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*The Formation of Language and Culture
in Temperate Europe after the Steppe
Migrations 3000–2800 BC*

Genetics, archaeology and language

WITH RECENT ADVANCES and results from ancient DNA research, showing an extensive incoming gene flow into Europe shortly after 3000 BC, we are now finally in a position where migrations, as part of the formation of the Corded Ware Culture, can be documented rather than debated. This has lifted an interpretative burden from archaeology in much the same way as ^{14}C -dating did when it was introduced. The new “freedom” can instead be invested in properly theorizing and interpreting local processes of migration, integration and consolidation, which represents an underdeveloped field of research. By integrating recent results from genetics, isotopic tracing, archaeology and historical linguistics, we can formulate better-founded models for the interaction of intruding and settled groups, the formation of a new material culture, and consequently also better models for language dispersals and language change.

In this presentation, I wish to explore how some of the results from my ERC research project team provide new sociolinguistic insights into the parallel processes of culture and language change after migration. More precisely, I shall explore what happened after the steppe migrations of Yamnaya Culture into central and northern Europe (Haak *et al.* 2015, Allentoft *et al.* 2015) led to the formation of the Corded Ware

Culture, and in all probability also to the formation of Pre-Proto-Germanic.

*Genetics, migrations and language dispersals:
How culture and language change went hand in hand*

What we have learned from the recent studies on DNA documenting large-scale migrations from the steppe into temperate, northern Europe during the early 3rd millennium BC can be summarized as follows:

- We can observe a widespread process of genetic admixture, leading to a dominance of steppe/Yamnaya DNA and a decline of Neolithic DNA in temperate Europe (Haak *et al.* 2015; Allentoft *et al.* 2015; Cassidy *et al.* 2015). It represents a rather massive migration, or a series of migrations, creating a new genetic landscape that shows continuity into modern Europeans (also Lazaridis *et al.* 2014; Mathieson *et al.* 2015). It was therefore a fundamental change.
- The late 4th millennium BC was a period of widespread technological innovations, which also introduced long-distance travels, and perhaps small-scale migrations. This horizon thus formed a prelude to the Yamnaya migrations (Johannsen & Laursen 2010; Hansen 2011 and 2014).
- The recent documentation of the existence of an early form of plague from Siberia to the Baltic in the early 3rd millennium BC may provide part of an explanation to this massive genetic changeover (Rasmussen *et al.* 2015). It may further explain the widespread decline of Neolithic activities around 3000 BC prior to the migrations (Hinz *et al.* 2012; Shennan *et al.* 2013). Figure 1 summarizes the migrations from steppe Yamnaya into northern and central Europe, later termed Corded Ware, and to the Altai in Siberia a long-distance migration.

These migrations lead to the formation of a new social and economic order in large parts of temperate Europe, and to the formation of the Corded Ware Culture with widely shared similarities in burial rituals



Arrows indicate migrations from Yamnaya steppe pastoralists into northern and central Europe to the west, and towards the east a singular long-distance migration to the Altai region.

over vast distances (Furholt 2014: fig. 7), which show strong affinities to the steppe Yamnaya burial rituals. Corded Ware people burned down forests on a massive scale, e.g. in western Jutland (Kristiansen 2007) in order to create open steppe-like grazing lands for their herds. This dominance of herding and open landscapes is found from Switzerland (Doppler *et al.* 2015) to Jutland (Andersen 1995), although with regional variations. The tens of thousands of small single grave barrows in northern Europe were aligned in lines in the landscape, similar to the practice in the steppe. They formed visible lines of communication in these vast open landscapes.

The Corded Ware Culture formed a new movable material culture with new pottery forms and the battle axe as the most prominent male symbol. Among the Yamnaya cultures pottery tradition was weakly developed. Being a pastoral, movable economy they rather employed containers made of leather, wood or bast, and woven vessels could be used

as well, just as they used mats and other lightweight materials easy to carry in their wagons (Shishlina 2008: 60, fig. 54). The formation of a new hybrid culture was most likely the result of interaction with existing Neolithic cultures with a developed pottery tradition. The Corded Ware Culture shared with the Yamnaya Culture individual burials under small mounds. Burial traditions are among the most conservative institutions and therefore diagnostic of social/religious organisation. When radically new burial traditions are introduced, they are most often based upon migrations (Kristiansen 1989).

Given the fact that the Corded Ware phenomenon is the result of widespread migrations from the Pontic Steppe that fundamentally changed the genetic and cultural landscape of Europe, we need now focus our attention on how it unfolded locally in order to understand the subsequent processes of demographic and cultural dominance. But we also need to understand the economic and social system from which it originated in the Yamnaya Culture, which flourished and expanded from around 3000 BC.

We should observe that Corded Ware cultures co-existed for several hundred years with late Neolithic cultures, in Denmark residing in the Danish isles, in other parts of northern Europe often residing in the close neighbourhood, whether Globular Amphorae cultures in Poland or Bernburger cultures in southern Germany. What we observe in the archaeological record is, therefore, a gradual process of acculturation and integration which meant that, after 2400 BC, former strict cultural boundaries were being gradually dissolved and a new shared material culture appeared, in Denmark first and foremost represented by flint daggers, in central Europe by early metal daggers. Bell Beaker groups had by now also emerged on the scene, introducing metallurgy and further complicating the mix of cultures and people. However, in burial rituals old megalithic traditions still had an impact as seen in the revival of stone cist burials in some regions. It was only by the Middle Bronze Age that cultural homogenization prevailed, which is to say that it took

nearly a thousand years until all regions in northern and central Europe had adopted a shared social and cultural outlook that in all probability also included shared languages.

With the help of strontium isotopic analysis and ancient DNA we can now reconstruct in some detail the social processes behind the observable archaeological changes. At the Corded Ware cemetery of Eulau the application of strontium isotopic tracing, ancient DNA and archaeology has allowed a full reconstruction of a family massacre and its local background (Meyer *et al.* 2009; Muhl *et al.* 2010). Four multiple burials contained single families of a father, mother and children in various combinations; it could be demonstrated that the mothers were of non-local origin, most probably originating in the Harz mountains 50–60 kilometres north of the settlement. The arrows that had killed the families confirmed this, as they belonged to another Neolithic culture, the Schönfelder Culture located in this area (compare Muhl *et al.* 2010: 44, 125). The Schönfelder Culture practised collective burials of multiple family groups as demonstrated by genetics, distinctively different from the Corded Ware practice of individual burials of single families (Meyer *et al.* 2012). We can observe that Corded Ware males practised exogamy; perhaps they had taken women from the Schönfelder Culture; in that case this could be a possible explanation to the fact that they were killed. The question is: was this a unique case, or did it reflect a more widespread marriage practice?

In a recent work on diet and mobility among Corded Ware cemeteries from southern Germany (Sjögren *et al.* 2016) it has been demonstrated that exogamy was indeed a common practice among Corded Ware groups in this larger region (from a sample of 60). Most adult women (between 28% and 42%) were of non-local origin and had a different diet during childhood. Such evidence fits well with recent genetic information documenting more varied haplogroups among CW females (Lazaridis *et al.* 2014). Their diet is more similar to previous Neolithic diets, while in Corded Ware there is a shift towards higher ^{15}N values,

suggestive of a shift in diet and/or in cultivation practices. There may be several different explanations for this shift, intense forms of cultivation, higher reliance on freshwater fish or on animal vs. vegetable protein, or a greater reliance on milk and milk products. A widespread opening of landscapes in some regions for grazing animals supports the latter.

The analysis comprises 60 individuals and cover the period from the early Corded Ware to the mature and late Corded Ware, that is from 2900/2800–2300 BC. Among the burials from the earliest, colonizing phase at Tiefbrunn we find a multiple burial of three individuals, one elderly male with a hammer head pin of steppe type, an adult young male, and a child, female, around 4 years old. mtDNA haplogroups were different for all three, indicating that they were not related on the maternal side (Allentoft *et al.* 2015). Sr isotope ratios suggest that the elderly man was non-local, while the young man and the child may be locals. The skulls of all three individuals exhibited signs of severe trauma, and they had probably suffered violent deaths, which once again demonstrates that the newcomers were not always received friendly.

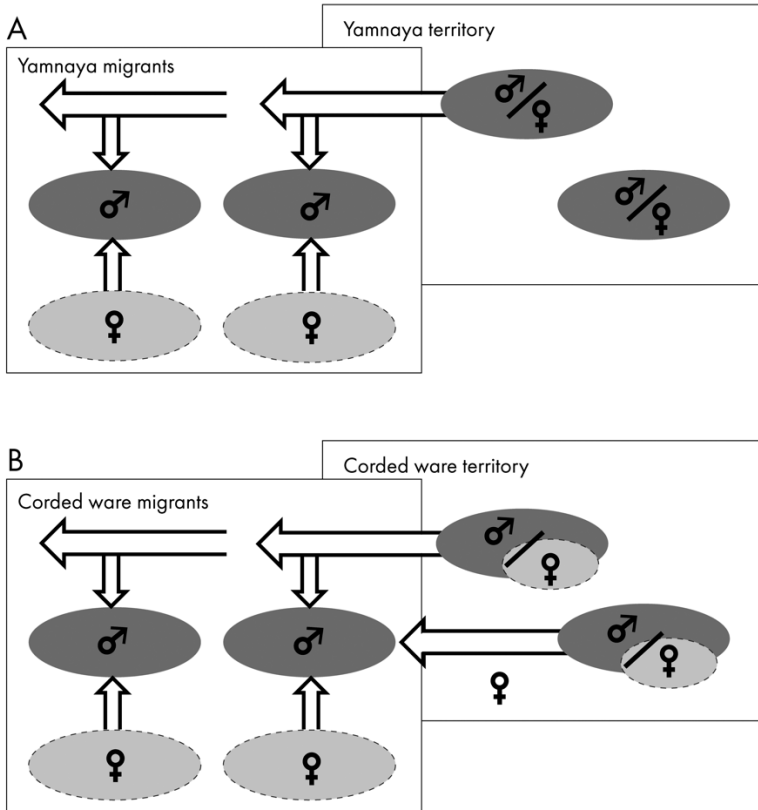
We have a similar early burial from Poland, the Kujawy region, of an elderly male of non-local origin, who had also a hammer headed pin of steppe influence (Pospieszny *et al.* 2015). Analysis of ancient DNA from the Tiefbrunn multiple burial showed a high percentage of Yamnaya steppe DNA. The larger, consolidated cemeteries from Bergreinfeld and Lauda Königshofen are from the middle phase of the Corded Ware Culture (2600–2500 BC), and here the practice of exogamy was well established over a longer period. We cannot know where the non-local women had their home base, but since their diet looked more ‘Neolithic’, we may assume that they originated in the late Bernburger Culture still residing on the higher elevations in the region.

Exogamy is a clever, and perhaps necessary policy, if mainly males constitute new migrating groups. This is a likely scenario for an expanding pastoral economy, and it gains some support from later histori-

cal sources from India to the Baltic and Ireland (Falk 1986; Kershaw 2010). They describe as a typical feature of these societies the formation of youth warrior bands consisting of boys from 12–13 years old up until 18–19, when they are ready to enter the ranks of grown-up warriors. A senior male leads such youth war bands, and they were often named ‘Black Youth’ or given names of dogs and wolfs, which were part of their initiation rituals (Brown & Anthony ms. for archaeological documentation).

The nature of this institution was recently summarized as follows: “In the Indo-European past, the boys first moved into the category of the (armed) youths and then, as members of the war-band of unmarried and landless young men, engaged in predatory wolf-like behaviour on the edges of ordinary society, living off hunting and raiding with their older trainers/models. Then about the age of twenty they entered into the tribe proper as adults.” (Petrosyan 2011: 345). The activities of the young war-bands were seasonal, during the other part of the year they lived within their households and communities, perhaps engaged in herding animals and other forms of farm labour. Such bands were mainly made up of sons without inheritance, as this was linked to the oldest son only. Thus, they formed a dynamic force that could be employed in pioneer migrations (Sergent 2003).

There is additional evidence to support the idea that males dominated the initial Yamnaya migrations and the formation of the early Corded Ware Culture: in burials from the earliest horizon, often with males as in Tiefbrunn and Kujawy, there is no typical Corded Ware material culture. This is shortly after followed by the A battle axes in male burials, but there is yet no pottery (Furholt 2014: 6ff., fig. 3). The Corded Ware pottery appears later, and we may suggest that it happens once women with ceramic skills are married in and start to copy wood, leather and woven containers in clay. Some confirmation of this is found in a uniquely preserved find of the typical flat bowl with short feet made of wood (Muhl *et al.* 2010: 47), well suited for turning milk into yoghurt



Model of how male dominated Yamnaya migrations lead to in-marriage of women from neighbouring Neolithic groups, which formed the Corded Ware Culture that continued the migrations.

or similar dairy products during night. Its pottery version became a shared type throughout the Corded Ware Culture and later also in the Bell Beakers Culture.

We may also note that pastoral economies historically tend to dominate agrarian economies, as they are both more mobile and warlike in

their behaviour, just as Yamnaya people were generally taller and had a healthier diet than Neolithic people (Mathieson *et al.* 2015). Such a pattern of economic and social dominance as reflected in taking wives from farming cultures while sending young males organized in war-bands off to settle in new territories, would explain both the genetic and linguistic dominance whose results we can observe even to this day. In addition, there is much to suggest that Neolithic populations had been decimated in many regions (Hinz *et al.* 2012; Shennan *et al.* 2013), most likely due to the spread of plague by Yamnaya groups (Rasmussen *et al.* 2015). In the previous figure I have summarized in a model how these processes took place, first from Yamnaya migrating groups, later by Corded Ware groups that continued the migrations.

However, the transformation of material culture and language from Yamnaya to Corded Ware, and from Proto-Indo-European to Pre-Proto-Germanic, was rather due to the role of in-marriage of women from Neolithic cultures who brought with them pottery skills which they adopted to a new material environment, while at the same time they also had to learn a new language. In that process language underwent gradual changes that were passed on to their offspring, and new words were adopted for new farming practices, as recently demonstrated by Kroonen and Iversen (Kroonen & Iversen in press). The Corded Ware practice of exogamic marriage thus provided a social-linguistic contribution to language change, in addition to the gradual change of language over time. We should probably also envisage young males from Neolithic cultures who changed side and joined the Corded Ware groups. Over time these integrating processes between Corded Ware and Neolithic groups would result in the formation of new dialects. These processes would also account for the local variation among Corded Ware groups in their later phases.

We have been able to reconstruct the social processes of cultural integration and hybridization that followed from marrying (probably) Neolithic women into Yamnaya settlements dominated by males of first-generation migrant status. This practice continued over several generations, and the women soon started to produce new pottery forms of existing containers made of organic materials, and made some innovations as well. The original herding economy of the Yamnaya migrants gradually gave way to new agrarian practices of grain growing, which led to the adaptation of new words for these crops, as recently demonstrated by Kroonen & Iversen (in press). The result of this hybridization process was the formation of a new material culture, the Corded Ware Culture, and of a new dialect, Pre-Proto-Germanic, likewise an adaptation to new conditions, the borrowing of new terms from neighbouring Neolithic communities and from in-married women. Archaeology here provides a sociolinguistic setting for a process of language change over several hundred years between 2800 and 2400 BC. Only then can we distinguish the contours of a north, west and east Proto-Germanic archaeological/linguistic landscape, before the westward expansion of Proto-Baltic/Slavic from the Urals to the eastern Baltic.

The new evidence conforms well to the reconstructed lexicon of Proto-Indo-European (Mallory & Adams 2006), which provides important clues that the subsistence strategy of early Indo-European speaking societies was based on animal husbandry. It includes, for instance, terms related to dairy production, wool production, horse breeding, and wagon technology. Words for crops and land cultivation, however, have proven to be far more difficult to reconstruct (Kroonen & Iversen in press). These results from historical linguistics are supported by similar evidence from archaeology (Andersen 1998; Kristiansen 2007). With these recent results from Kroonen and Iversen we can now demonstrate how social and economic interaction with existing Neolithic societies also had a corresponding linguistic imprint. This should not surprise us, as similar results are well documented from the interaction

of Yamnaya societies with their northern Uralic-speaking neighbours (Parpola & Koskallio 2007). We may thus consider the social dynamics of culture and language change as deeply intertwined, linked to an exogamic marriage practice among Corded Ware groups.

Föredrag den 10 januari 2017

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