

Chapter 5

Linking Pattern to Process in Cultural Evolution: Investigating Material Culture Diversity among the Northern Khanty of Northwest Siberia

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Introduction

Increasing numbers of archaeologists and anthropologists are borrowing theory, models and analytical methods from evolutionary biology in order to produce novel ways of understanding the emergence of cultural and linguistic diversity in different regions of the globe. Central to these investigations are long-standing interests in the processes by which traditions are passed from one generation to the next via a suite of social learning mechanisms that go on to generate larger scale patterns of cultural evolution (Cavalli-Sforza and Feldman 1981; Boyd and Richerson 1985; Durham 1990, 1992; Shennan 2002).

The application of cladistics (Lipo et al 2006a, Mace et al. 2005, for recent overviews of the field) and other quantitative analytical methods is of particular importance because of the refreshing degree of empiricism (Bryant et al 2005) injected into the increasingly sterile debates about the *exclusive* validity of general models of macro-scale cultural evolution (the ‘branching trees’ versus ‘tangled banks’ debate) (see Collard and Tehrani 2005: 109-12 and Collard et al 2006: 53-5 for recent overviews with references). As a result, a growing body of analytical work is demonstrating that cultural evolution is characterised by *both* branching *and* blending patterns of ‘descent with modification’, each affecting diverse datasets in different ways (Collard et al 2006: 62) and probably for very different reasons. Through time, the relative importance of branching and blending patterns of inheritance will generate quite different patterns of continuity and change across different domains of culture (Boyd et al 1997 for useful summary models).

Further research assessing the wider distribution of these general patterns of transmission will add to these general insights. However, more studies could take their analysis beyond this ‘mapping stage’ and attempt to *explain* how certain

processes are generating specific distributions of cultural similarities and differences among social groups and why. Such studies of ‘cultural transmission in action’ would ideally involve more detailed investigation into how particular forms of interaction, demography, social learning and subsistence practice interact with one another to structure transmission processes and generate observed *patterns* of cultural diversity (see Tehrani and Collard 2002; Collard and Tehrani 2005; Jordan in press)

This chapter opens with a review of how cultural transmission can be understood from a broadly evolutionary perspective and then presents a case study examining material culture diversity amongst Khanty communities in Northwest Siberia. Observed differences in male and female clothing styles raise a series of questions at the heart of recent debates about the evolution of regional diversity in material culture, for example, the degree to which craft traditions are subject to heritable continuity within social groups, or the degree to which they are borrowed and blended between communities (Collard and Tehrani 2005; Tehrani and Collard 2002; Jordan and Shennan 2003, 2005). The study combines independent information on kinship, interaction and ways of life with network-based analytical methods to explain why patterns of cultural diversification followed their particular trajectory. The investigation concludes with a suite of further questions that lie beyond the scope of the present paper, but indicate promising avenues for further research both within the region and beyond.

Understanding Culture as a System of Social Inheritance

At the heart of anthropology and archaeology are long-standing concerns with how traditions are passed from one generation to the next, and how these result in both cultural continuity and long-term culture change. In recent years ‘dual inheritance’ or ‘cultural transmission’ theory (Cavalli-Sforza and Feldman 1981; Boyd and Richerson 1985; Shennan 2002) has provided a set of coherent predictions about how social learning and the wider cultural transmission process can generate specific patterns of cultural diversity. Explicit parallels are drawn between processes of cultural ‘descent with modification’ (social learning, selection, innovation and drift) and the evolutionary processes of biological reproduction, selection, mutation and drift, which are argued to share broad similarities, but also fundamental differences, in

particular, the degree to which cultural traits can spread rapidly between members of the same generation, and not just from an older to a younger generation.

With emphasis on tracking heritable continuity, the two systems of social and genetic inheritance are argued to share enough similarities to warrant the use of models and methods developed in evolutionary biology in studies of cultural transmission (Boyd et al 1997). For example, biologists have long-standing interests in identifying the relative contributions of ancestral traits transmitted vertically within taxa, of independent convergent adaptation and, in some species at least, of the exchange of genetic material. In the same way, anthropologists or linguists interested in macro-scale patterns of cultural transmission have expressed interest in tracking the degree to which cultural practices or languages have been passed down within communities, have evolved independently or been borrowed and blended between them (Mace et al 2005; Lipo et al 2006a).

In recent decades biologists have largely used cladistic methods to reconstruct patterns of relationship based on descent (e.g. Kitching et al 1998). These are based on well-established models of biological speciation, and start out with the assumption that branching processes have generated patterns of observed diversity, which are represented by means of tree diagrams. Various statistical tests can then establish the degree to which the tree model fits the 'descent' signals in the data. In the last few years, however, network-based methods have begun to be used (Husan and Bryant 2006a, and see below). These serve a more exploratory role: they make no *a priori* assumptions about patterns of descent within a dataset and have the advantage of being able to plot both tree-like patterns of descent, as well as explore more complex scenarios where intensive lateral transfer has made a significant contribution, but they do not as yet provide statistical measures of the degree of reticulation in the network.

Equipped with these models and methods, together with others, increasing numbers of empirical culture evolutionary studies are exploring patterns of similarity and difference in culture and language across different populations, generating new insights into the underlying patterns of cultural evolution, the degree to which cultural transmission is canalised by linguistic transmission, and the degree to which different domains of culture track one another with varying degrees of fidelity through time

(see chapters in Lipo et al 2006a and Mace et al 2005 for recent overviews of the field).

The cladistic method has been at the centre of a suite of recent studies which have aimed to establish the extent of heritable cultural continuity within populations, versus lateral borrowing and hybridization between social groups (Collard and Tehrani 2005; Tehrani and Collard 2002; Jordan and Shennan 2003, 2005; Lipo et al 2006a; Mace et al 2005). However, since cultural transmission is grounded in networks of social learning, this untangling of the relative contributions of vertical versus horizontal transmission represents only a ‘mapping stage’ which must be integrated with other contextual insights in order to explain why cultural transmission followed different pathways in different historical settings (e.g. Tehrani and Collard 2002; Collard and Tehrani 2005; Jordan in press). Further studies are required to link analysis of ‘pattern’ more fully with attention to empirical ‘process’ – this demands combining micro-scale behavioural information (on social learning, interaction, kinship and mobility) with reconstruction of the macro-scale trajectories of cultural diversification (Lipo et al 2006b: 302).

Given these potentials, the present chapter makes two broad contributions to culture evolutionary studies: first, the case-study aims to demonstrate the utility of integrating more ‘traditional’ ethnographic and historical data into ‘descent with modification’ research; second, the study employs network-based analytical methods which have, to date, seen only limited application in recent culture evolutionary research (Jordan in press, for material culture; but see Bryant et al 2005 for an example of use in historical linguistics) in contrast to the expanding use of cladistic methods right across the social sciences (Lipo et al 2006a; Mace et al 2005).

Cultural Transmission in Northwest Siberia (1600 AD –2000 AD)

The Khanty are hunting, fishing and reindeer herding communities who reside along the lower reaches of the Ob’ River, Western Siberia (Figure 1). Today this ‘Northern’ group of Khanty number around 7200 individuals (1989 census (Randymova 2004: 3)), who maintain very high levels of ‘traditional’ culture relative to the ‘Southern’ and ‘Eastern’ Khanty groups who live further to the south (Martynova 1998: 80, 123).

Diversity in Northern Khanty Material Culture

Northern Khanty produce a range of parkas, fur coats, boots and other decorated garments as part of a rich and regionally-distinctive folk tradition (Figures 2-16) which has recently been documented by Siazzi (2000)¹ (See table 1).

- Male clothing consisted of the '*malitsa*' (a hooded fur coat, Fig 5), over which a '*navershmitsa*' (canvas over-smock, Fig 6, showing details of one local variant) was worn. In colder weather a '*gus*' (hooded winter top coat of fur or cloth, Fig 7) or 'parka' was added (Fig 8, note major differences in the overall cut, hood details and decoration techniques between this garment and the *gus*', Fig 7)), especially for long journeys in heavy frost. Various kinds of fur boot, with specific seasonal and other assorted variants, were worn on the feet (Figs 3 and 4). The Northern Khanty also had distinctive knife-carrying belts, which were worn over *navershmitsa*, and subject to decoration in different ways according to local traditions (Fig 2).
- Women's clothing sets included fur boots, fur hats, dresses, headscarves, a decorated cloth gown known in Khanty as a '*sakh*' (Figs 15, 16 and refer to Appendix 1 for local variants of this general type). The most distinctive garment was the highly decorated fur coat (termed here: Rus. '*shuba*') which was made according to a shared general design across region, with a 'multitude' of local variants (Siazzi 2000: 32). Compare figs 9-14, noting differences in the degree, format and location of decoration on different parts of the coat.

At a general level Siazzi (2000) links the design of the garments to the practical demands of the region's mobile hunting, fishing and reindeer herding economy (2000: 15, and below), which also provided the furs. Siazzi also suggests that the clothing performed a 'differentiating' function, marking individual wearers according to sex and age, but also expressing territorial, ethnic and religious identities (2000: 17). For example, the 'national' dress of the Lower Ob' Khanty was unique in relation to both other Khanty and neighbouring nationalities (e.g. the Nenets, Mansi, Komi). Upon seeing a stranger in traditional costume a Khanty could easily tell by the cut, sewing and ornamentation of garments exactly where the person had originated from, with

those from other regions described in Khanty as ‘*na muv khoiat*’ (Rus. ‘*chuzhikh zemel’ chelovek*’ – literally ‘*person from others’ lands*’) (Ibid 2000: 18).

Siazi describes overall similarity in clothing styles *within* each of the seven communities that form the focus of her study - the Kunovat, Poslovo, Synia, Voikar, Pitliar, Sob' and Pului Khanty (Fig 1) - but also goes on to explore considerable inter-community variation between them. This variability was documented by assembling information about each single category of garment from across the region (for example, the *shuba* fur coat) (2000: 18; Note 1). Each garment category was then described in relation to a defining set of basic ‘traits’ (e.g. the materials, colour, cut and decoration style employed in the making of a *shuba*). Next, the specific variations in these individual traits across the communities was recorded (e.g. Appendix 1 lists how all groups made the *shuba* with a fur collar, but only the Kunovat, Poslovo and Synia Khanty used fox and sable fur for that collar, while deer and polar fox pelts were used to make the collar amongst the Voikar, Pitliar, Sob' and Pului communities, but not by the other groups). This exercise generated a comprehensive presence-absence list of clothing and footwear variation across the seven Khanty communities for a range of different garment and boot types (see Appendix 1; for wider discussion of how this general classification method relates to culture evolutionary studies (see: Holden and Shennan 2005: 14; Jordan in press).

Understanding the origins of these patterns of similarity and difference in these clothing assemblages revisits long-standing debates about the operation of cultural ‘descent with modification’, in particular, the degree to which craft traditions are inherited vertically within communities, or appear through more complex processes of blending and borrowing traits between social groups.

What specific factors might have impacted on cultural diversification? In traditional Khanty society there were was a strong division of tasks according to gender lines. While Khanty men worked with reindeer, and made sledges and skis, the processing of animal skins and manufacture of garments had strong links with female domains of activity. In addition, all categories of clothing examined in the present study were sewn by women from separate household units; only in very rare situations, for example in the highly complex job of stitching ornamentation for boots, was the

assistance of a ‘master’ seamstress called for (Randymova 2004: 89). Ethnographic insights also point clearly to the skills and practices associated with the making of clothing and footwear being passed down a strictly female line of transmission, with most learning taking place by direct biological offspring (Siazi 2000: 16), a familiar theme in the wider literature on apprenticeship in small-scale societies (Shennan and Steele 1999).

Consideration of a wide range of historical and archaeological data leads Siazi to conclude that there has been long-standing conservatism in the *basic* manufacture, ornamentation and cut (Rus. ‘*pokroi*’), which has been stable for several generations, if not centuries. Social sanction appears to have played a role in ensuring continuity in design:

“a woman did not have the *right* to change the generally accepted (Rus, ‘obshchepriniaty’) cut which was passed on from generation to generation” (Siazi 2000: 18, my emphasis)

All these insights suggest strong heritable continuity in the basic garment designs, which were passed predominantly from mothers to daughters. How might this have impacted on larger-scale patterns of clothing diversity amongst the communities? If generations of Khanty seamstresses stayed within a single community, perhaps fostering a closer sense of group identity and encouraging local convergence in clothing styles and exclusion of external influences, then the likely long-term outcome would have been the formation of distinct stylistic ‘lineages’ of clothing, each exclusive to a single community. Such processes would be reinforced, for example, if the clothing had come to express ‘emblemic’ style, signalling community identity (Wiessner 1983) to other groups. Such differences may also have persisted despite frequent social interactions between groups (Barth 1969; Hodder 1982).

Other kinship patterns may have overturned this tendency. First, even if the skills were initially passed between biological mothers and their daughters, the practices would gradually have been imported into other communities as part of population movements between groups; for example, households may shift their residence for economic or political reasons, or as females moved after marriage, although social

sanction in the new community might force them to adopt local practices. Moore (2001: 43) has stressed inter-community marriage as a powerful mechanism for enabling dispersal of cultural traits over vast geographical distances and across cultural and linguistic frontiers. If recent centuries along the Lower Ob' were also characterised by inter-community marriage and migration, we might predict that similarities in material culture would be greatest amongst groups who had interacted and exchanged partners most frequently (Wobst 1977). This frequency of interaction may have been related rather directly to geographic proximity, although the requirements of the mobile subsistence round may have brought together distant communities for intensive but short-term periods of co-habitation, e.g. during annual fish runs.

Similar outcomes might be expected if clothing style was employed to signal the *individual* qualities of the maker, expressing skill, judgement, and individual physical attractiveness rather than a single sense of community identity. This more 'assertive' (Wiessner 1983) and individualistic expression of style through the use of conspicuous items of clothing might provide motivation for the expression of creativity within an otherwise conservative tradition. Women may have been encouraged to innovate and borrow freely from other groups and individuals that they come in contact with through trade or seasonal migrations. It is worth noting here that in the context of this creativity the predominantly vertical transmission of craft *skills* may not have impeded the ready horizontal transmission of specific clothing *traits*. For example, new decorative combinations of cloth and fur could easily have been invented or adopted from other individuals by any Khanty seamstress, despite the fact that the basic craft skills had been acquired during an earlier period of mother-daughter apprenticeship. Through time, these processes would gradually erode sharp stylistic differences between the female clothing traditions of the various groups, but would not necessarily require inter-marriage or household migration between groups, just frequent opportunities for general interaction and information exchange, perhaps linked to the patterns of the seasonal round. However, how this individualistic expression of female style might relate to the design of male clothes also made by seamstresses for their men-folk is less certain. It may follow that without this motivation to innovate, blend and borrow, the manufacture of male clothing styles

may have remained more conservative, and been more closely linked to the mother-daughter learning roles and through time to deeper community history.

In summary, exploration of the ethnographic record identifies a number of reasons for suspecting that cultural diversification in the region may have followed quite different trajectories, generating either crisp stylistic differences, or a more general ‘smudging’ of traditions between the communities. However, the degree to which one scenario predominates over others will have been determined, to a major extent, by the specific details of kinship, mobility and interaction practices. These factors formed the crucial behavioural and historical contexts in which individual action and personal intent generated longer-term culture change.

Northwest Siberia: The Historical Context (1650 AD –2000 AD)

The Northern Khanty live along the lower reaches of the River Ob’, which drains the West Siberian Plain. The region’s ecology is strongly continental, comprising boreal forest (‘taiga’) in the south, expanses of arctic tundra in the north, and a chain of alpine tundra running along the Ural summits (Figure 1). The Lower Ob’ lies at the intersection of many different cultural and linguistic influences: historical records indicate that the river banks and major tributaries were populated by Khanty (Ostiaks), with Mansi (Voguls) to the West, Nenets (Samoyeds) to the North and Komi to the North West. Khanty and Mansi spoke various Ob-Ugrian dialects, Nenets was a Samoyedic language and the Komi spoke Finno-Ugric dialects, all of which fall into the broader Uralic group of languages. In colonial times isolated Russian populations settled along trade and administrative outposts along the main rivers.

The integration of diverse subsistence practices has given form and content to settlement, mobility and interaction patterns across the region:

- The Lower Ob’ includes some of the richest fishing grounds in Eurasia due to unique set of ecological factors (Sirelius 1906, Federova 2000). From earlier prehistory local communities subsisted primarily through various forms of local lake- and river-fishing, practised year-round, and the interception of major seasonal runs along the main channels during the summers.

- Hunting for wild reindeer and elk (moose) provided meat and other resources, while winter hunting of sable, mink, squirrel, fox and other fur-bearers provided valuable pelts for trade (Golovnev 1993, Federova 2000, Perevalova 2004).
- Reindeer taming and domestication has a long history in the area. From the Iron Age small herds were initially kept for transport and as hunting decoys (Golovnev 1993, and Ingold 1980, for a wider discussion). The last four hundred years witnessed a wholesale ‘reindeer revolution’ as some hunters switched to the full scale management of large herds which provided full subsistence (Golovnev and Oshrenko 1999: 16). These herders followed their domestic reindeer on long-distance seasonal migrations, with winters spent at the sheltered tree line and summers out on the windswept tundra, where there were fewer insects. Smaller-scale herding also spread into the forest zone and provided transport for hunters to access new areas for trapping. Here, localised migrations between pastures were integrated into the seasonal hunting and fishing round (Golovnev 1993; see Figure 1).

The region was colonised by Russia in the later 16th C as part of the expanding international fur trade (Forsyth 1992). Small numbers of Cossacks built fortified towns along the Ob’ and imposed a ‘yasak’ fur tax on local populations. Members of the indigenous communities were registered into administrative units for the collection of this tax, generating colonial records that provide detailed insights into demography, kinship and interaction. Despite the imposition of tight fiscal control over the fur trade (Anderson 2004: 254) general contacts between Russians and locals were sporadic (Martynova 1998: 102-103), but later included missionary activity (Glavatskaia 2005). With State interests lying primarily in securing a steady supply of fur, native land rights were enshrined in law (Shimkin 1990), creating *de facto* apartheid between small colonial populations concentrated on the main and lower tributary rivers, and the native hunters, fishers and herders of more outlying regions (Jordan 2001: 2003).

The indigenous groups in the Lower Ob’ Region were registered into the Obdorsk and Kunovat *volosti* (the smallest administrative units of Czarist Russia) (see: Map 2 in Perevalova 2004: 170). Census materials suggest initial increases in Khanty population, followed by limited falls during the 19th C (Table 2). By the last Soviet

census (1989) these Khanty fell into Shurysharskii District (5000 Khanty) and Priural'skii District (2500 Khanty) of Yamalo-Nenets Autonomous Region (Siazi 2000: 4). On balance, Khanty populations did not witness the kinds of catastrophic demographic collapse that affected regions like California and the Pacific Northwest Coast during the same colonial period (Cook 1978; Boyd 1990), and which must have had significant implications for the inheritance of cultural traditions (see Shennan 2000).

While the Kunovat and Obdorsk *volosti* were territorial units 'invented' by colonial administrators, they encompassed a series of more 'localised' groups with their own senses of identity (Perevalova 2004:211). These included the seven Khanty 'communities' which form the focus of the present study (Siazi 2000; Table 2). Most occupied a single river, with group identity grounded in intensive local patterns of subsistence-based interaction; in some cases groups also worshipped at a central sacred site (Perevalova 2004: 211-213; see also: Martynova 1998: 124). Five of the southern groups speak the same Shuryshkarskii dialect of Khanty, while the two northern communities speak the Priural'skii dialect (Table 3).

Historical archives also provide fine-grained insights into marriage patterns and more general population movements (Perevalova 2004: 170; Martynova 1998: 80). From approximately 1650 AD to 1800 AD there is evidence of intensive inter- and intra-regional migrations, which are reflected in a rapid turnover of local family names, and are possibly linked to the imposition of the new fur tax regimes, as well as the associated commercialisation of hunting that may have pushed families to seek out new territories in order to pay their tax quotas (Martynova 1998: 87). This era of 'mass migration' was followed by a more stable period characterised by greater stability in local family names, although traces of a 'significant' rather than 'sizeable' flow in populations continues (Perevalova 2004: 215). Memories of general social mobility survive in the folklore, with most groups recounting origins outside their present places of residence (Martynova 1998: 87).

Many of these new forms of contact appear to be linked to transformations in the colonial economy. The 19th century boom in commercial fishing brought in Khanty from diverse regions, some of whom settled as sedentary fishing groups along the

main Ob' banks; others migrated in seasonally to the main Ob' River from the upper reaches of the tributary rivers, and often spent several weeks camping out on the river sands with members of distant communities during the main summer fishing season (Martynova 1998, Ahlqvist 1885: 211, Perevalova 2004: 258, Shimkin 1990; Kulemzin and Lukina 1992, Federova 2000). Perevalova (2004: 257) stresses the vast scale and intensity of these seasonal inter-community contacts, and suggests that commercial fishing, in particular, created the conditions for the 'consolidation of northern Khanty society'. By the 19th century almost the whole population of the Lower Ob' was engaged in commercial fishing activities (Perevalova 2004: 257) with those living along the riverbanks particularly strongly affected (Table 3).

Different regional patterns of reindeer husbandry also emerged (Martynova 1995), increasing inter-community contacts across the Lower Ob', as well as with regions and other communities lying beyond (see Fig 1) (Perevalova 2004: 270), especially amongst those groups practising large-scale husbandry, which demanded long-range migrations to the North and Northeast (Fig 1 and Table 2).

By the early 20th century the Northern Khanty were integrated into a regional economic system, with commercial links stretching outwards to the demands of world fur and fish markets. A lively internal trade within and between the rivers also created exchange contacts between hunting, fishing or herding specialists, while the northern herders who spent long periods out on the treeless tundra also swapped their reindeer hides for sleds, canoes and birch bark materials which were made by hunters and fishers in the forest zone. In conclusion, recent centuries have witnessed a steady increase in population levels combined with increasing degrees of social connectivity right across the Lower Ob' and beyond (Fig 1 and Table 3). How might this historical context have impacted on cultural transmission?

Quantitative Analysis of Material Culture Variability

The distribution of cultural traits across the seven communities was subjected to quantitative analysis within a broadly evolutionary framework in order to answer three main questions about cultural diversification:

- What are the *general* patterns of cultural transmission (i.e. branching or blending) affecting all traits and how do they relate to the known interaction patterns, kinship practices and demographic processes noted above?
- Have male and female clothing traits, as well as individual classes of garment (e.g. the female ‘*sakh*’ and ‘*shuba*’), been affected by similar processes of transmission, or does each have a different descent history?
- What is the relationship between cultural diversity, relative geographic location, and the dialect frontier that runs through the study area (Table 2 and Map 1)?

Considering the ethnohistoric insights into learning, interaction and exchange presented above we have no reasonable way of knowing whether cultural traditions have been transmitted vertically within the communities, which would generate branching patterns of descent, or whether a more complex pattern of transmission, characterised by frequent horizontal borrowing and hybridization, has predominated. These factors make it difficult to establish, *a priori*, the appropriate general model of cultural evolution in the region.

As Bryant and Moulton (2004) make clear, there is no model-free way of analyzing datasets, and while general tree-like models of speciation are well-established in evolutionary biology, caution is advised when applying the models to cultural or even biological datasets whose general patterns of evolution are poorly understood. Husan and Bryant explain that:

‘In tree-based phylogenetic analysis the goal is to find the phylogenetic tree that best explains the patterns in the data....[but]...the...method will attempt to fit a tree, even if there is still a huge gap between the data and the best tree that the method can find’ (Husan and Bryant 2006a: 258).

Given the uncertainties in the present case-study, a more heuristic exploration of the data is advisable at this stage. In recent years network-based methods have been developed as a tool for exploring general patterns of evolution where complex scenarios of descent with modification are poorly investigated with tree-based analysis:

‘The familiar evolutionary model assumes a tree, a model that has greatly facilitated the discussion and testing of hypotheses. However, it is well known that more complex evolutionary scenarios are poorly described by such models. Even when evolution proceeds in a tree-like manner, analysis of the data may not be best served by forcing the data onto a tree or assuming a tree-like model. Rather, visualisation and exploration of the data to discover and evaluate its properties can be an essential first step (Husan and Bryant 2006a: 254)

The *NeighborNet* technique (Bryant and Moulton 2004) is a network-based method that can “represent data without assuming that the data is tree-like” (Bryant et al 2005: 80). The method is outlined in detail by Bryant and Moulton (2004, and see Bryant et al 2005 for a recent application to analysis of linguistic descent history) and is based on the mathematical concept of a ‘split’ (Husan and Bryant 2006b:7-9).

The first step of analysis is the generation of a distance matrix from the assemblage of traits. These distances are then used to generate a series of splits in the data, using an agglomerative clustering algorithm, which progressively combines clusters in ways that overlap, into larger and larger overlapping clusters. Weights are then calculated for these splits and are represented in the form of a network diagram – or data “snapshot” - known as a ‘splits graph’ (see Bryant et al 2005: 68-69, 74-79). These ‘split networks are very useful for exploring and visualizing the different signals in a dataset’ (Husan and Bryant 2006a: 263) and can be regarded as a ‘tool for vizualisation’ (Huson and Bryant 2006a: 254).

If phylogenesis has been the dominant process of descent then the splits graph will closely resemble a tree diagram, as descent with modification will have proceeded in a strict branching manner, making the splits compatible. However, if horizontal borrowing and hybridization have been widespread, then the diagram will be much more complex, with conflicting signals represented as box-like sections in the graph – the larger the box the greater the conflict in the data, and the greater the role of horizontal transfer.

In summary, the NeighborNet plots contain two kinds of information: “the splits, which represent the groupings in the data; and the branch lengths, which indicate the degree of separation for each split” (Bryant et al 2005: 77). As a result, the splits graphs can be interpreted in terms of groupings in the data, with longer branch lengths indicating a greater degree of difference (see Bryant et al 2005). In the current study NeighborNet (Bryant and Moulton 2004) incorporated into *SplitsTree4* V4.4 (Husan and Bryant 2006a, 2006b) was employed, with the distance measure set as ‘*UncorrectedP*’.

Results of NeighborNet Analyses

The examination of material culture variability proceeded from analysis of the entire collection of traits (male and female clothes and all male and female footwear as a single ‘package’; see table 1 for a sample of the dataset) through to the ‘breaking open’ of this cultural package to facilitate analysis of smaller and smaller subsets of traits, including male and female clothing and footwear traits, and finally specific kinds of female garment, the ‘*sakh*’ and ‘*shuba*’.

Five NeighborNet plots are presented in Figures 17-21 and indicate several general features of cultural transmission in the region. First, descent histories have been complex, with numerous boxes in all plots indicating significant cultural hybridization, rather than crisply-branching patterns of descent. Second, the Sob’ and Pului Khanty are drawn out from the other groups in all plots (Particularly clearly in Fig 17 and 18, slightly less so in Fig 19 and 20, and to some extent in Fig 21), which is interesting because these distinctions in material culture map onto the dialect frontier (Table 2) which runs across the Ob’ (Fig 1). In contrast, clothing variation within the Shuryshkarskii dialect area is more varied and will be discussed below. This dialect frontier also appears to be one acknowledged by the local communities themselves. For example, informants from the southern communities perceive ‘sharp’ differences in the dress of the northern groups, and describe a dialect characterised by extensive borrowings from Nenets language, which makes it hard for them to understand (Perevalova 2004: 212).

Census data generate deeper insights into how this cultural frontier may have been maintained. At the end of the 18th C, the Sob' and Pului fell within the Obdorsk *Volost'*, with the Voikar Khanty just inside this border. 500 Khanty marriages took place in the territory during this period (Perevalova 2004: 216), with 412 involving partners from entirely *within* the area, of which 142 included marriages between Khanty and Nenets (though no mixed marriages are recorded for the Voikar). Only 57 marriages involved Khanty moving in from the Kunovat' *Volost'* to the south (which included the Kunovat', Poslovo and Synia Khanty), and only 25 marriages brought in partners from areas much further to the south. In contrast, marriages recorded in the Kunovat *Volost'* totalled 310, of which 156 involved partners only from within this area, none of whom were listed as being Nenets. Around 70 marriages involved partners moving in from Obdorsk *Volost'* to the north, but a further 88 marriages resulted in partners moving in from the Sos'va and Liapin Rivers, and from other areas to the south (see: Fig 1).

While the general trend is one of regional-scale inter-marriage similar to the patterns noted in North America by Moore (2001), the statistics suggest different *general* orientations in the movement of partners. On the basis of detailed analysis of the census data, and other archival and ethnographic materials, Perevalova (2004: 216) argues for the presence of an enduring cultural frontier characterised by divergent economic orientations, the first binding the more northerly Khanty (Sob' and Pului) into the nomadic reindeer breeding world of the tundra Nenets, and the second linking the more southerly groups (Poslovo, Synia, Pitliar and Kunovat) with other Khanty and Mansi hunter-fisher groups living in the forest zone.

In addition to the dialect frontier, what are the more specific patterns of clothing resemblance and difference amongst the groups? The '*All Traits*' plot (Fig 17) indicates that clothing and footwear styles among the five groups who speak the Shuryshkarskii dialect are broadly divergent from one another, although the boxes present at the centre of the diagram indicate that a significant degree of cultural hybridization has proceeded between these groups. This dataset includes a diverse range of male and female traits, and while the importance of the dialect frontier is readily apparent in the plot, it is difficult to interpret this 'general' overview in relation to either the details of the garments (Appendix 1), or local geography, for

there appears to be no straightforward association between clothing design and relative location of the communities around the region.

Fig 18 plots 'All Male' traits and suggests a range of clear cultural distinctions in addition to those marking major differences in clothing at the dialect frontier. For example, the Synia and Voikar are pulled out to the top, and Siazı (2000: 76) notes how these groups follow parallel migration routes up into the Urals where they frequently meet and interact. Most items of male clothing and footwear amongst these two groups are virtually 'indistinguishable' (see Appendix 1) and inter-community marriages are also common, with Synia women marrying into Voikar households retaining their traditions for making male clothing (Siazı 2000:76). However, in winter the Voikar tend to wear only a fur *gus'* (Fig 7), while the Synia, Pului and Sob' Khanty all wear parkas (Fig 8), which appears to be the reason that the Synia fall closer to these groups in the plot.

There is little overall difference in male footwear among the groups. Variation in clothing styles is more marked, and must be making a greater contribution to patterns pulled out by the plot. However, the variation tends to relate to more general design features like the presence or absence of extra coloured cloth in the *malitsa*, the use of black or grey fur and some extra decorative features in the *gus'* of the northern groups. The overall length of garments is generally lower among more northerly groups (see, e.g.: the *malitsa* and cloth- and fur *gus'*) who practice herding out on the tundra. In contrast, the Kunovat and Poslovo are much less reliant on reindeer herding (Table 3) and tend to wear shorter garments. These have a simpler cut (e.g. the *navershmitsa* (Fig 6), which has no additional coloured cloth or decoration) and less decoration (simpler on the fur *gus'* and absent on the cloth *gus'*). Their belts are also simpler with no attached knife sheaths, and the local *evtom vai* boots are very weakly decorated (Fig 3). Siazı notes how both the Kunovat and Poslovo Khanty suffer from shortages of quality reindeer fur due to smaller-scale herding practised in these areas (2000). Overall, the plot for male traits does appear to represent relative geographic location, with northern groups to the left and southern groups to the right. Intervening groups oppose each other along opposite sides as they do along the Ob' and the relative positions of the Voikar and Synia probably relates to the presence of the parkas among the Synia as noted above.

The plot for 'All Female Traits' (Fig 19) is considerably different to the plot for 'All Male Traits', discussed above. First, there appears to have been much more borrowing in female clothing traits between the groups. Second, the distribution of the groups around the plot is quite different as well. While the Sob' and Pului groups are pulled out, reflecting the dialect frontier, the Kunovat and Synia also appear to be forming a distinct cluster despite the fact that they face each other across opposite banks of the Ob' (Fig 1). Partly this can be accounted for by the existence of intense trade links between the two groups with both reindeer furs and finished garments traded for boats, sledges and other 'forest' items. Exchanges appear to have been conducted via members of both communities who met on the main river whilst summer fishing; similar trade in fish for fur and finished garments linked the Poslovo to the Synia (Siazi 2000: 60). Common migrations and pasturing was also practised among the Sob' and Pitliar Khanty, which may have generated further exchanges and the closer grouping of the Pitliar with the most northerly groups (Table 2). However, due to the large number of features recorded it is difficult to identify which specific traits are generating the overall patterns in this plot - further analysis was conducted on the individual *shuba* and *sakh* garments.

The plot for the '*Shuba*' (female fur coat) (Fig 20) resembles quite closely the plot of 'All Female Traits' discussed above. These are indications of quite significant 'hybridization' between the groups and the presence of the dialect frontier is much less clear. However, inspection of the data suggested that there were distinct geographic variations in the more basic design features. For example, longer coats are worn further to the north, a feature also noted in male assemblages. There are sharp differences in the furs used for the *shuba* collars, and this may reflect the local availability of pelts - squirrel, fox and sable are generally forest species and are used by groups in the south (Kunovat, Poslovo, Synia), while the use of species like polar fox are employed in the more northerly traditions (Voikar, Pitliar, Sob' and Pului) Khanty. In contrast, the distribution of other design and ornamentation features is much harder to interpret, with different traits distributed almost chaotically between groups almost irrespective of their relative location.

These patterns may be indicating first, the existence of distinct community traditions relating to garment ‘cut’ and basic design (a suggestion made by Siazzi 2000:18, see quote above) which are perhaps passed on vertically within the community, but second, a more confused set of distributions affecting ornamentation style, potentially an outcome of individual creativity and choice on the part of the maker, and leading to faster moving traditions of borrowing and blending. This potential for different aspects of the garment having different transmission histories was tested further by plotting only the first 41 of the *shuba* traits, which record more general garment features. However, the plot (not shown) also revealed a high degree of blending, suggesting that *all* aspects of this garment have been subject to intensive borrowing and recombination across the region.

Finally, the ‘*Sakh*’ (female cloth gown) (Fig 21) plot is quite different again, and reveals much less conflict in the dataset, suggesting a stronger branching signal. In this plot the dialect frontier is important, though less distinct than the major differences which appear to characterise the Synia and Kunovat groups on the one hand, and the Posovo and Voikar groups on the other. As noted above, these two groupings appear to reflect intense exchange contacts passing fur, fish and forest products between the communities, the Kunovat and Synia trading across the Ob’, and the Voikar and Poslovo from north to south. While variation in the *shuba* appears to reflect the wider set of female traits, the *sakh* has a different descent history, which also has little in common with variability in male clothing, other than general differences across the dialect frontier.

In summary, these plots suggest that hybridization has been a persistent feature of macro-scale cultural evolution in the region. At the same time, there are significant differences in material culture and language running across the region and these appear to have been an outcome of long-term trends in inter-marriage as well as more general cultural and economic orientations. Patterns of material culture variability within the southern dialect group are less consistent, with male and female clothing, and also different *items* of female clothing, all characterised by different descent histories. In particular, male garments and the female *sakh* appear to show traces of a stronger signal for phylogenetic history, while the full assemblage of female traits and

the *shuba* garment appear to have been more strongly affected by inter-community borrowing.

Discussion and Outlook: Accounting for Diversity in Northern Khanty Material Culture

These results enable a return to the three questions raised above. General patterns of regional transmission are certainly complex but the evidence indicates clearly that both branching and blending process have impacted on longer-term patterns of macro-scale evolution, albeit in different ways and for different aspects of male and female clothing assemblages. In particular, cultural hybridization appears to have been a major factor, and proceeded within the historical context of gradually expanding population levels, and the emergence of lively long-range inter-community contacts associated with the rise of reindeer husbandry and commercial fishing within a wider colonial context. Working against the more general trend towards cultural convergence was the different alignment of long-term marriage contacts along northern and southern axes, which appears to have generated a significant and enduring cultural and linguistic frontier running from east to west across the region. In summary, these results suggest that regional cultural diversity in the Lower Ob' reflects broader patterns of interaction and exchange, but in a less direct way than predicted by the simple 'ethnogenesis' hypothesis (Moore 2001) where mere proximity ensures cultural similarity.

We can also revisit the anecdotal ethnographic evidence outlined above which described the tendency for vertical transmission of craft skills between mothers and daughters, but also raised the potential for distinction between transmission of *skills* and *traits*, which might have different descent histories. Broader kinship and exchange patterns, and the use of clothing for either 'emblemic' (group) or 'assertive' (individual) style (Wiessner 1983) were argued to create the potential for either strong vertical descent and the maintenance of crisp stylistic frontiers (Hodder 1982), a general stylistic convergence amongst those in most frequent contact (Wobst 1977), or a set of more generalized distributions with interlocking scales of more muted stylistic difference (Welsch and Terrell 1998).

The analyses suggest that male and female clothing traits appear to have been characterised by different descent histories. There are grounds to suspect that the female *shuba* may represent an iconic statement of personal identity, with frequent re-combinations of novel traits expressing the individual creativity of the maker, and encouraging the borrowing of styles within a wider context of frequent inter-community marriage which would have eroded any trend towards crisp stylistic differences in the *shuba* garments made by different groups. In contrast, male clothing appears to be characterised by more localised patterns of vertical transmission and branching descent, which suggests that these items of material culture may be performing different social and symbolic roles. It is possible that men signal their personal identity via different media, and that variations in their garments represent more general design differences between north and south (e.g. in length and materials), while differences may also relate to the conservatism and vertical transmission of general clothing design within the different communities (see quote above). Finally, while there is a broad distinction between male and female clothing in the mode of transmission, the female *sakh* also follows a more branching pattern of descent. Overall, we can suggest a more generalized set of stylistic distributions that are only partly characterised by distinct frontiers, a conclusion more in line with Welsch and Terrell's (1998) concept of broader 'communities of culture'.

This pilot-study of Northern Khanty clothing could be extended in several directions. First, formal cladistic analysis (see above) could be conducted on the datasets that appear to have a signal for branching descent, and the kinds of historical associations between these lineages could also be explored (Jordan and Mace 2006). Second, the present study focuses on a 'female' domain of craft activity, while further work could document variations in other technologies, for example ski, sledge or boat designs. These are more strongly associated with the male sphere of activity which could have generated different transmission dynamics. While skis have a much deeper history in the region the distinctive herders' sledges appear to have been adopted by the Khanty *en masse* from the Nenets, as part of the wider take up of the 'package' of reindeer pastoralism (Federova 2000: 123). Third, periods of ethnographic fieldwork in the communities could generate more detailed information about the learning of craft skills and the broader social and cultural contexts in which clothing is created and displayed, as well as the ways in which these contexts generate different kinds of

strategies and motivations which eventually impact on longer-term material culture diversity. Fourth, the chapter has highlighted a series of relationships between material culture variability, demography, interaction patterns and kinship, all of which could provide ‘real world’ inspiration for simulation studies that explore in more detail how these variables might interact through time to create different configurations of cultural diversity.

Conclusion

This paper has argued that more studies of macro-scale cultural transmission need to move beyond the ‘mapping stage’ of analysis and combine independent knowledge about demography, ways of life and kinship within a broadly evolutionary framework in order to develop fuller understandings the processes affecting ‘descent with modification’ in material culture datasets. While the case-study illustrates the potentials of the approach, the results also demonstrate how more attention needs to be directed to the ‘active’ social and symbolic roles played by material objects in specific settings in order to understand how short-term decisions and strategies actively contribute to larger-scale patterns of cultural diversification.

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Figure captions

PAGE 1

Fig 1. Location map of the Lower Ob' region of Western Siberia (re-drawn from Perevalova 2004: 274), showing major rivers and Khanty communities mentioned in the text. Forms of reindeer herding and general directions of migrations are indicated. The different dialects of Khanty spoken by the communities (Siazi 2000) are indicated by the symbols (Note: the communities reside and migrate along the full length of the rivers and are not concentrated at the location-points of the symbols).

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Fig 2. Details of male belt showing knife and ornamentation details (for variations between groups see: Appendix 1); Fig 3. Details of male boot uppers (*Evtom Vai*), showing decorative cloth stripes along the structural seams; Fig 4. Details of male boot uppers (*Khanshan Vai*), showing the insertion of ornamental panels along the structural seams, a design feature copied from Nenets traditions (Siazi 2000: 176).

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Fig 5. Male clothing (*Malitsa* (fur smock) – general view); Fig 6. Male clothing (*Navershmitsa* – front, rear and general views to illustrate how the garment is worn over the *Malitsa*); Fig 7. Male clothing (*Gus'* (fur overcoat worn in very heavy frosts)); Fig 8. Male clothing (*Parka* (worn in very heavy frosts))

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Fig 9. Female clothing (*Shuba* (fur coat) – general view of garment made by speakers of the Shuryshkarskii dialect see: Fig 1) – rear); Fig 10. Female clothing (*Shuba* (fur coat) – general view of garment made by speakers of the Shuryshkarskii dialect (see: Fig 1) – front); Fig 11. Female clothing (*Shuba* (fur coat) – from Pitliar Khanty – rear); Fig 12. Female clothing (*Shuba* (fur coat) – from Pitliar Khanty – front)

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Fig 13. Female clothing (*Shuba* (fur coat) – general view of garment made by speakers of the Priural'skii dialect (see: Fig 1) – rear); Fig 14. Female clothing (*Shuba* (fur coat) – general view of garment made by speakers of the Priural'skii

dialect (see: Fig 1) – front); Fig 15. Female clothing (*Sakh* (cloth gown) – general view of garment made by speakers of the Shuryshkarskii dialect (see: Fig 1) – rear); Fig 16. Female clothing (*Sakh* (cloth gown) – general view of garment made by speakers of the Priural’kskii dialect (see: Fig 1) – front)

PAGE 6

Fig 17 NeighborNet Plot: All Traits (Male and Female Clothing and Footwear); Fig 18 NeighborNet Plot: All Male Traits (Clothing and Footwear)

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Fig 19 NeighborNet Plot: All Female Traits (Clothing and Footwear); Fig 20 NeighborNet Plot: Female ‘*Shuba*’

PAGE 8

Fig 21 NeighborNet Plot: Female ‘*Sakh*’

¹ The core dataset was collected by A.M. Siazzi between 1970-2000, a period coinciding with rapid oil and gas development in the region which drew in floods of Russian settlers and led to major disruptions in the traditional hunting, herding and fishing life-ways (Siazzi 2000:5). Industrialization was preceded by the later Soviet period (1960-80) which saw attempts to ‘wash’ out cultural differences between various nationalities in the USSR and led to youth being ‘scornful/disdainful’ of traditional native culture and decorative art. In recent years Siazzi has noted the reverse trend as Khanty intelligentsia have sought to ‘preserve’ and ‘resurrect’ traditional culture (Siazzi 2000:5). Produced in these cultural and political contexts the overarching goal of Siazzi’s monograph was to record traditional forms and recent innovations in Northern Khanty decorative art. The study draws on a rich vein of material from the mid- and latter part of the 19th C (for example, the Ahlqvist expeditions of 1858, 1877, Sirelius’s collections published in 1904, Rudenko’s 1909-10 study of Lower Ob’ garments recovered from burial contexts dated to the 1850’s, including ‘concrete’ examples of clothing and footwear, published in German in

1970), as well as a full century of detailed work by various Soviet- Perestroika- and post-Soviet era scholars. The monograph also draws on Siazı's own knowledge of craft traditions - she grew up in a family of reindeer herders, and received training from her mother who was a master seamstress in the production of ornamental wares. Siazı's adult life has been dedicated to studying and 'preserving' national craftsmanship and the published study is based on analysis of over 900 items from across the Lower Ob' region.