range of 1100 to 1400 AD and the number of T-shaped doors ranged from one T-shaped door to six T-shaped doors.

These variables were chosen because they were the most accessible data, due to the cyberSouthwest (cyberSW) online database by Archaeology Southwest (Mills et al. 2020). Archaeology Southwest has developed a free and accessible database with information on room numbers, artifact data, and date ranges of occupation based on ceramics assemblages.

Procedure

Finding sources to compile this data set was not simple, beyond simply querying the cyberSW, CRA and SRA with the phrase "T-shaped door." Even in recent reports on T-shaped doors, the number of doors, their location, and any other relevant information on their structure and makeup was often not included. Marion Love's (1975) work collected and discussed locations of T-shaped doors but didn't submit any structural details or number of doors.

Using Love along with other sources, the goal was to follow sources on T-shaped doors to their original reports to develop the data set. These research reports included Ph.D. theses, site forms from fieldwork, and field notes. Information was collected by utilizing a combination of local

archaeologists, NAU Library Special Collections, Archaeology Southwests' cyberSouthwest database, and the Museum of Northern Arizona's site file collections.

Further, this research needed to include an indigenous perspective as an aspect of analysis and conclusions. With the help of previous sources on oral tradition and ideology, this thesis intends to provide insight that could lend new perspectives to this discussion.

Data Set Yield

A total of 60 T-shaped doors was found across 36 sites in Arizona. This number is not intended to be an exhaustive collection of T-shaped doors, given the previously discussed issues with preservation in the SW/NW. In the data set some sites are only cited with one T-shaped door because only one could be verified. It is possible that in the sites listed there are more T-shaped doors than indicated, since no record of the number of T-shaped doors could be located.

The location of these T-shaped doors is mainly limited to four National Parks. This is likely due to increased research and preservation efforts within National Park boundaries. The main cluster of sites is within and around the boundaries of Flagstaff Area National Monuments, Montezuma Castle National Monument, Navajo National Monument, and Canyon De Chelly National Monument. I have listed the following information in Table 2 below for reference, sorted in alphabetical order by site name.

Table 2

Total Number of T-shaped doors found in Arizona

ID	Site ID	Site Name	Number of T-shaped doors	Occupation Start	Occupation End
1	No Data	Awatovi	2	1200	1700
2	No Data	Batwomen House	1	1100	1300
3	NA 2515	Betatakin	1	1250	1300
4	AZ V:2:1	Canyon Creek Ruin	1	1324	1350

5	No Data	Carter Ranch Site	1	1115	1250
6	AZ V:1:136	Coon Creek	1	1300	1330
7	AR-03-09-01-12)-Prescott National Forest	Duff Springs Cliff Dwelling	1	No Data	No Data
8	No Data	Gila Pueblo	1	1250	1400
9	AZ V:5:61	Hematite House	1	No Data	No Data
10	NA 3500	Hidden House	1	1120	1300
11	NA 3205 (3206)	Honanki	1	1200	1400
12	No Data	Hopi Kokopnyama	1	1300	1370
13	NA 8440	Houck Great House	1	1100	1250
14	NA 2160	Inscription House	6	1200	1300
15	NA 2519	Kiet Seel	6	1250	1300
16	NA 1511	Mindeleff Cavates	1	1250	1350
17	No Data	Musangnuvi	1	1690	2000
18	NA 1278	Montezuma Castle	6	1200	1400
19	NA 358	Nalakihu	1	1150	1250
20	NA 3209 (1251)	Palatki	1	1200	1400
21	AZ V:1:132	Ringtail Ruin	2	1275	1331
22	No Data	Rogers Canyon cliff dwelling	1	No Data	No Data
23	AZ V:1:165	Sierra Ancha	1	1304	1328
24	AZ V:1:167	Devils Chasm	2	1300	1330
25	AZ V:1:168	Devils Chasm	2	1300	1330
26	NA 1741	Three Turkey Canyon	1	1250	1300
27	No Data	Thumb Butte Canyon	1	No Data	No Data
28	AZ U:15:47/48(ASM)	Tonto National Monument	1	1250	1400
29	AZ U:8:47 (U:8:48)	Upper Tonto Ruin	1	1250	1400
30	AZ V:1:134	Uranium Mine Site	1	1242	1297
31	NA 300 (-313)	Walnut Canyon	1	1150	1250
32	NA2187	White House Ruin	2	1200	1280
33	AZ V:1:133	Workman Creek	1	1275	1330
34	SWSN 12000	Wukoki	1	1150	1275
35	NA 405	Wupatki	5	1130	1275
36	No. 3	Site Number 3	1	No Data	No Data

Montezuma Castle & Verde Valley. T-shaped doors at Hidden House, Honaki, and Palatki were first described by Love (1975:298), and further corroborated by Dixon (1956). Hidden House had the most detailed description, provided by Dixon, who noted they were "fallen as of publication," whereas both Honaki and Palatki were mentioned but not discussed in detail. In all three cases the research does not specify the precise number of doors, but rather that they existed. Therefore the number of T-shaped doors listed in the data set was one.

Figure 8: Montezuma Castle T-shaped entrance (2023)

Pinkley (1928:24) first references Montezuma Castle, followed by Love (1975:298). In his publication, Pinkley discussed the cliff dwelling, detailing multiple rooms in which he described six T-shaped doors in total. Three of those six doors were described as unique due to their large size (1928:23), unusual appearance (1928:19), and restored condition (1928:16). Restored condition refers to the action of the National Park archaeologists to rebuild sites for preservation purposes. There is one very large T-shaped door, or Mega T as Lekson has described it (Lekson 2020), similar

to the opening of the great kiva in Chetro Ketl (Figure 6). Unfortunately, the two other unique doors were not described in enough detail to provide further commentary. From this site, a total of six doorways were entered into the data set.

Flagstaff Area Monuments. Love (1975:298) describes the locations of T-shaped doors in the Flagstaff Area Monument sites of Nalakihu, Wukoki, Wupatki and Walnut Canyon. King (1949) and the Museum of Northern Arizona field notes of 1933 (Motz, 1933) detailed each site in their reporting. Nalakihu was first described in detail by King (1949): "Midway in the east wall a symmetrical T-shaped doorway with unusually deep lower portion extending to floor line. Occupants remodeled the door by walling it up 16 inches but leaving a ventilator about 8 inches" (King 1949:23). This was the only door King described for Nalakihu, and therefore, one door was counted.

The sites of Wukoki and Walnut Canyon, are grouped here due to the lack of detailed reporting. Love (1975) mentions both sites, but the in-text citations did not yield any further description. King (1949) depicts a T-shaped door in a photo of Wukoki, which was the only report of this door found. Despite the lack of references this sites T-shaped door was included because of the two citations. Information about Walnut Canyon was more difficult to find in the literature. Thankfully, Flagstaff Area Monuments' Kelsey Vaughan-Wiltsee (2022) was able to confirm one T-shaped door at Walnut Canyon. The total number of T-shaped doors reported for Walnut Canyon and Wukoki was one door each.

Wupatki was described in multiple reports in varying detail. The collected field notes of 1933 (Motz 1933) were the most comprehensive source for this site. In these field notes, there were detailed descriptions of the doors when excavated and the procedures that followed to stabilize and

preserve the site. This was critical given key sites throughout the US have been heavily reconstructed and stabilized. Wupatki was listed in this report with five T-shaped doors.

Navajo National Monument. Navajo National Monument is located west of Kayenta Arizona, in Tsegi Canyon, where many cliff dwellings are located. There are three major sites in the monument that have T-shaped doors, those being Betatakin, Keet Seel, and Inscription House (Anderson 1971; Dean 1967; Love 1975). In addition to those three sites, Batwoman House has a T-shaped door (Dean 1967) that is not included in Love's (1975) inventory.

Betatakin's T-shaped doors were unfortunately the least represented in the literature (Anderson 1971; Dean 1967). While Love (1975) states that there are T-shaped doors located at the site, additional sources contain no mention of unique doors or T-shapes. Due to the lack of literature, I attempted to use photo searches for this site in multiple data sets. This search did not yield anything akin to a T-shape. For this data set I included one door for Betatakin until more information can either eliminate or add to the listing.

Keet Seel was cited in the dissertation "The Chronological Analysis of Tsegi Phase Sites in Northeastern Arizona" by Dean (1967). As of publication, three of those six doors were sealed either completely or partially during occupation; "the lower half of the original T-shaped doorway (of room nine) was plugged with masonry topped by a large slab sill." (Dean 1967:411). For this site, six T-shaped doors were included in the data set.

After Love (1975), the accessible literature from Inscription House, much like Betatakin, did not mention any T-shapes. A Google image search reveals T-shaped doors at Inscription House, however finding sound empirical data proved to be difficult. Fortunately, the Museum of Arizona site data files held reliable field notes that filled in the necessary data. Using these sources, Inscription House has a total of six T-shaped doors. Two rooms at Inscription House are particularly

interesting, a sealed T-shaped door in room 36 of the site, (Collected Field Notes from Site NA 2160), and two T-shaped windows in room 14 (Collected Field Notes from Site NA 2160). Room 36

Figure 9: View from inside Inscription House (1966)

is of interest because the T-shaped door was sealed, and room 14 is of interest because it is unclear in the citation and literature how a T-shaped window differs from a T-shaped door. Therefore, a stronger definition of what is and is not a T-shaped door is required for future research. Inscription House was listed in the data set with six T-shaped doors.

There is the smaller site of Batwoman house, which was not indicated in the foundational sources but was discussed by Dean (1967:58). At this site, there is one T-shaped door located in Room 3. There are several unique features associated with Room 3. As mentioned in Dean (1967) "In the absence of an obvious kiva, it is tempting to so designate Room 3, for this chamber possesses a conspicuous feature not common to dwellings. This is a split-level 'bench' situated in the northeast corner of the room." This bench indicates potential ritual use of the room but, "Other features in the room are those usually associated with dwellings: a T-shaped doorway, a masonry entry box-deflector complex, a firepit, and a "window" (Dean 1967:58). For the data set one T-shaped door has been noted.

Canyon de Chelly National Monument. The last major region discussed in Love's (1975) report is the region surrounding Canyon De Chelly National Monument, located near Chinle, AZ. The site of White House within the monument is known to have T-shaped doors (Love 1975:297–298). Unfortunately, it was difficult to find information on the quantity of doors, location, and construction. With Love (1975) and the Museum of Northern Arizona (MNA) archives, it was clear that there are at least two T-shaped doors at the site. Further, Cosmos Mindeleff's work titled "Cliff Ruins of Canyon de Chelly" (1895) confirmed the presence of T-shaped doors and mentioned the possibility of three doors at White House, all of which were "found in adobe walls." (Mindeleff 1895:165). Given the lack of information about the third door, it was left out of the data set. One of the doors in the main room of White House, visited by Mindeleff, was sealed as of occupation (1895:111). Therefore, for the purpose of this project two T-shaped doors were recorded at White House.

Three Turkey Canyon is mentioned by Love (1975) and reported by Colton (1939). Although Colton's work was clearly a publication, attempts to access this work through MNA archives, NAU special collections, NAU collections, and NAU document delivery services were unsuccessful. Therefore, since this site is mentioned in Love (1975) and cited by Colton (1939) it was included within the data set as one door.

The last site included was not well labeled but was listed by Mindeleff as "Point marked 3 on the map" (1895: 102). The T-shaped door is located within site number three, north of a kiva in the western wall (1895:102). For this site within the canyon, one T-shaped door was reported.

The next two sites in the Canyon de Chelly area, Antelope House, and Mummy Cave, are not mentioned in Love (1975) or any other source material. When reviewing photos from the National Monument's website, it is clear there is at least one T-shaped door at each site. These two sites were

not included within the study since it is well known that preservation by NPS included rebuilding parts of sites throughout the region. Additional research on these sites would be worthwhile.

Hopi Mesas and Other T-shaped door sites: There were four additional sites outside of Love (1975): Carter Ranch, Houck Great House, and two pueblo sites on the Hopi Mesas, Kokopnyama, and Musangnuvi. Houck Great House was the most detailed of the four external sites, using field notes from the MNA (Collected Field Notes from Site NA 8440). Although the field notes did not describe the T-shaped door, there are site maps and site photos that depict one T-shaped door. From these records, it is clear there is one T-shaped door at Houck Great House. Based on collected dates from the cyberSW database, it is one of the oldest in Arizona dating to 1100 AD.

At Carter Ranch Site, referenced by Martin (et. al. 1964) “The "T"-shaped doorway in Room 6 also lacks a counterpart in this pueblo. Room 6 was probably the first to be built of this group…” (Martin et al. 1964: 52; Love 298) As a result, for this site one T-shaped door was included.

The Hopi village of Musangnuvi’s T-shaped door was most difficult to corroborate (Love 1975; Mindeleff and Mindeleff 1891). Despite being one of the first T-shaped doors discussed, no information regarding size or location was available. Musangnuvi was reported in the data set with one T-shaped door.

Hargrave and Haury (1931) describe all variations of the doorways at the Hopi pueblo site of Kokopnyama, including a description of one T-shaped doorway in room 25 (Hargrave and Haury 1931:100). Given this description, one T-shaped door has been indicated from Kokopnyama.

Additional sites. The information above was collected using the library databases and bibliographies of T-shaped door research. The most efficient method for collecting data on T-shaped doors was through direct communication with researchers in the region. For example, consulting with Kelsey Vaughan-Wiltsee (2022) was the most effective way to determine the quantity of T-

shaped doors within Walnut Canyon. For additional sites in Central Arizona, there were two main contacts that were able to not only substantiate information already known but provide sites that were not mentioned in the literature.

Matt Guebard (2022), a National Park archaeologist, emailed information about sites he had observed in addition to Richard Lange's (2006) work. The sites he had personally seen were Duff Springs Cliff Dwelling, Mindeleff Cavates, Canyon Creek Ruin, Lower Tonto National Monument, and Rogers Canyon Cliff Dwelling. Given Guebard's firsthand account of the Verde Valley sites of Duff Springs and Mindeleff Cavates both were recorded with one T-shaped door.

According to Steen and others (1962) there is one T-shaped door at each of the upper and lower sites of the Tonto National Monument. Canyon Creek Ruin, near Cibecue, AZ, was described by Haury (1934): "there are sealed doors (as of occupation) were to be seen on every hand in both first and second story rooms. One of these was a T-shaped door leading from Room 25B into 27B" (1934:41). Therefore, in these three sites, one T-shaped door each has been listed for each.

In Richard Lange's work *Echoes in the Canyons: the archaeology of the southeastern Sierra Ancha, Central Arizona* (2006), he details important characteristics of sites in the Sierra Ancha, and provides a chart of T-shaped doors. Lange further explains, "The Sierra Ancha doorways, however, are not true "T" doors—they have been modified to look that way, rather than the masonry forming the "T" door shape as part of the wall construction." (2006:93). This definition was not used for other sites in this thesis but is relevant to understand Table 3.

Table 6.10. Sierra Ancha Cliff Dwelling Door Shapes

SITE	Rectangular	Sub-rectangular	True T-shaped	Filled T-shaped	Other	Total
V:1:124	1					1
V:1:126					1	1
V:1:127					1	1
V:1:130	1	2			2	5
V:1:131	12				4	16
V:1:132	14			1	1	16
V:1:133	2					2
V:1:134	1			1	1	3
V:1:135	7					7
V:1:136	5				1	6
V:1:144	2					2
V:1:162	3				2	5
V:1:163	1					1
V:1:164	2	1				3
V:1:165	5			1	1	7
V:1:167	9		1	1	3	14
V:1:168				2		2
V:1:170	3				4	7
V:1:188	5					5
V:5:61	2				2	4
Totals	75	3	1	6	23	108

Table 3: 6.10 from Lange (2006)

Seven sites are indicated by Lange in the Sierra Ancha that have either a T-shaped door or a filled T-shaped door. In this description, Lange (2006) separates two sites with “sub-rectangular doors”. Given the decision to proceed with the original researcher’s interpretation, these sub-rectangular were excluded from the analysis. Therefore, there are six sites in the region with T-shaped doors, totaling to seven T-shaped doors in the Sierra Ancha.

Hopi Mesas. I then consulted Dennis Gilpin, an Arizona archaeologist with 50 years of experience. Based on Gilpin’s work, Awatovi, on Antelope Mesa, the easternmost of the Hopi Mesas, was included in the data set. From the excavations at Awatovi “approximately 111 doorways... Two of the doorways were T-shaped, and the rest were rectangular.” (Gilpin 2022). Both doorways at Awatovi were later sealed during occupation.

In Arizona, there were 60 T-shaped doorways found at 36 sites. Where possible each T-shaped door was verified with a firsthand account or a secondary source. This research also attempted to gain key details like room number, feature identification, directional facing, and doorway position.

Analysis Methods

The analysis for this research used ArcGIS and IBM SPSS. ArcGIS was used for its capabilities as a visualization and data analysis software. IMB SPSS Statistics software was used to conduct a preliminary number of descriptive statistics. Both SPSS and ArcGIS were used to report basic statistical information in addition to providing data visualizations. This analysis tests the theories of Callis (2021) and Lekson (2015), both of whom believe T-shaped doors are direct evidence of a cultural identity.

ArcGIS. Using ArcGIS and the constructed data, I created maps of T-shaped doors in the state of Arizona. The first map was developed illustrating T-shaped doors through time by separating each site with T-shaped doors by century of occupation. Separating by century was the best way to visually display the animated map. The intention of this map was to understand the origin point of T-shaped doors in Arizona and understand the path of T-shaped doors through time. This analysis tests determines where T-shaped doors in Arizona originate and where they last occur in the state.

Then a heatmap of T-shaped doors was rendered, showing the concentrations of T-shaped doors across the SW/NW. This analysis of concentration was based on the number of T-shaped doors in Arizona. This analysis was conducted to understand if there was variation in the number of T-shaped doors and where any variation occurs. This can help researchers recognize which areas held the deepest potential relationship with T-shaped doors.

Finally, information was used from the CRA and cyberSW database on Chacoan style architecture to run a cluster analysis. Specifically the variables chosen for the cluster analysis were core and veneer masonry, great houses, and the presence of T-shaped doors. Using binary code, 0 was used to represent an absence of a feature and 1 to represent the presence of a feature. For example, in the cases of Wupatki and Houck Great House, there are both a T-shaped door and core and veneer masonry. Therefore, within this analysis they were coded with a 1 in both the T-shaped door column and core and veneer masonry column. Once coded, two multivariate cluster analyses were run through ArcGIS.

A multivariate cluster analysis is a statistical tool that uses the presence or absence of features at various sites to determine if they are statistically distinct or statistically connected. If the sites are distinct, they will be separated from one another and if they are connected they will be grouped.

In addition to the basic multivariate cluster analysis, a spatially constrained cluster analysis was run. The reason both spatially constrained multivariate and multivariate cluster analysis were conducted was to learn if the physical locations of sites influenced their clustering. While both tools are very similar, they differ in their calculations. The multivariate analysis considers the variables to determine a natural cluster, however the spatially constrained multivariate analysis also requires that the natural cluster be spatially contiguous.

The sites that make up this section of the analysis are the 34 sites that contained T-shaped doors, every Arizona site in the CRA outlier database, and all Arizona sites in the cyberSW database that have great houses. In total there are 76 sites tested. The goal of this calculation is to understand if T-shaped doors cluster with other Chacoan features, as theorized by Lekson (2015). If there is a

direct relationship between T-shaped doors and Chacoan features, there should be a noticeable clustering of the three types of features.

SPSS. Using SPSS for the analysis of these data, the variables of occupation dates and number of T-shaped doors at a site were tested. Using these variables, first a descriptive statistical analysis was conducted to determine the mean, standard deviation, range, kurtosis, and skewness. These measures of central tendency and dispersion will determine what type of tests are possible with the data. This was completed using the computer program IMB SPSS statistics version 29. Note that if data on a particular site did not include all the information for dates of occupation or number of T-shaped doors, it was not included in the analysis. This was necessary because multiple archaeological sites in the data set had incomplete data.

After running the descriptive statistics for this project, the skewness and kurtosis values for the variables of T-shaped doors, occupation beginning, and occupation ending were calculated to determine the normality. In the beginning of any data set, it must be understood if the data is normally distributed. When tested, if the data has values of both kurtosis and skewness above plus or minus one, the data is not normally distributed. The idea of normality, within statistics, refers to the assumption that most data in research will fall into a standard bell curve called a normal distribution. Since most data in all research usually follows this standard, parametric tests were developed under this assumption. Parametric tests cannot be applied to non-normal data since important assumptions will be violated and results will be inaccurate. Additional non-parametric tests must be used when there is non-normal data that deviates from normal data. The variables of T-shaped doors, occupation beginning, and occupation ending were all not normal given the standard of plus or minus one.

Therefore, non-parametric tests were used to determine statistical correlations within the data. The test chosen was a Spearmen's rho correlation, a statistical test of correlation, which determines if two groups of continuous or ordinal variables are statistically correlated. If they are statistically correlated, then there is a potentially causal relationship between the two groups. If they are not above the threshold to be a nonrandom pattern, then they are not statistically correlated. Using a significance of 0.01; meaning a value of $p > 0.01$ determined the data is not statistically associated. Alternatively, a value of $p < 0.01$ meant the data was not statistically associated.

The goal of this Spearman's rho test of statistical association is to determine if there is a statistical association between time and the number of T-shaped doors. If a group of people is adopting T-shaped doors due to the cultural relationship between T-shaped doors and Chaco Canyon, there could be a statistically significant increase in the construction of T-shaped doors in the SW/NW. This increase would be because if people are migrating from major population centers they could be bringing indicative signs of cultural identity, like the Salado phenomenon. However it is also possible T-shaped doors would not increase in number over time because of this migration but increase in their overall distribution over time.

Oral Tradition. After these analyses, perspectives based in oral tradition were used to give context to the data. SW/NW archaeologists work where indigenous people have passed down knowledge for thousands of years, therefore archaeologists must place data into context of oral tradition (Colwell 2016, 2017). Archaeology in the past rebuked oral tradition because it was deemed unscientific and varied. Although oral tradition can change based on the needs of the community, current explanations are still the closest archaeologists can come to hearing about the past. Oral tradition will not determine why T-shaped doors were built, but it can determine what T-

shaped doors are, especially in the case of the T-shaped door, which is a common symbol in the SW/NW that can be compared to other symbols in the Maya world.

Love originally presented a potential relationship between T-shaped doors and Hopi iconography (Love 1975: 301). She further presented multiple Indigenous perspectives from the tribes of Zuni, Acoma, and Hopi. However after her account these Indigenous perspectives were left uninvestigated and recent research has focused on the political, social, and technological ramifications of the T-shaped door. In this research the Hopi people's oral traditions are explored, given their proximity to the research area and following Love's original work.

Summary

In total there were 60 T-shaped doors reported in Arizona. Three types of analysis were conducted: IMB SPSS, ArcGIS, and oral traditions. SPSS was used to provide a preliminary analysis of the data set to show any important qualities necessary for understanding patterns. Then, using the preliminary findings, a Spearman's rho test was conducted. Through ArcGIS, a set of detailed maps were produced that show the movement of T-shaped doors, concentration of doors, and a cluster analysis of doors in relation to Chacoan style features. Finally, relevant, and accessible oral tradition was utilized to further contextualize the data. Results appear in the next chapter.

Chapter 5 – Results & Discussions

This chapter will detail the outcomes I gathered from each method. The goal here is to provide the results of T-shaped doors for replication and application elsewhere in the SW/NW. The beginning of the chapter will explain the results from each test while the end of the chapter will provide my interpretation of each test.

Spearmen's Rho:

Due to the large number of variables, the results of the analysis are better depicted with the help of tables and figures. The following three tables visually show the non-normal data for each variable tested (Tables 4, 5, 6) and the last two tables (Table 7 and 8) represent the descriptive statistics of occupation dates and number of T-shaped doors.

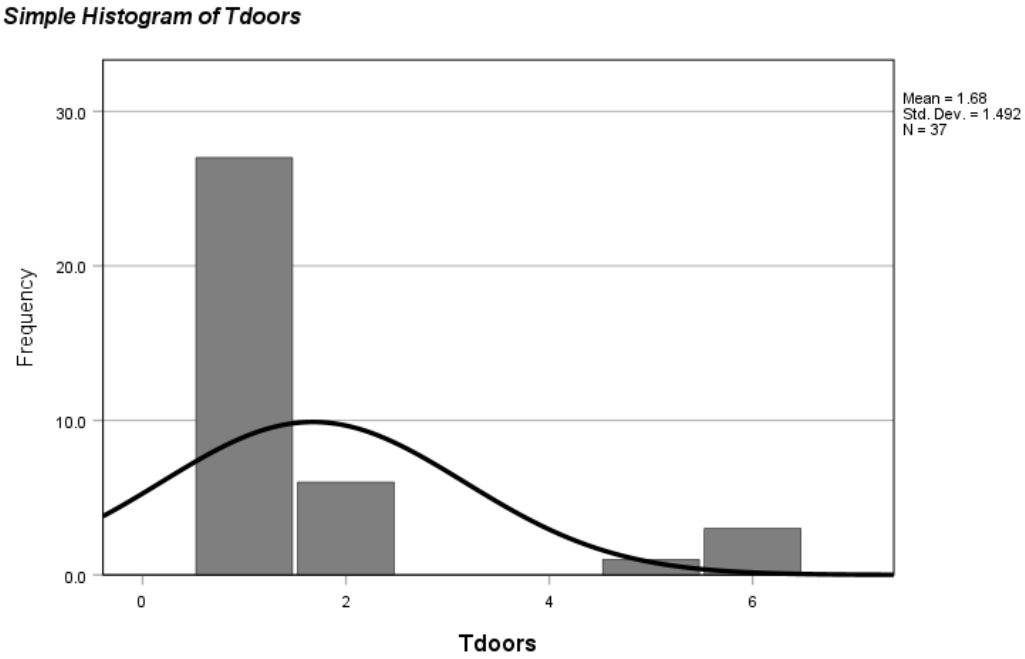

Table 4: Histogram of the Number of T-shaped doors per site (X axis shows number of T-shaped doors and the Y axis shows the number of sites)

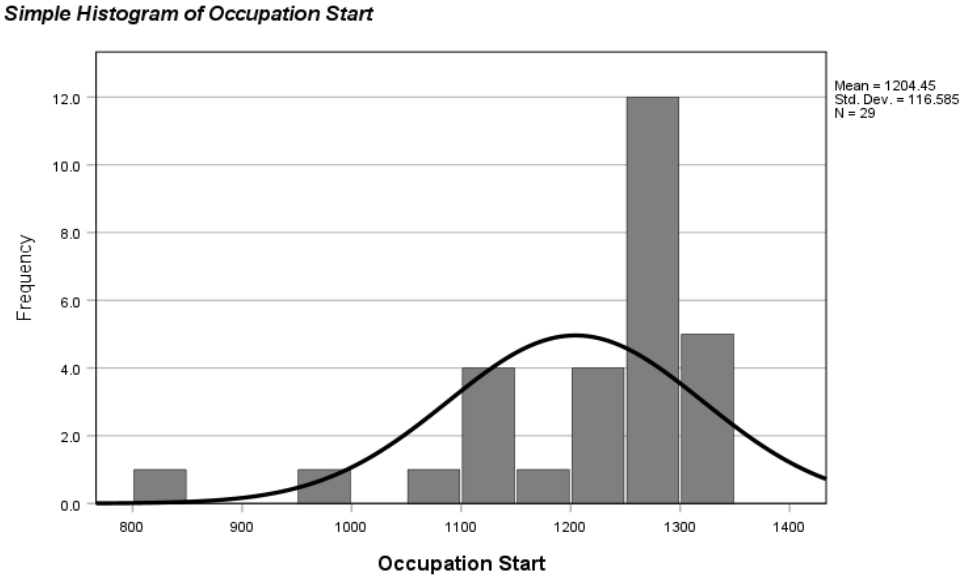

Table 5: Histogram of Occupation Start per site (X axis shows occupation start in years AD and the Y axis shows the number of sites)

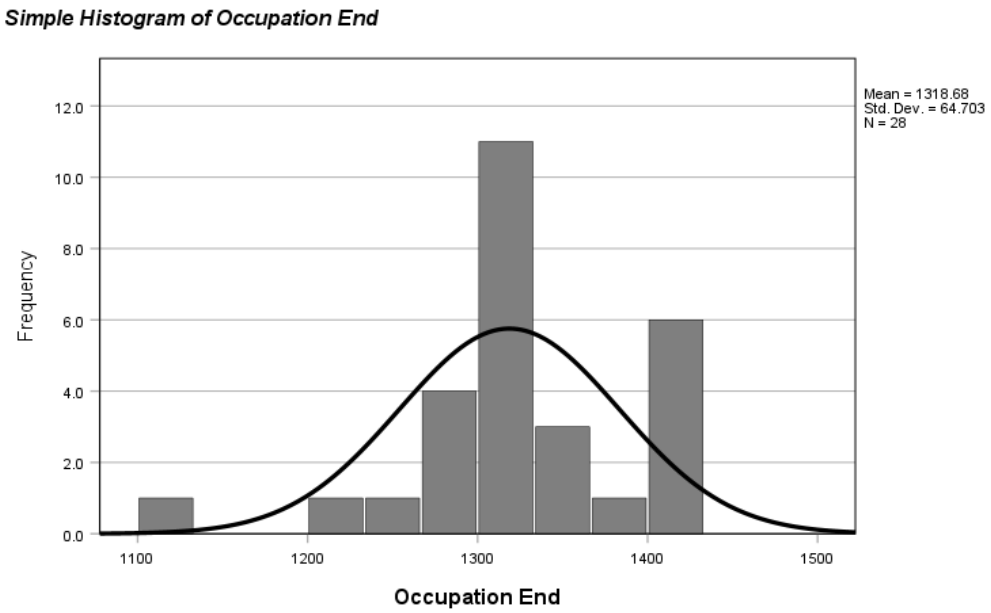

Table 6: Histogram of Occupation End per site (X axis shows the occupation end per site in years AD and the Y axis shows the number of sites)

Data Set Analysis

For the Spearman's rho correlation, the number of sites tested was 29 therefore $N = 29$ (Table 9). Before I report the correlation results, I will explain the kurtosis and skewness valuables for Tables 7 and 8. From Table 7 and 8, you can see that most of the values are strongly skewed with T-shaped doors having a skewness value of 2.393 and occupation end at 2.769 both well above the ± one parameter. Skewness is a measure of symmetry, and using these values, the data I have collected is not symmetrical.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Occupation Start	29	1100	1324	1222.41	67.649	-.437	.434	-.920	.845
Occupation End	29	1250	1700	1340.52	84.986	2.769	.434	11.115	.845
Valid N (listwise)	29								

Table 7: Descriptive Statistics of Occupations (29 Sites total from occupation start ranging from 1100 to 1324 with an average of 1222 and occupation end ranging from 1250 to 1700 with an average of 1340)

Further, the only variable that is not strongly skewed is the occupation beginning (see Table 7) which is at -0.437, below the ± one parameter. Given this value was only slightly below the parameter, it was not considered a normal skewness value. Using the kurtosis values again, each variable was well above the parameters for a normal distribution. The calculations for kurtosis values for T-shaped doors totaled 4.429, occupation start totaled -0.920, and occupation end totaled 11.115. The distance from one for each of these values means they are mostly leptokurtic. Kurtosis is a measure of the tails within a distribution or where the values cluster at the end of the distribution.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Tdoors	36	1	6	1.67	1.512	2.393	.393	4.429	.768
Valid N (listwise)	36								

Table 8: Descriptive Statistics of T-Shaped doors (The 37 sites in the data set ranging from one T-shaped door per site to six T-shaped doors per site, and an average of 1.68 T-shaped doors per site)

Kurtosis and skewness are both measures of dispersion within a distribution. For my data to be normal it must be within the requirements of a normal distribution with a skewness of ± one and a kurtosis ± one. These calculations are simply a reflection of the collected data. For all three variables the kurtosis and skewness values are outside of a normal distribution and therefore the data is not normal.

Correlations[b]

			Tdoors	Occupation Start	Occupation End
Spearman's rho	Tdoors	Correlation Coefficient	1.000	-.006	.031
		Sig. (2-tailed)	.	.975	.873
	Occupation Start	Correlation Coefficient	-.006	1.000	.456*
		Sig. (2-tailed)	.975	.	.013
	Occupation End	Correlation Coefficient	.031	.456*	1.000
		Sig. (2-tailed)	.873	.013	.

*. Correlation is significant at the 0.05 level (2-tailed).

b. Listwise N = 29

Table 9: Spearmen's rho Correlation Results

Occupation Start & End. The data in Table 9 shows that there is only one significant relationship, between occupation start and occupation end. The relationship between the start of occupation and the occupation end for the 29 sites was positive, r = 0.456 and significant, p = 0.013. This correlation is not relevant because it simply indicates that the start of occupation is related to the end of occupation. Simply put, this correlation indicates the start of occupation always occurs before the end of occupation, which is not random.

Occupation Start & T-shaped doors. The relationship between beginning of occupation and T-shaped doors N = 28 demonstrated a non-significant p = 0.975, weak positive relationship r = -0.006. This correlation is not significant given p = 0.975. Based on this correlation the number of T-shaped doors per site increases slightly as the occupation start increases. Therefore, between AD 1100 to 1400 there is a slight increase in the number of T-shaped doors per site over time. This relationship is arbitrary given the insignificant *p* value that is above 0.05.

Occupation End & T-shaped doors. The last two correlated variables were the relationship between end of occupation and T-shaped doors. Again, the correlation of these two variables for the

28 sites was not significant at $p = 0.873$, and their relationship was negative $r = 0.031$. Here T-shaped doors seem to decrease in number over time as the ending occupation dates increase. Therefore, given this correlation, between AD 1100 to 1400 there is a slight increase in the number of T-shaped doors per site, however again this is arbitrary given this relationship is not significance.

GIS Analysis

Three visualizations of the collected data were produced, using ArcGIS. Figure 10 is a simple geographic plot of T-shaped doors through time by century. This was plotted using the location information from the literature and temporal data from cyberSW. Figure 11 shows a heat map of the density of T-shaped doors, using the number of T-shaped doors at each site identified in the literature. The last point of analysis is a cluster analysis of T-shaped doors and known Chacoan features based on data from the CRA, cyberSW, and the data set.

T-shaped doors through time. Figure 10 below shows the path of T-shaped doors through time by century. These maps were shown by century to best represent the data using the fewest maps. There is no evidence of T-shaped doors in Arizona before 1000 AD. T-shaped doors first appeared at Houck Great House and Batwoman House in 1100 AD. Their appearance in Arizona is interesting given the dates when T-shaped doors first occurred in New Mexico. In the Southern San Juan Basin, at the site Pueblo Bonito the T-shaped door first appeared no earlier than 1020 AD which is within a century of the first T-shaped door in Arizona (Lekson 2015; CRA 2022). The following map depicts the century of 1100 to 1200 AD, representing the further expansion of T-shaped doors west into the sites of Wupatki National Monument and the Verde Valley. The third map shows the century of 1200 to 1300 AD and the continued growth and expansion of T-shaped doors in Arizona. In the 13th century T-shaped doors appear in Navajo National Monument, and around the Sierra Ancha and Tonto National Monument. The last map shows the distribution of T-

shaped doors from 1300 to 1400 AD, and represents the end of major occupations of sites in northern Arizona with T-shaped doors. It seems the last major sites where T-shaped doors can be found are in the Sierra Ancha, Verde Valley, and the Hopi Mesas. After 1400 AD there were only two occupied sites which have evidence of T-shaped doors, Awat'ovi and Musangnuvi. In conclusion, the four maps of T-shaped doors indicate they travel in two clear directions: from east to west from 1000 to 1200 AD and then north to south from 1200 to 1400 AD, ending at the Hopi Mesas.

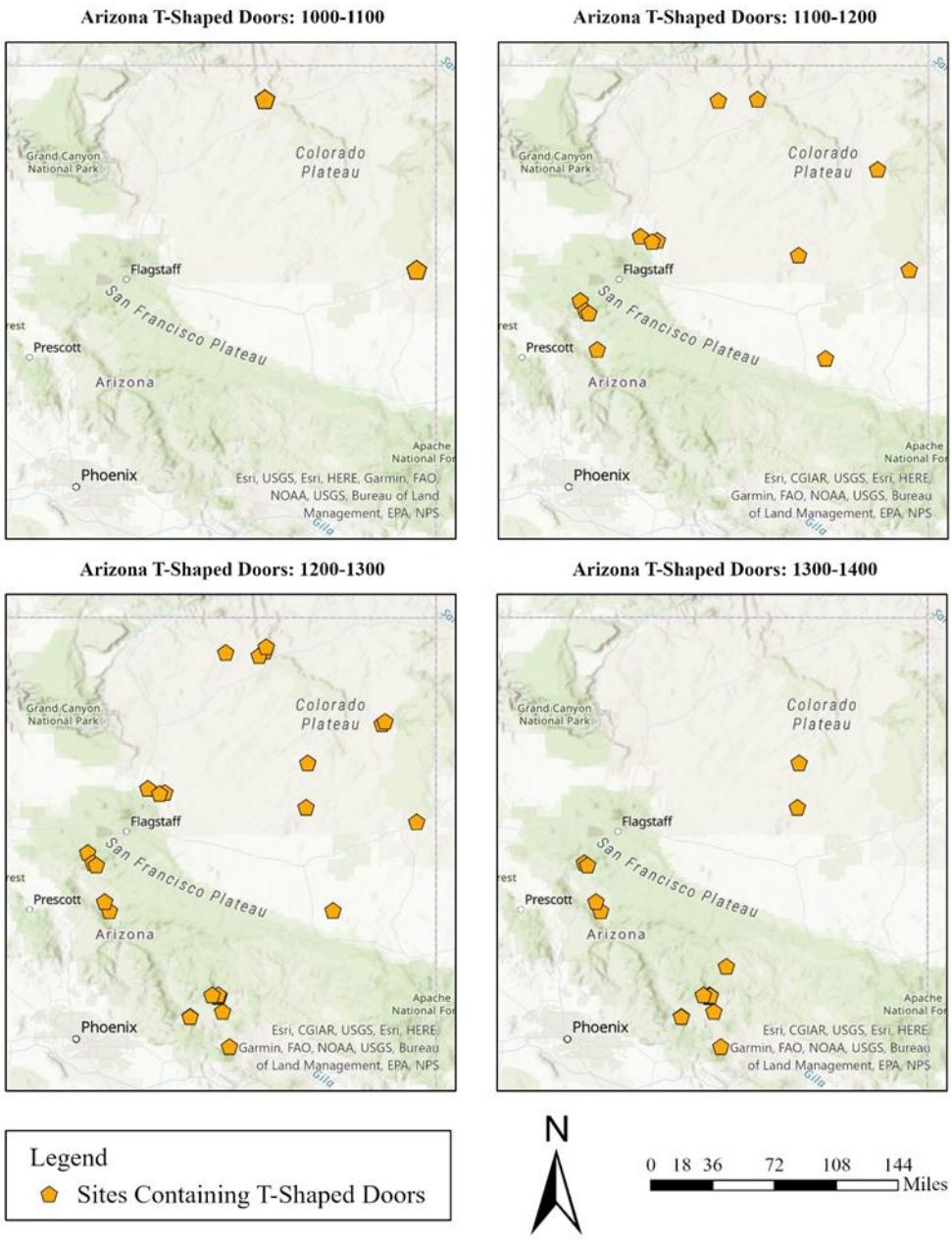

Figure 10: T-shaped doors represented through time separated by century

Figure 10 shows a clear growth of T-shaped doors starting in the eastern portion of the state, in proximity to Chaco Canyon. It should be noted, these occurs 100 years after T-shaped doors appeared at Chaco Canyon. After this spread from east to west, evidence of T-shaped doors began occurring in areas in northeast Arizona. Towards the end of their widespread use, T-shaped doors

last appeared in the Verde Valley, Tonto Basin, and near the Hopi Mesas. Based on the data, it seems T-shaped doors followed the movement of people in the ninth century onward (LeBlanc and Nelson 1976).

Heat Map. Figure 11 shows the density of T-shaped doors in Arizona. From north to south, the four locations of T-shaped doors with the highest density are Navajo National Monument, Flagstaff Area Monuments, Montezuma Castle National Monument, and the Tonto Basin. These areas are represented by the yellow circles on the map. Outside the densest areas, there are three areas showing red circles, indicating the presence of T-shaped doors with less concentration. Those three areas are, from east to west, Canyon de Chelly National Monument, the Hopi Mesas, and the western Verde Valley.

Heat Map of T-Shaped Doors

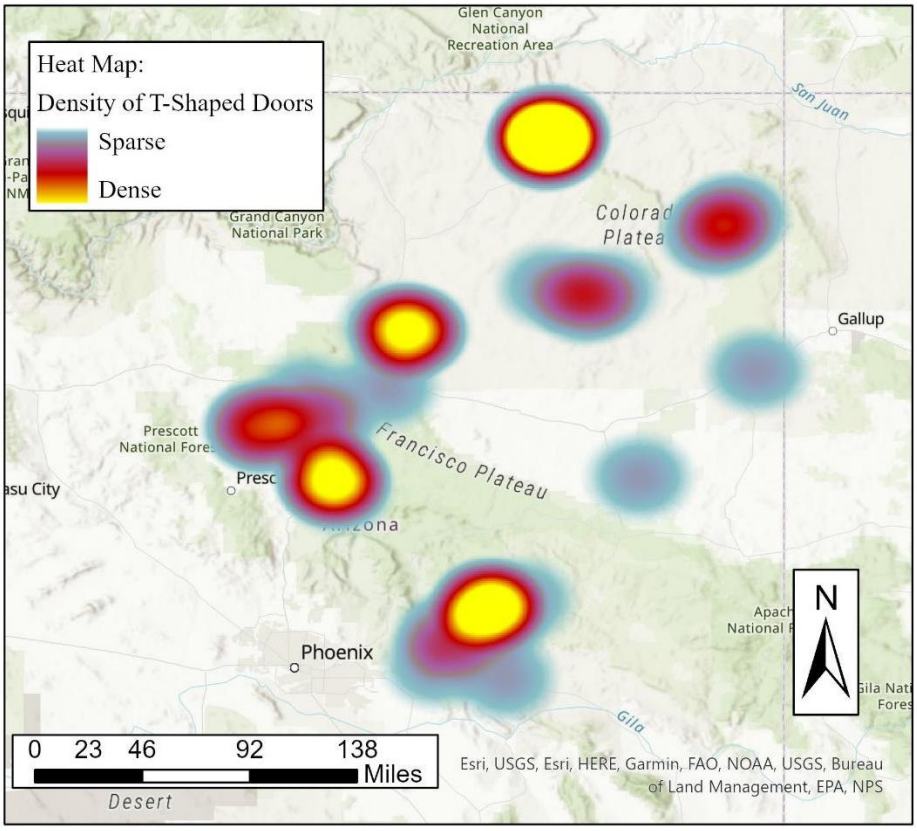

Figure 11: Density of T-shaped doors

Only 4 out of 37 sites in the data set have more than two T-shaped doors: Montezuma Castle, Inscription House, Keet Seel, and Wupatki. Out of the remaining sites, 27 sites have one T-shaped door, and six sites have two T-shaped doors. The three northernmost areas with the highest density (designated by yellow circles) are representative of some of these major sites. Inscription House is in the northernmost region, Wupatki is in the second region from the north, and Montezuma Castle is in the third region from the north. These three regions all have one site each with six T-shaped doors, which is likely the main reason for the high density of T-shaped doors. The exception is Tonto Basin, which represents the dense region that is furthest south. All the Tonto Basin sites have fewer than two doors, but the region contains a very high density of T-shaped doors. This means for this data set the region surrounding the Tonto Basin is unique. A large concentration of T-shaped

doors without one site containing more than two T-shaped doors indicates a consistent site cluster of T-shaped doors. It is also possible that a large amount of sample bias is present in the data from this region, given the continued study and degree of preservation of sites. Despite this, the area surrounding the Tonto Basin and the Sierra Ancha region should be considered for further T-shaped door research.

Cluster Analysis. The following analysis was conducted using the 37 sites analyzed that contain T-shaped doors. Those 37 sites were added to 42 sites in Arizona that have Chacoan features of core and veneer masonry and great house architecture, as listed by the cyberSW database, CRA database, and research for this report. Using binary code, each site was labeled with a 1 or a 0 for each feature. If a feature was present at each site, it was coded 1. If any of the features were not reported at the site, they were coded 0. Once coded, these groupings were plotted twice based on the coded data. The first plot using the binary coded data was the multivariate cluster analysis and the second plot was the spatially constrained multivariate analysis.

The multivariate cluster analysis resulted in a total of five groups (Figure 12). Group 1, represented by red pins, consists of 31 sites with T-shaped doors and no Chacoan features. Group 5, represented by the pink pins, consists of three sites with both T-shaped doors and Chacoan features. Groups 2, 3, and 4 consist of 42 sites with at least one Chacoan feature and no T-shaped doors. If you combine all sites with T-shaped doors, (Groups 1 and 5) there are 34 sites out of the 76 total sites. Based on this analysis, there is a distinct separation between sites with Chacoan features and those with T-shaped doors. Even when there are T-shaped doors present at sites that contain Chacoan features (Group 5), the multivariate cluster analysis did not group these sites with other sites of the Chacoan world. There is a clear pattern differentiating sites with T-shaped doors and sites with Chacoan features (Group 1).

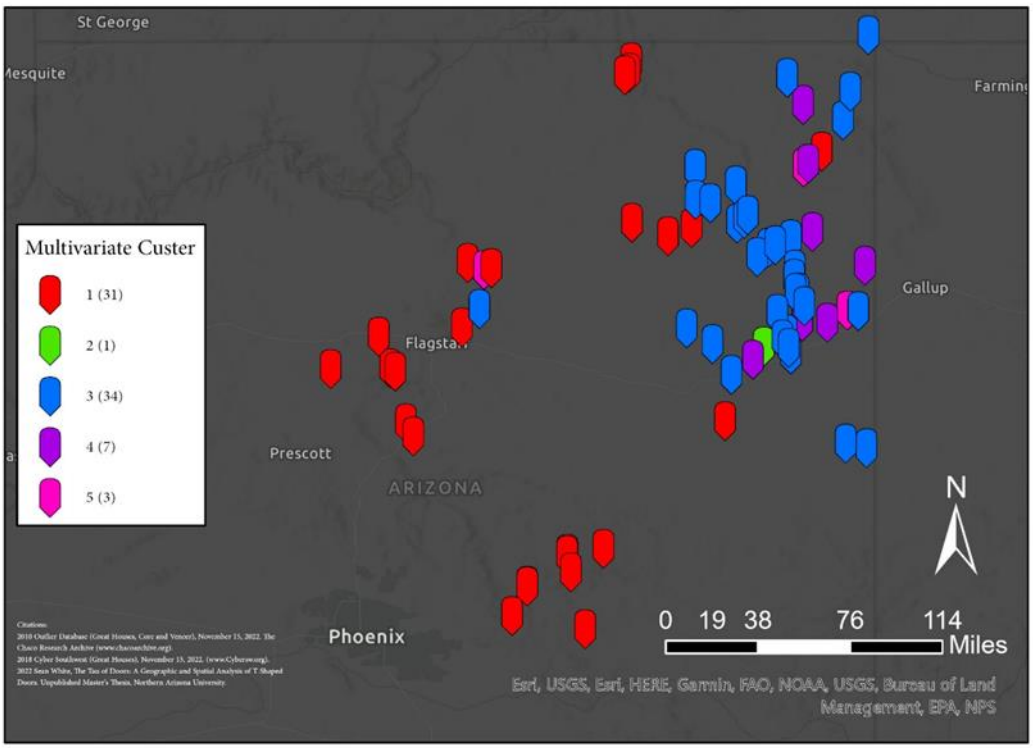

Figure 12: ArcGIS multivariate cluster analysis

Further analysis was completed using the ArcGIS spatially constrained multivariate analysis tool. The spatially constrained multivariate analysis uses the same mechanism as the analysis above, but additionally requires each cluster to be geographically contiguous. Not only must clustered groups be related based on the binary code, but they must also be geographically close to one another. This analysis resulted in a total of nine clustered groups, with two groups again comprising most of the sites (See Figure 13). Group 1, represented by red pins, are 30 sites that contain T-shaped doors and no Chacoan features. Group 2, represented by blue pins, are 34 sites with Chacoan features and no T-shaped doors. Group 1 in this test is different from the previous test since four sites have been separated from their initial group. Groups 5, 6, and 7 consist of three sites with T-shaped doors that were separated from Group 1. Groups 5 and 6 contain T-shaped doors, in addition to both Chacoan features. Group 7 contains only T-shaped doors and no Chacoan features. This group is likely separate from Group 1 because it is not geographically contiguous. Group 3 contains

the last site with a T-shaped door, in addition to two other sites without T-shaped doors. This demonstrates that there are two clear and separate groups of sites in the analysis, 1) those containing Chacoan features and 2) those containing T-shaped doors.

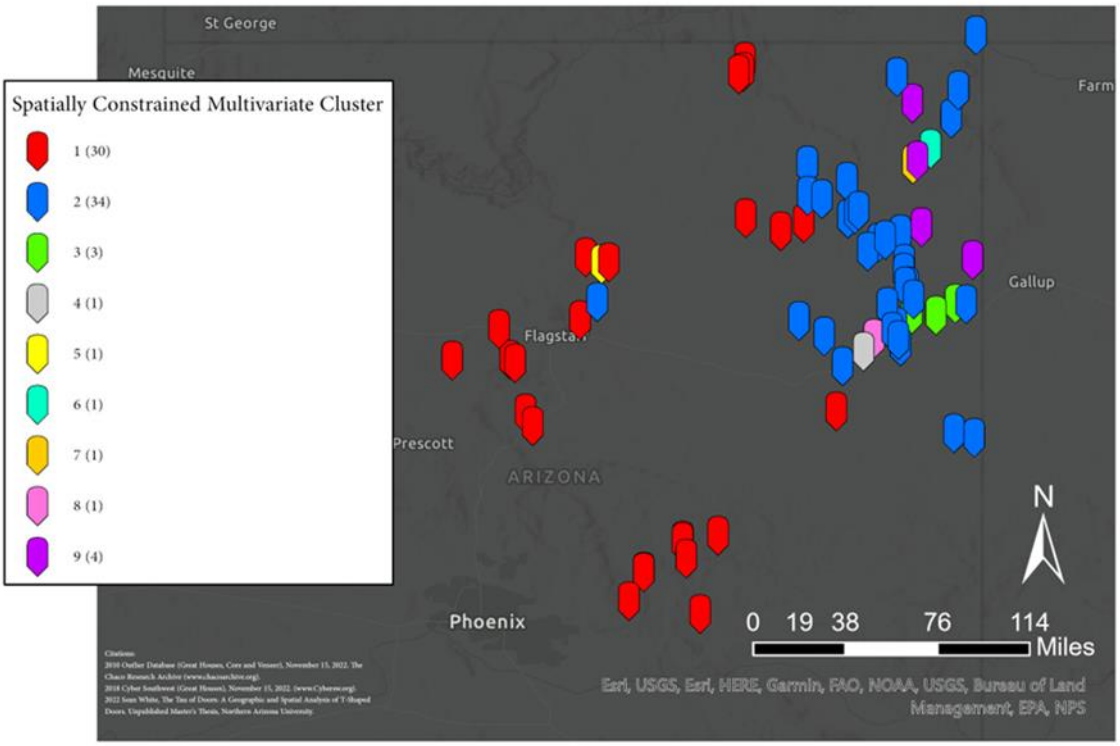

Figure 13: ArcGIS spatially constrained multivariate cluster

The 34 sites with T-shaped doors were compared to the 42 sites with corresponding Chacoan features of core and veneer architecture and great house architecture. The two analyses provided similar results, meaning that the geography and space did not factor heavily into the clustering of sites. Overall, for both analyses, there were two clear groups of sites in the region; one containing Chacoan features and the other containing T-shaped doors. This calls into question theories that T-shaped doors in the SW/NW are directly related to those at Chaco Canyon. This analysis indicates T-shaped doors are not directly related to other architectural features known to be directly affiliated Chaco Canyon. There is a clear difference between sites that are Chacoan and those that have T-shape doors in Arizona.

Oral Tradition & Footprints:

The last analysis involved a review of Hopi knowledge on archaeology, buildings, and T-shaped doors. Oral history and ethnography are often ignored and left out of discussions in archaeology despite being directly passed down from people's ancestors (Colwell 2017; Colwell-Chanthaphonh et al. 2010; Deloria 1997; Watkins 2000). Therefore, oral history was included to strengthen the analyses.

Lyle Balenquah, a Hopi archaeologist, believes that T-shaped doors represent *Masaaw*, the Earth Guardian, with whom the Hopi people entered into a spiritual contract to serve as stewards of the earth (Lekson 2020; Bernardini 2005:26). Balenquah discusses "From a Hopi perspective, T-doors are recognized as tangible monuments of Hopi history, marking the vast extent of landscapes once traversed and occupied by Hopi ancestors" (2023:1).

Masaaw is the central figure in Hopi history (Bernardini 2005; Bernardini et al. 2021). When the people of Hopi entered the fourth world they were greeted by its guardian, *Masaaw*. *Masaaw* then entered into a spiritual contract with them, to migrate across the land until they reached *Tuuwanasavi*, the earth's center (Bernardini 2005; Dongoske et al. 1997; Kuwanwisiwma and Ferguson 2004). As a part of this spiritual contract, they were instructed to leave their footprints, *itaakuku*, along the landscape as evidence of their presence (Colwell and Ferguson 2018; Kuwanwisiwma and Ferguson 2004:26). "Today, Hopis understand these footprints to be the archaeological remains of former settlements, pottery sherds, stone tools, petroglyphs, and other physical evidence of past use and occupation of the land" (Colwell and Ferguson 2018:9).

Describing Hopi people as a monolithic culture is inaccurate given their understanding of what it means to be Hopi. "Many Hopi people say they are still becoming Hopi in the sense that Hopi is a set of values to which people aspire humility, hard work by hand, generosity, living in

balance and harmony, and respect for others" (Hays-Gilpin and Gilpin 2018:134). Being Hopi is not simply being a part of a group; instead being Hopi requires attention and focus. This line of thought can even be extended to the Hopi people's understanding of becoming. As evident in their emergence story from the Grand Canyon, most Hopi people trace their origins to this one story. In addition to this one recognized history, each Hopi clan has its own unique story (Bernardini 2005:30). As directed by *Masaaw*, the people were to migrate across the land until they found *Tuuwanasavi*. They did not move as isolated groups, but instead as many groups, not simply one direction but many directions, and not simply one clan but many clans. "Migration traditions make clear that migration was not a uniform event associated with the depopulation of a village… rather individual clans often joined or left existing villages" (Bernardini 2005:29). In this migration story, when a clan wanted to earn entrance into a Hopi village, they needed to provide something in the form of "a ceremony or other contribution that would benefit the host village" (Bernardini 2005:35). It is therefore clear that in the past, there was never one pathway or monolithic group but instead a constant and ever-changing collaboration of people who gathered at *Tuuwanasavi*, the earth's center, is now known as the Hopi Mesas.

Leigh Kuwanwisiwma explains that "houses are living beings that nurture Hopi families" (Hays-Gilpin and Gilpin 2018:35). Houses are not simply places where sherds and other footprints are found, but they are living beings to be revered. It is in these houses that T-shaped doors are located (Dean 1967; King 1949; Pinkley 1928). As Balenquah states, "T-shaped doors contain cultural metaphors that express social identity, indicating a lifeway firmly planted in the earth through the cultivation of corn and other crops" (2023:1).

Along the paths of their migrations the people placed their footprints, *itaakuku*, across the SW/NW in the form of potsherds, structures, and other physical evidence. Footprints here become

important to the process of this research. Bernardini's analysis has focused on finding the imprint of migrant groups through analysis of clan symbols in rock art (Bernardini 2005). This work is relevant because in these footprints, he seeks to understand the identity of those in the past who lived in countless places across the landscape. More relevant is his work in the presentation of specific totemic symbols (See Figure 14). In this work he shows various symbols from six different clans, two of which are compelling given their striking resemblance to a T-shape. Both are indicated below by a red box in figure 14. One is a totemic symbol associated with the Bear Clan, and one is a petroglyph symbol associated with the Water/Cloud clan. Although this correlation is striking, it is not yet relevant until discussed with Hopi cultural and tribal authorities.

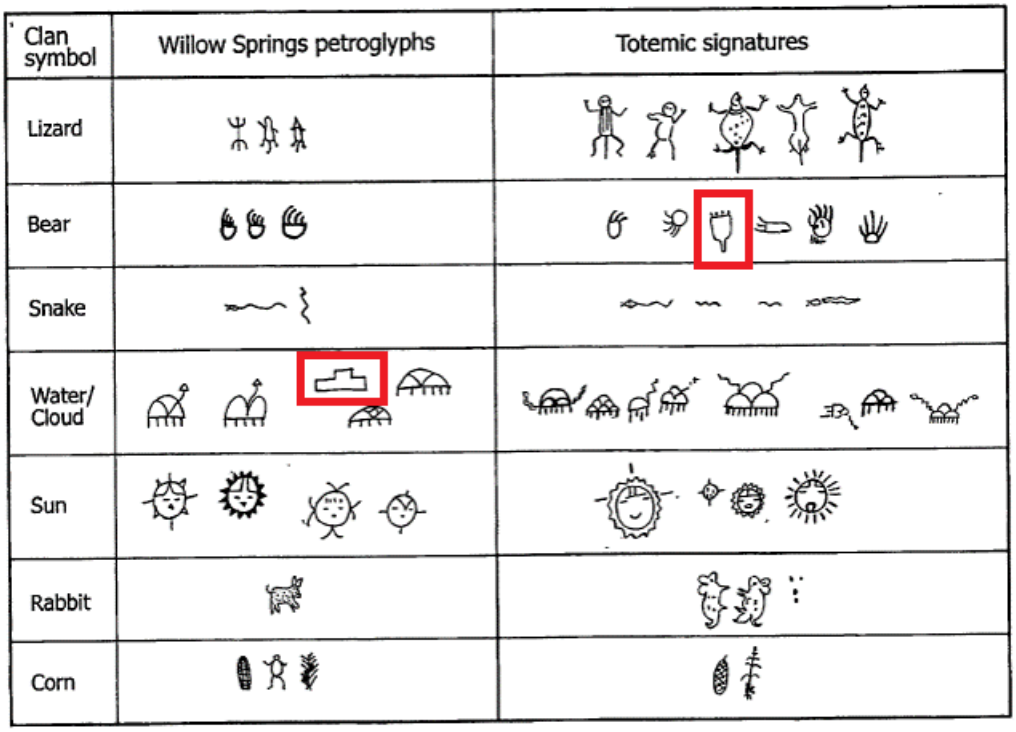

Fig. 4.1 Examples of clan symbols from the Willow Springs petroglyph site (Colton 1960; Michaelis 1981) and Fewkes' (1897) list of Hopi totemic signatures

Figure 14: Figure 4.1 from Bernardini (2005)

In conclusion, as stated by Balenquah “T-door imagery continues to be expressed through various aspects of Hopi cultural life. The doors are reminders of the hardships endured and lessons learned over the generations. The values associated with the T-door continue to be honored and carried out through the true Hopi spirit of cooperation, humility, and respectful stewardship of ancestral Hopi homelands” (Balenquah 2023:1).

Discussion

The first analysis was purely statistical, using IBM SPSS version 29. The data was analyzed to determine if the dates of occupation were statistically significant and directly associated using a Spearman’s rho test (Table 9). The only significant correlation in this test was the correlation between occupation start and occupation end. This correlation should be expected given occupation ranges are not random variables and are intentionally related to one another. Further in the other two correlations there appeared to be a slight positive relationship between the number of T-shaped doors and occupation start. In addition, there is a slight positive relationship between the number of T-shaped doors and occupation end. Since each results’ effect size was weak (± 0.1), and not statistically significant it is likely these two effects are simply random and not relevant to this research. Therefore, SPSS determined that there is no significant correlation between the number of T-shaped doors and a site’s occupation period.

The second type of analysis used ArcGIS to review the data in the context of the specific geography and time of the entire region. Figure 10 depicted T-shaped doors over time and indicated that there is a clear pattern beginning in northeastern Arizona at the Houck Great House site and in the Navajo National Monument area, expanding to include the Flagstaff area, and the Sierra Ancha, with the last door at the Hopi Mesas.

Figure 11 demonstrates four dense concentrations of T-shaped doors in the region, in the regions of Navajo National Monument, Flagstaff Area Monuments, Montezuma Castle National Monument, and the Tonto Basin. The three northernmost areas with the highest density have one site each with 6 T-shaped doors resulting in a high density of T-shaped doors for that region. Those three sites are Montezuma Castle, Keet Seel, and Wupatki. The remaining region with a high density of T-shaped doors is the Tonto Basin, where all sites have fewer than two doors.

The third analysis was completed in two parts, the first was a multivariate cluster analysis (Figure 12) and a spatially constrained cluster analysis (Figure 13) using ArcGIS. This analysis was conducted to determine the similarity of sites with T-shaped doors and sites with Chacoan features (core and veneer architecture and great house). This analysis indicated T-shaped doors are not related to other architectural features known to be of direct Chacoan descent.

Next, the oral traditions of the Hopi People were researched due to the proximity of the Hopi Mesas to the study area and the importance of oral tradition in archaeology. Primarily, "From a Hopi perspective, T-doors are recognized as tangible monuments of Hopi history, marking the vast extent of landscapes once traversed and occupied by Hopi ancestors." (Balenquah 2023:1). Further, the history of the many people who would become Hopi is varied; each clan has their own unique story. Clans often come together, separate, and together again eventually becoming Hopi (Bernardini 2005; Bernardini et al. 2021). Authors like Bernardini have begun to look at iconography in the SW/NW and identify common associations of that iconography to known groups. These tangible moments are the result of "*Ang Kuktota* literally, along there, make footprints" (Kuwanwisiwma and Ferguson 2004). Therefore, T-shaped doors are significant footprints of the past that represent the earth stewardship of Hopi ancestors in Arizona.

Chapter 6 – Conclusions

Limitations

The primary limitation for this research was gathering data. For places like San Juan Basin there is accessible data due to the Chaco Research Archive and the Salmon Pueblo Archaeological Research Collection. Outside of those two resources, other reports were sparse, and it was difficult to determine if they had the desired data. Further, these reports are often not directly accessible without aid from collection professionals.

T-shaped doors do not simply occur in Arizona and Chaco Canyon, they occur throughout the SW/NW. Therefore, these analyses must be expanded to include more doors in the future. This will not only help develop a larger contextual understanding of T-shaped doors, but will also provide a larger sample, therefore leading to more robust conclusions in the SW/NW. Since this research included only 37 sites, there is a possibility that the conclusions are not representative. More data will determine if the tests conducted represent larger geographic trends, or simply trends within Arizona.

Further, most T-shaped doors are located on federal land, which is often managed by the National Park Service. It is in these areas that there is often long term continued study, which has potentially created a sample bias for the locations of T-shaped doors. The location of T-shaped doors outside these areas would add valuable information not yet known by archaeologists. Furthermore, federal parks often have undertaken considerable amounts of architectural stabilization and even reconstruction. Therefore, this analysis could be skewed in these areas because the structure and a sizable portion of the wall must be standing for a T-shaped door to be preserved. It is likely the current number of doors included in this study are just a fraction of the T-shaped doors constructed in the past.

Finally, the low frequency of indigenous collaboration in T-shaped door research (or any architectural research) should be addressed. This study endeavored to include previously written perspectives and knowledge. These published perspectives cannot replace the broader knowledge of native people. In the future, it will be important to include descendants of the SW/NW and their knowledge in the study of T-shaped doors. Collaboration and direct authorship would be invaluable to the discussion of T-shaped doors. Future research should focus on what questions native people have.

Future Directions

Future researchers should continue expanding the data set of known T-shaped doors. Arizona is only one part of the SW/NW and increasing the amount of data about T-shaped doors collected in one place will aid future research designs.

The sealing of T-shaped doors is a potential avenue for future research, given 10 out of 60 doors were sealed during habitation. These doors indicate a change in use of the room and, potentially, a change in the perspectives of the people occupying each site. For some reason, there was a decision to seal the T-shaped door while people were still living at the site. Why would people seal these doors? What made people seal them, but keep occupying a site?

T-Shapes that occur outside Arizona require further investigation. Callis (2021) suggests T-shaped doors are not originally a SW/NW creation, but instead another feature that potentially stems from the Maya World and Mesoamerica, like macaws, cacao, and ball courts. Thorough investigation is needed to understand if this similarity discussed by Callis (2021) is due to coincidence, coevolution, or origination. In addition, more research is needed to know if T-shaped doors occur in between Maya world and the SW/NW.

Additionally T-shaped doors in Arizona occur along major centers of Hopi clan migrations. The last region with a high density of T-shaped doors is in the Tonto Basin which is a critical place of migration for many Hopi clans (Bernardini 2005; Bernardini et. al. 2021). The Tonto Basin itself is interesting given the lack of a site with more than two T-shaped doors, while still being a location with a high population density. Further it could be a compelling avenue of research to understand if T-shaped doors have any relationship to other Hopi clan symbols, as presented by Figure 14. Despite any of these ideas, in future research it will be crucial to collaborate with indigenous authorities and seek indigenously led research.

Conclusions

In Arizona, T-shaped doors first appeared in the eastern portion of the state around 1100 AD spreading west to the whole northeast portion of the state by 1300 AD and ending in the region around the Tonto Basin and the Hopi Mesas by 1400 AD (Figure 10). The highest concentration of Arizona T-shaped doors is located in the four regions of Flagstaff Area Monuments, Navajo National Monument, Montezuma Castle National Monument, and the Tonto Basin (Figure 11). Based on the data from Table 8 and the SPSS analysis, time is not a significant factor in determining the number of T-shaped doors.

In reviewing Figure 12 and Figure 13, T-shaped doors do not occur with other major Chacoan features like great houses and core and veneer masonry. This conclusion is a stark difference from Lekson (2015; 2020) and Callis (2021), both of whom believe T-shaped doors are an indication of cultural relationships. Based on the two cluster analysis Arizona T-shaped doors are distinct from the Chacoan features of core and veneer masonry and great house architecture. Further, they appear across the state at 1100 AD and by 1400 AD they are located only in the Tonto Basin and Hopi Mesas.

The last remnant of T-shaped doors is striking because of the multifaceted clan migration routes told by those in Bernardini's "Becoming Hopi" (Bernardini et al. 2021). Arizona T-shaped doors are inexorably linked to the footprints, *itaakuku*, of Hopi ancestors. This is because T-shaped doors do not correlate architecturally with Chacoan features, they do not spread in number over time, and they appear at numerous places in Arizona. T-shaped doors are likely the result of aggregation and dispersion of groups in Arizona who eventually end their movement at the Hopi Mesas.

Arizona T-shaped doors originate in eastern Arizona near Chaco Canyon and spread throughout the state until the fifteenth century when they last appear at the Hopi Mesas. Although T-shaped doors increase over time in Arizona this relationship is not statistically significant. Despite their migration path T-shaped doors in Arizona are not an inherently Chacoan trait. This research reveals that T-shaped doors in Arizona are best understood through, *itaakuku*, footprints of the past, and perspectives of modern Hopi people. Future research should continue with the framework of footprints and include perspectives outside of the Hopi people. With more work archaeologist can begin to understand the T-shaped door and how they relate to other important places and symbols throughout the SW/NW and Mesoamerica.

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