COMMUNITY MATTERS? INVESTIGATING SOCIAL COMPLEXITY THROUGH CENTRALIZATION AND DIFFERENTIATION IN BRONZE AGE PASTORAL SOCIETIES OF THE SOUTHERN URALS, RUSSIAN FEDERATION, 2100 – 900 BC

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In the past ten years or more, social complexity has taken center stage as the focus of archaeologists working on the Eurasian steppe. The Middle Bronze Age Sintashta period, ca. 2100 - 1700 BC, is often assumed to represent the apex of social complexity for the Bronze Age in the southern Urals region. This assumption has been based on the appearance of twenty-two fortified settlements, chariot burials, and intensified metal production. Some of these studies have incorporated the emergence and subsequent development of mobile pastoralism as their primary foci, while others have concerned themselves primarily with early forms of metal production and their association with seemingly nascent social hierarchies. Such variables are useful indicators of more complex forms of social organization usually accompanied by strong degrees of demographic centralization and social differentiation.

This dissertation explores the relationship between demographic centralization and the balance between social differentiation and integration based on the data collected during archaeological survey of 142 square km around and between two Sintashta period settlements, Stepnoye and Chernorech'ye, located in the Ui River valley of the southern Urals region, Chelyabinsk Oblast, Russian Federation. Because of the multi-component nature of

archaeological survey, materials recovered date from the Mesolithic to the twentieth century. However, the focus was on Bronze Age materials to better identify and evaluate changes between demographic centralization and social differentiation.

Center-hinterland dynamics and the use of historical capital (materials, practices, and places re-used in identifiable ways) were evaluated from the Middle Bronze Age Sintashta period through to the end of the Final Bronze Age. Based on the results of the Sintashta Collaborative Archaeological Research Project (SCARP) project, the ongoing work of Russian scholars, and the results of this dissertation, there is considerable evidence that it was in the Late Bronze Age that social complexity may have become more pronounced, even as the demographically centralized Sintashta period communities dispersed. The results of the landscape and materials analyses indicate strong possibilities for land-use and craft traditions carried through to the end of the Final Bronze Age, with such traditions acting as historical capital for later communities.

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To my parents, Dan and Jan Johnson

Acknowledgements

A PhD dissertation is an enormous, long-term project that by no means is the accomplishment of one individual. As it takes on a life and develops a history of its own, it requires a community to keep it on track, to repurpose it, and ultimately to complete it. That said I would like to express my heartfelt gratitude to the community of scholars and friends who helped me in this undertaking.

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1.0 INTRODUCTION

In 2009 I was presented with the opportunity to conduct my PhD fieldwork and research in the Russian Federation under the aegis of the Sintashta Collaborative Archaeology Research Project (SCARP), directed by Drs. Bryan Hanks, Roger Doonan, and Dmitri Zdanovich. SCARP needed someone to carry out a pedestrian survey outside and around the Middle Bronze Age Sintashta (2100 – 1700 BC) settlements of Stepnoye and Chernorech'ye in the Ui River Valley, Chelyabinsk Oblast in the southern Urals region. The fieldwork in the Ui River Valley afforded us the chance to implement the first systematic regional pedestrian survey in this part of the Eurasian steppe. Our primary focus was to investigate the emergence of center-hinterland dynamics in the Sintashta period through settlement patterning, combining our interests in demography, landscape, and diachronic social change. I was awarded an NSF doctoral dissertation improvement grant in 2010 to conduct the research. Combining resources, my NSF funding along with support from SCARP, I was able to return to Stepnoye in the fall of 2011 to conduct analyses of the pottery sherds, lithics, and faunal remains that had been collected in the 2009 and 2011 surveys. The following pages and chapters are the direct results of my discussions and interactions with SCARP team members, my analyses of the collected spatial and material data, and my thoughts on the importance of the historical development of and changes to centralization and differentiation in the transformation of complex forms of social organization among prehistoric pastoral societies in north central Eurasia.

1.1 DISSERTATION CASE STUDY AND REGION – SINTASHTA PERIOD THROUGH FINAL BRONZE AGE SOUTHERN URALS

A logical starting point for my investigation of complex social and political organization in pastoral societies is the historical conditioning that contributed (or not) to later developments in the Late and Final Bronze Ages, 1700 – 900 BC. For the purpose of the dissertation, my starting point is the Sintashta period (approx. 2100 – 1700 BC) of the southern Urals region in the Russian Federation. Scholars have suggested that the appearance of twenty-two Sintashta (2100 – 1735 cal. BC; Hanks et al. 2007) enclosed settlements represent conspicuous changes from the possibly pastoral, less differentiated, communities in the Early Bronze Age to early Middle Bronze Age (3300 – 2500 cal. BC) as well as the Late and Final Bronze Age (Bochkarev 1995; Epimakhov 2002a, 2009a; Frachetti 2008; Koryakova 1996, 2002a; Koryakova and Epimakhov 2007).

For the most part, the Sintashta development is discussed by Russian and foreign scholars alike in terms of fortified settlements, copper metal production, spatial patterning of household structures, and complex burial rites (Gening 1977; Gening et al. 1992; Zdanovich 1997; Zdanovich and Zdanovich 2002). These Sintashta settlements represent a markedly different development from what proceeded the earlier phases of the Bronze Age of the southern Urals. The settlements are all located on tributaries of the Tobol and Ural Rivers, are often situated on flat fluvial terraces near or on the tributaries, and range in size from .5 to 3.5 hectares (enclosed site area) with each settlement location demonstrating long-term occupation through 2-4 construction phases (Zdanovich and Batanina 2002, 2007). The settlements are not located any standard distance from each other as spacing between settlements ranges from 8 km to 70 km (Drennan et al. 2011; Johnson and Hanks 2012; Koryakova and Epimakhov 2007). In all, the

geographic area associated with the emergence of the Sintashta fortified settlements encompasses approximately 68,000 km^2. There are also kurgan (barrow) complexes, or cemeteries, associated with many of the settlements, with the cemeteries being located rather sporadically around the landscape (Koryakova and Epimakhov 2007: 67-68). The excavations of the kurgan complexes in various cemeteries have been the primary source of information regarding Sintashta social and political organization. Excavations of household structures, or dwellings, have contributed a limited amount of information that has been used to infer homogenous subsistence and productive practices for Sintashta communities, i.e., pastoral herding and community-wide intensified metal production (if not specialization).

Many of the hypotheses proposed for Sintashta societal developments include: 1) climate change (Anthony 2009; Koryakova and Epimakhov 2007); 2) the appearance of warfare and emergent chiefly competition (Anthony 2007, 2009); 3) migration (Epimakhov 2002a; Zdanovich and Zdanovich 2002); and 4) the intensification and proliferation of metallurgical production (Hanks 2009b; Vinogradov 2004); with most hypotheses based almost exclusively on data collected from burials and household units. The model that I am primarily interested in for the Sintashta developments is G. Zdanovich's proto-urban framework of the 'Country of Towns' (1997; with D. Zdanovich 2002). The Country of Towns is based primarily on the appearance of these enclosed settlements and on (alleged) similarities found among the settlements including: 1) spatial organization; 2) types and scales of economic activities such as metallurgical production; and 3) shared communication systems, or an *ethos*, linked by decorative and manufacturing styles in pottery and metal production.

These models of Sintashta period developments, including the Country of Towns, generally *assume* a complex demographically (and politically) centralized nature, including the emergence

of social differentiation within and between communities. Such forms of differentiation are often visible in craft production and consumption, hierarchical settlement patterning exhibiting tendencies towards robust asymmetrical power dynamics, and related differences in demographic scale and composition of communities. Not only are these changes very different from what came before, but it has been suggested that the Sintashta period took center stage in later developments; that in culture historical terms the Sintashta communities acted as the foundation for the emergence (ethnogenesis) and expansion of cultural groups in the Late Bronze Age (Koryakova and Epimakhov 2007; Kuz'mina 2007).

For the purposes of this dissertation, it is the dual nature of the socio-cultural and economic developments of the Sintashta period that is of primary interest: 1) that the Sintashta groups were centralized communities; and 2) that these communities became the historical basis for later developments (Epimakhov 1996, 2002a, b, 2009a; Zdanovich 1997: 14-15; Zdanovich and Zdanovich 2002). If the Sintashta communities were in fact proto-urban in nature, as suggested in Zdanovich and Zdanovich (2002), it is worth noting here some defining characteristics of what it means to archaeologists to be 'urban'. Charles Redman (1978: 215–216) suggests that urban societies are comprised of centers that are at once differentiated from, yet integrated as a social totality, with their rural hinterland. Stephen Savage and Steven Falconer (1995: 37-38) further suggest that studies of urban developments are more compelling when they "comprehend entire networks of sedentary settlement, and, in so doing, distinguish different trajectories whereby cities, towns, villages and hamlets became incorporated or disarticulated as regional systems broke down." Building from Savage and Falconer's suggestion, I explore the historical complex processes that are entangled in the disintegration of centralized/urban communities as a crucial component in the study of social complexity for Bronze Age Eurasia.

The central question that is being posed here is not do pastoralists (mobile or not) undergo urbanization. Rather to what extent are these processes, centralization and social differentiation, utilized as the historical basis in later forms of complex social and political organization. In other words, how do increasingly dispersed populations participate in what becomes a shared, remembered ethos and/or sense of community? This primary research is the foundation for this dissertation, as it was for the completed fieldwork.

1.2 DISSERTATION FIELDWORK AND RESEARCH

The dissertation fieldwork and research articulates productively with the ongoing archaeological work being conducted by SCARP. One major component of the SCARP fieldwork, including the dissertation fieldwork, has focused primarily on the Ui River Valley in the northern most area of the Sintashta cultural complex that contains two Sintashta enclosed settlements, Stepnoye and Chenorech'ye. The Stepnoye and Chernorech'ye settlements and their related economic catchments were the primary focus of SCARP's initial interests in the relationship between early copper metallurgical activities, socio-economic developments and community. The dissertation project focuses on these interests through an examination of the geographic area or territory between the Stepnoye and Chernorech'ye settlements to provide a better evaluation of the local catchment area around each Sintashta settlement and to address questions of autonomy and integration through the search for hinterland populations and traces of their occupation and activities. Furthermore, the dissertation fieldwork builds productively from previous reconnaissance surveys conducted by Elena Kupriyanova a decade earlier (discussed in Chapter Four). What remains unknown or understudied at this point is whether or not center-hinterland

dynamics can be identified for Sintashta communities. Furthermore, the longer-term impact of such dynamics on post-Sintashta social and political organization remains unclear.

As such, the focused research questions first posed in my NSF Doctoral Dissertation Improvement grant and further explored through the course of the dissertation are:

1) How do overall regional population distributions and densities of occupation zones within the research area change from the EBA to LBA?

2) Is it possible to develop better and more empirically validated estimates of the demographic and spatial scale of EBA/MBA/LBA communities?

3) Are empty spaces or 'buffer zones' between communities present in the survey region and if so, how do these relate to the two MBA Sinatshta settlements already identified? Does buffer zone patterning contribute to understandings of community centralization and conflict during the Bronze Age, and if so, how did this change diachronically?

4) How well do settlement locations relate to possible economic or resource zones? To what extent do these relationships differ between settlements and how do these relationships change over time in the Bronze Age?

5) Can pedestrian survey and surface collection support the model that pastoral communities became more sedentary in the MBA leading to the appearance of Sintashta fortified settlements as suggested by Anthony (2007, 2009)? Did communities become more fragmented, dispersed, and demographically smaller in the LBA with the decline of the Sintashta Country of Towns?

The dissertation builds from Drennan et al.'s (2011) recent suggestions, as well as other trends in scholarship focusing on late prehistoric Eurasian steppe societies (Epimakhov 2002a, 2009a, 2009b; Honeychurch et al. 2009; Houle 2009, 2010; Koryakova 1996, 2002a, b; Koryakova and Epimakhov 2007; Rogers 2011; Sneath 1999, 2007) regarding the ways in which middle range societies emerged in various regions of the Eurasian steppe as part of broader scale, longer term historical traditions. I also draw upon a range of ethnographic and archaeological research on pastoralism and complexity (Anthony 2007, 2009; Chang 2012; Drennan et al. 2011; Epimakhov 2002a, b, 2009a; Frachetti 2011, 2012; Hanks 2002, 2009b; Hanks and Doonan 2009; Johnson and Hanks 2012; Koryakova 1996, 2002; Koryakova and Epimakhov 2007; Zdanovich 1997; Zdanovich and Zdanovich 2002; among others) to situate the Bronze Age (3300 – 900 BC) southern Urals in a broader comparative framework that highlights the historicity crucial to the roles of centralization and differentiation in the emergence of, and changes to, later forms of complex social organization. The dissertation, in Chapter Two, grounds this framework through a detailed discussion of perceived problems regarding the relationship between pastoralism, culture, complexity, and history in Bronze Age north-central Eurasia. Chapter Three details the methodology employed through field research and artifact analyses. Chapters Four through Six examine the temporal sequencing of socio-political and economic developments of the southern Urals region and the results of the 2009 and 2011 surveys. The dissertation concludes with a discussion in Chapter Seven of these developments and their comparative value in examining the developmental trajectories of pastoral middle range societies and discusses potential avenues of future research relating to these themes.

2.0 COMPLEXITY AND ARCHAEOLOGICAL TRADITIONS FOR THE BRONZE AGE EURASIAN STEPPE

Since at least F. Engel's (1884) *The Origin of Family, Private Property, and the State*, pastoralists have been relegated to a lower rung of social evolution, and more recently, what many scholars term social complexity. Such classic views presuppose that pastoral societies are both mobile and are, as a result of increased mobility and lack of definable surplus, incapable of or resistant to complex social and political organization (cf. Evans Pritchard 1940; Fortes 1945; Fortes and Evans-Pritchard 1940; Morgan 1848). While certainly such views have changed over the past three decades or so, there still exists a lingering sense of a fundamental incompatibility between pastoralism and complexity, with the result being the perpetuation of a timeless, idealized, and essentialized 'pastoral' type (Sneath 2007: 59).

This may be due to at least three related factors: 1) the narrow focus of scholarship on conceptualizing complexity at the inter- or pan-regional scale with little attention paid to smaller-scale developments or processes, 2) investigating complexity in terms of an apex and end-result rather than as ongoing processes, and 3) as a monolithic entity focusing on only a few components, often inequality and hierarchy. Susan McIntosh (1999: 4) suggests that such long standing views of complexity obscure other under-represented studies of complex forms of social organization in other geographic areas such as Africa. McIntosh states this is mostly due to the narrow conceptualization of complexity as differentiation and centralization, overlooking equally important aspects of complexity that are diffuse, segmentary, and heterarchical. However, this

only highlights the binary opposite to centralization and differentiation, rather than seeking a more productive marriage between the two. Questions that can, and should, take center stage is how complexity changes over time, such as moving from centralized to decentralized or diffuse, and how complexity is situated in and through historically conditioned practices. In other words, if we treat centralization and differentiation only as moments of hierarchy rather than as processes deeply entangled in the complex interplay between local and regional histories we miss the more substantive multi-scalar (local to pan-regional) connections that have been assumed for developments in the steppe (Hanks and Doonan 2011).

2.1 CENTRALIZATION AND DIFFERENTIATION AS HISTORICAL PROCESS IN PASTORAL SOCIETIES

A growing number of archaeologists are now questioning the assumption that pastoralists are fundamentally egalitarian due to their alleged inability to maintain long-term (storage) reserves necessary for social inequalities (Hammer 2012, 2014; Houle 2010; Porter 2012: 9). I would suggest that this prevalent attitude, pastoralism as egalitarian, is rooted in an even more pernicious but tacit bias against pastoralists; that because pastoralists are mobile by nature they are also incapable of or resistance to historicity. D. Sneath (2007: 3) suggests:

> The notion of a timeless, traditional, nomadic, tribal society organized by kinship made the emergence of steppe states a puzzle to be explained away in terms of contact with the urban and agricultural polities on their borders. But a critical reevaluation of the materials shows that the dichotomies of tribe and state, tradition and modernity, kinship and class, have been projected onto material that cannot be usefully analyzed in these terms.

Sneath reacts against the linear evolutionary constructs that portray pastoralism as an evolutionary dead end, with little to no capability for more complex forms of social organization due to their mobile and "timeless" tribal nature. Conventional views of pastoral socio-political developments often imply that the segmentary tribe is the natural condition or result of social, political and economic processes for pastoralists. Nomadic states are either treated as anomalies in the evolution of complex societies or compared in terms of state-oriented developments often to the detriment of pastoral development (Burnham 1979; Irons 1979; Koryakova and Epimakhov 2007; cf. Sneath 1999, 2007 for critique).

This is due to the hyper-focus on the limitations or constraints determined by kinship, as seems fitting for tribal groups (Sneath 2007). Maurice Godelier (1978; and Sneath 2007: 12), states that tribes are envisioned as kinship societies and therefore their social relations and production systems are contextualized in terms of kin relations, rather than testing the possibilities for more complex formations that move beyond the static evolutionary boundary of strict kin-based social organization. While Anatoly Khazanov (1984: 166) suggests that social differentiation manifests in pastoral groups less clearly and weakly than in agrarian societies, he also leaves open the possibilities for more complex social and political developments in terms of pastoral chiefdoms and states. He further states (1984: 67)

> At the same time the character of dispositional leadership is such that, in favourable circumstances and when necessity demands, it is able to emerge, even in a society in which social differentiation is undeveloped and in which an aristocracy as a specialized stratum does not exist, or else its position is very weak.

It is commonly agreed upon that pastoralists are not a cultural and/or evolutionary "dead-end" (for excellent discussion of this see N. Kradin {2008}), Kradin (2002, 2008, 2011) notes

there is little agreement thus far as to their place in the emergence and subsequent evolution of complex societies. Recently, Drennan et al. (2011: 149, 152) note the variable forms of chiefly social organization in the prehistoric Eurasian steppe and that such chiefdoms should not be considered a societal type, but rather a process to be investigated.

Emily Hammer (2012, 2014) points out that this is the "invisibility" of pastoral societies. She suggests that to overcome this invisibility we must move beyond site-oriented archaeology and incorporate a 'landscape archaeology' approach. However, by emplacing the developmental trajectories of mobile groups and ignoring the materialization of pastoral social organization we only compound the invisibility effect. Certainly, monuments constructed by pastoral communities are used for socio-political purposes integrating participants into a political whole (Drennan et al. 2011; Houle 2009, 2010) and can act as landscape anchors for other socio-economic activities such as grazing (Hammer 2012, 2014). However, this invisibility will to some extent persist as long as we continue to define pastoral societies solely by their socio-economic activities (pastoralism) rather than fleshing out their complex socio-political dimensions that link socio-political development with history, movement, and craft production. Rather than focusing on pastoral social organization as either kinship- or inequality-driven, pastoral social organization should be examined in terms of historical and material processes, with the potential for establishing, maintaining, and utilizing historical social reserves or capital. One way to do so is to examine the historical nature of centralization and differentiation. Such an approach combines landscape and material culture (beyond just monuments). We can understand complex social organization to be an amalgam of numerous and variable historical processes rather than only as a locus of power that in no way foreshadows a future over-bearing form of governance (Clastres 1989: 174; also found in Barrett 1994: 163). If we can reinsert history into

pastoral social and political lifeways, rather than just focused on the economic dimension of moving animals, then we can also understand that pastoral social actions are mediated through continuities and changes to traditions of knowledge, with social systems being the recursive products of human agency (Barrett 1994: 165).

Paul Connerton (1989: 6) states that any beginning (an attempt at new social actions) has its inextricable moments of recollection; that which grounds new actions. For changes in social organization, local histories become increasingly important to legitimize the development of new types of socio-economic and political organization. Such histories are entangled in a mix of landscape and material traditions (Bradley 1998, 2012; Gosden 1996; Smith 2003). As noted by Bryan Hanks (2008: 257):

> The important scalar relationship between memory at the social level and the experiential individual level has particular significance for the archaeologist, as the majority of the human past is set among societies of oral rather than written tradition. As Goody (2000) has suggested, the dynamic process of memory production among non-literate societies plays an especially important role in the preservation of tradition and culture practice.

Despite it being located well away from the classic Eurasian steppe geographic entity, in the early Iron Age of southwest Germany, mortuary landscapes and pottery were co-opted and re-used for purposes of legitimizing new elites, with pottery sherds being curated and deposited 150 years after a vessels initial deposit (Arnold 2002; Johnson and Schneider 2013). Such historical capital becomes crucial components in establishing the validity of new forms of social organization in light of social change.

This dissertation focuses on both landscape and craft traditions as the forms of historical capital used to mediate social change during the course of developmental trajectories of chiefly communities in the Eurasian Bronze Age. However, it is important to develop a better

understanding of how social change and development has been approached in the southern Urals of the Russian Federation before moving on to the discussion of the results from the surveys. To do this, the rest of this chapter lays out the broader context of social change (and action) in terms of social complexity of the Middle Bronze Age Sintashta period to the end of the Final Bronze Age.

2.2 THEORY AND HISTORICAL PROCESSES IN THE ARCHAEOLOGY OF THE EURASIAN STEPPE

The Eurasian Bronze Age, approx. 3300 – 900 BC, is a complex set of time periods containing many of the major social, political, and economic developments of not only the steppe, but also those that coincide with major developments outside of the steppe, including the emergence of states and cities, warfare, and long distance trade and interaction. Much of the research and debate regarding the steppe developments centers primarily upon a number of broad, and some specific, topics including language and cultural dispersal, migration, horse domestication, warfare/conflict, metal production, and socio-economic interactions between steppe societies and state formations in western and south-central Asia (Anthony 2007, 2009; Degtyareva et al. 2003; Drennan et al. 2011; Epimakhov 2002b, 2005, 2007, 2009; Frachetti 2009, 2011, 2012; Grigor'yev 2000b; Hanks 2009, 2010; Hanks and Doonan 2009; Hanks and Koryakova 2006; Hanks and Linduff 2009; Houle 2010; Johnson and Hanks 2012; Kohl 2008; Koryakova 1996, 2002a; Koryakova and Epimakhov 2007; Kradin 2007, 2011; Rodgers 2007). Despite the increased interest in modeling or framing complexity, there remains a fundamental disjuncture between archaeology done at the site level and interpretations cast as a regional or pan-regional net. Following Klejn (1993, 2012), Kohl (2007), Koryakova (2002), and Trigger (1989), I

examine the different theoretical trajectories employed by Russian and Anglo-American archaeologists, exploring how complexity has been used and its potential for revealing better, more detailed interpretations and explanations for the developments of the Eurasian Bronze Age.

At first glance, there seems to be a very broad gap between Russian archaeological practice (the combination of theory and method) and the practice of Anglo-American archaeologists. This is because there is no single "practice" for each tradition, but rather a multitude of practices. In addition, there is a growing number of disparities between how archaeology is practiced in the Russian Federation and neighboring countries (Klejn 2012; Kohl 2008; Koryakova 2002; Koryakova and Epimakhov 2007). That said, there remains some important commonalities, in particular the use of culture history as a dominant paradigm.

In addition, there could be a lengthy discussion about the differences between what we now term Anglo-American and Russian archaeologies. I think perhaps the most important and pervasive, yet at times masked or hidden, difference is the use of Marxist approaches in archaeology. Between the two, the adoption of both culture historical and Marxist approaches in archaeology, there maybe a great deal more that brings the traditions together than divides them (Koryakova 2002: 240). At the same time, it seems clear now that there was never a single cohesive set of Soviet/Russian archaeological practices. Ludmila Koryakova (2002: 242) has suggested that too much emphasis has been placed on the adoption of the Lenin-Marxist approach in Soviet, and now Russian, archaeology by western colleagues. Even during the Stalinist periods, Soviet archaeology went through various stages of development regarding theoretical direction, including numerous permutations of Lenin-Marxism. Despite this, there seems a clear difference in how Marxism was adopted by archaeologists during the early Soviet period and how Marxism is being adopted now. For example, L. Klejn (2012: 16) notes that

when naming the “Academy of the History of Material Culture” the name was chosen with its clear reference to Marxism and/or historical materialism and its connection to labor-production, and that Lenin added the word “history” to the title. In Klejn’s words (2012: 18), “The Marxist view of the history of society became for the first time the property of professional archaeologists, and a cohort of innovators began to exploit the opportunities this opened up.” Archaeology became quickly aligned with the Lenin-Marxist views of illustrating the existence of a pre-class society and Morgan’s evolutionary schemata that acted as the foundation (Klejn 2012: 19). Klejn (2012: 21) further notes that archaeologists portrayed early, or what we now term prehistoric, humans as toiling “to lay down the structure of their collective (family, tribal territorial commune, or ethnos).” Qualitative changes also occurred. The static, autochthonous mass of ancient populations became mobile, undergoing large scale patterns of movement (migration), abrupt changes in technological organization/innovation, and a focus on the social relations in and between material culture(s) (Klejn 2012: 25).

In addition, the complementary focus on ethnogenesis, the creation of ethnic groups, characterized to a large degree the archaeology of the pre-Stalinist and the post-WWII Stalinist periods. Stalin had focused on the production and propagation of a new nationalism, with Soviet scientists becoming increasingly concerned with national identity and awareness (Klejn 2012: 33). He also formalized evolutionary stages (primitive communal, slave, feudal, capitalist and socialist) (McGuire 2002: 58). During the Stalinist periods constraints were placed on archaeological research, but within these limitations Soviet archaeologists were able to make important strides regarding culture history and change. Along with evolutionary stages and ethnogenesis came a focus on large scale, often centrifugal forces (migration) that highlighted the movement/migrations of new ethno-cultures out of prehistoric Russia.

By the end of WWII, important new methodological developments were occurring alongside extant ideas of ethnogenesis and culture history. These new developments included further exploration and publication of Tolstoff's settlement studies from the 1930s, an increased interest in dating techniques, X-ray diffraction and S. Semenov's (1954) volume on functional traceology (what we now call use wear) (McGuire 2002; Trigger 2006). Clearly by the end of the Stalin regime new ideas in Soviet archaeology had taken hold as well as further exploration and rethinking of already established paradigms was underway. Along with Semenov's pioneering work, much work began before and especially after WWII on aerial photography. In the post war period, when huge tracts of land were added to the Soviet Union, the use of aerial photography became an important development in economic policies, and subsequently in archaeology. While access is still often restricted by government agencies, aerial photography has proven to be invaluable in the identification of prehistoric sites in the Russian Federation. Natalaya Batanina and B. Hanks (2013: 200 - 201) have noted that such sites include some of the Chorasmian oases, the ancient Greek colony of Olbia, and most importantly the identification of the twenty-two MBA settlements known as the Country of Towns (*strana gorodov*), in which this dissertation is primarily interested. The identification of this regional settlement pattern and its subsequent linking to the MBA Sintashta cultural development, which also included technological innovations like the earliest form of spoke-wheeled chariots and early forms of settlement fortification, indicated complexity at an unprecedented scale on the Russian steppe (Batanina and Hanks 2013: 201).

The technological innovations pioneered by the Russians caught the eye of one of the most pre-eminent archaeologists. By the late fifties, V.G. Childe was recognized as one of the preeminent archaeologists and prehistorians of the time not only in the US and UK, but also in

the Soviet Union (Klejn 2012; Trigger 2006). Whereas earlier, Childe had seen much promise in the archaeology of the Soviet Union the dogmatic clinging to state-ideology based Lenin-Marxist interpretive frameworks by Soviet archaeologists eventually led to Childe's disillusionment with Soviet archaeology. At the same time, Childe's Marxist views, focusing on the dialectic between history and event, between material culture and process, went unappreciated in Anglo-American archaeology, with editors such as Glyn Daniel often obscuring or hiding Childe's Marxist tendencies (McGuire 2002, 2006). Without delving into this noteworthy subject matter too extensively, suffice to say that there seems to have been, and continues to be, a fundamental commonality in the ways Marxism manifested in Anglo-American archaeologies and the archaeology of the Soviet and then post-Soviet or Russian Federation periods (cf. Klejn 2012; Kohl 2008; Koryakova 2002; McGuire 2002; Trigger 2006): the avoidance of Marxist dialectics.

While Koryakova (2002) is critical of the current state of theory and method in post-Soviet Russian archaeology, at least as of 2002, and Anglo-American archaeologists are experiencing a "house in disorder" (McGuire 2002: xxvii), there really is as Berezkin (2000) suggests more bringing us together than separating us. In general, both traditions in archaeology face the struggle to reconcile history and event, and need better explanations of the distinction between process and action and their visibility in material culture (Anthony 1995: 183). This struggle goes on for both Anglo-American and Russian archaeologists. In addition, the concept of cultural evolution and deeply entrenched portrayals of the "primitive" act as an insidious foundation for studies of pastoralists in prehistory (Kuper 2005; Potter 2012; Sneath 2007). Both nationalistic traditions share this as their epistemologies are rooted in the work of Lewis Henry Morgan. Finally, and in a related sense to the first three points, is our ongoing use, and struggle with, the concept of culture history (Roberts and Vander Linden 2011). Following Childe's (1944: 1)

original suggestion based on Marxian dialectics, and further explored by McGuire (2002), I adopt an approach to material culture (including landscape) that participates in the social relations that create them as well as the broader socio-cultural systems in which they move and operate. Such diachronic changes to community social organization in terms of the historical context of participation and integration work as a productive and complementary meeting point for Anglo-American and Russian archaeologists, particularly in terms of social complexity.

There exists a renewed interest in regional archaeological studies focusing on pastoralist social organization and complexity in the steppe (cf. Chang 2012; Drennan et al. 2011; Hanks 2009, 2010; Hanks and Linduff 2009; Honeychurch 2004; Honeychurch et al. 2009; Houle 2010; Frachetti 2009, 2012; Koryakova and Epimakhov 2007; Kradin 2008, 2011; among others). Three of the models or frameworks of complexity proposed for the Bronze Age Eurasian steppe include: non-uniform institutional complexity (Frachetti 2012), shared social fields (Kohl 2008), and to a lesser extant (about complexity) (Chernykh 1992, 2004). All three frameworks are geographically and theoretically expansive, incorporating developments such as mobile pastoralism, chariot use, and copper and bronze metallurgy that occur throughout the steppe and beyond. Interesting, and perhaps problematically, all three argue for broader conceptualizations of societal developments rather than actually focusing on the smaller scale goings-on.

Evgenii Chernykh's (1992, 2004, 2009; et al. 2000) model of metallurgical provinces which focused on the overlap of metal use (types of copper-based alloys and typologies of metal artifacts) with archaeological cultures. Such a metallurgical province is a "unified production system with similar traditions of metallurgical development" (Koryakova and Epimakhov 2007: 25-26). Koryakova and Epimakhov (2007: 26) have stated that in all of the identified regional

centers, metallurgy existed as a specialized craft activity, possibly used for long-distance exchange.

For Phil Kohl (2008: 502), *shared social fields* emphasize the social and technological interconnections between cultures and their importance in evolutionary development. He sees the development of mobile pastoralism as being one of the key elements that integrated different social and economic fields and that brought people into contact with each other allowing for the exchange of technologies and other economic materials and practices. Perhaps most importantly for this dissertation is Kohl's suggestion that the macro-scale goings-on need to be better integrated with local and regional developments (2008: 502). Furthermore, Kohl's focus on the historical development also represents a crucially important component.

Building from Kohl's narrative, Michael Frachetti (2009, 2012) proposes that the development of mobile pastoralism was a, if not *the*, key factor, in the emergence of complex social, political, and economic entities. Frachetti (2012: 5) suggests, and assumes, "that distinct socio-economic communities-gestating in the fourth and third millenia BC-contributed to the subsequent inter-regional alignments of social institutions...in the second millennium BC". His primary focus is on the 'non-uniform institutional relationships' that developed and integrated various localities into broader social fields, or interactive systems (Kohl 2008). While Frachetti discusses the transition to mobile pastoralism (2012: 6-11), and he mentions the importance of linking the local with the regional and the regional with the pan-regional, there is no actual evaluation of local developments and their alleged links (cf. Hanks and Doonan 2011). In Hanks and Doonan's review of Frachetti's article they point out that the 'right to participate' in such systems at the local level is not established (Hanks and Doonan 2011: 23-24). Furthermore, Frachetti (2012: 32) suggests that institutional participation was discontinuous and indirect, and

that such participation shifted based on the "institutional ideas" to which participants adhered. In the case of non-uniform institutional complexity those ideas centered on the symbolic power of chariots.

David Anthony (2007, 2009) suggests that it is a number of overlapping factors including environmental change, aggrandizing chiefs, and conflict, that led to the emergence of complex forms of social organization in the Sintashta period. L. Koryakova (1996) suggests that some type of chiefly community emerged in the Middle Bronze Age as well, focusing primarily on chariot burials, fortified settlements, and intensive metal production. To varying degrees the other frameworks depend on the same evidence from the Sintashta period, especially ideas that intensive metallurgical production and chariot burials substantially contributed to the emergence of social complexity in the Eurasian steppe. Such factors are only a few in the developmental trajectories of pastoral societies, and these trajectories should be treated as an amalgam of vital historical processes. A solid foundation for evaluting these trajectories is establishing the basis for diachronic social change. This is done through a review of the evidence for differentiation from the Sintashta period to the Final Bronze Age.

2.3 SOCIAL CONTEXTS FOR INTER- AND INTRA-COMMUNITY CHANGE AND DIFFERENTIATION IN THE BRONZE AGE EURASIAN STEPPE

The Eurasian Bronze Age is characterized by a number of developments that appear in various regions and at different times. Some of the more commonplace developments include the: 1) appearance of more geographically mobile forms of pastoralism; 2) the advent of metal production, from arsenical copper to more complex alloying; 3) increased, possibly pandemic, warfare; 4) increases, if not institutionalization, of social inequality, usually in the forms of

socio-political hierarchy visible through the appearance of relatively elaborate chariot burials; and 5) a substantial demographic increase.

However, most of these developments are investigated through evidence gathered from burials or to a lesser degree from excavations of household structures. For complexity (and for that matter culture history) there are certain problematic arguments that need to be confronted. If, as stated earlier in this chapter, complexity is the overlap or interconnectedness between socio-economic and political practices, then its study would necessitate different fields of inquiry. For complexity to move beyond its current problematic association with social inequality, scholars will need to focus on complexity as the amalgam of processes that entangle not only centralization and differentiation but also history, community, and identity. To do this, a more plausible evaluation will need to move beyond a predominant focus on a society's or culture's mortuary practices or materials that are only associated with elite status, beginning with an evaluation of the current status of the historical development of complexity in Bronze Age societies in the southern Urals.

2.4 MIDDLE BRONZE AGE SINTASHTA PERIOD OF THE SOUTHERN URALS

The Middle Bronze Age of the southern Urals has been modeled not only as sometimes a chronological meeting of cultures, but also an admixture of various cultural groups (Anthony 2007, 2009; Koryakova 1996; Vinogradov 1995; Zdanovich 1997; Zdanovich and Zdanovich 2002) (Figure 2.1). This is represented most clearly in the overlapping territories of the Abashevo, Poltavka and the Sintashta (Anthony 2007, 2009; Koryakova and Epimakhov 2007). Despite the overlapping spatial representation of these cultural groups, we do not really have a

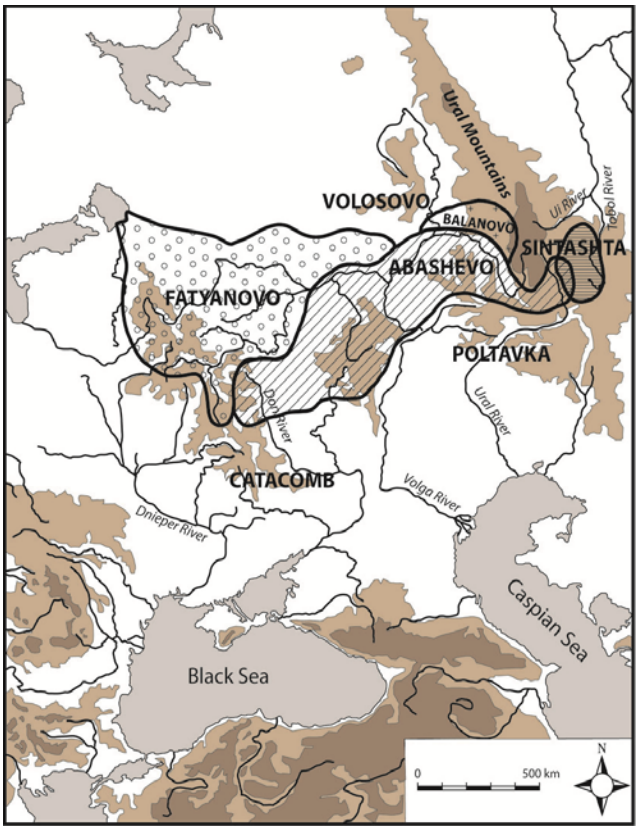

Figure 2.1. Distribution map of Middle Bronze Age cultural groups (after Anthony 2007: 379)

very good idea about the socio-political dynamics involved with these cultural groups. More often than not, such cultural groups are assigned to a group based primarily upon decorative and technical characteristics, such as pottery forms, decorative styles, and tempers used in the production of ceramics (this is discussed more fully in Chapter Six). Out of the Middle Bronze Age cultures listed above and the territorial focus of the dissertation, I focus primarily on the socio-cultural, political and economic developments of the Sintashta.

In 1969, V.F. Gening and colleagues began work in the Bredy district of Chelyabinsk oblast, uncovering a range of sites dating from the Mesolithic to the Middles Ages along the

bank of the Sintashta River, a tributary of the larger Tobol River. In 1972, V. Stefanov headed the first exploration of two of the main Sintashta burial mounds (Gening 1977; Gening et al. 1992). For the next few years, the broader Bronze Age burial mound cemetery complex was completely investigated, including those mounds identified as LBA. By the 1980s, V. Gening and G. Zdanovich continued to explore the settlement of Sintashta and its associated burial monuments (Figure 2.2). The eponymous Sintashta settlement site is characterized by its fortification elements, comprised of both an outer embankment and a moat/ditch. The settlement has two entrances each with a type of tower and palisade (Gening et al. 1992: 39-41). Koryakova and Epimakhov (2007: 68-69) suggest that this kind of complex fortification system is indeed characteristic of all twenty-two identified Sintashta settlements.

The internal design and architecture of the Sintashta settlements also is of great interest, and debate. Three organizational designs are identified – square, circular and oval (Zdanovich and Batanina 2002, 2007). G. Zdanovich and I. Batanina (2002: 123-124) discuss the associated symbolism between the geometric shapes of the settlements. Such symbolism, they argue, is connected to cosmologies of meaning representing participation in communities that were not necessarily tied to face-to-face interaction. They further suggest that the arrival of new populations that sought to break from tradition deliberately rupturing links with the past expressing hostility between temporal groups, as represented by their planography, in particular the “squares” against the “ovals” and “circles” (Zdanovich and Batanina 2002: 124 – 125).

The internal spatial organization of many of the Sintashta settlements conforms broadly to a few principles: an open area near or at the center of the settlement, household dwellings are located very close together, and that pathways are created between houses and residential blocks. For instance, Koryakova and Epimakhov (2007: 72) suggest that “residential blocks” are visible

given the architectural layouts. However, such residential blocks are visible only for a relatively small number of settlements, such as Arkaim, Kuisak, Bersuat, Sarym-Sakly, Rodniki,

Figure 2.2. Map of Sintashta settlement with earlier dwellings highlighted in lighter gray and later (most likely Late Bronze Age) dwellings in dark grey (after Zdanovich and Batanina 2007)

Andreevskoe, and Chernorech'ye, with such settlements cross-cutting the planographic divides (Zdanovich and Batanina 2002, 2007).

Furthermore, the generally accepted suggestion that settlement structures, often interpreted as houses, or dwellings, exhibit little differentiation in size does not hold up to closer scrutiny despite scholars suggesting overall similarities in size, usually between 100 and 200 m^2 (Gening et al. 1992; Zdanovich and Batanina 2007). A closer look at the settlement structures reveals

much wider variety than previously assumed, somewhere between 20 m^2 and 360 m^2, if not more (Figure 2.3). Even if we accept the 100 – 200 m^2 estimate, this is still a highly noticeable

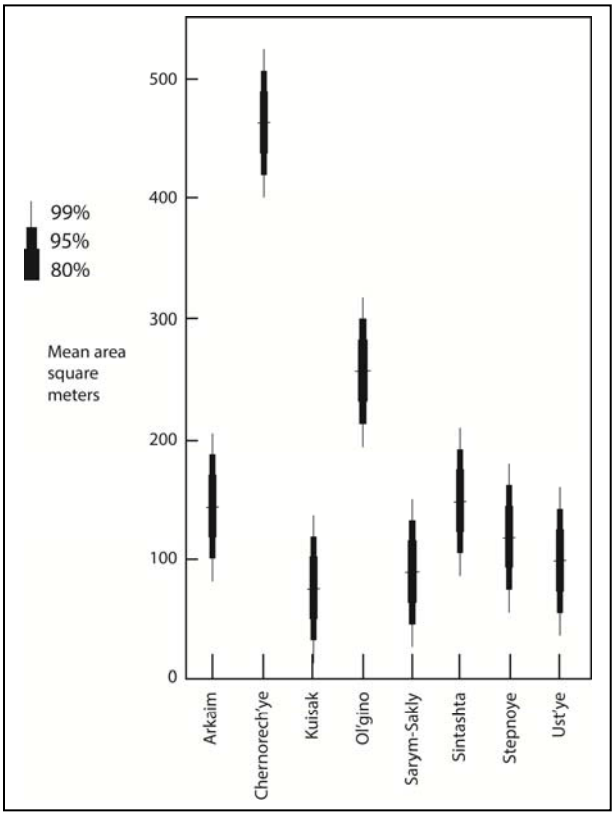

Figure 2.3 Average Sintashta structure sizes (derived from the largest and smallest structure sizes) for the settlements discussed in this dissertation

difference between overall individual structural area, with the largest being around four times the size of the smallest.

The proportional differences exhibited in Figure 2.3 demonstrate a much wider range of structure sizes for Sintashta period settlements than previously indicated. The data used for this are taken from the settlement plans found in G. Zdanovich and I. Batanina (2007). I assume that at least some of the structures in these settlements are not actually dwellings, but rather have

other purposes. In addition, B. Hanks (personal communication) has suggested that 'slump effect' for the dwelling depressions needs to be taken into account and negate the possibility for precise measurements of the structures. However, the point of Figure 2.3 is not to provide precise measurements, but rather to demonstrate that there is a much wider range of differences in dwelling size within and between the Sintashta period settlements than implied in many of the comprehensive studies of Bronze Age Eurasia (Anthony 2007; Kohl 2007; Koryakova and Epimakhov 2007; Vinogradov 2013). If we consider complexity to be rooted in differentiation, centralized or not, than Figure 3.3 illustrates a fairly narrow range of differences with some overall fairly consistent trends between the majority of the settlements with areas below 150 square meters, and two settlements (Chernorech'ye and Ol'gino, respectively) expressing dramatic differences from the others.

Probably the most widely used indicator of social complexity through differentiation is mortuary data in the form of the types and distribution of grave goods as well as treatment of bodies in cemeteries. For the Sintashta, grave goods assemblages focus on the discovery of a few items: chariots, stonehead maces and battle axes, and metal goods. Andrei Epimakhov (2002b) provides the most comprehensive catalog of the burials to date, even though now it is over 10 years old. To get a better idea of the complexity evinced in Sintashta burial practices, I provide the tabulated data gleaned from tables provided by Epimakhov (2002b) for five cemeteries: Arkaim, Kammenyi Ambar, Krivoe Ozero, Sintashta, and Solntze. To evaluate the proportional distribution of grave goods, I present a bullet graph to illustrate the differences within each cemetery and between the cemeteries (Figure 2.4).

The five settlements that cemetery data was collected for by Epimakhov include Arkaim, Ol'gino, Chernorech'ye, Sintashta, and Ust'ye, respectively. Different numbers of burials were

excavated at each cemetery, which is why I use a bullet graph to evaluate the proportional distributions of the goods within each cemetery recorded by Epimakhov. If I had set up the bullet

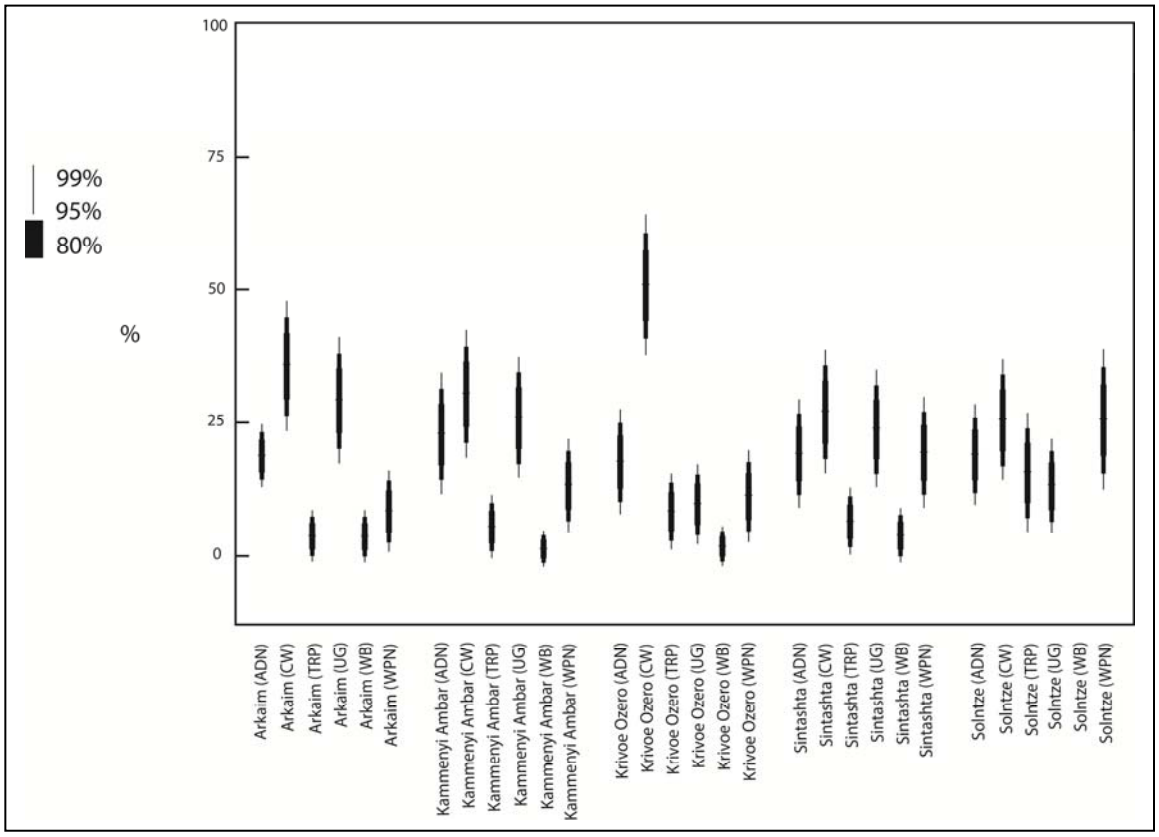

Figure 2.4 Bullet graph illustrating proportional differences between different categories of grave goods from five Sintashta period cemeteries (ADN: adornment/jewelry; CW: Ceramic Wares; TRP: Transport; UG: Utilitarian Goods; WB: Wooden Bowls; WPN: Weapons)(from Epimakhov 2002b: 124-32)

graph to be the proportional distribution of each category across the cemeteries, the distributions would be skewed in favor of more burials equaling more goods, rather than a more accurate evaluation of the distribution of specific categories in comparison to the rest of the categories within each cemetery.

The proportional differences expressed in Figure 2.4 indicate some intriguing differences and similarities in the burial patterns between the communities involved, and that there is a

moderate to high confidence level that the proportional distributions are meaningful. Interestingly, adornment (ADN) appears in similar proportions among all of the communities. Ceramic wares (CW) also appear in similar proportions among their assemblages, except for Chernorech'ye which exhibits a much greater proportional difference than the other cemeteries and we can say with a higher degree of confidence that the difference is meaningful. This category is discussed in detail in Chapter Seven, and indicates that the importance of ceramics for the Chernorech'ye community and the later populations that occupy the same area of the Ui River valley.

For all of the cemeteries there are similar proportional distributions between the categories of transport (TRP), including evidence for chariots and horses (cheek pieces and harness equipment), and wooden bowls (WB), except for Solntze which has no wooden bowls. These categories exhibit very little proportional differences between cemeteries but are found in much smaller proportions than other goods in each cemetery. In general, utilitarian goods (UG) are found in greater proportions than most other categories except for ceramic wares. Finally, weapons (WPN) are found in differing proportions among the cemeteries, with Solntze exhibiting much greater proportions of weapons than the other cemeteries.

Overall, there are only a few substantial differences in the cemeteries with the most conspicuous proportional difference being the ceramic wares found at the Chernorech'ye cemetery of Krivo Ozero (cf. Vinogradov 2003). The general trend between the cemeteries is a greater proportion of ceramic wares than utilitarian goods such as stone knives, chisels, pestle, awls, and spindle whorls appearing. Chariots too are only found in five cemeteries and the weapons found are somewhat ambiguous regarding their actual function. The sorts of "weapons" discovered in Sintashta burials include: daggers, bows and arrows, spears, and axes. The axes

may be the most unambiguous type as they are primarily battle axes. The rest (spears, bow/arrows, and daggers) can all be used for hunting or other activities.

Given that the Sintashta communities are modeled as highly differentiated based on the weapons and chariots found in the burials (Anthony 2007, 2009; Anthony and Vinogradov 1995; Jones-Bley 2000; Zdanovich 1997; Zdanovich and Zdanovich 2002), there is a conspicuous lack of evidence for clear expressions of differentiation and hierarchy. Based on differences in dwelling sizes and proportional differences exhibited in their burial practices, and in agreement with Koryakova and Epimakhov (2007) and D. Zdanovich (2002), there does not seem to be a great deal of differentiation among the settlements and cemeteries examined here. Only one community shows any conspicuous proportional differences in distribution of materials in burials *and* house size (Chernorech'ye) with another community exhibiting moderate proportional differences in terms of house size (Ol'gino). Bryan Hanks (2009: 150) suggests that the variability found in the mortuary record does not necessarily support the notion that there was a high degree of social differentiation and inequality in MBA Sintashta period communities.

Furthermore, Hanks (2009: 150-151) further suggests that no single model will fit the Sintashta period developments. For instance, based on embankments at each settlement, as well as weapons and chariots in burial, conflict has been proposed as one of the prime movers for the Sintashta cultural developments. Yet, the weapons in the burials are found in different proportions in the five cemeteries (Figure 2.4), the label of weapon may be applied too generously as the category includes many items that are ambiguous, including knives, bows/arrows, and spears. Perhaps most importantly, little or no osteological evidence has been recovered to support such a conclusion (Hanks 2009: 151; Judd et al. 2008; Lindstrom 2003).

Taken separately, the Sintashta developments seem rooted in everyday practices and structures that were not highly differentiated.

Robert Drennan et al. (2011: 166-67) suggest that based on existing evidence determining Sintashta community structure is a difficult task, and they highlight the socio-economic possibilities if centripetal links between demographically centralized populations and hinterland populations can be identified. Given the proportional distributions of the different artifacts in Figure 2.4 and the evaluation of differences in dwelling size from the settlements mentioned in this dissertation, there appear to be few examples of that exhibit strong evidence for social differentiation along these lines. Perhaps most importantly for this dissertation, is that Drennan et al. (2011: 169) state that chiefly social systems in the Sintashta period appear in very different forms from other case studies in the Eurasian steppe, such as the large settled communities of the Tripol'ye culture of Chalcolithic Ukraine. They further note that the systems in place for the Sintashta did not have any real permanence and that the regional populations declined considerably. This is one of the points that this dissertation seeks to explore...what happen to social systems in the later periods.

2.5 LATE BRONZE AGE CULTURES AND CULTURAL TERRITORY

By the end of the Sintashta period (ca. 1800/1700 BC), some of the fortified settlements that represent the most distinguishing feature of the Sintashta cultural groups began to fall into disuse while others continued to be used, whereas some others were re-used in the FBA. Only a few settlements, however, were completely abandoned while others were inhabited into the Petrovka and Alakul' phases of the Late Bronze Age (Figure 2.5, 2.6). These phases of the Late Bronze

Age, along with the Fyodorovo, and possibly later, the Final Bronze Age Sargary groups, have been conceptualized and investigated under the broader heading of Andronovo (Hanks et al.

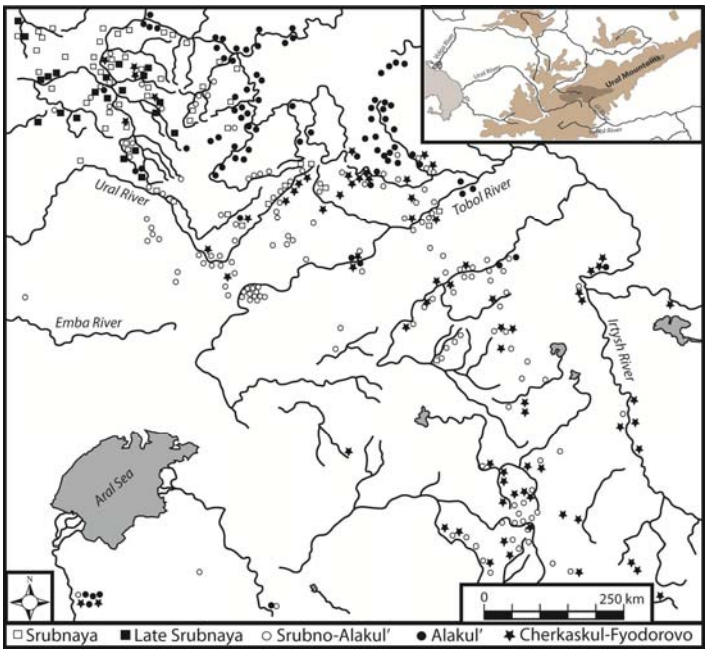

Figure 2.5. Broad distribution map of some Late Bronze Age cultural groups (after Koryakova and Epimakhov 2007: 113)

2007). The Andronovo has revolved around the timing and/or sequencing of this "family" of cultures.

Before I leap into a discussion of the social, political, and economic contexts of the use of tradition for legitimizing purposes which I cover in Chapters Four through Six, I briefly cover the Andronovo as I believe the focus on the Andronovo family of cultures continues to obscure the importance of societal developments during the Late Bronze Age and their connection to Sintashta communities.

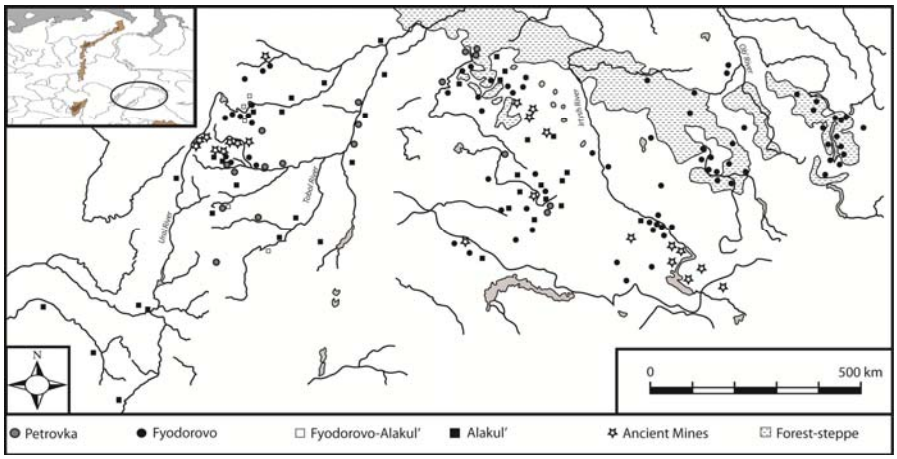

Figure 2.6 Distribution of Petrovka and Andronovo (Alakul' and Fyodorovo) sites in the southern Urals area, with ancient mines and forest steppe marked as well (after Koryakova and Epimakhov 2007: 125)

2.5.1 The Andronovo Problem – Culture or Cultural Horizon?

The idea of an Andronovo cultural entity was first introduced by A. Formozov in 1951, with the basis of the idea formed around Kossinna's tribal/ethnic formations and N. Y. Marr's theories regarding stadial evolution. Obviously, the idea of an Andronovo family of cultures is rooted in ethnogenesis, with successive cultures being borne out of its predecessor(s). Elena Kuz'mina (2007: 10) suggests that an archaeological culture is one that is:

> open, dynamic, statistically stable system of different types of sites that occupy a continuous territory with an objectively established unity of interconnected types, which develop uniformly over a long time period and vary in space in a limited manner, distinguishing this system markedly from other systems.

At the same time, Kuz'mina (2007) also recognizes the variability at the local and micro-regional levels, as well as the importance of technological production as a component in the foundation of cultural unity.

There are several problems with this, noted to a certain extent by Tkachev and Khavanskii (2006), mostly that there is a great deal of variation in pottery form and decorative style. While there maybe some similarities, and Tkachev and Khavanskii (2006) suggest that certain forms can be strongly correlated with the presence of certain decorative types, there still appears to be a wide range of variation, and this is taking primarily into account the burial ceramics. The material that would appear to signal its use by an ethno-cultural group may in fact be communities undergoing different social, political, and economic processes. This possibility seems to be under-valued in most culture-historical approaches as the concept of "culture" paints our study subjects with a veneer of ethnic, social, political and economic homogeneity that may not actually be present (this is covered more in Chapter Six).

This may partially explain why the Andronovo culture concept has been a work-in-progress. Different archaeologists have attached to it different sites and materials often through different dating schemes (Kuz'mina 2007). For instance, Koryakova (1996) has suggested that the Late Bronze Age Andronovo groups lack complex burial rituals seen through elaborate grave good assemblages, no monumental architecture, or complex rituals. We can assume that this is in comparison to the preceding Sintashta cultural groups that allegedly have all three of these in abundance. At the same time, and in a related manner to which we often characterize and model more mobile groups such as pastoralists, the Andronovo cultural groups are thought to have become more mobile and expanded to the east and west of the southern Urals (Frachetti 2008; Koryakova and Epimakhov 2007). This 'horizon' of development has become increasingly contentious, especially among Russian and other international archaeologists, as they seek origins for cultural and linguistic developments (Anthony 2007; Kuz'mina 2007; Mallory 1989). L. Koryakova and A. Epimakhov (2007) suggest that the Andronovo horizon link a large chunk

of central Asia. Because the Andronovo horizon is used as a blanket homogenous cultural identity that masks, obscures, or denies more complex forms of social organization for the pastoralists in the Late Bronze Age, I move now to examine the current understanding of Late Bronze Age social organization.

2.6 LATE BRONZE AGE SOCIAL ORGANIZATION IN THE SOUTHERN URALS

L. Koryakova and A. Epimakhov (2007: 151) suggest that the Late Bronze Age cultural groups subsumed local populations. This would seem to indicate a domination/resistance scheme not unlike those found in colonizing state scenarios. Yet, rarely is a discussion of the types of participation involved in such a scheme included and more closely evaluated. Only recently has someone mentioned the utility of investigating participation along these terms (Frachetti 2012). Frachetti (2012: 32) suggests that participation is a key element in his non-uniform institutional complexity model, one that indicates the likelihood, if not inevitability, of local variation in communities. At the same time, A. Ventresca Miller (2013: 123) suggests drawing upon Malkin (2011) that such processes are more similar to 'Hellenization' where local areas are colonized and brought under the sway of a (pan-) regional socio-political and economic entity. However, this maybe more like an 'imagined community' as originally conceptualized by B. Anderson (1991), as participation is neither mandatory nor necessarily state-directed and individuals generate a sense of community identity through participation in an often unrecognized form media and community consciousness.

A. Epimakhov (2002a, 2009) and M. Frachetti (2011) suggest that by the end of the Middle Bronze Age, Sintashta groups disperse becoming demographically and socio-politically less

centralized. A. Epimakhov (2009) suggests that Late Bronze Age communities became less differentiated while also becoming increasingly dependent on kinship organization principles. This may be true when compared to Sintashta burial patterns that emphasize high status mortuary practices, especially in male burials, as well as female grave assemblages including ornamentation and dress (Hanks et al., forthcoming; Kupriyanova 2008:142-147). Interestingly, Elena Kupriyanova (2008) notes that it is during the Late Bronze Age, in particular the Petrovka and Alakul' phases, that there is a general increase in the deposition of bronze ornamentation for women. This is in stark contrast to the more judicious deposition of these materials in the Sintashta period burials. This leaves us with some very perplexing problems in terms of social complexity, in particular when evaluating the connections between social differentiation, settlement patterning and demography. While the Sintashta periods have captured and retained the interest of Russian and international scholars, there seems to be an equal, if not greater, amount of problems with understanding the social and political organization of the LBA, as well as possibly more compelling evidence for complex social organization.

Despite this still under-studied possibility, Epimakhov (2002a: 145) states very strongly that the Late Bronze Age Alakul' socio-political organization was "characterized by the absence of socially diagnostic features: the traditions of monumental architecture are forfeited, the concentration of population on the local territories, and the number of artifact indices and armament are reduced." He further suggests that these changes were not produced by external factors but rather were the result of internal, evolutionary pressures (2002a: 145). Some of the basic demographic principles for socio-political development include competition over resources and/or territory occurs when certain demographic thresholds are hit (i.e., population pressure and/or social crowding); economic collapse due to overexploitation of said resources/territory

also has a direct correlation with increased population levels; warfare as an outlet for socio-political competition also can be seen to have roots in demography, i.e., the more people there are, the more likely people are to interact socially, politically, and economically and that eventually competition and conflict are increasingly likely to arise.

Despite a robust history of kurgan excavation, there is little agreement as to the degree and nature of social differentiation exhibited in Alakul' funerary rites. Such rites are almost entirely made up of inhumations and include the infrequent burial of children in both house floors and in kurgans, the interment of adults both males and females, sometimes together facing each other. Alakul' burial grounds are numerous, with the largest encompassing dozens of burial complexes (Matveyev 1998; Potemkina 1985). Individual burial mounds can contain up to 40 or 50 graves, with the mounds themselves averaging 20 m in diameter and 1 m in height (Stefanov and Korochkova 2006). Grave assemblages from Alakul' burials often contain: pottery, elaborate ornaments, including bracelets, pendants, and metal headdresses (Korochkova and Stefanov 2004; Kupriyanova 2008; Usmanova and Logvin 1998) (Figure 6.1). In at least one case, a chariot is buried with an individual presumed to be a male.

More specifically, Alakul' settlements reach sizes of 1 – 3.5 ha and are usually located on river terraces, near large valleys (Potemkina 1985). While the Late Bronze Age in general is often characterized by a steady decline in inter-societal conflict (Epimakhov 2009; Koryakova and Epimakhov 2007), fortifications (or embankments) on an Alakul' site were discovered at the Kamyshnoye II settlement (Potemkina 1985). By now the identification of "fortifications" in both the Sintashta period and the Late Bronze Age should be in question. Is it possible that there might be other reasons to enclose a settlement? This is discussed briefly in Chapter Four.

The overall spatial organization of the Alakul' settlements matches fairly closely the Petrovka settlements, with a linear street layout with rows of dwellings running parallel to whatever river the settlement is on (Potemkina 1985, 1996; Stefanov 1996). Alakul' houses are often between 140 – 270 m^2 in area and were semi-subterranean in nature. Wells, storage pits and hearths (sometimes multiple of each in a single house) are also found in Alakul' dwellings (Epimakhov 2010). Evidence for metallurgical activities is also a common feature in many Alakul' dwellings, including furnaces and metal production implements (Figure 6.13).

Clearly, metal production is important not only for Sintashta populations, but also in the Late Bronze Age and later. This is exemplified by the Late Bronze Age (Alakul'- Srubnaya) site of Kargaly in the southwest Urals. Kargaly, and its associated residential settlement Gorny, is a copper ore mining and production center in the Orenburg Oblast' (Chernykh 1997, 2002). The ore deposits are spread out over a 500 km^2 area, with the richest deposits found in the Ural River basin. E. Chernykh (1997) notes that mining must have included open air shafts, or surface mining, often evinced by pits and spoil heaps of production waste, i.e., slag, etc. Kargaly exhibits unprecedented levels of production in the area, and offers the best evidence for a scale of metal production that could have been used in broad, inter-regional trade and exchange systems. The Gorny settlement (1650 – 1330 cal. BC) itself bears evidence of such productive activities through house structures, smelting yard, a smelting prep area where different minerals were sorted, a ritual or sacred shaft, and a refuse dump (Chernykh 1997). In addition, Chernykh (2004: 19) notes that Kargaly was a powerful center with its trade and exchange activities oriented towards the west. Chernykh (2004: 235) also compares Arkaim with Gorny (Table 2.1). Not only is Gorny approximately 4 times larger than Arkaim, but there is abundant evidence suggesting

Table 2.1 Table comparing archaeological materials from Sintashta period Arkaim and Late Bronze Age Gorny (after Chernykh 2004; Hanks 2009)

Variables	ARKAIM	GORNY
Site Area in Hectares	1.7 - 1.75	3.5 - 4.0
Excavated Area (sq. meters)	8055	892 (main site)
Sherds : Vessels	9000:304	~11000:755
Copper samples : Objects	?: ~15	3131: ~400
Casting Moulds	?	172
Stone Hammers	~40	1184
Slag (pieces)	?	4416
Animal Bone Fragments : Bone Artifacts and Half-finished items	11834:?	~2250000:18000

that it is much more densely populated (pottery sherds found – Arkaim: 9000 to Gorny: around 110,000). While sites such as Kargaly provide ample evidence for large or massive-scale intensive craft activities, perhaps community-based specialization, the degree to which this is connected to social complexity as an amalgam of historical processes has been less well-studied. A. Epimakhov (2009: 87) suggests that Late Bronze Age communities developed more along the lines of kinship and other horizontal factors, with little evidence for vertical (status-related) developments. Given the comparison of Arkaim and Gorny and the increase in social differentiation and wealth visible in the deposits of bronze goods in female burials, the Late Bronze Age appears to be more complex than previously believed. The complexity of Late Bronze Age social organization needs to be (re)evaluated in terms of historical traditions adopted (or not) by each community.

2.7 FINAL BRONZE AGE SOCIAL ORGANIZATION IN THE SOUTHERN URALS

In the southern Urals, the Final Bronze Age is closely associated with the Sargary cultural group(s). S. Zdanovich (2003) notes that the Sargary occupied a large swath of steppe and forest-steppe between the Tobol and Irtysh Rivers. She also suggests that for the Sargary, there are at least two settlement and house/dwelling types (2003). The first consists of larger settlements containing dwelling depressions, similar to the Sintashta and Late Bronze Age groups. These houses are up to 200 m^2 in size, with up to several dozen in a settlement. The other type is represented by smaller settlements, sometimes up to 2.5 ha in area, but with household dwellings represented as surface scatters of artifacts, usually pottery. L. Koryakova and A. Epimakhov (2007: 163) suggest that these settlements/household dwellings were most likely inhabited seasonally, perhaps as a part of the cyclical movement of large herds of animals. Furthermore, there is no patterning to the spatial organization of the Final Bronze Age settlements, but are highly concentrated in clusters (Zdanovich 1983). In addition, Final Bronze Age mortuary practices are usually non-differentiated with grave good assemblages consisting of bone tools, pottery, and numerous metal goods such as daggers, arrowheads, as well as some lithics.

S. Zdanovich (2003) suggests based on the settlement evidence known for the Final Bronze Age that Sargary populations practiced yearly herding, with one part of the community engaging in the movement of the herds around the stationary part. The other part of the community would have stayed in place, took care of dairy animals and participated in other domestic craft activities. Importantly, it is also during this time that the first reliable evidence for the domestication and cultivation of cereals is found. Evdokimov (2000) and Zdanovich (2003) have both documented finds in the form of agricultural tools such as sickles, pestles, grinding stones, and stone hoes.

L. Koryakova and A. Epimakhov (2007) note, however, that there is little to no evidence for socio-political organization in Sargary groups. They suggest that these groups were less demographically populated than their Sintashta and Late Bronze Age predecessors. In addition, there is little evidence in the forms of wealth differentiation by households, either in settlements or in burial practices. At the same time, Koryakova and Epimakhov (2007: 168) also propose that "we should not interpret the modest character of the Sargary culture as a reflection of lineal degradation". While it seems fairly clear that in comparison to the Sintashta and the Late Bronze Age, the Final Bronze Age demonstrates less complex forms of social and political organization, this does not mean that the Final Bronze Age was completely devoid of complexity, but rather that communities in this period while becoming increasingly dispersed also carried on with traditions from previous periods. The degree to which these traditions played a role in Final Bronze Age social complexity has yet to be investigated.

2.8 CHANGE AND CONTINUITY FROM THE SINTASHTA PERIOD TO THE FINAL BRONZE AGE

What becomes clear in this chapter is that centralization and differentiation are two of the major components being discussed by both regional and international scholars, while history, community, and identity are often only implied. In terms of the Sintashta, models like the proto-urban Country of Towns seem to have little basis, and even the degree of differentiation as expressed in the mortuary practices is debatable. If as Susan McIntosh suggests that many investigations of complexity are centered on centralization and differentiation and that archaeologists should also consider how diffuse, segmentary, and heterarchical societies may develop considerable complexity (1999: 4). This creates a dichotomy with

centralization/differentiation on the one end and decentralized/heterarchy on the other. This dissertation treats these factors as parts of a historical process, and if we evaluate how such factors changed (or not) over time through the establishment and later development of various traditions, we gain a better perspective on social complexity. The rest of this chapter lays the foundation for the evaluation of three traditions (demography, landscape, pottery use) as explored in Chapters Four, Five, and Six, respectively, that begin with the Sintashta traditions and move onto evaluation later changes to these traditions during the Late Bronze Age, and finally the use of or changes to those traditions in the Final Bronze Age of the southern Urals.

Before doing that, however, we need to reconcile the timeless nature of pastoral societies and social complexity with a field methodology that while still 'site-focused' seeks to move its analytical focus beyond any particular settlement or burial mound to a broader, landscape-oriented approach. This may be because common Anglo-American archaeological conceptual and methodological tools, such as landscape archaeologies and systematic regional survey, have been under-utilized in investigations of pastoral societies (though this is changing in other parts of Central and East Asia; see Chang 2006, 2012; Drennan and Dai 2010; Honeychurch 2009; Houle 2010; Wright 2006). Excavations of burial mounds and single settlements remain the preferred method for investigation of both local and regional socio-political organization in the Eurasian steppe, with regional-scale studies taking a proverbial back seat and leaving the actual scale and degree of complexity in living communities largely speculative.

3.0 METHODOLOGY

This dissertation builds conceptually from the suggestion laid out in Drennan et al. (2011: 150, 153-54); Drennan and Peterson 2011: 71-79) that middle range societies, such as chiefdoms, be considered a process rather than a evolutionary type and that such processes might be investigated through data threads including: supra-local demographic density and scale, demographic centralization, and degree of productive differentiation. To best address the questions presented in Chapter One and to evaluate the historical relationships between demographic centralization and pastoral social organization discussed in Chapter Two, regional archaeological pedestrian survey and its results are adopted as the primary in-road into the theoretical issues with which this dissertation research engages. Systematic pedestrian survey has never been incorporated into the fieldwork strategies of the various projects in the southern Urals until SCARP's initiation of a pilot survey in 2009, which I supervised. Until then, survey had been conducted along opportunistic lines, focusing primarily on eroding riverbanks or other areas likely to yield archaeological materials. This over-reliance on sites in "predictable" areas contributes to conventional notions that archaeological sites are only found in proximity to rivers or other water sources. While I certainly do not disagree with the well-founded notion that archaeological sites can be found in abundance near water sources, one of the methodological points of this dissertation project is to think outside of those parameters and identify archaeological sites that had not been found due to limited field methodologies. In other words,

if the prevalent notion is that archaeological sites are found only or in much greater densities near water sources, but no one investigates varying distances away from those water sources, then we can say with a high degree of certainty that we actually have no idea what the site distribution will be like away from those water sources. In this and following chapters, I illustrate the potential for systematic archaeological survey in the southern Urals region that can bridge the lacunae that exist regarding demographic centralization and social differentiation involved in social complexity during the Sintashta period through Final Bronze Age.

3.1 PREVIOUS WORK IN THE VALLEY

Since 2007 SCARP has undertaken a multi-disciplinary investigation of the subsistence and productive economies and socio-political organization of individual Sintashta settlements. Using portable HHpXRF surveys across four (Stepnoye, Chernorech'ye, Ust'ye, and Kizil-mayak) of the twenty-two settlements SCARP directors aim to identify the degree of variation in both scale of metal production as well as techniques used in metallurgical activities. The results of the HHpXRF surveys indicate a much smaller scale of metal production at Stepnoye and Ust'ye previously believed for Sintashta communities (Doonan et al. 2014). Local historic (and possibly prehistoric) mines were also identified in each of the settlement catchments and based on the analyses of slags collected at each of the sites as well as copper objects recovered from burials associated with the settlements, there is a greater amount of variation in metallurgical techniques and resources used in the production of metals at both settlements (Hanks et al. 2009; Doonan et al. 2014; Pitman et al. 2013; Pitman 2014).

Along with the HHpXRF surveys and excavations at Stepnoye, a small pilot pedestrian survey (approx. 180 hectares) of plowed fields located southwest across the river from the Sintashta period Stepnoye settlement was conducted in 2009. That season's survey led to a variety of important, if not compelling, results. Lithics (n = 184) were found, with most belonging to the Neolithic/Eneolithic periods. One partial MBA projectile point was also recovered, with a dense scatter of flakes (n = 68) exhibiting all stages of core reduction, as well as finished tools in a 90 m^2 area. In addition, a dense concentration of what have been tentatively identified as pottery testers or wasters (n = 283) was discovered in a 200 m^2 area approximately

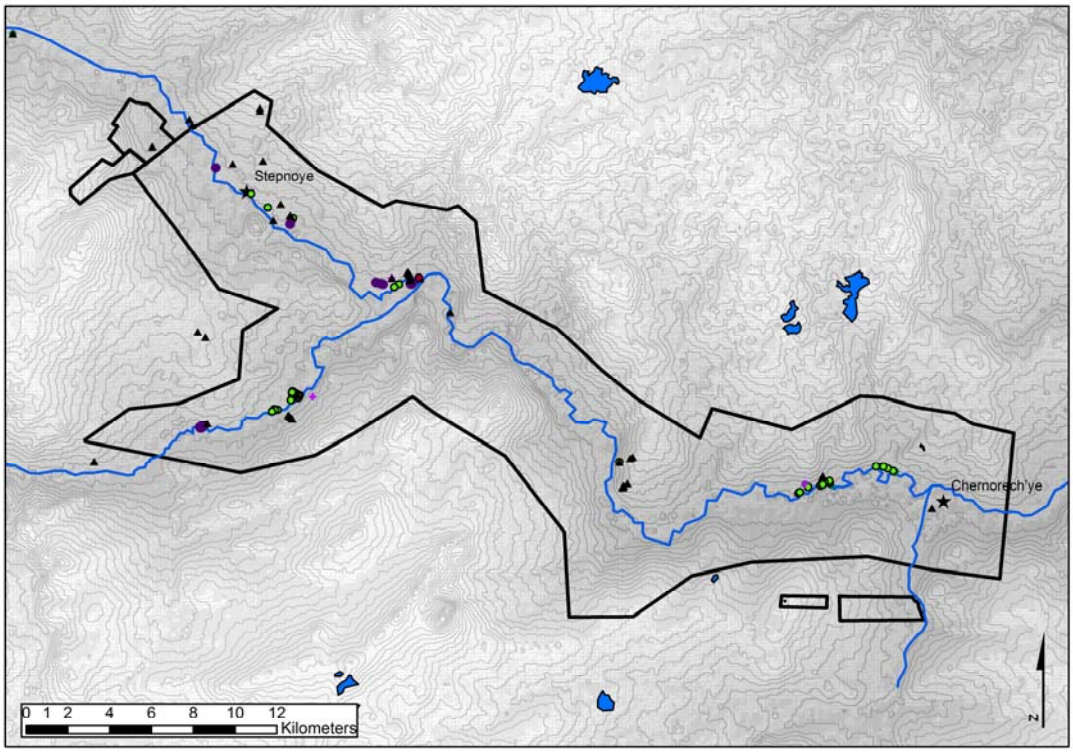

Figure 3.1 Sites identified during Elena Kupriyanova's earlier surveys of the Ui River valley. Site type designations are: black triangle - kurgans/kurgan cemetery, light purple crosses Late Bronze Age menhir, purple dot - habitation site, green dot - individual find

200 m from the flake scatter. Pottery sherds were also found (n = 165), with Middle Bronze Age sherds (n = 2), Late Bronze Age (n = 54) and Final Bronze Age (n = 19), with the rest identified as either Bronze Age or prehistoric. Overall, 11 new 'sites' and 3 clay deposits within the Stepnoye area were identified.

The 2009 field survey followed up on the targeted surveys conducted by E. Kupriyanova (Chelyabinsk State University) along the north bank of the Ui River and the environs of the modern village of Stepnoye during 2000 and 2001 (Figure 3.1). B. Hanks, E. Kupriyanova, N. Batanina, and myself resurveyed this area in 2009 so that Global Positioning System (GPS) coordinates (using a handheld GPS – Garmin eTrex Legend) could be noted for each previously recorded 'site'. A total of 59 sites were recorded during the 2009 season, although many more points were taken with the GPS and recorded as individual finds (Figure 3.1).

The surveys conducted by Kupriyanova proved instrumental in first investigating the spatial patterning of the Ui River valley. E. Kupriyanova (2000) first identified some of the major sites that during the 2011 survey would be further documented. In addition, it is due largely to her work in the valley that we have any idea of the contents of the Bronze and Iron Age mortuary and ritual landscape. While the dissertation deals primarily with the habitation sites, the concentration of ritual monuments in some areas of the valley lends support to some of the results of the demographic and spatial analyses present in later chapters.

3.2 2011 SURVEY BETWEEN SINTASHTA PERIOD SETTLEMENTS

The cumulative results of SCARP fieldwork indicates possibilities for a much greater degree of autonomy between Sintashta communities with a greater focus on local subsistence and

production economies (Doonan et al. 2014; Johnson and Hanks 2012). A larger scale pedestrian survey was written into the original SCARP NSF proposal and planned for the 2007-2010 field seasons. The survey was originally designed to survey the community catchments to develop a better understanding of the socio-economic dynamics between craft producers located in the fortified settlements and possible processing locations (and populations) dispersed throughout the catchments of Stepnoye and Chernorech'ye in the Ui River valley.

Using the SCARP pilot survey as my base, I was awarded a NSF Doctoral Dissertation Improvement Grant (BCS# 1034903) in 2010 to investigate diachronic changes in Bronze Age population distributions, densities and demographic composition in relation to socio-political transformations in southern Russia. Utilizing a regional scale pedestrian survey and surface collection, I sought to determine the nature of social change as it is related to community development through demographic centralization. Such relationships are traditionally used to illustrate processes, such as urbanization, as well as the emergence and development of socio-political complexity among early sedentary societies. Only recently has intensive regional pedestrian survey been implemented to investigate similar, but much smaller-scale, social, economic and political developments in (agro)pastoral societies (Chang 1992, 2006, 2008; Honeychurch 2004; Houle 2010). My dissertation fieldwork represents a rare opportunity to conduct regional systematic survey and surface collection to evaluate diachronic demographic, social and economic changes in communities most likely containing both sedentary *and* mobile groups, along with possible hunter/gatherer/forager and pastoral components.

The 2011 survey was conducted between May 12 and August 4, 2011. The survey was conducted in two blocks located along the two major rivers in the region, the Ui River and the Kurasan River. The largest of the two blocks is the area between Stepnoye and Chernorech'ye,

approx. 20 km long and 4 km wide, and was surveyed in two stretches, the south and north banks, respectively (Figure 3.2). This allowed for each side of the river to be systematically surveyed, 2 km on each side with transects running north/south or with turns of the river, east/west. Transects were started as close to the river as the team could get depending on vegetation, with an initial waypoint taken at the start and one taken at the end of the 2 km transect. Based on the results of the previous 2009 pilot survey, with the majority of sites located within a 1 km of the rivers and even more sites being located within 500 m, it was thought that 2 km on each side of the river would allow for the survey team(s) to encounter, identify and record the sites within the survey zone.

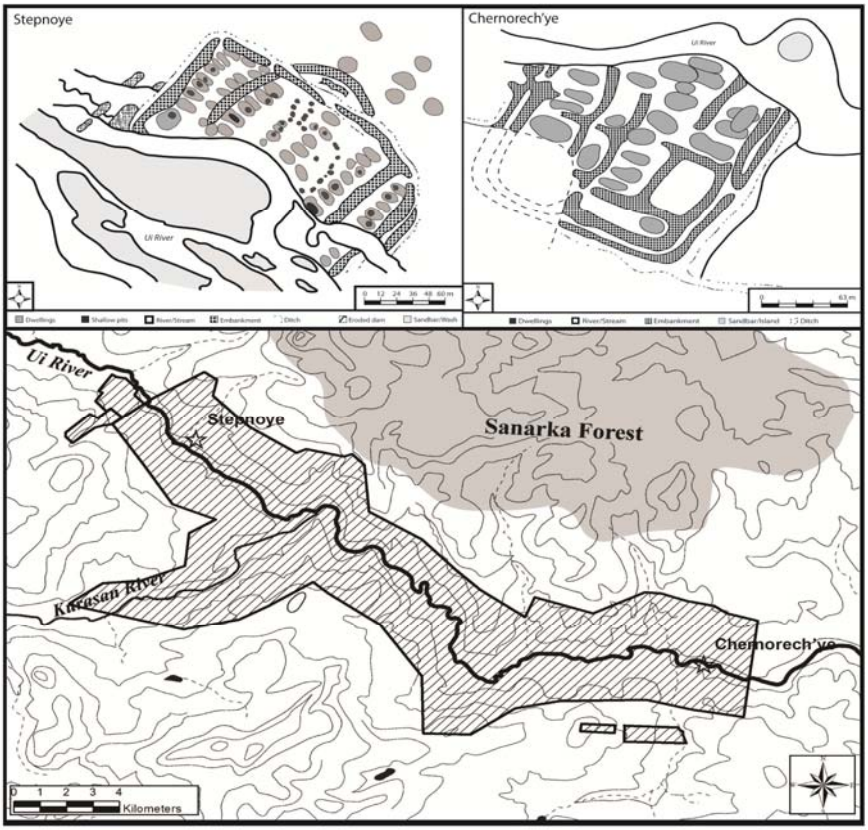

Figure 3.2 Survey zone with Sintashta period enclosed settlements of Stepnoye and Chernorech'ye marked by stars with plan views of settlements provided as well (after Zdanovich and Batanina 2007)

The 2011 field personnel consisted of one team of students and volunteers (usually ranging between 4 and 8 team members) from the University of Pittsburgh, Chelyabinsk State University, University of Sheffield and the University of Southampton. In addition, locals from the modern village of Stepnoye volunteered in the survey to make certain that a minimum of 100 km^2 would be surveyed by the project end date. All students had archaeological experience either through US, British, or Russian field schools or worked with me during the 2009 pilot survey. Transect intervals were spaced 50 m apart so as to allow for the full study area to be surveyed within the project dates. At 50 m apart, it was thought in the original NSF grant proposal that team members (between 10-12 people) would ideally need to walk only 2 km to cover 1 km^2 per day. Even if conditions required reducing transect intervals periodically due to vegetation, only a maximum of 4 hours of walking per day would be involved. If 1 km^2 produced an average of 2.75 sites, as was recorded during the 2009 survey, and each area requires about 1 hour to record (averaging small and large sites), another 3 hours of work per day would be involved. It was also suggested in my NSF grant proposal that given the relatively sparse nature of the surface scatters recorded during the 2009 survey (.12 sherds/m^2), an intensive, systematic collection strategy would be implemented for identified sites, with 100 m^2 collection units implemented for each site. With such a strategy in place, and with 8 hour work days, the team covered at least 2 km^2 each day, making possible the approximate total survey area of 142 km^2 in the three months allowed to complete the survey.

The original field methodology was altered during the first week of the 2011 survey. While the transect intervals were kept at 50 m, collection unit (CU) grids were expanded to 100 m by 100 m with team members walking 100 m long transects 2.5 m apart. Collection unit numbers were assigned to groups of collected finds. Single sherds from historic periods were not assigned

CU numbers and were treated as single finds. Orange pin flags were used to mark the location of each find. Recording each CU took between 15 minutes to an hour, though the largest of the CUs (66, 67, 89 and 91) took multiple hours. While the original plan was to document the center point of each collection unit using a GPS unit, with their spatial extent recorded by hand on satellite imagery (at 15 m resolution), in consultation with our Russian colleagues it was noted early in the 2011 field season that this would be insufficient for the needs of the project as well as our Russian archaeology permit. First, the resolution needed for the satellite imagery was not available or was prohibitively expensive. Second, as the majority of surface scatters identified during the 2011 survey usually consisted of 3 – 15 finds (almost always pottery sherds and/or lithics) we decided to use the GPS to document the spatial location for each find and to later use ArcGIS 10 to draw polygons to illustrate the spatial extent of the scatter and to determine the overall shape and area for each site. Other information such as terrain, surface visibility, disturbances, and preservation conditions were also recorded for each site. In addition, location of resources such as possible lithic and copper quarries, clay deposits, and evidence of prehistoric and historic mines were recorded when possible.

3.2.1 Surface Visibility and Recording Scheme in Survey Area

Perhaps one of the most significant issues for the 2011 survey was ground visibility. During the 2009 pilot survey, I recorded varying field conditions in the survey area between mid-June to the end of August, with ground visibility ranging between 10 – 100%. This also held true for the 2011 field season. However, in the 2009 field season, at least half of the southern bank of the Ui River (up to the 2 km away) had been plowed and planted, while in the 2011 field season, very few hectares along the Ui River were plowed. Although an initial concern once the team arrived

in the field, we worried a lot less as the survey was conducted in either steppe grasslands that had at one time or another been cultivated or in currently cultivated fields; visibility of surface artifact scatters ranged from poor (but still visible – 15%) to excellent (100%). There were four areas that were encountered where surface visibility was 0% as the vegetation was too dense, with these areas being highlighted on with their total area being deducted from the total area surveyed.

Two km transects provided enough distance from the river to actually, though unintentionally, cover the different environmental zones. The low green vegetation areas were located near the river and dry sparse vegetation, except for steppe grass clumps, were located approximately 500 meters away from the rivers. To the north of the Ui River valley, starting roughly 1 km away, was the beginning of the forest steppe, which had a thick but not impervious undergrowth of steppe grass in between stands of coniferous and deciduous trees (Figure 3.3)..

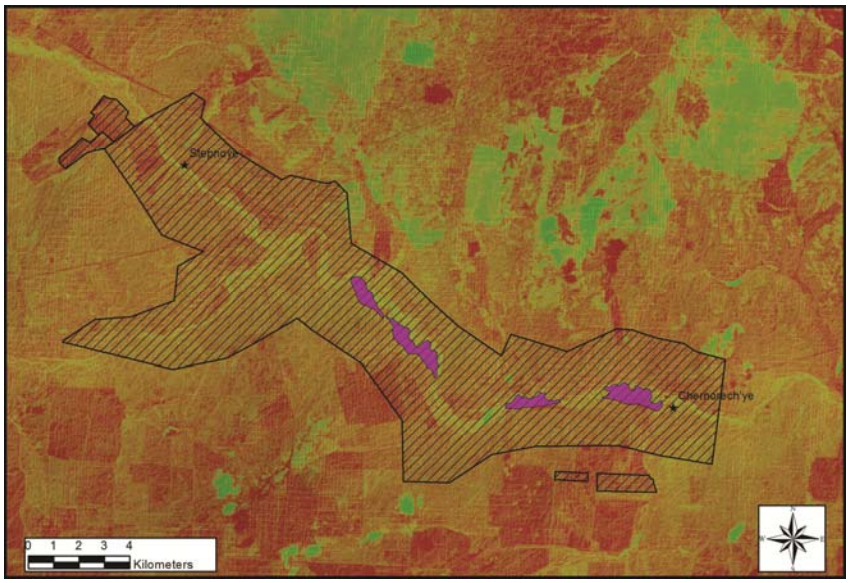

Figure 3.3 Survey Zone with Landsat 7 image superimposed over a DEM to highlight differences in vegetation (denser areas of vegetation marked in green, more recently plowed areas marked in red) and the minimal elevation differences in the Ui River valley. In addition, non-surveyed areas are highlighted in purple

There were only four instances where survey along the river had to be abandoned due to the thick growth of brush and grass. Despite this, approximately 142 km^2 was covered in the survey. Differences in elevation on the sides of the river were negligible, especially on the Kurasan and the western half of the Ui, whereas within the eastern half of the Ui river survey area, differences in elevation were more noticeable. Slopes along the Ui River between Stepnoye and Chernorech'ye were not very steep except in one area where the Kurasan merges with the Ui.

Overall, visibility was within acceptable ranges often between 20 - 90%. Curiously, this dropped dramatically to 0% visibility over the Sintashta period settlement of Chernorech'ye, which is covered in grass. No materials were collected during the focused survey over Chernorech'ye. Despite better visibility over Stepnoye due to the discontinuous clumping of steppe grass over the site no materials were recovered during the focused survey over Stepnoye. This has led me, and my committee members, to a conundrum regarding the lack of materials over clearly occupied sites. This might be due to being picked over given all of the tourists that go out to the site or camp near it, at least for Stepnoye. Unfortunately, as shovel testing or deep raking (removing sod or clumps of steppe grass and raking to 3 or 4 cm below surface) was not allowed. Thus, until some sort of surface exploration utilizing one of these techniques at Chernorech'ye is done, we will be left with important questions that desperately need answering...why were no sherds found on the surface at Stepnoye and, if the sod was removed at Chernorech'ye, would we find sherds? For now, those questions (and answers) will have to wait until it becomes permissible to explore Chernorech'ye through shovel testing or deep raking.

In the 2009 field season, I met and interviewed several local farmers to determine the scheduling of plowed fields and to obtain permission for pedestrian survey in plowed fields (as plowed fields comprised 40 – 50% of the south bank of the Ui River and the east bank of the

Kurasan River during that field season). Bryan Hanks, in a separate trip to Stepnoye in February 2011, worked out many of the logistics for the SCARP teams that would begin arriving in May, starting with the survey team. In 2011, Dmitri Zdanovich and I met with local administrators from Stepnoye and Chernorechye to gain final permission for the survey. Permission was granted and areal extents of each administrative district discussed. Materials collected during the 2011 survey were processed at the field house in Stepnoye. Each find was recorded using my GPS handheld unit, documented in my field notebook, and then placed in a bag with the name of the project, initials of the recorder, the date, GPS waypoint number, spatial coordinates and elevation, description (count and type of finds), and CU number. During the walking of the collection unit each find was marked with a blaze orange or fluorescent pink pin flag. The collection unit was then photographed with flags in place and then finds were collected. Finds were brought back to the field house, assigned a lot number by waypoint, labeled, weighed, measured and finds as a collection unit were then photographed. Each find has been recorded first in the field note book with spatial coordinates, elevation and brief description, then once a lot number has been assigned to each waypoint documented in the lot notebook. Lots are assigned as follows (last two digits of year of collection 11, collection unit number, e.g., 001, and then the waypoint, e.g., _1200 for a complete Lot label of 1101_1200). Finds were assigned relative temporal categories (Early Bronze Age, Middle Bronze Age Sintashta, Middle Bronze Age/Late Bronze Age – Petrovka, Late Bronze Age – Alakul', etc.) by E. Kupriyanova and D. Zdanovich and this information was also recorded on each find bag.

Preliminary measurements and weights were documented for each of the finds from the CUs as well as for the whole, more in-depth analyses of both ceramics and lithics were conducted between September and October at the Arkaim Center in Chelyabinsk, Russian

Federation and the dig house in Stepnoye. In 2009, I conducted a preliminary paste composition analysis of a small sample of Middle through Final Bronze Age ceramics (n = 13). This was expanded upon during the Sept. - Oct. 2011 study period. As the majority of sherds recovered during the course of the survey were non-decorated, paste composition analysis, with a primary focus on type, mixes, density and location of temper, revealed some important differences in paste composition. In addition, I also focused on thickness, sherd exterior, interior and core colors, as well as decoration. Lithics were examined by thickness, weight, color, size, utilization, typology, and use wear patterns. Faunal remains were recorded, counted and weighed and then analyzed using Number of Individual Specimens Present (NISP). In addition, species or at the very least size of the mammal was recorded, when possible. The lithic and faunal data appear in the appendices.

Spatial data were collected originally as GPS waypoints, with each point recorded in my field notebook including coordinates and elevation, number of finds per waypoint (some waypoints had more than one find due to the resolution of the GPS {4 – 5 m}), date of collection, initials of recorder(s) and the type of find (ceramic, lithic, slag, etc.). These data were then recorded at the field house with a separate lot number per waypoint with a longer description of the finds, including time period and type of find(s) including flake, tool, etc. Spatial data (distribution of waypoints) were later synthesized and analyzed using Geographic Information Systems (GIS) (ArcGIS – ArcMAP/ESRI software) on my personal computer. Satellite imagery was collected using United States Geological Survey (USGS) – Earth Explorer. Most imagery consisted of declassified, archived Landsat Imagery as well as digital elevation (DEM) and shuttle radar topography mission (SRTM) imagery. Furthermore, base maps were procured from the ESRI home site.

3.2.2 Test Excavations

Test excavations began mid-July and continued until August 4th, 2011. Twelve 1 m x 1 m test units (Test Units 1 – 12) were excavated to sterile, and a thirteenth unit dug to 30 centimeters below surface (Results of which are discussed in Chapters Five – Seven). Test Unit 13 was closed due to heavy soil disturbance. Test units were placed in or near sites previously identified in the 2009 and 2011 surveys. Units were excavated in arbitrary 10 cm levels or until a noticeable soil change. All excavated fill was sieved through 1/4" screens. In addition, soil samples from features were taken for flotation in hopes of collecting micro-finds.

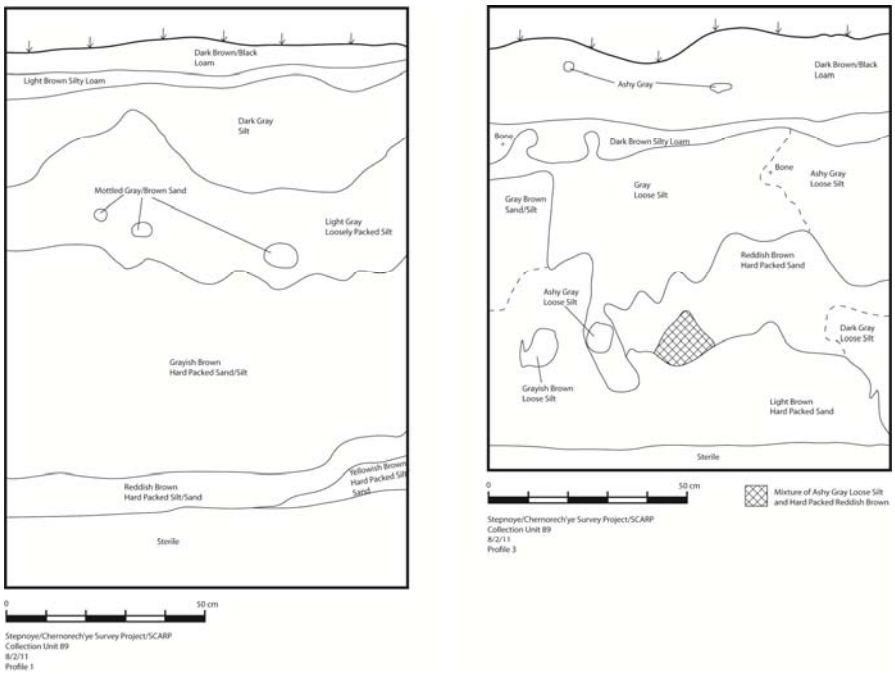

Figure 3.4 Profiles excavated into eroding riverbank at site 89/Chernorech'ye 2. Profiles demonstrate the multi-component nature of the site

We used a 1/8" mesh that was obtained at a local shop in the Stepnoye village. Profiles and plans were drawn for each unit and photographs of each level, including a final unit photo, were taken

(Figure 3.4). Finds from each level were collected in separate level bags marked with excavator and recorder, date, test unit number and location, as well as number and types of finds.

3.3 DISCUSSION OF CHRONOLOGY

The chronological framework for the Sintashta period to the Final Bronze Age is not quite as well-developed as it could be. While previous chronologies have been relative in nature following along visible changes in ceramic traditions, conventionally following vessel form and decoration, only recently has an extensive radiocarbon dating program been initiated. Hanks et al. 2007 (see also Epimakhov et al. 2005) initiated a region-wide absolute dating scheme based on radiocarbon dating (see below). Yet this is the first attempt at providing a set of absolute dates with which to "ground" or shore up the relative dating schemes.

Thus the Sintashta period is estimated to be between 2050 - 1700 cal. BC, the Late Bronze Age Alakul' - Fydorovoka period (and their permutations) is estimated to be between 1900 - 1500 cal. BC, and the Final Bronze Age 1400 - 800 cal. BC. This fits roughly with the more widely used date ranges of the Sintashta 2100 - 1700 BC, general Late Bronze Age 1700 - 1300 BC, and the general Final Bronze Age of 1300 - 900 BC. Hanks et al. (2007: 362) provide refinement for the Sintashta periods and the Late Bronze Age cultural traditions, in particular the dating of the Alakul' cultural developments. However, the refinement of the overall regional dating scheme has yet to be more systematically applied to the more generally accepted dating scheme based on ceramic traditions. Unfortunately, such a project is beyond the scope of the dissertation project, but I mention it now in hopes of someone in the future undertaking this important project.

What this means for the Middle Bronze Age Sintashta through Final Bronze Age Ui River valley is that the pottery sherds collected during the survey are identified to broader periods, and in some cases to cultural groups, such as the Alakul'. However, many sherds are only identifiable to the broader chronological categories of Middle through Final Bronze Ages. In general, Middle Bronze Age pottery are usually higher-fired, talc-tempered, burnished and highly decorated, with different sizes of bucket-shaped vessel forms. Amount and location of decoration seems to range from whole vessel to shoulder to lip. There is little mention of Sintashta plainware, i.e., the complete absence of decoration, whereas there is a great deal of variation between amount and kinds of decoration (Tkachev and Khavanskii 2006). Late Bronze Age pottery demonstrates a greater degree of variation in form types, but less so in location of decoration with most of it located near the neck and lip of the vessel (Stefanov 1996). Decorations appear somewhat related to the Sintashta decorations, but with new stylistic elements added. Plainware begins to show up in the Late Bronze Age, as does lower-fired pottery. Temper types begin to change with talc showing up less, and grog (crushed ceramics) showing up more. Grit is a common temper, and would have also been a natural component found in the clay. Pottery production in the Final Bronze Age also demonstrates a great deal of variety among vessel forms, and with decoration. Location of decoration, when present as plainware and low-fired ware becomes much more prevalent, is located almost exclusively on or near the lip. Temper again varies greatly, with talc becoming even less prominent than in the Late Bronze Age, and grog also becoming less widely used. Different densities of grit become more prominent.

Overall, the sherds found in the 2009 and 2011 surveys correspond strongly to these broader descriptive changes in ceramic traditions from the Sintashta period to the Final Bronze Age. Only two Middle Bronze Age sherds were recovered during the surveys and due to the

initial focus of the dissertation research on the spatial distribution of Bronze Age sites rather than Bronze Age pottery craft traditions, the mortuary and settlement ceramics from Stepnoye were not analyzed. The comprehensive treatment of Sintashta period ceramics by Tkachev and Khavanskii (2006) is used as the foundation for discussing pottery production in the Middle Bronze Age.

As no radiocarbon dates are available from secure contexts to more accurately date the later Late and Final Bronze Age traditions, broader periodizations are used through the dissertation. As Jean-Luc Houle (2010: 42) has mentioned for the Khanuy valley in Mongolia, the lack of chronological precision is highly problematic but for the purpose of this dissertation it should not necessarily be something that should be prohibitively difficult for the reader to think through. This dissertation project, under the aegis of SCARP, provided to the best of our knowledge the first systematic regional survey done in the southern Urals, as well as a more systematic attempt to analyze Bronze Age pottery focusing on characteristics other than form and decoration. Given the nature of the pottery found during survey (usually in sherd form) the types of ceramic analysis necessitated moving beyond form and decoration to aspects of paste recipes and associated characteristics. Even this was done in a "rudimentary" fashion as again only sherds were recovered so aspects of computer-aided tomography and neutron activation analysis seemed unduly time- and cost-consuming, as well as unlikely to provide the kinds of information that would have contributed substantively to addressing the research problem and questions that my dissertation is based upon. As more work always needs to be done, and this dissertation represents what I think is an important first step(s) in evaluating the social and political dimensions of complexity in early pastoral societies, it is hoped that later generations of students and scholars will use my research as a springboard for their own.

3.4 EVALUATING DEMOGRAPHIC CENTRALIZATION: POPULATION HISTORIES AND DISTRIBUTION

Initially, producing population estimates for the different Bronze Age periods in the Ui River valley was one the primary objectives for the dissertation research. Studies of population levels in archaeology are thoroughly stigmatized of late, mostly due to their connections to scales of different neo-evolutionary stages (band, tribe, chiefdom, state). More recently, archaeologists are rethinking their approaches to demography, and reconceptualizing its utility focusing on crowding (Kuijt 2000), fissioning (Bandy 2004), and centralization (Drennan and Peterson 2008). While in the later stages of the dissertation the production of demographic estimates was discarded in favor of determining how strongly centralized Bronze Age pastoral societies were in this part of the southern Urals, it should be noted that I think demographic estimates are an important factor to consider in any assessment of social complexity, especially when undertaking a comparative study between societies with different types of economies. This is because despite the fact that some societies are smaller demographically, there is a growing body of evidence that strongly indicates that societies with low-density populations undergo or develop complex forms of social and political organization, including forms of urbanism (Fletcher 1995, 2009).

To some extent, the inability to produce demographic estimates for early pastoral groups also underscores the need for different types of fieldwork in this part of the steppe. An important aspect of demographic estimates as derived from data collected from regional survey is their historical aspect. By this I mean that if we are considering complexity on the steppe it makes sense to establish a timeline of changes in population levels in a region, or even in a local community.

That said, all is not lost. As the primary goal of the dissertation is to evaluate the historical and spatial connections between demographic centralization from the Middle to the Final Bronze Age, demography could be left out and returned to later once more data are collected. Through mapping proportional distributions of sherds and analysis of their centralization, it is thought that the proportional distribution of sherds across the landscape stand as a (more) plausible proxy for actual population estimates. Thus, a site with more sherds can be plausibly understood to have more people living at it than a site with fewer sherds.

3.5 TERRITORY AND COMMUNITY: PASTURAGE, VISIBILITY, AND INTEGRATION

For many archaeological studies of pastoral societies, beginning (if not ending) with the establishment of environment zones that might have been utilized by early pastoralists is a primary concern (Chang 1992; Frachetti 2004, 2008; Houle 2010). This is to some degree true for my study as well, though the focus is different. Predominantly, researchers of pastoral societies have been concerned with the spatial/mobility patterns of herding activities, i.e., upland/lowland, etc (Hammer 2012, 2014; Houle 2010). This is not necessarily the case with this study. Rather, based on the primary research problem regarding the relationship between social complexity and early pastoral societies as well as questions presented in Chapter One, the spatial patterning of interest is more of the demographic centralization expected of early complex urban societies, albeit at a much lower scale/density than it is for identifying seasonal herding patterns/movements.

Catchments focusing on pasturage area needed for a settlement's livestock are presented to help develop a better understanding of the amount of physical area needed to not overgraze

available pasturage (using present day vegetation as a proxy). In relation to the now long-running critique of catchments that they provide a rarely utilized circular definition of territory (Roper 1979), it is thought that the area covered by the viewsheds might correspond to some degree to the size of area needed for specific kinds of catchments. Viewshed analysis centered on the population centers (with a 1.5 m offset) established and presented in Chapter Four, in hopes that the viewsheds might provide an opportunity to plausibly move beyond the circular catchment shape. Proximity to water is also considered to be an important component in both the catchments and the viewshed analysis as for both humans and herd populations water are logical, if not prominent, factors in location choice for settlements.

Viewsheds remain under-utilized for examining issues of territory, although see Llobera (2006) for a fuller consideration of visibility in human societal developments. Archaeologists such as E. Jones (2006) and M. Connolly and G. Lake (2006) suggest that viewsheds and the amount of viewshed overlap can be a good indicator of social boundaries and the degree of social integration present. In his study of Onondaga Iroquois settlement choice, Eric Jones (2006: 536) notes that there is little correlation between visibility of surrounding landscape and possibility of conflict in times of social stress. What he does note is relationship between land use, settlement choice, and visibility. For the Middle through Final Bronze Age Ui River valley, if this is true then we might expect population centers to exert visual control over their territories so as to keep better track of their herds and herders, as well as to encourage stronger forms of social integration. As such, a visual hierarchy of sorts is expected to feature prominently indicating a high level of social integration and that these visual hierarchies might have changed over time from the Late to Final Bronze Age. The results of these spatial analyses are presented in Chapter Five.

3.6 POTTERY PRODUCTION/USE, DIFFERENTIATION, AND INTEGRATION IN THE BRONZE AGE SOUTHERN URALS

Given that the primary material collected during the 2009 and 2011 surveys consisted of pottery sherds from the Bronze Age through historic periods, the sherds are the link between not only time periods but also within and between communities in the Ui River valley. These communities, labeled as Stepnoye and Chernorech'ye for Sintashta period populations, are subsequently labeled west and east, respectively, for the Late and Final Bronze Ages. Initially, primary use of the sherds was for generating population estimates. However, during the fall of 2011 I returned to the Russian Federation to analyze the collected sherds, focusing specifically on the Late through Final Bronze Age sherds. During the analysis I noticed various patterns emerging regarding paste recipe. These patterns included distribution of decorated and non-decorated sherds and their relationship to talc tempered and non-talc tempered sherds. Furthermore, more patterns emerged regarding the distribution of thin and thick walled sherds and their relationship to the above two characteristics in the identification of different wares being used by populations in the Late and Final Bronze Age Ui River valley.

Almost certainly the various paste characteristics have a functional quality about them. Finnish archaeologists note that the use of talc temper in pottery among Bronze Age pastoral societies in Finland is most likely due to talc's ability to be a effective thermal conductor (Ikäheimo and Pattilla 2002). However, the differential processing of talc as temper as evidenced in the sherds collected during the 2009 and 2011 surveys indicates other purposes beyond just functional aspects such as cooking. Taken with the fact the use of talc as a temper seems to have become a tradition among the Middle through Final Bronze Age, if not later, pastoral societies of the southern Urals, there seems to be ample evidence for talc's use as a symbolic connection to

earlier communities. For Andrew Roddick and Christine Hastorf (2010) the role of tradition, including those focused on pottery production, cuisine, and the construction and use of monuments, play an important part in mediating socio-political change during the Formative Period (1500 BC to AD 400) of the southern Titicaca Basin. A. Roddick and C. Hastorf (2010: 3) examine the complex arrangement (and rearrangement) of these factors over time; of communities utilizing "divergent artifact styles" yet participating in an increasingly shared iconography while at the same time constructing and sharing spaces designed for commemoration. The ceramic analysis for the Ui River valley has little to do with vessel form and decoration. Rather by necessity I focus on paste composition and how 'recipes' were used or changed over time.

A clear historical link in terms of the paste recipes for pottery production between the Late and Final Bronze Ages emerge during my analysis of the spatial distributions of the sherds. As noted in Chapter Two, such links are tied to 'technologies of remembrance', traditions in craft production that act as historical capital and are woven into new material practices as well as new forms of social organization to help legitimize the implementation of new socio-political community structures. To flesh that out the proportions of different pottery characteristics are evaluated using stem-and-leaf plots, bullet graphs, and centralization analysis. This is done to better highlight the differences in production and use of pottery between the Late Bronze Age-Final Bronze Age east and west communities, and how such differences might be associated with changes to social organization during the same transition.

4.0 POPULATION HISTORIES OF THE BRONZE AGE SOUTHERN URALS

A logical starting place for evaluating the historical conditioning for social complexity in the Bronze Age southern Urals is an assessment of the population histories and distributions within the study area(s). Such an assessment proves timely as discussions of population dispersal, stabilization, and multiple-tiered settlement hierarchies appear in the regional and international literature on the Bronze Age southern Urals area (Anthony 2007; Drennan et al. 2011; Epimakhov 2009a and b; Frachetti 2012; Johnson and Hanks 2012; Koryakova and Epimakhov 2007; Sharapov 2011; Zdanovich 1997; Zdanovich and Zdanovich 2002). Despite the renewed interest in population dynamics and its strong connection to ethnogenesis and culture historical approaches, few systematic treatments of population history and/or distribution have been conducted for the Bronze Age of the Southern Urals (although see Epimakhov 1996, 2002a, 2009a and b for his work on the link between demography and complexity). My study builds from Epimakhov's ongoing research of Bronze Age demography in the southern Urals, as well as Drennan and Peterson's (2008) research into chiefdoms and demographic centralization, and seeks to fill some of the gaps in our knowledge of changes in population levels, demographic centralization, and population dispersal for Bronze Age communities in the southern Urals.

4.1 POPULATION HISTORIES OF THE SINTASHTA PERIOD OF THE SOUTHERN URALS

Engaging with demographic estimates is an important, if not necessary, step for determining the scale and intensity of change in community population levels and to better evaluate the nature of changes to socio-political institutions through the distribution of sites in the Bronze Age in the Ui River valley. While the survey produced little concrete evidence for Late and Final Bronze Age household structures (although Kupriyanova 2000; Epimakhov 2009a, Matveev 1998, and Potemkina 1985, all contain such information), we do have a solid starting point for generating population estimates in the Sintashta period; documentation of household structures in the various Sintashta settlements, with a primary focus on Stepnoye and Chernorech'ye, as well as the excavations at Ol'gino by the joint Russian-German team co-directed by Ludmila Koryakova and Ruttiger Krause. All of these estimates are generated using the settlement plans redrawn from Soviet-period aerial photography and recorded in Zdanovich and Batanina's (2007) volume, *Аркаим: Страна Городов*, or *Arkaim: Country of Towns*. It should be noted that I do not use this volume without a critical eye. Recent geophysical work conducted at Stepnoye and Ust'ye, under the direction of Drs. Bryan Hanks and Roger Doonan, reveals more construction phases to these settlements than previously believed, making accurate demographic estimates somewhat problematic (Batanina and Hanks 2013; Hanks et al. 2009). The Sintashta period estimates presented in this chapter are used in a relative fashion to develop a broader and more comparative understanding of the other Sintashta settlements as well as their population dynamics and histories.

Previous models posit the existence of densely populated Sintashta settlements numbering in the thousands (Epimakhov 1996), as well as the existence of robust hinterland populations

outside of the fortified settlements (G. Zdanovich 1989, 1997; D. Zdanovich 2002; Zdanovich and Zdanovich 2002: 251). Using V. Masson's (1980: 180) highest density estimate of 400 people per hectare, Epimakhov (1996) originally estimates the settlement populations at 20 - 30 people per dwelling reaching up to 1200 (minimum) and 1800 (maximum) inhabitants. Subsequently, Epimakhov (2002a: 141) revised these estimates suggesting that no more than 1000 people could have lived within the embankments of Sintashta period settlements. While some settlements contain up to approximately 80 household structures, others contain much less (Zdanovich and Batanina 2007). Epimakhov (2002a: 143) now suggests that the number of inhabitants in the Sintashta settlements numbered in the hundreds with Arkaim, one of the largest settlements, most likely containing 640 inhabitants.

This fits well with those estimates documented ethnographically for pastoral societies by F. Barth (1961: 15 – 20), A. Khazanov (1984: 28-31), and S. Vainshtein (1980: 242) (Table 4.1).

Table 4.1 Table expressing average size of nuclear family and amount of livestock per family, as well as sources where the estimates can be found. Some estimates are found in A. Khazanov (1984)

Average size of pastoral families	Avg. Sz. NuclearFm	Herd Size and Composition for that size family
Tuva (Vainshtein 1980)	4	see table in Vainshtein (1980: 242)
Pishek/Kirgiz (Vainshtein 1980)	5.5	25 units of livestock per family of 5+
Kazakh (Tolybekov 1959: 131)	4-6	15-20 camels, 4-5 horses, 100-150 sheep/goats
Mongol (Maisky 1959 140-1)	5	14 horses, 3 camels, 13 cattle, 6 sheep/goat
Rudenko (1969: 18)	5	1 horse, 5 cattle, 6 sheep/goat
Kalmuck (Pallas 1776: 226)	5	8 mares, 1 stallion, 10 cows, 1 bull
Kababish (Asad 1970: 52)	5	20-25 camels, 40-50 sheep
Somali (Silberman 1959: 569)	4	50 sheep/goat and 1 milk camel, or 100 sheep for comfort

S. Vainshtein (1980: 242) connects the number of family members to those family members engaged in work, along with the size of the units of livestock kept by the family. This has great

relevance for the Sintashta settlements as livestock may have been kept in pens adjacent to or possibly *inside* the household dwellings. While obviously we cannot graft directly what has been recorded ethnographically onto a distant prehistoric past, it does indicate heuristically some possibilities for the uses of living spaces among the Sintashta period settlements.

It is not surprising that Epimakhov generates such estimates as the excavated household structures, or dwellings, are structures that contain some of the largest area of lived spaces. The size of the dwellings also needs to be taken into consideration as 20 - 30 people per dwelling seems excessively high, especially as ethnographic and historical documentation of the sizes of pastoral nuclear families indicate that between 5 and 6 people is a comfortable average size (Table 4.1). Size of the household dwelling should also play a crucial role in determining the size of a nuclear families in early pastoral communities.

At first glance, the layout of the dwellings is conducive to more people in a structure than would typically be found in agrarian societies (average 5 people per nuclear family) with sizes of dwellings ranging between 100 - 250 m^2 (Sintashta period dwellings are also covered in the next chapter). Most dwellings contain similar features including front porch or patio, living area, an area for craft and domestic activities such as ovens, wells and chimney (Koryakova and Epimakhov 2007: 73). Epimakhov (1996, 2002a) suggests that the "living areas" range between 35 - 65m^2 and could not accommodate more than 20 - 30 people. If the "living areas" are spatially distinct from the "economic areas" then we can see that living areas are outside of the central economic area, with people sleeping, eating, and socializing between the economic area and the outer posts holding up the dwelling. .In this case, lower estimates, including those more recently offered by Epimakhov (2002a) (see Table 4.1), seem more likely and as suggested in Chapter Four, I use a mean of 5 (with minimum of 3 and maximum of 7) to represent nuclear

family households for the Sintashta period. The estimation of population levels based on both ethnographic accounts and size of social versus economic area at the Sintashta settlements includes the production of maximum and minimum limits as well as the household area mean for

Table 4.2 Table with the number of dwellings and population estimates for each Sintashta period settlement. Minimum, mean, and maximum estimates are provided for ethnographically and historically derived numbers of members per pastoral nuclear family and the number (640) suggested by A. Epimakhov (2002a) (in italics). Numbers of Sintashta dwellings are those identified and counted as presented in Zdanovich and Batanina (2007)

Settlement	**No. of Sintashta dwellings as counted by dissertation author**	**Minimum (3)/(5.8)**		**Mean (5)/(7.8)**		**Maximum (7)/(9.8)**	
Alandskoye	56	168	*325*	28	*437*	392	*549*
Andreevskoye	72	216	*418*	360	*562*	504	*706*
Arkaim	82	246	*476*	410	*640*	574	*804*
Bakhta	23	69	*133*	115	*179*	161	*225*
Bersuat	84	252	*487*	420	*655*	588	*823*
Chekatai	21	63	*122*	105	*164*	147	*206*
Chernorech'ye	26	78	*151*	130	*203*	182	*255*
Isiney	35	105	*203*	175	*273*	245	*343*
Kamysty	12	35	*70*	60	*94*	84	*118*
Kizil'skoye	23	69	*133*	115	*179*	161	*225*
Konoplyanka	27	81	*157*	135	*211*	189	*265*
Kuisak	38	114	*220*	190	*296*	266	*372*
Ol'gino	42	126	*244*	210	*328*	294	*412*
Parizh	36	108	*209*	180	*281*	252	*353*
Rodniki	26	78	*151*	130	*203*	182	*255*
Sarym-Sakly	39	117	*226*	195	*304*	273	*382*
Sintashta	48	72	*278*	120	*374*	168	*470*
Sintashta 2	40	120	*232*	200	*312*	280	*392*
Stepnoye	50	150	*290*	250	*390*	350	*490*
Ust'ye	31	93	*180*	155	*242*	217	*304*
Zhurumbai	31	93	*180*	155	*242*	217	*304*
Totals	**842**	**2454**	***4885***	**4090**	***6569***	**5726**	***8253***

each settlement. For instance, Arkaim has approximately 82 household structures, and has a lower estimate of 246 persons and an upper of 574 persons (Table 4.2). In addition, Alandskoye and Andreevskoye (each with approximately 70 household structures) most likely contain 210 to 490 persons. Furthermore, Stepnoye (50 household structures) and Chernorech'ye (26 household structures) most likely would contain: Stepnoye - 150 to 350 persons and Chernorech'ye – 78 to 182 persons. Just based on these estimates alone, there is a great deal of variation in the demographic possibilities for number of households in the Sintashta settlements. As a result, Epimakhov's (2002a) and Kohl's (2007: 14) more conservative estimates of several hundred people per settlement, with possibly as many as 400 or 500, seems increasingly plausible (Table 4.2). However, my primary focus is on the differences in projected population levels at Stepnoye (mean, 250 persons) and Chernorech'ye (mean, 130 persons) and what this means for population levels in the Late and Final Bronze Ages, and how it can be better related to demographic centralization and social organization in the Sintashta period.

4.2 POPULATION LEVELS AND DISTRIBUTIONS FOR THE SINTASHTA PERIOD AND LATE BRONZE AGE OF THE SOUTHERN URALS

Much of the research on Bronze Age populations in the southern Urals relies on data gleaned from the *Archaeological Atlas of the Kizil'skoye region* (Zdanovich et al. 2003). The limited nature of the Kizil'skoye data (eight positively identified Late Bronze Age sites) is acknowledged but the data is used cautiously to identify broader, long-term changes from the Sintashta period to Late Bronze Age. Denis Sharapov (2011), in his Masters degree research from the University of Georgia, uses data taken from the Atlas to examine population levels and distributions in the Late Bronze Age of the Kizil'skoye region. Using McEvedy and Jones (1978), Sharapov (2011)

estimates that there is a 75% increase in population levels from the Middle to Late Bronze Age based on the total areas of occupied household dwelling space in the 102 alleged Late Bronze Age sites with 900 houses/dwellings (201,069 m^2) and the three Sintashta settlements in the region (9,915 m^2). He concludes (2011: 95) that such an increase could not have happened from autonomous population growth but rather would have been susceptible to broader, external demographic processes/forces such as migration. This is a logical conclusion as the Bronze Age southern Urals is often modeled as a set of periods experiencing in/out migrations that intensify well into the early Iron Age (Anthony 2007; Koryakova 1996, 2002; Koryakova and Epimakhov 2007). If population levels change as the result of migration rather than local autonomous population growth as Sharapov suggests, then we should also expect to see dramatic increases or decreases in local and/or regional population levels along with little to no local historical connections to preceding periods.

However, if population growth was due at least partially to local autonomous factors and historical conditions we might expect to see demographic levels stay relatively stable or with slight increases or decreases depending on changes, if any, to birth and mortality rates. Questions persist about how populations dispersed from the Sintashta settlements, how were populations distributed in the Late Bronze Age and to what extent did demographic centralization carry on with the disintegration and dispersal of Sintashta period communities.

There are at least three, possibly four, documented Sintashta period enclosed settlements in the Kizil'skoye region: Sarym-Sakly, Kuisak, and Kizil'skoye (and Arkaim along the border) (Figure 4.3). Based on the population estimates listed in Table 4.2, this would give us mean settlement population numbers of 195, 190, and 115 (and 410 for Arkaim), respectively. The total then for known Sintashta populations in the northeast area of Kizil'skoye is 500, without the

extra 410 from Arkaim. This gives us a necessary starting point for thinking about changes to population levels and distribution at both the regional and local scales.

I want to point out that two different sets of numbers have been provided for Sarym-Sakly and Kuisak. The number of household dwellings identified for the Sintashta settlements of Sarym-Sakly and Kuisak is 38 and 41, respectively, for a grand total of 77 according to Zdanovich and Batanina (2007: 124, 141). The number of dwellings for these two settlements in the Atlas is 30 and 31, respectively, for a total of 61 (Zdanovich et al. 2003: 60, 142, 152). I use the more conservative estimates of 30 and 31 to discuss changes to population levels in this part of the Kizil'skoye region. At least according to what has been documented for the Kizil'skoye region Sintashta period populations were concentrated in the enclosed settlements. Over time these centralized populations would have dispersed moving into the landscape around and between Sarym-Sakly and Kuisak (Figure 4.1)(Table 4.3), possibly along with the arrival of new populations.

These numbers are basically a single slice of family demographics, or one generation of family members living in a dwelling. This also assumes contemporaneity of sites, which is always somewhat problematic but for now we will assume that the "open" settlements belong to the Late Bronze Age period and that they were inhabited at the same time. Given that we have a beginning number for the Sintashta populations of 500 and a number of 900 for the Late Bronze Age period, then we see a fairly drastic increase in population from the Sintashta period to the Late Bronze Age. This fits closely with Sharapov's (2011) suggestion that from Sintashta period to Late Bronze Age regional populations would have increased by 75% (875), mostly due to in-migration. While this seems a plausible scenario there is no accounting for Bronze Age pastoral sites that do not leave a pronounced archaeological signature. Given the nature of the data

collected for the Kizil'skoye region, mostly from the analysis of aerial photography, ephemeral sites such as smaller pastoral camps are usually missed. Only recently has a discussion of

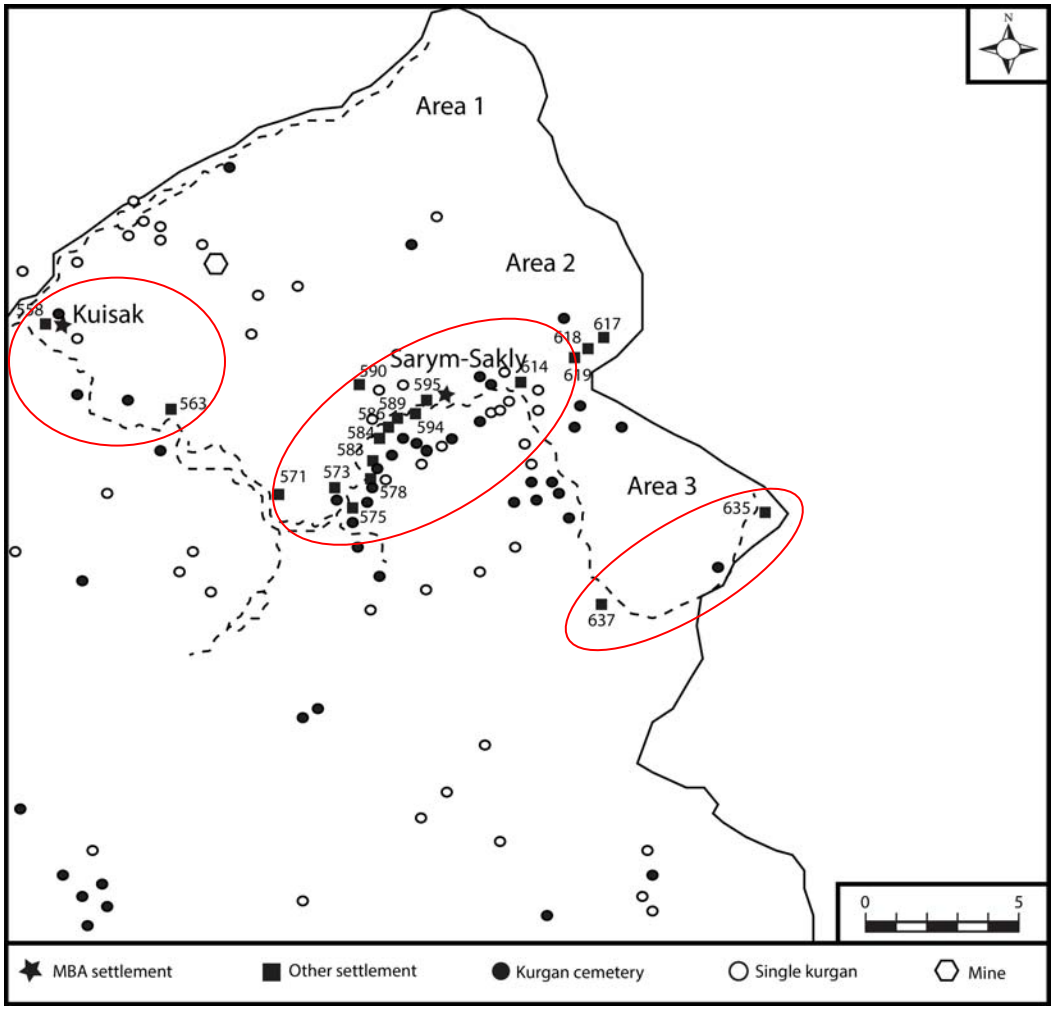

Figure 4.1 Map of northeast area of the Kizil'skoye region focusing on the most likely later (Late Bronze Age) settlement distribution around and between Sintashta settlements of Kuisak and Sarym-Sakly (adpated from Zdanovich et al. 2003: 60)

Table 4.3 Table of the Late Bronze Age sites around and between Kuisak and Sarym-Sakly. Atlas IDs provided in Zdanovich et al. 2003.

Atlas ID	Number of Dwellings	Mean Population Estimate
558	16	80
563	11	55
571	6	30
573	5	25
575	17	85
583	9	45
584	7	35
586	11	55
589	8	40
590	16	80
594	3	15
595	3	15
614	11	55
617	4	20
618	15	75
619	8	40
635	7	35
637	23	115
Totals	**180**	**900**

settlement *patterning* in the Kizil'skoye region appeared in the archaeological literature, with the possibility of settlement size hierarchies based on areas of household depressions (Epimakhov 2009b: 95-97). Such estimates, however, are problematic as "living space" or "social space" (used for social activities or sleeping) are very different than space demarcated for economic or domestic activities, with the conflation of the two leading to an over-exaggeration of settlement size and functionality. I would suggest that one thing that is possible is to more broadly evaluate changes in population levels in relative terms (there seems to have been almost twice as many people living in the northeast area of the Kizil'skoye region in the Late Bronze Age than in the

Middle Bronze Age), and more importantly for this dissertation, is the connection between changes to population levels and changes in settlement patterning. Using a stem-and-leaf plot, an

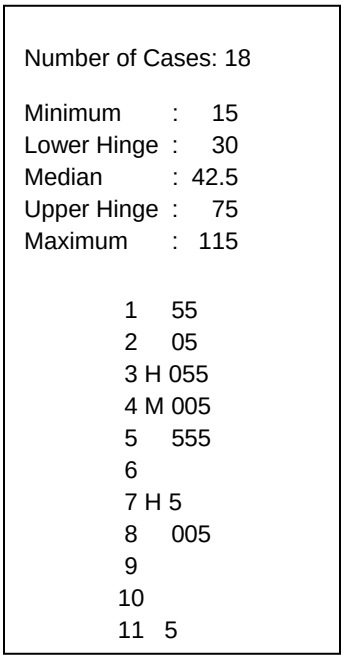

Figure 4.2 Stem and Leaf plot of population estimates for Late Bronze Age sites based on information found in Table 4.3

exploratory data analysis technique, I explore the northeast Kizil'skoe data in terms of the spread of the population batch (Figure 4.2).

Even though there is no conspicuously distinct peak in this batch of numbers we can see an innate characteristic of the batch emerge, settlements with fewer people are more numerous and form a very low and even hump, while settlements with more people are not quite numerous enough to form a distinct peak. If we take the number of dwellings as our proxy, which corresponds directly to our population estimates, or if we keep our population estimates, we can see that there is no five-tiered hierarchy in this part of the Kizil'skoye region, but rather the

presence of a three-tiered hierarchy seems fairly clear (see Chapter Five, page 102). Rather than discussing this in terms of hierarchies, it might be more productive to discuss populations in terms of demographic centralization.

How would centralization be evaluated for this part of the Kizil'skoye region? A good

Table 4.4 The settlement pattern of the northeast area of the Kizil'skoye region broken down into three separate areas containing Atlas IDs as seen in Figure 6.4

Area 1	**Area 2**	**Area 3**
563, 558	619, 618, 617, 614, 595, 594, 590, 589, 586, 584, 583, 575, 573, 571	637, 635
Total Pop: 150	**Total Pop: 615**	**Total Pop: 135**

starting point is identifying the most densely populated area (by number of sites), which I have labeled Area 2 (Table 4.4). From there, we can see that at least three distinct areas of settlement are apparent in Figure 4.2 (and Table 4.3). While site 637 is the largest site based on number of dwellings and by population when compared to any single settlement, a clear pattern of demographic centralization emerges in terms of one area having four times the number of sites than the other two areas. The Kizil'skoye data indicates some intriguing possibilities for demographic centralization in the pastoral societies of the Sintashta period and Late Bronze Age. I explore these possibilities through the more systematically collected data from the 2009 and 2011 surveys in the Ui River valley.

4.3 POPULATION LEVELS AND DISTRIBUTIONS IN THE SINTASHTA PERIOD THROUGH FINAL BRONZE AGE UI RIVER VALLEY

Whereas with the Kizil'skoye information there is a distinct lack of data regarding ephemeral pastoral sites, for the Ui River valley there is an equal dearth of knowledge regarding, at least for the Late Bronze Age (and Final Bronze Age), number of household depressions. This is not to say that no dwellings are recorded, but rather they are few. This makes direct comparison between the Kizil'skoye region and Ui River valley in terms of number and sizes of dwellings problematic. Rather, I talk about changes in population levels in terms of a proxy: proportions of sherds collected during the survey. This is not to say that sherds = people. Rather, that higher densities of sherds are likely to represent the traces of activities of more people just as lower densities of sherds will represent the activities of fewer people.

The use of sherds as proxy for population has both positive and negative aspects to it. The negative is that with no absolute estimates there can be no direct comparison with the population levels in the northeast portion of the Kizil'skoye region. This is fine as the main point of the dissertation was not so much to generate population estimates that could then be used to discuss the demographic scale and levels of social complexity, but rather to evaluate patterns of population distribution and centralization.

Two communities (east and west) are identified spatially through their use of different parts of the Ui River valley landscape and which correspond well to the fact that Sintashta populations had also split the valley between the Stepnoye and Chernroech'ye communities. (Figures. 4.3 and 4.4). At the same time, it is difficult to generate population estimates that can be used in the absence of equally good field conditions (visibility, visitation, etc.) for all time periods and

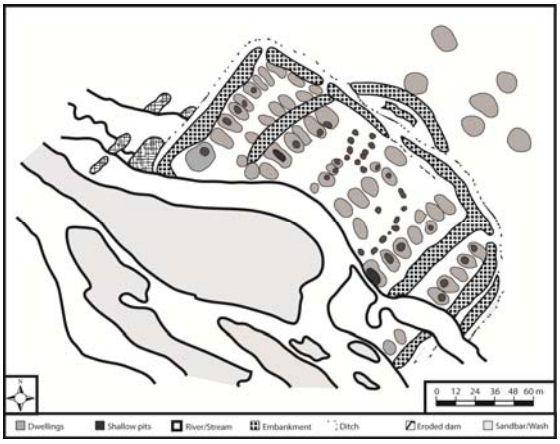

Figure 4.3 Plan of Sintashta period Stepnoye settlement (after Zdanovich and Batanina 2007)

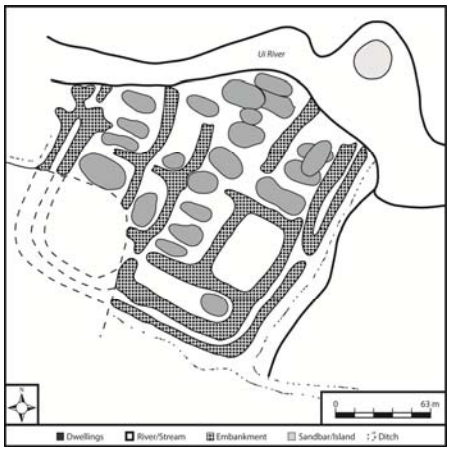

Figure 4.4 Plan of Sintashta period Chernorech'ye settlement (after Zdanovich and Batanina 2007)

locations involved. Given the highly problematic field conditions, there is no reliable starting point that can then be used to generate the numbers used to produce population estimates for the later periods as suggested by Drennan et al. (2003). These "magic numbers" are used to determine the number of people needed to leave 1 sherd per square meter across an area of 1 ha in a century (Drennan 2003 et al. 2003: 161). However, this is not possible given the field conditions at the Sintashta settlements of Stepnoye and Chernorech'ye. As such, proxies based on densities of identifiable sherds found on the surface are used for determining relative population level changes and concentrations for the Late and Final Bronze Ages. For Sintashta period Stepnoye and Chernorech'ye, population estimates are generated with minimum, mean, and maximum numbers of people per household based on the ethnographic and historical estimates discussed earlier in this chapter (Table 4.1).

Stepnoye and Chernorech'ye provide us with general population numbers based on the mean estimates provided in Table 4.1 of 250 and 130, respectively. Perhaps more importantly, is

that each community is treated as completely centralized, as no or very little data was collected by either Russian archaeologists or me during the 2009 and 2011 surveys to indicate otherwise and thus each is treated as having a *B* value of 1.0 according to Drennan and Peterson (2008: 364). In Chapter Six distribution maps and stem-and-leaf plots provide a very crude picture of centralization in relation to the production and/or use of social and natural boundaries or buffers that delineated east and west communities in the Ui River valley (cf. Drennan and Peterson 2008: 361). Following Drennan and Peterson (2008), centralization is used here to provide a more detailed picture of historical changes to population dynamics, in particular centralization, from the Sintashta period to the Final Bronze Age.

One of the primary post-fieldwork goals of the dissertation research, as presented in Chapters One through Three, is to develop a better understanding of what happened to social and political organization in the post-Sintashta periods in relation to changes in population levels and distributions. Our starting point is the Sintashta populations of the Ui River valley (Stepnoye - 250 and Chernorech'ye - 130, for a total of 380) and that the distribution of populations between the eastern (Chernorech'ye) and western (Stepnoye) halves of the Ui River valley. Within the delineated survey zone 66% of the Sintashta population in the survey zone lived in the Stepnoye settlement, while 34% lived in Chernorech’ye (Figure 4.4).

We know that at least in the Sintashta period the population distribution in the Ui River valley, much like in the northeast region of Kizil'skoye, was uneven. Did this imbalance of population distribution continue into the Late and Final Bronze Ages? Did population distributions change in the later periods? If so, to what degree did the Late and Final Bronze

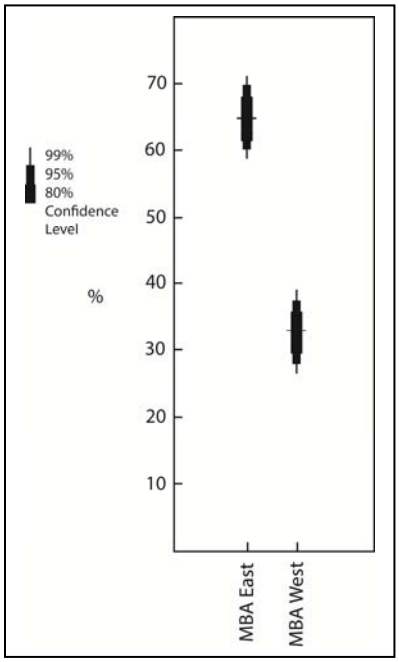

Figure 4.5 Bullet graph demonstrating proportional differences in population with error ranges for the east and west communities in the Ui River valley

Age populations continue on with demographic centralization first seen in the Sintashta period? I explore these two questions in the following pages utilizing stem-and-leaf plots and centralization analysis.

4.3.1 Late Bronze Age Populations in the Ui River Valley

Sintashta populations in the Ui River valley are distinct from each other both spatially (Stepnoye in the western half of the survey area and Chernorech'ye in the eastern half) and in terms of their population levels. Late Bronze Age population distributions also can be split into two distinct east and west populations. Obviously, producing population estimates is an ideal way of going about comparing population levels between the east and west groups in the Ui River valley.

However, as already discussed due to differing field conditions across the valley and the lack of Sintashta period finds on the surface of the Stepnoye and Chernorech'ye settlements made this a difficult, and possibly, misleading task. Instead, sherd proportions are used as a proxy for population density at sites (Figures 4.6 - 4.7). As mentioned earlier, more sherds represent the everyday actvities of more people, whereas less sherds = the activities of less people.

The proportional densities are spread out fairly evenly across the western community with only one notable peak that doesn't show up well with the kernel density map (arrow in the western community) (Figure 4.6; Table 4.5). The eastern population densities show a marked difference between sherd population levels with one site conspicuously standing out (also with an arrow) (Table 4.6). In Figure 4.7 there are only two clear density clusters that are visible, both in the east community, though in the west there is also a clear standout with site 83 (Table 4.5, Table 4.6; Figure 4.7, 4.8). By far the eastern community has the

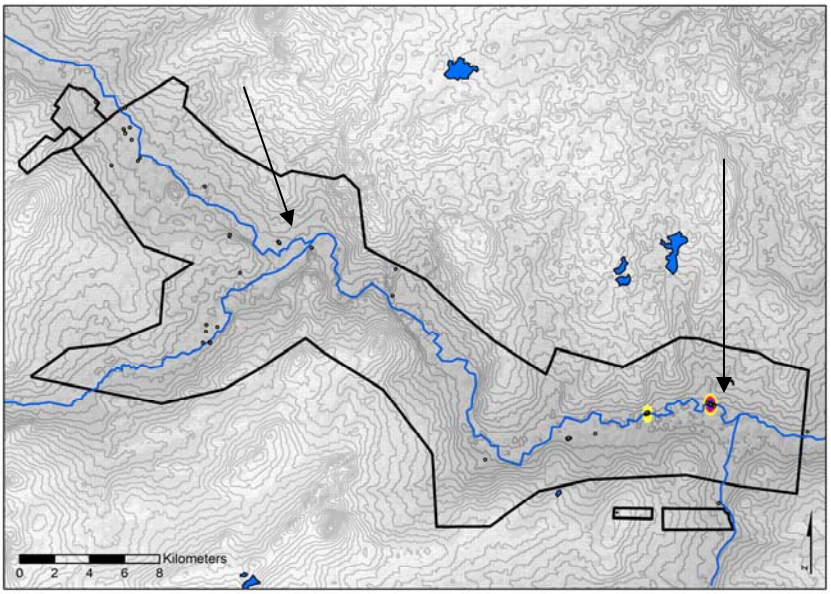

Figure 4.6 Kernel density map of Late Bronze Age sherds in the Ui River valley with arrows pointing out the highest densities of sherds in each community. Points represent individual loci of sherd scatters.

Table 4.5 Distribution of Late Bronze Age sherds in the west community

Collection Unit	Number of Sherds	Sherd Proportions
1	8	2.9
21	2	.7
31	2	.7
35	4	1.4
45	1	.4
54	1	.4
57	2	.7
65	2	.7
74	2	.7
83	17	6.1
87	1	.4
100	3	1.1
101	1	.4
102	1	.4
103	8	2.9
104	1	.4
105	8	2.9
106	1	.4
107	1	.4
108	1	.4
Totals	**67**	**24.4**

Table 4.6 Distribution of Late Bronze Age sherds in the east community

Collection Unit	Numbers of Sherds	Sherd Proportions
3	2	.7
18	1	.4
19	1	.4
20	5	1.8
85	1	.4
89	168	60.2
91	30	10.8
97	2	.7
98	1	.4
99	1	.4
Totals	**212**	**75.6**

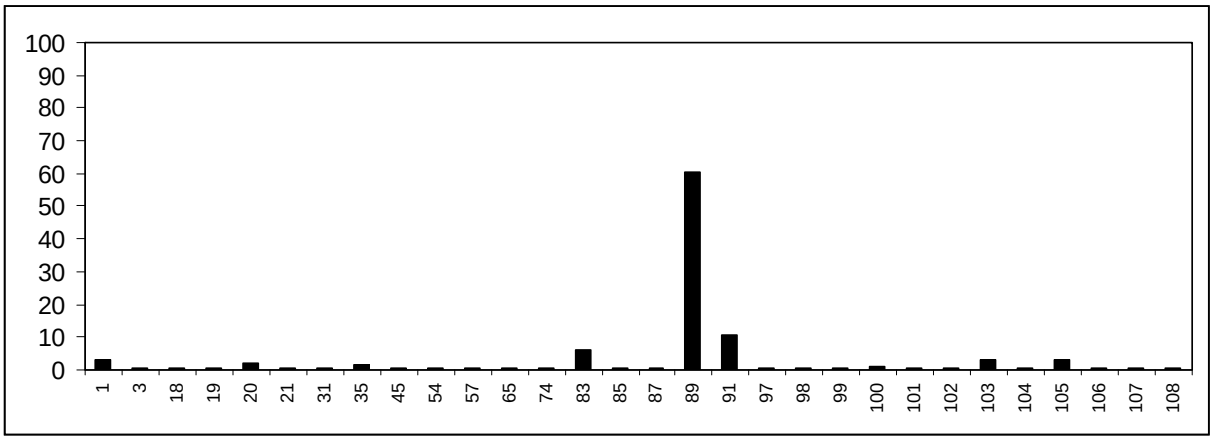

Figure 4.7 Proportional distribution of sherds by site in the Late Bronze Age Ui River valley

greater population density. This is very different from the Sintashta population levels when the majority of the population was found in the Stepnoye settlement in the western area of the river valley (Tables 4.5 and 4.6). By the end of the Late Bronze Age that pattern shifts dramatically with the growth of two settlements, 89 and 91 (Figure 4.7). If we accept the use of demographic proxy by sherd proportions, then population levels in each community changed visibly from the Sintashta period to the Late Bronze Age. As it is, pottery sherds act well as a proxy for population estimates in that it allows us to understand the more general patterns of population movements in both a single context (in the Late Bronze Age) and in a comparative, historic context (Sintashta period through the Late Bronze Age)(Figure 4.8). In addition, what is hinted at in the proportional distributions is the presence of demographic centralization, particularly in the east community. The proportional distribution of sherds is further evaluated through stem-and-leaf plots. Such plots are a good initial exploratory tool for teasing out patterns that might not be

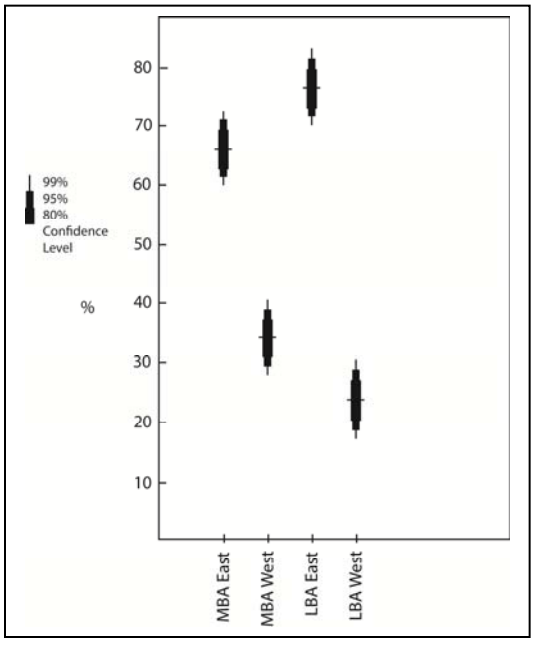

Figure 4.8 Proportional distributions of population (people and sherds, respectively) in the Sintashta period and Late Bronze Age Ui River valley survey zone

readily visible in other plots, graphs, etc. However, though the bar graph in Figure 4.8 indicates that site 89 might be a good basis for evaluating demographic centralization.

We can see that the medians for both east and west sherd populations are very close (.55 and .7, respectively) (Figs. 4.9 and 4.10). Given that the median is unaffected by extreme outliers such as seen for the east sherd population (60.2%), it seems that both batches behave in a similar way. However, it is also clear that both batches have different midspreads, with the east batch being spread out almost twice as much (.85% and 1.4%, respectively). Perhaps more importantly, is that we can see that the highest proportions for the east and west sherds are treated as outliers. Rather than trimming those outliers, it might be expected that population

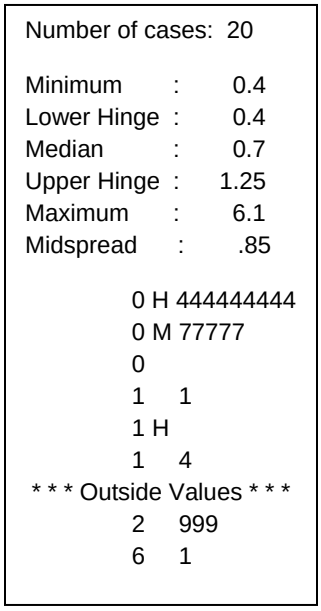

Figure 4.9 Stem-and-leaf plot of proportional distribution of Late Bronze Age sherds in the west half of the Ui River valley survey zone

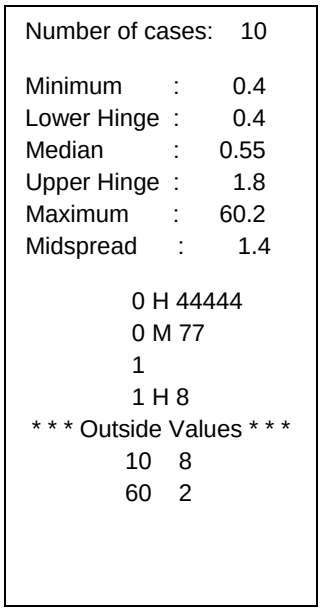

Figure 4.10 Stem-and-leaf plot of proportional distribution of Late Bronze Age sherds in the east half of the Ui River valley survey zone

centers and possibly other more densely populated sites would fall outside normal range and act as a springboard into an evaluation of the degree of centralization present in both populations.

This centralization analysis is based on dividing the Ui River valley survey zone first into two halves (east and west) that contain the same amount of surveyed area and then each half is divided into 12 concentric rings or portions of them that contain one-twelfth of the total area of the half shown in Figure 4.11. Populations of sherds are tabulated for each ring and which are then expressed as proportions of the total population of sherds visible in Tables 4.6 and 4.7 for each community. Those proportions are then turned into cumulative proportions for each successive ring and then summing them. In this sense, a completely decentralized population is expressed as 8.3% in each ring with a total of 650 or a completely centralized population is expressed as 100% in each ring and would have a cumulative proportion sum of 1200. The range is between 650% and 1200% (Drennan and Peterson 2008: 364). The cumulative proportions from Tables 4.6 and 4.7 have 650 subtracted from them and they are then divided by the remained of 550 to arrive at *B* values of .07 and .871, respectively. Given that a *B* value of 0 represents total decentralization and a *B* value of 1.0 equals complete centralization it is apparent that the west population is almost completely demographically decentralized with a *B* value of .07, whereas the east population is almost completely demographically centralized with a *B* value of .871. If we think of the Sintashta populations in the Ui River valley as having been completely centralized with *B* values of 1, then we might think of the later Late Bronze Age populations of the east half of the survey zone as retaining a strong tradition of demographic centralization.

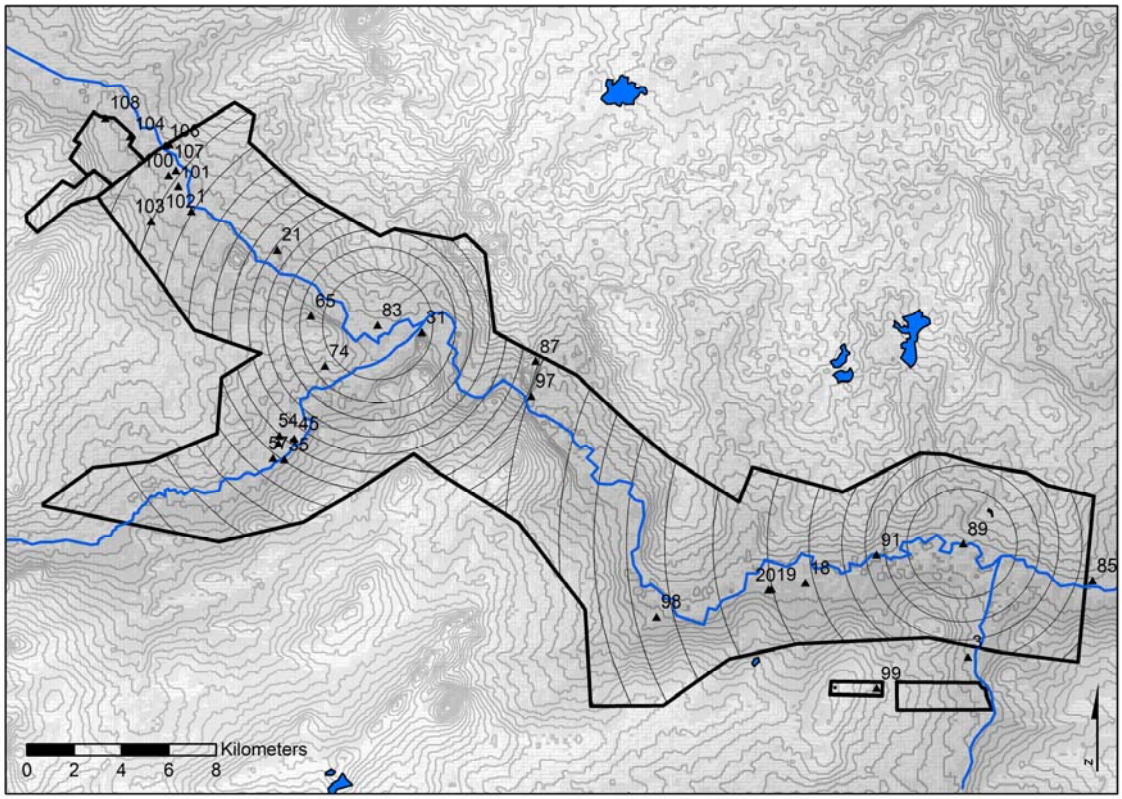

Figure 4.11 Centralization analysis of Late Bronze Age sherds for both west and east communities in the Ui River valley

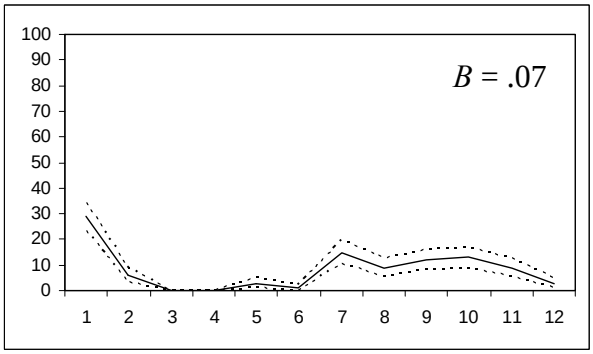

Figure 4.12 Graph of distribution of Late Bronze Age ceramic population across 12 concentric rings in the west half of the Ui River valley survey zone with 90% confidence level highlighted

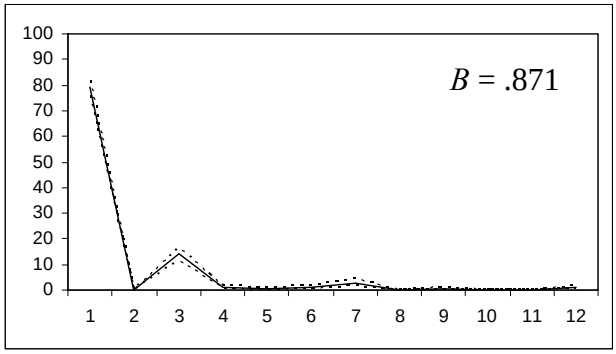

Figure 4.13 Graph of distribution of Late Bronze Age ceramic population across 12 concentric rings in the east half of the Ui River valley survey zone with 90% confidence level highlighted

Table 4.7 Calculation of *B* value for Late Bronze Age west population of sherds

LBA West	Est. Pop	Pop Prop	Cum Prop
Ring 1	19	29	29
Ring 2	4	6	35
Ring 3	0	0	35
Ring 4	0	0	35
Ring 5	2	3	38
Ring 6	1	1	39
Ring 7	10	15	54
Ring 8	6	9	63
Ring 9	8	12	75
Ring 10	9	13	88
Ring 11	6	9	97
Ring 12	2	3	100
Totals	67	100	688

Table 4.8 Calculation of *B* value for Late Bronze Age east population of sherds

LBA East	Est. Pop	Pop Prop	Cum Prop
Ring 1	168	79.00	79
Ring 2	0	0.00	79
Ring 3	30	14.00	93
Ring 4	2	1.00	94
Ring 5	1	0.50	94.5
Ring 6	2	1.00	95.5
Ring 7	6	3.00	98.5
Ring 8	0	0.00	98.5
Ring 9	1	0.50	99
Ring 10	0	0.00	99
Ring 11	0	0.00	99
Ring 12	2	1.00	100
Totals	212	100	1129

Clearly by the end of the Sintashta period, new settlement patterns appear with populations dispersing into their local landscape. At the same time, however, some of the populations maintained traditions of demographic centralization even as they moved away from the enclosed settlements. Centers and hinterlands both appear, with a large population center (89) appearing in the east community and a much smaller center in the west (83). At the same time, even with the appearance of a smaller center in the west community, the populations there exhibit an almost completely decentralized distribution pattern.

4.3.2 Final Bronze Age Populations in the Ui River Valley

Between the Sintashta period and the Late Bronze Age there is a dramatic shift in population levels between the east and west areas of the Ui River valley survey zone. In the Sintashta period, the majority of the populations live in the Stepnoye settlement, whereas roughly half

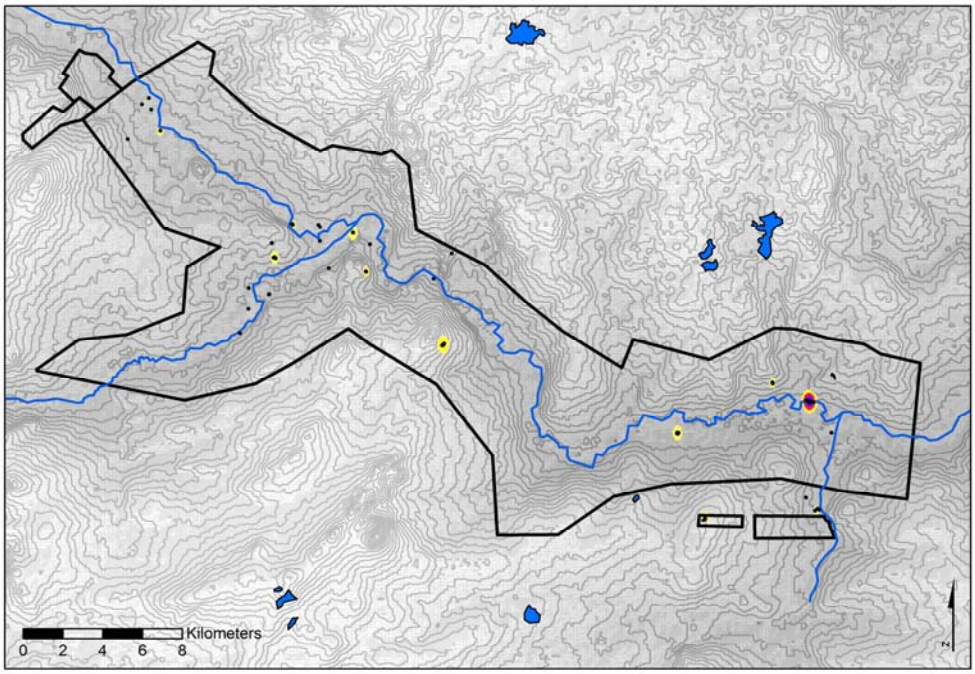

Figure 4.14 Kernel density distribution of Final Bronze Age sherds in east and west communities

of the number lives in the Chernorech'ye settlement. In the Late Bronze Age, the majority of the population shift location to the eastern half of the survey zone. In addition, and perhaps more importantly for this dissertation, is that demographic centralization continues on in the eastern half and almost disappears in the western half. What remains to be seen is how these changes play out in the Final Bronze Age, the last Bronze Age time period that we have any evidence for and which has been drastically understudied in terms of population levels and demographic centralization.

Using the Final Bronze Age sherds as a proxy for understanding population levels and changes to them, Figure 4.15 expresses the distribution of the densities across the survey zone. The western half of the survey zone expresses higher densities of sherds, albeit lower numbers

all together for the Final Bronze Age in comparison to the Late (Tables 4.9 and 4.10). The eastern half demonstrates a similar pattern to what we had seen in the Late Bronze Age with a

Table 4.9 Distribution of total Final Bronze Age sherds in the western community

Collection Unit	Number of Sherds	Sherd Proportions
1	1	.9
4	4	3.7
27	1	.9
28	4	3.7
29	1	.9
30	5	4.7
33	1	.9
34	3	2.8
35	1	.9
36	1	.9
67	3	2.8
71	2	1.9
74	4	3.7
83	4	3.7
87	1	.9
110	1	.9
113	2	1.9
114	1	.9
115	1	.9
116	1	.9
117	1	.9
Totals	**43**	**40.2**

Table 4.10 Distribution of total Final Bronze Age sherds in the eastern community

Collection Unit	Numbers of Sherds	Sherd Proportions
2	3	2.8
3	3	2.8
5	1	.9
7	7	6.5
18	6	5.6
24	4	3.7
25	4	3.7
89	31	29.0
90	4	3.7
112	1	.9
Totals	**64**	**59.8**

majority of sherds showing up at site 89. Site 89 still appears as the dominant center with the largest proportion of sherds (29%) being found there and the rest spread fairly evenly across the survey zone (Figure 4.15).

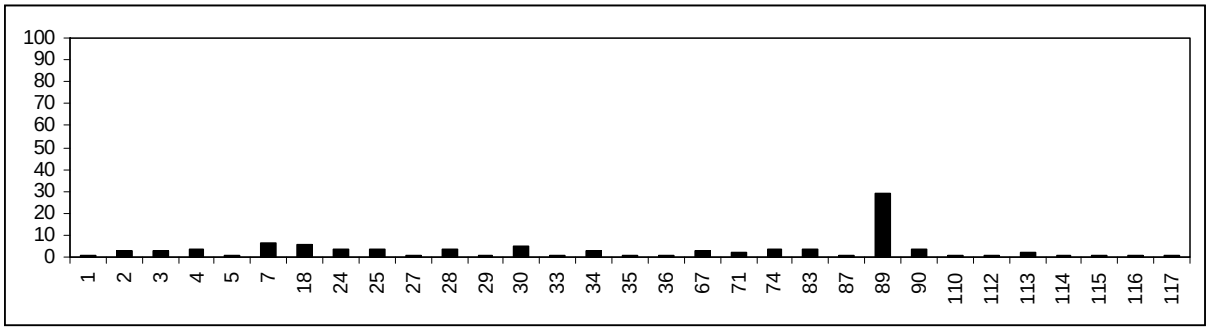

Figure 4.15 Proportional distribution of sherds by site in the Ui River Valley for the Final Bronze Age

By the end of the Final Bronze Age populations move back to the west community, though the east community still exhibits evidence for more people (Figure 4.16). The proportional distribution of sherds for the Final Bronze Age west and east communities (40.2% and 59.8%, respectively) still expresses some interesting differences that were further explored using stem-and-leaf plots. Such plots are used to identify any patterns that might be used as springboards into discussions of centralization, such as what is done for the Late Bronze Age.

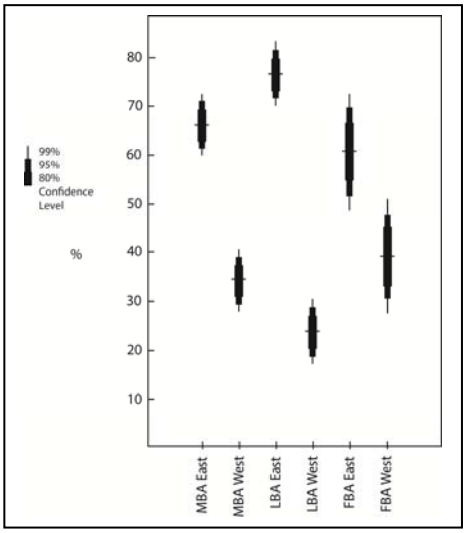

Figure 4.16 Proportional distribution of east and west populations in the Sintashta period through the Final Bronze Age

We can see that the medians for both west and east sherd populations are not very close (.9 and 3.7, respectively) (Figures 4.17 and 4.18). Given that the median is unaffected by extreme outliers such as seen for the east sherd population (59.8%), it seems that both batches behave in very different ways. However, it is also clear that the batches have different midspreads, with the east batch being spread out almost twice as much (1.7% and 2.8%, west and east respectively). Perhaps more importantly, is that we can see that the highest proportions for the east community is treated as an outlier.

While the Late Bronze Age is often seen as a period characterized by the breakdown and subsequent dispersal of the more complex Sintashta populations ultimately leading to the emergence of the Andronovo horizon, the Final Bronze Age is seen primarily in terms of the

```
Number of cases:  21

 Minimum      :    0.9
 Lower Hinge  :    0.9
 Median       :    0.9
 Upper Hinge  :    2.8
 Maximum      :    4.7
Midspread     :   1.7

          0 M 999999999999
          1
          1    99
          2
          2 H 88
          3
          3    7777
          4
          4    7
```

Figure 4.17 Stem-and-leaf plot of proportional distribution of Final Bronze Age sherds in the west half of the Ui River Valley survey zone

```
Number of cases:    10

 Minimum      :    0.9
 Lower Hinge  :    2.8
 Median       :    3.7
 Upper Hinge  :    5.6
 Maximum      :     29
Midspread     :    2.8

          0    99
          1
          2 H 88
          3 M 777
          4
          5 H 6
          6    5
* * * Outside Values * * *
         29    0
```

Figure 4.18 Stem-and-leaf plot of proportional distribution of Final Bronze Age sherds in the east half of the Ui River Valley survey zone

precursor to the emergence of the more fully mobile pastoral societies of the Early Iron Age (ca. 900/700 BC). Given that the Final Bronze Age has been almost completely overlooked in terms of demographic centralization not only in the Ui River valley, but also for the southern Urals more broadly, such an evaluation takes on extra importance as it provides the historical record for changes to population levels at the local and regional scales. Final Bronze Age populations are often considered to have more fully adopted a mobile pastoral lifeway. S. Zdanovich (2003) suggests based on the settlement evidence known for the Final Bronze Age, with Final Bronze Age Sargary populations practicing yearly herding.

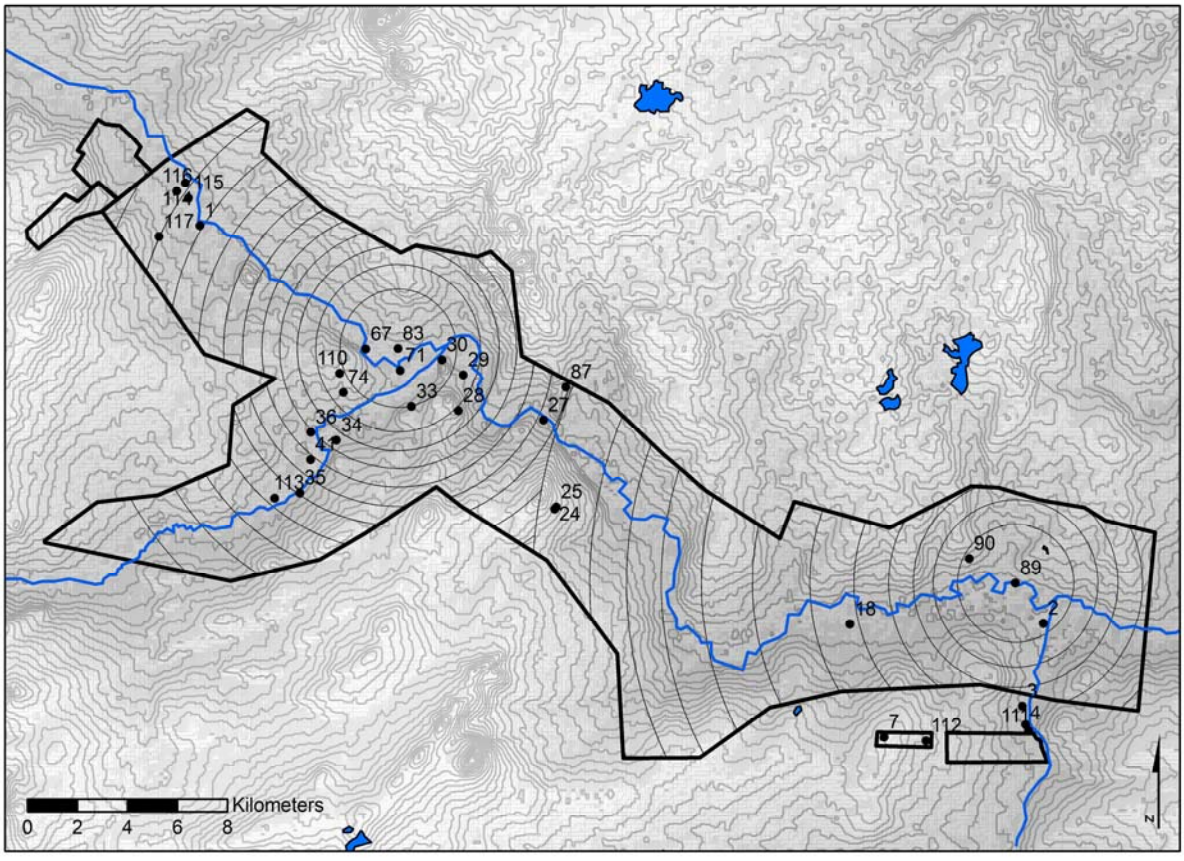

Figure 4.19 Centralization analysis of Final Bronze Age sherds for both west and east communities

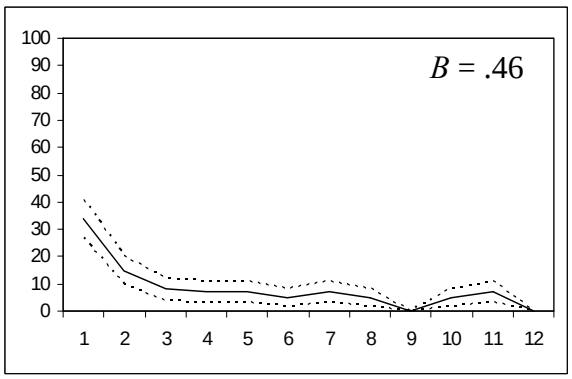

Figure 4.20 Graph of distribution of Final Bronze Age ceramic population across 12 concentric rings in the west half of the Ui River valley survey zone with 90% confidence level highlighted

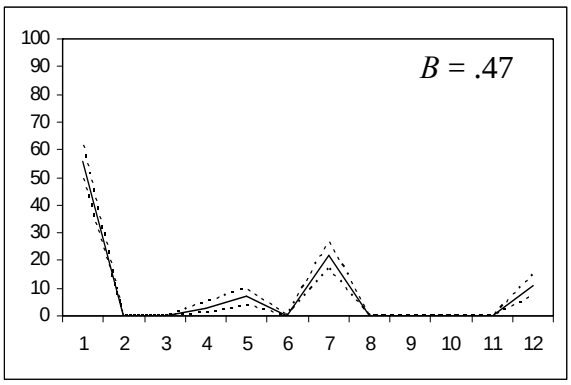

Figure 4.21 Graph of distribution of Final Bronze Age ceramic population across 12 concentric rings in the east half of the Ui River valley survey zone with 90% confidence level highlighted

Table 4.11 Calculation of *B* value for Final Bronze Age west population of sherds

FBA West	Est. Pop	Pop Prop	Cum Prop
Ring 1	15	34.0	34
Ring 2	7	15.0	49
Ring 3	4	8.0	57
Ring 4	3	7.0	64
Ring 5	3	7.0	71
Ring 6	2	5.0	76
Ring 7	3	7.0	83
Ring 8	2	5.0	88
Ring 9	0	0.0	88
Ring 10	2	5.0	93
Ring 11	3	7.0	100
Ring 12	0	0.0	100
Totals	44	100	903

Table 4.12 Calculation of *B* value for Final Bronze Age east population of sherds

FBA East	Est. Pop	Pop Prop	Cum Prop
Ring 1	38	56	56
Ring 2	0	0	56
Ring 3	0	0	56
Ring 4	2	3	59
Ring 5	5	7	67
Ring 6	0	0	67
Ring 7	15	22	89
Ring 8	0	0	89
Ring 9	0	0	89
Ring 10	0	0	89
Ring 11	0	0	89
Ring 12	8	11	100
Totals	68	100	906

One part of the community engages in the movement of the herds around the stationary part. The other part of the community stays in place, taking care of dairy animals and participated in other domestic craft activities. Such a conceptualization of Final Bronze Age settlement and economic

activities indicates the lingering presence of sedentism and a moderate tendency for demographic centralization seems clear.

The Final Bronze Age communities in the Ui River valley (Figures 4.19 - 4.21), at least those populations recorded in the survey zone, are fairly weakly centralized, with *B* values for the west (.46) and the east (.47) (Tables 4.11 and 4.12). This indicates marked differences from the Late Bronze Age when the east community is extremely strongly centralized and the west almost completely decentralized. Despite the majority of the population still living in the eastern community, focusing particularly on site 89, the west community demonstrates stronger demographic centralization in the Final Bronze Age. This had also been hinted at in the stem-and-leaf plot, despite the fact that there is no clear indicator of an outlier like 89 that represents a small population center. This is one of the benefits of the centralization analysis proposed by Drennan and Peterson (2008) that centralization is not just measured by the size of a single population center but rather as an area that is the most populated.

4.4 SUMMARY - POPULATION HISTORIES AND DEMOGRAPHIC CENTRALIZATION IN THE BRONZE AGE OF THE SOUTHERN URALS

During the Sintashta period through Final Bronze Ages, populations moved within their familiar, historical landscapes. During the Sintashta period, population distribution in the Kizil'skoye region is somewhat evenly distributed between the Kuisak and Sarym-Sakly settlements, where as in the Ui River valley the majority of populations are located in the west half of the valley in the Stepnoye settlement and with local populations around each Sintashta settlement completely demographically centralized. By the end of the Late Bronze Age, population density shifts focusing on the east half of the valley, in particular at site 89 with a exceptionally strong

demographically centralized pattern showing up in the east half, while in the west half the community is almost completely decentralized. In the Final Bronze Age, this trend continues but not as strongly with more people living at 89 than anywhere else in the valley but exhibiting a weakly demographically centralized pattern, more weakly centralized than in the west despite the lower density of population. While there is a strong connection between population locational changes from the Sintashta period and the Late Bronze Age that continues into the Final Bronze Age, the links within and between each community in terms of settlement size, differential land use, and establishment and use of territory have yet to be investigated.

5.0 TERRITORY, COMMUNITY, AND DIFFERENTIATION IN THE BRONZE AGE SOUTHERN URALS

A logical next step after the assessment of historical changes to population distribution and the varying degrees to which populations were centralized in the southern Urals is an evaluation of how these populations established and used their territories differently (or not) over time. The idea of territory is certainly nothing new for pastoral societies, and in fact, much of pastoral social organization is dependent on how groups engage with their local and regional landscapes and negotiate territorialization/deterritorialization (Barth 1961; Cribb 1991; Khazanov 1984). For R. Cribb (1991: 54-55), the pastoral 'tribe' itself refers to a territorial system, in which population units are linked to specific areas of territory, and how they used and controlled their territories would be important components in their social system. If this is the case, and allocation of territory to different pastoral groups does seem to hold true for many pastoral societies, this is an important step in investigating social differentiation among pastoral communities (Barfield 1993; Barth 1964; Cribb 1991; Salzman 2004).

For the pastoral communities of the Bronze Age southern Urals, there is a noticeable shift from completely centralized populations living in enclosed settlements with no to little evidence of hinterland occupation during the Sintashta period to populations living in increasingly dispersed communities during the Late and Final Bronze Ages. Such shifts in demographic distribution also indicate a change in relationships between communities and their local landscapes. This chapter explores these relationships with a simple understanding that changes to

social organization are linked to changes in the way populations utilize their landscape, and that pastoral communities through the Bronze Age may have done this differently from their contemporaries as well as from previous communities.

5.1 TERRITORY, COMMUNITY, AND DIFFERENTIATION IN THE SINTASHTA PERIOD OF THE SOUTHERN URALS

In Chapter Four, Sintashta period groups were identified as completely demographically centralized communities (assumed in Anthony 2009; Epimakhov 2002a; Frachetti 2009; Hanks 2009; Peterson 2009; Vinogradov 2004; Zdanovich and Zdanovich 2002). This seems particularly clear when we examine a distribution map of the Sintashta settlements, or the

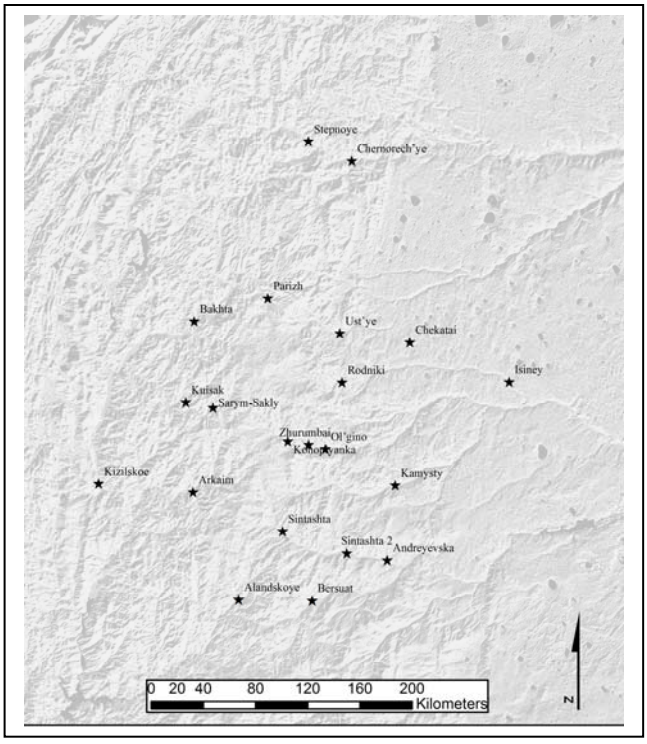

Figure 5.1 Distribution map of the Sintashta settlements of the southern Urals

Country of Towns (Figure 5.1). The settlements are seemingly divorced from any historical predecessor or from any spatial association with complex social practices.

As a cultural phenomenon the populations of the Sintashta period are treated pretty much as a homogeneous whole, with equal participation by each community in a shared Sintashta cultural identity, including socio-economic and political practices. As mentioned in Chapter one, L. Koryakova and A. Epimakhov (2007: 69) indicate that the Sintashta period settlements range

Table 5.1 List of Sintashta settlements, their areas according plans from Zdanovich and Batanina (2007) along with proportional size grades

Alandskoye	10.58	6
Andreyevska	3.60	3
Arkaim	13.20	6
Bakhta	2.32	2
Bersuat	9.55	5
Chekatai	0.77	1
Chernorechye	3.32	3
Isiney	1.45	2
Kamysty	3.51	3
Kizilskoe	1.35	2
Konoplyanka	1.02	2
Kuisak	1.41	2
Olgino	1.87	2
Parizh	2.06	2
Rodniki	1.41	2
Sarym-Sakly	5.47	4
Sintashta	1.76	2
SintashtaII	1.46	2
Stepnoe	2.16	2
Ustye	1.84	2
Zhurumbai	6.92	4

Case Studies: 21

Minimum : 0.770
Lower Hinge : 1.450
Median : 2.060
Upper Hinge : 3.600
Maximum : 13.200

```
0      7
1 H    034444
1      788
2 M    013
2
3      3
3 H    56
4
4
5      4
* * * Outside Values * * *
6      9
9      5
10     5
13     2
```

Figure 5.2 Stem-and-leaf plot of Sintashta period settlement sizes based on plans in Zdanovich and Batanina (2007)

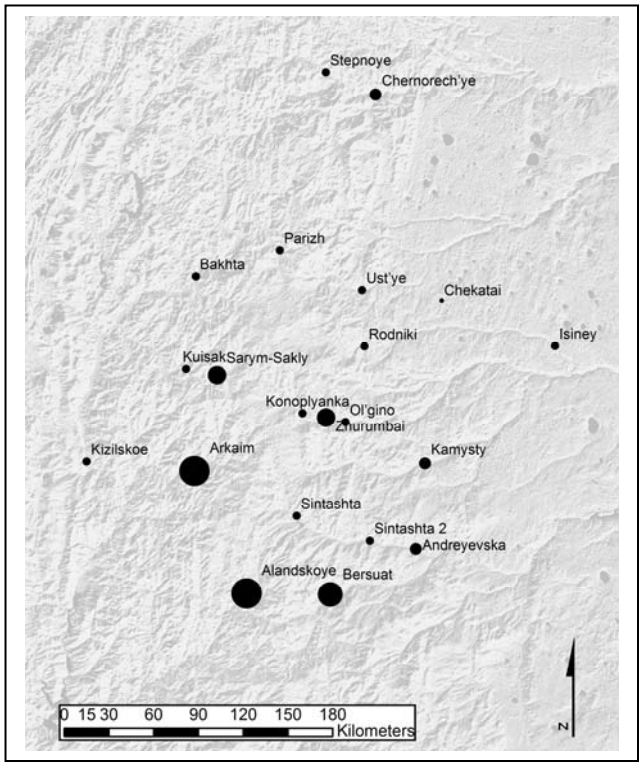

Figure 5.3 Distribution map of Sintashta period settlements with proportional symbols exhibiting size categories

in size between .6 and 3.5 ha. Yet, according to the settlement plans and scales published in Zdanovich and Batanina (2007), there is a greater range in settlement sizes between approximately .7 and 13.2 ha (Figures 5.2 and 5.3; Table 5.1). I use these measurements to initiate a discussion of differences in settlement size and how these differences may relate to different uses of local landscapes and the establishment of territory by each community, including social boundaries.

Sintashta period settlements demonstrate a variety of sizes with the three largest (Arkaim, Alandskoye, and Bersuat) located in the southwest of the southern Urals region. The stem-and-

leaf plot in Figure 5.2 expresses the range of settlement sizes (in ha) giving us at least five tiers. As it is, given the distinct lack of evidence for hinterland settlements, we can assume that each Sintashta settlement is an autonomous, economically self-sufficient community. If this is the case, then perhaps we can better understand the relationship between the area needed to

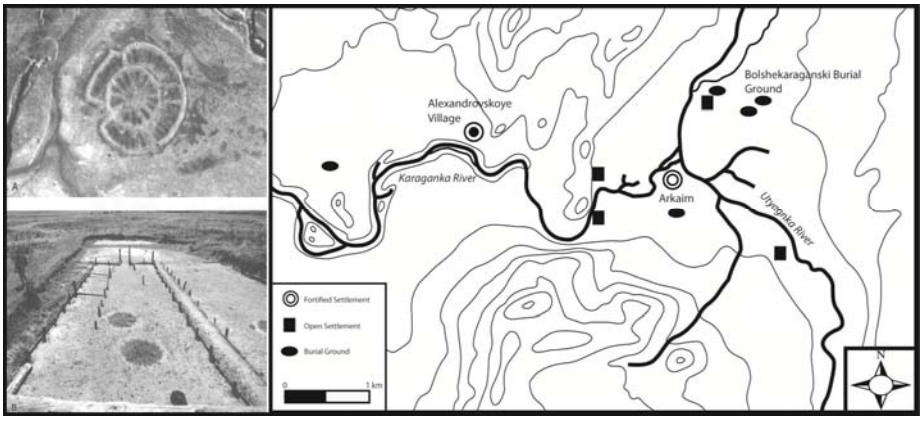

Figure 5.4 Photo of Arkaim settlement, house plan, and map of the broader Arkaim settlement hinterland (after Zdanovich 1997: 14; 2002)

maintain herds of livestock and broader areas of territorial control for each settlement. As very little evidence has been discovered to indicate reliance on agriculture, it is assumed that the area required for subsistence needs would be based on pasturage rather than arable land. As I am discussing pastoral societies that exhibit little if any evidence for use of agriculture, there is a fairly homogenous distribution of resources in terms of the amount of the vegetation that livestock (cattle, sheep, goats) would need for survival, which for the most part focuses on steppe grasses and other vegetation.

Catchments are idealized spatial representations that delineate the amount of potential resources for a community (Roper 1979). These representations are usually given a circular form,

with the radius determined by the distance it takes to walk in a day, assuming that community members are traveling to and from a central place everyday (or most days). Because of these standardized projections of size and shape for catchments, catchment analysis has come under intense scrutiny and criticism for its idealization (and perhaps over-simplification) of human-environment relationships (Finsten et al. 1983; Roper 1979). I will not go into all of the aspects of the catchment analysis and its many critiques, except to say that catchments are usually given a circular form with an underlying assumption of homogenous distribution of resources. That is unless very specific maps and/or satellite imagery are available to identify the most optimal resources, including vegetation, soils, etc. There is no necessarily direct correlation between the character of ancient and modern landscapes, just as there is no direct grafting of ethnographic analogies onto prehistoric pasts. However, we can assume that areas for the best vegetation (most lush and dense) will be close to water sources. Taking into account such criticisms, I tie settlement size to catchments to viewsheds to discuss control and utilization of pasturage, and to explore other considerations such as social boundaries and community integration.

The first step produces the standardized catchments for pasturage area needed in a plausible manner. To do this, the catchments are based on the average number of animals in a herd for a nuclear family of five (Table 4.1, as presented in Ch. 4) with 25 animals per household used. This number is then multiplied by the number of dwellings for each settlement. That number is then multiplied by 2, representing the number of hectares of pasturage needed for each animal to survive a year (Table 5.2). For the Late and Final Bronze Age Ui River sites, there are no identifible household depressions (except for Streletsk I with 8 dwellings, which matched the calculation for that site), so the overall area of the sherd scatter is divided by the average size of an Late Bronze Age dwelling (205 m^2; Koryakova and Epimakhov 2007: 128) and Final Bronze

Table 5.2 Table representing the number of dwellings and number of livestock needed to generate catchments of specific size suitable for each Sintashta period settlement population

Settlement	No. of Dwellings	Units of livestock	Total Units of Livestock	Area in hectares	Area in square m	Radius
Alandskoye	56	25	1400	2800	28000000	2985.41
Andreevskoye	72	25	1800	3600	36000000	3385.14
Arkaim	82	25	2050	4100	41000000	3612.58
Baxta	23	25	575	1150	11500000	1913.26
Bersuat	84	25	2100	4200	42000000	3656.37
Chekatai	21	25	525	1050	10500000	1828.18
Chernorechye	26	25	650	1300	13000000	2034.21
Isiney	35	25	875	1750	17500000	2360.17
Kamysty	12	25	300	600	6000000	1381.98
Kizilskoye	23	25	575	1150	11500000	1913.26
Konoplyanka	27	25	675	1350	13500000	2072.96
Kuisak	38	25	950	1900	19000000	2459.25
Ol'gino	42	25	1050	2100	21000000	2585.44
Parizh	36	25	900	1800	18000000	2393.65
Rodniki	26	25	650	1300	13000000	2034.21
Sarym-Sakly	39	25	975	1950	19500000	2491.39
Sintashta	48	25	1200	2400	24000000	2763.95
Sintashta 2	40	25	1000	2000	20000000	2523.13
Stepnoye	50	25	1250	2500	25000000	2820.95
Ust'ye	31	25	775	1550	15500000	2221.22
Zhurumbai	31	25	775	1550	15500000	2221.22

Age dwellings (240 m^2; Koryakova and Epimakhov 2007: 163). I determine 2 hectares a year by following the posts of ranchers involved in the *localharvest.com* forum, which focused on the acres needed to feed one animal per year. Most contributors to the forum suggest 1 to 2 acres per animal/per year, but also indicate this is also highly variable due to rainfall, heterogeneous quality of pasture, etc. To offset this, I use a conservative base of 2 hectares per animal, which comes out to approx. 5 acres per year. The results are catchments that do not necessarily conform

to the idea that there is a set distance to walk, but rather a catchment focusing on what is needed to feed a number of animals for a year based on one economic resource rather than all economic resources, including raw lithic material and copper ore, located within a set distance.

Initially, the catchment is presented in the familiar circular shape. Below is the distribution map of the Sintashta period settlements with their pasturage catchments (Figure 5.5). However, these circular shapes do not adequately allow for considerations of where better, rather than just

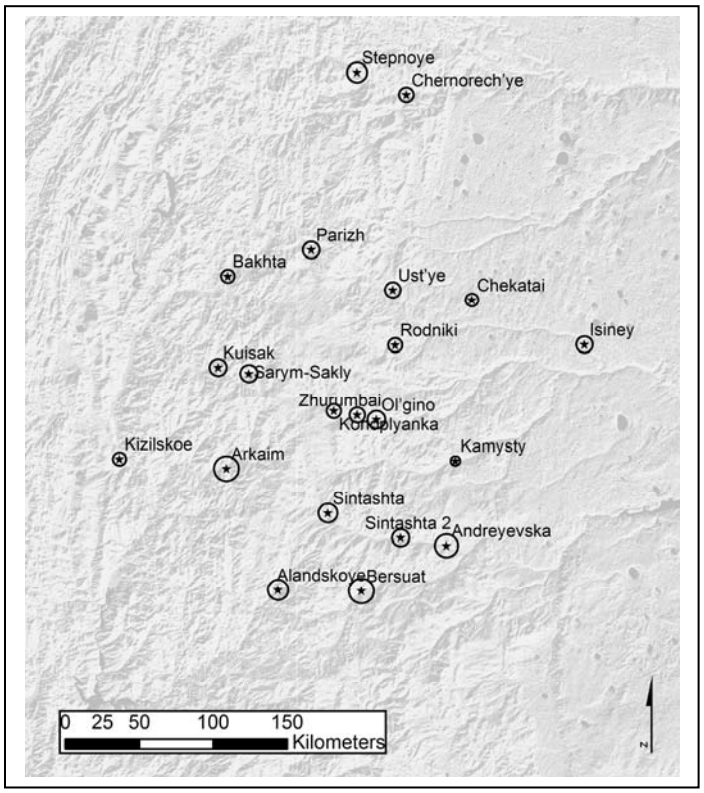

Figure 5.5 Distribution map of Sintashta period settlements and their pasturage catchments

adequate, pasturage might be located (especially in times of drought or conflict). In addition, such catchments only reflect the amount of area needed for a year's worth of pasturage for the given amount of livestock. Given these two considerations, location of better pasturage and the

amount of pasturage needed for more than one year so as not to overgraze those areas, catchments may not have a typical circular shape. Given the presence of enclosed settlements for the Sintashta period indicative of permanent markings, or what E. Hammer calls landscape anchors (2012, 2014), it seems likely that the type of pastoral mobility in question is a form of *tethered mobility*. Tethered mobility is defined as expressing specific limitations to the range and/or time of movement by reliance on particular resources and/or social circumscription (Wendrich and Barnard 2008: 7; after Ingold 1980). One seemingly plausible alternative to thecircular catchment is one that is more dependent on the topography of human choice, including social differentiation in terms of amount of land seen and controlled. In other words, to what extent do viewsheds correspond with the area needed for herd catchments?

The calculation of a viewshed, or regions of visibility and inter-visibility depending on the number of settlements involved, is the number of cells that can be seen from a specified viewpoint (Connolly and Lake 2006: 226). For the purpose of this dissertation, I am primarily concerned with the size of and degree (if any) overlap between individual viewsheds of specific settlements to determine whether or not the calculated area needed for settlement herds would fall within the visibility parameters for each respective settlement. This seems particularly important as the Sintashta period is modeled as one of conflict and competition. A plausible expectation for this is that if conflict/competition over resources such as pasturage is commonplace then the area needed for pasturage would be within the visible area outside of each settlement with little to no overlap in viewsheds (Figure 5.6).

What becomes clear is that the pasturage area needed for each settlement falls well within the range of each settlement's viewshed (Figures 5.6 and 5.7). There are three exceptions to this: Sintashta, Baxta, and Isiney, though with Isiney the pasturage needed and the size of the

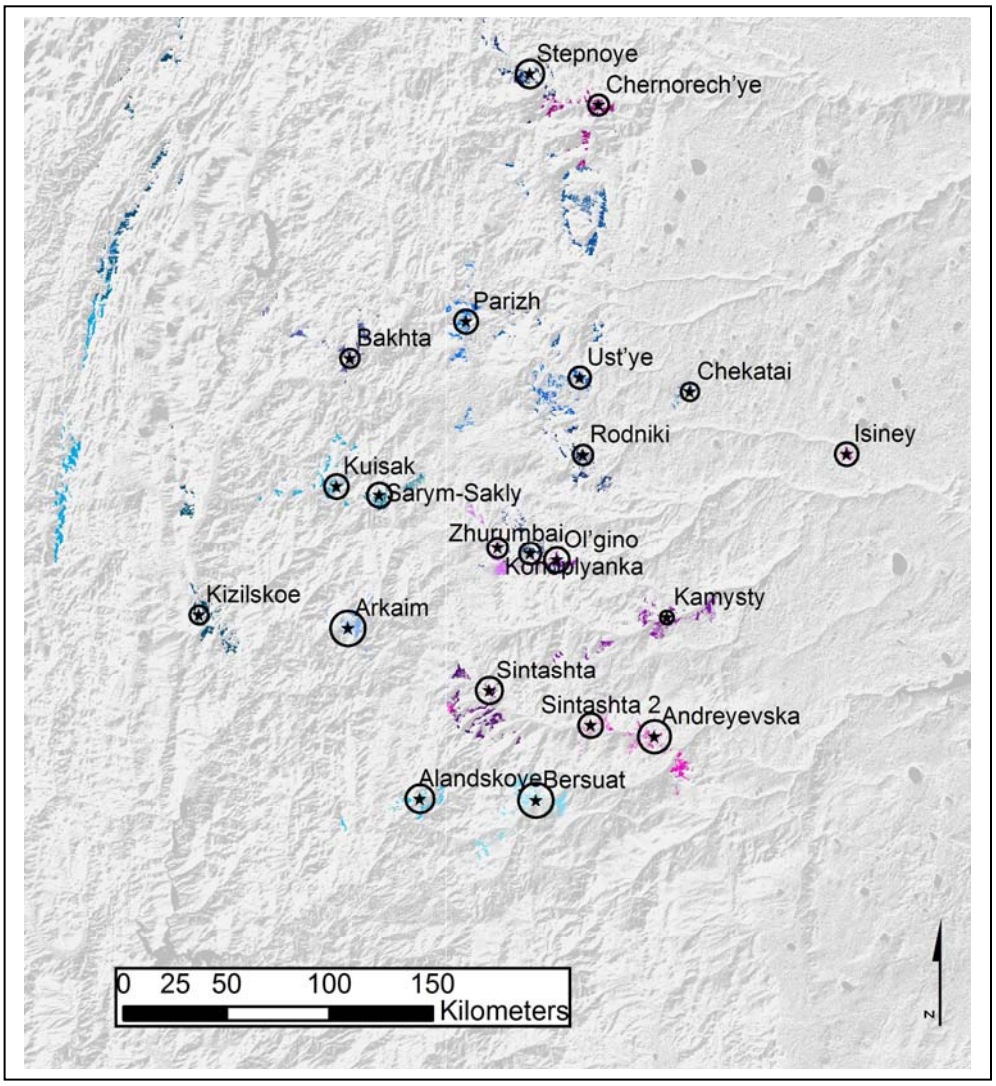

Figure 5.6 Map illustrating both calculated pasturage catchments and viewsheds for each Sintashta period settlements, with viewsheds in different colors

viewshed is fairly close. Expansive viewsheds are representative of choices in settlement location that included higher elevations along with unobstructed views usually along river valleys and flat marshlands, as stated in Anthony (2007, 2009) and Koryakova and Epimakhov (2007).

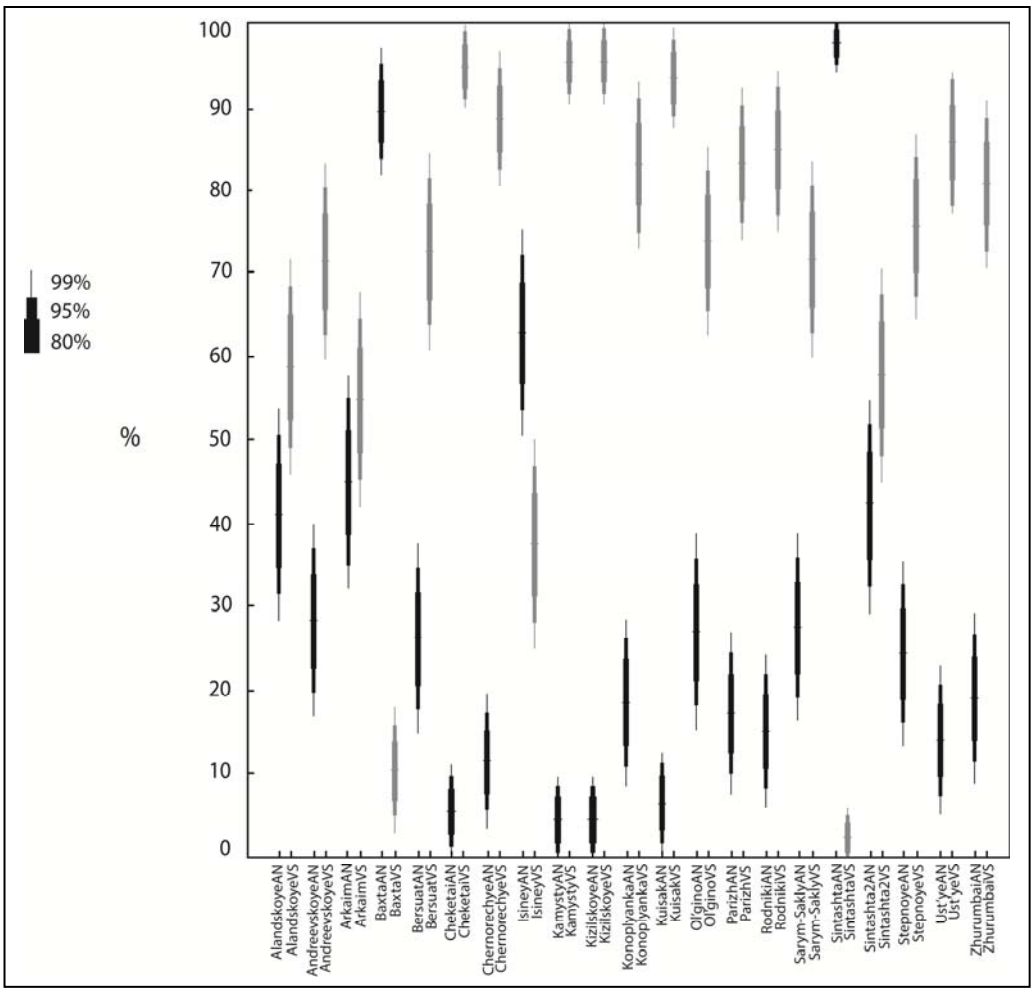

Figure 5.7 Bullet graph of presenting the proportional relatonship between Area Needed (AN)(in black) and Viewshed size (VS)(in gray) for Sintashta period settlements

Despite the relatively limited viewsheds of Sintashta and Baxta, there is a meaningful relationship expressed between the area needed for pasturage and the amount of area visible from each settlement. The proportional differences between the area needed for each settlement's catchment and their viewshed indicate strong possibilities for the relationship between choice of settlement location and the amount of area needed for pasturage by Sintashta period communities. The resultant question is did these relationships change in later periods and if so, how and why?

5.2 TERRITORY, COMMUNITY, AND DIFFERENTIATION IN THE LATE BRONZE AGE SOUTHERN URALS

The Late Bronze Age of the southern Urals has been termed a period of expansion, colonization, and stability (Koryakova and Epimakhov 2007). As mentioned in Chapter Four, Epimakhov (2009b) notes that there seems to be a five-tier settlement hierarchy visible during the Late Bronze Age in the Kizil'skoye region (using the Atlas by Zdanovich et al. 2003). What remains unclear at this point is if there was a tendency towards hierarchical settlement patterning and control over local territories in the Late Bronze Age that differs from or was similar to what had happened in the Sintashta period. I compare the Late Bronze Age settlement size patterning of the northeast area of the Kizil'skoye region to that of the Ui River valley to evaluate any trends of social hierarchy within and between communities following Epimakhov (2002a) (Figures 5.8 and 5.9). For the Kizil'skoye region, number of households provides the base size, while for the Late Bronze Age Ui River sites actual area is used.

Figures 5.8 and 5.9 illustrate some important differences in settlement patterning between two different regions of the southern Urals. In the northeast area of the Kizil'skoye region there appears to be little clear evidence for a settlement hierarchy. The stem-and-leaf plot shown below (Figure 5.10) exhibits a batch with a small rounded peak with no outside values that would signal the presence of a settlement that was substantially larger than the others. Following

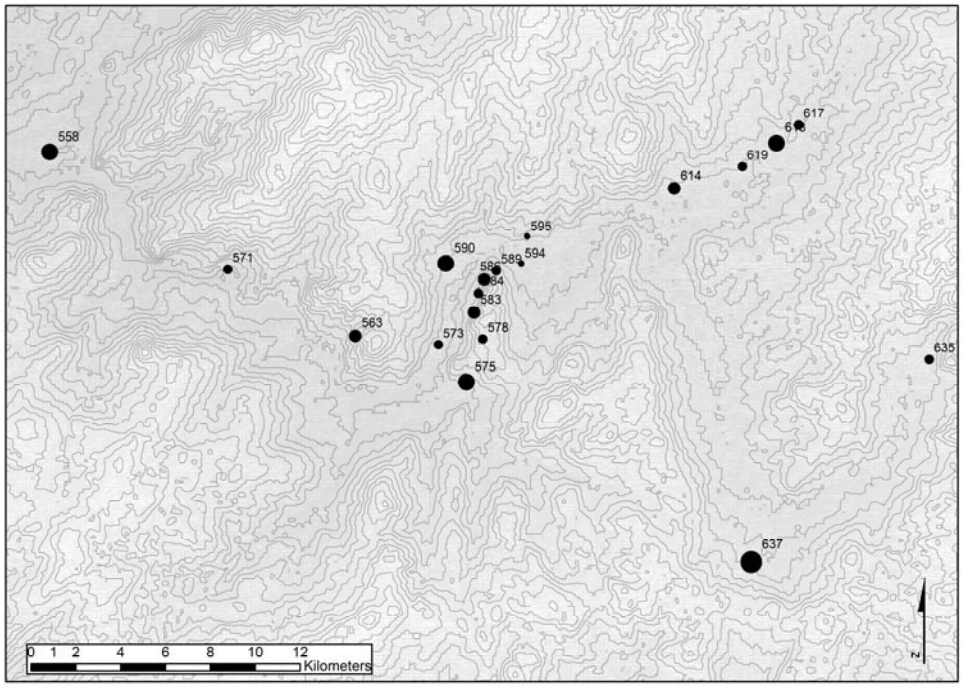

Figure 5.8 Map of Late Bronze Age settlement patterning in the northeast Kizil'skoye region with settlement sizes represented by proportional symbols

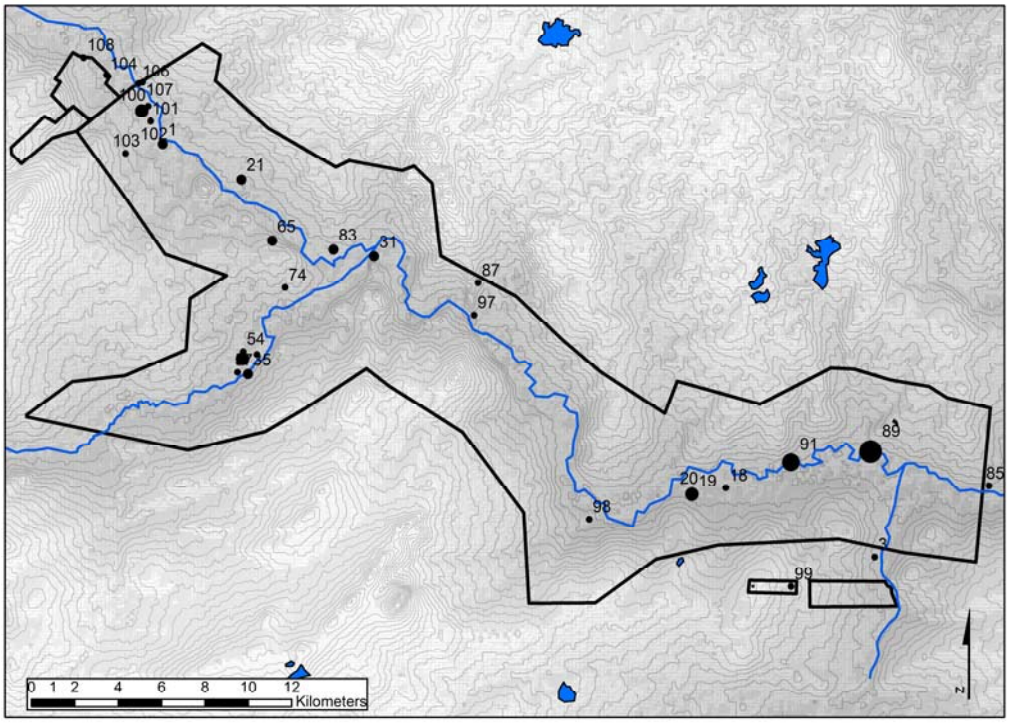

Figure 5.9 Map of Late Bronze Age settlement patterning in the Ui River valley with site sizes and number of sherds represented by proportional symbols for each community

the very strong form of demographic centralization for the east community presented in Chapter Four, the stem-and-leaf plot for the Late Bronze Age Ui River valley indicates solid evidence for the emergence of a major settlement that is much larger than the rest, with the larger values separated as the outside values and with much smaller sites predominating the other end of the batch (Figure 5.11). Importantly, this includes the presence of small sites that are rarely documented in the steppe and that most likely indicate a variety of small herding camps (see Cribb 1991; Houle 2010; Watson 1979). Perhaps most importantly for both examples, there are some clear differences sizes in the settlement patterning exhibited between the areas discussed.

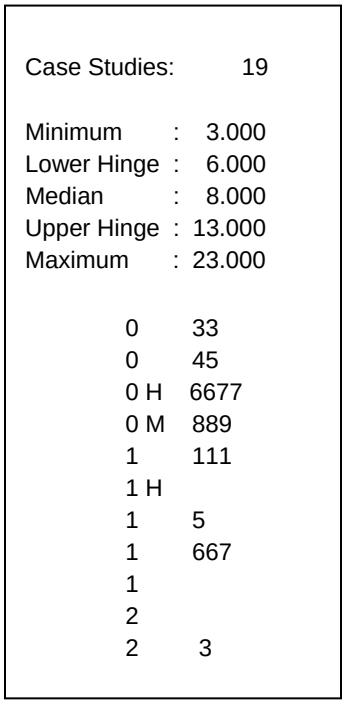

Figure 5.10 Stem-and-leaf plot of number of houses in the Late Bronze Age northeast Kizil'skoye

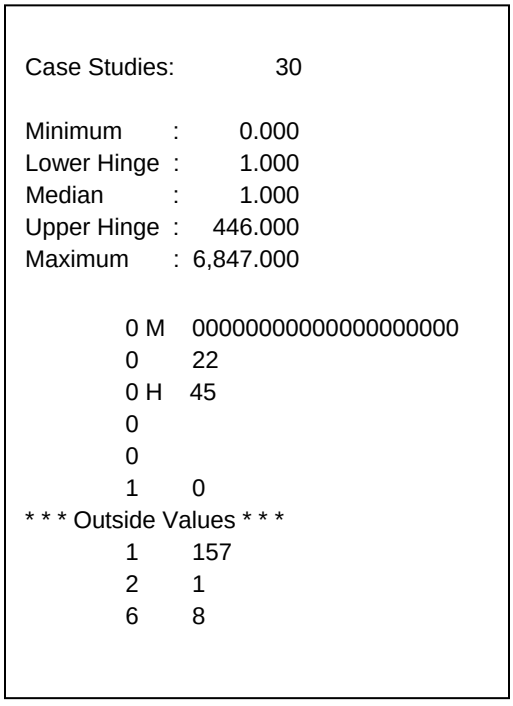

Figure 5.11 Stem-and-leaf plot of site sizes in the Late Bronze Age Ui River valley

As established in Chapter Four, it is clear that local center-hinterland dynamics do not develop until the Late Bronze Age, and then only in the east community. For the Ui River valley hinterland sites are much smaller and cling to areas along the river, along with the larger sites (Figures 5.12 and 5.13). There is not much difference among the communities in that regard; Late Bronze Age sites are found predominantly along rivers and their tributaries. One obvious reason for this is proximity to water. This is to be expected as both humans and livestock need water. Perhaps more importantly is the fact that vegetation along riverbanks is much more lush and denser than it is farther away from water sources.

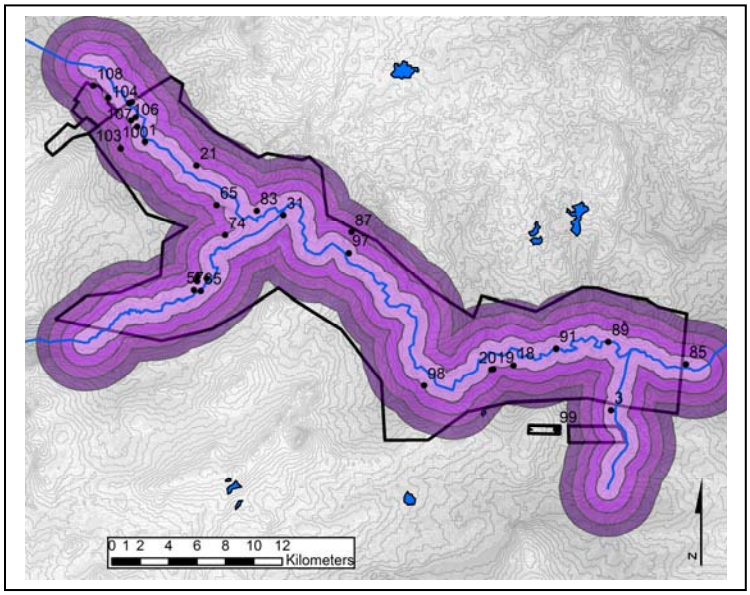

Figure 5.12 Late Bronze Age river buffers in the Ui River valleywith buffers set at 500 m, 1000 m, 1500 m, and 2000 m.

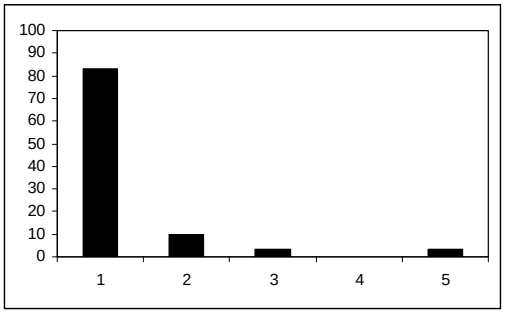

Figure 5.13 Late Bronze Age river buffers in the Ui River valley with buffers set at (1) 500 m, (2) 1000 m, (3) 1500 m, (4) 2000 m, and (5) beyond 2000 m

There is a clear connection between Late Bronze A site location and proximity to the major river and its tributaries in the Ui River valley. This also holds true for the Late Bronze Age northeast Kizil'skoye region. As pointed out for the Sintashta period, territory may not fit circular

patterns as such formations do not utilize the best available pasturage nor do they necessarily keep the herds and herders within a visible range of the largest settlements. Viewsheds may be more useful in indicating a different shape and size of community territory and catchment in the Sintashta period as well as during the Late Bronze Age for targeting different areas for grazing (Figures 5.14 and 5.15). In addition, the degree of overlap between viewsheds of the largest

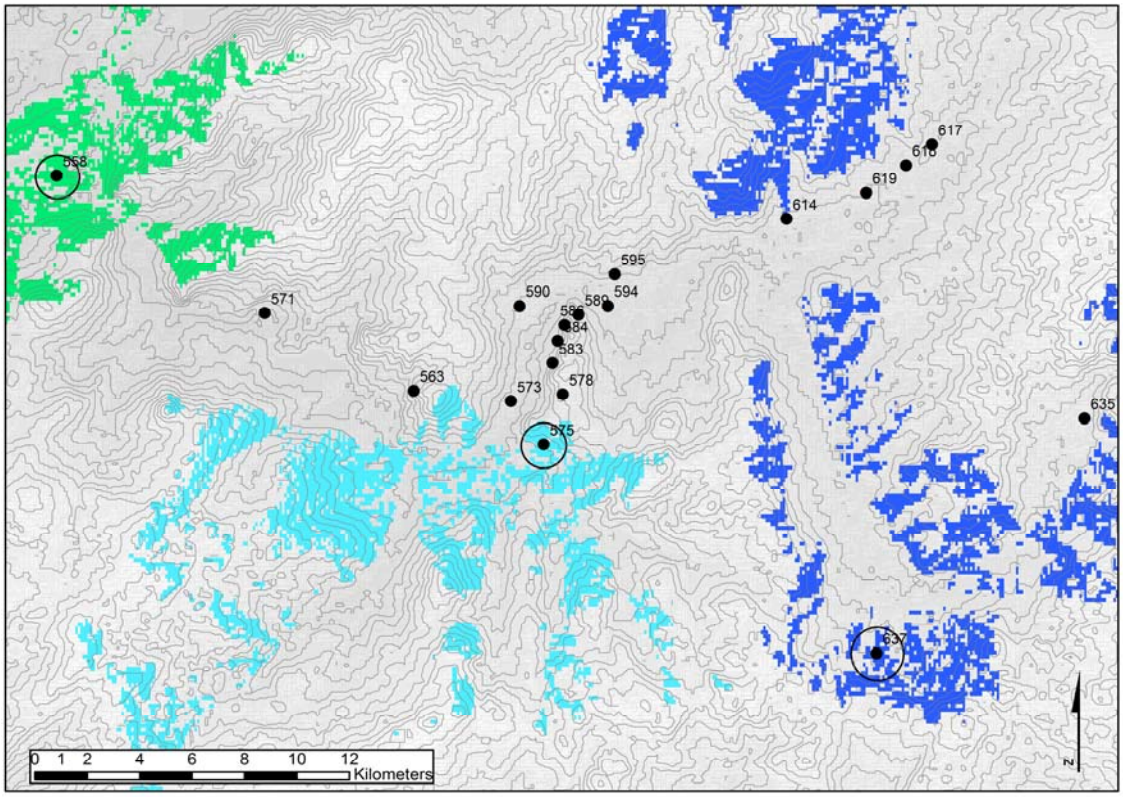

Figure 5.14 Viewsheds of the three largest Late Bronze Age settlements in the northeast Kizil'skoye region

settlements might provide compelling information as to the degree to which Late Bronze Age communities are integrated internally, while also differentiating territory so as not to mix herds or over-graze.

The proportional differences between the AN and the VS in the Late Bronze Age are overall greater than what they were for the Sintashta settlements in the northeast Kizil'skoye region and the Ui River valley (Figures 5.16 - 5.18). There is a clear pattern of smaller, more

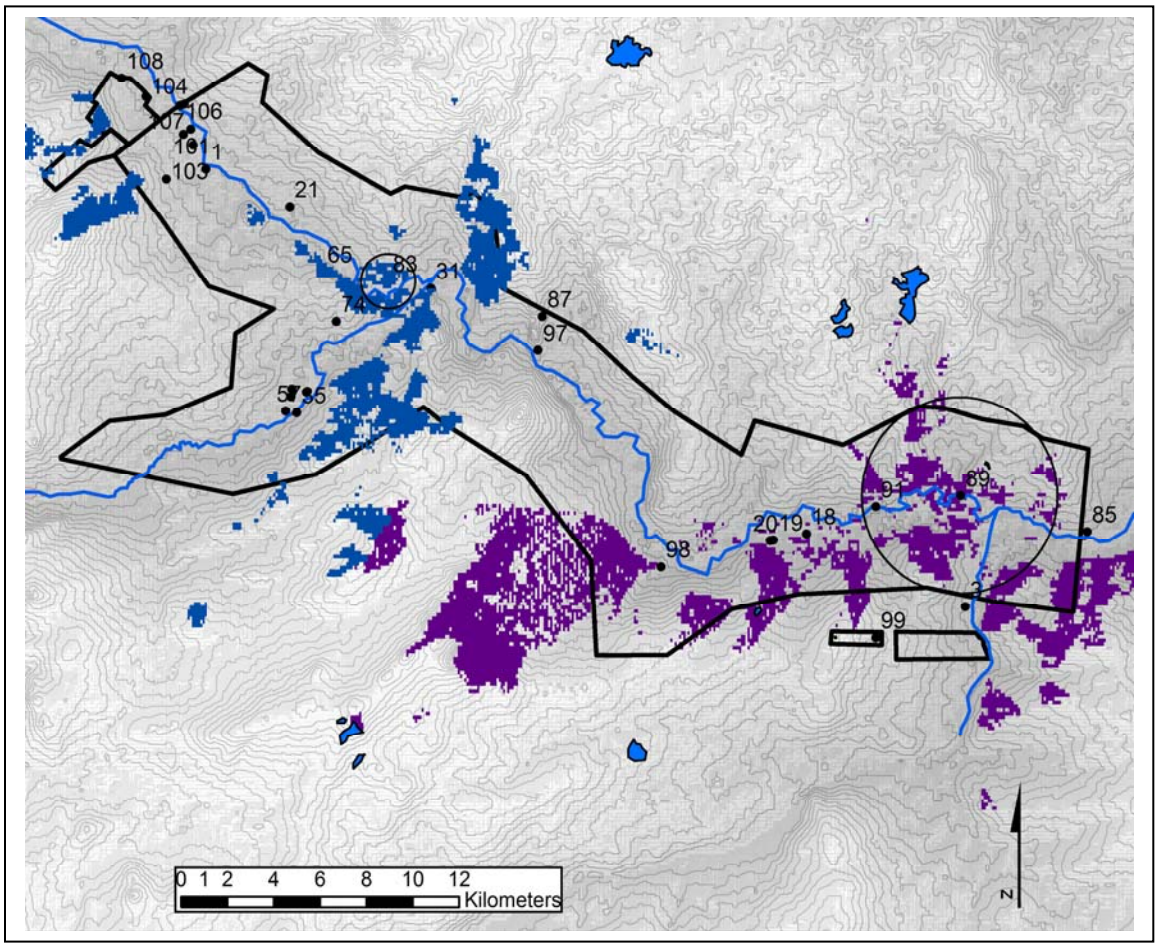

Figure 5.15 Viewsheds of the two largest Late Bronze Age settlements in the Ui River valley

dispersed settlements emerging in the Late Bronze Age and their pasturage needs shrinking accordingly. At the same time, settlement locations are chosen that kept much greater areas within sight of larger settlements. In terms of grazing, rather than using circular catchments to determine pasturage viewsheds offer not only the immediate needs of the group or community

involved but also the needs in the long term with possibilities for switching pastures so as to avoid over-grazing. The question, do viewsheds overlap, has multiple implications in terms of possible social and physical boundaries between communities as well as the degree to which pasturage might have been shared between and within communities.

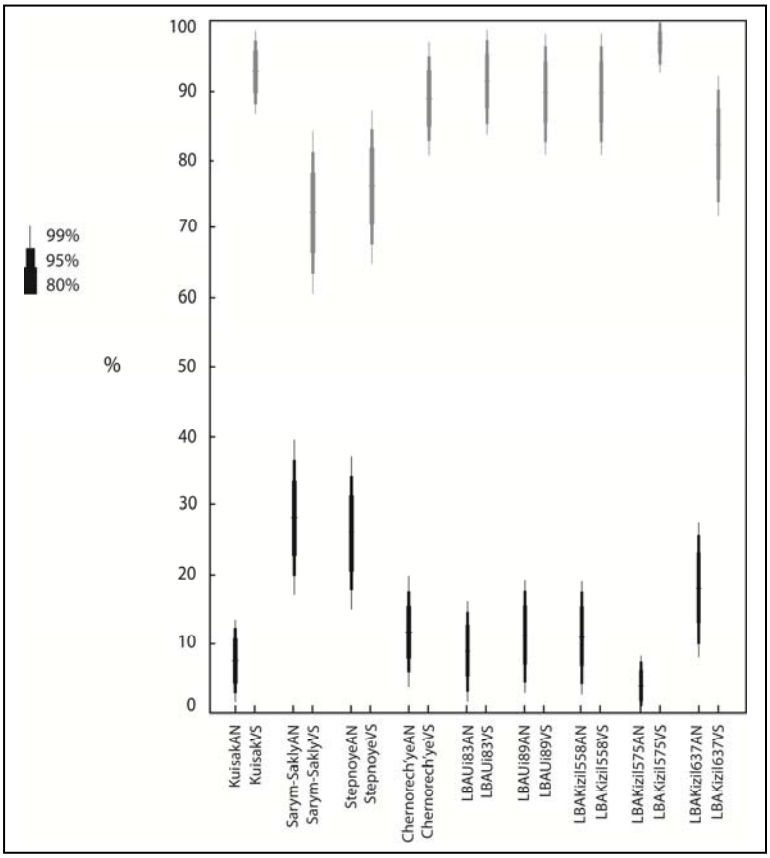

Figure 5.16 Bullet graph illustrating proportional relationship between Area Needed for pasturage (AN) and viewsheds (VS) from the Sintashta period through the Late Bronze Age in the Kizil'skoye region and Ui River valley

In the Sintashta period northeast Kizil'skoye region, there is no overlap of viewsheds between the Kuisak and Sarym-Sakly settlements (Figure 5.14). There is, however, a small amount of overlap (33.51 ha) between the Stepnoye and Chernorech'ye communities in the Ui

River valley. This overlap disappears in the Late Bronze Age between the Ui east and west communities. As for intra-community overlap between the largest Late Bronze Age settlements in each region, for the Kizil'skoye area there is no overlap between the three largest settlements.

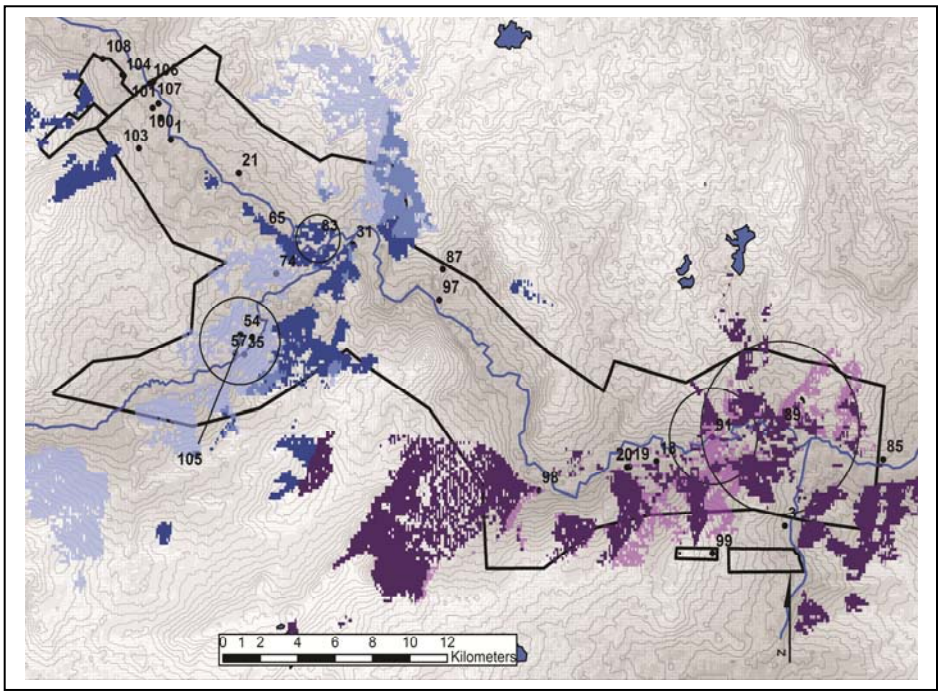

Figure 5.17 Viewsheds of the two largest Late Bronze Age settlements in each community in the Ui River valley with their respective catchments delineated

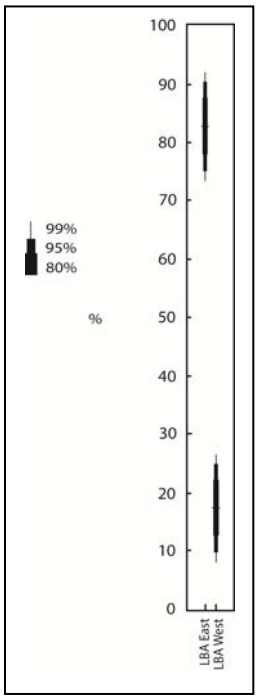

Figure 5.18 Proportional distribution of Late Bronze Age viewshed overlap in the east and west communities of the Ui River valley

However, for the Ui River valley there is a large proportional difference in the intra-community viewshed overlap in the east community, whereas with the west community there is very little difference exhibited (Figures 5.17 and 5.18).

5.2.1 Summary of Territory, Community, and Differentiation in the Late Bronze Age Southern Urals

In the Sintashta period there is a great deal of variation in terms of settlement, pasturage catchment, and viewshed sizes. But for the Late Bronze Age, the picture that emerges in terms of establishment and use of territory by specific communities is that there was a great deal of variation going on in terms of tendencies of differentiation and integration through disparate uses of local landscapes. For the northeast Kizil'skoye region, the Late Bronze Age communities remained autonomous in terms of their location choice (as determined by the locations of the three largest settlements in that area), remaining outside their neighbors field of vision as well as most likely maintaining separate territories for grazing needs while also ensuring enough area for rotational grazing of herds to prevent over-grazing.

The situation during the Late Bronze Age in the Ui River valley provides an interesting contrast. In terms of settlement size, there is considerable evidence (at least in terms of site area) that very distinct and comparatively large settlements are present in the east community. In the west community there is little compelling evidence of major differences in settlement size and, in fact, there is very little evidence for much integration in terms of the two largest identified sites being within site of each other. The degree of overlap for the west community is proportionally low and their pasturage catchments are spatially distinct also with no overlap. The east community provides a very different picture. Viewsheds and pasturage catchments provide compelling evidence for intra-community integration in the east community. The viewsheds of the two largest sites (89 and 91) overlap considerably unlike those of the west community.

By the end of the Sintashta period and into the Late Bronze Age, community territory is established and maintained along the lines of community size, degree of autonomy, and

sometimes porous social boundaries. Whereas some communities maintain their distance from their neighbors, others such as the east community in the Ui River valley establish a shared territory between the two largest settlements. What is needed now is a better understanding of if, and how, any of these patterns might have changed in the Final Bronze Age.

5.3 TERRITORY, COMMUNITY, AND DIFFERENTIATION IN THE FINAL BRONZE AGE OF THE SOUTHERN URALS

The Final Bronze Age remains one of the least studied, and as a result, least understood Bronze Age periods of the southern Urals region. L. Koryakova and A. Epimakhov (2007: 161) label the Final Bronze Age "the eve of a new epoch", meaning it is the stage before another major cultural

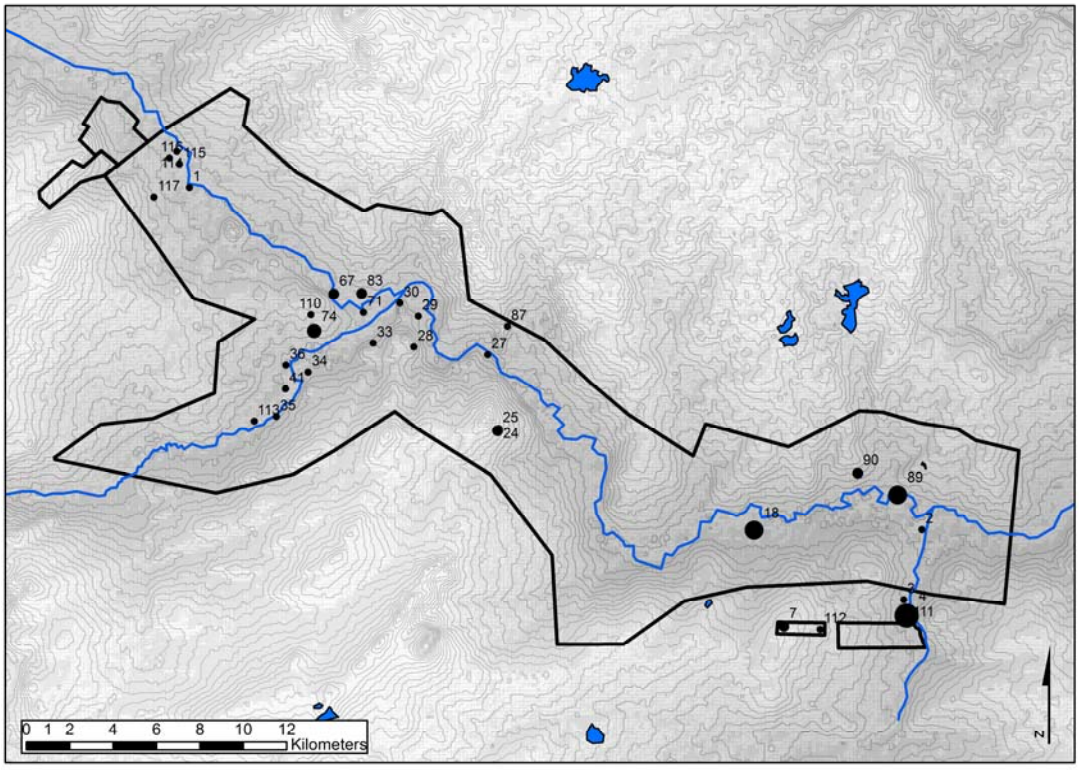

Figure 5.19 Distribution map of Final Bronze Age settlement patterning in the Ui River valley with site sizes represented by proportional symbols

and social transition on the Eurasian steppe. It is also usually seen as a time ofreduced, if not absent, social complexity on the steppe (Zdanovich 2003). Unfortunately, whereas in the other sections of this chapter I am able to draw upon previously published work for the Sintashta period and the Archaeological Atlas for the Late Bronze Age, there is no corresponding supplementary material for the Final Bronze Age, at least not yet. As such, the work conducted by the dissertation author during the 2009 and 2011 surveys is the primary material used in this section to evaluate territory, community, and differentiation in the Final Bronze Age of the southern Urals (Figure 5.19).

In terms of Final Bronze Age settlement size in the Ui River valley, what seems to be an innate characteristic of the batch emerges, smaller settlements are more numerous and form a

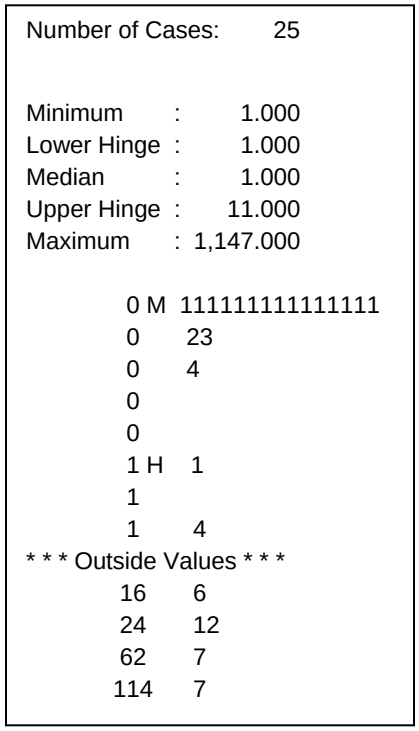

Figure 5.20 Stem-and-leaf plot of site sizes for the west community in the Final Bronze Age Ui River valley

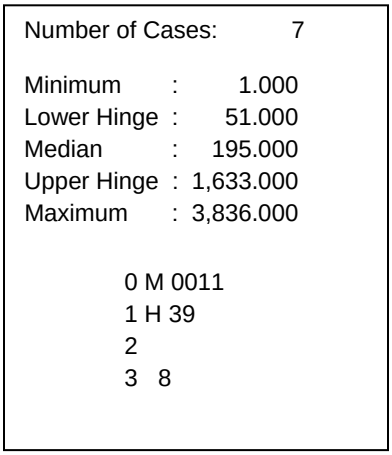

Figure 5.21 Stem-and-leaf plot of site sizes for the east community in the Final Bronze Age Ui River valley

distinct peak on the low end of the plot, while larger settlements at least in the west community are considered "outside values" (Figures 5.20 and 5.21). There appears to be more variation in site size for the Final Bronze Age west community in the Ui River valley, although the east community has considerably larger sites.

The distribution of sites in terms of proximity to river/tributaries is also very similar to the Late Bronze Age with a preponderance of sites located within the 500 m buffer, and fewer sites found in the other buffer zones (Figures 5.22 and 5.23). Much like in the Late Bronze Age, there is a clear connection between Final Bronze Age site location and proximity to the major river and its tributaries in the Ui River valley. Again, like in the Late Bronze Age the best pasturage may is found closer to the river and tributaries and thus territory may not fit the common circular catchments as such representations do not utilize the best

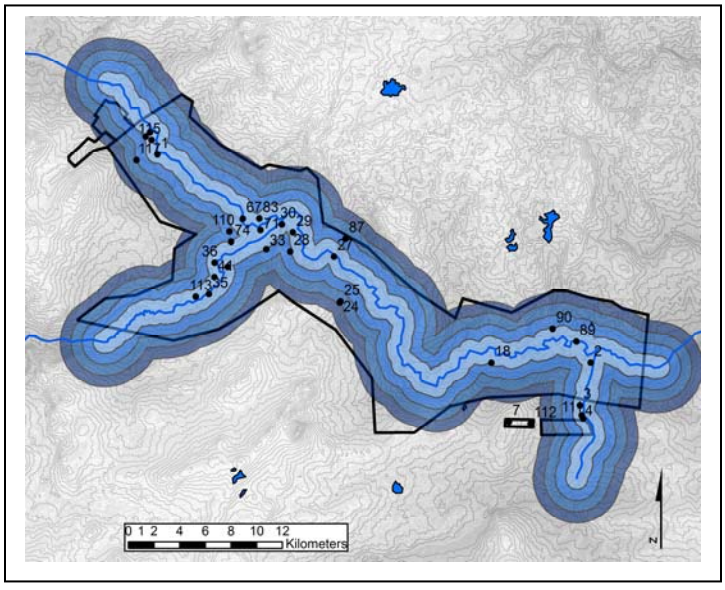

Figure 5.22 Final Bronze Age river buffers in the Ui River valley with buffers set at 500 m, 1000 m, 1500 m, and 2000 m

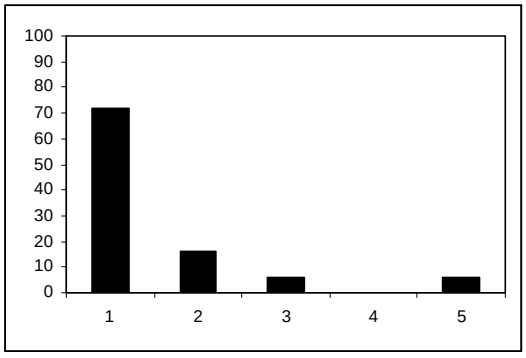

Figure 5.23 Final Bronze Age river buffers in the Ui River valley with buffers set at (1) 500 m, (2) 1000 m, (3) 1500 m, (4) 2000 m, and (5) beyond 2000 m

available pasturage nor do they necessarily keep the herds and herders within a visible range of the largest settlements. As established in the Late Bronze Age section viewsheds may be more useful in indicating targeted areas for grazing (Figures 5.24 - 5.26). In addition, the degree of overlap between viewsheds of the largest settlements provides some compelling information as to the degree to which Final Bronze Age communities were integrated and expressed territorialization so as not to mix herds or over-graze.

Pasturage catchments fit well within the area provided by the various viewsheds. The proportional differences are for the most part even greater in the Final than in the Late Bronze Age, which makes sense as sites shrank as populations continued to disperse. Correspondingly,

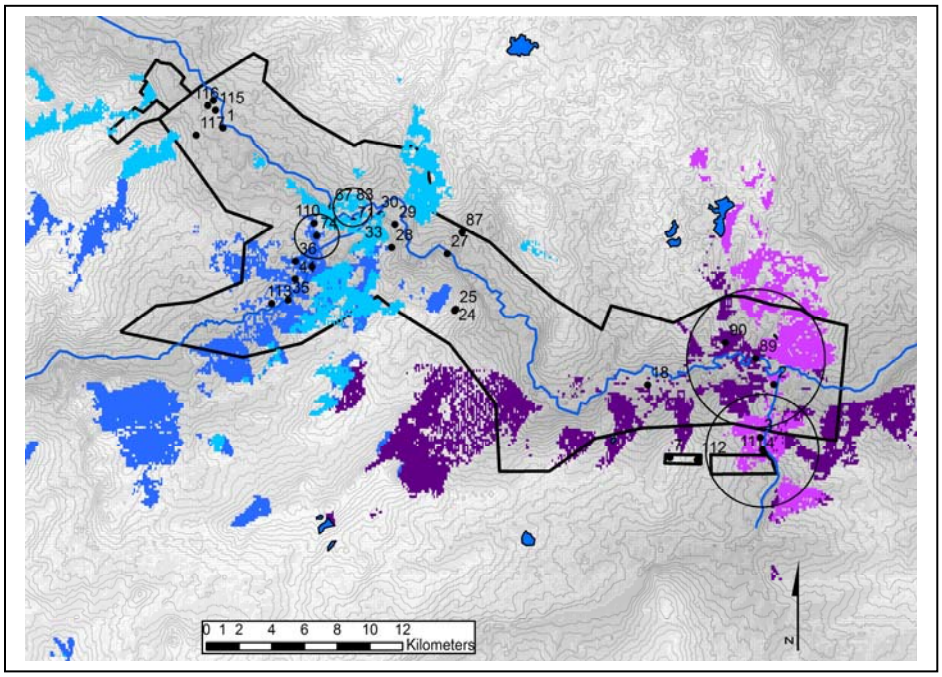

Figure 5.24 Viewsheds of the two largest Final Bronze Age sites in each of the communities in the Ui River valley

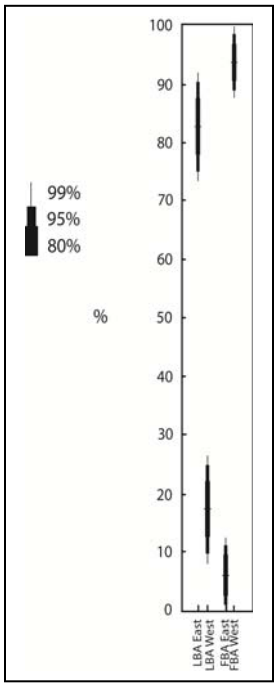

Figure 5.25 Proportional distribution of viewshed overlap in the Late and Final Bronze Age east and west communities of the Ui River valley

site locations are chosen so as to allow for greater visibility of different sections of the Ui River valley landscape. The pasturage catchments for the two largest sites for each community in the valley were separate with no overlap, yet their viewsheds indicate somedifferences from what had occurred in the Late Bronze Age. In the Late Bronze Age, there is a very large proportional difference between the west and east intra-community viewshed overlap with the east community exhibiting the most conspicuous proportional differences.

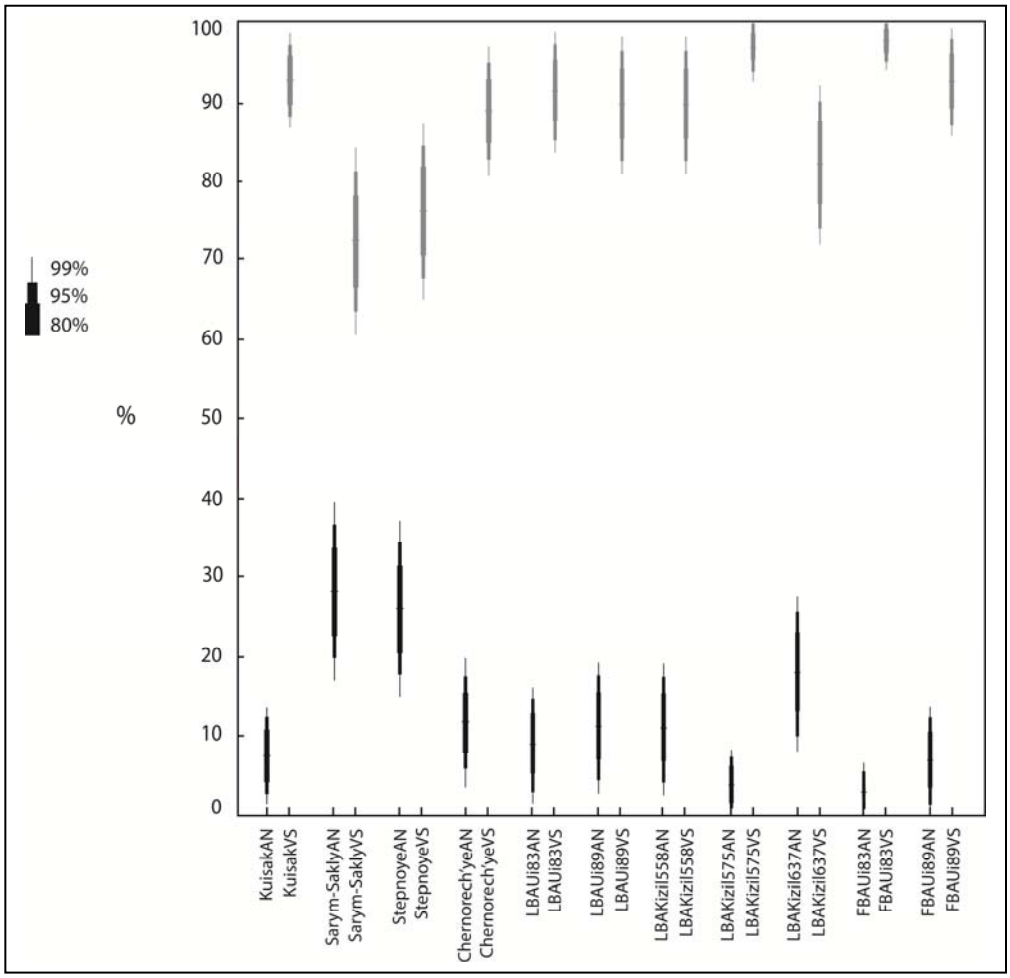

Figure 5.26 Bullet graph illustrating proportional differences of Area Needed for pasturage (AN) and viewsheds (VS) from the Sintashta period through the Final Bronze Age in the Kizil'skoye region and Ui River valley

During the Final Bronze Age, the west community demonstrates a much greater amount of overlap in its viewsheds, whereas the east community expresses very little overlap. This is most likely due to the disappearance of the second largest site (91) in the Late Bronze Area and the emergence of site 4 in a different part of the east community. For both of the larger sites in the west community, directionality falls along a northeast-southwest line. While the catchments in the west community are separate their viewsheds may indicate the use of shared areas for grazing. The viewshed for the east community may indicate the opposite, that separate areas were being used for grazing perhaps to avoid mixing herds.

5.3.1 Summary of Territory, Community, and Differentiation in the Final Bronze Age Southern Urals

The situation during the Final Bronze Age in the Ui River valley provides an interesting reversal in terms of the territorial goings-on of the east and west communities. During the Final Bronze Age in the west community there is now compelling evidence for major differences in settlement size and strong evidence for proportional differences for overlap in intra-community viewsheds, indicative of integration of the two largest identified sites within site of each other. The degree of overlap for the west community is proportionally high even though the size of their pasturage catchments is spatially distinct with no overlap. The east community provides a very different picture. In terms of settlement size, there is considerable evidence (at least in terms of site area) that there were some very distinct and comparatively large settlements in the east half of the survey zone. However, viewsheds and pasturage catchments provide less compelling evidence for intra-community integration in the east community. The proportional differences of the viewshed overlap for the two largest settlements are minor.

5.4 CHAPTER SUMMARY

From the Sintashta period to the Final Bronze Age in the southern Urals, communities utilize their local territories according to different principles. This is not to say that some basic ecological principles are not adhered to such as staying in proximity to water sources. But it is during the Late and Final Bronze Ages that social organization of communities plays a more important role indicating a level of integration for some communities (and time periods) that is overlooked by many scholars, especially in the case of the Final Bronze Age. The establishment of shared territory, presumably for grazing purposes, allows integrated communities to consolidate wealth (and possibly power) and generate a broader identity or ethos in which the populations of these sites participate. On the other hand, there is also considerable evidence that other communities maintain physical and social distances, staying apart from other groups and maintaining separate areas for grazing. The degree to which such communities actually interacted is not yet established, although the fact that there is so little inter-community viewshed overlap indicates some important differentiation occurring in the Late and Final Bronze Age. In the next chapter, I explore how Bronze Age communities in the southern Urals were integrated socially and symbolically, as well as the degree of differentiation expressed, through pottery production and use.

6.0 CRAFT PRODUCTION AND SOCIAL INTEGRATION IN THE BRONZE AGE SOUTHERN URALS

So far in the dissertation I have established that by the end of the Sintashta period the east and west communities of the Ui River valley dispersed becoming increasingly decentralized over time. Both communities are bound to their local landscapes, maintaining specific territories in which their populations and herds settled and traversed. What has not been established very strongly yet is how Late and Final Bronze Age populations participate in their respective community ethos, how strong these expressions are and how these expressions are historically conditioned and organized through tradition, and finally what all of this means for the social organization of each time period.

To address these questions, analysis was conducted on the sherds collected during the 2009 and 2011 surveys. Such material expressions of participation are conventionally framed in culture historical terms, with a dominant focus on vessel form and decoration. Certainly these characteristics are two very visible aspects of pottery production and use. At the same time, for the purposes of survey the focus on vessel form is unrealistic as we rarely find whole vessels. It also seems a rare occasion to find diagnostic sherds, and for this project too few diagnostics (n = 12) are identified to prove useful in establishing numbers of vessels and their forms. Decoration is recorded but given the number of the many permutations in decorative style, location of specific kinds of decoration, density of decoration, and many other variables, decoration is recorded as present or absent rather than type of decoration.

By moving ceramic analysis in this region beyond the relationship of decoration and vessel form, I hope to include those socio-economic groups or populations that do not use decorated pottery as a form of participation in local communities or regional cultural groups. Instead, I focus on paste recipe and thickness. By paste recipe, I mean not only the ingredients (though I focus on the most distinct temper for Sintashta period through Final Bronze Age pottery; the use of talc as temper) but also how that temper is processed, recording inclusion sorting and temper density. I think (or hope) that such characteristics provide a better baseline to evaluate participation in and differentiation between communities through how paste recipes and pottery use change over time.

Pottery production and use among pastoralists is often understudied due to the idea that pottery is inimical to a mobile lifestyle, and therefore pottery is not as extensively used among pastoral groups as metal and leather goods (Vainshtein 1980; Watson 1979). As a result, pottery production and use among pastoralists remains an enigma. Vessel form and decorative style of Sintashta ceramics (and almost all other periods) are studied extensively, seen in the comprehensive volume by Tkachev and Khavanskii (2006), as well as other smaller-scale studies (Zdanovich 1997; Bordanov 2010). However, in comparison to the study of metallurgy in the same time periods, ceramic analysis remains under-developed as a productive and important line of evidence for evaluating social differentiation and historical trajectories in the Bronze Age of the southern Urals. My ceramic analysis represents an early, and admittedly limited, attempt to flesh out ceramic studies in the region by providing useful information on contexts of production and use beyond just vessel form and decorative style as related to cultural groupings. In the pages that follow, the results of the analysis are presented and I hope they will contribute productively to our understanding of the historical role(s) of craft traditions in social complexity.

6.1 SINTASHTA POTTERY PRODUCTION

Sintashta period pottery appears decoratively similar but is actually highly variable. This includes typological characteristics such as form with big-can shaped vessels with numerous types of decoration on the upper lip representing the majority of settlement pottery (Figure 6.1;

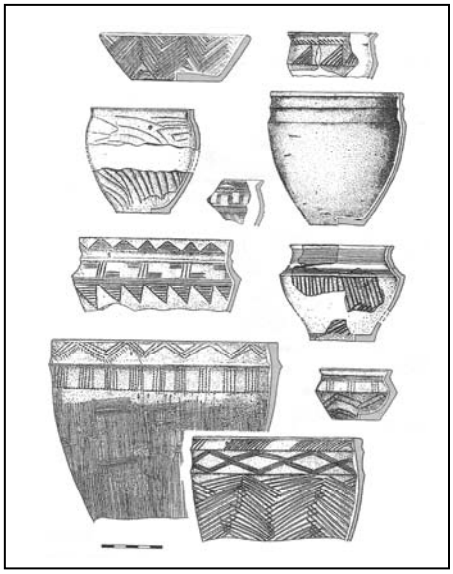

Figure 6.1 Sintashta culture ceramics from Arkaim (from Koryakova and Epimakhov 2007: 74)

Tkachev and Khavanskii 2006). Different size large vessels (16 – 20 liter vessels) constituted almost 20% of the Arkaim settlement pottery, while other types of pottery including smaller or similar size pots with decorated shoulders are also found in both settlement and mortuary contexts (Koryakova and Epimakhov 2007: 73-74). In addition, fabric-impressed pottery is also fairly common among Sintashta vessels. Ceramic typologies include into four types: S-profiled jars, I-profiled jars, bowls and plates (Tkachev and Khavanskii 2006). L. Zhang (2012: 53) has noted that S and I-profiled jars are found in greater quantities than the bowls and plates, while

also suggesting that such typologies are not satisfactory as they do not cover the full range of ceramics present in Sintashta settlement and mortuary contexts.

Other methods of determining differentiation in inter/intra-community contexts are determinations of presence/absence of decoration and the distributions of temper, and in particular, talc. Beyond noting the presence of talc (or other tempers) (Koryakova and Epimakhov 2007: 86), scholars studying pottery from Sintashta communities focus predominantly on morphological and decorative stylistic attributes. Yet, talc is one of the defining characteristics of Sintashta (and later) pottery as it is not found in pottery before the Sintashta period and in decreasing amounts after the Sintashta period. Thus, the potential for analysis of paste recipes in association with other pottery characteristics in ceramic studies for the Sintashta and later periods is, to the best of my knowledge, unrealized.

To do this, I incorporate technical practices that are widely accepted in Anglo-American ceramic studies in archaeology. I believe that these studies can be equally useful for gleaning information from pottery used in ancient societies of the Eurasian steppe. Unfortunately, I am unable to conduct such studies on Sintashta pottery as no positively identified Sintashta sherds were collected during the survey. In addition, due to restrictions on time and financial resources, there is no analysis of sherds from the Stepnoye settlement excavations. This analysis remains an important, if not crucial, undertaking for future scholarship in the region.

The analytical focus for the pottery centers on presence/absence of decoration, presence/absence of talc as temper, density of talc as temper, inclusion sorting of temper, and thickness of pottery. This is done in two parts. First, an evaluation of similarity in paste recipes and pottery attributes between the east and west communities in the Ui River valley is presented. This is expressed through bullet graphs that evaluate proportional differences first at the broader

decorated versus non-decorated assemblage level and then moves to a comparative analysis of the proportional distribution of paste recipes and ceramic attributes to examine inter- and intra-community similarities in the analyzed ceramic assemblages. The second part consists of the analysis of centralization of the ceramic attributes such as decoration and different paste characteristics. Both parts are done to tease out diachronic changes in paste recipe and ceramic attributes, focusing specifically on changes from the Late to the Final Bronze Age.

6.2 POTTERY PRODUCTION AND USE IN THE LATE BRONZE AGE OF THE SOUTHERN URALS

L. Koryakova and A. Epimakhov (2007: 130) note that Late Bronze Age pottery (especially Alakul') is quite peculiar, with vessels containing flat bottoms, striking profiles, and a ledge between the neck and shoulder. In addition, Alakul' pottery surface treatments are often carefully done with elaborate decorations consisting of indentations, punctations, and trailing. Common motifs include isosceles and rectangular hatched triangles, zigzags, and rhombus patterns (Figure 6.2). Such decorations are usually located on the neck, shoulder, and the lower part of the vessel body. Alakul' decoration is typical for settlement pottery, but Stefanov (1996) notes that non-decorated pottery also appears in Alakul' settlement pottery assemblages. Following Stefanov's (1996) indication that there should be a proportional distribution of decorated/non-decorated pottery sherds (n = 90/189, respectively), paste recipes of talc-tempered/non-talc tempered pottery (n = 217/67, respectively), and thickness (>1 cm/<1 cm) of sherds (n = 251/28, respectively) in the west and east communities in the Ui River valley are all evaluated, with a total of 279 sherds examined (Figure 6.3).

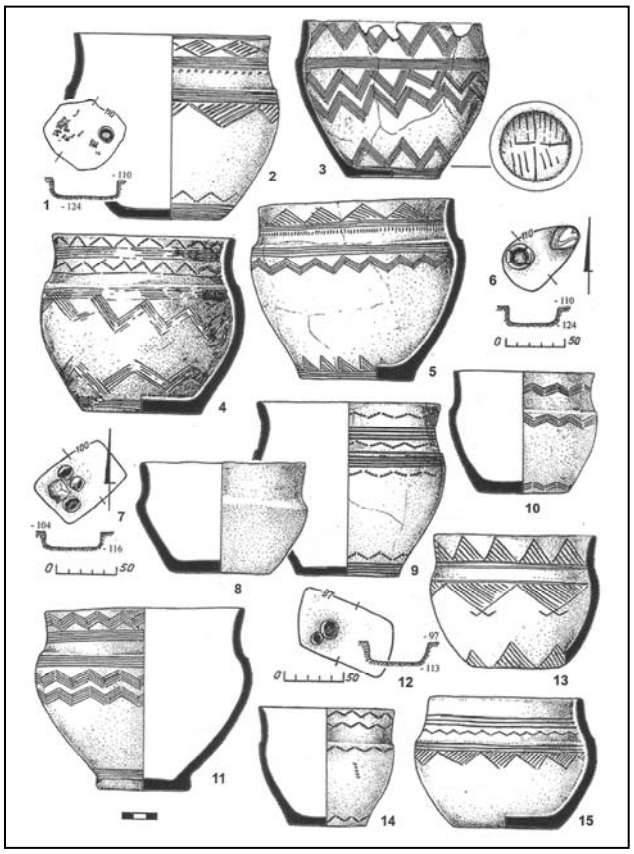

Figure 6.2 Alakul' pottery (from Koryakova and Epimakhov 2007: 132)

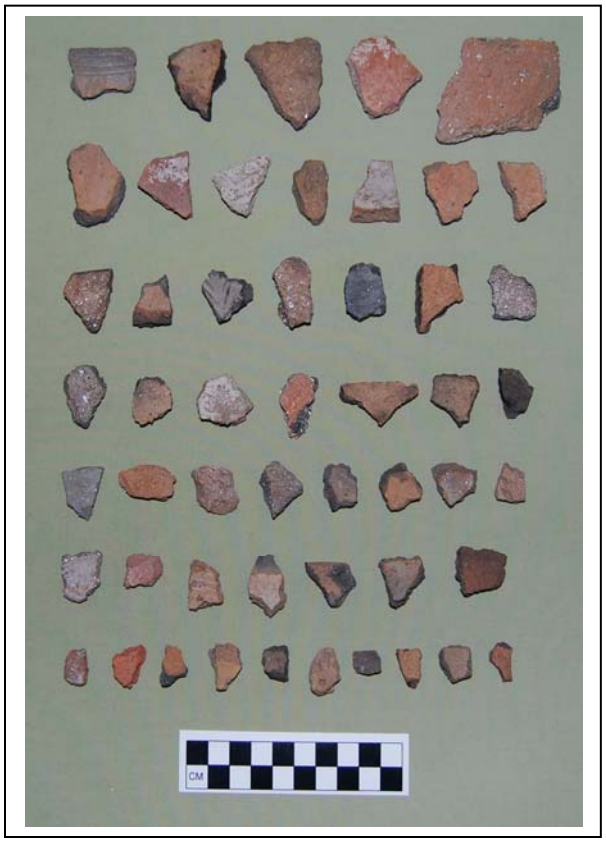

Figure 6.3 Late Bronze Age pottery sherds from site 89 collected in the 2011 field season with talc visible as shiny specks

6.2.1 Decorated and Non-Decorated Pottery in the Late Bronze Age of the Southern Urals

Decorated pottery in Eurasian steppe archaeology is often used conventionally as markers of status (Houle 2010; Krushek 2003) or as cultural identity (Koryaova and Epimakhov 2007; Stefanov 1996; Tkachev and Khavanskii 2006; Zhang 2011). Following Krushek (2003) and Houle (2010), decorated ceramics are defined as pottery with added features that indicate steps beyond the initial forming process, including but not limited to applications of slips, paints, glazes, and incisions, punctates, etc. Non-decorated ceramics are defined as the absence of such characteristics.

The distribution of decorated and non-decorated pottery is explored first using a bar graph to evaluate differences in proportional distributions of the decorated sherds in the Ui River survey zone (Figure 6.2). Only those sites with 5 or more sherds are documented. In addition, given that the absence of decorated sherds is a mirror image of non-decorated sherds, we can assume that for many of the recorded sites proportions of non-decorated sherds will be directly related to the proportion of decorated sherds. For decorated pottery there are five sites that stand out (Figure 6.4).

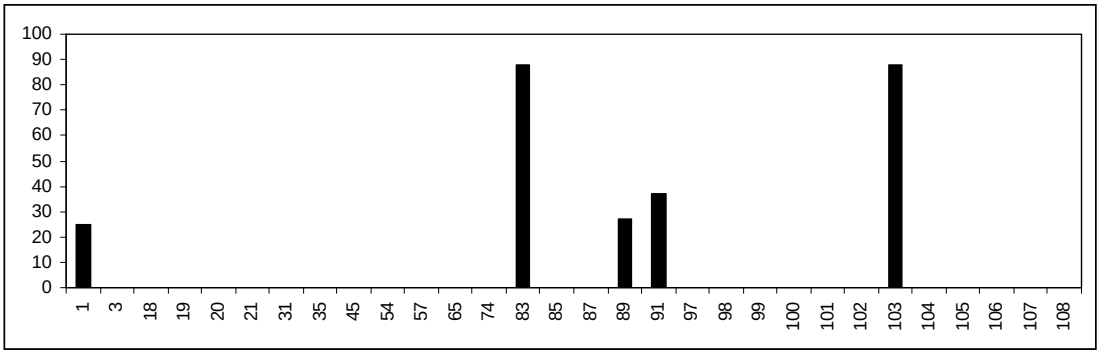

Figure 6.4 Proportional distribution of Late Bronze Age decorated (black) ceramics (5 sherds and over) in the Ui River survey zone

The bar graph expresses some intriguing differences between the proportional distributions of decorated and non-decorated ceramics in the survey zone, but do not tell us the confidence levels at which we can discuss the proportional distributions of decorated/non-decorated ceramics for the Late Bronze Age east and west communities. The sample sizes are all fairly small (ranging between the smallest {1 sherd} to the largest {168 sherds}, with most sites containing less than 15 sherds, and only three sites containing more (89, 91, and 83). As Houle (2010: 152) points out, following Krushek (2003: 185), small sample sizes should not necessarily

favor non-decorated sherds, and in fact the two (decorated and non-decorated) need to be considered together.

Proportional distributions of decorated and non-decorated sherds are evaluated by community in the bullet graph presented below (Figure 6.5 and 6.6). For the east and west communities there is a high to moderate statistical confidence, respectively, that the differences in proportions of decorated and non-decorated sherds are meaningful. For the east community we can be 95% confident that the differences in proportions are not just due to the vagaries of sampling, and that there are almost three times more non-decorated than decorated sherds.

6.2.2 Late Bronze Age Ceramic Pastes and Other Attributes

Two groups of sherds were identified in the east community, and to a lesser extent in the west community. The first sherd group consists of non-decorated, thin-walled (<1.0 cm) sherds with low densities of coarsely sorted talc temper. The other group includes decorated, thick-walled (>1.0 cm) sherds with high densities of finely sorted grit and grog temper. The first paste is found in much greater proportions than the decorated sherds with non-talc-tempered paste in the east community (Figure 6.4). This seems unlikely to be due to any bias exhibited in the field regarding field technicians picking decorated sherds over non-decorated sherds. Rather, given the other characteristics found in the non-decorated sherds it is likely that there is a functional aspect to the talc tempered paste.

Initially I thought that the talc tempered pottery will have similar proportions as the decorated ceramics, especially when thinking of the visibility of talc. Talc is a hydrated magnesium silicate and has a natural propensity for thermal conductivity, or in other words helps resist thermal shock or stress, which is the strain that happens when ceramics experience uneven

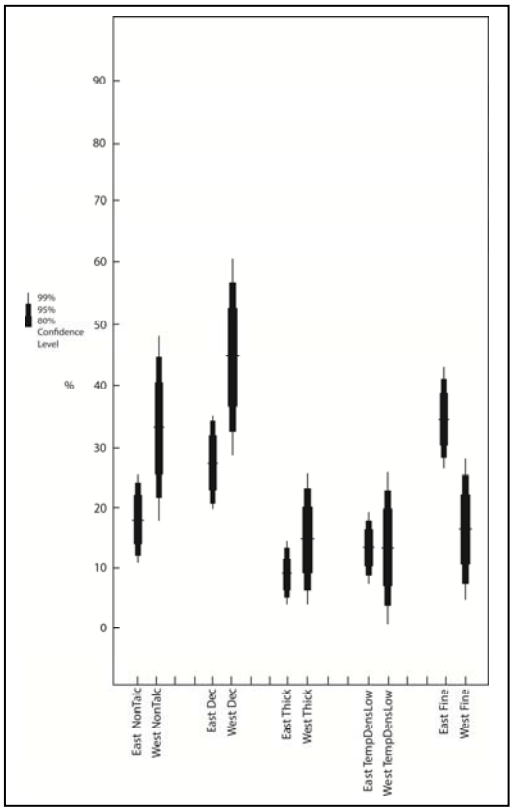

Figure 6.5 Bullet graph expressing proportional differences of different categories of ceramic characteristics split between the Late Bronze Age east and west communities of the Ui River valley

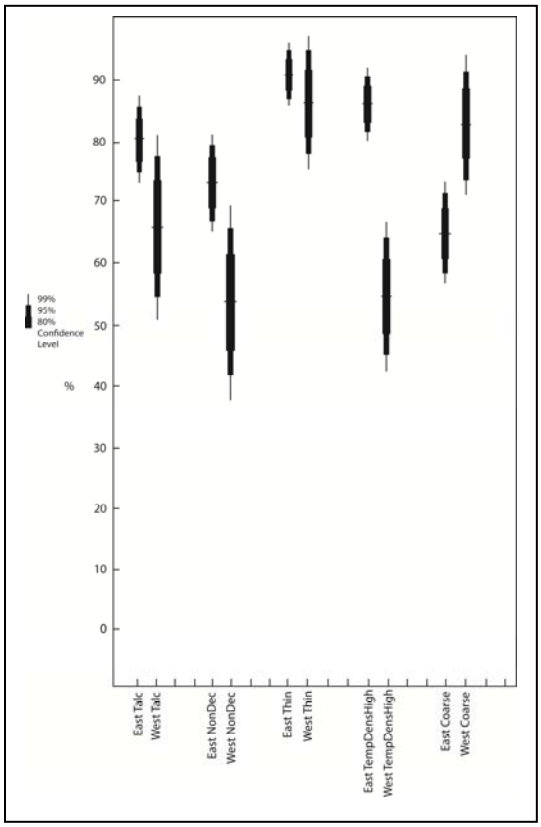

Figure 6.6 Bullet graph expressing proportional differences of different categories of ceramic characteristics split between the Late Bronze Age east and west communities of the Ui River valley

or unequal reactions to heat (Rice 1987: 106, 229). This makes talc an ideal temper in ceramics used for cooking, as well as ceramics used for metallurgical activities (cf. Pitman et al. 2013), when used in smaller amounts like 10% (Lawrence and West 1982: 224; Rice 1987: 230). Given the differences in the proportional distribution between the two pastes, we can say that there is a high confidence level that the differences in proportions of the fabric characteristics exhibits characteristics of two distinct groups. One group consists of a talc-tempered paste with low amounts of large, coarse inclusions, which is what one would expect in a cooking ware. The

second group consists of a non-talc tempered paste with finer inclusions of both grit (silica) and grog (crushed pottery sherds).

For the west community, there is a much lower statistical confidence that differences in proportions of paste characteristics are meaningful. While differences in proportion are much smaller than what we see in the east community, there are still considerable differences between thickness, density of temper, presence/absence of talc as temper, and the degree of inclusion sorting. All of this strongly indicates the presence of two groups with distinctive pastes in both the east and west communities, though with a meaningful distinction between decorated and non-decorated ceramics.

Given the information presented in the bar graphs and bullet graphs (as well as in Chapters Four and Five) there are some very visible trends emerging: some sites stand out in terms of the having the most sherds, but that even in sites with much smaller populations of sherds there is a visible distinction between types of pastes being utilized. Finally, there appears to be some distinct paste characteristics that are connected to the establishment (if not perpetuation) of historical traditions; of paste recipes used to link communities to their local histories. This use and reuse of talc as temper as a primary paste characteristic indicates a carrying-on of local traditions. What has not been dealt with is the patterning of the characteristics in each community. In other words, to what degree were these paste characteristics (and, by extension, recipes) centralized?

R. Drennan and C. Peterson's (2008) centralization analysis is used to identify centralization in sherd populations in the Ui River valley survey zone (Figure 6.7). In addition, error ranges that express 90% confidence level are also added to the graph distribution charts to

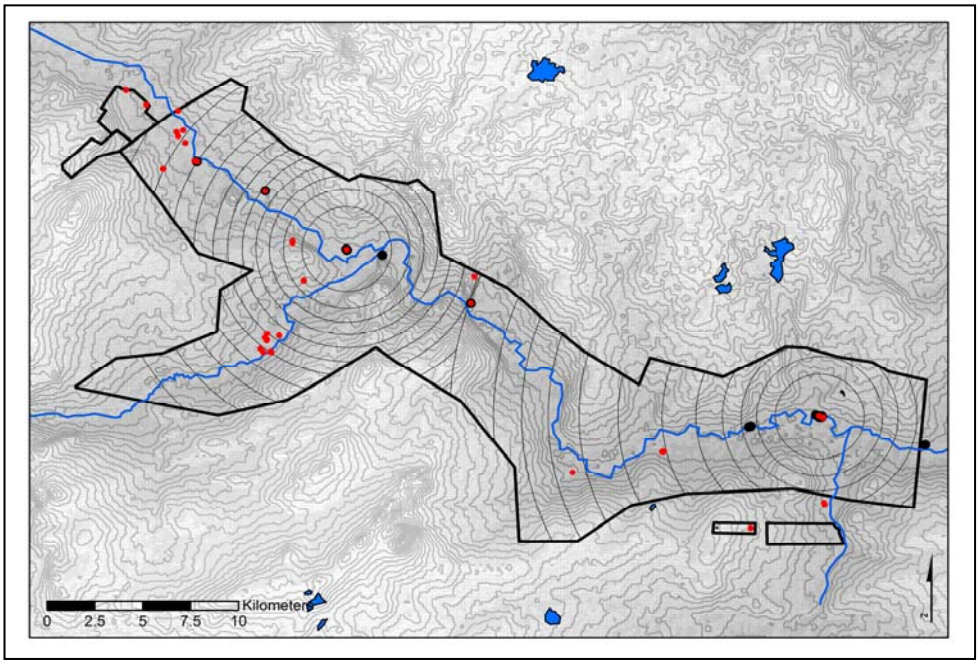

Figure 6.7 The distribution of Late Bronze Age decorated (black dots) and non-decorated sherds (red dots) across the Ui River valley survey zone divided into 12 equal-area rings

Table 6.1 Calculation of *B* value for the Late Bronze Age decorated sherds in the east community

LBA East Dec	Est. Pop	Pop Prop	Cum Prop
Ring 1	46	78	78
Ring 2	0	0	78
Ring 3	11	18	96
Ring 4	0	0	96
Ring 5	1	2	98
Ring 6	0	0	98
Ring 7	0	0	98
Ring 8	0	0	98
Ring 9	0	0	98
Ring 10	0	0	98
Ring 11	0	0	98
Ring 12	1	2	100
Totals	59	100	1134
B value			.88

Table 6.2 Calculation of *B* value for the Late Bronze Age non-decorated sherds in the east community

LBA NonDec	Est. Pop	Pop Prop	Cum Prop
Ring 1	122	80	80
Ring 2	0	0	80
Ring 3	19	12	92
Ring 4	2	1	93
Ring 5	0	0	93
Ring 6	2	1	94
Ring 7	6	4	98
Ring 8	0	0	98
Ring 9	1	1	99
Ring 10	0	0	99
Ring 11	0	0	99
Ring 12	1	1	100
Totals	153	100	1125
B value			.86

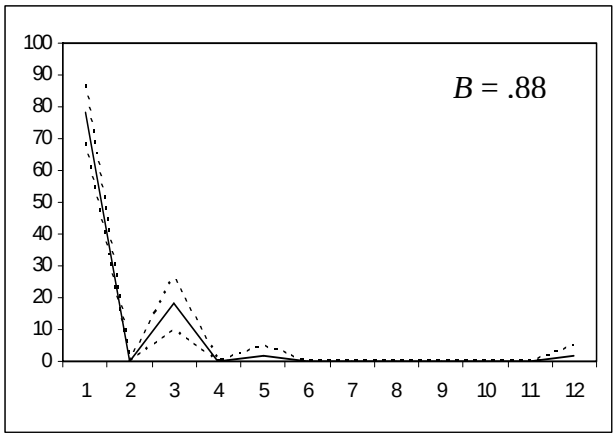

Figure 6.8 Graph of distribution of Late Bronze Age decorated sherds in the east community with the 90% confidence zone highlighted

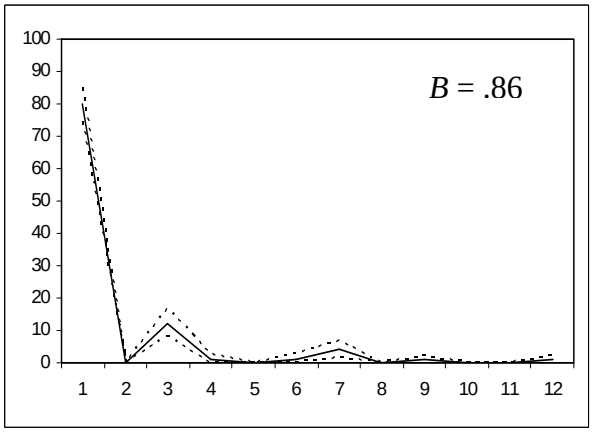

Figure 6.9 Graph of distribution of Late Bronze Age non-decorated sherds in the east community with the 90% confidence zone highlighted

address notions of statistical significance, especially important when comparing populations with little difference. Three aspects are analyzed, including decorated/non-decorated, talc tempered/non-talc tempered, and thickness (>1.0cm/<1.0 cm). The other two are excluded as it is thought that establishing three out of five patterns is enough to identify tendencies, if any, towards centralization. I start with the decorated and non-decorated ceramics as this appears to be a meaningful category in both communities (Figure 6.7- 6.9; Tables 6.1 and 6.2).

The east community, which contains sites 89 and 91, exhibits a very strong degree of centralization for both the decorated and non-decorated sherds, with *B* values of .88 and .86, respectively (Figures 6.8 and 6.9). The west community in the Ui River valley exhibits the opposite end of the centralization spectrum, that is, a weakly centralized pattern for the decorated sherds and a completely decentralized pattern for the non-decorated sherds. The population proportion of the innermost ring for the Late Bronze Age community is much greater than the west community and the third ring also contains a moderate proportion that fits well

Table 6.3 Calculation of *B* value for the Late Bronze Age decorated sherds in the west community

LBA WestDec	Est. Pop	Pop Prop	Cum Prop
Ring 1	17	55	55
Ring 2	0	0	55
Ring 3	0	0	55
Ring 4	0	0	55
Ring 5	1	3	58
Ring 6	0	0	58
Ring 7	0	0	58
Ring 8	2	6	64
Ring 9	2	6	70
Ring 10	7	24	94
Ring 11	2	6	100
Ring 12	0	0	100
Totals	31	101	822
B value			.31

Table 6.4 Calculation of *B* value for the Late Bronze Age non-decorated sherds in the west community

LBAWest NonDec	Est. Pop	Pop Prop	Cum Prop
Ring 1	2	6	6
Ring 2	4	11	17
Ring 3	0	0	17
Ring 4	0	0	17
Ring 5	1	2	19
Ring 6	1	2	21
Ring 7	10	28	49
Ring 8	4	11	60
Ring 9	6	17	77
Ring 10	2	6	83
Ring 11	4	11	94
Ring 12	2	6	100
Totals	36	98	560
B value			-.16

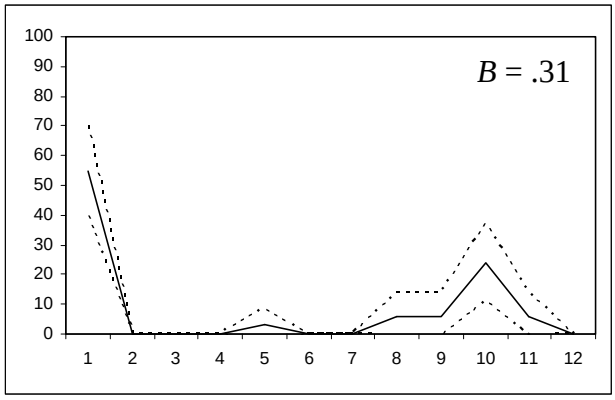

Figure 6.10 Graph of distribution of Late Bronze Age decorated sherds in the west community with the 90% confidence zone highlighted

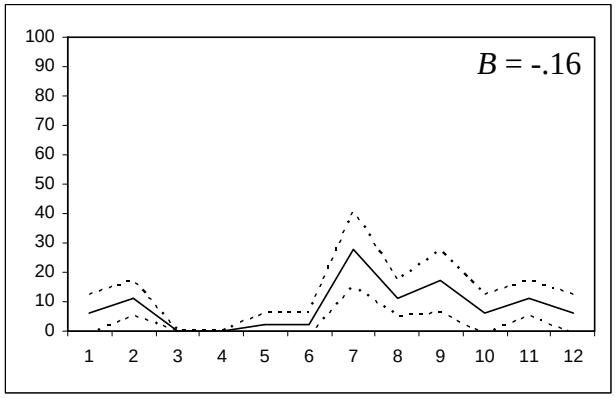

Figure 6.11 Graph of distribution of Late Bronze Age non-decorated sherds in the west community with the 90% confidence zone highlighted

into the strongly centralized pattern. For the west community, the innermost ring and the other outer rings do not resemble the east community's pattern and thus has a much lower *B* value (Figures 6.10 and 6.11; Tables 6.3 and 6.4).

The centralization patterns of decorated and non-decorated sherds between the two communities indicate that the east community in the Ui River valley contains not only the most sherds, but also exhibits a very strongly centralized pattern of both decorated and non-decorated sherds. Given what we know regarding the proportional and centralized distribution of decorated and non-decorated sherds in the survey zone, the results of the centralization analysis indicate the importance of decorated pottery for the east community, whereas for the west community decorated pottery is very weakly centralized.

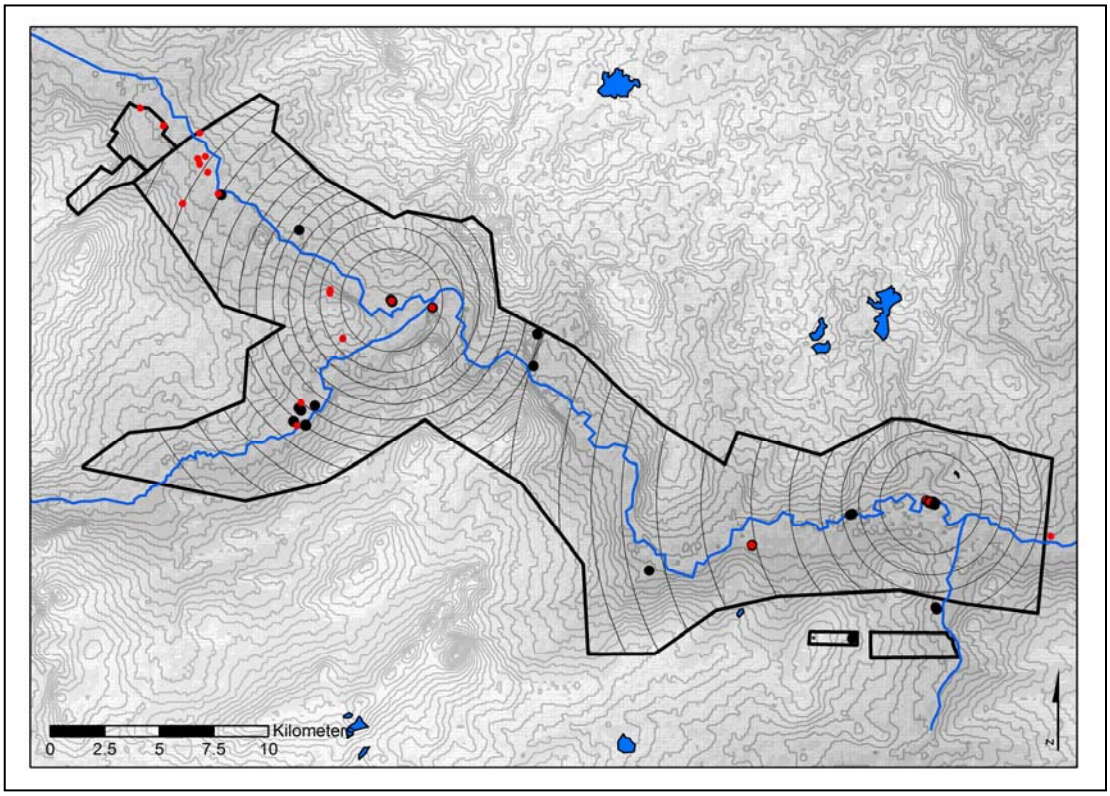

Figure 6.12 The distribution of Late Bronze Age talc tempered (black dots) and non-talc tempered sherds (red dots) across the Ui River valley survey zone divided into 12 equal-area rings

Table 6.5 Calculation of *B* value for the Late Bronze Age talc tempered sherds in the east community

LBA EastTalc	Est. Pop	Pop Prop	Cum Prop
Ring 1	135	78	78
Ring 2	0	0	78
Ring 3	30	18	96
Ring 4	2	1	97
Ring 5	0	0	97
Ring 6	2	1	98
Ring 7	2	1	99
Ring 8	0	0	99
Ring 9	1	1	100
Ring 10	0	0	100
Ring 11	0	0	100
Ring 12	0	0	100
Totals	172	101	1142
B value			.90

Table 6.6 Calculation of *B* value for the Late Bronze Age non-talc tempered sherds in the east community

LBAEast NonTalc	Est. Pop	Pop Prop	Cum Prop
Ring 1	33	82	82
Ring 2	0	0	82
Ring 3	0	0	82
Ring 4	0	0	82
Ring 5	1	3	85
Ring 6	0	0	85
Ring 7	4	10	95
Ring 8	0	0	95
Ring 9	0	0	95
Ring 10	0	0	95
Ring 11	0	0	95
Ring 12	2	5	100
Totals	40	100	1073
B value			.77

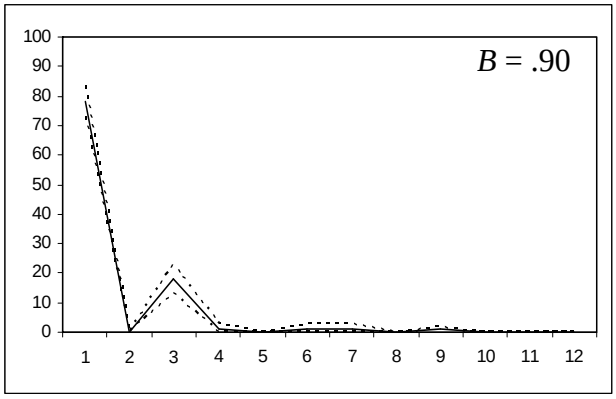

Figure 6.13 Graph of distribution of Late Bronze Age talc tempered sherds in the east community with the 90% confidence zone highlighted

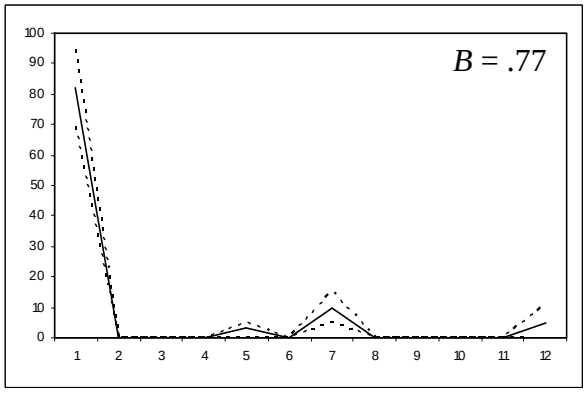

Figure 6.14 Graph of distribution of Late Bronze Age non- talc tempered sherds in the east community with the 90% confidence zone highlighted

It is worth taking some time to better understand how decorated/non-decorated pottery is related to other characteristics (as explored above in the bullet graph), and to what degree these

other characteristics might be equally centralized, if at all. The use of talc tempered and non-talc tempered pottery is a very strong and noticeable distinction for the Ui River valley (Figures 6.12 - 6.14; Tables 6.5 and 6.6). Talc tempered pottery in the Sintashta period is near ubiquitous (Igor Chechushkov: personal communication), but its use is less well understood for the Late Bronze Age. I establish in the bullet graph above that there is a high level of confidence that talc and non-talc tempered sherds show up in meaningful proportions in the Ui River valley, especially in the east community and less so in the west community.

As mentioned earlier, the use of talc tempered ceramics is linked to the production and use of pottery intended for cooking purposes (Rice 1987). It would make a great deal of sense for talc tempered ceramics to be very strongly centralized in the east community, given that in Chapter Four I that the east community is shown to form a very strong pattern for demographic

Table 6.7 Calculation of *B* value for the Late Bronze Age talc tempered sherds in the west community

LBA WestTalc	Est. Pop	Pop Prop	Cum Prop
Ring 1	17	38	38
Ring 2	1	2	40
Ring 3	0	0	40
Ring 4	0	0	40
Ring 5	2	5	45
Ring 6	0	0	45
Ring 7	5	11	56
Ring 8	6	13	69
Ring 9	5	11	80
Ring 10	3	7	87
Ring 11	5	11	98
Ring 12	1	2	100
Totals	45	101	738
B value			.16

Table 6.8 Calculation of *B* value for the Late Bronze Age talc non-tempered sherds in the west community

LBAWest NonTalc	Est. Pop	Pop Prop	Cum Prop
Ring 1	2	9	9
Ring 2	3	14	23
Ring 3	0	0	23
Ring 4	0	0	23
Ring 5	0	0	23
Ring 6	1	5	28
Ring 7	5	22	50
Ring 8	0	0	50
Ring 9	3	14	64
Ring 10	6	26	90
Ring 11	1	5	95
Ring 12	1	5	100
Totals	22	98	578
B value			.13

centralization. As the east community contains the largest population it also contains the largest proportion of talc tempered ceramics used for cooking. This also holds true for the non-talc tempered ceramics, which are strongly centralized in the east community along with the decorated ceramics.

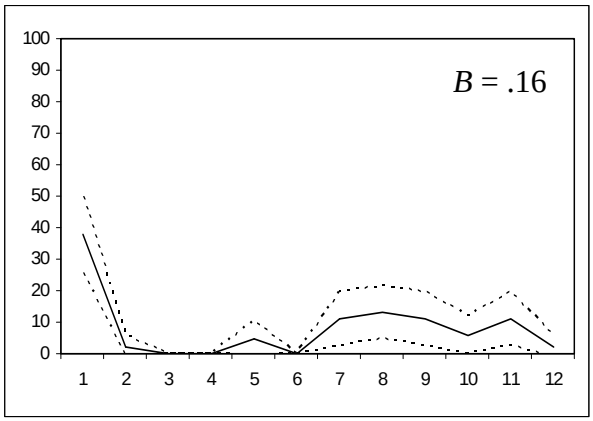

Figure 6.15 Graph of distribution of Late Bronze Age talc tempered sherds in the west community with the 90% confidence zone highlighted

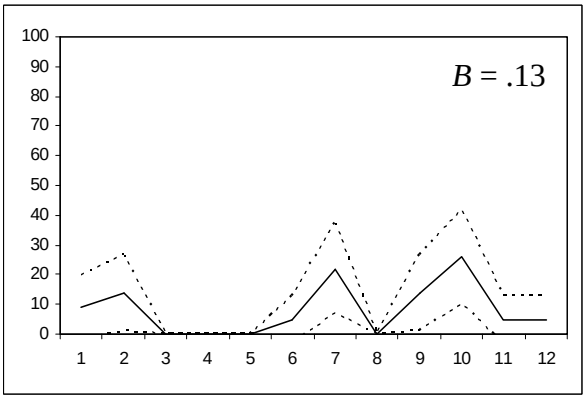

Figure 6.16 Graph of distribution of Late Bronze Age non- non-talc tempered sherds in the west community with the 90% confidence zone highlighted

The west community exhibits a very weakly centralized, if not almost decentralized, pattern of talc and non-talc ceramics (Figures 6.15, 6.16; Tables 6.7, 6.8). Even though the west community contains a much smaller population, as established in Chapter Five, this should not affect the centralization pattern, especially given that I identify a small centralized population there (site 83). Rather it seems that the talc-tempered sherds are focused on the innermost ring, while the non-talc tempered sherds are found in greater proportions in the outer rings.

The last characteristic evaluated through centralization is thickness of pottery. This characteristic exhibits the most difference between thin (<1cm) and thick (>1cm) in the bullet graph, highlighting sherds that are less than 1.0 cm in thickness being found in much greater

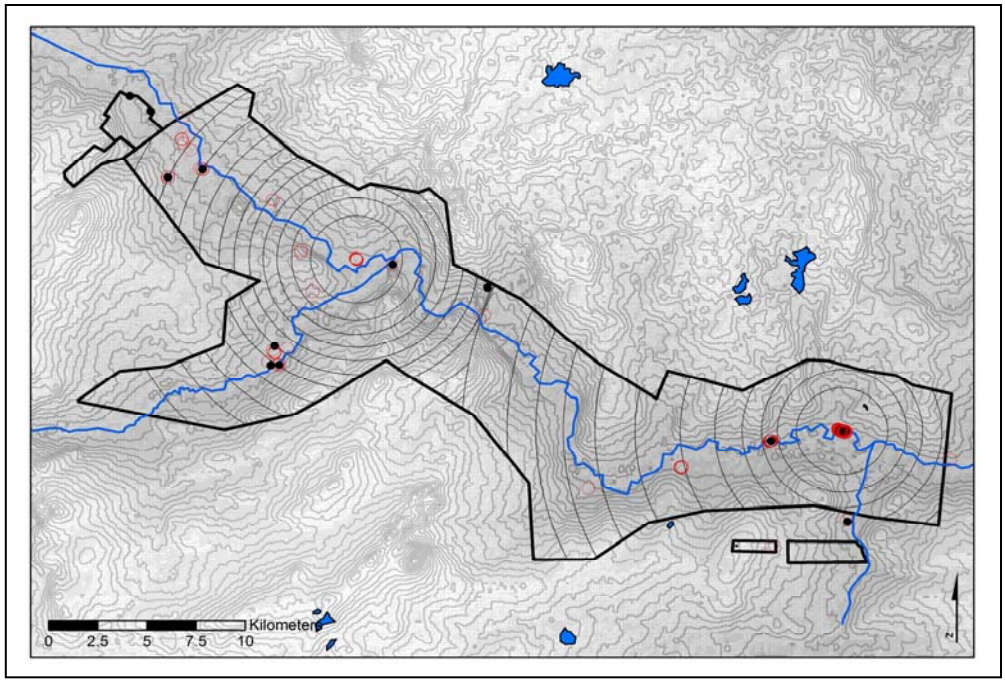

Figure 6.17 The distribution of Late Bronze Age thick (black dots) and thin sherds (red circles) across the Ui River valley survey zone divided into 12 equal-area rings

Table 6.9 Calculation of *B* value for the Late Bronze Age thick sherds in the east community

LBAEast +1 cm	Est. Pop	Pop Prop	Cum Prop
Ring 1	16	85	85
Ring 2	0	0	85
Ring 3	1	5	90
Ring 4	1	5	95
Ring 5	0	0	95
Ring 6	0	0	95
Ring 7	0	0	95
Ring 8	0	0	95
Ring 9	0	0	95
Ring 10	0	0	95
Ring 11	0	0	95
Ring 12	1	5	100
Totals	19	100	1120
B value			.86

Table 6.10 Calculation of *B* value for the Late Bronze Age thin sherds in the east community

LBAEast -1 cm	Est. Pop	Pop Prop	Cum Prop
Ring 1	153	78	78
Ring 2	0	0	78
Ring 3	29	14	92
Ring 4	1	1	93
Ring 5	1	1	94
Ring 6	2	1	95
Ring 7	5	3	98
Ring 8	0	0	98
Ring 9	1	1	99
Ring 10	0	0	99
Ring 11	0	0	99
Ring 12	1	1	100
Totals	193	98	1123
B value			.86

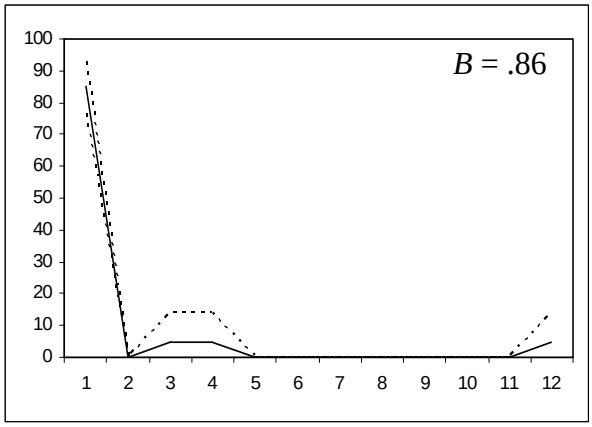

Figure 6.18 Graph of distribution of Late Bronze Age thick sherds in the east community with the 90% confidence zone highlighted

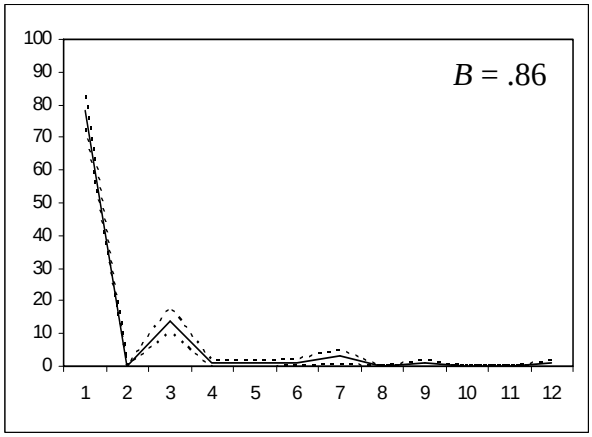

Figure 6.19 Graph of distribution of Late Bronze Age thin sherds in the east community with the 90% confidence zone highlighted

Table 6.11 Calculation of *B* value for the Late Bronze Age thick sherds in the west community

LBA West +1.0cm	Est. Pop	Pop Prop	Cum Prop
Ring 1	1	11	11
Ring 2	0	0	11
Ring 3	0	0	11
Ring 4	0	0	11
Ring 5	0	0	11
Ring 6	0	0	11
Ring 7	2	22	33
Ring 8	1	11	44
Ring 9	3	34	78
Ring 10	1	11	89
Ring 11	0	0	89
Ring 12	1	11	100
Totals	9	100	499
B value			-.28

Table 6.12 Calculation of *B* value for the Late Bronze Age thin sherds in the west community

LBA West -1.0cm	Est. Pop	Pop Prop	Cum Prop
Ring 1	18	31	31
Ring 2	4	7	38
Ring 3	0	0	38
Ring 4	0	0	38
Ring 5	2	3	41
Ring 6	1	2	43
Ring 7	8	14	57
Ring 8	4	7	64
Ring 9	5	8	72
Ring 10	8	14	86
Ring 11	7	12	98
Ring 12	1	2	100
Totals	58	99	706
B value			.10

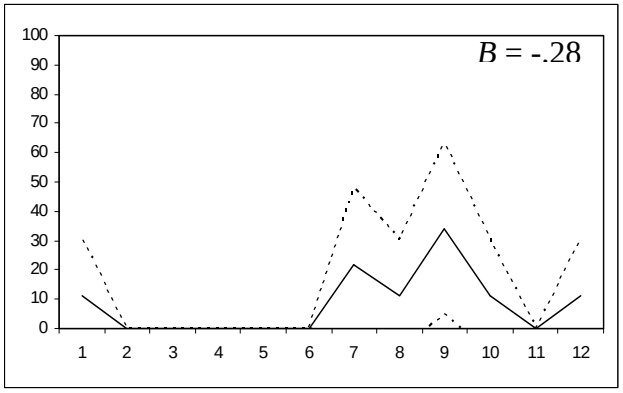

Figure 6.20 Graph of distribution of Late Bronze Age thick sherds in the west community with the 90% confidence zone highlighted

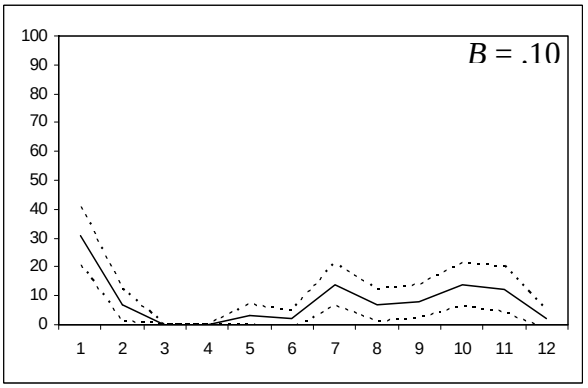

Figure 6.21 Graph of distribution of Late Bronze Age thin sherds in the west community with the 90% confidence zone highlighted

proportions and with a high confidence level that these differences in proportions are meaningful. Yet, the bullet graph does not indicate the spatial patterning of the two different categories of thickness as to the degree of centralization of these patterns. As noted previously, such patterns might shed more light on the degree of centralization presents in the east and west Late Bronze Age communities in the survey zone.

Both thicknesses in the east community are very strongly centralized especially in the innermost rings in the east community indicated by *B* values of .86 (Figures 6.17 - 6.19; Tables 6.9 and 6.10). The proportional differences are expressed in the bullet graph but the number of thick wares in the innermost ring (site 89) is conspicuous in its small proportions. Thicknesses in the west community is expressed in decentralized and weakly centralized patterns with *B* values of -.28 and .10 of the thick and thin wares, respectively (Figures 6.17, 6.20, 6.21; Tables 6.11 and 6.12).

6.2.3 Summary of Late Bronze Age Pottery in the Ui River Valley and the Southern Urals

The characteristics evaluated in the centralization analysis, decorated/non-decorated, talc tempered/non-talc tempered pottery, and thick and thin sherds, indicate not only that two groups are being used, but also that in the east community most cooking and storage activities are strongly associated with the most centralized human population. The fact that decorated sherds are found in similar proportions and in similarly centralized patterns to the non-talc tempered, thick sherd group in both communities also indicates that notions of status and identity may be expressed differently in the east and west communities, with status and/or identity markers being more meaningfully expressed in demographically centralized communities.

The centralization analysis of the three pottery characteristics indicates some fundamental differences in the nature and role of social (and possibly) political activities between the east and west communities. Given the strong differences noted for demographic centralization in Chapter Six, we can see that activities that included the use of thin (cooking) and thick (storage/transportation) wares were centralized in the main population center (site 89). However, thick wares while centralized at site 89 are found in very low proportions in other rings of the east community, indicating that their use was restricted to the population at site 89. This corresponds to the use of decorated pottery in the east community, which is also strongly centralized with a focus on site 89, and to a lesser degree on site 91 from ring 3. In addition, non-talc tempered is also strongly centralized in site 89, with very little non-talc tempered sherds appearing in the outer rings (as should be expected). If these three characteristics (thick-walled, decorated, non-talc tempered) is a ware, its use seems to have been restricted to the population center at site 89.

The west community demonstrates no such centralized pattern. All three characteristics are either weakly centralized or exhibit a pattern of decentralization. If the thick ware is a status/identity marker then there is very little need for it given how weakly centralized (or decentralized) thick, talc or non-talc tempered, and decorated and non-decorated sherds are in this community. The implications for these centralization patterns regarding social organization is that the east community most likely consisted of populations that expressed strong degrees of social differentiation, with a primary focus on site 89. There is little evidence for social differentiation in the west community, through either evidence in the form of thick ware, which is negligible, and thin ware, which is distributed seemingly randomly across the west end of the survey zone.

6.3 POTTERY PRODUCTION AND USE IN THE FINAL BRONZE AGE OF THE SOUTHERN URALS

Clearly by the end of the Late Bronze Age, populations continue to disperse leading to increasingly smaller and less populated communities than in the Sintashta period. Despite the later dispersal of populations, strong tendencies towards demographic centralization were still expressed in the Late and Final Bronze Ages (see Chapters Four and Five). Along with this, paste recipes for ceramics are also maintained to a certain extent through the use of talc as a temper for cooking vessels. The establishment of two different wares, one thin-walled, talc-tempered, and non-decorated and the other thick-walled, non-talc tempered, and decorated provides some compelling evidence for both integration and differentiation among the communities in the Ui River valley.

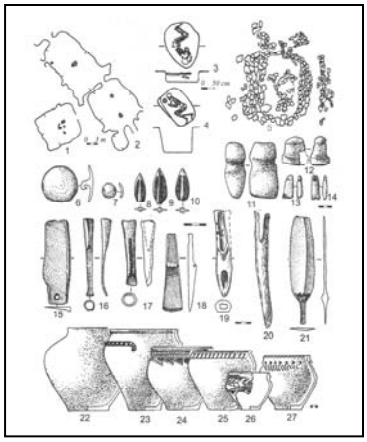

Figure 6.22 Final Bronze Age Sargary pottery (from Koryakova and Epimakhov 2007: 165)

Figure 6.23 Final Bronze Age pottery sherds from site 3 collected during the 2011 field season

That said, the pottery production and use remains even more drastically under-studied than wares from other time periods, and linking the pottery traditions from the Late Bronze Age to the Final Bronze Age has yet to be done. The collection of sherds from both periods represents an excellent opportunity to contribute information to the small corpus of studies on Final Bronze Age pottery, as well as evaluating social changes that occur between the Late and the Final Bronze Ages.

6.3.1 Decorated Pottery in the Final Bronze Age of the Southern Urals

For the analysis and evaluation of trends in Final Bronze Age pottery production and use, I follow the same steps that I did for the Late Bronze Age pottery. As such, a bar graph of decorated pottery for the Final Bronze Age Ui River valley was generated (Figure 6.24). Decorated and non-decorated pottery is explored first using stem-and-leaf plots to evaluate differences in proportional distributions of the decorated sherds and non-decorated sherds in the Ui River survey zone (Figure 6.22 and 6.23). For decorated pottery there are no sites

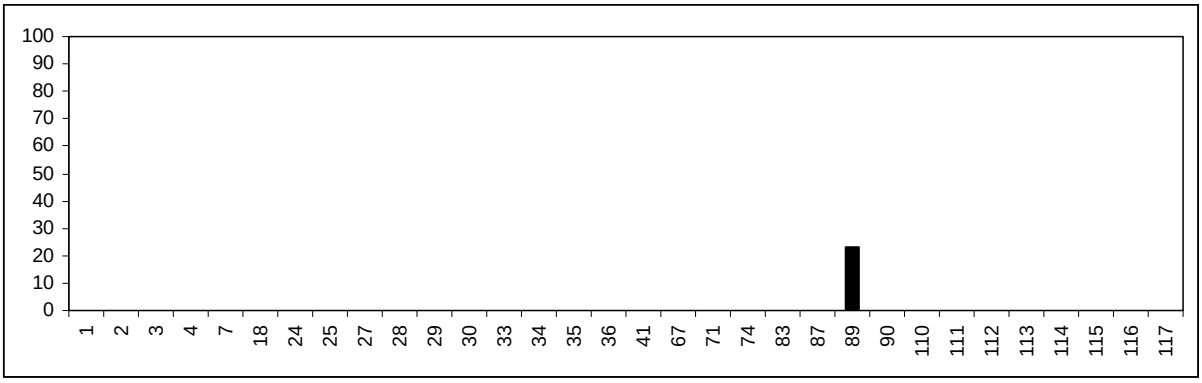

Figure 6.24 Bar graph of proportions of Final Bronze Age decorated sherds per site in the Ui River survey zone

that stand out as far as being outside values. For the non-decorated sherds, there is an obvious peak with an outside value. The very low median percentage for the non-decorated ceramics, in comparison to the decorated ceramics, indicates a small but possibly important difference in proportions.

6.3.2 Final Bronze Age Ceramic Pastes and Other Attributes

Given that two wares are identified for the Late Bronze Age pottery, it is a useful starting point to identify, if possible, the continued use of them. The total number of decorated/non-decorated (n = 14/98, respectively), talc/non-talc pastes (n = 23/89, respectively), and thick (> 1.0 cm) and thin (<1.0 cm) (n = 31/81, respectively) make up the FBA sherd population that was examined. The bullet graph below expresses some fairly distinct differences in the proportional distribution ceramic characteristics (Figures 6.25 and 6.26). Despite the small sample sizes there is a moderate to high confidence level that the differences in proportions, especially for the east community, are meaningful. For the west community the confidence level is low to moderate

with the differences expressed being meaningful. The bullet graph also shows quite clearly two trends in paste recipes and their relationship with decoration. For the Late Bronze Age, one

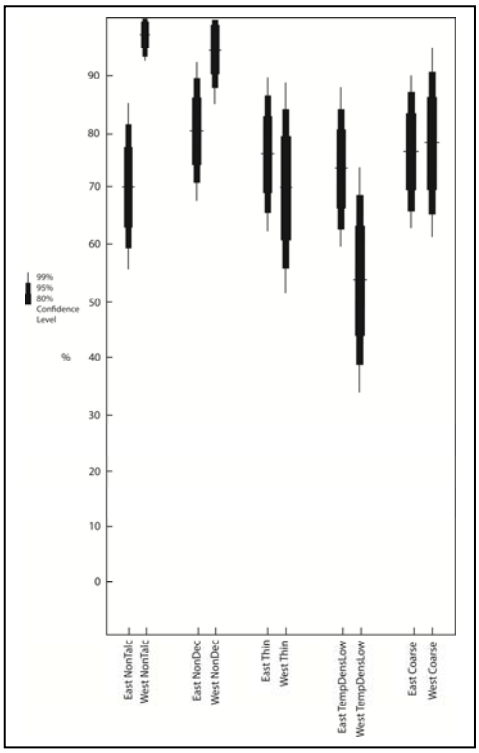

Figure 6.25 Bullet graph expressing proportional differences of different categories of ceramic characteristics split between the Final Bronze Age east and west communities of the Ui River valley

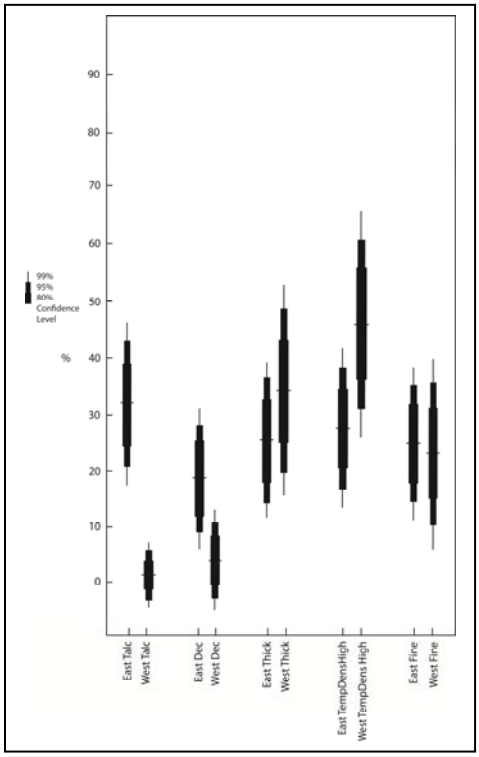

Figure 6.26 Bullet graph expressing proportional differences of different categories of ceramic characteristics split between the Final Bronze Age east and west communities of the Ui River valley

group consists of thin, non-decorated, low density, coarse talc tempered ceramics while the other group consists of thick, decorated, high density, finely processed non-talc (grit) tempered ceramics. For the Final Bronze Age, these relationships are inverted. The first ware is decorated, thick-walled pottery, with finely-processed, high density talc temper. The second is non-decorated, thin-walled pottery, with high densities of coarsely processed non-talc temper (grit

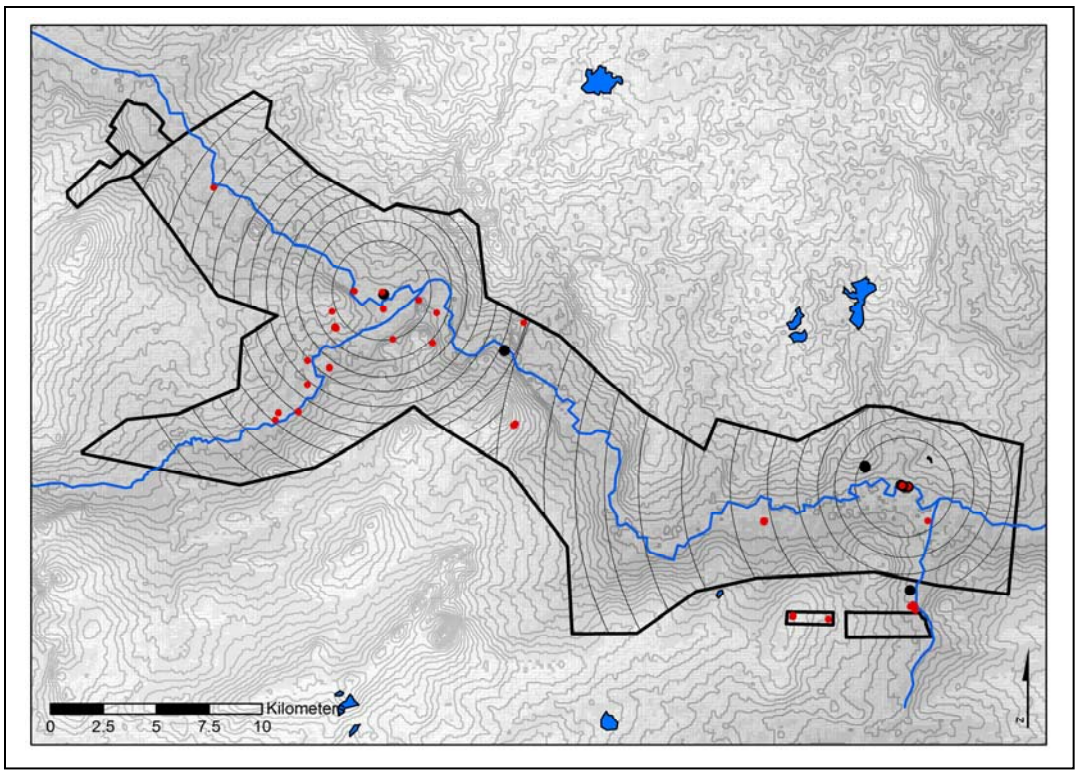

Figure 6.27 The distribution of Final Bronze Age decorated (black dots) and non-decorated sherds (red dots) across the Ui River valley survey zone divided into 12 equal-area rings

Table 6.13 Calculation of *B* value for the Final Bronze Age decorated sherds in the east community

FBA EastDec	Est. Pop	Pop Prop	Cum Prop
Ring 1	11	92	92
Ring 2	0	0	92
Ring 3	0	0	92
Ring 4	1	8	100
Ring 5	0	0	100
Ring 6	0	0	100
Ring 7	0	0	100
Ring 8	0	0	100
Ring 9	0	0	100
Ring 10	0	0	100
Ring 11	0	0	100
Ring 12	0	0	100
Totals	12	100	1176
B value			.96

Table 6.14 Calculation of *B* value for the Final Bronze Age non-decorated sherds in the east community

FBAEast NonDec	Est. Pop	Pop Prop	Cum Prop
Ring 1	27	48	48
Ring 2	0	0	48
Ring 3	0	0	48
Ring 4	2	4	52
Ring 5	5	9	61
Ring 6	0	0	61
Ring 7	14	25	86
Ring 8	0	0	86
Ring 9	0	0	86
Ring 10	0	0	86
Ring 11	0	0	86
Ring 12	8	14	100
Totals	56	100	848
B value			.36

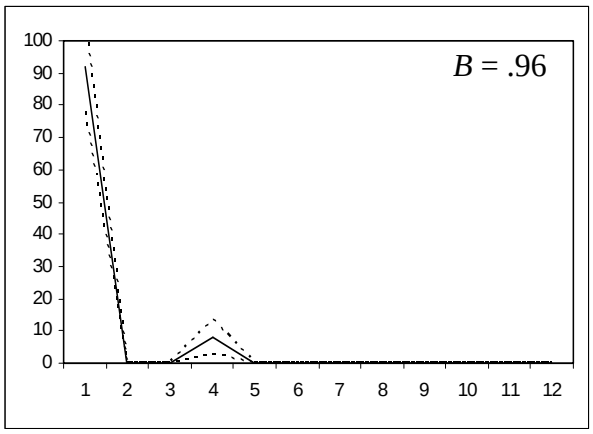

Figure 6.28 Graph of distribution of Final Bronze Age decorated sherds in the east community with the 90% confidence zone highlighted

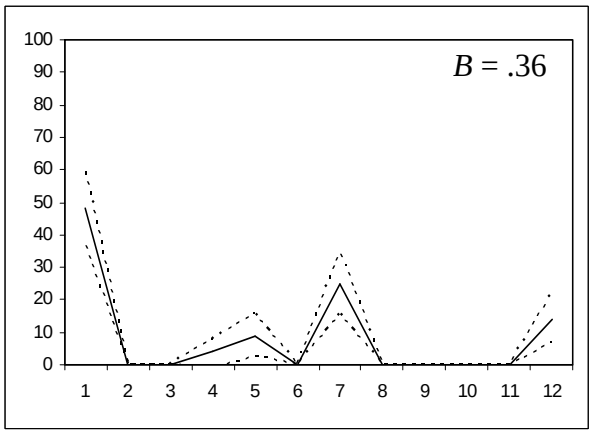

Figure 6.29 Graph of distribution of Final Bronze Age non-decorated sherds in the east community with the 90% confidence zone highlighted

Table 6.15 Calculation of *B* value for the Final Bronze Age decorated sherds in the west community

FBAWest Dec	Est. Pop	Pop Prop	Cum Prop
Ring 1	1	50	50
Ring 2	0	0	50
Ring 3	0	0	50
Ring 4	0	0	50
Ring 5	0	0	50
Ring 6	0	0	50
Ring 7	1	50	100
Ring 8	0	0	100
Ring 9	0	0	100
Ring 10	0	0	100
Ring 11	0	0	100
Ring 12	0	0	100
Totals	2	100	900
B value			.46

Table 6.16 Calculation of *B* value for the Final Bronze Age decorated sherds in the west community

FBAWest NonDec	Est. Pop	Pop Prop	Cum Prop
Ring 1	14	33	33
Ring 2	7	16	49
Ring 3	4	10	59
Ring 4	3	7	66
Ring 5	3	7	73
Ring 6	2	5	78
Ring 7	2	5	83
Ring 8	2	5	88
Ring 9	0	0	88
Ring 10	2	5	93
Ring 11	3	7	100
Ring 12	0	0	100
Totals	42	99	910
B value			.47

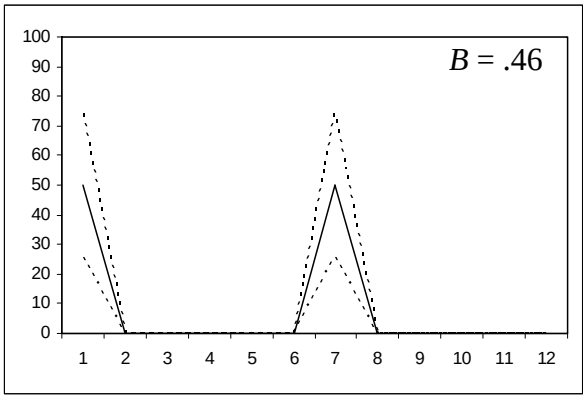

Figure 6.30 Graph of distribution of Final Bronze Age decorated sherds in the west community with the 90% confidence zone highlighted

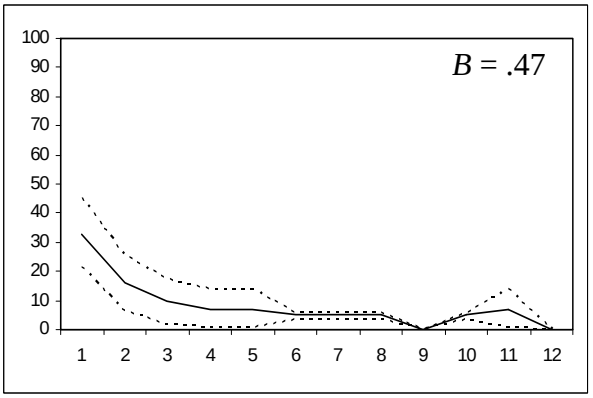

Figure 6.31 Graph of distribution of Final Bronze Age non-decorated sherds in the west community with the 90% confidence zone highlighted

and grog). Clearly, something changed during the Late Bronze Age/Final Bronze Age transition. As I did for the Late Bronze Age characteristics, three aspects are chosen to evaluate in terms of centralization: decorated/non-decorated, talc tempered/non-talc tempered, and thickness (thick/thin).

The Final Bronze Age east community exhibits a very strong centralized pattern for the decorated ceramics focusing almost entirely on the innermost ring, which would make sense given that if all of the sherds are found in that ring it would have a *B* value of 1.0 rather than the .96 that it does have (Figures 6.27 - 6.31; Tables 6.13 and 6.14). Non-decorated sherds exhibit a very different pattern, weakly centralized with a B value of .36. Whereas the east community exhibits a very strong centralized pattern for decorated pottery and a very weakly centralized pattern for non-decorated pottery, the west community in the survey zone expresses a much more evenly, albeit somewhat weakly, centralized patterns for both decorated and non-decorated pottery (Figures 6.28 - 6.31; Tables 6.15 and 6.16). For decorated pottery, this might be considered suspect as there are only two sherds that have a *B* value of .46. The non-decorated

pottery in the west community (n = 42) has a *B* value of .47. The patterns for centralization of the decorated and non-decorated pottery are clear for the east community with both very strong and fairly weak, while the west community shows more evenly centralized patterns of decorated and non-decorated pottery.

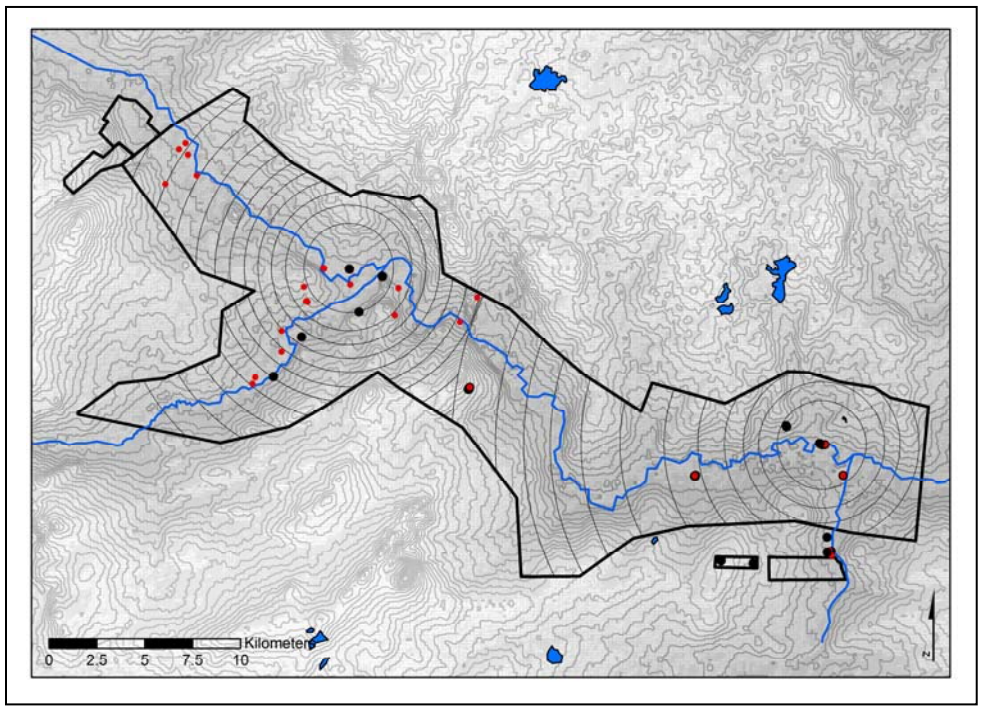

Figure 6.32 The distribution of Final Bronze Age talc tempered (black dots) and non-talc tempered sherds (red dots) across the Ui River valley survey zone divided into 12 equal-area rings

Talc tempered and non-talc tempered sherds also exhibit some interesting centralization patterns. Talc tempered pottery in the Final Bronze Age east community are strongly centralized, expressed through a *B* value of .86. Non-talc tempered pottery is weakly centralized with a *B* value of .26 (Figures 6.32 - 6.34: Tables 6.17 and 6.18). As expected, both decorated pottery and talc tempered pottery is expressed in strongly centralized patterns in the east community of the Ui River Valley zone. Correspondingly, the non-decorated pottery and non-talc tempered pottery

also appear in similar patterns. Only one talc tempered sherd was found in the west community, so while it has a *B* value of 1, it is relatively meaningless and does not have an

Table 6.17 Calculation of *B* value for the Final Bronze Age talc tempered sherds in the east community

FBAEast Talc	Est. Pop	Pop Prop	Cum Prop
Ring 1	18	82	82
Ring 2	0	0	82
Ring 3	0	0	82
Ring 4	1	5	87
Ring 5	2	8	95
Ring 6	0	0	95
Ring 7	1	5	100
Ring 8	0	0	100
Ring 9	0	0	100
Ring 10	0	0	100
Ring 11	0	0	100
Ring 12	0	0	100
Totals	22	100	1123
B value			.86

Table 6.18 Calculation of *B* value for the Final Bronze Age non-talc tempered sherds in the east community

FBAEast NonTalc	Est. Pop	Pop Prop	Cum Prop
Ring 1	20	43	43
Ring 2	0	0	43
Ring 3	0	0	43
Ring 4	1	2	45
Ring 5	3	7	52
Ring 6	0	0	52
Ring 7	14	31	83
Ring 8	0	0	83
Ring 9	0	0	83
Ring 10	0	0	83
Ring 11	0	0	83
Ring 12	8	17	100
Totals	46	100	793
B value			.26

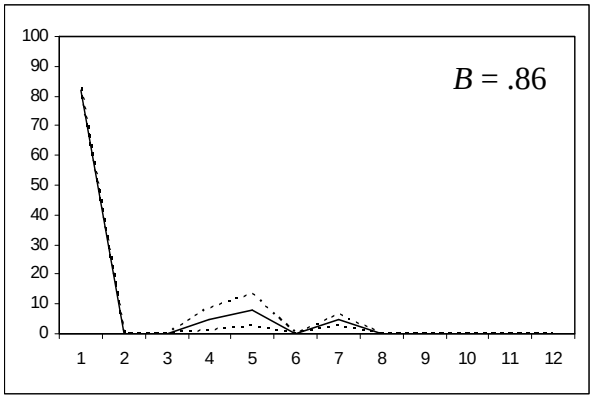

Figure 6.33 Graph of distribution of Final Bronze Age talc tempered sherds in the east community with the 90% confidence zone highlighted

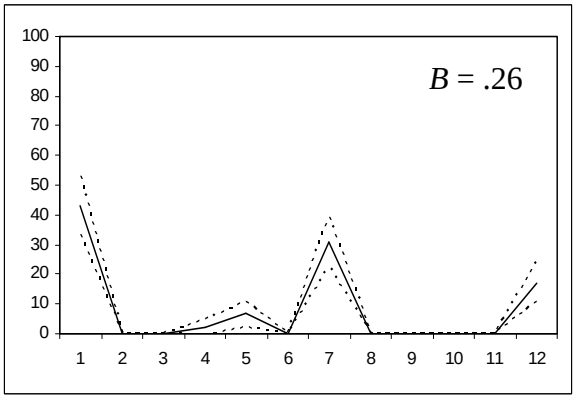

Figure 6.34 Graph of distribution of Final Bronze Age non-talc tempered sherds in the east community with the 90% confidence zone highlighted

Table 6.19 Calculation of *B* value for the Final Bronze Age non-talc tempered ceramics in the west community

FBA West	Est. Pop	Pop Prop	Cum Prop
Ring 1	14	32	32
Ring 2	7	16	48
Ring 3	4	9	57
Ring 4	3	7	64
Ring 5	3	7	71
Ring 6	2	5	76
Ring 7	3	7	83
Ring 8	2	5	88
Ring 9	0	0	88
Ring 10	2	5	93
Ring 11	3	7	100
Ring 12	0	0	100
Totals	43	100	900
B Value			.46

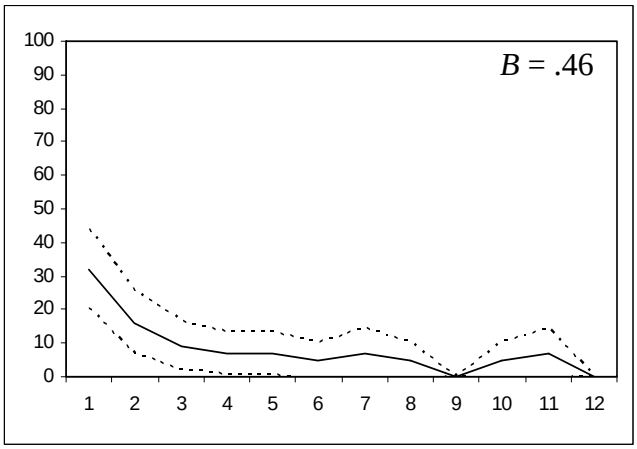

Figure 6.35 Graph of distribution of Final Bronze Age non-talc tempered sherds in the west community with the 90% confidence zone highlighted

associated graphic. On the other hand, the use of non-talc tempered pottery in the west community was moderately centralized with a *B* value of .46, much stronger than its use in the Late Bronze Age (Figure 6.35).

Thickness of pottery also exhibits a wide range of centralization (Figures 6.34, 6.35, 6.36; Tables 6.20 and 6.21). Thick-walled pottery appears as being very weakly centralized with a *B* value of .19. The thin walled pottery, as expected, is moderately centralized with the innermost ring containing a much greater proportion of thin pottery. In the west community, there is a similar pattern of centralization (Figures 6.36 - 6.38; Tables 6.22 and 6.23). The west community exhibits somewhat low to moderate strengths of centralization for thick and thin walled pottery, with *B* values of .39 and .50, respectively.

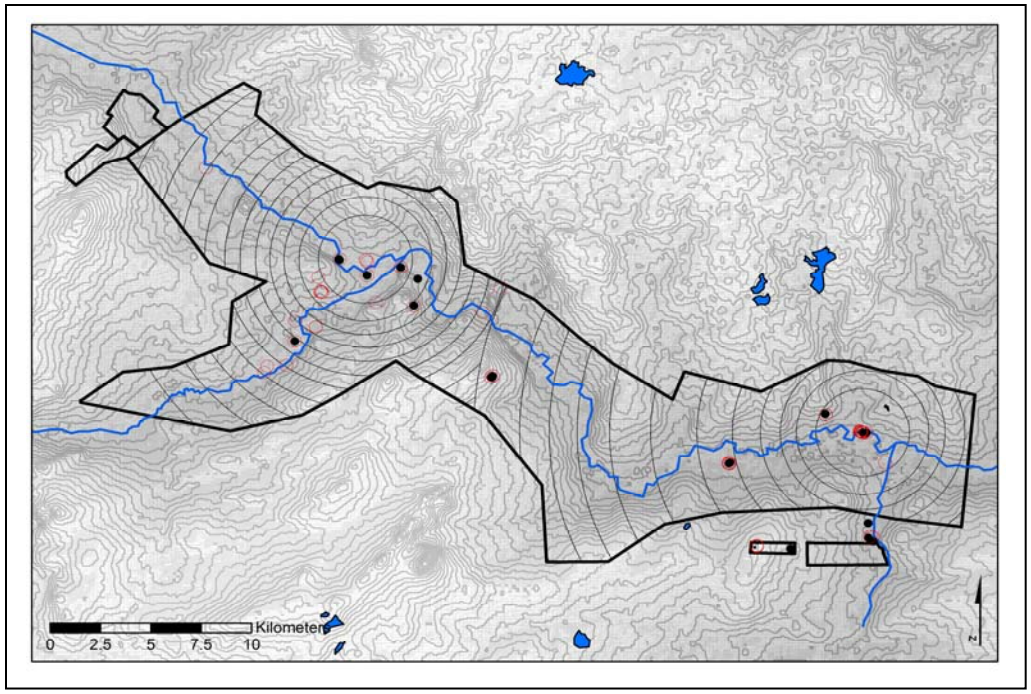

Figure 6.36 The distribution of Final Bronze Age thick (black dots) and thin sherds (red circles) across the Ui River valley survey zone divided into 12 equal-area rings

Table 6.20 Calculation of *B* value for the Final Bronze Age thick sherds in the east community

FBAEast +1.0cm	Est. Pop	Pop Prop	Cum Prop
Ring 1	7	41	41
Ring 2	0	0	41
Ring 3	0	0	41
Ring 4	3	18	59
Ring 5	0	0	59
Ring 6	0	0	59
Ring 7	2	12	71
Ring 8	0	0	71
Ring 9	0	0	71
Ring 10	0	0	71
Ring 11	0	0	71
Ring 12	5	29	100
Totals	17	100	755
B value			.19

Table 6.21 Calculation of *B* value for the Final Bronze Age thin sherds in the east community

FBAWest -1.0cm	Est. Pop	Pop Prop	Cum Prop
Ring 1	29	59	59
Ring 2	0	0	59
Ring 3	0	0	59
Ring 4	0	0	59
Ring 5	5	10	69
Ring 6	0	0	69
Ring 7	12	24	93
Ring 8	0	0	93
Ring 9	0	0	93
Ring 10	0	0	93
Ring 11	0	0	93
Ring 12	3	7	100
Totals	49	100	939
B value			.53

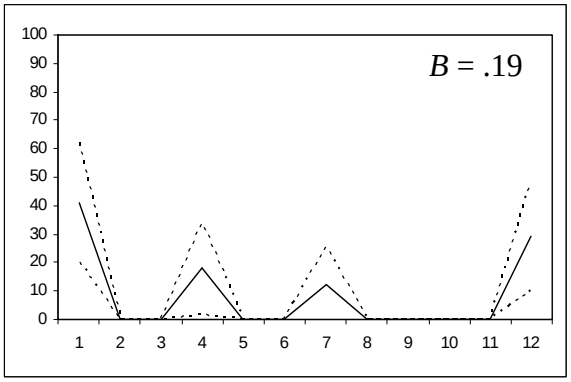

Figure 6.37 Graph of distribution of Final Bronze Age thick sherds in the east community with the 90% confidence zone highlighted

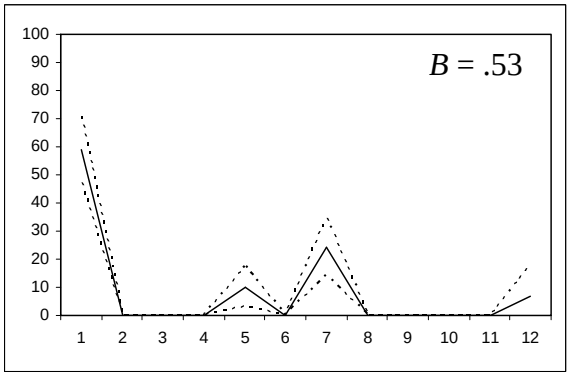

Figure 6.38 Graph of distribution of Final Bronze Age thin sherds in the east community with the 90% confidence zone highlighted

Table 6.22 Calculation of *B* value for the Final Bronze Age thick sherds in the west community

FBAWest +1.0cm	Est. Pop	Pop Prop	Cum Prop
Ring 1	4	29	29
Ring 2	2	14	43
Ring 3	3	21	64
Ring 4	0	0	64
Ring 5	0	0	64
Ring 6	1	8	72
Ring 7	0	0	72
Ring 8	2	14	86
Ring 9	0	0	86
Ring 10	0	0	86
Ring 11	2	14	100
Ring 12	0	0	100
Totals	14	100	866
B value			.39

Table 6.23 Calculation of *B* value for the Final Bronze Age thin sherds in the east community

FBAWest -1.0cm	Est. Pop	Pop Prop	Cum Prop
Ring 1	12	38	38
Ring 2	4	13	51
Ring 3	1	3	54
Ring 4	3	9	63
Ring 5	3	9	72
Ring 6	1	3	75
Ring 7	4	13	88
Ring 8	2	6	94
Ring 9	0	0	94
Ring 10	1	3	97
Ring 11	1	3	100
Ring 12	0	0	100
Totals	32	100	926
B value			.50

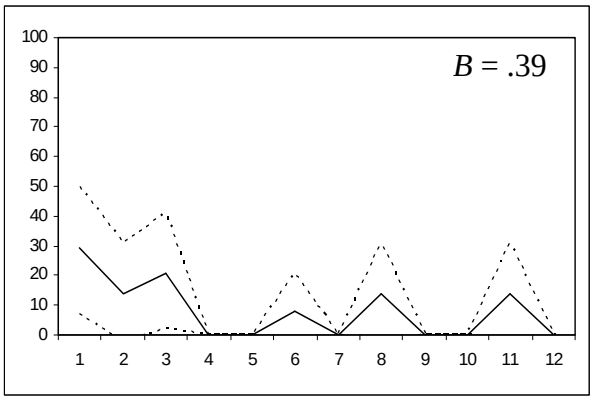

Figure 6.39 Graph of distribution of Final Bronze Age thick sherds in the west community with the 90% confidence zone highlighted

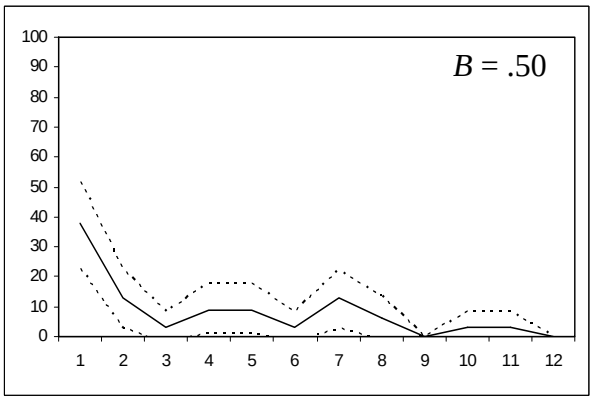

Figure 6.40 Graph of distribution of Final Bronze Age thin sherds in the west community with the 90% confidence zone highlighted

6.3.3 Summary of Final Bronze Age Pottery in the Ui River Valley and the Southern Urals

Along with demographic decentralization in the Final Bronze Age, pottery is a meaningful marker of everyday activities, as well as for status and identity. While the tradition of two wares is continued into the Final Bronze Age, their actual composition change. The first is a decorated thin ware that is talc tempered, with high densities of finely processed talc. The second is a non-decorated thick ware with no talc, but low densities of grog and coarse granules of grit. The centralization patterns for the three primary characteristics of decorated/non-decorated, talc tempered/non-talc tempered, and thickness of pottery walls, indicate a wide range of strengths of centralization between the two communities, with the strongest centralized patterns appearing in the east community and less so in the west community.

The centralized pattern of the decorated ceramics, and the shift from thick-walled, decorated storage vessels to decorated cooking vessels, indicates rather strongly that there is a shift in function for pottery decoration, one that possibly marks differences between more public

and private use. More importantly, there is a continuation of tradition, of social differentiation being practiced in the east community centered on site 89. Even though population levels most likely decrease dramatically in the Final Bronze Age, social differentiation still plays an important role in the social organization of Final Bronze Age communities, and indeed appears to a stronger degree in the west community.

6.4 CHAPTER SUMMARY

The presence of ceramics in the survey zone indicates a number of things. First, as mentioned in Chapter Four, that locations where more people were living can be expected to contain more garbage, i.e., pottery sherds. This is the case for the east community and, in particular, sites 89, 91, and 83 exhibit the most pottery for the Late Bronze Age, and for the most part for the Final Bronze Age. In addition to having the most pottery, during the Late and Final Bronze Ages, the east community exhibits clear proportional distributions that indicate the presence of two groups of sherds with different paste recipes. In addition, the east community also expresses the strongest patterns of centralization for decorated/non-decorated, talc tempered/non-talc tempered, and thin/thick walled ceramics.

The presence of two thick and thin wares in the Late Bronze Age indicates that pottery was being produced (and used) for specific purposes. The non-decorated, thin walled, talc tempered ceramics in the Late Bronze Age are ideal for cooking, while the decorated, thick walled, non-talc tempered pottery are used for other activities such as transport and/or storage. Such distinctions between thick/thin wares that are talc tempered or non-talc tempered are made for other early pastoral societies, including Early Bronze Age pastoralists in northern Finland

(Ikäheimo and Pantilla 2002). Interestingly, the distinct patterns exhibited by the east community are not shared by the west community. The Late Bronze Age west community has both sherd groups present, but in smaller proportions. Perhaps more importantly is the fact that these groups appear in much weaker forms of centralization for the three characteristics in the west community.

Despite the sharp drop off in population documented for the Final Bronze Age in Chapter Four, there are still strong forms of centralization and the use of two distinct wares (thick and thin). However, the characteristics change somewhat. Decorated pottery is found in similar proportions to talc tempered pottery as well as thin-walled pottery. Non-decorated, non-talc tempered, and thick-walled pottery are also found in similar proportions. Decorated, talc tempered and thin walled pottery exhibit very strong patterns of centralization, focused primary on site 89. The flipside of these characteristics show up in much weaker, if not decentralized, patterns.

6.4.1 The Implications of the Ui River Valley Pottery Study

Given what has been said about the Late Bronze Age, and even more so for the Final Bronze Age, that there is a general dispersal of populations that also included a dramatic reduction in social inequalities and stability, the Ui River valley ceramic analysis contributes some important information. Between communities, there are important distinctions maintained that most likely are initiated in the Sintashta period. The sherd groups and paste recipes maintain some continuities such as the use of talc as a factor to relieve or resist thermal stress/shock, the use of thin-walled ceramics most likely used in cooking, and the use of thick-walled ceramics for other functions. The thick walled ceramics are found in much smaller proportions and could have been

used for storage. The use of talc is not only an important consideration for functionality of pottery, but also is a tradition that began in the region with the Sintashta populations (Koryakova and Epimakhov 2007; Tkachev and Khavanskii 2006). By the Final Bronze Age, talc is not used as much and by the beginning of the Iron Age, talc is in almost complete disuse, replaced by differing amounts of silica, both natural and added, as well as grog.

Perhaps most importantly is the use of decoration, as its use changes noticeably from the Late to Final Bronze Age. Decoration is one of the primary markers for establishing cultural identity in the southern Urals (as well as in other geographic areas). While Tkachev and Khavanskii (2006) focus primarily on the links between decoration and vessel form, the line of inquiry used here is the association in proportional distributions and centralization of paste recipes and other pottery attributes. As mentioned earlier, the similar proportions of thick-walled, decorated, non-talc tempered pottery in the Late Bronze Age indicates its use for storage/transportation, which might have been more public or open in nature. By the Final Bronze Age, the use of decorated ware changes. Decorated ceramics are more closely associated with thin-walled, talc-tempered ceramics used for cooking, which might indicate a shift from public to private use. The conventional context for decorated ceramics is that of regional and local markers of identity, or status as suggested Houle (2010), and is important for their interpretation as their symbolic dimensions are expressed along private and public lines.

It is clear from the centralization analysis that pottery wares and paste recipes played an important role in the social organization of both the Late and Final Bronze Ages. Given that the decorated, non-talc tempered thick ware are primarily centralized at the Late and Final Bronze Age population center of site 89. While decorated pottery's exact function remains a mystery (though we can say with some certainty that it wasn't used as cook ware), its restricted use fits in

well to the notion that decorated ceramics are indicative of status and/or identity being expressed in different contexts and perhaps at different scales from the Late to Final Bronze Age.

7.0 CONCLUSIONS

The goals of the dissertation are two fold: 1) to empirically evaluate the development of social complexity in Bronze Age pastoral communities of the southern Urals in the Russian Federation and 2) to assess the role of historical traditions in these developments. The previous chapters establish that there is indeed a close historical link between demographic centralization and social differentiation in the Sintashta period, and that these links persisted through the Late and into the Final Bronze Age, if not the Iron Age. The data analyzed in Chapters Four through Six are especially productive in illuminating not only the presence of these links, but also their strength in relation to one another. As such, in this chapter I more directly and thoroughly address the (somewhat) speculative research questions posed in Chapter One. The research questions posed in Chapter One are:

1) How do overall regional population distributions and densities of occupation zones within the research area change from the EBA to LBA?

Given the overall lack of evidence for Early Bronze Age occupation in the valley (except for Birzskoye identified in the 1960s and later re-identified by E. Kupriyanova) but the ample evidence for earlier (Mesolithic and Neolithic) populations there seems to be enough evidence to suggest that the Ui River valley was occupied previous to the Sintashta period and may have

contributed to the appearance of the Sintashta settlements. The Sintashta period represents a peak in population levels, with the populations being completely centralized. By the Late Bronze Age in the Ui River valley, populations disperse into the landscape with the east community retaining a tradition of demographic centralization, while the west community is fairly decentralized. In the Final Bronze Age, some of these traditions continue although populations overall are increasingly dispersed and less centralized, especially in the east community.

The implications for such changes is that while there is ample evidence for demographic centralization in the Sintashta period, there is also a debatable degree of social differentiation, at least as expressed in mortuary rituals. These autonomous communities are most likely self-sufficient both economically and politically, but this needs to be more thoroughly investigated through an expansion of the survey. Given the completely centralized nature of the Sintashta populations, and their relatively low numbers, there is not enough evidence for a compelling argument for population pressure, territorial competition, and inter-community warfare. This, however, does not exclude the (strong) possibility for smaller scale conflict as is suggested by Anthony (2009), Drennan et al. 2011, Epimakhov (2009b), Hanks (2009b), Hanks et al. forthcoming, and Koryakova and Epimakhov (2007), among others. Yet, given the lack of skeletal trauma on individuals from the Kammenyi Ambar 5 cemetery (as well as at the Bolshoikaraganskii mound/cemetery) (Judd et al. 2008; Lindstrom 2002), there is little support for broader scale, internecine conflict between communities over resources, be they economic or ritual. Rather the geographic and temporal scales of such conflicts are limited, perhaps along the lines of livestock raiding (Hanks: personal communication).

Furthermore, SCARP convincingly demonstrates that the level of metallurgical production activities is nowhere near what has been commonly assumed. Following Grigor'yev (2000a) and

Vinogradov (2004), Hanks and Doonan (2011a and b; Doonan et al. 2014) indicate that metal production only happened a few times a year and may have been a seasonal industry. These results are suggested for both Stepnoye and Ust'ye, and should lead scholars to question the scale of production happening in these communities as well as their ramifications for local and regional socio-political developments. But given what we know of metal production in the Late Bronze Age and settlement sizes (such as Gorny), the Late Bronze Age may be a better time to investigate intensive metal production.

Strong forms of demographic centralization also appear in the Late Bronze Age, and less so in the Final Bronze Age. While the Sintashta communities appear as completely demographically centralized (with *B* values of 1.0), the debatable amount of differentiation in Sintashta period mortuary practices indicates that Sintashta communities acted as the historical foundation for demographic and possibly political centralization for later communities. Community differentiation in terms of population sizes, demographic centralization, and social differentiation are expressed strongly in the Late and Final Bronze Ages.

2) Is it possible to develop better and more empirically validated estimates of the demographic and spatial scale of EBA/MBA/LBA communities?

This question is answered I think in a convincing manner in Chapter Four. Through the combination of aerial photography, the previous surveys conducted by E. Kupriyanova and the 2009/2011 surveys, it is certainly possible to develop better demographic estimates and understandings of the spatial scale of Bronze Age communities in the southern Urals. As shown in the previous data chapters, what appears as relatively isolated and/or autonomous

communities in the Sintashta period of the Ui River valley, become more spatially and demographically dispersed in the Late Bronze Age and even more so in the Final. The most obvious reason for this, given that no evidence has been found to date of agricultural practices, that these communities are increasingly focused on pastoralism and their settlements become more ephemeral and more geographically widespread. Accordingly, population numbers change noticeably from the Sintashta period to the Final Bronze Age.

3) Are empty spaces or 'buffer zones' between communities present in the survey region and if so, how do these relate to the two MBA Sintashta settlements already identified? Does buffer zone patterning contribute to understandings of community centralization and conflict during the Bronze Age, and if so, how did this change diachronically?

Buffer zones are a primary staple in the scholarly diet of archaeologists interested in conflict/warfare (Arkush 2011; LeBlanc 2001, 2006). Steven LeBlanc (2006) has shown that buffer zones are strongly linked to nascent tensions between communities as open spaces become connected with no-man's lands, a zone ready made for the expression of hostilities. However, it is also possible that such zones can be used for ritualized expressions of conflict between communities, especially when those communities have lower population numbers and cannot afford the "expense" of dead community members (Arkush and Stanish 2005). A spectrum of possibilities needs to be considered when exploring the possibilities for conflict as a driving force behind socio-political developments, such as what we see from the Sintashta period to the Final Bronze Age in the southern Urals. Furthermore, the historical tradition of both rigid and porous socio-natural boundaries between communities was first established in the Sint

ashta period and endured into the Final Bronze Age.

As established in Chapter Five, a useful tool for investigating social organization and territory in small-scale societies is the degree to which they are visible to other communities and within each community. In Chapter Five I explore the degree to which Sintashta Stepnoye and Chernorech'ye communities, and those located in the east and west communities in the later periods, are visible to one another. I also investigate the possibility of overlapping viewsheds for each time period, operating under the assumption that one way to provide protection (and control) and signal social integration of hinterland groups is to stay within sight of the larger, more densely occupied settlements. There is strong evidence for the presence of such overlapping viewsheds for some of the communities in both the Late and Final Bronze Ages.

4) How well do settlement locations relate to possible economic or resource zones? To what extent do these relationships differ between settlements and how do these relationships change over time in the Bronze Age?

As mentioned above, the demographic patterning noted in the dissertation is strongly linked to socio-economic activities, primarily pastoralism. The spatial patterning of sites does not correspond to expectations of serious competition over resources, with any one zone or area being consistently utilized relatively close to the larger settlements. It is thought that resource zones in or near the Ui River valley were an important impetus, or draw, for the Sintashta communities. The recent results of the HHpXRF surveys and analysis of slags from the sites of Stepnoye and Ust'ye reveal a lower scale of production (and need) for metallurgical activities (Doonan et al. 2014; Hanks 2011, 2012). While a large and important area for copper mining,

historic and most likely prehistoric, the Sanarka Dacha (forest-steppe) area to the north of Stepnoye yields little conclusive evidence of utilization or exploitation by Sintashta period through Final Bronze Age communities. We can assume that this area of Sanarka provides much of the raw materials for metal production, and perhaps lithic raw materials as well, but there is no clear settlement patterning along the seasonal drainages or the other tributaries that would lead us to believe that community settlement and demographic patterning is related to such economic activities.

What *is* clear is that the Sintashta period through Final Bronze Age communities stuck close to water. The hydrology buffer zones modeled for the Late and Final Bronze Age exhibit a strong relationship between site location and water. Such a pattern would seem obvious, but I think takes on increased importance when considering the need for water for livestock, especially as communities became more mobile and moved with their animals. Given the lack of evidence for occupation of the Ui River valley in the Iron Age, it would seem that by the end of the Final Bronze Age, groups were leaving the valley, possibly following the Ui River and its tributaries to other valleys.

Social differentiation is an important factor that appears alongside changes to demographic distribution and spatial patterning. There are clear patterns of differentiation expressed through the use of thin and thick wares, decorated versus non-decorated pottery, and the use of talc as temper for different sites. The demographic and spatial patterning of the different paste recipes as well as the decorated versus non-decorated determinations indicate that social differentiation is an important part of everyday life for Late Bronze Age communities, and even more demographically dispersed Final Bronze Age communities. While in the Late Bronze Age east community there are strong associations between demographic centralization, occupation and

use of territory, and possible proscriptions in the production and use of certain pottery wares, in the Final Bronze Age such patterns either disappear or appear in a different configuration. What is intriguing is that while site 89 appears in the Final Bronze Age in much reduced size, there is also a strong tendency to use talc tempered, decorated pottery whereas in other groups in the Ui River valley these practices were abandoned. Clearly, there are enduring traditions that came into play here as the once densely occupied east community shrunk but clung to its social memories, if not traditions, of differentiation. This would also fit in with the general idea that differentiation in the Final Bronze Age is obscured or reduced (Koryakova and Epimakhov 2007; Zdanovich 2003).

5) Can pedestrian survey and surface collection support the model that pastoral communities became more sedentary in the MBA leading to the appearance of Sintashta fortified settlements as suggested by Anthony (2007, 2009)? Did communities become more fragmented, dispersed, and demographically smaller in the LBA with the decline of the Sintashta Country of Towns?

Many of the answers listed above are related to the answer for Question Five. Despite the range of data collected during the survey and surface collection, we can say definitively that pedestrian survey and surface collection can help support, or refute, models such as what Anthony (2007, 2009) proposes for Sintashta communities. No data are collected regarding Early Bronze Age occupations of the Ui River valley. However, an abundance of lithics collected, and subsequently identified and characterized by V. Moison (2011) as belonging to the Mesolithic and Neolithic, indicate a long history of occupation in the valley. We can now say with some certainty that later (Late and Final Bronze Age) communities in the southern Urals, as verified by

the research done in the Ui River valley, become more dispersed and demographically smaller than in the Sintashta period. However, we can also now say that as these communities increasingly disperse over time, they did not lose completely their traditions of demographic centralization and social differentiation, but rather carry these traditions with them into later time periods and different locations. For example, it seems clear (though still under-studied) that Late Bronze Age mortuary practices exhibit a high degree of social differentiation, expressed through chariots, weapons, and personal ornamentation, as well as in strong patterns of demographic centralization, use of distinct territories, and the traditional pottery recipes linked to the Sintashta period by the use of talc as a primary temper.

Thus the general results from the Ui River valley survey are as follows:

1) Strong patterns of demographic centralization appear in the Late Bronze Age and weaken in the Final Bronze Age.

2) Boundaries/buffer zones are important factors in the spatial distribution of sites as well as economic activities.

3) Population levels in the Sintashta period – Final Bronze Age in the Ui River valley demonstrate a steady decrease.

4) There is a strong correlation between demographic centralization and social differentiation between the east and west communities in the Late and Final Bronze Ages.

5) The tradition of using talc as temper in cooking vessels continued on through to the Final Bronze Age.

7.1 RESULTS FROM THE UI RIVER VALLEY STUDY AND ITS IMPLICATIONS FOR THE BRONZE AGE SOUTHERN URALS

One question that remains is how do these results contribute to existing models or frameworks of societal development in the southern Urals region? The limited number of chariot burials and burials with weapons as well as bodily ornamentation indicate the presence of social hierarchies may be overstated for the Sintashta period. As for the Country of Towns, there is little evidence to support the notion of robust hinterlands. Rather, each Sintashta community is fairly isolated and largely autonomous from other communities. This is further supported by the results of SCARP that indicate a much smaller scale of metal production occurring in the Sintashta period than what has been commonly believed. The SCARP findings agree with Grigor'yev's (2000a) and Vinogradov's (2004) determinations that metal production in the Sintashta periods is probably at the household level. The results from SCARP also indicate a part-time, probably seasonal, nature of metal production (Doonan et al. 2014). The picture that emerges then for the Sintashta period is a collection of small, politically and demographically centralized and autonomous communities living in the southern Urals. Furthermore, as the Sintashta period and its cultural group are proposed to be the precursors for the Late and Final Bronze Age cultural developments, re-conceptualizing and re-evaluating the scale and organization of these communities seems very important and salient for any investigation and assessment of Late and Final Bronze Age social organization.

7.1.1 Late Bronze Age Social Complexity

There seems ample reason to believe that the Late Bronze Age exhibits a strong degree of social complexity. The evidence from the Ui River valley indicates fairly drastic differences in community social organization between the east and west communities. The east community exhibits a very strong degree of demographic centralization as well as social integration with its smaller hinterland settlements. The west community demonstrates the opposite pattern, with little centralization and integration expressed. Indeed, the spatial patterning of the different wares also confirms this conclusion.

Given the presence of demographic centralization and clear evidence for social differentiation in the Late Bronze Age communities, it seems likely that more complex social organization may have appeared in the Late Bronze Age rather than the Sintashta period, or may have carried through from the Sintashta period as part of a historical process. The Sintashta communities are centered on fortified settlements and there is no evidence for the emergence of center/hinterland relationships between a population center and rural/surrounding populations. While populations fluctuate between the Late and Final Bronze Age in the Ui River valley, evidence for strong pattern of centralization and differentiation start in the Sintashta period and continue to be expressed in the Late and Final Bronze Age east community. Such evidence runs contra to many of the arguments that suggest that the Late Bronze Age is a period exhibiting the absence of social differentiation (Epimakhov 2009b; Kupriyanova 2008).

Rather, the emergence of more easily identifiable forms of differentiation and complexity indicate a need for more focused studies of the historical expressions of status and community participation. This may have been the result of lingering social, political and economic tensions between communities in (and perhaps from without) the Ui River valley. If the Sintashta period

is a period of internecine conflict, as suggested by Anthony (2007, 2007), Hanks (2009; 2012), and Koryakova and Epimakhov (2007), such tensions would not dissipate quickly and most likely would contribute to the continuation and changes to aspects of social organization of Late Bronze Age communities and the social interactions between them.

It is difficult at this point to assess the role of climate and ecology in the social changes from the Sintashta period to the Late Bronze Age. D. Anthony (2009) suggests that environmental conditions are likely cooler and drier in the Sintashta period than in preceding periods leading to Sintashta populations to settle in or near marshier areas along the major rivers and their tributaries in the southern Urals region. Yet, the proximity of the Urals mountain range drastically affected the severity of the climatic effects on Sintashta communities. In addition, new stances on environmental change, i.e., those proposed by political ecologists, focus on the variation found in (and agency of) the scale and tempo of environmental change and this may radically alter how we model human-environment relationships, especially in terms of pastoral demography. As there seems not to have been any radical population growth at the micro-regional level for either the Sintashta or Late Bronze Age periods, there is little or no evidence for population pressure that leads to competition over resources that is one of the trademarks for the emergence of chiefly social developments. Yet, given the degree of social differentiation and demographic centralization found for the Late Bronze Age, there is little doubt that these historical processes (centralization and differentiation) contribute greatly to Late Bronze Age social organization, possibly in tandem with the emergence of centralized chiefly political authority.

7.1.2 Final Bronze Age Social Complexity

As mentioned periodically throughout the dissertation, there is little known about the social organization of Final Bronze Age communities. There is no positive identification of the Final Bronze Age settlements in the Ui River valley as being Sargary, and the distributional patterns of the sites indicate a general trend of weakening demographic centralization. There is a noticeable drop in population levels, as there was a drop in the overall amounts of ceramics. This fits more broadly with what is known regionally about the Final Bronze Age. L. Koryakova and A. Epimakhov (2007), as well as S. Zdanovich (2003), suggest that in the Final Bronze Age there is little evidence for linear social hierarchies, yet the centralization of the two sherd groups, or wares, despite their drop in numbers indicates enduring forms of social differentiation as well as some modifications to the traditional paste recipes. The strong link between demographic centralization and social differentiation first established in the Sintashta period and elaborated upon in the Late Bronze Age, dissipates in the Final Bronze Age Ui River valley leaving a few hold outs, such as site 89.

At the regional level, even less is known about Final Bronze Age social organization. As mentioned in the previous Late Bronze Age sub-section it is noted that if all else is equal then half of the data regarding settlements from the Kizil'skoye region should be assigned to the Final Bronze Age. If this is the case, and the evidence from the Ui River valley survey indicates intriguing possibilities, it might be that the Final Bronze Age needs to be even more thoroughly investigated and evaluated. What is apparent is that the Bronze Age pastoral communities of the southern Urals are capable of strong expressions of social complexity that are historically conditioned and that different communities exhibit some intriguing and strong differences that warrant further investigation.

7.2 DISCUSSION OF FUTURE WORK

If we understand social complexity to be the strength and duration of historically overlapping social, political, and economic factors or fields, then a multitude of interactive characteristics need to be investigated. As it is, this dissertation took on three characteristics - demographic centralization, territory/integration, and pottery production and use - and evaluated them with an eye to how they interact with each other. However, this is not to say that important considerations are not left out. One of the most glaring holes is the fact that the Sintashta period ceramics from the Stepnoye settlement and cemeteries are not analyzed. Such an analysis will establish more firmly and accurately the historical base from which to evaluate the tradition that carries through into the production of Late and Final Bronze Age ceramics. The scope of such a project by necessity entails another dissertation or a post-doctoral project, and I hope that in the near future this work is conducted.

Another aspect is ground-truthing the sites identified during the surveys. While some of this was done through very limited test excavations, a broader set of excavations is needed to determine the social, political, and economic nature of these sites and how they are related to one another. This too entails the production of another dissertation or postdoctoral work. This will not only contribute to the framework presented here, but perhaps more importantly, will contribute to the broader investigations of early pastoralism in the Eurasian steppe.

7.3 SOCIAL COMPLEXITY IN PASTORAL AND AGRARIAN SOCIETIES

This chapter discusses the empirical results of the analyses presented in Chapters Four through Six, without delving too much into the broader, more theoretical problems and social issues laid out in Chapters One and Two. In some ways, discussing social complexity in pastoral societies still feels like an up-hill battle despite the recent important work on the topic. This may be due to what Kuper (2005) has termed the conceptualization of the pastoral primitive as well as the tyranny of the ethnographic record, which Sneath (2007) and Porter (2012) both lay at the feet of the early British ethnographers of African societies, e.g., Evans-Pritchard, Fortes, Firth, etc. A. Kuper (2005) suggests that many of the problems with adequately evaluating and studying different groups is our need to place them in neo-evolutionary stages, and that this began with the work of Lewis Henry Morgan and continued in and through the work of Marx and Engels. The argument is that by placing what we often term 'tribal' societies into such schemata we inadvertently limit or deny the capacity of these groups to be more complex. In addition, that as this line of thought becomes more concretized through time, we do not explore alternatives to the conventional wisdom about pastoral developmental trajectories – that they are at the core tribal and thus incapable of more complex forms of social organization.

This line of thought also has an insidious methodological bent to it. By denying or restricting pastoralists to a lower rung on the neo-evolutionary ladder, we also (perhaps unwittingly) often adopt investigative methodologies and parameters that reify the notion of the lack of complexity in pastoral societies in general. This is exemplified in a shared focus on pastoralism as an economic, rather than social and political, activity that is overly reliant on favorable environmental conditions. As a result, many archaeological investigations have focused on pastoralism as a subsistence strategy requiring approximations of herd size and

composition, and/or on environmental considerations that either impede or encourage the expansion of pastoralism as a subsistence strategy. This is not to say that these issues are not important or deserve much needed research, but rather they need to be moved out of deterministic frameworks, while allowing room for the investigation of the social and political facets of pastoral life.

To do so, our methodologies need to be equally complex and thorough. While GIS has been used extensively to model human-animal-environment relationships in pastoral societies, very few studies have undertaken GIS-based analyses of the social and political dimensions. This too has recently changed, however, with some of the work being conducted in Mongolia (Honeychurch et al. 2009; Houle 2010) and Kazakhstan (Chang 2012; Frachetti 2008, 2012; Ventresca Miller 2013). In the Russian Federation, there is increased interest in these topics though little actual exploration utilizing GIS (Anthony 2007, 2009; Epimakhov 2002, 2009; Hanks 2009; Hanks and Doonan 2009; Hanks 2012; Johnson and Hanks 2012; Koryakova 1996, 2002; Koryakova and Epimakhov 2007, among many others).

It is clear that the models that we are using and testing are important for investigations of pastoral life in the past. Yet, at the same time we should not ignore our broader audience, other archaeologists who may or may not be aware of the important social, political, and economic developments found in pastoral societies that may have tremendous comparative value for them. Moving our 'subjects' out of the essentialized tribal category and placing them in trajectories that are explored through comparative analysis is one way in which a broader audience might come to know and understand the value of comparisons with pastoral case studies.

Certainly, this is a growing trend in archaeological studies of pastoralism and mobility, especially in the last few decades (Chang 2006, 2008, 2012; Frachetti 2006, 2012; Hanks 2009;

Honeychurch et al. 2009, among others). Many of us work in regions that still have a strong culture-historical point of view, and thus these facets are often obscured when discussing changes at the broader pan-regional, cultural level. As Hanks and Doonan (2012) suggest in their reply to Frachetti (2012), how social, political, and economic processes play out at the local and micro-regional level are as important as the goings-on at the pan-regional, meta-narrative level. With a growing number of archaeologists working on sites scattered across the Eurasian steppe, we can only hope that the social and political facets of prehistoric and historic pastoral societies increasingly come to light.

BIBLIOGRAPHY

Anderson, B.

1991 *Imagined Communities: Reflections on the Origin and Spread of Nationalism*. London: Verso.

Anthony, D.

1995 Is there a future for the past? An overview of archaeology in western Russia and Ukraine. *Journal of Archaeological Research* 3(3): 177 – 204.

2007 *The Horse, the Wheel and Language: How Bronze Age Riders from the Eurasian Steppe Shaped the Modern World*. Princeton: Princeton University Press.

2009 The Sintashta genesis: The roles of climate change, warfare and long-distance trade. In *Social Complexity in Prehistoric Eurasia: Monuments, Metals and Mobility*, (eds.) B. Hanks and K. Linduff. Cambridge: Cambridge University Press, pp. 47-73.

Anthony, D. and N. Vinogradov

1995 The birth of the chariot. *Archaeology* 48(2): 36-41.

Arkush, E.

2011 *Hillforts of the Ancient Andes: Colla Warfare, Society and Landscape*. Gainesville: University of Florida.

Arkush, E. and C. Stanish

2005 Interpreting conflict in the ancient Andes: Implications for the archaeology of warfare. *Current Anthropology* 46(1): 3 – 28.

Arnold, B.

2002 A landscape of ancestors: the space and place of death in Iron Age west-central Europe. In *The Space and Place of Death*, (eds.) H. Silverman and D. Small, AP3A No. 11 Arlington: Archaeological Papers of the American Anthropological Association, pp. 129-144.

Bandy, M.

2004 Fissioning, scalar stress and social evolution in early village societies. *American Anthropologist* 106(2): 322-33.

Barfield, T.
1993 *The Nomadic Alternative*. New York: Pearson.

Barth, F.
1964 *Nomads of South Persia: the Basseri Tribe of the Khamseh Confederacy*. Boston: Little, Brown and Company.

1969 Introduction. In *Ethnic Groups and Boundaries: The Social Organization of Culture Difference*, (ed) F. Barth, Boston: Little, Brown and Co., pp. 1-38.

Barrett, J.
1994 *Fragments from Antiquity: An Archaeology of Social Life in Britain, 2900-1200 BC.* Oxford: Blackwell.

Batanina, I.
1995 *Otchot. Arkheoloicheskaya karta zapovednika "Arkaim"*. Chelyabinsk: unpublished report on file at Historical-Cultural Reserve – Arkaim, Chelyabinsk, Russia).

Batanina, N. and B. Hanks
2013 Soviet period air photography and archaeology of the Bronze Age in the southern Urals of Russia. In *Archaeology from Historical and Satellite Archives*, (eds.) W. Hanson and L. Oltean, London: Springer, pp. 199 – 219.

Bochkarev, V.
1995 Kulturogenez I razvitiye metalloproizvodstva v epokhu pozdnei bronzy (po materialam yuzhnoi poloviny Vostochnoi Evropy). In *Drevniye indoiranskiye kultury Volgo-Uraly'a*, (ed) I. Vasily'ev, Samara Pedagogical University, pp. 114-23.

Burnham, P.
1979 Spatial mobility and political centralization in pastoral societies. In *Pastoral Production and Society*, (ed) Equie Ecologie, Cambridge: Cambridge University Press, pp. 350 – 359.

Chang, C.
1992 Archaeological landscapes: The ethnoarchaeology of pastoral land use in the Grevena province of Greece. In *Space, Time, and Archaeological Landscapes*, (eds.) J. Rossignol and L. Wandsnider, New York: Plenum Press, pp. 65-89.

2006 The grass is greener on the other side: The social evolution of Eurasian steppe communities in southeastern Kazakhstan. In *The Archaeology and Ethnoarchaeology of Mobility*, (eds.) F. Sellett and P-L. Yu, Orlando: University of Florida Press, pp. 184 – 200.

2008 Mobility and Sedentism of the Iron Age Agropastoralists of Southeast Kazakhstan. In *The Archaeology of Mobility: Old World and New World Nomadism*, (eds.) H. Barnard and W. Wendrich. University of California: Los Angeles, pp. 329-342.

2012 Lines of power: Equality or hierarchy among the Iron Age agro-pastoralists of southeastern Kazakhstan. In *Revolutions and Regimes: The Archaeology of Power and Politics in Eurasia*, (eds.) C. Hartley, C. Bike Yazicioglu, and A. Smith, Cambridge: Cambridge University Press, pp. 122-142.

Chechushkov, I. and A. Epimakhov
2010 The Chariot complex of the Ural-Kazakhstan Steppes. In *Horses, Chariots and\ Charioteers of the Steppes of Eurasia*, (ed) E. Kuz'mina, Moscow: Samara.

Cherlenok, E.
2001 The Chariot in the funeral rite in the beginning of the Late Bronze Age of the Eurasian Steppes. *Vectnik molodik uchenik*, St. Petersburg: Nauka, pp. 22 – 29.

2006 The Chariot in Bronze Age Funerary Rites of the Eurasian Steppes. In *Horses and Humans: The Evolution of Human-Equine Relationships*, (ed) S. Olsen, Oxford Archaeopress, pp. 173 - 179.

Chernykh, E.
1992 *Ancient Metallurgy in the USSR: The Early Metal Age*. Cambridge: Cambridge University Press.

2004 Kargaly: The largest and most ancient metallurgical complex on the border of Europe and Asia. In *Metallurgy in Ancient Eastern Eurasia from the Urals to the Yellow River*, (ed.) K. Linduff. Lewiston: Edwin Mellon Press, pp. 223-237.

2009 Formation of the Eurasian steppe belt cultures: Viewed through the lens of archaeo-metallurgy and radiocarbondating. In *Social Complexity in Prehistoric Eurasia: Monuments, Metals and Mobility*, (eds.) B. Hanks and K. Linduff. Cambridge: Cambridge University Press, pp. 115- 145.

Chernykh, E., S. Avilova, and L. Orlovskaya
2000 *Metallurgicheskiye provintsiji I rediouglerodnaya khronologiya*. Moscow: Institute of Archaeology RAS.

Childe, V.G.
1944 *Progress and Archaeology*. London: Watts.

Clastres, P.
1989 *Society against the State*. New York: Zone Books.

Conolly, J. and M. Lake.
2006 *Geographical Information Systems in Archaeology*. Cambridge: Cambridge University Press.

Connerton, P.
1989 *How Societies Remember*. Cambridge: Cambridge University Press.

Cribb, R.
1991 *Nomads in Archaeology*. Cambridge: Cambridge University Press.

Degtyareva, A., S. Kuzminykh, and L. Orlovskaya
2003 Metalloproizvodstvo petrovskikh plemen (po materialam poseleniya Kulevechi III). *Voprosy arkheologiyi, antropologiyi, i etnografiyi* 3: 23 – 54.

Doonan, R. B. Hanks, D. Zdanovich, E. Kupriyanova, D. Pitman, N. Batanina and J. Johnson
2014 Metals, Society and Economy in the Late Prehistoric Eurasian Steppe. In *Reader in Early Metallurgy* (eds.) B. Roberts and C. Thornton. New York: Springer, pp. 755-784.

Drennan, R. and X. Dai
2010 Chiefdoms and Sates in the Yuncheng Basin and the Chifeng Region: A Comparative Analysis of Settlement Systems in North China. *Journal of Anthropological Archaeology* 29: 455 – 468.

Drennan, R., B. Hanks and C. Peterson
2011 The comparative study of chiefly communities in the Eurasian steppe region. *Social Evolution and History: Studies in the Evolution of Human Societies* 10(1): 149-86.

Drennan, R. and C. Peterson
2008 Centralized communities, population, and social complexity after sedentarization. In *The Neolithic Demographic Transition and its Consequences*, (eds.) J.-P. Bocquet Appel and O. Bar-Yosef, New York: Springer, pp. 359-86.

2011 Challenges for Comparative Case Study of Early Complex Societies. In *The Comparative Archaeology of Complex Societies*, (ed.) M. Smith. Cambridge: Cambridge University Press, pp. 62 -87.

Drennan, R. D., C. E. Peterson, G. G. Indrisano, T. Mingyu, G. Shelach, Z. Yanping, K. M. Linduff and G. Zhizhong
2003 Approaches to regional demographic reconstruction. In *Regional Archaeology in Eastern Inner Mongolia: A Methodological Exploration*, (ed) The Chifeng International Collaborative Archaeological Research Project, Science Press, Beijing, pp. 152-165.

Engels, F.
1972 (1884) *The Origin of the Family, Private Property and the State*. London: International Publications.

Epimakhov, A.
1996 Demograficheskije aspekty sotsiologicheskikh rekonstruktsij (po materialam sintashtinsko-petrovskikh pamyatnikov). In *XIII Urailskoe arheologicheskoye soveshchaniye*, (ed.) V. Ivanov, Ufa: Vostochnyi Universitet, pp. 58-60.

2002a Complex societies and the possibilities to diagnose them on the basis of archaeological data: Sintashta type sites of the Middle Bronze Age. In *Complex Societies of Central Eurasia from the 3rd to the 1st Millennium BC: Regional Specifics in Light of Global Models,* (eds.) K. Jones-Bley and D. Zdanovich. Journal of Indo-European Studies, Monograph series 45. Washington: Institute for the Study of Man, pp. 139-48.

2002b *Yuzhnoye Zauralye v period srednei bronzy*. Chelyabinsk: Southern Urals State University.

2005 *Ranniye Kompleksniye Obshyestva Severa Tzentral'noi Evrazii (po materialam mogil'nika Kamennyi Ambar-5),* Kniga 1. Chelyabinsk: Nauk.

2009a Settlements and cemeteries of the Bronze Age of the Urals: The potential for reconstructing early social dynamics. In *Social Complexity in Prehistoric Eurasia: Monuments, Metals and Mobility*, (eds.) B. Hanks and K. Linduff. Cambridge: Cambridge University Press, pp. 146-67.

2009b Ot Arkheologii Pamyantika k Arkheologii Sotsiuma: Epokha Bronzy Yuzhnogo Zaural'ya. In: *Problemy istorii, filologii I kultury 3*, (ed) M. Abramzon,.Moskva-Magnitogorsk-Novosibirsk 2009, 92–104.

Evans-Pritchard, E.

1940 *The Nuer: A Description of the Modes of Livelihood and Political Institutions of a Nilotic People*. Oxford: Oxford University Press.

Finsten, L. G. Feinman, R. Blanton, and S. Kowalewski

1983 A comment on Steponaitis' determination of catchment productivity. *American Anthropologist* 85: 124-129.

Fletcher, R.

1995 *The Limits of Settlement Growth: A Theoretical Outline*. Cambridge: Cambridge University Press.

2009 Low-density, Agrarian-based Urbanism: A Comparative View. *Insights,* Institute of Advanced Study, Durham University 2(4): 2 - 19.

Fortes, M.

1945 *The Dynamics of Clanship among the Tallensi*. Oxford: Oxford University Press.

Fortes, M. and Evans-Pritchard

1940 *African Political Systems*. Oxford: Oxford University Press.

Frachetti, M.

2004 *Bronze Age Pastoral Landscapes of Eurasia and the Nature of Social Interaction in the Mountain Steppe Zone of Eastern Kazakhstan*. Ph.D Dissertation. University of Pennsylvania.

2006 The Dzhungar Mountains Archaeology Project: Reconstructing Bronze Age life in the mountains of eastern Kazakhstan. In *Beyond the Steppe and the Sown*, (eds.) D. Peterson, L. Popova, and A. Smith, Boston: Brill, pp. 122 – 141.
2008 *Pastoralist Landscapes and Social interaction in Bronze Age Eurasia*. Berkeley: University of California Press.

2009 Differentiated landscapes and non-uniform complexity among Bronze Age societies of the Eurasian steppe. In *Social Complexity in Prehistoric Eurasia: Monuments, Metals and Mobility*, (eds.) B. Hanks and K. Linduff. Cambridge: Cambridge University Press, pp. 19-46.

2011 The Migration Concept in Central Eurasian Archaeology. *Annual Review of Anthropology* 40: 195 – 221.

2012 Multiregional emergence of mobile pastoralism and nonuniform institutional complexity across Eurasia. *Current Anthropology* 53(1): 2-38.

Gening, V.
1977 Mogilnik Sintashta I problema rannikh indoiranskikh plemen. *Sovetskaya arkheologiya* 4: 53 – 73.

Gening, V., G. Zdanovich, and V. Gening
1992 *Sintashta, vol. 1*. Chelyabinsk: Uzhno-Uralskoe knizhnoe izdatelstvo.

Godelier, M.
1978 Infrastructures, Societies, and History. *Current Anthropology* 19(4): 763-71.

Goody, J.
2000 *The Power of the Written Tradition*. Washington: Smithsonian Institution Press.

Gosden, C,
1994 *Social Being and Time*. London: Wiley-Blackwell

Grigory'ev, S.
2000a Metallurgicheskoye proizvodstvo na yuzhnom Urale v epokhu srednei bronzy. In *Drevnaya istoriya Yuzhnogo Urala*, (ed.) N. Iovavan, Chelyabinsk: Southern Urals State University, pp. 444-600.

2000b Epokha bronzy. In *Drevnaya istoriya Yuzhnogo Zauraly'a. Kamennyi vek. Epokha bronzy*, (ed) N. Iovavan, Chelyabinsk: Southern Urals State University, pp. 222 – 442.

Hammer, E.
2012 *Local Landscapes of Pastoral Nomads in Southeastern Turkey*. Unpublished Dissertation, Department of Anthropology, Harvard University.

2014 Local landscape organization of mobile pastoralists in southeastern Turkey. *Journal of Anthropological Archaeology* 35: 269-288.

Hanks, B.

2000 Iron Age Nomadic Burials of the Eurasian Steppe: A Discussion exploring Burial Ritual complexity. In *Kurgans, Ritual Sites, and Settlements: Eurasian Bronze and Iron Age*, (eds.) J. Davis-Kimball, E. Murphy, L. Koryakova, and L. Yablonsky, Oxford: BAR International Series 890, Archaeopress, pp. 19 – 30.

2002 The Emergence of the Eurasian Steppe 'Nomadic World' of the First Millennium BC: Inherent Problems withi the Study of the Iron Age Nomadic Groups. In *Ancient Interactions: East and West in Eurasia*, (eds.) K. Boyle and C. Renfrew. Cambridge: McDonald Institute for Archaeological Research, pp. 183 – 197.

2008a Reconsidering Warfare, Status and Gender. In *Are All Warriors Male? Gender Roles on the Ancient Eurasian Steppe*, (eds.) K. Linduff and K. Rubinson, New York: Altamira Press, pp. 15 – 34.

2008b NSF Annual Report, Award #0726279, Field Season June, 2007 to May, 2008.

2009a NSF Annual Report, Award #0726279, Field Season June, 2008 to May, 2009.

2009b Late prehistoric mining, metallurgy, and social organization in North Central Eurasia. In *Social Complexity in Prehistoric Eurasia: Monuments, Metals and Mobility*, (eds.) B. Hanks and K. Linduff. Cambridge: Cambridge University Press, pp. 146-67.

2010 NSF Annual Report, Award #0726279, Field Season June, 2009 to May, 2010

2011 NSF Annual Report, Award #0726279, Field Season June, 2010 to May, 2011

2012 NSF Annual Report, Award #0726279, Field Season June, 2011 to May, 2012

Hanks, B. and R. Doonan.

2009 From scale to practice: A new agenda for the study of early metallurgy on the Eurasian steppe. *Journal of World Prehistory Special Addition – World Metallurgy*, (eds.) T. Taylor, C. Thorton and B. Roberts, 22: 329-356.

Hanks, B., A. Epimakhov, and C. Renfrew.

2007 Towards a refined chronology for the Bronze Age of the southern Urals, Russia. *Antiquity* 81: 353-61.

Hanks, B. and E. Kupriyanova.

2009 The Body Violent: Warfare and Social Practice in the Eurasian Steppe from the 2nd to 1st Millennia BCE. Paper presented at the Body Histories Conference, University of Cambridge.

Hanks, B. and K. Linduff (eds),
2009 *Social Complexity in Prehistoric Eurasia: Monuments, Metals and Mobility*. Cambridge: Cambridge University Press.

Hanks, B., C. Merrony and A. Epimakhov
2009 A Geophysical Prospection of Middle Bronze Age Settlement and Cemetery Organization in the Southeastern Urals, Russian Federation. *Journal of Archaeological Prospection*.

Honeychurch, W.
2004 *Inner Asian Warriors and Khans: A Regional Spatial Analysis of Nomadic Political Organization and Interaction*. Unpublished PhD Dissertation, University of Michigan, Ann Arbor.

Honeychurch, W., J. Wright, and C. Amartuvshin
2009 Re-writing monumental landscapes as Inner Asian political process. In *Social Complexity in Prehistoric Eurasia: Monuments, Metals and Mobility*, (eds.) B. Hanks and K. Linduff. Cambridge: Cambridge University Press, pp. 330-357.

Houle, J.-L.
2009 Socially integrative facilities and the emergence of societal complexity on the Mongolian Steppe. In *Social Complexity in Prehistoric Eurasia: Monuments, Metals and Mobility*, (eds.) B. Hanks and K. Linduff. Cambridge: Cambridge University Press, pp. 358-77.

2010 *Emergent Complexity of the Mongolian Steppe: Mobility, Territoriality and the Development of Early Nomadic Polities*. Unpublished Dissertation. University of Pittsburgh.

Ikäheimo, J. and H. Panttila
2002 Explaining ceramic variability: The case of two tempers. *Fennoscandia archaeologica* XIX: 3 - 11.

Irons, W.
1979 Political Stratification among Pastoral Nomads. In *Pastoral Production and Society*, (ed) Equie Ecologie, Cambridge: Cambridge University Press, pp. 361 – 374.

Johnson, J. and B. Hanks
2012 Society, Demography and Community: Reassessing Bronze Age Sintashta Populations in the Southern Urals, Russia (2100 – 1700 BC). In *Beyond Elites: Alternatives to Hierarchical Systems in Modelling Social Formations* (eds.) T. Keinlin and A. Zimmermann. Bonn: Verlag, Dr. Rudolf Habelt GmbH, pp. 355 – 69.

Johnson, J. and S. Schneider
2013 Materiality of Place, Performative Time, and Mortuary Space as Locality in the Early Iron Age of south-west Germany". In *Place as Material Culture: Objects, Geographies and the Construction of Time*, (eds.) G. Bailey and D. Georghieu, Cambridge: Cambridge Scholars Publishing.

Jones, E.
2006 Using viewshed analysis to explore settlement choice: A case study of the Onondaga Iroquois. *American Antiquity* 71(3): 523-538.

Jones-Bley, K.
2000a The Sintashta "Chariots". In *Kurgans, Ritual Sites, and Settlements: Eurasian Bronze and Iron Age*, (eds.) J. Davis-Kimball, E. Murphy, L. Koryakova, and L. Yablonsky, Oxford: BAR International Series 890, Archaeopress, pp. 19 – 30.

Judd, M., M-E. Kovacik, D. Rajev, B. Hanks & A. Epimakhov
2008 Unpublished Bioarchaeology Report on Kamennyi Ambar 5 Cemetery. Report held by B. Hanks at the University of Pittsburgh, Dept. of Anthropology.

Khazanov, A.
1984 *Nomads and the Outside World*. Madison: University of Wisconsin Press.

Klejn, L.
1993 *The Phenomenon of Soviet Archaeology (in Russian).* St. Petersburg: Farn.

2012 *Soviet Archaeology: Trends, Schools and History*. Oxford: Oxford University Press.

Kohl, P.
1987 The ancient economy, transferable technologies and the Bronze Age world system: A view from the northeastern frontier of the ancient Near East. In *Centre and Periphery in the Ancient World*, (eds.) M. Rowlands, M. Larsen and K. Kristiansen, Cambridge: Cambridge University Press, pp. 13-24.

2007 *The Making of Bronze Age Eurasia*. Cambridge: Cambridge University Press.

2008 Shard Social Fields: Evolutionary Convergence in Prehistory and Contemporary Practice. *American Anthropologist* 110(4): 495 – 506.

Korochkova, O. and V. Stefanov
2004 The Trans-Ural Federovo Complexes in Relation to the Andronovo. In Metallurgy *in Ancient Eastern Eurasia from the Urals to Yellow River*, (ed) K. Linduff, Lewiston, Queenston, Lampeter: The Edwin Mellon Press, Ltd, pp. 85 – 107.

Koryakova, L.
1996 Social trends in temperate Eurasia during the second and first millennia BC. *Journal of European Archaeology* 4: 243-80.

2002a The Social Landscape of Central Eurasia in the Bronze and Iron Ages: Tendencies, Factors and the Limits of Transformation. In *Complex Societies of Central Eurasia from the 3rd to 1st Millennium BC: Regional Specifics in Light of Global Models*, (eds.) by Karlene Jones-Bley and D.G. Zdanovich. Institute for the Study of Man: Washington, pp. 97-118.

2002b Present Day Russian Archaeology and the Outside World. In *Archäologien Europas: Geschicte, Methoden und Theorien*, (eds.) P. Biehl, A. Gramsch, and A. Marciniak, Münster: Waxmann, pp. 239 – 254.

Koryakova, L. and A. Epimakhov.
2007 *The Urals and Western Siberia in the Bronze and Iron Ages*. Cambridge: Cambridge University Press.

Koryakova, L. and B. Hanks
2006 Horse Husbandry among the Iron Age Trans-Uralian Societies. In *Horses and Humans: The Evolution of Human-Equine Relations*, (ed) S. Olsen, Oxford: Archaeopress, pp. 275 – 287.

Kuijt, I.
2000 People and Space in Early Agricultural Villages: Exploring Daily Lives, Community Size and Architecture in the Late Pre-Pottery Neolithic. *Journal of Anthropological Archaeology* 19: 75 - 102.

Kradin, N.
2002 Nomadism, Evolution and World-Systems: Pastoral Societies in Theories of Historical Development. *Journal of World-Systems Research* 8 (3): 368 – 388.

2008 Early State Theory and the Evolution of Pastoral Nomads. *Social Evolution and History* 7(1): 107 – 130.

2011 Heterarchy and Hierarchy among the Ancient Mongolian Nomads. *Social Evolution and History* 10(1): 187 – 214.

Krause, R., L. Koryakova, L. Fornasier, S. Sharapova, A. Epimakhov, S. Panteleeva, N. Berseneva, I. Molchanov, A. Kalis, A. Stobbe, H. Thiemeyer, R. Wittig, and A. Konig
2010 Befestige Siedlungen der bronzezeitlichen Sintashta-Kultur im Transural, Westsibirien (Russische Föderation). *Eurasia Antiqua* 16: 97 – 130.

Krushek, M.
2003 *The Evolution of the Bogota Chiefdom: A Household View*. Unpublished Dissertation, Department of Anthropology, University of Pittsburgh.

Kuper, A.
2005 *The Reinvention of Primitive Society: Transformations of a Myth*. London: Routledge.

Kupriyanova, E.
2000 *The Settled and Natural Landscape of the Chelyabinsk Oblast*. Report for The Historical and Archaeological Arkaim Center, Chelyabinsk State University.

Kupriyanova, E. (ed)
2008 *Ten' Zhenshiny: zhenskii kostum epokhi bronzy kak "tekst" [po materialam nekrpoloei Yuzhnogo Zaural'ya I Kazakhstana]*. Chelyabinsk: Avto Graf.

Kuz'mina, E.
1994 *Oykuda prishli indoarii? material'naia kul'tura plemen andronovskoi obshchnosti I proiskhzhdenie indoirantsev*. Moscow: MGP "Kalina".

2004 Historical representatives on the Andronovo and metal use in eastern Asia. In *Metallurgy in Ancient Eastern Eurasia from the Urals to the Yellow River*, (ed.) K. Linduff. Lewiston: Edwin Mellon Press, pp. 38-84.

2007 *The Origin of Indo-Iranians*. Leiden: Brill.

2008 *The Prehistory of the Silk Road.* Philadelphia: University of Pennsylvanial Press.

LeBlanc, S.
2001 Introduction. In *Deadly Landscapes: Case Studies in Prehistoric Southwestern Warfare,* (eds.) S. LeBlanc and G. Rice, Salt Lake City: University of Utah Press.

2006 Warfare and the development of social complexity: some demographic and environmental factors. In: E. Arkush and M. Allen (eds.), *The Archaeology of Warfare*. Miami: University Press of Florida 2006, pp. 437–468.

Lindstrom, R.
2002 Anthropological characteristics of the population of the Bolshoekaragansky Cemetery, Kurgan 25. In *Arkaim - Nekropol*. Yuzhno-Uralskoye knizhnoye izdatelstvo, Chelyabinsk, pp. 159 - 164.

Mallory, J.
1989 *In Search of the Indo-Europeans: Language, Archaeology, and Myth*. London: Thames and Hudson.

Masson, V.
1980 Rannezemledelcheskie obshchestva i formirovanie poseleniy gorodskogo tipa. In *Rannie zemledeltsy: Etnograficheskie ocherki*, (eds.) N. Butinov and A. Reshtov, Leningrad: Nauka, pp. 178-185.

Matveyev, A.
1998 *Pervye andronovsty v lesakh Zauralya*. Novosibirsk: Nauka.

McEvedy, C. and R. Jones
1978 *Atlas of World Population History*, New York: Facts on File.

McGuire, R.
2002 *A Marxist Archaeology*. Clinton Corners: Percheron Press.

2006 Marx, Childe and Trigger. In *The Works of Bruce G. Trigger: Considering the Contexts of His Influences*, (ed) R. Williamson, Montreal: McGill University Press, pp. 61 – 79.

McIntosh, S (ed).
1999 *Beyond Chiefdoms: Pathways to Complexity in Africa*. Cambridge: Cambridge University Press.

Merrony, C., B. Hanks, R. Doonan
2009 Seeking the Process: The Application of Geophysical Survey on some Early Mining and Metalworking Sites. In: T. L. Kienlin and B. Roberts (eds.), *Metals and Societies: Studies in Honour of Barbara S. Ottaway.* Universitätsforschungen zur prähistorischen Archäologie 169. Bonn: Habelt 2009, pp. 421–430.

Moison, V.
2011 Report. Lithics from 2011 Field Season, Ui River Valley.

Morgan, L. H.
1877 *Ancient Society*. New York: Henry Holt and Company.

Petrova, L.
2007 Keramicheckiji komplexcii epoch pozdneiji bronzii ctepnoye zonii yuzhnogo Zauralya. *Ictoriiya i Arkheologiya*: 81 – 85.

Pitman, D.
2014 *Craft Practice and Resource Perception in the Southern Urals during the Middle Bronze Age*. Unpublished Dissertation, Department of Archaeology, University of Sheffield.

Pitman, D., R. Doonan, B. Hanks, D. Zdanovich, E. Kupriyanova, L. Brempt, and D. Montgomery
2013 Exploring metallurgy at Stepnoye: The role of ceramics in the matte conversion process. In *Accidental and Experimental Archaeometallurgy*, (eds.) D. Dungworth and R. Doonan, The Historical Metallurgical Society, Occasional Publication, No. 7, pp. 153 - 160.

Popova, L.
2006 *Political Pastures: Navigating the Steppe in the Middle Volga Region (Russia) During the Bronze Age*. Unpublished Ph.D Dissertation. University of Chicago.

2009 Blurring the boundaries: Foragers and pastoralists in the Volga-Urals region. In *Social Complexity in Prehistoric Eurasia: Monuments, Metals and Mobility*, (eds.) B. Hanks and K. Linduff. Cambridge: Cambridge University Press, pp. 296-320.

Porter, A.
2012 *Mobile Pastoralism and the Formation of Near Eastern Civilizations*. Cambridge: Cambridge University Press.

Potemkina, T.
1985 *Bronzovji vek lesostepnogo Pritoboly'a*. Moscow: Nauka.

1995 Problemy svyazei i smena kultur Zauraly'a v epokhu bronzy (rannij I srednij etapy). *Rossijskaya arkheologiya* 1: 14-27.

Redman, C.
1978 Multivariate artifact analysis: A basis for multidimensional interpretations. In *Social Archaeology: Beyond Subsistence and Dating*, (eds.) C. Redman, M. Berman, and E. Curtin, New York: Academic Press, pp. 159 – 192.

Rice, P.
1987 *Pottery Analysis: A Sourcebook*. Chicago: University of Chicago Press.

Roberts, B. and M. Vander Linden
2011 Investigating Archaeological Cultures: Material Culture, Variability, and Transmission. In *Investigating Archaeological Cultures: Material Culture, Variability, and Transmission*, (eds.) B. Roberts and M. Vander Linden, London: Springer, pp. 1 – 21.

Rodderick, A. and C. Hastorf
2010 Tradition brought to the surface: Continuity, innovation, and change in the Late Formative Period, Taraco Peninsula, Bolivia. *Cambridge Archaeological Journal* 20 (2): 157 - 178.

Rogers, J. D.
2007 The contingencies of state formation in eastern Inner Asia. *Asian Perspectives* 46 (2): 249 - 274.

Salzman, P.
2004 *Pastoralism: Equality, Hierarchy, and the State*. Boulder, CO.: Westview Press.

Savage, S. and S. Falconer
1995 Heartlands and hinterlands: Alternative trajectories of early urbanization in Mesopotamia and the Southern Levant. *American Antiquity* 60: 37–58.

Sharapov, D.
2011 *Middle Bronze Age – Late Bronze Age Transition in the southern Urals (Russia). Case Study: Shifts in Settlement Patterns in the Kyzil Area, Chelyabinsk District*. Unpublished Masters Thesis, University of Georgia.

Smith, Monica
2003 Introduction. In *The Social Construction of Ancient Cities*, (ed) M. Smith, Washington, D.C.: Smithsonian Institution Press, pp. 1 – 36.

Sneath, D.
1999 Mobility, technology, and decollectivisation of pastoralism in Mongolia. In *Mongolia in the Twentieth Century: Landlocked Cosmopolitan*, (eds.) S. Kotkin and B. Elleman, Armonk: Sharpe Inc., pp. 223 - 233.

2007 *The Headless State: Aristocratic Orders, Kinship Society, and Misrepresentations of Nomadic Inner Asia*. Cambridge: Cambridge University Press.

Spooner, B.
1972 *The Cultural Ecology of Nomads*. Addison-Wesley Modules in Anthropology No. 45.

Stefanov, V.
1996 Poseleniya alakulskoi kultury Uzhnogo Urala. In *Materialy po arkjeologiji i etnografiji Uzhnogo Urala*, (ed) A. Tairov, Chelyabinsk: Kammenyi Poyas: 43 – 63.

Stefanov, V. and O. Korochkova
2006 *Urefty I – Zauralski pamyatnik v andronoskom kontexte*. Ekaterinburg: Ural State University.

Tkachev, V.
1998 K probleme proiskhozhdeniya petrovskoi kul'tury. In *Arkhelogicheskie pamyatniki Orenburzh'ya*. Orenburg, Russia.

Tkachev, V. and A. Khavanskii
2006 *Keramika Sintashtinckoye Kul'tury*. Samara: Orck.

Trigger, B.
2007 *A History of Archaeological Thought, Second Reprinting*. Cambridge: Cambridge University Press.

Usmanova, E. and V. Logvin
1998 *Zhenskie nakosnye ukrashenia Kazakhstana: (epokha bronzy).* Lisakosk: Lisokovsk Museum.

Vainshtein, S.
1980 *Nomads of South Siberia: The Pastoral Economies of Tuva*. Cambridge: Cambridge University Press.

Ventresca Miller, A.
2013 *Social Organization and Interaction in Bronze Age Eurasia: A Bioarchaeological and Statistical Approach to the Study of Communities*. Unpublished PhD Thesis, Department of Anthropology, University of Pittsburgh.

Vinogradov, N.
1995 Khronologiya soderhaniye i kulturnaya prinadlezhnost' pamyatnikhov sintashtinskogo tipa bronzovogo veka v Yuzhnom Zauraly'e. *Vestnik Chelyabinskogo pedagogicheskogo institute. Istoricheskije nauki* I: 16-26.

2003 *Mogil'nik bronzovogo veka Krivoe Ozero v Yuzhnom Zaural'ye*. Chelyabinsk: Yuzhno-Ural'skoe knizhnoe izd-vo.

2004 Sintashtinskie i petrovskie dvernosti Uzhnogo Yrala. Problema sootnosheniya i interpretatsii. In *Pamyatniki Arkheologii i Drevnogo Iskusstv Evrazii*. Moscow: RAN, pp. 261-84.

2013 *Drevnee Ust'ye: Yukreplennoe poseleniye bronzeovogo veka i Yuzhnom Zauralye*. Chelyabinsk.

Wendrich, W. and H. Barnard
2008 The Archaeology of Mobility: Definitions and Research Approaches. In *The Archaeology of Mobility*, (eds.) W. Wendrich and H. Barnard, Los Angeles: Cotsen Institute of Archaeology, UCLA, pp. 1 – 25.

Wheatley, D. and M. Gillings.
2002 *Spatial Technology and Archaeology: The Archaeological Applications of GIS*. London: Taylor and Francis.

Wolf, E.
1982 *Europe: the People without History*. Cambridge: Cambridge University Press.

Wright, J.
2006 *The Adoption of Pastoralism in Northeast Asia: Monumental Transformation in the Egiin Gol Valley, Mongolia*. Unpublished Dissertation, Harvard University.

Zdanovich, D.
1995 Arkaim: Arii na Urale ili nesostoyavshayasya tsivilizatsiya. In *Arkaim: Islledovaniya. Poiski. Ortkrytiya.* Chelyabinsk: Kammenny Poya, pp. 21-42.

2002 *Okhrannye arkheologicheskiye raskopki poseleniya Stepnoye 8 i mogil'nika Stepnoye 7 (Troitskii raion Chelyabinskoi oblasti) v 2001 godu. Otchyot.* Fondy LAI CHelGU. Chelyabinsk.

Zdanovich, G.

1997 Arkaim – kulturnyi kompleks epokhi sredni bronzy Uzhnogo Zaural'ya. *Rossijskaya arkheologiya* 2:47-62.

1999 Garmonizatisya prostranstva "Strany gorodov." Paper presented to the XIV Uralskoye arkheologicheskoye soveshchaniye, Chelyabinsk.

Zdanovich, G. and I. Batanina.

2002 Planography of the fortified centers of the Middle Bronze Age in the southern Trans-Urals according to aerial photography data. In *Complex Societies of Central Eurasia from the 3rd to the 1st Millennium BC: Regional Specifics in Light of Global Models*, (eds.) K. Jones-Bley and D. Zdanovich. Journal of Indo-European Studies, Monograph series 45. Washington: Institute for the Study of Man, pp. 120-38.

2007 *Arkaim – Strana Gorodov*. Ushno-Uralskoye knishnoye isdatelctvo. Chelyabinsk.

Zdanovich, G., I. Batanina, N. Levbit, and S. Batanin.

2003 *Archaeological Atlas of Chelyabinsk Oblast.* Uralskoye knishnoye isdatelctvo. Chelyabinsk.

.

Zdanovich, G. and D. Zdanovich.

2002 The 'Country of Towns' of the Southern Trans-Urals. In *Ancient Interactions: east and west of Eurasia*, (eds.) K. Boyle, C. Renfrew, and M. Levine. Cambridge McDonald Institute for Archaeological Research, pp. 249-64.

Zdanovich, S.

2003 The Steppes of the Urals and Kazakhstan during the Late Bronze Age. In *Prehistoric Steppe Adaptation and the Horse*, (eds.) M. Levine, C. Renfrew, and K. Boyle, Cambridge: McDonald Institute Monographs.

Zhang, L.

2012 *Ancient Society and Metallurgy: A Comparative Study of Bronze Age Societies in Central Eurasia and North China*. Oxford: Archaeopress.