Making Sense of Social Behavior from Disturbed and Commingled Skeletons: A Case Study from Çatalhöyük, Turkey

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The Neolithic site of Çatalhöyük in Anatolia, Turkey, is well known for its size (~13 ha), long occupation (~1,400 years), mud-brick architecture with plastered house walls and floors, decorated buildings (painted walls, elaborate installations), figurines, and intramural burial practices. Dated from 6000 to 7400 B.C.E., Çatalhöyük was once a thriving Neolithic village of 3,500–8,000 people who lived in houses built atop older ones, creating a human-made mound physically linking one house to another through time (Cessford, 2005; Hodder, 2007). The dead were kept close to the living at Çatalhöyük by burying them within the houses. The occupants of the houses continued their daily activities above the floors while the dead occupied the space under the floors. The two worlds of life and death coexisted in Çatalhöyük houses, and through their burial customs and social rituals, the living continued to interact with the dead post-interment.

The burial customs of the Çatalhöyük people have been the focus of attention since the late James Mellaart (1967) famously, but erroneously, suggested that skeletal excarnation occurred prior to the interment of the secondary skeletons under the house floors of Çatalhöyük. In fact, the excavations at Çatalhöyük since 1995 demonstrate that the majority of the human remains found in the houses were primary interments, albeit often disturbed, and fewer were secondary depositions. Less commonly, individuals were interred in foundation deposits, middens, and the external areas near the buildings. Many loose and disarticulated bones have been found in both grave and non-grave contexts throughout the site.

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A.J. Osterholtz et al. (eds.), *Commingled and Disarticulated Human Remains: Working Toward Improved Theory, Method, and Data*, DOI 10.1007/978-1-4614-7560-6_2,

Intramural burial customs were commonly practiced at other contemporary Neolithic sites around the region, such as Çayönü, Bademağacı, Aşıklı Höyük, Körtiktepe, and Nevali Çori (Duru, 2005; Esin & Harmankaya, 2007; Hauptmann, 1999, 2007; Özdoğan, 2007a; Özkaya et al., 2008; Özkaya & San, 2007),with a few exceptions including PPNA Hallan Çemi (Rosenberg, 2007). However, at Çayönü and Abu Hureyra (Moore & Molleson, 2000; Özbek, 1986; Özdoğan, 2007b; Özdoğan & Özdoğan, 1998; Talalay, 2004), nonresidential buildings were used to bury people. At other sites such as Ilıpınar and Menteşe, the graves were in a large, nonresidential space that lacked the regularity and organization of a cemetery (Roodenberg & Roodenberg, 2007a, 2007b; Roodenberg-Alpaslan, 2008). The burial preferences at many Anatolian sites have resulted in a great deal of commingled bones, making the issue of mixed assemblages a general problem for this region during this time period.

Çatalhöyük contains an abundance of commingled remains in large measure because of their intramural burial customs. For instance, the Çatalhöyük people reused the same space in the houses for interment on a continual basis, often encountering previously interred skeletons as they dug the graves. In addition, as part of their burial customs, they routinely engaged in dismemberment and bone retrieval, actively collecting bones and body parts, and later intentionally depositing some of these partial skeletons or elements as secondary interments. Some burials were disturbed at a maximum level while others were left alone or only mildly displaced. By deciphering the flow of bones in and out of the grave during the life of the house, the interactions of the Çatalhöyük people with their dead before and after interment can be traced. One goal of this chapter is to untangle the commingled human remains in order to understand the social responses of the Çatalhöyük community to death and to the dead in various states of decomposition which they routinely confronted post-interment.

Neolithic activities are one source of disturbance to the burials at Çatalhöyük, but other factors contribute to the large amount of scattered and mixed bones on the site. The upper layers of the east mound at Çatalhöyük have been altered by considerable erosion, particularly on its slopes, and by the use of the mound as a cemetery by post-Neolithic people, including Roman, Byzantine, and early Selçuks (Cottica, Hager, & Boz, 2012). Burrowing animals have had a negative impact on the mound, especially at its core.

Tracing the Movement of Bones

The intramural interment of the deceased at Çatalhöyük did not end the interaction of the living with their dead. Many locations in the house were used for interment, but some areas were more heavily used than others. The platforms and central floors in many buildings, for instance, were opened and closed several times for multiple burial events over the life of the house. When other dead people were encountered in the same grave area, those digging the grave had to make choices. Once confronted with a body, did they avoid a skeleton or did they disturb it? Did they leave some or all of the bones in the grave pit or did they take them outside the grave? Did they put more bones in the open grave, adding secondary skeletal elements, or did they close the grave immediately after the last interment?

Table 1 Depositional categories at Çatalhöyük

Primary	A complete or nearly complete articulated skeleton found in its original place of interment
Secondary	A partial or complete skeleton moved from its original interment location, then redeposited in a different location
Tertiary	Loose, scattered, disarticulated human bones unrelated to burial contexts
Primary disturbed	A complete or partially articulated skeleton found in its primary location but disturbed from its original position during another interment or during bone retrieval event(s)
Primary disturbed loose	Loose, scattered, and disarticulated human bone that is found in contexts related to interment
Unknown	Inadequate contextual data for determination of deposition

The complicated movement of human bones post-interment by the people at Çatalhöyük dictated the use of customized depositional categories for the skeletal remains.[1] Starting with the three depositional categories used by Andrews, Molleson, and Boz (2005) for Çatalhöyük burials (primary, primary disturbed, and secondary), three additional categories were recognized: primary disturbed loose, tertiary, and an unknown category (Table 1) (Boz & Hager, in press). Primary burials are skeletons found undisturbed in situ, primary disturbed burials are found partially in situ and partially disturbed, and secondary interments are skeletons or skeletal elements that were intentionally redeposited into a grave after having been originally buried or curated elsewhere. The primary disturbed loose bone category was created to identify the bones stemming from the in situ disturbance to primary individuals. The post-excavation analysis clearly demonstrated that many, if not all, of the loose bones in the grave fill could be refitted to the primary disturbed skeleton(s) lying partially articulated in the grave. Large and complicated burial pits with a considerable number of loose bones proved more difficult to refit due to time and lab space constraints. The primary disturbed loose bone category was added to specifically address issues related to the minimum number of individuals in each burial pit.

Tertiary bones are unassigned bones found mainly outside of the grave, mostly in isolated contexts, buried without intention. This category includes loose bones and, less frequently, articulated parts of bodies. These bones are scattered in non-burial contexts including midden deposits, building fill deposits, and in-construction materials. Some of the loose bones in grave fills may have reentered the grave pit as tertiary bones. An unknown was also included for the small number of bones without contextual data, mainly due to issues of erosion or Post-Neolithic disturbance.

The archaeological context and post-excavation analysis of the human remains clarify the flow of the human bones in and out of the graves during the life of the typical Çatalhöyük house (Fig. 1). When a primary interment was disturbed, the body/skeleton or its parts were moved and/or taken, but the partial skeleton, still articulated, often stayed in the grave, becoming a primary disturbed interment. The skeletal elements disarticulated from the body or skeleton moved in two directions

[1] Recovered from 1999 to 2010.

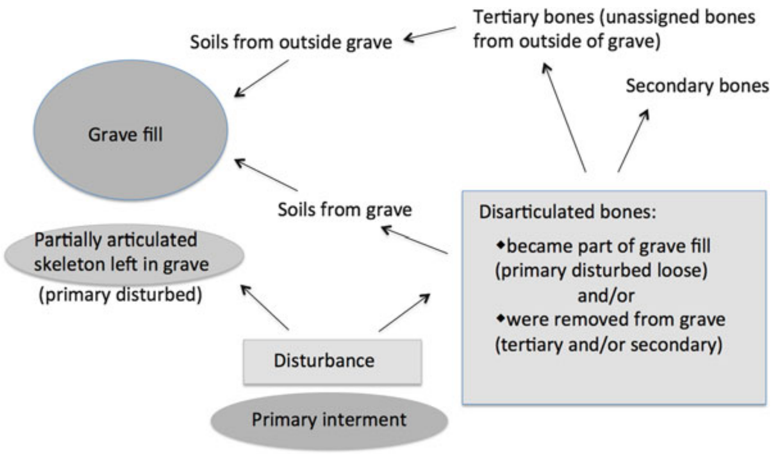

Fig. 1 Flow of human bones in and out of the grave during the life of the Çatalhöyük house

that were not necessarily mutually exclusive. First, some or all of the loose bones joined the soils from the grave and became part of the grave fill surrounding the partial skeleton and any other skeletons still in the grave pit. These bones were identified as "primary disturbed loose bones." Secondly, some or all of the disarticulated bones from the primary burial were removed from the grave pit to be used as secondary context elements. Less care was afforded to other bones coming out of the grave pit, many subsequently dropped or discarded, ultimately becoming tertiary bones. Tertiary bones might reenter the grave pit when soils from outside the grave were brought in by human actions as grave fill and/or by the activities of burrowing animals. Secondary elements could also reenter the grave pit through human deliberate action.

The intramural burials at Çatalhöyük generally reveal a high level of disturbance to the primary interments where many, but not all, of the skeletons were impacted, some several times. With multiple disturbances, the grave fill became increasingly mixed and churned over time, containing many primary disturbed loose bones and some tertiary bones from outside soils. Ultimately the integrity of the grave fill for each individual was lost. The customized depositional categories used in the study take into account the specific conditions of past human interaction that resulted in the commingled remains at Çatalhöyük.

Determining MNI

Observed MNI

The complicated deposition and redeposition of the human remains at Çatalhöyük presented a challenge to the determination of the minimum number of individuals (MNI) from the site. The Çatalhöyük Human Remains Database (access-based) was designed to code information for a number of variables for each bone and/or skeleton. The variables include a bone inventory where bones are marked present or absent, fragmented, or complete, and the bone preservation and bone condition are noted. Age and sex information are recorded as codes whenever sex determination was possible (Hillson et al., in press). The bone inventory has a link to all of the context information from the excavation and specialist databases. The 2,017 entries in the Çatalhöyük Human Remains Database range from complete skeletons to single loose bones, and therefore, they do not correspond to 2,017 discrete individuals.[2] The first task was to determine how many of these entries represent separate interred individuals and how many entries represent the disarticulated, scattered bones of disturbed individuals.

During excavation and at lifting, the depositional categories of the skeletons and loose bones were documented. On post-excavation analysis, the MNI was calculated and the depositional category confirmed by examination of the bones for the duplication of elements, and of the age, sex, and size criteria that discriminate between individuals. The six depositional categories were separated in two subgroups: (1) primary, primary disturbed, and secondary skeletons which represent the number of individuals that were observed to be interred on the site and (2) tertiary and primary disturbed loose bones which represents the disarticulated bones recovered from Çatalhöyük. The tertiary category was excluded from the first subgroup because it represents unprovenienced bones, occupying soils without intention, from skeletons potentially counted already in the MNI calculation. The primary disturbed loose bone category was excluded from the first subgroup because these bones are from individuals who have already been counted as primary disturbed skeletons. The exclusion of the primary disturbed loose bones from subgroup 1 was a cornerstone of the MNI calculation as an explicit attempt to avoid inflation of the primary disturbed individuals in the sample. All bones in the category of unknown contexts were excluded from the study.

The primary, primary disturbed, and secondary depositional data (subgroup 1), combined with the post-excavation analysis of the skeletons, produce an MNI of 384 Neolithic individuals recovered from the east mound of Çatalhöyük. The tertiary bones and primary disturbed loose bones (subgroup 2) were found in high absolute numbers ($n = 1{,}633$), aptly demonstrating the considerable movement of bones throughout the site.

Computerized MNI

A computerized determination of the MNI based on the entries into the Çatalhöyük Human Remains Database was attempted as a means to simplify the process of MNI calculation when large numbers of commingled bones were found, a situation common to the large, substantial burial pits that have been excavated at Çatalhöyük.

Diagnostic zones (DZs) are a way of standardizing the counts of bones for the MNI that has been used for faunal assemblages (Russell & Martin, 2005; Watson,

[2] All data are based on queries completed August 2010.

1979). The principle of the DZ technique is to count only recognizable parts or zones of a particular bone. These zones were counted when more than half of the zone was present. In fragmentary collections, the use of the DZ prevents counting the same bone more than once. For this study, three zones exist for the long bones: proximal, shaft, and distal. These zones were recorded in the Çatalhöyük Human Remains Database as complete, fragmented, or absent but without further comment on the state of fragmentation. Due to the constraints of the database on this last issue and to avoid potential counting errors resulting from the duplication of elements, the computerized MNI only counted the bone(s) when the diagnostic zone was complete. Loose teeth, ribs, and small finger bones of the hands and feet were also excluded from the query.

In most instances, the computerized MNI and the observed MNI resulted in the same MNI determination. A few differences in the MNI from each technique proved to be instructive because they point to the strengths and weaknesses of the two MNI calculations. For example, in Building 1, a large house in the North Area of the site, the computerized MNI is 34 while the observed MNI yields 58, representing the greatest level of discrepancy between the two MNI techniques in the sample. Since the number of burials observed in the field was more closely aligned with the higher number (58), the underrepresentation of individuals in the computerized MNI (34) is inaccurate in this building. Upon examination, the computerized MNI missed several individuals due to the level of fragmentation of the commingled remains that characterized the complicated burials in Building 1. The computerized MNI should be helpful when studying large and commingled samples because the technique takes into account all the bones that are recovered from the site whether they were found in a burial context or not. However, for this study, the computerized MNI was not able to adequately calculate fragmented bones in all instances, and therefore, the current configuration of the MNI calculation from the database needs improvement to accurately count fragmentary skeletons, focusing first on recording the level of fragmentation of the diagnostic zones.

By contrast, in Buildings 3 and 44, the computerized MNI exceeded the observed MNI by one individual, suggesting that the observed MNI based on the archaeological context and laboratory analysis was incorrect. When the skeletal samples in each house were scrutinized, it was plausible that another individual had been interred without any in situ evidence in the grave pit due to a high level of disturbance. On the other hand, the known flow of tertiary bones into the grave pit through the introduction of new grave fill means that the bones from the "extra" individual in Buildings 3 and 44 could be tertiary bones from the imported soils. In most instances, the observed MNI gives the number of skeletons accurately when field and laboratory information are combined and the skeletons are fully contextualized. Underestimation due to the exclusion of isolated bones or tertiary bones is the main weakness of the observed MNI technique.

Deposition, Age, and Sex

Recent work at Çatalhöyük confirms that the majority of depositions were primary single interments (Andrews et al., 2005; Boz & Hager, in press), although many of these same interments were partially disturbed post-interment. Loose human bones

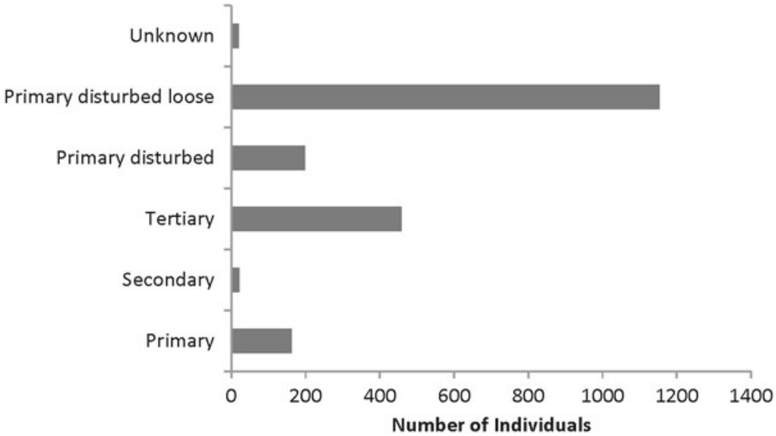

Fig. 2 Distribution of Çatalhöyük human bones by depositional categories

in primary disturbed contexts account for the majority of disarticulated human skeletons found at the site (57 %, $n=2{,}017$) (Fig. 2). The large number of loose bones from grave contexts reflects the numerous times previously interred individuals were disturbed as a result of multiple burials events in the same location, a common and regular burial practice at Çatalhöyük. Burials containing multiple individuals interred in a single burial event occurred rarely. Tertiary bones are the next highest category of recovered bones (23 %), indicating how much of the human bone on the site has been moved from primary interments to non-burial contexts by humans, Neolithic and post-Neolithic, and animals over the course of 1,400 years.

The primary disturbed individuals (52 %) comprise the majority of the three depositions in subgroup 1 (MNI = 384), followed by primary deposition individuals (42 %). Secondary interments, while often striking and memorable, account for a minority of the individuals (6 %) recovered thus far.

When age categories from all depositions are examined ($n=1{,}894$), the adults are represented in higher percentages than other age groups (67 %) (Fig. 3). The "adult" category, that is, individuals of adult status (post-20 years) who could not be further designated, were found predominantly in tertiary, unknown, and primary disturbed contexts. A different pattern is seen when only primary, secondary, and primary disturbed deposition age categories are viewed ($n=384$). In these three depositions, subadults represent a higher percentage (56 %) of the sample relative to the adults (46 %). Many of these juveniles were neonates, infants, and children (90 % of juveniles, $n=214$). Adults of all ages were dying and surviving in nearly equal numbers although middle adults are more common in the sample than younger and older adults. In secondary depositions, adults (mainly middle adults) and juveniles (mainly children) have been recovered in nearly equal numbers.

Sex was difficult to determine for many of the adults, and an assessment was not attempted for the juveniles who were too young for accurate sex determination. When all depositions are included ($n=1{,}598$), the adults for whom sex could not be determined dominate the sample (51 %), and there are a large number of youths in the

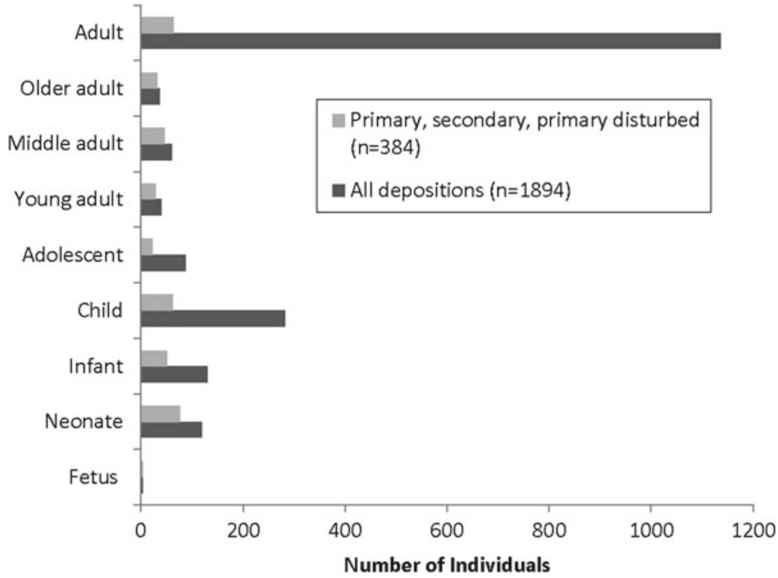

Fig. 3 Age categories by deposition

sample (38 %). Examination of only primary, primary disturbed, and secondary skeletons ($n=384$) for sex reduces the amount of indeterminate adults in the sample (14 %) while maintaining a relative large number of juveniles of unknown sex (54 %). Adult females (17 %) slightly outnumber the adult males (15 %) in the sample.

Locations of Graves in the Houses

The analysis of the MNI by buildings reveals an interesting aspect of Çatalhöyük intramural burials: the number of interments in the houses varies significantly. Not surprisingly, the houses with the largest number of interments demonstrated the most pronounced amount of disturbance to the previously interred human skeletons, resulting in sizeable areas of commingled remains. In the North Area, Building 1 contained the largest number of individuals ($n=58$) while the adjacent Building 3, also a relatively large building, had eight ($n=8$) individuals interred within it. Additionally, two skulls were deposited secondarily, likely at the time of house abandonment (Hager & Boz, 2012). By contrast, Building 49, a relatively small house by Çatalhöyük standards, had 15 individuals buried within it, most in two northern platforms. In the South Area, Building 50 yielded the largest number of interments ($n=15$), followed by Building 65 ($n=13$), and Buildings 6 and 44 ($n=10$). Yet, other buildings had no burials (Building 2) or a relatively low number of interments (Building 79). These MNI data from the North and South Areas indicate that residence in the house did not guarantee interment in the house. Some houses, like

Building 1 with its large number of interments and Building 2 with no interments, clearly show that other factors were involved in the interment decisions within specific houses. Pilloud and Larsen (2011) found that the dead in a single house may or may not have been kin-related ancestors based on metric and non-metric dental traits. They found that the occurrence of specific dental morphologies did not correlate with the choice of building in which the individuals were interred and that based on phenotypic similarities, there was no evidence of any clustering of dental traits in individuals buried in houses which were spatially close. Pilloud and Larsen conclude that the social structure at Çatalhöyük may have been centered on the house as a unifying structure as opposed to biological relatedness. Additional work needs to be done on the biological relatedness of the residents of Çatalhöyük to corroborate these results.

Since the use and reuse of the same space for interment in the houses contributed greatly to the displacement of the human bones, a closer look at the locational data was undertaken. Çatalhöyük is strikingly uniform in the layout of the Neolithic house and in the similarity of the functional divisions of the house. While conformity was the rule, both vertically and horizontally, some important variations did exist relative to building size, decorative elaboration, interior installations, and other interior factors (Hodder, 2007). Given that the houses conformed to a similar pattern, not only in structure but also in function, the distribution of the Çatalhöyük interments was examined in the different areas of the house.

The typical Çatalhöyük house was comprised of a main room that was functionally divided into specific areas. A rooftop entrance incorporated a ladder located at the southeast corner of the main room. In the south, under the roof opening, were the ovens and hearths that were associated with cooking and the preparation of foods and other resources. Raised platforms characterized the houses, and they were frequently located in the north and east of the central room. Many houses, but not all, had side rooms with thresholds open to the main room. These smaller rooms served primarily as food storage areas, having yielded numerous paleobotanical samples during excavation (Twiss et al., 2009). The external areas, the side yards and open spaces immediately around the buildings, had a small number of interred individuals. Foundation deposits, also containing intentionally interred individuals, refer to the base construction layers of the building.

The intramural burials have been found in all areas of the house although the greatest number of individuals was interred in the central room of the building, including both males and females, and all age groups (Fig. 4). Within the central room, the raised platforms were often used for interment and, in many instances, repeatedly opened and closed for multiple burial events, resulting in a large quantity of commingled remains over time. The northern and eastern platforms were favored for burial of the dead over the other platforms. In addition to the platforms, the central floors were used for interment. Infants and neonates were the most varied in their burial localities. Found in the platforms and central floors like the adults, neonates and infants were also interred in less common areas near ovens and other southern localities where few adults have been found.

Two locations are of particular interest because the interments are dominated by the presence of neonates: side rooms and the foundation layers of buildings. These

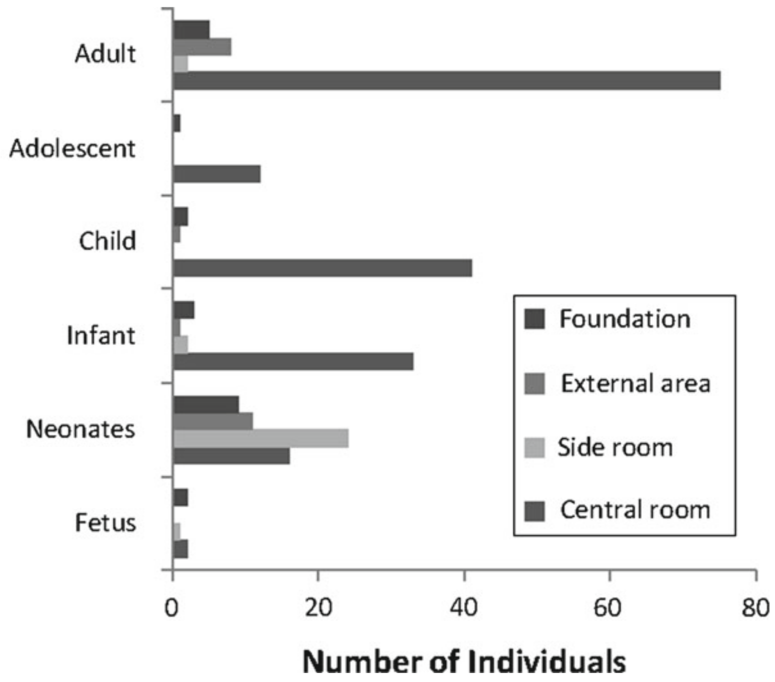

Fig. 4 Location of interments in or near Çatalhöyük buildings by age

locations are also similar because, for the most part, the burials were not disturbed post-interment and thus lack commingled remains and because no males have been found interred in the side rooms or foundation layers.

The majority of the side room burials (83 %) were neonates. The interment of the newborns in these small rooms, mainly without disturbance, suggests that the small spaces played an important role in the life of Çatalhöyük parents, possibly the women above all, when a newborn died. Why bury the youngest of the dead in the side rooms? Certainly, the newborn's grave would be near the central room but not in it, away from busiest areas of the house but close by. The lack of disturbance and any subsequent commingling of the neonatal bones suggest a specific memory of the graves. In addition, the small side rooms may have afforded privacy to the parents in the event of the death of a newborn, perhaps becoming a place of solace or refuge. The side rooms mainly contained food items, and domestic activities were clearly focused in these rooms. Patton and Hager (in press) and Gifford-Gonzalez (2007) suggest that there may be a link between the storage areas, a viewpoint that food is life, and the unrealized life potential of the newborns. Interment of the newborn within the domestic sphere of the houses might be related to the transformation of foodstuffs into life, just as newborns transform into adults.

The high proportion of juveniles (73 %) in foundation layers ($n = 22$) in the upper levels of Çatalhöyük compared to other age groups, and newborns (41 %) especially, supports the viewpoint that newborns might represent the potentiality of the life, both for the house and for those who occupied it. As in the side rooms, all of the adult foundation burials were females or possible females, perhaps reflecting a link to house construction and new life. Practicality and a convenient place to bury the newborns with a minimum of grave digging may explain the interment of neonates in foundation deposits over other age groups. The death of a newborn might have coincided with the construction of a new house, although conversely, it could also be argued that the construction of the house may have begun with the death of a neonate.

The external areas and middens have also yielded several neonates and fewer adults, mainly older ones. In these extramural areas near the buildings, adult males but no adult females have been found. The disposal of the body extramurally rather than in the house indicates differential treatment of the dead at the site. While it is clear that some individuals were given much care and attention and that others appear to have been discarded, perhaps carelessly in some instances, especially in these external areas, it remains unclear what discriminating factors contributed to the interment decisions. Social factors, issues of health, cause of death, and/or group membership outside of the community could have come into play in the decisions surrounding death and the disposal of the body.

The locational data from the Çatalhöyük houses demonstrate how interment decisions impacted the integrity of the dead body or skeleton over time for adults and juveniles and males and females. Intramural burial practices at Çatalhöyük offered limited amounts of space in concert with a preference for certain areas of the house for interment. With repeated disturbances and interactions with the deceased, the burial practices contributed substantially to the dispersal of human bones on the site.

Dismemberment

Another major source of human bone dispersal at Çatalhöyük was the practice of dismemberment. Numerous examples of fully articulated arms, hands, legs, and feet have been found dispersed in various grave and non-grave contexts. Skeletons with the heads removed post-interment and solitary skulls have been found at Çatalhöyük, but in the majority of cases, the skulls and headless bodies could not be matched. An analysis of the sample of headless bodies shows no preference for age although there is no evidence for taking the skulls of neonatal or preterm skeletons. However, more adults than juveniles had their heads taken. By sex, more males have been found headless than females. When the solitary skulls are examined, there was no particular preference for any age, although the skulls of neonates have not been found in isolated contexts. Solitary skulls, where sex is based solely on cranial and mandibular traits, suggest that more males than females had their heads taken.

Evidence for cut marks on the human bones is relatively rare at Çatalhöyük given the amount of human bones taken from the bodies (Andrews et al., 2005; Human Remains Archive Reports from Çatalhöyük, 1999–2009). The lack of cut marks and the presence of fully disarticulated elements suggest that many of the loose body

Fig. 5 An example of dismemberment at Çatalhöyük: the secondary interment of a partial older woman from Building 49. Photo courtesy of the Çatalhöyük Research Project

parts were separated after complete decomposition of soft tissues had occurred. Even so, there are examples from Çatalhöyük where articulated body parts were separated from the rest of the body in a manner that demonstrate deftness in their bone retrieval abilities. A striking example of their surgical skill during dismemberment was the last burial of Building 49, an older woman buried in the central floor where it abutted the northwest platform containing the interred remains of nine individuals (Fig. 5). For this last house burial, all that was present in the well-defined grave was the articulated head, mandible, and torso of the older woman. The grave was devoid of extraneous, loose human bones, including those missing from the woman. Her grave indicated that dismemberment took place at a different locale when her body was partially decomposed and that she was secondarily deposited under the floor of the house, already dismembered. The bones of her shoulders (scapulae and clavicles), arms, and legs had been cleanly removed, leaving no cut marks on the articulated bones of the torso, head, or mandible. This individual represents an example of intentional dismemberment prior to interment, rather than a disturbance to an intact primary burial, and demonstrates an intimate knowledge of human anatomy.

In another example, the skillful removal of an adult man's skull (F. 492) from his body did result in cut marks on the first cervical vertebra (C1) that remained in articulation with the base of the skull (Andrews et al., 2005). At the time of skull removal, at least some soft tissues were holding the skull and vertebrae in articulation. The person taking the skull clearly knew how to take it between C1 and C2 with a minimum disturbance to the rest of the body.

Fig. 6 Figurine from Istanbul Area of East Mound of Çatalhöyük, side view. Photo courtesy of the Çatalhöyük Research Project

Other similar examples exist in the Çatalhöyük burial sample demonstrating not only familiarity with the skeleton but also the relative importance of human skeletal elements in the Çatalhöyük culture more broadly. In their material culture, the skeleton can also be found, such as a figurine carved with images conjuring up themes of birth and death on opposing sides of a headless figure (Fig. 6). On the back of this figurine, skeletal parts were precisely carved: ribs connected to vertebrae, scapulae correctly floating on the upper back, and individual pelvic bones holding the weight of the torso. The front of the figurine is highly suggestive of a late-term pregnant female, raising questions on how the Çatalhöyük people may have viewed birth and death, perhaps understanding that they lie on the same continuum.

Bone retrieval was an integral part of Çatalhöyük burial customs. When and why did they reclaim the bones? The archaeological context of the burials indicates that bone retrieval was always intentional but not always planned. At the interment of a newly deceased person, the removal of the skull or bony elements from the previously interred may have occurred without the specific intention of opening the grave for those bones. On the other hand, the Neolithic people might have anticipated doing both once the grave cut was made. In other cases, the removal of the body parts was clearly intentional and planned as evidenced by the specificity of their actions and of the bones taken from the grave.

The repeated opening of the graves and the fact that the typical Çatalhöyük house was occupied for ~75–80 years (Cessford, 2005) strongly suggest that a social memory of the burial locations existed. Evidence to support the memory of specific graves includes not only the neonates in the side rooms but also crowded platforms where disturbance had not occurred. In Building 49, for instance, the northeast platform had five juveniles sequentially buried in close proximity to each other, some in tightly constrained graves and with none disturbing the other; this was a surprising finding given the relatively small size of the platform. Moreover, the movement of specific bones between houses clearly demonstrates a social memory of some of the individuals beneath the floors. In two related buildings, for instance, there is evidence that the Neolithic people removed body parts from one house to specifically add to the deposits of the house built directly above it. At the abandonment of Building 65, an older building, the Neolithic people retrieved bones from two individuals and then later placed these bones into the new house, Building 56, thus creating a physical and ancestral link between the houses.

Kuijt (2008) suggests that individuals could lose their named individuality after two to three generations, the living having little connection to the previously dead as specific individuals where their memory did not persist. In this case, the dry bones may have meant less to the living as they had before and may account for the apparent random disposal of some bones which may represent the forgotten dead (Boz & Hager, in press). By contrast, great care was taken regarding the bones of many individuals at Çatalhöyük, perhaps those with specific named personae.

Secondary skeletons provide information on what happened to some of retrieved bones. In some cases, the removed body parts were used as artifacts. In one such example, a plastered skull reddened with pigment was curated, re-plastered, and repainted several times before it was buried in the arms of an older female in the foundation layers of a house. In another case, the skull of a woman was found in a post-retrieval pit, possibly as a foundation offering. In Building 3, the intentional placement of two skulls with their foreheads touching at the time of house abandonment represents retrieved, possibly curated skulls, from other individuals whose specific identity may have been known. In Building 60, a secondary deposition of a partial male skeleton consisting of his skull, arms, hands, legs, and feet had been placed into the grave in a simulated flexed position above a woman who had died in childbirth (Patton & Hager, in press). The woman's skull was taken after her interment, possibly up to a year later, and the placement of the male's skull replicated the missing skull of the female. The close proximity of the two individuals indicates a potentially significant relationship between the woman who died first and the man who was placed near her later, likely when her head was removed.

In other cases, there is no indication of what the Çatalhöyük did with body parts they had removed with such care. For example, there is no indication of where the removed arms and legs of the older female from Building 49 were deposited. As the last interment in that house, this woman's dismemberment could have been related to the formation of a new, as yet undiscovered house, in a manner similar to what has been documented in Buildings 56 and 65.

Conclusions

The large number of commingled remains at Çatalhöyük raised the issue of how to deal with them in a meaningful way. In order to understand the factors leading to the commingling of the human remains and to discern the minimum number of individuals in the sample, six depositional categories were applied to the collection. There were distinct advantages to customizing the depositional categories to the site-specific conditions at Çatalhöyük where commingled remains are the norm and bones loosened and transported during grave disturbance and/or pre-interment dismemberment pose particular challenges. Two techniques for the determination of MNI were done, each technique is predicated on observations of the depositional category in the calculation. The computerized MNI needs modifications to the database to better incorporate fragmentary bones into the analysis. In particular, recording the degree of fragmentation for the diagnostic zones would aid in achieving solid results. The observed MNI relied heavily on information from the field that proved valuable in our determinations. Followed by rigorous laboratory analysis, the calculation of the observed MNI produced reliable results but with some underrepresentation in the multiple event burials where earlier interred individuals were fully disturbed and where isolated bones were not counted.

For Çatalhöyük, this study found that social factors of the Neolithic people lead to the broad dispersal of the commingled remains, in concert with disturbance by post-Neolithic people and erosion and disruption through normal taphonomic processes over time. The intramural burial practices of the Çatalhöyük people, likely the same community of people as the deceased, accounted for a considerable amount of the commingling of the Çatalhöyük human remains recovered from the new excavations since 1995. The reuse of the same space in the houses for interment was common, the custom of dismemberment and bone retrieval was pervasive, and secondary deposits of the specific bones were noted, at times in provocative contexts. All of these funerary activities impacted the integrity of the Çatalhöyük human remains.

Clearly, an intense and complex relationship existed between the living people of Çatalhöyük and their dead. They shared space in their houses, above and below, and the dead were routinely encountered with each new death. They managed, handled, and disrupted the dead bodies before and after interment, at times on partially defleshed skeletons. Once a grave pit was open, they sometimes took bones, possibly of specific individuals, while placing other ones into the grave. With their constant interaction with the deceased, the inhabitants of Çatalhöyük undeniably became familiar with the dead body in its various states of decomposition at a very high level. Their link to the dead lay in the reality of the skeletons that occupied the space below them and in their interactions with their dead throughout the life of the house.

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http://www.springer.com/978-1-4614-7559-0

Commingled and Disarticulated Human Remains
Working Toward Improved Theory, Method, and Data
Osterholtz, A.J.; Baustian, K.M.; Martin, D.L. (Eds.)
2014, XVI, 285 p., Hardcover
ISBN: 978-1-4614-7559-0