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Parallel societies: evidence for the co-existence of Late Funnel Beaker West and Early Corded Ware communities

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The background of the cover is a landscape at sunset. A dark silhouette of a mountain is centered in the middle ground. The sky is filled with clouds, illuminated from below by the setting sun, creating a gradient of orange, yellow, and blue. In the foreground, there is a dark, flat area, possibly a field. Overlaid on the lower half of the image is a complex network diagram consisting of numerous small, semi-transparent nodes connected by thin, light-colored lines. The nodes are more densely packed in some areas, forming clusters, while other areas have more sparse connections. The overall aesthetic is one of a transition or a complex system, fitting the title 'The Eve of Destruction?'.

THE EVE OF DESTRUCTION?

LOCAL GROUPS AND LARGE-SCALE NETWORKS DURING THE LATE
FOURTH AND EARLY THIRD MILLENNIUM BC IN CENTRAL EUROPE

DANIELA HOFMANN, DORIS MISCHKA & SILVIANE SCHARL (EDS)



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Parallel societies

Evidence for the co-existence of Late Funnel Beaker West and Early Corded Ware communities

Quentin P.J. Bourgeois, Erik J. Kroon
and S. Louise Olerud

Abstract

In this paper we argue for a long overlap between Funnel Beaker West and Corded Ware societies in the Netherlands and north-western Germany. Using Bayesian modelling, we re-examine the available radiocarbon dates for Funnel Beaker West and Corded Ware. The models indicate an overlap of at least 175 years between c. 2900 and 2725 calBC. This overlap is supported by archaeological cases in which Corded Ware and Funnel Beaker funerary and depositional practices are found to be contemporaneous, to occur at the same locations, or to exhibit specific, similar practices. We further examine this overlap in Corded Ware and Funnel Beaker West practices in the funerary and depositional domain. We find a recurring pattern of distinction and exemption in these highly symbolic practices, which we suggest best fits a scenario in which Corded Ware and Funnel Beaker West groups exist in parallel throughout the first half of the third millennium BC, with only occasional interaction. The precise nature of the (lack of) interaction between Corded Ware and Funnel Beaker societies remains open to interpretation. However, we show that local patterns are key to the interpretation of the transition as a whole. The overreliance on culture historical narratives in aDNA studies is prone to underestimate this variability, because samples are only taken from clear Corded Ware or Funnel Beaker West contexts, and not from exceptional ones. Therefore, we argue that systematic, detailed studies of funerary and depositional practices are crucial for understanding events in the third millennium BC and beyond.

Keywords: Funnel Beaker West, Corded Ware, Bayesian modelling, funerary and depositional practices, third millennium BC

Introduction

The transition from Funnel Beaker West groups to Corded Ware groups in the northern Netherlands and adjacent parts of north-western Germany is often characterised as a rapid, disruptive process occurring no later than 2750 calBC. Corded Ware traditions would supplant Funnel Beaker West ones in a matter of decades (Lanting and Van der Plicht 2000, 67–68), causing changes in funerary rites, ceramic style and landscape (Van Gijn and Bakker 2005, 304–05). This notion of a “fast and furious” transition feeds

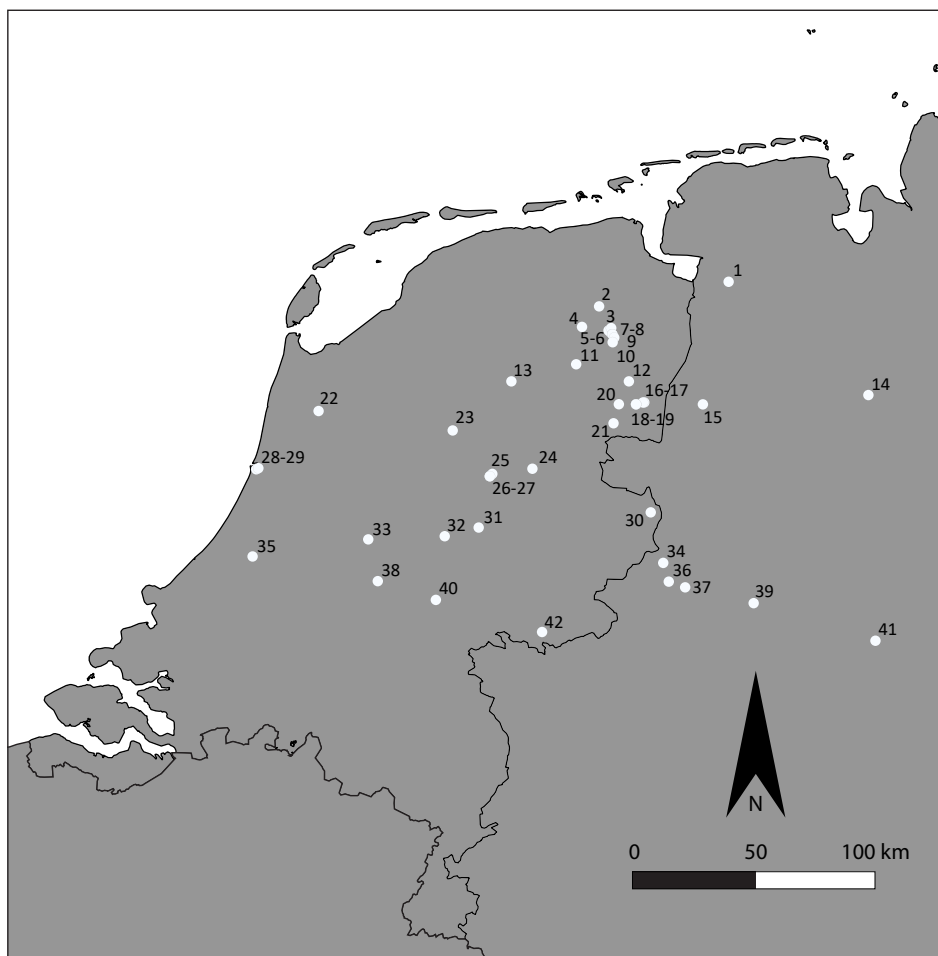


Figure 1. Overview of sites discussed in the text. 1 Leer-Westerhammerich; 2 Glimmer Es; 3 Annen-Holtkampen; 4 Zeijen; 5 Anlo-“Veekraal”; 6 Anlo; 7 Eext-Galgwanderveen; 8 Eext-Tumulus Visplas; 9 Eext-Bergakkers; 10 Eexterhalte; 11 Hijkerfeld; 12 D32; 13 De Eese; 14 Visbek; 15 Emmeln 2; 16 Angelslo; 17 Emmen-Angelslo; 18 Noorbarge-Hoge Loo; 19 Noorbarge; 20 Kruidhaarsveld; 21 Dalen-Huidbergsveld; 22 Zandwerven; 23 Schokland-P14; 24 Dalfsen-Oosterdalfsen; 25 Hanzelijn-Oud; 26 Bedrijvenpark H2O; 27 Hattermerbroek; 28 Zeewijk-Oost; 29 Zeewijk; 30 Denekamp; 31 Vaassen; 32 Uddelermeer; 33 Baarn-De Drie Eiken; 34 Heek-Ammerter Mark; 35 Hazerwoude-Rijndijk Windturbinepark; 36 Heek-Averbeck; 37 Schöppingen-Haidberg; 38 Maarn-De Helm; 39 Gitttrup; 40 Ede-Hotel Bosbeek; 41 Hunte 1; 42 Silvolde.

into broader narratives about the third millennium BC in Europe (Allentoft *et al.* 2015; Haak *et al.* 2015; Kristiansen *et al.* 2017; Olalde *et al.* 2018). Most recently, this characterisation was reiterated in archaeogenetic studies: a fast, disruptive transition is a perfect fit for a “massive migration” scenario (Kristiansen *et al.* 2017).

In this article, we present evidence against a rapid, disruptive transition between Funnel Beaker West and Corded Ware groups. The rapid transition scenario is anchored in problematic, culture historical views of Funnel Beaker West and Corded Ware, which the standard chronology for the area uncritically reproduces. We argue, on the basis of radiocarbon evidence and archaeological cases (Figure 1), that Funnel Beaker societies in the Netherlands and north-

western Germany coexist with Corded Ware groups for several centuries, but probably interact little during this period. Such a scenario is not uncommon, and is known for the transition between Funnel Beaker North and Corded Ware traditions in Denmark (Iversen 2016; 2020), as well as for the co-existence of Bernburg, Globular Amphora and Schönfeld groups in central Germany (Furholt 2003a; Müller 2001; Wetzel 1979), and Globular Amphora and Corded Ware material in Poland (Włodarczak 2009; 2017).

This paper contributes to the growing evidence for the existence of “parallel societies” in the third millennium BC. These parallel societies are direct continuations from various regional groups, such as the Funnel Beaker West. The existence of parallel societies

could explain the otherwise puzzling resurgence of Neolithic genetic signatures in individuals from the Bell Beaker period onward (Olalde *et al.* 2018; Papac *et al.* 2021).

A word about archaeological cultures

Funnel Beaker West and Corded Ware groups are well-known parts of the culture historical framework for north-western Europe. This framework regards archaeologically defined groups of material culture as bounded entities. In turn, these entities were held to be directly representative of past ethnic groups. While this view has been rightly criticised, the relation between an archaeologically visible material culture and the social entities behind it remains one of the big challenges of archaeology (e.g. Eisenmann *et al.* 2018; Frieman and Hofmann 2019; Jones 2007).

Crucially, recent ancient DNA (hereafter aDNA) studies initially appeared to confirm the above connection by identifying mass migrations from the Pontic Caspian steppe with the emergence of the Corded Ware culture in Europe (Allentoft *et al.* 2015; Haak *et al.* 2015). This led to archaeologists criticising aDNA studies as harking back to culture historical notions (Booth 2019; Eisenmann *et al.* 2018; Heyd 2017). While this discussion far surpasses the scope of this article, we think it is important to emphasise three different observations before continuing.

Firstly, subsequent aDNA studies have continued to confirm the above results. In some cases, culture historical classifications and groups of people do overlap. Throughout Europe, individuals buried in a Corded Ware fashion have steppe ancestry to some extent, while this ancestry was absent in individuals from earlier periods (Egffjord *et al.* 2021; Knipper *et al.* 2017; Olalde *et al.* 2018; Papac *et al.* 2021; Scorrano *et al.* 2021). Therefore, the Corded Ware culture, as originally envisioned by culture historical approaches, indeed reflects a group of people who migrated from the Pontic Caspian steppe. Moreover, these people are genetically distinct from Funnel Beaker groups who have mixed Neolithic farming and western hunter-gatherer ancestry (Allentoft *et al.* 2015, 168; Haak *et al.* 2015, 208).

Secondly, despite the coinciding of genetic and archaeological classifications, there is no *a priori* relation between biological ancestry and cultural identity in archaeology or aDNA studies (see Booth 2019, 5–6). Indeed, recent aDNA studies show that people buried in a Corded Ware fashion are genetically heterogeneous (see Booth 2019, 11; Papac *et al.* 2021; Shriner 2018). Similarly, the material culture associated with Corded Ware groups varies throughout Europe (Furholt 2014; 2020). This regional variability could relate to the vast geographical scale of the Corded Ware phenomenon,

but also to the influence of earlier groups who occupied these areas and interacted with Corded Ware migrants (Furholt 2020, 10–11).

Thirdly, and most importantly, the above situation implies that a return to archaeological questions is necessary. What processes cause the migration seen in genetics and the changes in material culture reflected in the archaeological record to coincide? How do migrants and native groups interact? Some scholars argue for violent clashes and/or diseases decimating the indigenous Neolithic populations (Rascovan *et al.* 2019; Rasmussen *et al.* 2015; Schroeder *et al.* 2019; Valtueña *et al.* 2017), while others argue for peaceful assimilation over time through exogamy (Knipper *et al.* 2017; Mitnik *et al.* 2019; Scorrano *et al.* 2021). The most recent aDNA studies have started to address these questions by tracking genetic diversity over time in small regions (Mitnik *et al.* 2019; Papac *et al.* 2021). These studies show that distinct genetic groups initially lived apart, but increasingly mixed over time in some parts of Europe.

The present paper applies a practice perspective to the transition between Funnel Beaker West and Corded Ware groups. We assume, on the basis of the above aDNA papers, that entities such as Funnel Beaker West and Corded Ware represent respectively indigenous and migrating groups living in the north-eastern part of the Netherlands and the north-western parts of Germany during the third millennium BC (Allentoft *et al.* 2015, 168; Haak *et al.* 2015, 208). While no individuals from Funnel Beaker West or Corded Ware contexts in the Netherlands have been sampled for aDNA, we expect their genetic profiles to be roughly similar to those elsewhere. As such, we distinguish Funnel Beaker West and Corded Ware groups or communities throughout this paper. This refers to the overall correlation between genetic ancestries, material culture and particular practices (Bourgeois and Kroon 2017). However, this does not imply that we consider these groups as strictly bounded, monothetic entities, nor that the prehistoric people(s) living in these areas actively self-identified with a Funnel Beaker West or Corded Ware group identity (Jones 2007).

The chronological question — radiocarbon evidence

The culture historical framework for the Netherlands and north-western Germany proposes a strict chronological separation between Funnel Beaker West and Corded Ware material culture. Corded Ware would immediately follow Funnel Beaker West around 2750 BC (Lanting and Van der Plicht 2000). This framework rests on ceramic typology which was anchored in absolute time through radiocarbon evidence later on.

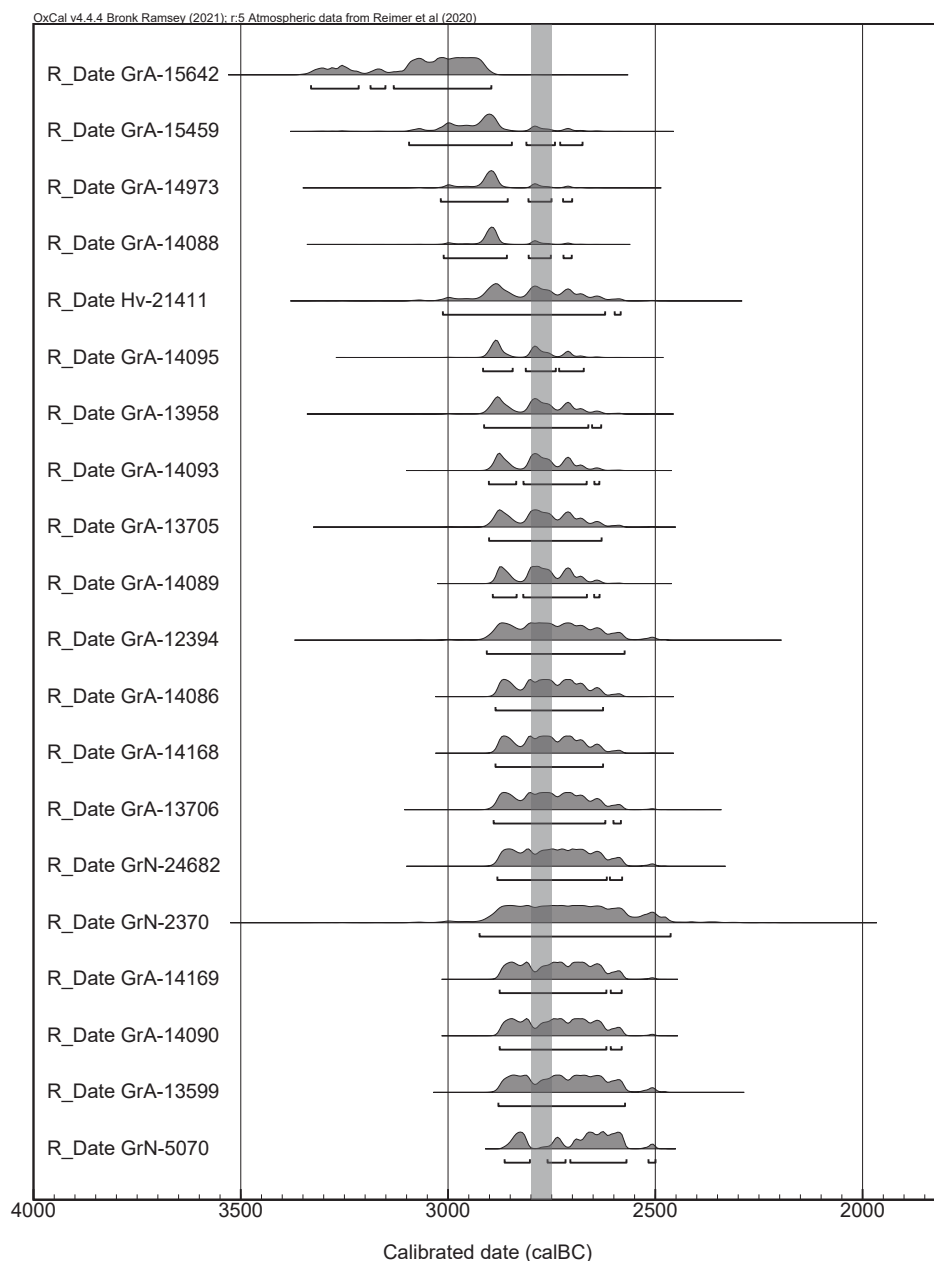


Figure 2. Calibrated radiocarbon dates of Funnel Beaker West cremation burials associated with late Havelte pottery. 2σ ranges, calibration using IntCal 2020 (Reimer *et al.* 2020) in OxCal 4.4 (Bronk Ramsey 2009). The majority of radiocarbon dates stem from cremated human remains and a few from charcoal fragments of the pyre remains. The grey vertical bar indicates the duration of the youngest Funnel Beaker West horizon according to the current chronology (Brindley 1986; 2022, 112). The calibrated radiocarbon dates do not concur with this range.

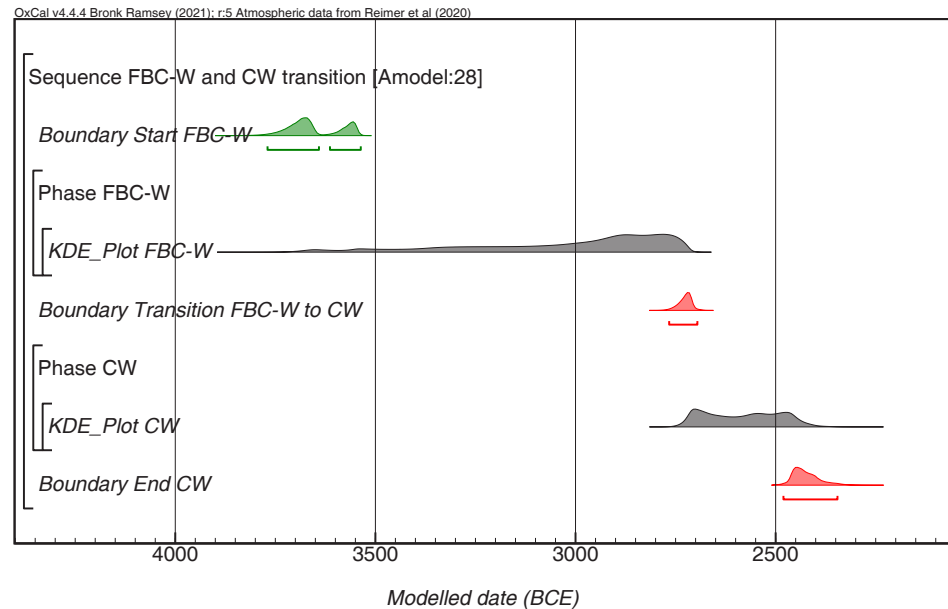
We argue that the initial typological distinction between Corded Ware and Funnel Beaker West ceramics distorted the radiocarbon evidence. The effort to construct a culture historical framework led archaeologists to frame the typological distinction between Funnel Beaker West and Corded Ware pottery as a chronological distinction. This framework was then imposed on the radiocarbon evidence (Lanting and Van der Plicht 2000). As a result, young Funnel Beaker West dates and old Corded Ware dates are systematically dismissed as contaminated or simply erroneous, because Funnel Beaker West and Corded Ware material must form a neat transition (Lanting and Van der

Plicht 2000; but see Fokkens *et al.* 2016, 277–85 for a critical reassessment).

The strict temporal distinction between the Funnel Beaker West and Corded Ware groups does not hold up if we inspect the calibrated radiocarbon dates behind the chronology. For instance, several cremation burials¹ with ceramics from the youngest Funnel Beaker West horizon would fall between 2800 BC and 2750 BC according to ceramic typology (Brindley 2022, 112).

¹ Note that the sandy soils of the Netherlands do not preserve skeletal remains, unless they have been burnt. This is therefore the only bone material available for radiocarbon dating.

Figure 3. Bayesian analysis of radiocarbon dates for a hypothesised rapid transition between the Funnel Beaker West and Corded Ware cultures. The individual radiocarbon dates have been left out for readability. This model places the transition between 2767 and 2696 calBC. However, the agreement between model and base data is low (see top left corner).



However, radiocarbon dates of the human remains in these burials fall well into the third millennium BC (Figure 2) (Kroon 2024). In other words, the youngest Funnel Beaker West burials date to a period for which the presence of Corded Ware pottery is widely attested in north-west Europe (Furholt 2003b).

These cremation burials and their respective dates cast doubt on the narrative which sees Funnel Beaker West and Corded Ware as successive entities. The mismatch between radiocarbon dates and the standard chronology can be explained in two ways. Firstly, the dates could indicate a chronological overlap between Corded Ware assemblages and the youngest phases of Funnel Beaker West. Secondly, the mismatch could be attributed to the presence of plateaus in the calibration curve for this timeframe (Furholt 2003a). Hypothetically, the dated Funnel Beaker West burials could fall in the earliest part of their calibrated range (for example 2800–2750 calBC), and all Corded Ware burials in the later parts. Below, we employ a Bayesian framework to determine the likelihood of both scenarios (Bronk Ramsey 2009).

We collected a total of 84 radiocarbon dates from Funnel Beaker West ($n=57$) and Corded Ware ($n=27$) contexts in the Netherlands and north-western Germany. All radiocarbon dates have direct associations with Corded Ware or Funnel Beaker West pottery and stem from burials or closed contexts with pottery (see Appendix 1). We calibrated these dates in OxCal 4.4 with the IntCal20 curve (Bronk Ramsey 2009; 2017; Reimer *et al.* 2020) and tested two possible models of the transition from Funnel Beaker West to Corded Ware in a Bayesian framework. All age ranges are calibrated at a 2σ confidence level.

Model 1 represents the current chronological framework for Funnel Beaker West and Corded Ware material by placing both of these cultures in a sequence. In this sequence, the latter succeeds the former in a single event. In other words, *all* TRB dates *must* be older than *all* Corded Ware dates. Model 2 consists of the alternative scenario in which Funnel Beaker West and Corded Ware material can co-exist. This model calculates a likely start/end date of both. In both models we use Kernel Density Estimation (KDE) in combination with start/end date modelling to produce reliable estimates of the duration of both phases (Bronk Ramsey 2009; 2017). The Bayesian analysis subsequently determines the likelihood of either model given the available data.

The Bayesian analysis for model 1 (Figure 3) proposes a boundary date between Funnel Beaker West and Corded Ware at 2767–2696 calBC, which roughly concurs with the standard chronology (Lanting and Van der Plicht 2000). However, the model exhibits poor agreement between the proposed chronological sequence and the observational data ($A_{\text{model}} = 28.4\%$; Bronk Ramsey 2009, 356). In other words, there are too many radiocarbon dates for Funnel Beaker West material of which the calibrated age range is entirely younger than the calibrated age range of several Corded Ware samples. A rapid transition cannot be a likely explanation of the observed spread of radiocarbon dates. Therefore, this model should be rejected.

By contrast, the second model (Figure 4) does not impose a rapid transition between the Funnel Beaker West and Corded Ware phenomena, but simply calculates the most likely start and end dates for both on the basis of the available radiocarbon dates. This model allows for a potential overlap. The Bayesian analysis indicates

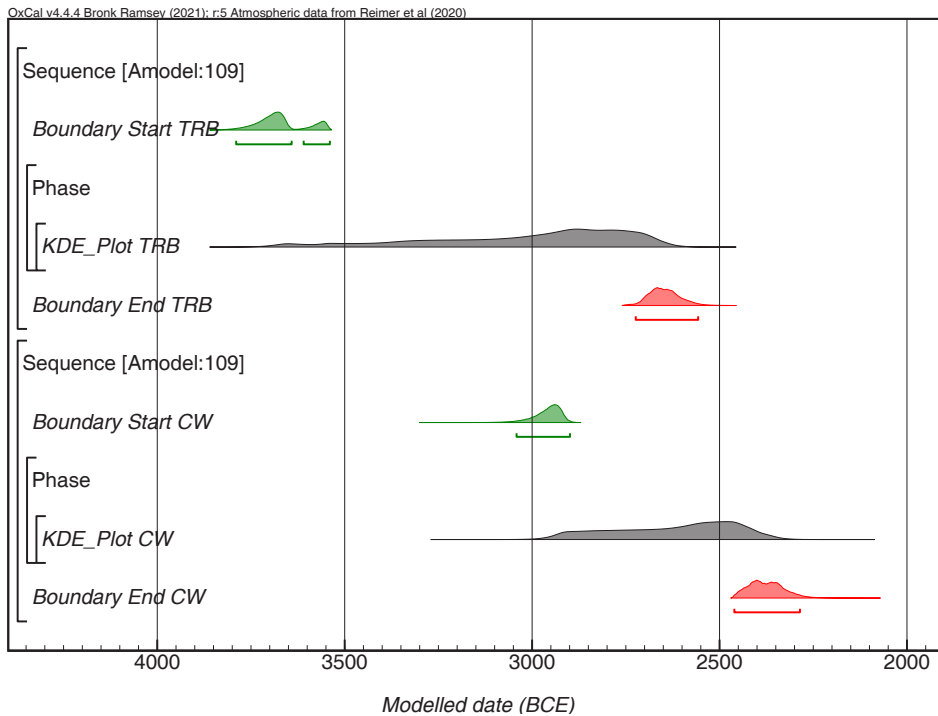


Figure 4. Bayesian analysis of radiocarbon dates for the Funnel Beaker West and Corded Ware cultures without an assumed, rigid boundary. The individual radiocarbon dates have been left out for readability. The Funnel Beaker West and Corded Ware cultures have been modelled as phases with independent boundaries (see key words on the left). The proposed start for the Funnel Beaker West culture is based on sparse data and should be ignored. The Bayesian analysis shows that the end date for the Funnel Beaker West culture post-dates the start date of the Corded Ware culture by almost two centuries. This model exhibits good fit with the observational data (cf. Figure 3).

that Funnel Beaker West material culture persists until 2724–2558 calBC, while Corded Ware traditions start around 3042–2900 calBC. Therefore, this model demonstrates a considerable overlap between the Funnel Beaker West and Corded Ware groups. The most conservative estimate for the duration of this overlap is c. 175 years, but a longer overlap is feasible. Contrary to model 1, the agreement between this model and the observed data is good ($A_{\text{model}} = 108.5\%$). As such, the radiocarbon evidence favours a long co-existence between Funnel Beaker West and Corded Ware societies in the Netherlands and north-western Germany.

The two models presented above demonstrate that it is far more likely that Funnel Beaker West and Corded Ware groups coexisted for a significant amount of time, than for one to have quickly supplanted the other. This quick transition scenario is simply untenable on the basis of the available radiocarbon dates. Therefore, we must envision a long period of cohabitation, lasting multiple centuries, between these two groups in the Netherlands and north-western Germany. In the next section, we show that this long period of cohabitation is evidenced in the archaeological record as well.

Archaeological evidence for the contemporaneity of Funnel Beaker West and Corded Ware groups

The focus of our argument is funerary and depositional practice. Generally, Funnel Beaker West and Corded Ware groups exhibit distinct practices in these highly symbolic contexts (see Bourgeois and Kroon 2017; Fontijn 2019 for a characterisation of these practices). However, several cases demonstrate that these distinct practices can on occasion spill over from one into the other, indicating contemporaneity, but also an intimate familiarity related to depositional and funerary practices. Therefore, we argue that this pattern of largely distinct, but on occasion identical practices supports a parallel existence of Corded Ware and Funnel Beaker West communities with only occasional interaction.

Funerary rites

The traditional contrast between Funnel Beaker West and Corded Ware traditions revolves around funerary practices. Funnel Beaker West practices involve communal burials in megalithic tombs, as well as individual burials in flat graves. These flat graves are often part of extensive



Figure 5. Funnel Beaker West burial no. 13 at the Dalfsen-Oosterdalfsen flat grave cemetery. Left: unedited photograph of the burial. Right: line drawing indicating the corpse silhouette (1); an undecorated bowl (2); and the strike-a-light comprising a marcasite ball and three flint flakes (3). The body is placed in a left-flexed position (head NE, facing SW) with the grave goods placed in front of the body (Van der Velde *et al.* 2022, 50–52). The excavators draw a parallel between such practices and those observed in Corded Ware burials (Van der Velde and Raemaekers 2022, 20). Image: Van der Velde 2022, fig. 9.1; image used with permission.

cemeteries (see Lanting and Brindley 2004, 92 for an overview). The most recently excavated example of such a flat grave cemetery is Dalfsen-Oosterdalfsen (Van der Velde *et al.* 2022). This site illustrates the systematic nature of Funnel Beaker West funerary practice. Dalfsen-Oosterdalfsen encompasses over a hundred Late Funnel Beaker West graves. The deceased individuals in these graves are interred in crouched positions, and the burials are furnished with pottery, flint and stone axes as grave goods (Figure 5) (Bouma and Van der Velde 2022, 34–35, 43–44).

Apart from flat grave cemeteries, Late Funnel Beaker West burials are also found in megalithic tombs. The construction of these monuments probably occurred during earlier Funnel Beaker West phases, but most megalithic tombs also show continued deposition of ceramic vessels, likely as grave goods for deceased individuals, into the later stages of the Funnel Beaker West culture (Bakker 1992; Van Gijn and Bakker 2005). Unfortunately, bone preservation inside megaliths is poor, and little to no unburnt skeletal remains are known from these tombs in the Netherlands.

Corded Ware funerary rituals in the Netherlands also exhibit a distinct set of practices. Inhumations are common, usually graves below barrows or more rarely flat graves. These inhumation burials can form larger alignments across landscapes (Bourgeois 2013). Moreover, Corded Ware burials involve highly standardised grave goods: battle axes, flint blades, flint axes and beakers are most common (Wentink 2020, 226). Similarly, the positioning of the bodies and grave goods is highly standardised, as is

the case across the whole Corded Ware distribution area (Bourgeois and Kroon 2017).

It is clear that both Late Funnel Beaker West and Corded Ware communities bury their dead in accordance with well-established, distinctive practices. Yet these practices do not always neatly correspond to the distinction between Funnel Beaker West and Corded Ware material. We illustrate this with examples from megalithic tombs, flat grave cemeteries and the use of fire in flat graves.

Code-switching Corded Ware

A first funerary practice that transcends the Funnel Beaker West/Corded Ware boundary is the continued use of megalithic tombs by Corded Ware groups. Recent studies of the inventories of these megaliths show that Corded Ware vessels occur systematically within them (Brindley and Lanting 1992, 107–08; Drenth 2012; Jager 1985, 239; Van der Velde *et al.* 2019, 20; Van der Waals 1964, 39). These Corded Ware ceramics in megaliths have all been characterised as later re-use, detached from the initial Funnel Beaker West use of these megaliths by several centuries. However, the similarity extends beyond mere inclusion of vessels in a megalithic tomb.

Funnel Beaker West ceramics in funerary contexts predominantly consist of beakers, bowls and larger vessels referred to as tureens, tureen-amphorae or amphorae (Brindley 2022, 142 for recent tallies of vessels in megaliths and flat grave cemeteries; Lanting and Brindley 2004). By contrast, Corded Ware funerary contexts in the Netherlands contain nearly exclusively beakers (Wentink 2020, 48, tab.4.1). Crucially, the Corded Ware vessels deposited in megalithic tombs break with Corded

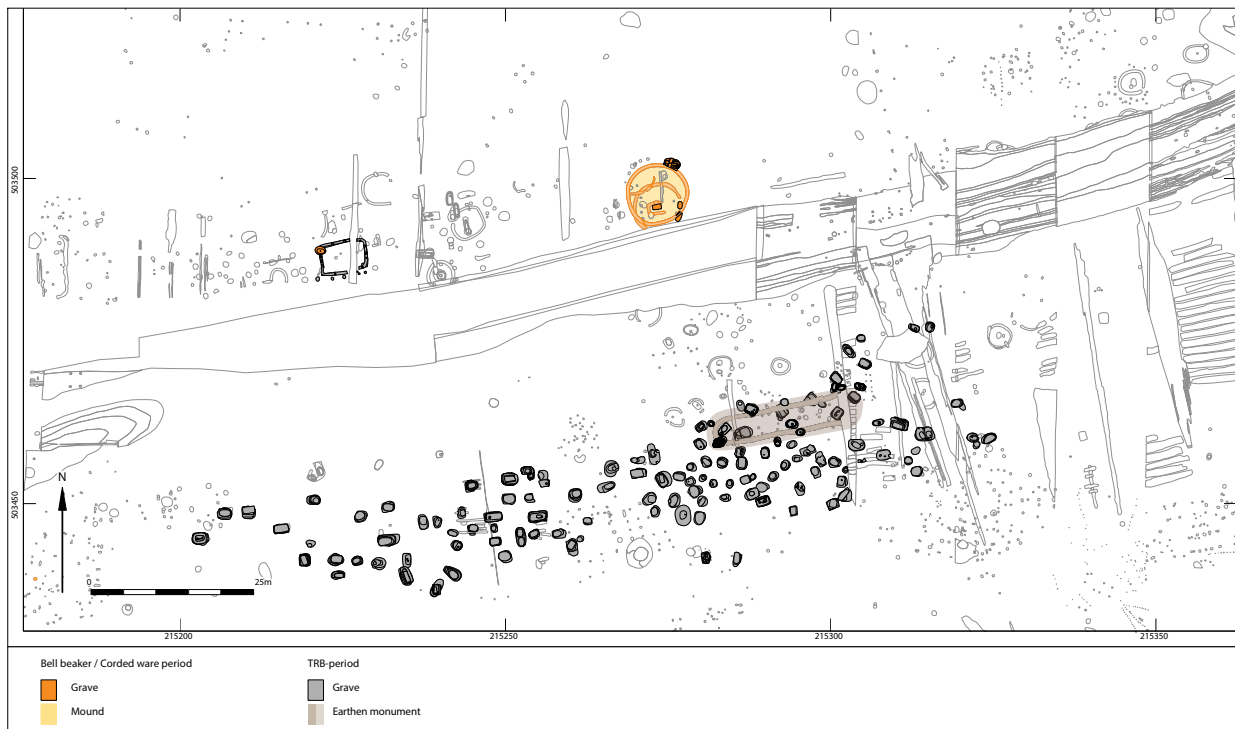


Figure 6. Map of the Funnel Beaker West flat grave cemetery at Dalfsen-Oosterdalfsen. The grey features are the Funnel Beaker West flat graves. Corded Ware and Bell Beaker burials (in orange) appear just north of the cemetery. A further cremation burial (burial 136) is situated at the far west end of the cemetery (left of the north arrow). The ^{14}C dates of this burial fall into the third millennium calBC (Poz-88040: 4205 ± 35 BP; Poz-88702: 4240 ± 35 BP; Bouma and Van der Velde 2022, tab. 3.1). Image: Van der Velde 2022, fig. 9.1; image used with permission.

Ware conventions. J.A. Bakker (1992, 59) shows that the Corded Ware vessels in megalithic tombs involve higher frequencies of amphorae and large vessels, such as short-wave moulded wares, along with beakers. He suggests the difference to “ordinary” Corded Ware burials might relate to the status of the deceased. However, we argue that the choice of these larger vessels equally resonates with Funnel Beaker West practices, where similar vessels are included in funerary deposits. The similarity in types implies that whoever deposited these Corded Ware vessels in these megaliths knew what was the right pottery to include (Fontijn 2019): not beakers, but amphorae and short-wave moulded ware, items extremely rare in Corded Ware burials in the region. This indicates knowledge of and adherence to Funnel Beaker West practices in the deposition of this Corded Ware material.

Angelslo-Emmerhout: the curious case of flat grave 14

One of the most clear-cut cases of contemporaneity between Corded Ware and Funnel Beaker West groups stems from the site of Angelslo-Emmerhout. A large-scale excavation of this site uncovered the remains of both Funnel Beaker West and Corded Ware burials, all

of which are aligned on a single axis at least 400 m long (Arnoldussen and Scheele 2012). The best-known and most controversial of these burials is flat grave no. 14. It contains the remains of a cremated individual, along with partially heated and fragmented late Funnel Beaker West ceramics and a Corded Ware sherd (Bakker and Van der Waals 1973, 24–25; Waterbolk 1960). J.N. Lanting and J. van der Plicht in particular hotly contest that this is a closed context, insisting that the Corded Ware sherd must have been a later intrusion (Lanting and Van der Plicht 2000, 32, 66). However, the excavators explicitly mention that the upper part of the grave fill was homogeneous and did not show traces of disturbance (Bakker and Van der Waals 1973, 25). An additional argument presented by Lanting and Van der Plicht is that the Corded Ware sherd does not show signs of heating, while the Funnel Beaker West sherds do, again suggesting a later intrusion. However, the original excavators state that some Funnel Beaker West ceramics also lack signs of heating, and this was confirmed by later analysis (Drenth and Meurkens 2014, 303–04).

Whatever the case may be, charcoal fragments stemming from burnt branches within the pit were radiocarbon dated (GrN-5070, 4100 ± 30 BP, calibrated 2864–2500 calBC), making this burial fully contemporaneous with the nine

Corded Ware burials found in close proximity. In fact, one of these Corded Ware burials was also radiocarbon dated to the same time period (charcoal branches from the primary burial underneath Tumulus VIII; GrN-6644, 4160±30 BP, calibrated 2879–2631 calBC). The presence of these flat graves and burial mounds indicates that this area was in use as a burial ground by communities using Corded Ware pottery and Funnel Beaker West pottery at the same time. The lack of intercutting and the careful spacing of burials along a single axis also suggest adherence to the same rules of where the deceased would be buried.

Angelslo-Emmerhout is not the only case where both Funnel Beaker West and Corded Ware style burials occur closely together. For example, Corded Ware and Bell Beaker barrows occur in close proximity to the Funnel Beaker West flat grave cemeteries at Uddelermeer (Bakker 1979, 105, 194–96), Kruidhaarsveld (Bakker 1979, 31; Van Giffen 1937, 74–77; Waterbolk 1958, 12–13), and Dalfsen-Oosterdalfsen (Bouma and Van der Velde 2022, 62–63). In particular the latter case is intriguing. Here a large Funnel Beaker West flat grave cemetery was uncovered with more than a hundred burials placed along a coversand ridge. To the north of this cluster of Funnel Beaker West graves several Corded Ware and Bell Beaker burials were discovered. The contemporaneity of these burials is difficult to establish, as only a single grave was radiocarbon dated. This grave (number 135) was the only cremation burial amongst the Funnel Beaker West group of graves and was dated to c. 2900–2670 calBC (two dates are available from the same cremated remains: Poz-88040, 4205±35 BP and Poz-88702, 4240±35BP, calibrated c. 2900–2670 calBC). This would make this grave contemporaneous to several Corded Ware burials that were also found here. Intriguing in this case is that the Corded Ware and Funnel Beaker West burials appear to be geographically separated from one another. The Corded Ware (and later Bell Beaker) burials are all located in an area 50 m to the north of the Funnel Beaker West cemetery (Figure 6), apparently respecting the confines of the latter (Bouma and Van der Velde 2022). This spacing of the burials, and contemporaneity with at least some of the Funnel Beaker West burials, suggests two distinct groups with different burial traditions respecting, but also opposing each other's funerary space.

These examples demonstrate that Corded Ware and Funnel Beaker West burials can appear as part of the same funerary space or — especially in the case of Dalfsen — just across the road from one another. Interestingly all these examples have been explained as mysterious continuities in practice (Arnoldussen and Scheele 2012, 157; Brindley and Lanting 1992, 135). However, an interpretation which sees Corded Ware and Late Funnel Beaker West communities as contemporaneous is a better explanation for these cases and is in fact better supported by the radiocarbon evidence.

And I bring you... fire

While there are interesting parallels between Funnel Beaker West and Corded Ware, as we described above, there is also a significant difference. The majority of Funnel Beaker West burials that can be reliably dated to the third millennium BC are cremation burials (Figure 2). Indeed, cremation was a key part of Late Funnel Beaker West burial rituals and potentially for Funnel Beaker communities in general (Blank 2021). These cremations do not only appear in flat graves, but also in megalithic tombs associated with Late Funnel Beaker West ceramics (Bakker 1992, 55, 93–94; Bakker and Van der Waals 1973, 27).

This practice of cremating the dead is extremely rare in Corded Ware contexts. There are only four known cases of Corded Ware cremation burials in the Netherlands: Baarn-De Drie Eiken (Drenth and Hogestijn 2014, 109; Wentink 2020, 135); Elderslo (Lanting 1973, 228); Vaassen (Drenth and Hogestijn 2014); and Zeijen “Jodenbergje” (Drenth and Hogestijn 2014, 108–09).

That is not to say that fire did not play a role in the funerary ritual of the Corded Ware. Indeed, there are many indications that the burial pit itself, or the wood used in the construction of a chamber, was set on fire prior to the inhumation (Wentink 2020, 202). This practice has been attested many times in the Netherlands through the regular presence of charcoal, burnt coffins and/or charred wooden structures in graves (e.g. Jager 1985, 211, 215–19, 229, 233) and may have been part of a broader practice across the Corded Ware sphere of rites (Nordqvist and Heyd 2020; Šebela 1999). Intriguingly, this practice is also well attested at the site of Dalfsen-Oosterdalfsen mentioned above, with eight Funnel Beaker West graves containing charred wooden coffins (Bouma and Van der Velde 2022, 40–41).

However, the importance of fire appears, generally speaking, greater in Funnel Beaker West rites when compared to Corded Ware ones. Cremation of deceased individuals returns more systematically with Bell Beaker groups, with 23 known cases of Bell Beaker cremations in the Netherlands, even if inhumations are more common (Hamburg *et al.* 2011, 258–60). As such, it would appear that the practice of cremating the dead makes a resurgence in Bell Beaker contexts. In the same vein, the inclusion of strike-a-lights in burials returns in Bell Beaker graves (Wentink 2020, 196); these were already a common artefact in Funnel Beaker West megaliths (Bakker 1979, 77). A similar point has been raised for flint arrowheads: common in Funnel Beaker West megalithic tombs, virtually absent in Corded Ware burials, and present again in Bell Beaker graves (Wentink 2020, 129–30).

Funnel Beaker West and Corded Ware burial traditions are distinct from a general point of view, with a small number of exceptions which blur the boundaries between the two. The apparent fusion between these distinct

funerary practices in Bell Beaker contexts is highly relevant. We argue that the resurgence of Funnel Beaker funerary practices in Bell Beaker burials can best be explained through Funnel Beaker groups existing in parallel with Corded Ware societies throughout the first half of the third millennium BC. Such a resurgence is inexplicable if a fast, disruptive transition truncates Funnel Beaker societies around 2750 calBC, centuries before the first Bell Beaker groups. Moreover, the resurgence better fits patterns observed in recent aDNA studies (see discussion below).

Depositional practices

Selective deposition in Funnel Beaker West and Corded Ware societies follows a similar pattern of distinction and exemption as with funerary rites. We follow the definition of selective deposition by D. Fontijn (2002, 5–6; 2019, 26–29), who stresses that certain specific objects, with specific life biographies, are systematically deposited in specific places in the landscape.

Selective deposition is abundant in the Funnel Beaker West setting. In particular, there is a strong emphasis on axe depositions in both funerary contexts and wetlands. However, different types of axes were deposited in these contexts. Large, imported axes of flint, Alpine jade or copper in an unused state were deposited in wetlands. These items could be deposited alone or with items related to axe production: flint nodules, axe blanks and occasionally chisels. This depositional practice contrasts with the inclusion of small, heavily used flint axes in burials and megalithic tombs as grave goods (Van Gijn 2010, 131–34, 136; Visser 2021, 57; Wentink *et al.* 2011, 400–04). These practices were mutually exclusive: there are no large imported flint axes in megaliths, and there are no small used flint axes in wetland depositions.

Corded Ware selective deposition follows a different set of practices. Burials appear as the appropriate place to deposit objects, such as axes similar to those deposited in megalithic tombs. However, there is no distinction between local and imported objects: both appear together in funerary contexts, rather than in separate contexts as in the Funnel Beaker West case (Visser 2021, 58; Wentink *et al.* 2011, 405–06). Furthermore, in a few rare cases large imported axes are deposited in graves (Wentink 2020, 102–05), and not in wetlands as they would have been in a Funnel Beaker West context.

While Corded Ware and Funnel Beaker West groups clearly adhere to different depositional practices from a general point of view, there are exceptions which show these practices can occasionally spill over. Nine hoards of Corded Ware axes are known from landscape locations which are also the setting of Funnel Beaker West depositions. The axes involved differ from Funnel Beaker West axes commonly deposited in wetland contexts in that they are smaller, made of local flint, heavily used

and sometimes accompanied by other flint tools such as scrapers or flint blades, but never by flint nodules or axe blanks (Visser 2021, 58; Wentink *et al.* 2011, 404–05). Corded Ware axes were also polished with soft material (e.g. hide/leather, water and sand), rather than on a sandstone slab as is typical for the Funnel Beaker West axes (Van Gijn 2010, 144). In addition to the location, there is also overlap in the treatment of the deposited items: both Funnel Beaker West and Corded Ware axe depositions involve treatment of the cutting edge with ochre prior to deposition (Wentink *et al.* 2011, 404). This treatment hints at a deeper understanding of what was supposed to be done with these axes prior to deposition, distinct knowledge on what was the *right* treatment (Fontijn 2019; Wentink *et al.* 2011).

Similar to the use of fire in funerary rites, Funnel Beaker West depositional practices appear to make a return during the Bell Beaker period. In particular, copper axes are deposited in wet contexts, a practice which reaches enormous heights during the Bronze Age (Fontijn 2002). A clear separation between specific objects in specific contexts appears to have been re-established, along a similar vein and logic as the Funnel Beaker West depositions (Fontijn 2019).

In sum, depositional practices exhibit a pattern similar to what we see in funerary rites. Funnel Beaker West and Corded Ware practices are, on the whole, different. However, there are a number of exceptional cases in which Corded Ware finds appear to adhere to Funnel Beaker West depositional practices in terms of location and treatment with ochre. Given that wetland depositions imply loss of items beyond retrieval, such precise adherence must imply intimate familiarity with Funnel Beaker depositional practices. Moreover, both Bell Beaker and later Bronze Age depositions show that Funnel Beaker West depositional practices persist into later periods, seemingly uninterrupted. This pattern is a direct analogy to the pattern in funerary practices (see above), and is best interpreted as an indicator of parallel existence of Late Funnel Beaker West and Corded Ware communities with only marginal interaction until Bell Beaker times.

Broader perspective: final remarks

In this paper, we argue for a long overlap between Funnel Beaker West and Corded Ware societies in the Netherlands and north-western Germany. Such a parallel existence best fits the radiocarbon evidence for this period, as well as the archaeological evidence for funerary and depositional practices. A re-examination of the available radiocarbon dates for Funnel Beaker West and Corded Ware contexts with Bayesian modelling indicates that both societies overlap for at least 175 years between c. 2900 and 2725 calBC. This overlap is further supported by archaeological cases in which Corded Ware and Funnel Beaker funerary and depositional practices are found

to be contemporaneous, occur at the same locations or exhibit similar distinct practices.

Funerary and depositional practices in both societies are otherwise distinct in these crucial, symbolic realms of human action. However, this pattern of distinction is subject to various exceptions. There are Corded Ware axes deposited in accordance with Funnel Beaker depositional practices, Funnel Beaker cremation burials with Corded Ware material culture, and Corded Ware pottery deposited in megaliths in accordance with Funnel Beaker West traditions, to name but a few exceptions.

This recurring pattern of distinction and exemption, combined with a resurgence of Funnel Beaker West practices during Bell Beaker times, best fits a scenario in which Corded Ware and Funnel Beaker West groups exist in parallel, with interactions being an exception throughout the first half of the third millennium BC. Only with the advent of the Bell Beaker period do we see a clear mixture of Funnel Beaker West and Corded Ware practices, both in the sphere of funerary rites and in selective deposition.

It must be stressed that such a parallel existence of Funnel Beaker West and Corded Ware groups is by no means unusual in a broader, European context. R. Iversen (2016; 2020) demonstrates that Funnel Beaker North and Corded Ware communities in Denmark follow a similar trajectory of parallel coexistence. This coexistence would lead to an elaborate “creolisation process” in which there is a continuation of Funnel Beaker North practices with Corded Ware material culture. Similarly, various European regions yield indications of parallel coexistence between older Neolithic societies and Corded Ware groups as distinct entities. Examples are the Bernburg, Globular Amphora and Schönfeld groups in central Germany (Furholt 2003a; Müller 2001; Wetzel 1979), as well as Globular Amphora settings in Poland (Włodarczak 2009; 2017; see also Müller this volume; Szymyt this volume) and the Vlaarding culture closer to home (Beckerman 2015).

The widespread occurrence of parallel societies in the third millennium BC can explain the increased admixture of Neolithic ancestry in Bell Beaker compared to Corded Ware individuals, as observed in recent aDNA studies (Papac *et al.* 2021). This resurgence implies the existence of groups with initially minimal interbreeding, who over time became increasingly mixed. The evidence for the existence of distinct Corded Ware and Funnel Beaker West practices in funerary and depositional domains with minimal cross-over would fit such a scenario.

At the same time, the present paper is a cautionary tale for overreliance on culture historical narratives in aDNA studies. A sample design which focuses on the classical exponents of traditional archaeological cultures is prone to underestimate variability. This is particularly problematic when a funerary practice which involves

cremation burials obscures the total genomic variability for a given region and period.

The precise nature of the (lack of) interaction between Corded Ware and Funnel Beaker societies remains open to interpretation (see Iversen 2020; Needham 2005 for discussions on possible scenarios). Crucially, these interpretations should not assume this process to be homogeneous for any given area. As this paper shows, minor, local exceptions relating to the choices of groups of mourners, or the practitioners of depositions, are key to the interpretation of the transition as a whole. This emphasises the importance of practices for understanding events in the third millennium BC and beyond. Systematic, detailed studies of funerary and depositional practices enable archaeologists to move beyond culture historical frameworks and to directly address the pivotal questions of the palaeogenetic revolution (Booth 2019).

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Appendix 1. List of Funnel Beaker culture and Corded Ware culture ¹⁴C dates and their archaeological context. FBC= Funnel Beaker culture; CW= Corded Ware culture.

Site	Lab code	Radiocarbon age	Sigma	Arch. culture	Association	Material	Source
Heek-Averbeck F25	GrN-11763	4980	60	FBC	From infill of grave with ceramics	Charcoal	Brindley 1986, 105; Lanting and Van der Plicht 2000, 65
Gittrup F440	GrN-12262	4920	70	FBC	From infill of grave with ceramics	Charcoal	Brindley 1986, 105; Lanting and Van der Plicht 2000, 66
Heek-Averbeck F34	GrN-11765	4890	80	FBC	From infill of grave with ceramics	Charcoal	Brindley 1986, 105; Lanting and Van der Plicht 2000, 66
Heek-Ammerter Mark F32	GrN-16492	4700	40	FBC	From grave with ceramics	Charcoal	Lanting and Van der Plicht 2000, 65
Heek-Ammerter Mark F1052	GrN-16494	4680	60	FBC	From grave with ceramics	Charcoal	Lanting and Van der Plicht 2000, 65
Schokland-P14	UtC-1921	4630	70	FBC	On decorated sherd	Charred residue	Lanting and Van der Plicht 2000, 67
Slootdorp-Kreukelhof	GrA-102	4570	30	FBC	From a TRB camp	Charred plants	Lanting and Van der Plicht 2000, 67
Heek-Ammerter Mark F1444/85	GrN-17308	4565	65	FBC	From central post in a house associated with ceramics	Charcoal	Lanting and Van der Plicht 2000, 65
Odoorn-D32 "vlakgraf"	GrN-2221	4550	80	FBC	From pit with ceramics, associated with megalith	Charcoal	Lanting and Van der Plicht 2000, 65
Schöppingen-Haidberg	GrN-16040	4550	60	FBC	From multiple cremation burial with ceramics	Cremation (human bone)	Lanting and Van der Plicht 2000, 65
Lavenstedt Ks FL. F	ERL 14449	4537	44	FBC	From occupation layer	Charcoal	Gerken 2012, 245 as quoted in Mennenga 2017, 311
Heek-Averbeck F4	GrN-9202	4520	35	FBC	From grave fill with a finds concentration incl. ceramics	Charcoal	Finke 1983 as quoted in Brindley 1986, 105; Lanting and Van der Plicht 2000, 65
Gittrup F707	GrN-12263	4490	60	FBC	From grave with ceramics	Charcoal	Brindley 1986, 105
Heek-Averbeck F38a	GrN-11766	4480	60	FBC	From infill of grave with ceramics	Charcoal	Finke 1983 as quoted in Brindley 1986, 105; Lanting and Van der Plicht 2000, 65
Emmeln 2	Poz-64311	4470	35	FBC	Find from megalith with ceramics from multiple phases	Charcoal	Menne 2018, 32–33
Dalen-Huidbergsveld	GrN-18785	4460	80	FBC	From coffin in a grave which contained ceramics	Charcoal	Kooi <i>et al.</i> 1989 as quoted in Lanting and Van der Plicht 2000, 66
Visbek Flachgrab 1	Poz 71757	4460	40	FBC	From stone packing grave, with ceramics and flint among stone packing	Animal bone	Mennenga 2017, 153, 312
Emmeln 2	Poz-64310	4440	30	FBC	Find from megalith with ceramics from multiple phases	Charcoal	Menne 2018, 32-3
Anlo-"Veekraal"	GrN-1855	4420	55	CW	From coffin with ceramics inside	Charcoal	Jager 1985 nr 26; Lanting and Van der Plicht 2000, 74; Waterbolk 1960

Site	Lab code	Radiocar- bon age	Sigma	Arch. culture	Association	Material	Source
Angelslo settlement pit 5	GrN-4200	4415	65	FBC	From pit with ceramics	Charcoal	Bakker and Van der Waals 1973 as quoted in Brindley 1986, 105; Lanting and Van der Plicht 2000, 66
Anlo	GrN-1824C	4410	60	FBC	From pit with ceramics	Charcoal	Waterbolk 1960; Brindley 1986, 105; Lanting and Van der Plicht 2000, 66
Heek-Averbeck F27	GrN-11764	4400	60	FBC	From infill of grave with ceramics	Charcoal	Finke 1983 as quoted in Brindley 1986, 105; Lanting and Van der Plicht 2000, 65
Leer-Westerhammerich cremation 620	GrA-15642	4390	60	FBC	From burial with ceramics	Cremation (human bone)	Lanting and Van der Plicht 2000, 67
Uddelermeer	GrM-26730	4387	27	FBC	Cremation with ceramics	Cremation (human bone)	Kroon (unpublished)
Glimmer Es	GrN-6156	4380	40	FBC	Charcoal concentration, from possible wall structure of a pit; pit contains ceramics	Charcoal	Brindley 1986, 105; Lanting 1975 as quoted in Lanting and Van der Plicht 2000, 66
Angelslo settlement pit 5	GrN-4201	4380	75	FBC	From pit with ceramics	Charcoal	Bakker and Van der Waals 1973 as quoted in Brindley 1986, 105; Lanting and Van der Plicht 2000, 66
Hunte 1	KIA-23204	4348	30	FBC	From vessel	Charred residue	Grootes 2007, 541–43 as quoted in Hamburg <i>et al.</i> 2011, 281–83, footnotes 8–10
Hunte 1	KIA-23207	4331	29	FBC	From vessel	Charred residue	Grootes 2007, 541–43 as quoted in Hamburg <i>et al.</i> 2011, 281–83, footnotes 8–10
Emmeln 2	Poz-68248	4330	35	FBC	Find from mega-lith with ceramics from multiple phases	Human bone	Menne 2018, 32–33
Zandwerven	GrA-116	4320	60	CW	On sherd	Charred residue	Lanting and Van der Plicht 2000, 78
Angelslo settlement pit 7	GrN-5767	4315	60	FBC	From pit with ceramics	Charcoal	Bakker and Van der Waals 1973 as quoted in Brindley 1986, 105; Lanting and Van der Plicht 2000, 66
Noordbarge	GrA-15459	4290	60	FBC	From burial with ceramics	Cremation (human bone)	Lanting and Van der Plicht 2000, 67
Leer-Westerhammerich cremation 68	GrA-14973	4275	45	FBC	From unfurnished burial	Cremation (human bone)	Lanting and Van der Plicht 2000, 67
Leer-Westerhammerich cremation 581	GrA-14088	4270	40	FBC	From burial with ceramics	Cremation (human bone)	Lanting and Van der Plicht 2000, 67
Hattermerbroek, Bedrijventerrein Hattermerbroek-Zuid	GrA-41638	4260	35	FBC	From vessel	Charred residue	Hamburg <i>et al.</i> 2011, 120
Nottuln	GrN-12414	4240	60	FBC	From layer in upper fill of a Michelsberg ditch with FBC ceramics	Charcoal	Eckert 1986 as quoted in Brindley 1986, 105; Lanting and Van der Plicht 2000, 66
Dalfsen cremation grave 135	Poz-88702	4240	35	FBC	From burial	Cremation (human bone)	Bouma and Van der Velde 2022, 35
Leer-Westerhammerich	Hv-21411	4235	70	FBC	From burial with ceramics, associated with GrA-13706 and GrN-24682	Charcoal	Lanting and Van der Plicht 2000, 67
Leer-Westerhammerich cremation 580	GrA-14095	4235	40	FBC	From burial with axe	Cremation (human bone)	Lanting and Van der Plicht 2000, 67

Site	Lab code	Radiocar- bon age	Sigma	Arch. culture	Association	Material	Source
Emmen-Angelslo flat grave 14	GrA-16021	4230	60	FBC	From burial with ceramics	Cremation (human bone)	Lanting and Van der Plicht 2000, 66
Hattermerbroek, Bedrijventerrein Hattermerbroek-Zuid	GrA-41639	4230	35	FBC	From vessel	Charred residue	Hamburg <i>et al.</i> 2011, 120
Emmen-Angelslo flat grave 3	GrA-13958	4220	50	FBC	From burial with ceramics	Cremation (human bone)	Lanting and Van der Plicht 2000, 66
Emmeln 2	Poz-68249	4220	35	FBC	Find from megalith with ceramics from multiple phases	Human bone	Menne 2018, 32–3
Noordbarge-Hoge Loo	GrN-6724	4210	40	CW	Lower infill of a burial with battle axe	Charcoal	Lanting and Van der Plicht 2000, 75
Leer-Westerhammerich cremation 578h	GrA-14093	4205	40	FBC	From burial with multiple cremations and ceramics, associated with GrA-14086	Cremation (human bone)	Lanting and Van der Plicht 2000, 67
Dalfsen cremation grave 135	Poz-88040	4205	35	FBC	From burial	Cremation (human bone)	Bouma and Van der Velde 2022, 35
Emmen-Angelslo flat grave 1	GrA-13705	4200	50	FBC	Cremation with sherds in infill	Cremation (human bone)	Lanting and Van der Plicht 2000, 66
Leer-Westerhammerich cremation 585	GrA-14089	4190	35	FBC	From burial with ceramics	Cremation (human bone)	Lanting and Van der Plicht 2000, 67
Leer-Westerhammerich cremation 602	GrA-12394	4180	70	FBC	From burial with ceramics	Cremation (human bone)	Lanting and Van der Plicht 2000, 67
Leer-Westerhammerich cremation 578b	GrA-14086	4170	40	FBC	From burial with multiple cremations and ceramics, associated with GrA-14093	Cremation (human bone)	Lanting and Van der Plicht 2000, 67
Leer-Westerhammerich cremation 600	GrA-14168	4170	40	FBC	From burial with ceramics	Cremation (human bone)	Lanting and Van der Plicht 2000, 67
Leer-Westerhammerich cremation 604	GrA-13706	4170	50	FBC	From burial with ceramics, associated with Hv-21411 and GrN-24682	Cremation (human bone)	Lanting and Van der Plicht 2000, 67
Ede-Hotel Bosbeek	GrN-6129	4165	55	CW	From infill of grave furnished with a CW beaker, a flint blade and a faceted battle axe. Charcoal concentration especially in western end along the side of the grave pit	Charcoal	Modderman 1954, 41–44 as quoted in Lanting and Van der Plicht 2000, 75
Vaassen Tumulus III	GrN-6369	4165	40	CW	Charcoal concentration from infill of ditch around a disturbed grave furnished with a battle axe and a flint blade, and probably a CW beaker and a greenstone axe	Charred twigs	Lanting and Van der Waals 1971 as quoted in Lanting and Van der Plicht 2000, 75

Site	Lab code	Radiocar- bon age	Sigma	Arch. culture	Association	Material	Source
Annen-Holtkampen	GrN-11918	4165	30	CW	From infill of a grave furnished with a CW beaker. A ZZ beaker was found higher up in fill	Charcoal	Lanting and Van der Plicht 2000, 76
Emmen-Angelslo flat grave 4	GrA-13600	4160	50	FBC	From burial with ceramics	Cremation (human bone)	Lanting and Van der Plicht 2000, 66
Emmen-Angelslo	GrN-6644	4160	30	CW	From post in burial with ceramics	Charcoal	Drenth and Lanting 1991, 110 as quoted in Lanting and Van der Plicht 2000, 76
Leer-Westerhammerich	GrN-24682	4150	50	FBC	From burial with ceramics, associated with GrA-13706 and Hv-21411	Charcoal	Lanting and Van der Plicht 2000, 67
Angelslo flat grave 3	GrN-2370	4145	100	FBC	From cremation burial with ceramics	Charcoal	Bakker and Van der Waals 1973 as quoted in Brindley 1986, 105; Lanting and Van der Plicht 2000, 67
Eext - tumulus Visplas	GrN-6727	4145	30	CW	From post in feature surrounding burial with ceramics	Charcoal	Lanting and Van der Plicht 2000, 75
Leer-Westerhammerich cremation 602	GrA-14169	4140	40	FBC	From burial with ceramics	Cremation (human bone)	Lanting and Van der Plicht 2000, 67
Leer-Westerhammerich cremation 203	GrA-14090	4140	40	FBC	From unfurnished burial	Cremation (human bone)	Lanting and Van der Plicht 2000, 67
Maarn-De Halm	GrN-7802	4140	50	CW	Charcoal concentration from ditch of a "beehive grave" furnished with a CW beaker, a flint axe, a flint blade and a battle axe	Charcoal	Lanting and Van der Plicht 2000, 75
Emmen-Angelslo flat grave 5	GrA-13599	4130	50	FBC	From burial with ceramics	Cremation (human bone)	Lanting and Van der Plicht 2000, 67
Keinsmerbrug	GrA-48396	4130	60	CW	From occupation layer	Charred grain	Smit 2012, 21 as quoted in Fokkens <i>et al.</i> 2016, 87
Angelslo flat grave 14	GrN-5070	4100	30	FBC	From cremation burial with ceramics	Charred sticks	Bakker and Van der Waals 1973 in Brindley 1986, 105
Zeewijk-West	GrA-56014	4100	40	CW	From vessel	Charred residue	Smit 2014, 35 in Fokkens <i>et al.</i> 2016, 80
Hattermerbroek, Bedrijventerrein Hattermerbroek-Zuid graf 3	GrA-41646	4075	30	CW	From infill of grave of one or more individuals (one the basis of discolorations, no skeletal elements preserved), perhaps placed on bed of twigs, with two CW beakers, a flint axe, a pseudo-Grand Pressigny dagger, 6 flint flakes and a flint blade; in upper fill a sherd, 2 flint cores and a Bell Beaker	Charcoal	Hamburg <i>et al.</i> 2011, 125 as quoted in Fokkens <i>et al.</i> 2016, 146 tab. 7.7
Baarn-De Drie Eiken	GrA-14965	4065	45	CW	From burial with ceramics	Cremation (human bone)	Lanting and Van der Plicht 2000, 76

Site	Lab code	Radiocar- bon age	Sigma	Arch. culture	Association	Material	Source
Aartswoud	GrN-12015	4055	40	CW	From ash layer in occupation layer	Charcoal	Lanting and Van der Plicht 2000, 78
Zeewijk-West	GrN-56013	4030	40	CW	On ceramic vessel	Charred residue	Smit 2014, 35 as quoted in Fokkens <i>et al.</i> 2016, 80
Keinsmerbrug	GrA-47383	4025	40	CW	From occupation layer	Charred grain	Smit 2012, 21 as quoted in Fokkens <i>et al.</i> 2016, 87
Eexterhalte	GrA-12384	4005	60	CW	From burial with flint	Human bone	Harrema 1977 as quoted in Lanting and Van der Plicht 2000, 76
Keinsmerbrug	GrA-47380	4000	40	CW	From occupation layer	Charred grain	Smit 2012, 21 as quoted in Fokkens <i>et al.</i> 2016, 87
Keinsmerbrug	GrA-47381	3995	40	CW	From occupation layer	Charred grain	Smit 2012, 21 as quoted in Fokkens <i>et al.</i> 2016, 87
Keinsmerbrug	GrA-47377	3970	40	CW	From occupation layer	Charred grain	Smit 2012, 21 as quoted in Fokkens <i>et al.</i> 2016, 87
Keinsmerbrug	GrA-47382	3965	40	CW	From occupation layer	Charred grain	Smit 2012, 21 as quoted in Fokkens <i>et al.</i> 2016, 87
Eext-Bergakkers	GrN-6349	3945	40	CW	From coffin with ceramics inside	Charcoal	Lanting and Van der Plicht 2000, 75
Eext-Galgwanderveen	GrN-6635	3940	40	CW	From charred wooden coffin in burial with ceramics	Charcoal	Jager 1985, nr 34 as quoted in Lanting and Van der Plicht 2000, 75
Eext-Galgwanderveen	GrN-6368	3935	35	CW	From charred furnishing of burial with ceramics	Charcoal	Jager 1985, nr 34 as quoted in Lanting and Van der Plicht 2000, 75
Zeewijk-West	GrN-15565	3925	40	CW	Fragment from occupation layer	Bone (species indet)	Lanting and Van der Plicht 2000, 79; Smit 2014, 35 as quoted in Fokkens <i>et al.</i> 2016, 80
Puttershoek-Sportlaan	GrA-12299	3920	60	CW	From ceramic vessel	Charred residue	Lanting and Van der Plicht 2000, 79
Zeewijk-Oost	GrN-18488	3910	50	CW	Outer ring of oak posts from house plan	Worked wood	Lanting and Van der Plicht 2000, 79; Smit 2014, 35 as quoted in Fokkens <i>et al.</i> 2016, 80

