

Niti koje vežu elitu Lociranje eneolitičkih tekstilnih zanata

Threads that bind the establishment Housing eneolithic textile craft

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Uvod

Alatke i zanat

Tretiranje i obrada vlakana uvelike ovise o dostupnosti i prirodi izvora sirovine, kao i o željenim krajnjim proizvodima. Dakle, i početna i završna faza proizvodnje tekstila ocrtavaju se u dijelu procesa koji uključuje pređenje. Posljedično, različiti načini eksploatacije vlaknastog materijala i njegovo pretvaranje u tekstilni proizvod mogu se promatrati kroz funkcionalni aspekt tekstilnih alatki, odnosno, preciznije, kroz pršljenove.

Pršljenovi su jednostavne alatke koje stvaraju napetost i rotaciju tijekom procesa pređenja, dok se vretenom izvlači vlakna iz pripremljene sirovine i zavija ih se u uzicu ili nit. Pršljenovi su najbrojnija vrsta neizravnih dokaza za proizvodnju tekstila u eneolitičkim kontekstima, što doprinosi potencijalu za proučavanje tehnoloških trendova, osobito onih koji se odnose na dinamiku i promjene u obradi vlakana. Oni pružaju određene podatke o procesu pređenja, a ujedno i o: prvo, svojstvima korištenih vlaknastih materijala (Grömer 2005; Verhecken 2010), i, drugo, tipu i kvaliteti proizvedene niti (Bohnsack 1981; Crewe 1998). Iako nisu ključni, pršljenovi su vrlo korisne alatke za proizvodnju niti (Barber 1991: 42) koje znatno ubrzavaju i poboljšavaju ovu, početnu, fazu u proizvodnji tekstila koja slijedi nakon pribavljanja i pripreme sirovih vlakana (Barber 1991: 51-53). Dok jedan pršljen označava proizvodnju jedne niti u pojedinom

Introduction

Tools for the Craft

Fibre treatment and processing greatly depend on the availability and the nature of raw material resources, as well as on the desired end products. Thus, both the initial and the final phase of textile production are reflected in the spinning part of the process. Consequently, different modes of both, the fibre material exploitation and its fabrication into textile produce, can be studied through the functional aspect of textile tools, more precisely, the spindle whorls.

Spindle whorls are simple tools that impart both tension and rotation during the process of spinning, in which the spinner draws out strands of raw material and twists them together into a cordage or thread. They are the most numerous among indirect evidence for manufacture of textiles in Eneolithic contexts. This contributes to their potential for studying technological trends, particularly those related to fibre processing dynamics and change. They provide specific information about the spinning process, while offering information on: first, the used fibre material traits (Grömer 2005; Verhecken 2010) and second, the type and quality of the produced thread (Bohnsack 1981; Crewe 1998). Even though not essential, spindle whorls are highly beneficial tools for thread production (Barber 1991: 42) that make this initial stage in textile manufacture, which follows the acquisition and prepara-

trenutku i tijekom procesa pređenja ga može koristiti samo jedna osoba (prelja/predioč), veći broj i koncentracija nalaza mogu vrlo jasno ocrtavati grupne aktivnosti. Posljedično, arheološke strukture s visokom koncentracijom pršljenova mogu se smatrati indikatorom intenzivnih aktivnosti pređenja.

Prostorni element proizvodnog procesa uključen je u analizu kako bi se ispitala složenost organizacije eneolitičke proizvodnje tekstila. Cilj ovog rada bio je istražiti u kolikoj su mjeri strategije nabavljanja, obrade i tretiranja vlakana bile društveno sprovedene. Preciznije, pokušalo se posvetiti raspravi o tome postoji li dovoljno dokaza koji sugeriraju da su obrada vlakana i proizvodnja niti bile, osim na razini kućanstva, koordinirane i u sklopu većih, moguće i specijaliziranih skupina ljudi unutar eneolitičkih zajednica.

Novi teorijski pristup (Joyce & Gillespie 2000; Robin & Rothschild 2002) naglašava ulogu posredovanja u stvaranju, transformaciji i doživljaju prostora i mjesta. Dakle, dublje razumijevanje određenih proizvodnih aktivnosti, a osobito njihova prostorna organizacija, ključni su čimbenici za istraživanje društvenog aspekta proizvodnje. Većina analiziranih i dokumentiranih neizravnih dokaza za proizvodnju tekstila u neolitiku spada u skupinu nalaza utega za tkalačke stanove otkrivenih *in situ*, a koji se na proučavanom prostoru najčešće pojavljuju u kontekstu kuća (Selmeczi 1969; Barber 1991; Jovanović 2011). S obzirom na činjenicu da se u nekim ruralnim područjima do današnjih dana većina poslova vezanih uz tekstil odvija u kućanstvu, proizvodnja tekstila na razini domaćinstva smatrana je standardnim objašnjenjem koje, nehotimično, negira mogućnost rane specijalizacije tog zanata. Nadalje, za razliku od tkanja, koje zahtijeva određeni prostor, pređenje je prilično mobilna aktivnost koja se odvijala u nizu prostornih konteksta i nije ničime bila ograničena na prostor domaćinstva. Dakle, namjerno odbacivanje pršljenova često se nije moralo odvijati paralelno s odbacivanjem drugih vrsta predmeta iz domaćinstva. Etnografske su studije pokazale da se pređenje često odvija prilikom obavljanja drugih radnji (Crowfoot 1931: 37). Elizabeth Barber (Barber 1991: 69) čak je zabilježila: „jedan od razloga zbog kojih kotač nije bio popularan u Grčkoj jest to što je najprikladnije vrijeme za pređenje bilo tijekom putovanja od jednog do drugog sela, ili prilikom čuvanja stada. Čini se da je navika pređenja tijekom hodanja, ili jahanja na magarcu, na sjevernom

tion of raw fibres, much faster and more proficient (Barber 1991: 51–53). While a single spindle whorl counts for the production of one thread at a time and can be used by an individual spinner during the rendering process, their increased number and concentration can be highly reflective of group activities. Thus, archaeological features with high spindle-whorl concentration can be considered as an indication of intensified spinning practice.

In order to investigate the possibility and the complexity of organization of Eneolithic textile productions, the spatial element of the manufacturing process was addressed. The aim of this study was to examine to which extent were the fibre material procurement, handling and treatment strategies socially structured. More precisely, an attempt has been made to discuss if the initial phase of textile production was managed on the household level or is there enough evidence to suggest that the fibre processing and thread fabrication practice was also coordinated within larger, possibly specialized groups, during the studied periods.

New theoretical approach (Joyce & Gillespie 2000; Robin & Rothschild 2002) stresses the role of agency in the creation, transformation and experience of space and place. Hence, a deeper understanding of the specific manufacturing activities and in particular their spatial organization are the key factors for investigating the social aspects of the production. The majority of analysed and reported indirect evidence for the Neolithic textile productions falls into the group of *in situ* evidences of loom-weights, most often recovered from the house contexts across the studied region (Selmeczi 1969; Barber 1991; Jovanović 2011). Considering the fact that in some rural areas a big portion of textile work is still, until today, performed at home, the household level of textile production is regarded as a standard that rather unintentionally discriminates the possibility for early craft specialization. Further, unlike weaving that requires an activity area, spinning is a rather mobile practice that was practiced in a wider range of spatial contexts and is not at all limited to the domestic sphere. Thus, an intentional discard of spindle whorls often might not occur with other classes of domestic refuse. Ethnographic studies show that spinning is often done while performing other tasks (Crowfoot 1931: 37). Elizabeth Barber (Barber 1991: 69) even reports: “One reason the wheel has not been popular in Greece is that one of the most convenient times there for spinning is while travelling about- from one village to the

Mediterranu prilično stara.“ Imajući navedeno na umu, visoka frekvencija pršljenova u jednom arheološkom kontekstu ukazuje na značajnu razinu proizvodnje pređe (specijaliziranu, organiziranu, ili oboje), bez obzira na prirodu depozita (primarnu ili sekundarnu).

S obzirom na to da morfološke odlike alatki znatno utječu na njihovu funkcionalnost (Gromer 2005; Martensson et al. 2006; Verhecken 2010), tehnička analiza pršljenova predstavlja temelj za istraživanje korištenih tehnika, metoda i materijala, te konačnih proizvoda predenja. Ipak, do koje mjere morfologija alatki uvjetuje sam proces proizvodnje i dalje se propitkuje i istražuje kroz eksperimentalne studije (Laurito et al. 2014; Kania 2015).

Zanat i specijalizacija

Promatranje razina procesa proizvodnje tekstila kroz vremenske i prostorne kategorije omogućava definiranje uzoraka zanatske proizvodnje. Mnoge studije bile su usmjerene na pojmove obrtništva i specijalizacije kroz proučavanje njihove uvjetovanosti društvenom organizacijom (Clark 1995; Chapman 2003). Već je Vere Gordon Child predložio svezu između pojave specijalizacije zanata i razvoja društvenih struktura (Childe 1930, 1950, 1951, 1958).

Veliki dio arheološke teorije odnosi se na specijalizaciju u podmaklom, potpuno razvijenom obliku unutar društvenog konteksta profiliranih hijerarhija (Chapman 1996; Gilman 1996), iako postoje i studije koje propitkuju pretpostavke o razini društvene složenosti koja je potrebna za njezino rano uspostavljanje (Perlès & Vitelli 2000; Souvatzi 2008).

Cathy Lynne Costin predložila je model koji pokazuje najviše potencijala za proučavanje prostornog aspekta specijalizacije (Costin 1991). Ona je specijalizaciju zanata definirala kao: „diferencirani, regulirani, trajni i, moguće, institucionalizirani sustav proizvodnje” (Costin 1991: 4), a predložila je i četiri kategorije za proučavanje njezine složenosti: *kontekst*, *koncentraciju*, *razmjer* i *intenzitet* (Costin 1991: 5-9). *Kontekst* se odnosi na političke i društveno-ekonomske uvjete proizvodnje, dok se *koncentracija* odnosi na njezinu prostornu organizaciju i distribuciju. *Razmjer* procjenjuje broj sudionika integriranih u proizvodni proces, dok se

next, or while tending the flocks. The habit of spinning while walking, or riding a donkey, seems to be fairly old in the north Mediterranean”. With all of this in mind, a high frequency of spindle whorls in a single archaeological context is suggestive of a significant level of yarn production (specialized, organized, or both), regardless of the nature of the deposit (primary or secondary).

Technical analysis of spindle whorls enables the investigation of techniques, materials, methods and products, since the morphological traits of the tools greatly impact their functionality (Grömer 2005; Mårtensson et al. 2006; Verhecken 2010). Nevertheless, the level on which the morphology influences and conditions the spinning process continues to be questioned and investigated through experimental studies (Laurito et al. 2014; Kania 2015).

Craft for the Specialization

Observation of the stages of textile manufacturing process in time and space categories allows for the definition of patterns of craft production. Many studies addressed the concepts of craftsmanship and specialisation through examining their dependence on social organization (Clark 1995; Chapman 2003). Already Vere Gordon Child proposed the relationship between the emergence of craft specialization and the development of class structures (Childe 1930, 1950, 1951, 1958).

A big portion of archaeological theory deals with specialisation already in its developed form within the social context of profiled hierarchies (Chapman 1996; Gilman 1996), although there are studies which challenged the assumptions about the level of social complexity essential for its early establishment (Perlès & Vitelli 2000; Souvatzi 2008).

Cathy Lynne Costin proposed a model, which probably holds the greatest potential for addressing the subject of specialization on a spatial level of investigation (Costin 1991). She defined the craft specialization as a “differentiated, regularized, permanent, and perhaps institutionalized production system” (Costin 1991: 4) and suggested four categories for addressing its complexity: context, concentration, scale and intensity (Costin 1991: 5–9). *Context* focuses on the political and socio-economic conditions of the production, while *concentration* examines its spatial organisation and distribution. *Scale* category assesses the amount of people involved and integrated in the process and finally, *intensity* ad-

intenzitet odnosi na količinu uloženog i utrošenog vremena (Costin 1991: 11-16).

U kontekstu arheologije tekstila, problemom specijalizacije zanata s teorijskog aspekta bavila se Eva Andersson-Strand, koja razlikuje četiri razine specijalizacije: *proizvodnju u kućanstvu, industriji u kućanstvu, zavisnu specijaliziranu proizvodnju i radioničku proizvodnju za trgovinu* (Andersson 2003: 47, fig.1.). Njezin se model odnosi na isti problem kao i onaj Cathy Lynne Costin, a sugerira da su stupanj organizacije rada (*koncentracija*), njezina raširenost (*razmjera*) i razina angažiranosti pojedinaca (*intenzitet*) u društveno-ekonomskom kontekstu (*kontekst*) glavni parametri za stupnjevanje ili procjenu specijalizacije zanata u sklopu proizvodnje tekstila (Andersson Strand 2011: 3). Iako utemeljen na proizvodnji tekstila iz doba Vikinga, njezin model može se smatrati prikladnim za proučavanje promjena u pretpovijesti (Grömer 2016: 246-61).

Specijalizacija i složenost društva

U kontekstu proizvodnje tekstila, majstorstvo je neraskidivo povezano s nekoliko aspekata društvenog identiteta koji se ne odnose samo na status, već i na rod, dob i srodstvo (Dolfini 2013). Ipak, pri proučavanju nestratificiranih društava potrebno je prihvatiti pretpostavku da specijalizacija zanata nije nužno bila vezana uz složenost društvene strukture. U prilog tomu govore argumenti autorica Catherine Perlès i Karen Vitelli, koje smatraju da razine specijalizacije i društvene složenosti ne moraju nužno biti proporcionalne (Perlès & Vitelli 2000). Nadalje, Kenneth Sassaman kritizirao je pristranost modela koji se temelje na inkorporiranju i koncentriranju moći unutar političkih ekonomija, zbog toga što ne uzimaju u obzir nestratificirana društva, te time negiraju njihov potencijal za razvijanje specijaliziranih uloga u proizvodnji. (Sassaman 1998). John Cross predložio je novu definiciju specijalizacije koju bi se moglo implementirati pri proučavanju proizvodnje malih razmjera kakva se veže uz egalitarne zajednice (Cross 1993). Formiranje specijalizirane proizvodnje i njezina provedba mogle bi se, dakle, shvatiti kao kontinuum između *nezavisnih* (samostalnih i neustrojenih koji zadovoljavaju ekonomske potrebe društva) i *zavisnih* (unaprijeđenih i privrženih koji zadovoljavaju potrebe elita ili centraliziranih institucija) *specijalista* (Brumfiel & Earle 1987:5), dok bi se proces njihovog razvoja “trebalo proma-

addresses the amount of time spent and invested by individuals (Costin 1991: 11-16).

In the context of textile archaeology, the issue of craft specialization has been theoretically addressed by Eva Andersson-Strand, who distinguishes between four levels of specialisation: *household production, household industry, attached specialist production and workshop production for trade* (Andersson 2003: 47, fig.1.). Her model addresses the same issues as Cathy Lynne Costin's, suggesting that the degree of labour organisation (*concentration*), its spread (*scale*) and involvement (*intensity*) in the socio-economic context (*context*) are the main parameters for gradation or evaluation of craft specialisation within the frame of textile manufacture (Andersson Strand 2011: 3). Although established on the Viking age textile production, her model may be concerned as suitable for the study of prehistoric developments (Grömer 2016: 246-61).

Specialization for the Social Complexity

In the context of textile production craftsmanship is inseparably intertwined with several facets of social identity besides status, including gender, age and kin (Dolfini 2013). Whereas, the presumption that craft specialization is not necessarily related to the developed social complexity needs to be addressed for the study of non-stratified societies. Supporting this issue, Catherine Perlès and Karen Vitelli argued that levels of specialization and social complexity do not have to be necessarily proportional (Perlès & Vitelli 2000). Furthermore, Kenneth Sassaman criticized the bias towards models built on incorporation and concentration of power within political economies, with unranked societies being left unaddressed and excluded from having potential for specialized production roles (Sassaman 1998), while John Cross suggested a redefinition of specialization, so it could be implemented in the research of low-level production expected for the egalitarian communities (Cross 1993). Formation of specialized production and its enactment could thus be conceptualized as a continuum between *independent* (self-reliant, unregimented and providing for the economic demands of the society) and *attached* (promoted from, dependent of and providing for elites or centralized institutions) *specialists* (Brumfiel & Earle 1987:5), while the process of its development “should be viewed as additive, rather than the replacement of one mode

trati kao pridodavanje novih segmenata načinu proizvodnje, a ne kao kao zamjenu jednog načina drugim“ (Costin 2001: 274). Predložena dinamika vrlo se dobro uklapa u kontekst proizvodnje tekstila kroz pretpovijest, povijest, pa i moderno doba, osobito u ruralnim područjima i za vrijeme kada je proces proizvodnje na razini domaćinstva bio široko rasprostranjen i postojao usporedno s drugim oblicima koji su se razvijali s vremenom (Grömer 2016: 248).

Istraživanja obrade vlakana i proizvodnje tekstila u Mezopotamiji (McCorriston 1997) i Anatoliji (Sagona & Zimansky 2009) iznjedrila su dokaze o postojanju specijaliziranih zanata već u kasnom 4. i 3. tisućljeću prije Krista. Studije mezopotamske proizvodnje tekstila, koja se temelji na proizvodnji vune, bave se detaljima vezanim uz organizaciju i centralizaciju rane industrije kroz promatranje odnosa društvenih tokova, razvoja proizvodnje i procesa urbanizacije. (McCorriston 1997). Veliki broj očuvanih organskih dokaza iz naselja u močvarnim područjima oko Alpa doveo je do razvitka sličnih argumenata o istovremenoj organiziranoj i specijaliziranoj proizvodnji lana u zapadnoj i središnjoj Europi. U dobro očuvanim slojevima na lokalitetima Arbon-Bleiche 3 i Pfylen-Breitenloo otkrivene su važne informacije o pripremi i obradi lana, a koje sugeriraju da su pojedina sela bila fokusirana na uzgoj lana i obradu vlakana. (Schlichtherle 2009). Prostorna distribucija alatki za proizvodnju tekstila unutar naselja ukazuje na organiziranu i specijaliziranu proizvodnju (Maier 2001; Lauzinger & Rast-Eicher 2011: 539-540), dok arheološki i botanički nalazi ukazuju na podjelu rada i razvoj određenih društveno-ekonomskih razlika zbog kojih dobra i ekonomski faktori, uključujući lan, nisu u jednakoj mjeri bili dostupni svim stanovnicima (Schlichtherle et al. 2010). Za istovremenu proizvodnju tekstila u jugoistočnoj i središnjoj Europi dosad nisu doneseni isti zaključci. S obzirom na zatvorenost Panonske nizine, koja se proteže od Karpata i jugoistočnih Alpi na sjeveru i zapadu do sjevernih padina planina središnjeg Balkana na jugu i rijeke Dunav na istoku, ovo je područje izvjesno bilo vrlo otvoreno trgovačkim i prometnim putovima. Očekivano, istovremeno je moglo biti otvoreno i utjecajima vezanim uz proizvodnju tekstila koji su stizali preko Alpa i Karpata, kao i onima koji su stizali balkanskim i dunavskim putovima.

Čini se izglednim da srednje, a osobito kasnoeneolitička društva na prostoru velike Panonske nizine razvijaju nove izvore vlakana i načine proizvodnje

by another” (Costin 2001: 274). Proposed dynamics resonates very well within the context of textile production, mainly while its household level persists wide spread, from prehistoric times through the entire history, into the modern era, especially in rural areas, in addition to other forms that developed through time (Grömer 2016: 248).

Research on fibre processing and textile production in Mesopotamia (McCorriston 1997) and Anatolia (Sagona & Zimansky 2009) revealed evidence for craft specialization already in the late 4th and 3rd millennium BC. In particular, the study of Mesopotamian wool based textile production addressed the details of organization and centralization of the early industry, through its relation to the processes of urbanization and social flux (McCorriston 1997). Due to the abundance of preserved organic evidence from the wetland settlements of the circum alpine region, arguments for organized and specialized flax production were made for the contemporary western central Europe. Well preserved layers at Arbon-Bleiche 3 and Pfylen-Breitenloo revealed valuable information on its preparation and handling, suggesting that certain villages were focused on flax growing and fibre processing (Schlichtherle 2009). The spatial distribution of the textile tools within settlements proposes organized and specialized textile work (Maier 2001, Lauzinger & Rast-Eicher 2011: 539-540), while archaeological and botanical evidence pointed to the division of labor and the development of certain socioeconomic differences, where goods and economic factors, including flax, were not available in the same extent to all inhabitants (Schlichtherle et al. 2010). So far, no similar conclusions were made about the contemporary textile productions across the South East and Central Europe. With its enclosed Pannonian Plain, stretching from the foothills of the Carpathian Mountains and the South East Alps in the North and West, to the northern slopes of the Central Balkan Mountains in the South and the Danube River in the East, this area was presumably highly exposed to trade and traffic routes. Expectantly, it could have been simultaneously opened to the production influences that were crossing the Alps and Carpathians, as to those arriving through the Balkan and Danube routes.

It is not unlikely that during the period of the striving wool economies in the Near Eastern and East Mediterranean centres and the developing fibre flax productions in the western Central Europe, Middle and especially Late Eneolithic societies oc-

dok bliskoistočna i istočnomeditranska društva uzgajaju vunu, a upotreba lana raste u zapadnoj i središnjoj Europi. Najveći broj arheoloških dokaza o eneolitičkoj privredi potječe s prostora današnje Mađarske, dok zoološke, a osobito arheobotaničke, studije nisu toliko sustavno provedene u Hrvatskoj i Srbiji (Reed 2016). Osim toga, zbog manjka očuvanih nalaza tekstila, alatke korištene u proizvodnji ostaju jedini izvor informacija za istraživanje prijelaza na organiziranu proizvodnju koja se posljedično usmjeravala na kultivirane izvore vlakana.

Porast proizvodnje mogao je biti izazvan različitim faktorima. Primjerice, na taj su proces mogli utjecati tehnološki napredak, dostupnost sirovina, potražnja ili razmjena. Sukladno tomu, proizvodnja unutar domaćinstva zamijenjena je proizvodnim sustavom koji stvara viškove.

Specijalizaciju se u arheologiji često indirektno definira kroz proučavanje stupnja standardizacije u tehnologiji (Blackman et al. 1993; Costin & Hagstrum 1995; Eerkens & Bettinger 2001; Roux 2003). Uobičajen pristup za proučavanje standardizirane proizvodnje uključuje uočavanje uniformnosti sirovina i procjenu varijabilnosti metričkih atributa proučavanih predmeta.

Analiza alatki

Lociranje organizirane proizvodnje

Karakter i sastav eneolitičkih društava u različitim je regijama vjerojatno varirao ovisno o lokalnim geografskim značajkama, dostupnosti resursa te društvenim i ekonomskim sklonostima populacija. Prijelaz iz razdoblja kasnog neolitika objašnjava se zamjenom velikih telova manjim i kratkotrajnijim naseljima te promjenom strategije preživljavanja u smislu prijelaza sa zemljoradnje na intenzivnije stočarstvo (Parkinson 2006: 186; Gyulai 2010). Ipak, do kraja novog razdoblja, obrasci naseljavanja iznova su se promijenili. U Mađarskoj, badenska je kultura razvila gustu mrežu visinskih i nizinskih, kao i velikih i malih naselja i špilja (Horváth & Virág 2003:127). Iznova su formirani telovi koji su vjerojatno funkcionirali kao društvena i ekonomska središta kojima su gravitirala manja satelitska naselja koja su bila raspršena oko rijeka i potoka (Durman 1995; Tasić 2003-2004). Moguće je da ove promjene ocrtavaju pojačanu razmjenu koja se

cupying the vast Pannonian Plain were adapting new fibre resources and developing new modes of manufacture as well. The biggest portion of the archaeological evidence for Eneolithic husbandry comes from the region of modern day Hungary, while zooarchaeological and especially archaeobotanical studies have been not as systematically conducted in Croatia and Serbia (Reed 2016). Additionally, limited by the absence of preserved textile finds, textile tools remain the main source of information for investigating the transition to organized productions that consequently intensified the focus on cultivated fibre material resources.

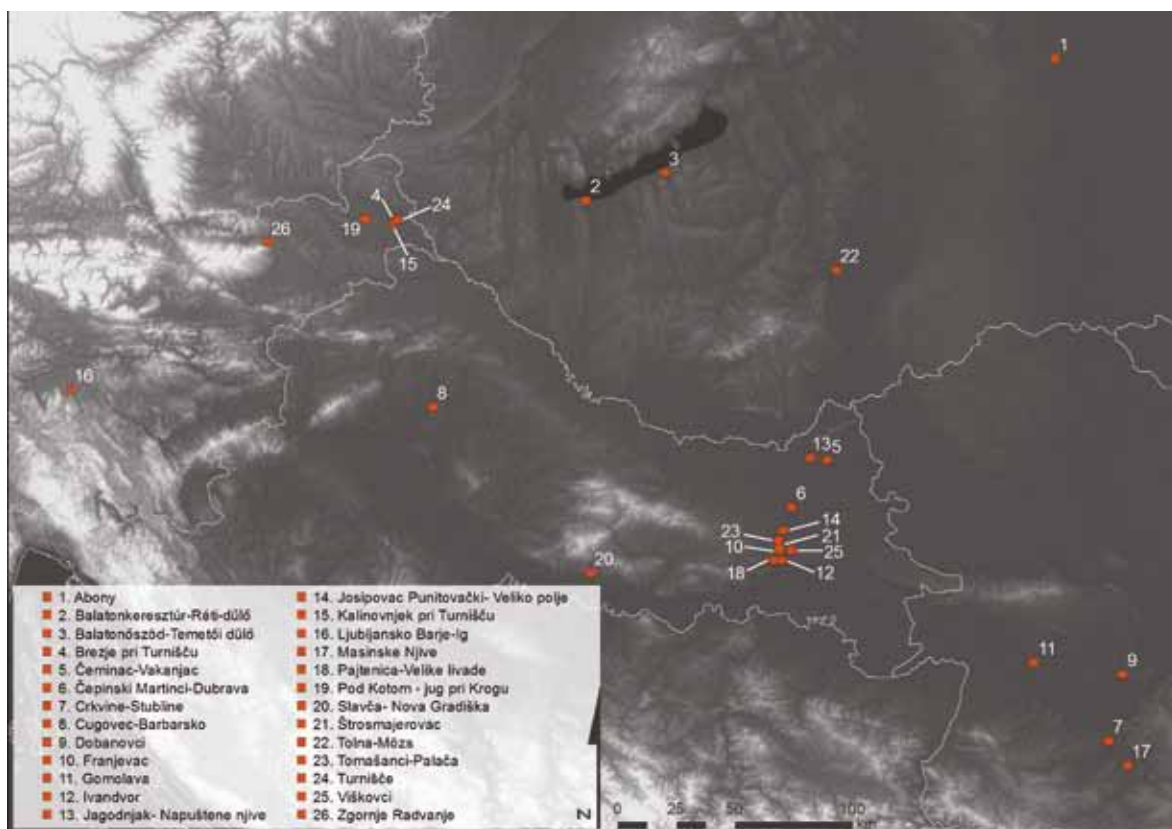
The intensification of production might have been caused by different factors. For an example technological advance, resource availability, product demands or trade might have all fuelled the process. Consequently, the domestic mode of production gives way to a production system that produces surpluses.

In archaeology, the specialisation is often diagnosed indirectly by studying the degree of standardisation in technology (Blackman et al. 1993; Costin & Hagstrum 1995; Eerkens & Bettinger 2001; Roux 2003). The most common approach is to study standardisation by looking for the uniformity of raw materials or the variation in metric attributes of the studied objects.

Tool Analysis

Locating Organized Production

Character and constitution of Eneolithic societies most likely varied regionally, depending on local geography, accessibility of resources and socio-economic inclinations. The transition from the late Neolithic period has been explained through the replacement of large tell sites with smaller short-term settlements and a transformation of subsistence strategies from crop agriculture to more intensified animal husbandry (Parkinson 2006: 186; Gyulai 2010). However, by the end of the period, settlement patterns are once again altering. In Hungary, the Baden culture developed a dense network of both upland and lowland large and small settlements and caves (Horváth & Virág 2003:127). Once again, the large tell sites were being established that most likely acted as the socioeconomic centres for the smaller satellite settlements dispersed around rivers and streams (Durman 1995; Tasić 2003-2004). These changes possibly reflect the in-



Slika / Figure 2. Zemljopisni položaj lokaliteta s kojih potječu uzorci pršljenova / Geographical distribution of the sites represented in the spindle whorl sample.

5. i kraja 3. tisućljeća prije Krista.¹ Sve proučavane kulturno-povijesne skupine, izuzev protoboleráz grupe, u zadanom su uzorku zastupljene na dva ili više nalazišta (Sl. 1).

U skupini od 26 uzorkovanih lokaliteta (Sl. 2) s kojih potječe 836 pršljenova, na dva je ustanovljena značajna koncentracija alatki.² Oba nalazišta, Ivandvor i Franjevac kod Đakova, iskopavana su u zaštitnim istraživanjima na autocesti A5 koja je

1 Tijekom trogodišnjeg doktorskog istraživanja analizirano je 1152 pršljena koji su uneseni u bazu podataka alatki za proizvodnju tekstila. Studija je u početku obuhvaćala alatke s 34 arheološka lokaliteta, ali je konačna analiza provedena na ograničenom uzorku od 836 pršljenova: standard za uzorkovanje lokaliteta postavljen je na minimalno tri zabilježena pršljena s potpunim metričkim i kronološkim podacima. Skup nalaza pršljenova iz kasnog neolitika isključen je iz analize, prvenstveno zbog toga što baza podataka nije sadržavala pršljenove datirane u rani eneolitik, zbog čega nije bilo moguće temeljito istražiti kontinuitet ili promjene u organizaciji proizvodnje za ovu prijelaznu fazu.

2 Nije o svim pršljenovima postojala jednaka količina podataka stoga je za potrebe funkcionalne analize određen minimalni kriterij: pouzdano kronološko određenje, tipološko određenje i spomenuti standard izmjera. Nedostatak podataka o kontekstu pršljenova pronađenih na lokalitetu Ljubljansko Barje-Ig, a koji sačinjavaju veliki dio uzorka pripisanog ranom brončanom dobu, ne dopušta nikakvu detaljnu analizu prostorne distribucije, zbog čega je nemoguće donositi ikakve zaključke o dinamici i organizaciji zanata na prijelazu iz kasnog eneolitika u rano brončano doba, što je ograničilo analizu na razvojne procese tijekom srednjeg i kasno eneolitičkog perioda.

Age (the latest tools belonging to the Somogyvár-Vinkovci spindle whorl set), falls roughly between the middle of the 5th and the end of the 3rd millennium BC¹. All investigated culture-historical groups in the sample were represented on two or more sites, except for the Proto-Boleráz group (Fig. 1).

In the cluster of 26 sampled sites (Fig. 2) that yielded 836 spindle whorls, two settlements displayed a significant level of concentration of tools². Both

1 During a three-year doctoral research 1152 spindle whorls were recorded in the textile tools database. Initially, the study included tools from 34 archaeological sites, but consequently the final analysis was conducted on a restrained sample of 836 spindle whorls: the site sample standard was set at minimum three recorded spindle-whorls with the complete metric data and chronological placement. The Late Neolithic spindle whorl set was left out of the outlined analysis, mainly because Early Eneolithic spindle whorls were not at all recorded in the database. Thusly no continuity or change in manufacturing organization could be thoroughly investigated for the production of this transitional phase.

2 Not all spindle whorls provided equal amount of information and for the purpose of the functionality analysis a minimum criterion was applied: reliable chronological assignment, typological determination and the mentioned measurement standard. The lack of contextual data for the spindle whorls found at Ljubljansko Barje - Ig site, which account for the big portion of the Early Bronze Age sample unable any thorough spatial distribution examination. This left the conclusions regarding the dynamics of the craft organization during the Late Eneolithic to Early Bronze Age transitional period impossible, limiting the focus of the analysis on the developments that occurred in the Middle and Late Eneolithic.

dio europskog koridora C5, odnosno na trasi Osijek-Đakovo. Ostaci naselja iz srednjeg eneolitika koje se, prema još neobjavljenim analizama podataka, može pripisati kulturno-povijesnoj grupi Retz-Gajary, zabilježeni su na lokalitetu Ivandvor (Leleković 2007), dok je kasnoeneolitičko naselje pripisano kostolačkoj kulturi definirano na lokalitetu Đakovo-Franjevac (Balen 2011). Područje na kojem su lokaliteti dio je đakovačko-vinkovačkog ravnjaka, odnosno povišenog terena koji se pruža jugoistočno od Satnice Đakovačke. Eneolitička naselja ovog tipa osnivana su uz vodene tokove na prirodno povišenim mjestima. Oba su lokaliteta jednoslojna s horizontalnom stratigrafijom, a na njima, djelomično zbog intenzivne zemljoradnje, nije bilo očuvanih kulturnih slojeva (Leleković 2007; Balen 2011).

Pršljenovi uključeni u niže predstavljenu analizu dokumentirani su bilježenjem četiriju glavnih metričkih vrijednosti pršljena (promjer pršljena, promjer rupe za nasad vretena, visina pršljena i težina pršljena), te računanjem omjera težine i promjera pršljena i visine i promjera pršljena.³

Lociranje prelja i predioca retzgajarske kulture

Naseljem retzgajarske kulture na Ivandvoru dominirala je velika višecelijska ukopana struktura, veličine otprilike 280 kvadratnih m (SJ 11861/11862) (Sl. 3), dok su na ostatku površine zabilježene manje strukture različitih oblika i veličina koje su bile raspršene na prostoru od 2 hektara. Ostaci nadzemnih konstrukcija ili nisu pronađeni, ili nisu prepoznati (Leleković 2007: 12-13).

Od 79 pršljenova pronađenih na lokalitetu koji su pripisani retzgajarskoj kulturi, njih 62 pronađena su u „glavnoj“ jami, u kojoj je pronađena i velika količina grube keramike, lomljenog kamena i životinjskih kostiju čije analize nisu završene i objav-

³ Analizirani uzorak alatki uključuje 328 potpuno očuvanih pršljenova, 163 polovično očuvana pršljena, 223 djelomično očuvana pršljena te 122 manjih ulomaka pršljenova (manje od 10% sačuvano). Vrijednosti težine pršljenova iz uzorka bilježene su u četiri različite kategorije vjerojatnosti, ovisno o stanju očuvanosti predmeta. Težina cjelovitih predmeta dokumentirana je u kategoriji cjelovita težina, težina gotovo cjelovitih predmeta kojima nedostaje tek manji dio u kategoriji procijenjena težina, težina polovično očuvanih predmeta dokumentirana je u kategoriji izračunata težina (izračunata težina = udvostručena izmjerena težina) i, naposljetku, težina djelomično očuvanih predmeta zabilježena je u kategoriji rekonstruirana težina (rekonstruirana težina = gustoća x volumen). Varijable volumena i gustoće dobivene su iz virtualnih (trodimenzionalnih) modela koji su napravljeni na temelju djelomično očuvanih pršljenova.

sites, Ivandvor and Franjevac near Đakovo, were excavated as a part of salvage archaeological investigations on the A5 highway route of the European C5 Corridor, more precisely on its Osijek-Đakovo section. The remains of a Middle Eneolithic settlement, which, according to the still unpublished data analysis, is attributed to the Retz-Gajary culture-historical group, were recorded on Ivandvor (Leleković 2007), while the Late Eneolithic settlement associated with the Kostolac culture-historical group was ascertained on Đakovo – Franjevac (Balen 2011). The area of the two localities belongs to the Đakovo-Vinkovci Plateau, namely the elevation extending southeast of Satnica Đakovačka. Eneolithic settlements of this type were founded near watercourses and on natural elevations. Both sites consist of a single layer with horizontal stratigraphy and had no cultural layer preserved, partly due to the intensive agricultural activity (Leleković 2007; Balen 2011).

Spindle whorls used for the following analysis were recorded by taking four main measurements (whorl's diameter, its perforation diameter, height and weight) and calculating their weight/diameter and height/diameter ratios³.

Housing Retz-Gajary Spinners

The Retz-Gajary settlement at Ivandvor was dominated by a large, multicellular, approximately 280 square meter big pit structure (SJ 11861/11862) (Fig. 3), while the rest of the smaller features of different shapes and sizes were sporadically scattered over an area of 2 hectares. The remains of the surface architecture were either not found, or were not recognized (Leleković 2007: 12–13).

Out of 79 spindle whorls excavated at the settlement and attributed to the Retz-Gajary culture, 62 were recovered from the 'main' pit structure that also yielded a large amount of coarse pottery, lithic material and animal bones that are still under anal-

³ Analysed tool sample includes 328 whorls which were completely preserved, 163 whorls preserved in half, 223 partially preserved whorls and 122 whorls that had small fragments (less than ten percent) missing. Weight values of the spindle whorls in the sample were documented in four different reliability categories, depending on their preservation status. Weights of complete samples was documented in the *complete weight* category, weights of almost complete samples with small fragments missing was documented in the *estimated weight* category (estimated weight = weight if not complete), weights of samples preserved in half were documented in the *calculated weight* category (calculated weight = weight if not complete doubled) and finally weights of partially preserved samples were documented in the *reconstructed weight* category (reconstructed weight = density x volume). Volume and density variables were provided from virtual (three-dimensional) models created for the partially preserved spindle whorls.



Slika / Figure 3. Zračna fotografija velike strukture retzgajarske kulture (SJ 11861/11862) s lokaliteta Ivandvor / Aerial photo of the large Retz-Gajary structure (SJ 11861/11862) at Ivandvor (foto / photo: T. Leleković).

ljene. Među važnijim nalazima iz tog konteksta svakako je bodež izrađen od tankog brončanog lima (dužine 12 cm) i plosnati keramički pečat, ili *pintadera*, koja je na obje strane ukrašena različitim simbolima (Sl. 4).

Preostalih 17 pršljenova s lokaliteta nalazilo se u 12 različitih struktura i s obzirom na njihov *in situ* kontekst, ne može ih se povezati s velikom grupom nalaza iz „glavne“ strukture. Analiza alatki nije pokazala značajne razlike između glavne skupine pršljenova i onih koji su pronađeni u pojedinim strukturama drugdje u naselju.

Osnovne morfološke značajke koje ocrtavaju funkcionalna svojstva pršljena ne ukazuju na razlike u korištenim izvorima vlakana, niti debljinu dobivene niti, što sugerira da su se slični krajnji proizvodi mogli proizvoditi na različitim lokacijama unutar naselja. Distribucija vrijednosti težine i promjera alatki ne varira u odnosu na prostorni kontekst, zbog čega je tehnološki standard moguće sagledati samo na razini lokaliteta, a ne u odnosu na određenu lokaciju ili proizvodni prostor unutar naselja (Sl. 5). Štoviše, neznatna devijacija promatranih parametara (Sl. 6) sugerira naizgled specijaliziranu tehnologiju koja može ocrtavati korištenje prilično uskog spektra izvora vlakana. Prilično lagani pršljenovi, težine između 20 i 30 grama, prevladavaju u uzorku s Ivandvora (56%), iako ima i nešto lakših (10-20 g) te nešto težih (30-40 g) primjeraka. Skupina srednjeg promjera (40-50 mm i 50-60 mm) sačinjava većinu, odnosno 94% uzorka. Skupina male visine uvjerljivo je najbrojnija na lokalitetu, što je dodatno naglašeno zbog ograničene tipološ-

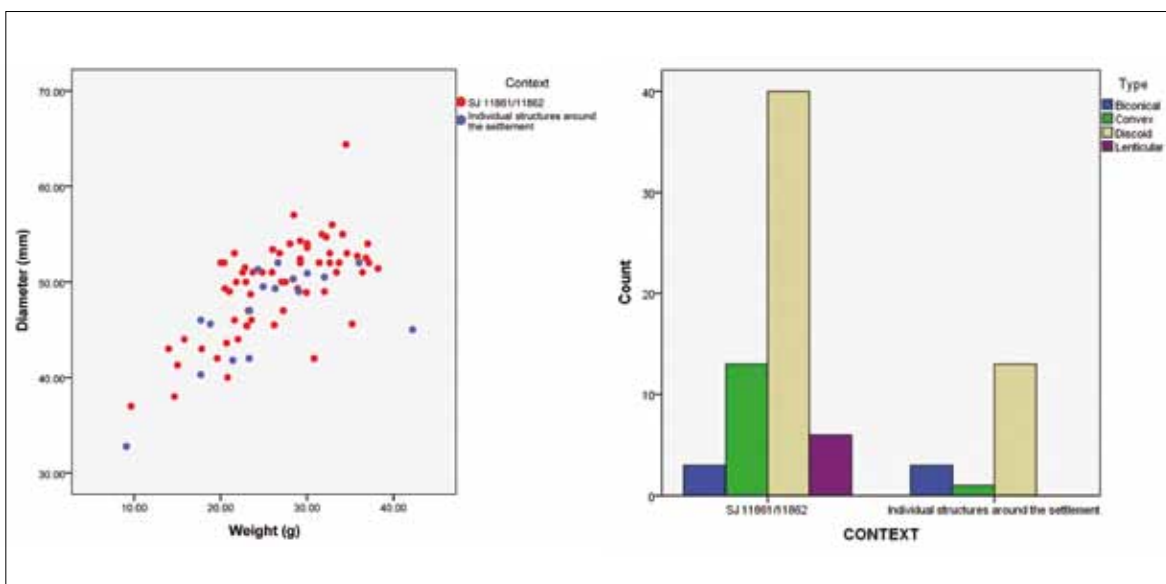


Slika / Figure 4. Pločasti pečat retzgajarske kulture s lokaliteta Ivandvor / Retz-Gajary tile stamp recovered at Ivandvor (foto / photo: T. Leleković).

ysis and remain unpublished. Some of the more important findings allocated in the context include a dagger made of a thin bronze sheet (length 12 cm) and a ceramic tile stamp, or *pintadera*, decorated with different symbols on each side (Fig. 4).

The remaining 17 spindle whorls found at the site were distributed among 12 different structures and cannot be brought to connection with the large assemblage from the ‘main’ structure, at least as far as their *in situ* context is concerned. The tool analysis did not show a significant difference between the main spindle whorl set and the collection of spindle whorls discovered in individual structures around the settlement.

The main morphological traits, indicative of the spindle whorls’ functional properties, do not propose distinction in either the fibre material that was used, nor in the thickness quality of the spun thread, thus suggesting similar end products may have been produced everywhere around the site. Distribution of the tools’ weight and diameter values does not appear to vary depending on the spatial context, making the technological standard observable mainly on the site level, rather than conditioned by the specific location, or area of manufacture (Fig. 5). Nonetheless, low deviation of all the investigated parameters (Fig. 6) suggests a seemingly specialised technology that may be reflective of a rather narrow focus in terms of fibre resources. Relatively light whorls, ranging from 20 to 30 grams dominate in the Ivandvor sample (56%), although slightly lighter (10-20 g) and slightly heavier (30-40 g) whorls are fairly represented as well. Middle di-



Slika / Figure 5. Omjer težine i promjera (lijevo) i distribucija tipova (desno) pršljenova iz pojedinačnih jamskih struktura s lokaliteta Ivandvor / Spindle whorls' weight-diameter (left) and type distributions (right) given for separate pit structures at Ivandvor.

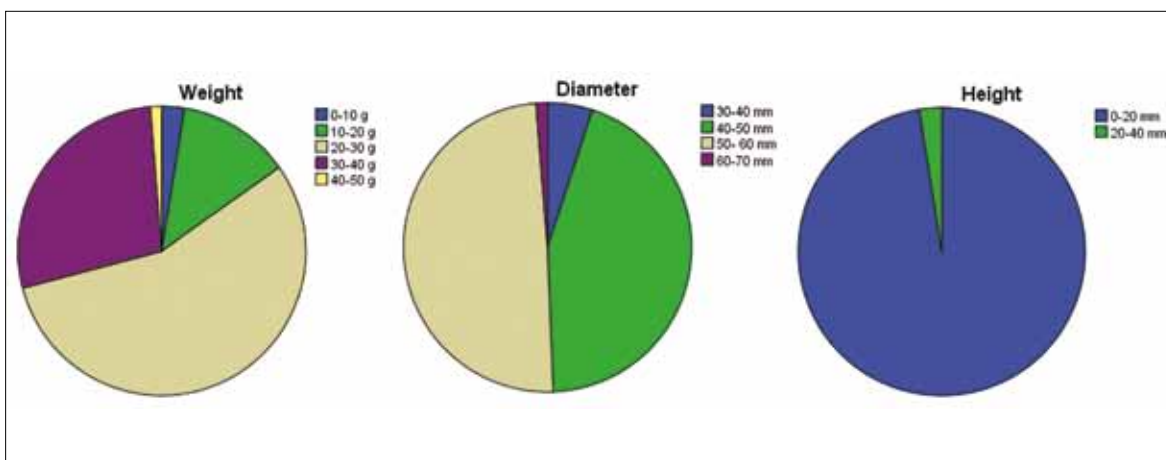
ke varijabilnosti u skupini pršljenova, a koja sadrži visoku frekvenciju diskoidnih primjeraka.

Jedine primjetne razlike između glavne skupine pršljenova i onih iz ostatka naselja vidljive su u distribuciji tipova (Sl. 5). Skupina nalaza iz velike ukopane strukture naizgled je tipološki raznolikija. Funkcionalno je nemoguće razlikovati lećaste i diskoidne pršljenove koji sačinjavaju većinu u obje skupine nalaza, ali zanimljivo je primijetiti da „glavni“ skup nalaza iz najveće strukture sadrži prilično velik postotak pršljena lećastog tipa (7,6%) koji nije zabilježen drugdje na lokalitetu.

ameter classes (40-50 mm and 50-60 mm) represent the majority, making up for the 94 percent of the sample. Low height class is convincingly the main type represented at the site, which resonates further in the restricted typological variability within the spindle whorl set that revealed a very high frequency of discoid spindle whorls.

The only noticeable difference between the main spindle whorl set and the collection from the rest of the settlement can be observed in the distribution of the spindle whorl types (Fig. 5). The large assemblage recovered from the big pit structure appears typologically more diverse. Functionally

Slika / Figure 6. Frekvencija određene kategorije težine, promjera i visine pršljenova s lokaliteta Ivandvor / Frequency of the particular weight, diameter and height classes of spindle whorls at Ivandvor.





Slika / Figure 7. Velika jamska struktura retzgajarske kulture (SJ 194) s lokaliteta Josipovac Punitovački-Veliko polje I / Large Retz-Gajary pit structure (SJ 194) from Josipovac Punitovački – Veliko polje I site (prema / after: Čataj 2009: 34, Fig. 11.).

Sudeći prema velikoj količini lomljenog kamenog materijala, kako alatki tako i krhotina, s posebno velikim udjelom jezgri (>70 komada), lomljenih kamenih predmeta koji se ne mogu definirati kao alatke (Shott 1993), već kao mugući oblik pripremljene sirovine, „glavnu“ ukopanu strukturu može se interpretirati kao zajednički radni prostor za obradu sirovina, a ne kao specijaliziranu radionicu za tekstil. Centralna pozicija te jame u naselju također se uklapa u ovaj scenarij, ako pretpostavimo da su najbitniji resursi mogli biti korišteni na razini zajednice. Centralizirana pozicija te jame u naselju također se uklapa u ovaj scenarij, ako pretpostavimo da su resursi korišteni na razini zajednice.

Iz spomenute velike ukopane strukture potječe 79% svih nalaza s lokaliteta (79 pršljenova) i 36% cijelog uzorka retzgajarske kulture (172 pršljena) zabilježenog u bazi podataka. Dakle, bez obzira na veličinu ovog, pretpostavljeno radnog prostora, koncentracija pršljenova ukazuje na prilično intenzivno i organizirano pređenje. Ta činjenica postaje jasnija ako se primijeni model u kojem svaki pojedinac prede uz pomoć jedne alatke po pojedinom zadatku, što bi moglo sugerirati da je veća skupina prelja/predioca mogla koristiti prostor radionice.

Osim na Ivandvoru, uzorci pršljenova retzgajarske kulture zabilježeni su na lokalitetima Josipovac Punitovački-Veliko polje I (Čataj 2009), Cugovec-

the lenticular type cannot be separated from the discoid spindle whorls, which make the majority in both sets, but it is an interesting observation that the ‘main’ assemblage from the largest structure holds a relatively high percentage of the particular spindle whorl type (7.6 %) that hasn’t been attested anywhere else on the site.

Judging by the vast amount of lithic material, tools and debitage, with particularly high frequency of cores (> 70 pieces), a non-tool category (Shott 1993) of chipped stone artefacts that might have only been used as sources of raw material, a joint work area for raw material processing, rather than a specialized textile workshop, presents a plausible interpretation for the ‘main’ pit structure. Its central position within the settlement also agrees with this scenario, if we consider the possibility that the most important resources were managed on a communal level.

The assemblage found in this large sunken structure at the site accounts for 79 percent of the entire settlement set (79 spindle whorls) and 36 percent of the entire Retz-Gajary sample (172 spindle whorls) recorded in the database. Thus, despite the size of this, presumably work-related space, the concentration of spindle whorls suggests a rather intensified and organized spinning activity. This becomes even more obvious if a tool per spinner scenario is applied, suggesting that a larger group of spinners may have been using the workshop area.



Slika / Figure 8. Replike retzgajarskih pečata pronađenih na lokalitetu Josipovac Punitovački-Veliko polje I i otisci kakve ostavljaju na lanenom platnu / Replicas of Retz-Gajary stamp seals found at Josipovac Punitovački-Veliko polje I and their impressions on a linen cloth (prema / after: Čataj 2009: 255, Fig. 6).

Barbarsko (Balen & Drnić 2014), Jagodnjak-Napuštene njive i Čeminac-Vakanjac u istočnoj Hrvatskoj. Osim na Ivandvoru, samo je još na lokalitetu Josipovac Punitovački-Veliko polje I, također iskopavanom u zaštitnim istraživanjima na autocesti A5 na europskom koridoru C5, ustanovljena velika koncentracija pršljenova koja može sugerirati intenzivno korištenje prostora za pređenje. I u ovom je slučaju najveći broj alatki pronađen u najvećoj ukopanoj strukturi na lokalitetu (19,5x12 m). Od 58 pronađenih pršljenova, ukupno njih 31 (53%) pronađen je u velikoj višćelijskoj ukopanoj strukturi (SJ 194) smještenoj na sasvim istočnom dijelu naselja (Sl. 7).⁴ Osim velikog broja pršljenova, u ovom je kontekstu pronađeno i mnoštvo keramike (fine i grube fature), životinjskih kostiju, lomljene litike i ulomaka lijepa. Samu strukturu autorica je interpretirala kao radni prostor (Čataj 2009: 34-35).

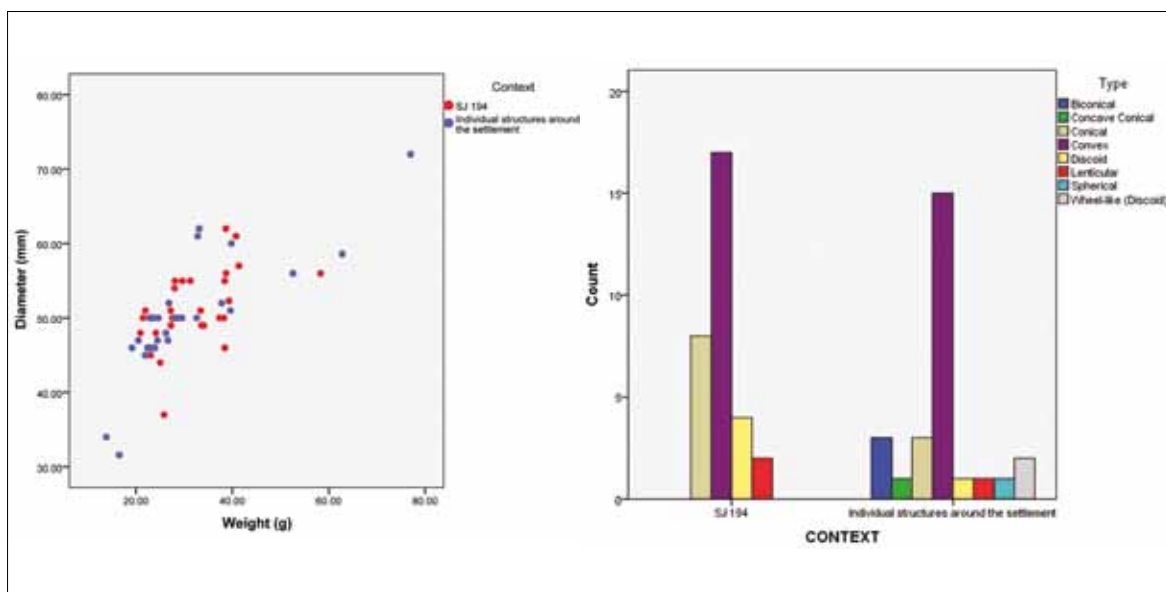
Već je i Lea Čataj (2009: 34) primijetila visoku frekvenciju pršljenova uz južni rub strukture, u blizini vatrišta, te interpretirala njihov *in situ* položaj kao oznaku dijela prostora u kojem se odvijala proizvodnja tekstila. Skupinu od 13 rupa od stupova i kolaca, koja je otkrivena u istom dijelu jame kao i pršljenovi, autorica smatra mogućim dokazima za postojanje strukture za tkanje (Čataj 2009: 34). Ako razmotrimo nekoliko mogućih načina tkanja (Barber 1991: 79-91), uključujući horizontalne varijante poput pojasnih i podnih tkalačkih stanova

⁴ SJ 194 je radiokarbonski datirana u vrijeme između 3790. i 3650. pr. Kr. (Čataj 2009: 50).

Besides at Ivandvor, spindle whorl samples attributed to the Retz-Gajary culture-historical group were recorded Josipovac Punitovački-Veliko polje I (Čataj 2009), Cugovec-Barbarsko (Balen and Drnić 2014), Jagodnjak-Napuštene njive and Čeminac-Vakanjac sites in eastern Croatia. Apart from Ivandvor, only at Josipovac Punitovački-Veliko polje I site, which was also excavated as a part of salvage archaeological investigations on the A5 highway route of the European C5 Corridor, a high concentration of spindle whorls that may propose an intensified use of space for spinning was attested. Here, again, the largest pit structure (19.5 x 12 meters) at the settlement yielded the highest number of tools. Out of 58 recovered spindle whorls, all together 31 (53 %) were found in a large multicellular sunken structure (SJ 194) located in the very eastern part of the settlement (Fig. 7)⁴. Besides the numerous spindle whorls, the context yielded a vast amount of ceramic finds (both fine and coarse ware), animal bones, lithic material and daub fragments. The structure itself was interpreted by the author as a working area space (Čataj 2009: 34-35).

Already Lea Čataj (2009: 34) notices a high concentration of spindle whorls located in the southern edge of the structure, close to the fireplace, and defines their *in situ* context as a textile production area within the working space. She refers to the group of 13 dowel and peg holes, discovered in the area

⁴ SJ 194 was C14 dated to the period between 3790 and 3650 BC (Čataj 2009: 50).



Slika / Figure 9. Omjer težine i promjera (lijevo) i distribucija tipova (desno) pršljenova iz pojedinačnih jamskih struktura s lokaliteta Josipovac Punitovački-Veliko polje I / Spindle whorls' weight-diameter (left) and type distributions (right) given for separate pit structures at Josipovac Punitovački-Veliko polje I.

pričvršćenih za tlo, ova situacija mogla bi predstavljati prihvatljivo objašnjenje za izostanak utega u dokumentiranim retzgajarskim kontekstima. Zanimljivo je spomenuti i dodatnih pet pršljenova iz male jamske strukture (3,5x3,5 m) sa sjevernog dijela iskopne površine (SJ 132), kao i dva pečata ili pintadere (Sl. 8).⁵ Autorica je i taj prostor interpretirala kao radni, sugerirajući da je bio korišten za aktivnosti vezane uz proizvodnju tekstila (Čataj 2009: 33).

Slično distribuciji na Ivandvoru, analiza alatki ni u ovom slučaju nije otkrila razlike između „glavnog“ skupa nalaza i pršljenova pronađenih u drugim strukturama u naselju. Glavne morfološke značajke koje ukazuju na funkcionalna svojstva alatki ne ukazuju na razlike u korištenim vlaknima ili kvaliteti debljine dobivene niti. S tim na umu, moguće je zamisliti da su konzistentni završni proizvodi bili proizvedeni unutar naselja. Distribucija težine i promjera pršljenova, kao i na Ivandvoru, ne varira s prostornim kontekstom. Iako pojedine lokacije pokazuju malo ili nimalo posebnosti s obzirom na promatrane parametre funkcionalnosti, veća koncentracija alatki iz glavnog proizvodnog prostora (SJ 194) pokazala je manju tipološku varijabilnost u usporedbi s ostatkom pršljenova iz naselja (Sl.

⁵ SJ 132 je radiokarbonski datirana u vrijeme između 3950. i 3710. pr. Kr. (Čataj 2009: 50).

where spindle whorls were found, as a possible evidence of a weaving structure (Čataj 2009: 34). If we consider several weaving possibilities (Barber 1991: 79–91), including the use of horizontal variants, like the backstrap and the ground loom constructions, this could present a plausible explanation for the lack of loom weights in the documented Retz-Gajary context(s). Interestingly, another 5 spindle whorls were recorded in the smaller pit structure (3.5 x 3.5 meters) in the northern part of the investigated area (SJ 132), together with two stamp seals or *pintaderae* (Fig. 8)⁵. The author interpreted this feature as a work space as well, proposing it was used for textile related activities (Čataj 2009: 33).

Similar to the distribution at Ivandvor, the tool analysis did not show any difference between the ‘main’ assemblage and the set of spindle whorls found in different structures around the settlement. Again, the main morphological traits, indicative of tools' functional properties, do not suggest differences in fibre material use, or thickness quality of the spun thread. Having this in mind, it is conceivable that consistent end products were produced within the settlement. Distribution of the spindle whorls' weight and diameter values, again, like at Ivandvor, does not appear to vary depending on the spatial

⁵ SJ 132 was C14 dated to the period between 3950 and 3710 BC (Čataj 2009: 50).

9). Općenito niska devijacija svih promatranih metričkih vrijednosti sugerira prilično specijaliziranu proizvodnju koja je, moguće, odraz ograničenog izbora korištenih vlakana (Sl. 10). Glavni tehnološki standard, vidljiv isključivo na razini lokaliteta, sugerira da su ovdje, kao i na Ivandvoru, najčešće korišteni lakši pršljenovi. U uzorku prevladavaju pršljenovi težine od 20 do 30 g (53%), iako je uočena i znatna količina nešto težih primjeraka (30-40 g). Najčešći su oni srednjih vrijednosti promjera (40-50 mm i 50-60 mm) koji sačinjavaju 86% uzorka. Najzastupljeniji su primjerci nižeg razreda visine (<20 mm), iako to nije rezultiralo očekivanom dominacijom klasičnih spljoštenih tipova, poput diskoidnih i lećastih pršljenova. Suprotno tomu, i ono što je glavna razlika u odnosu na nalaze s Ivandvora, na ovom lokalitetu najčešće se javljaju konveksni i konični tipovi pršljenova (Sl. 9).

U usporedbi s drugim pršljenovima retzgajarske kulture, oni s lokaliteta Ivandvor i Josipovac Punitovački-Veliko polje I ne pokazuju značajna odstupanja koja bi ih izdvajala u tehnološkom smislu proizvodnje. Upravo suprotno, funkcionalna analiza alatki sugerira znatnu količinu dosljednosti koja može ukazivati na nepostojanje razlika u korištenim vlaknima, ali i na homogenost krajnjih proizvoda (Sl. 11).

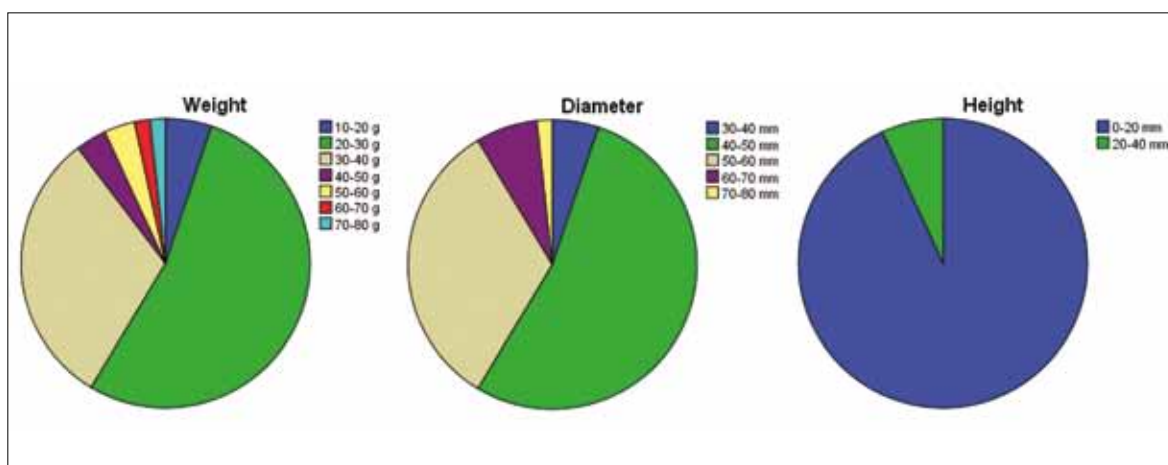
Uz povećanu frekvenciju pršljenova zabilježenu na oba lokaliteta, kada ih se promatra u kontekstu pojedinog nalazišta, njihovi tipološki profili ukazuju nekoliko stvari. Diskoidni pršljenovi, koji su naizgled najčešći tip u retzgajarskoj kulturi, prilično se rijetko javljaju na lokalitetu Josipovac Puni-

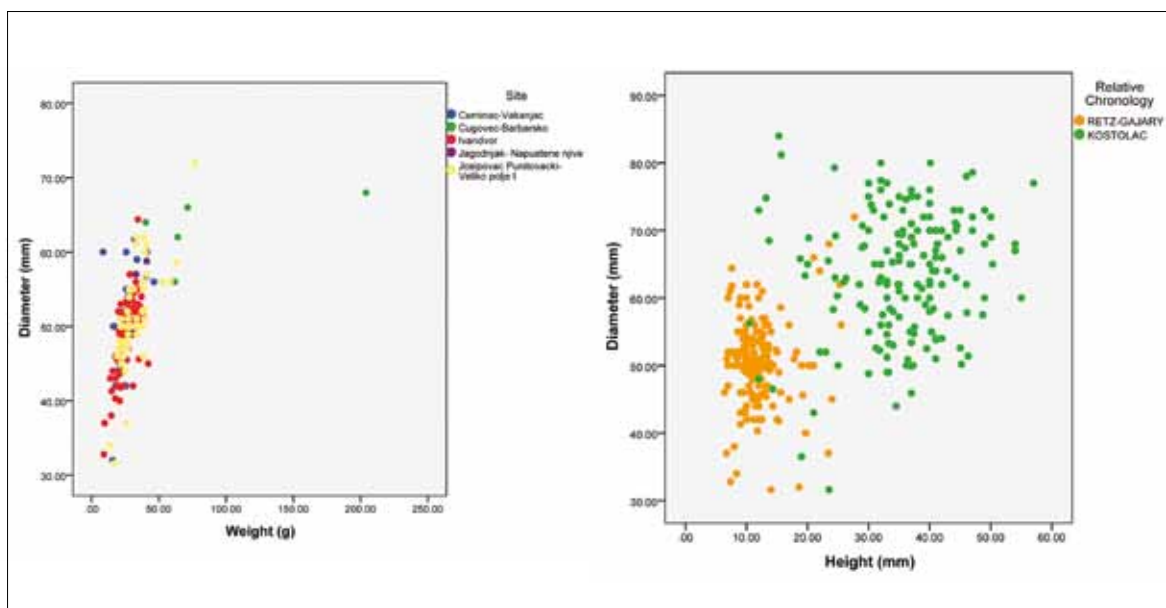
context. Although the specific locations, particularly the main area of the manufacture (SJ 194), display little to no peculiarity regarding the inspected functionality parameters, its higher tool concentration revealed a significantly lowered typological variability in comparison to the rest of the spindle whorl sample (Fig. 9).

The generally low deviation of all the considered metric values suggests a rather specialised production, possibly resonating limited fibre material options (Fig. 10). The main technological standard, observable only on the site level, suggests that here, again, like at Ivandvor, lighter spindle whorls were most commonly used. Spindle whorls ranging from 20 to 30 grams dominate in the sample (53 %), although slightly heavier (30-40 g) whorls are highly represented as well. Middle diameter classes (40-50 mm and 50-60 mm) are the most common, making up for the 86 percent of the sample. Low height class (< 20 mm) is the most represented at the site, although this is not reflected in the dominance of the typically flat types, like discoid and lenticular spindle whorls. On the contrary, and this is the main difference when compared to the Ivandvor set, the most frequent here is the convex and conical spindle whorl type (Fig. 9).

When compared to other Retz-Gajary spindle whorls, both the Ivandvor set and the set from Josipovac Punitovački-Veliko polje I are not revealing any significant deviation that would separate them in technological sense of production. On the contrary, functional analysis of the tools proposes a fair level of consistency, which may be further con-

Slika / Figure 10. Frekvencija određene kategorije težine, promjera i visine pršljenova s lokaliteta Josipovac Punitovački-Veliko polje I / Frequency of the particular weight, diameter and height classes of spindle whorls at Josipovac Punitovački-Veliko polje I.





Slika / Figure 11. Omjer težine i promjera (lijevo) i distribucija tipova (desno) pršljenova s lokaliteta retzgajarske kulture / Spindle whorls' weight-diameter (left) and type distributions (right) against sampled Retz-Gajary sites.

tovački-Veliko polje I, gdje prevladavaju konveksni pršljenovi, praćeni koničnima. Tip koničnih pršljenova, pak, u potpunosti izostaje u skupu nalaza s Ivandvora. Čini se da je bikonični tip, češći krajem 4. i tijekom 3. tisućljeća pr. Kr., korišten samo na ova dva lokaliteta, i nije zabilježen na preostala tri proučavana lokaliteta retzgajarske kulture. Cijeli skup nalaza pršljenova retzgajarske kulture karakterizira mala varijabilnost u visini (>80% nalaza je u kategoriji plosnatih predmeta čija visina ne prelazi 20 mm), kao i prilično standardizirana težina (>80% nalaza teži između 10 i 40 g) te maksimalna vrijednost promjera (>80% nalaza varira od 40 do 60 mm).

Lociranje prelja i predioca kostolačke kulture

Naselje kostolačke kulture na lokalitetu Đakovo-Franjevac jedno je od najvećih dokumentiranih lokaliteta te kulture u Hrvatskoj, a rezultate istraživanja detaljno je objavila Jacqueline Balen, koja je i vodila zaštitna istraživanja na nalazištu. Zabilježeni nepokretni arheološki nalazi uključuju višestruke strukture ovalnog i izduženog oblika, plitke kružne ili ovalne jame, duge uske jarke te rupe od stupova.

Slično Ivandvoru, na lokalitetu nisu prepoznati ostaci nadzemne arhitekture, iako lijep pronađen u zapunama određenih jama ukazuje na postojanje konkretnih nadzemnih konstrukcija. Budući

sidered as an indication of both, the undifferentiated use of raw fibre materials and the homogeneity of end products (Fig. 11).

Along with the elevated frequency of spindle whorls attested at both sites, their typological profiles account for few peculiarities, when observed on an inter-site level. The discoid spindle whorl, which appears to be the most common Retz-Gajary type is fairly underrepresented at Josipovac Punitovački – Veliko polje I, where convex spindle whorls dominate and the conical type seems to be the second most common. The conical spindle whorl type, on the other hand, is completely missing in the Ivandvor set. The biconical type, more common for the later 4th and the succeeding 3rd millennium BC appears to be used only at these two settlements and has not been recorded at the other three investigated Retz-Gajary sites. The entire Retz-Gajary spindle-whorl sample is characterized by a low height value variability (> 80 % being in the flat tool class, not higher than 20 mm) and rather standardized weight (> 80 % ranging from 10 to 40 g) and maximum diameter values (> 80 % ranging from 40 to 60 mm).

Housing Kostolac Spinners

The Kostolac settlement at Đakovo – Franjevac is one of the largest documented sites of this culture in Croatia and the results of its investigation were published in great detail by Jacqueline Balen, who led the rescue excavations. Multicellular structures of oval and elongated shape; shallow circular, or

da u ukopanim strukturama na lokalitetu nisu *in situ* pronađeni ostaci peći ili ognjišta, kao ni popratnih stupova, autorica ove prostore interpretira kao radne, a ne stambene. Na Franjevcu je zabilježeno nekoliko vrsta dokaza koji podupiru ovakvu interpretaciju navedenih prostora. U tom smislu, interpretacija koju Jacqueline Balen nudi za istražene prostore pruža podatke o organizaciji aktivnosti na lokalitetu (Balen 2011: 86-88). Neke od struktura sadržavale su duboko ukopane manje jame, vjerojatno rupe od stupova koji su mogli nositi lakše nadzemne konstrukcije, a zbog čega je spomenute strukture moguće interpretirati kao radioničke prostore. Izduženi uski jarci smješteni u južnom dijelu istražene površine, mogli su biti dijelom samostojećih drvenih ograda korištenih u procesu štavljenja kože. Nepravilne jame ispunjene gotovo sterilnim sedimentom, u kojima nije bilo organskih sastavnica ni arheološkog materijala, vjerojatno su služile za miješanje gline, dok

oval pits; long, narrow trenches and postholes make up for the recovered immovable archaeological finds.

Similar to Ivandvor, no surface architecture was recognized with certainty at the site, although the recovery of daub in the fills of certain pits attests for the presence of solid above-ground structures. Since none of the sunken structures at the settlement contained *in situ* elements of ovens or hearts and no surrounding posts were traced, the author is closer to interpreting them as activity spaces, rather than ascribing them residential character. There are several different lines of evidence at Franjevac, which are in agreement with its work-related character. In this manner, Jacqueline Balen's interpretations of the investigated features inform about the organization of the activities at the site (Balen 2011: 86-88). Some structures were composed of deeply dug pits, most probably postholes, which could have supported light constructions, making these features interpretive as workshop spaces. Elongated narrow trenches, all located in the southern part of the investigated area may have been self-standing timber fences used in the process of tanning animal hides. Irregular pits that were filled with almost sterile sediment, lacking organic components and archaeological material, most likely served for mixing clay, while bell shaped pits that widen towards their dugout bottom, in which large concentrations of botanical remains were attested, were likely utilized for storage (Balen 2011: 86-88).

Interestingly, out of the 142 recorded features at Franjevac, which yielded Kostolac pottery, two structures (SJ 160/161 and SJ 876/877), the most dominating in size (20 x 17 meters), just like it was the case with Retz-Gajary sites, held the majority (62 %) of the recovered spindle whorls (Fig. 12).

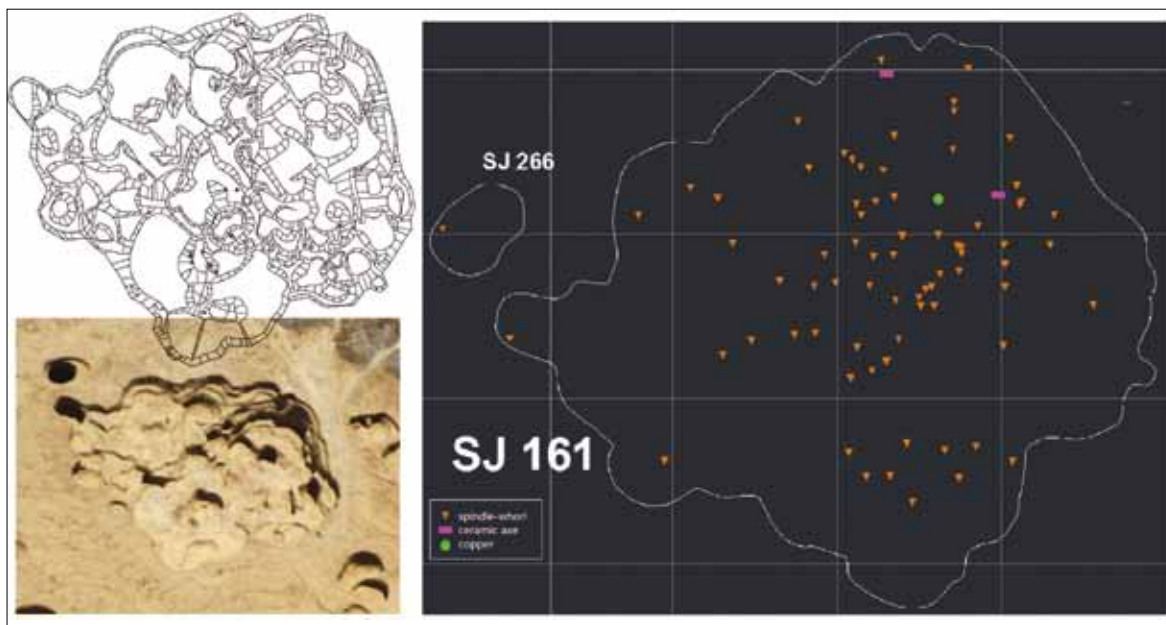
Out of 121 spindle whorls excavated at the settlement and attributed to the Kostolac culture, 63 (more than 50 % of the entire Franjevac sample and 37 % of the entire Kostolac sample recorded in the database) were found in the southern large pit structure (SJ 160/161) that also yielded a substantial amount of other ceramic and lithic material (Fig. 13).

Other interesting findings allocated in the same context (SJ 160) include 8 polished stone tools, 5 grindstones, 3 small spools, 2 small ceramic axes, a small decorated ceramic tile and bone tools- spatulae and an awl (Balen 2011: 36-37, 135)⁶. This large sunken structure contained several pit features

⁶ SJ 160 (upper layer that yielded 56 spindle whorls) was C14 dated to the period between 3380 and 2880 BC (Balen 2011: 159).

Slika / Figure 12. Zračna fotografija lokaliteta Đakovo-Franjevac snimljena sa sjeverne strane. Žuta strelica pokazuje na južnu (SJ 160/161), a crvena na sjevernu (SJ 876/877) od dvaju velikih jamskih struktura u kojima je zabilježena velika koncentracija pršljenova / Aerial photo of the Đakovo-Franjevac site taken from the northern side. Yellow arrow is pointing to the southern (SJ 160/161) and the red arrow is pointing to the northern (SJ 876/877) of the two large pit structures with high concentration of spindle whorls (prema / after: Balen 2011: 12, Fig. 1. 1.).





Slika / Figure 13. Velika višecelijska ukopana struktura (SJ 160/161) s lokaliteta Đakovo-Franjevac. Lijevo: zračna fotografija i tehnički crtež (prema: Balen 2011: 37). Desno: tlocrt s prikazom prostorne distribucije nalaza preuzet iz objavljenog plana lokaliteta izrađenog u programu AutoCad (prema: Balen 2011) / Large multicellular sunken structure (SJ 160/161) from Đakovo-Franjevac. Left: aerial photo and the technical drawing (after: Balen 2011: 37). Right: plan with the spatial distribution of finds taken from the published AutoCad map of the site (after: Balen 2011).

su zvonolike jame, koje se šire prema dnu i koje su sadržavale velike koncentracije botaničkih ostataka, vjerojatno bile korištene za skladištenje (Balen 2011: 86-88). Zanimljivo, od 142 zabilježene strukture koje su na Franjevcu sadržavale kostolačku keramiku, dvije strukture (SJ 160/161 i SJ 876/877), najvećih dimenzija (20x17 m), kao što je bio slučaj i na retzgajarskim lokalitetima, sadržavale su većinu (62%) pronađenih pršljenova (Sl. 12).

Od 121 kostolačkog pršljena pronađenog na lokalitetu, 63 (više od 50% cijelog uzorka s Franjevca i 37% cijelog kostolačkog uzorka u bazi podataka) je pronađeno u velikoj ukopanoj strukturi (SJ 160/161), u kojoj je pronađena i znatna količina keramičkog i kamenog materijala (Sl. 13).

Iz istog konteksta (SJ 160) potječe još zanimljivih nalaza, uključujući osam glačanih kamenih alatki, pet žrvnjeva, tri mala kalema, dvije male keramičke sjekire, mala ukrašena keramička pločica i koštane alatke – spatule i šilo (Balen 2011: 36-37, 135).⁶ Ova velika ukopana struktura sadržavala je nekoliko jamskih objekata različitih dubina i dimenzija, a autorica te činjenice uzima kao dodatni argument protiv moguće stambene funkcije objekta (Balen 2011: 87). Osim toga, Jacqueline Balen smatra da je

of uneven depth and dimensions, so the author interprets this fact as an extra argument against its possible residential function (Balen 2011: 87). In addition, Jacqueline Balen argues that the large structure from Franjevac might have been used for cult purposes: firstly, she suggests this on the account of the discovery of two buried skulls in the two separate smaller features within the pit itself (one belonging to a child and another to an adult female) and secondly, due to the position of another cylindrical feature next to it (SJ 265/266), which was initially probably used for storage, but secondarily served as a burial place (Balen 2011: 88). Interestingly, both the female skull burial pit from the large structure and the male burial pit next to it yielded a single spindle whorl, each. Female skull was found together with a fragment of a copper dagger (Balen 2011: 37), while a skeleton of an adult male was buried in the cylindrical pit together with two pigs (Balen 2011: 51).

Another 12 spindle whorls were recovered from the northern, of the two dominating structures (SJ 876/877) at Đakovo – Franjevac, which also contained several pit features of uneven depth and dimensions that lead the author's interpretation

⁶ SJ 160 (gornji sloj u kojem je pronađeno 56 pršljenova) je radiokarbonski datirana u vrijeme između 3380. i 2880. pr. Kr. (Balen 2011: 159).

velika struktura s Franjevca mogla biti korištena u kultne svrhe: prvo, autorica takvu funkciju pretpostavlja na temelju dvaju ukopanih lubanja koje su pronađene u dvije odvojene manje jame unutar strukture (jedna dječja i druga odrasle žene), i, drugo, zbog položaja dodatne cilindrične strukture koja je zabilježena pored ove (SJ 265/266), a koja je prvotno vjerojatno korištena za skladištenje, dok je sekundarno poslužila za ukop (Balen 2011: 88). Zanimljivo, i u ženskom grobu unutar jame, kao i u muškom iz jame pored, pronađen je po jedan pršljen. Uz lubanju žene pronađen je i ulomak bakrenog bodeža (Balen 2011: 37), dok je u cilindričnoj jami uz kostur muškarca otkriven i ukop dvije svinje (Balen 2011: 51).

Još je 12 pršljenova pronađeno u sjevernijoj od dvije najveće strukture (SJ 876/877) na lokalitetu Đakovo-Franjevac, koja je također bila sastavljena od nekoliko jama različitih dubina i dimenzija, što je autoricu navelo da niti ovu jamu ne interpretira kao stambenu. Izuzev pršljenova, u jami je pronađeno mnogo keramičkog i kamenog materijala. Neki od važnih nalaza iz ovog konteksta uključuju mali kalem i keramički žrtvenik (Balen 2011: 78).⁷

Preostalih 46 pršljenova kostolačke kulture s Franjevca pronađeno je u 18 različitih struktura širom lokaliteta i na temelju zabilježenog *in situ* konteksta, ne može ih se povezati s dva velika skupa nalaza. Veća koncentracija pršljenova (10) pronađena je u relativno velikoj jami (SJ 572/573) u kojoj je bila

⁷ SJ 876 je radiokarbonski datirana u vrijeme između 3100. i 2960. pr. Kr. (Balen 2011: 159).

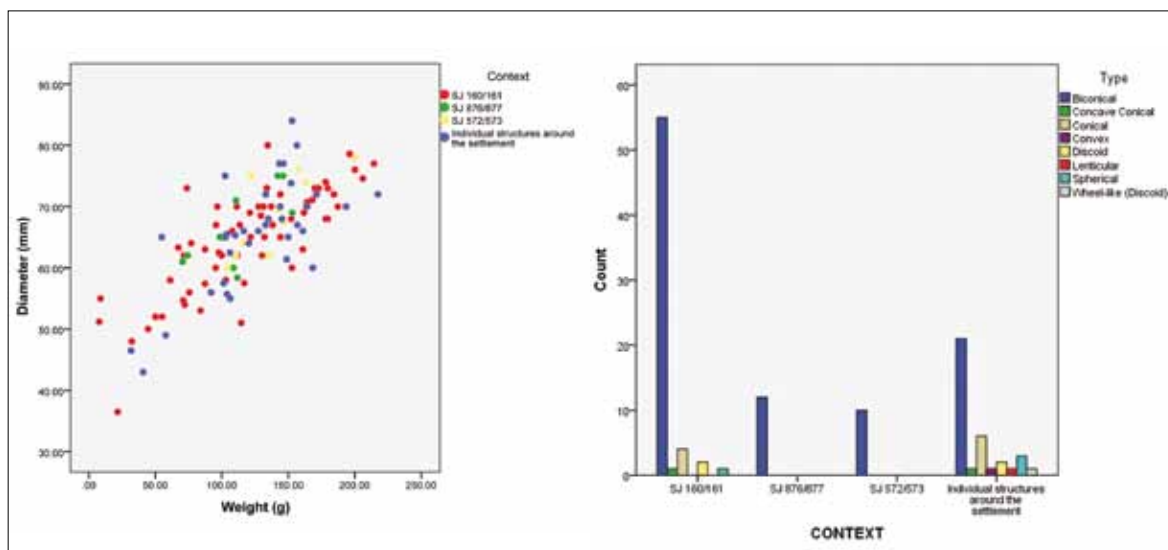
away from defining it as a living area. Besides the spindle whorls, the pit yielded a huge amount of ceramic and lithic material. Some of the more important findings allocated in the context include a small spool and a ceramic altar (Balen 2011: 78)⁷.

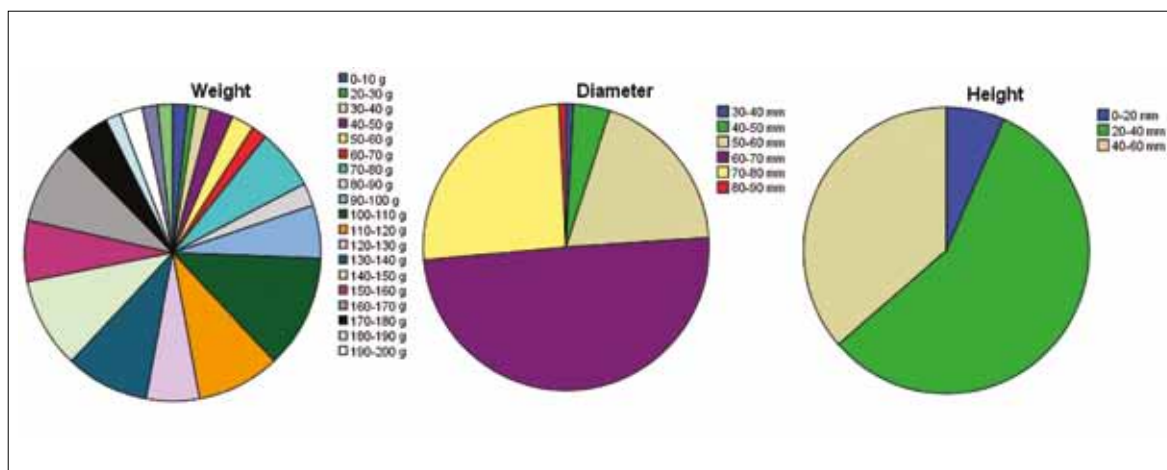
Remaining 46 Kostolac spindle whorls found at Franjevac were distributed among 18 different features and cannot be brought to the connection with the two large assemblages as far as their *in situ* context is concerned. Higher concentration of spindle whorls (10) was recovered in another relatively large pit (SJ 572/573) which also yielded a fair amount of ceramic material and a stone axe. Even though fireplaces were documented in this particular structure, Balen is still inclined to consider it as a working space rather than ascribing it residential character (Balen 2011: 67, 88).

The results of the tool analysis reveal some specifics among the three 'main' assemblages from the largest pit structures. Although only minor differences were observed, which would functionally or typologically separate these sets from the rest of the spindle whorls recovered around the settlement, they are significant for the investigation of tool standardisation and thus potentially indicative of higher levels of specialisation attestable for the particular locations at the site.

⁷ SJ 876 was C14 dated to the period between 3100 and 2960 BC (Balen 2011: 159).

Slika / Figure 14. Omjer težine i promjera (lijevo) i distribucija tipova (desno) pršljenova iz pojedinačnih jamskih struktura s lokaliteta Đakovo-Franjevac / Spindle whorls' weight-diameter (left) and type distributions (right) given for separate pit structures at Đakovo-Franjevac.





Slika / Figure 15. Frekvencija određene kategorije težine, promjera i visine pršljenova s lokaliteta Đakovo-Franjevac / Frequency of the particular weight, diameter and height classes of spindle whorls at Đakovo-Franjevac.

i znatna količina keramike te kamena sjekira. Iako su u ovom dijelu strukture zabilježena ognjišta, Balen i ove strukture smatra radnim, a ne stambenih prostorima (Balen 2011: 67, 88).

Rezultati analize alatki otkrivaju neke osobitosti u tri „glavna“ skupa nalaza iz najvećih jamskih struktura. Iako su među njima primijećene samo manje razlike koje bi ove skupove nalaza mogle funkcionalno i tipološki razlikovati od ostalih pršljenova sa nalazišta, dovoljno su značajne za istraživanje standardizacije alatki i stoga potencijalno ukazuju na višu razinu specijalizacije na određenim lokacijama na lokalitetu.

Usporedba morfoloških značajki prisutnih u trima skupovima nalaza ne ukazuje na znatne razlike u korištenim vlaknima ili kvaliteti krajnjih proizvoda, iako je među analiziranim pršljenovima uočena zanimljiva varijabilnost u pogledu veličine i tipa, a koja bi mogla ukazivati na eventualna ograničenja u pogledu funkcionalnosti alatki (Sl. 14). Najveće su razlike zabilježene između dvaju manjih skupova nalaza iz velikih struktura (SJ 876/877 i SJ 572/573). U oba skupa vidljiva je slaba zastupljenost manjih vrijednosti težina i promjera pršljenova, pošto su prisutne isključivo velike (>50 mm u promjeru) i teške (teže od 70 g) alatke.

Najveći skup nalaza iz južne ukopane strukture nije pokazao značajne razlike u distribuciji vrijednosti težina i promjera pršljenova u usporedbi s ostalim skupovima alatki koje su pronađene na različitim mjestima u naselju. Suprotno dvama manjim skupovima, u „glavnom“ skupu nalaza pršljenova iz 'južne' strukture (SJ 160/161) zabilježena je

Morphological traits represented in the three assemblages, when compared, do not propose a major distinction in fibre material use, or different quality end products, although few interesting observations regarding the level of both size and type variability within the analysed sets of spindle whorls can be drawn, pointing to possible limitations regarding their functionality (Fig. 14). The biggest difference can be noticed in the case of two smaller assemblages coming from the two large structures (SJ 876/877 and SJ 572/573). They are both showing restriction in the distribution of smaller weight and diameter values, holding exclusively large (> 50 mm diameter classes) and heavy (heavier than 70 g weight classes) tools.

The largest assemblage from the southern pit structure does not reveal much difference regarding the distribution of spindle whorls' weight and diameter values, when compared to the rest of the tool set recovered at different locations around the settlement. Opposite to the two smaller assemblages, a slightly higher frequency of smaller weight (10% < 50 g) values can be detected for the 'main' spindle whorl set recovered from the 'southern' structure (SJ 160/161). Although there is no big difference observable in the distribution of higher values between the studied sets, since the massive tools appear to dominate in all of them, it should be mentioned that both the very large (> 80 mm) and especially the very heavy tools (> 60% > 100 g) are convincingly the most represented classes in the 'main' (SJ 160/161) assemblage.

The general tendency of all the considered metric values to cluster around the higher end of the

nešto viša frekvencija nalaza manje težine (10% <50 g). Iako u proučavanim skupovima nije uočena značajna razlika kod distribucije većih vrijednosti, s obzirom na to da masivnije alatke prevladavaju u svima, valja istaknuti da izuzetno velike (>80% je >60 mm), a osobito izuzetno teške (>60% je >100 g) alatke uvjerljivo sačinjavaju najveće razrede u „glavnom“ skupu nalaza (SJ 160/161).

Opća tendencija grupiranja svih promatranih metričkih vrijednosti oko višeg kraja spektra ukazuje na prilično specijaliziranu proizvodnju koja, gotovo sigurno, odražava i ciljani odabir vlakana i korištenje određenih tehnika. Glavni tehnološki standard, gledano na razini lokaliteta, pokazuje da su najčešće korišteni teški, a posebno vrlo teški pršljenovi. Pršljenovi teži od 100 g prevladavaju u uzorku (>70%), iako su zabilježeni i nešto lakši primjerci (>20% je 40-100 g). Prevladavaju nalazi velikih promjera (>60 mm) koji sačinjavaju više od 70% uzorka, iako su prisutni (>20%) i oni umjerenih veličina, od 40 do 60 mm (Sl. 15). Ova prilično velika varijabilnost u težini pršljenova nije se odrazila kroz varijabilnost tipova. Bikonični pršljenovi uvjerljivo su glavni tip na Franjevcu (>80%), i jedini korišteni tip (100%) na dvije određene lokacije (SJ 876/877 i SJ 572/573), na kojima je već ustanovljena viša razina standardizacije alatki.

Unatoč ljudskim ukopima otkrivenim u južnoj strukturi (SJ 160/161), koji bi mogli objasniti kontekst kroz posebno odlaganje, u višim slojevima strukture nisu uočene indikacije sekundarnog depozita glavnog skupa nalaza pršljenova.

Najveća koncentracija pršljenova na Franjevcu, ako se uzme u obzir model po kojem svaki pojedinac za vrijeme predenja koristi po jedan pršljen, sugerira da je znatan broj prelja/predioca mogao koristiti „glavni“ radionički prostor u južnoj jamskoj strukturi (SJ 160/161), što ujedno ukazuje na intenzivne, i, najizglednije, specijalizirane aktivnosti koje su se odvijale u naselju, i to upravo u središnjim i najvećim strukturama, barem na istraženoj površini.

Osim na lokalitetu Đakovo-Franjevac, pršljenovi kostolačke kulture pronađeni su na Gomolavi, lokalitetu tel tipa u Srbiji. Na Gomolavi, za razliku od Đakovo-Franjevca, njihova prostorna distribucija ukazuje na proizvodnju u domaćinstvu (Sl. 16). Sloj kostolačke kulture na lokalitetu izvrsno je očuvan, a arheološki nalazi koji dokazuju postojanje nadzemnih konstrukcija pružili su vrijedne podatke o naseljavanju: tri horizonta naseljavanja koji su

spectrum suggests a rather specialised production, almost certainly reflecting both the focused fibre material use and the particular technique practice. The main technological standard, when observed on the site level, suggests that heavy and especially very heavy spindle whorls were most commonly used. Whorls heavier than 100 grams dominate in the sample (> 70 %), although slightly lighter (40-100 g) whorls are represented as well (> 20 %). Larger diameters (> 60 mm) seem to prevail, making up for more than 70 percent of the sample, although moderate sizes, ranging from 40 to 60 mm appear to be represented (> 20 %) as well (Fig. 15). This relatively high weight value variability is not at all reflected in the deviation of types. A biconical whorl is convincingly the main type used at Franjevac (> 80 %), and the only type used (100 %) at the two specific locations (SJ 876/877 and SJ 572/573), which already displayed a higher level of tool standardisation.

Despite the human burials recovered in the southern structure (SJ 160/161), that may suggest a special deposition as a plausible explanation for the context, no indications for a secondary refuse of the main spindle whorl assemblage, found in the upper layers of the investigated feature, were attested.

The highest recorded concentration of spindle whorls at Franjevac, if a tool per spinner scenario is concerned, would suggest that a substantial number of spinners could have been using the ‘main’ workshop space in the southern pit structure (SJ 160/161). Thus, this large concentration of tools proposes that intensified and, most likely, specialized spinning practice took place at the settlement, precisely in its most central and largest structures, as far as the investigated area is concerned.

Besides at Đakovo – Franjevac, spindle whorls attributed to the Kostolac culture-historical group were recorded at Gomolava, a tell site in Serbia. At Gomolava, as opposed to Đakovo – Franjevac, their spatial distribution agrees with the household production (Fig. 16). Kostolac cultural layer was substantially preserved at the site and the archaeological evidence, attesting above ground constructions, provided some valuable information on housing: three habitation horizons comprised of houses and accompanying features revealed intensive occupancy, displaying parallel rows of buildings, overlapping of certain house plans, continuous architectural renovations, use of partition walls, use of in-house hearts and ovens and double-



Slika / Figure 16. Kuća 6 (IIIb1) s lokaliteta Gomolava – pršljenovi u kućnom lijepu / House 6 (IIIb1) at Gomolava – Spindle whorls in daub. (prema / after: Petrović & Jovanović 2002: 100).

sadržavali kuće i popratne strukture ukazuju na intenzivnu okupaciju, a vidljivi su paralelni redovi građevina, preklapanje planova nekih kuća, kontinuirano arhitektonsko obnavljanje, korištenje pregradnih zidova, vatrišta i peći unutar objekata te dvostruka krovništa na pravokutnim građevinama (Petrović & Jovanović 2002: 299).⁸

Pršljenovi iz kostolačkog sloja naseljavanja često su pronalazeni u kućama, jamama i popratnim prostorima na telu kroz sve tri faze naselja (Petrović & Jovanović 2002). Visoka frekvencija alatki koja je zabilježena na Gomolavi (51 pršljen) čini ovaj uzorak važnom referentnom točkom za usporedbe sa drugim lokalitetima, iako nije bilo moguće izdvojiti pojedinačne lokacije s većom koncentracijom alatki koje bi sugerirale da su se aktivnosti vezane uz predenje ikada odvijale na za to predodređenoj lokaciji.

Tehnološki standard na Gomolavi karakterizira najveća zastupljenost velikih (>40% je 50-60 mm) i teških (>75% je 40-100 g) pršljenova, za razliku od Franjevac gdje je zabilježena znatno viša frekvencija ekstremnih vrijednosti. I jako veliki (>60 mm) i jako teški (>100 g) pršljenovi, kakvi prevladavaju na Franjevcu, znatno se rjeđe pojavljuju u uzorku s Gomolave (Sl. 17).

⁸ C14 datumi s Gomolave padaju u raspon između 3038. i 2903. pr. Kr. te 3108 i 2877 pr. Kr. (Petrović & Jovanović 2002: 303), što znači da je faza naseljavanja tela istovremena naselju s lokaliteta Đakovo-Franjevac.

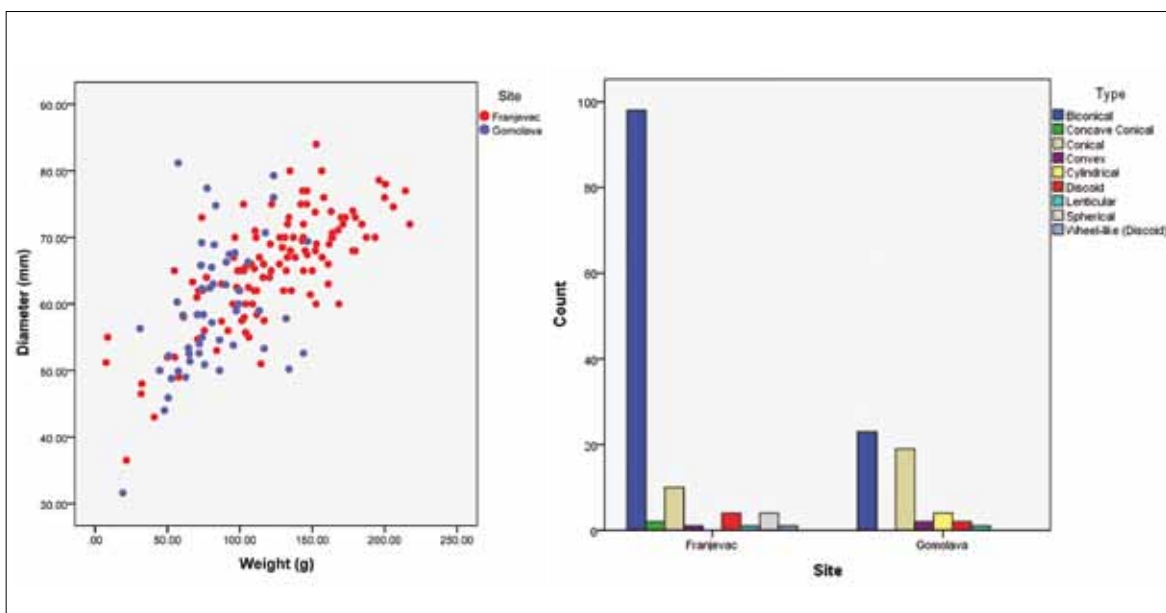
pitched roofing of rectangular buildings (Petrović and Jovanović 2002: 299)⁸.

Spindle whorls from the Kostolac level of occupation at the tell were commonly found in houses, pits and their surrounding areas belonging to all three habitation horizons (Petrović & Jovanović 2002). A high frequency of tools recorded at Gomolava (51 spindle whorls) makes this sample a valuable point of reference for the inter-site comparison, although no specific location with a higher concentration of tools could be recognized, which would suggest that a designated area for spinning activities ever existed at the site.

The technological standard at Gomolava is characterized by the highest distribution of the large (> 40 % 50-60 mm) and heavy (> 75 % 40-100 g) spindle whorl classes. As opposed to the Franjevac sample, which revealed a much higher frequency of extreme values. Both, very large (> 60 mm) and very heavy (> 100 g) spindle whorls, which dominate at Franjevac are significantly less represented in the Gomolava sample (Fig. 17).

In terms of typological variability, the situation at Gomolava appears more dynamic. Although

⁸ C14 dates from Gomolava cover the span 3038-2903 BC and 3108-2877 BC (Petrović & Jovanović 2002: 303), making the Kostolac occupational phase at the tell contemporary to the Đakovo – Franjevac settlement.

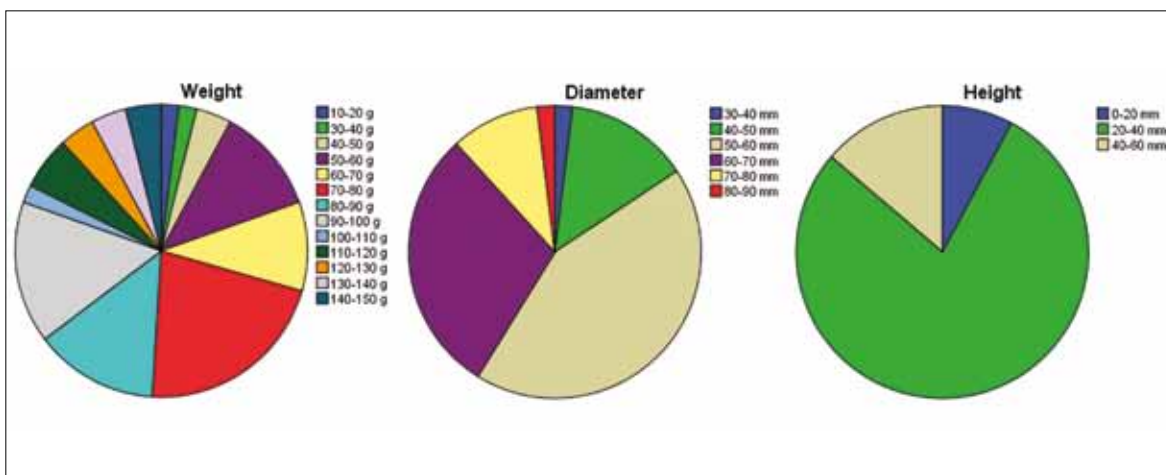


Slika / Figure 17. Omjer težine i promjera (lijevo) i distribucija tipova (desno) pršljenova s lokaliteta kostolačke kulture / Spindle whorls' weight-diameter (left) and type distributions (right) against sampled Kostolac sites.

U pogledu tipološke varijabilnosti, situacija na Gomolavi čini se dinamičnijom. Iako je u uzorku s Franjevca zabilježeno osam različitih tipova, zbog potpune prevlasti bikoničnih pršljenova taj se skup nalaza čini izrazito standardiziranim. S druge strane, na Gomolavi je zabilježeno šest različitih tipova pršljenova, a dva glavna tipa (>80%) prilično su jednakomjerno zastupljena (bikonični >45%, a zatim konični tip >35%).

the sample from Franjevac yielded eight different types, the absolute dominance of biconical spindle whorls makes this set appear as highly standardized. On the other hand, at Gomolava six different types of spindle whorls were recorded, but the two main types (> 80 %) seem to be more equally distributed within the sample (biconical > 45 %, followed by conical type > 35 %).

Slika / Figure 18. Frekvencija određene kategorije težine, promjera i visine pršljenova kostolačke kulture s lokaliteta Gomolava / Frequency of the particular weight, diameter and height classes of Kostolac spindle whorls at Gomolava.



Glavno ograničenje varijabilnosti u uzorku s Gomolave, za razliku od tehnološkog standarda kostolačke kulture, vidljivo je u distribuciji vrijednosti visine (Sl. 18). Ovdje uvjerljivo prevladavaju pršljenovi srednje visine (20-40 mm), što se znatno odražava na smanjenu varijabilnost vrijednosti težina (u usporedbi s distribucijom težina u uzorku s Franjevca). Osim toga, distribucija vrijednosti promjera na Gomolavi također pokazuje manju zastupljenost velikih alatki (60-70 mm i 70-80 mm).

Trendovi ili tradicije

Kako bi se istražili glavni čimbenici koji su mogli utjecati na tehnološki razvoj, rane faze te dinamiku procesa specijalizacije tijekom srednjeg i kasnog eneolitika, uspoređena su dva uzorka pripisana retzgajarskoj i kostolačkoj kulturno-povijesnoj skupini (Sl. 19).

Zanimljivu posebnost u oba skupa nalaza kostolačke kulture čini distribucija vrijednosti težina pršljenova, odnosno očita smanjena zastupljenost lakših alatki (<30 g), unatoč njihovoj brojnosti i generalno visokoj varijabilnosti u vrijednosti težina primjećenoj u uzorcima. Ovaj razred težine pršljenova je, pak, uvjerljivo najučestaliji u proučavanim retzgajarskim skupovima nalaza. Kao što pokazuju

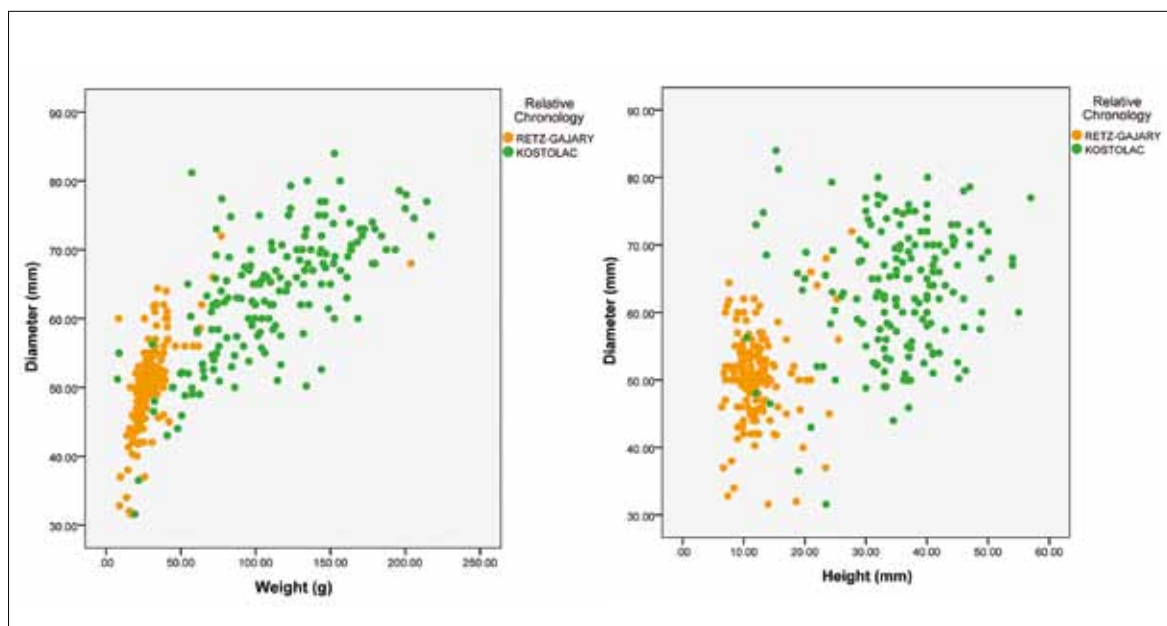
In the Gomolava sample, the main variability restriction, in comparison to the Kostolac technological standard, can be observed in the height class distribution (Fig. 18). Here, the convincing dominance of the medium height class spindle whorls (20-40 mm), is substantially resonating the lowered deviation of the weight value (in comparison to the weight value distribution in the Franjevac sample). Additionally, the diameter value distribution at Gomolava displays a decreased frequency of large tools (60-70 mm and 70-80 mm) as well.

Trends or Traditions

In order to explore the main factors which might have influenced the technological developments, the early stages and the dynamics of the specialisation process during the Middle and Late Eneolithic, two samples belonging to Retz-Gajary and Kostolac culture-historical groups were compared (Fig. 19).

An interesting peculiarity regarding both of the investigated Kostolac assemblages is that their spindle whorl weight value distribution, or their spindle whorl weight class variability is highly restricted in the case of light tools weighing (<30 g), despite the high frequency of spindle whorls and the high weight value deviation apparent in the samples. This particular weight class of spindle whorls is, on

Slika / Figure 19. Distribucija omjera težina-promjer (a) i visina-promjer (b) za uzorke pršljenova retzgajarske i kostolačke kulture / Weight-diameter (a) and height-diameter (b) distributions given together for Retz-Gajary and Kostolac spindle whorl samples.



rezultati analiza, pršljenovi retzgajarske kulture grupiraju se oko nižeg kraja spektra vrijednosti varijable težine: u istraženim je skupovima nalaza ustanovljen samo mali postotak teških, i još neznatniji broj izuzetno teških alatki.

Ograničena zastupljenost pršljenova manje visine u kostolačkom uzorku također odražava prevladavanje, prvo, bikoničnog, i, zatim, koničnog tipa pršljena. Suprotno tomu, zanimljivo je primijetiti stabilne vrijednosti težine retzgajarskih pršljenova: tehnološki standard koji je jasno postignut kroz dominaciju nižih pršljenova i ograničenje maksimalne vrijednosti promjera (Sl. 20). U kostolačkim skupovima uvelike prevladavaju teški i vrlo teški pršljenovi. Kao što je spomenuto, vrlo teški pršljenovi posebno su zastupljeni na lokalitetu Đakovo-Franjevac, gdje su razredi vrlo velike težine pronađeni u dvije strukture koje pokazuju najveću lokaliziranu standardizaciju. Te, izuzetno velike, vrijednosti tipične su za kostolačke skupove nalaza i mogu se povezati sa značajno dugim (pretpostavljeno biljnim) vlaknima i/ili pređenjem (Hochberg 1979: 21; Barber 1991: 52) teže i deblje pređe ili užadi (Vakirtzi 2014: 53). Izuzev uplitanjem (uvijanje dvaju ili više niti zajedno), visoku frekvenciju vrlo teških pršljenova moguće je objasniti korištenjem određene tehnike pređenja.

Poznate su dvije tehnike pređenja ručnim vretenom: uz pomoć visećeg vretena koje samostalno visi na niti, i uz pomoć poduprtog vretena koje je oslonjeno i okreće se na tlu ili u posudi. Pri pređenju s oslonjenim vretenom gravitacija ne utječe na proces, zbog čega je parametar težine manje važan. Glavni nedostatak ove tehnike jest to što pojedinac mora stajati na istom mjestu, za razliku od korištenja visećeg vretena koje omogućava da se sjedi, stoji, hoda, jaše, itd. dok se prede. (Grömer 2005: 109). Lokalizirane koncentracije vrlo teških pršljenova pronađene u najvećim jamskim strukturama na lokalitetu Đakovo-Franjevac mogle bi ukazivati na određenu logiku koja stoji iza „sedentarnog“ karaktera korištenja oslonjenog vretena. Karina Grömer je u pokusima pređenja dokazala kako je pomoću poduprtog vretena (oslonjene na tlu ili u posudi) s vrlo teškim pršljenom (iznad 100 g) moguće isprediti čak i fine niti promjera 0.3 mm, jer gravitacija ne utječe na proces, te ne dovodi do pucanja niti (Grömer 2005: 110).

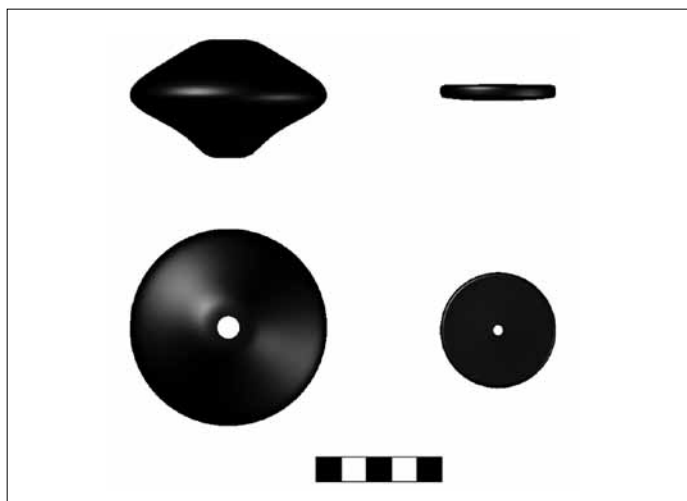
Razmotri li se odnos težine pršljena i tipa vlakna koje se prede korištenjem visećeg vretena, postaje jasno da bi za pređenje tankih i kratkih vlakana

the other hand convincingly the most dominating one in the studied Retz-Gajary sets. As shown by the results of the analysis, Retz-Gajary whorls cluster in the lower spectrum of the weight variable distribution: only a low percentage of heavy and even lower percentage of very heavy tools appear in the investigated assemblages.

Restricted distribution of the low height class in Kostolac sample is also resonating a dominance of firstly, the biconical and secondly, the conical type of whorls. In contrast, it is interesting to observe the fixed weight values of the Retz-Gajary spindle whorls: a technological standard that is evidently established through the dominance of lower height classes of whorls and the restriction of the maximum diameter value (Fig. 20). Kostolac sets are greatly dominated by heavy and very heavy spindle whorls. As mentioned, very heavy whorls are particularly represented at Đakovo – Franjevac, where two structures that showed the highest localized standardization held mainly very heavy classes. These extremely high weight values, typical for Kostolac assemblages, may be brought to connection with substantially long (presumably plant) fibres and/or plying (Hochberg 1979: 21; Barber 1991: 52) heavier thick yarns or ropes (Vakirtzi 2014: 53). Besides plying (twisting two or more threads together) the use of a specific spinning technique could explain a high frequency of very heavy whorls.

Two different techniques of spinning with a hand spindle are known: using a drop spindle that hangs freely on the lengthening thread and using a supported spindle that turns on the ground or in a vessel. In supported spinning gravity does not influence the process, making the weight parameter less crucial. The main disadvantage is that the spinner has to stay in one place, in contrast to the use of drop spindle, which allows the spinner to sit, stand, walk, ride etc. (Grömer 2005: 109). Localized concentrations of very heavy whorls found in the largest pit structures at Đakovo – Franjevac may resonate a certain logic behind the ‘sedentary’ character of practicing the supported technique. Karina Grömer’s spinning experiments proved that when spinning supported (on the ground or in a bowl) even fine threads of 0.3 mm diameter can be spun with heavy whorls (more than 100 g), while gravity does not affect the spinning process or break the thread. (Grömer 2005: 110).

If we consider the relationship between the weight of a whorl and the type of fibre being spun when



Slika / Figure 20. Veliki bikonični pršljen kostolačke kulture s lokaliteta Đakovo-Franjevac i diskoidni pršljen retzgajarske kulture s lokaliteta Ivandvor / A large Kostolac spindle whorl of a biconical type from Đakovo-Franjevac and a Retz-Gajary spindle whorl of a discoid type found at Ivandvor (crtež / drawing: A. Grabundžija).

bilo prikladnije koristiti lakše pršljenove te da bi odabir težih pršljenova bio prikladniji za pređenje debljih i dužih vlakna ili za uplitanje niti (Liu 1978: 99). U proučavanim skupovima nalaza, razlike između dominacije lakših pršljenova u retzgajarskoj i dominacije težih pršljenova u kostolačkoj kulturi ukazuju na znakovite prilagodbe u tehnologiji.

Michael Ryder (1968: 81) i Elizabeth Barber slažu se u tvrdnji da su pršljenovi težine oko 33 g prikladni za pređenje dugih niti vune srednje težine (Barber 1991: 52). Osim toga, objavljeni rezultati tehnološke analize skupova nalaza datiranih u 4. i rano 3. tisućljeće pr. Kr. s lokaliteta Arslantepe u Turskoj (Laurito et al. 2014) govore u prilog navedenoj tezi. Zanimljivo, jedini koštani pršljen iz cijelog uzorka (836 pršljenova u bazi podataka) koji je pronađen na lokalitetu Josipovac Punitovački-Veliko polje⁹ vrlo je sličan (oblikom, načinom izrade te zabilježenim vrijednostima veličine i težine) spomenutim koštanim alatima 4. tisućljeća s lokaliteta Arslantepe koje su, pretpostavlja se, korištene za pređenju vune.

Valja spomenuti rezultate još jedne analize (Vakirtzi 2014) koja je provedena na brončanodobnim alatima iz Tasosa u sjevernoj Egeidi, a koja također sugerira da je ovaj težinski razred pršljenova korišten za pređenju vune. Nasuprot tomu, kako bi se moglo prestići punu dužinu lanenih vlakana, najpogodnije je koristiti teške pršljenove, težine između 100 i 150 g (Gleba & Mannering 2012: 10).

⁹ Koštani pršljenovi izuzetno su rijetki u Panonskoj nizini tijekom ovog razdoblja, a ovaj nalaz prvotno je objavljen kao koštani privjesak (Čataj 2009: 31).

using a drop spindle, a light whorl would be suitable for spinning fine, short fibres and heavy whorls would be chosen for coarser and longer fibres or for plying (Liu 1978: 99). In the examined assemblages, the difference between the dominance of light weighted spindle whorls in the Retz-Gajary sets and the dominance of heavy weighted spindle whorls in the Kostolac sets, accounts for a significant technological adjustment.

Both Michael Ryder (1968: 81) and Elizabeth Barber argued that whorls around 33 grams are suitable for long staple medium-heavy wool (Barber 1991: 52). Additionally, reported results of the technological analysis on the 4th and early 3rd millennium BC assemblages from Arslantepe, Turkey (Laurito et al. 2014) support this conclusion. Interestingly, a single bone spindle whorl in the entire (836 spindle whorls in the database) sample, which was recovered at Josipovac Punitovački – Veliko polje⁹ highly resembles (in shape, production, and recorded size and weight values) the mentioned 4th millennium bone tools from Arslantepe, suggested for spinning wool.

It should be mentioned that results of another analysis (Vakirtzi 2014), of the North Aegean Early Bronze Age tools from Thasos, also propose that this particular spindle whorl weight class was used for spinning wool. Quite the opposite, in order to spin a full-length flax, it is ideal to use a heavy whorl, weighing between 100 and 150 grams (Gleba & Mannering 2012: 10).

⁹ Bone spindle whorls are very rare in the Pannonian Plain during this period and the particular find was initially published as a bone pendant (Čataj 2009: 31).

Iako vještina pojedinca do određene mjere može biti važnija od težine alatke (Kania 2015), znakovitu razliku u vučnoj snazi između kratkih životinjskih i dugih biljnih vlakana trebalo bi se moći prepoznati, ako ne u distribuciji alatki umjerenih/srednjih vrijednosti, onda svakako kroz zastupljenost ekstremno različitih kategorija pršljenova. Prve su vunene tkanine izuzetno rijetke i javljaju se tek od 4. tisućljeća pr. Kr. (Shishlina et al. 2003; Rast-Eicher 2014). S druge strane, količina peludi lana u uzorcima iz priobalnih naselja na švicarskim jezerima sugerira intenzivnu proizvodnju lana na prijelazu tisućljeća, a koja postaje još jasnije vidljiva zahvaljujući konkretnim ostacima tekstila pronađenim na ovim, izuzetno dobro očuvanim, lokalitetima (De Capitani et al. 2002: 115-120).

Bilo da je ona vezana uz ciljano korištenje određenih izvora vlakana, ili pak da ovisi o primjeni određenih tehnika, u usporedbi uzoraka retzgajarske i kostolačke kulture može se govoriti o određenoj razini standardizacije alatki. S druge strane, ako uzmemo kvalitetu predene niti kao parametar za usporedbu ove dvije proizvodne tradicije, također možemo objasniti razlike između ciljanih krajnjih proizvoda.

S obzirom na to da je u proučavanom razdoblju dokazano korištenje životinja za vuču (Fabiš 2005; Johannsen 2005; Isaakidou 2006), uprezanje životinja, povećana zemljoradnja te mobilnost i transport mogli su utjecati na pojačano korištenje tehnike uplitanja niti (vjerojatno za izradu teških konopa i užadi), kao što sugerira masivnost alatki kostolačke kulture.

Keramički pečati predstavljaju posebnu kategoriju nalaza koje se može povezati sa standardizacijom. Mnogi autori predlažu da su ti predmeti korišteni u proizvodnji tekstila (Mellart 1967: 220; Makkay 1984: 91; Barber 1991: 175; Budja 2003: 119), dok se o njihovom simboličkom aspektu nagađa kroz prizmu razvoja indeksa društvenih odnosa između različitih naselja na razini regije (Priatelj 2007: 252). Hodder ih interpretira kao osobne predmete (Hodder 2006: 231), prvenstveno na temelju dva pečata pronađena u grobovima iz slojeva IV i VI na lokalitetu Çatalhöyük.

Pitanja o osobnom identitetu i statusu, koja su objašnjiva kroz pojam osobnog vlasništva ili iznimne umješnosti individue, moguće je postaviti i za kontekst ljudskih ukopa iz velike strukture kostolačke kulture na lokalitetu Đakovo-Franjevac. Iako na analiziranim lokalitetima retzgajarske kulture

Although the influence of tool's weight can be to a certain degree surpassed by a spinner's skill (Kania 2015), the substantial difference in tensile strength between the short animal and long plant fibres should be distinguishable, if not in the distribution of the moderate spindle whorl types, then in the distribution of the extremely different tool categories. First woolen textiles are exceptionally rare and appear only from the 4th millennium BC (Shishlina et al. 2003; Rast-Eicher 2014). On the other hand, level of flax pollen in the samples taken from the lake-shore settlements in Switzerland indicated an intensive flax production at the turn of the millennia, even more obvious thanks to the actual textile-remains recovered at these exceptionally preserved sites (De Capitani et al. 2002: 115-120).

Whether being connected to the more focused use of certain fibre materials or dependent on the application of specific techniques, when compared, a certain level of tool standardization may be argued for the Retz-Gajary and Kostolac samples. In addition, if we would use the spun thread quality as a parameter for distinction it might explain how substantially different end products were aimed for by these two production traditions.

Since animal traction has been attested for the period (Fabiš 2005; Johannsen 2005; Isaakidou 2006), harnessing of animals, increased agriculture, mobility and transport may all have promoted the intensified plying technique (maybe for heavy cords and ropes), as suggested by the massiveness of the Kostolac tools.

Ceramic stamps are a peculiar category of finds that might be connected to the standardization. Many authors proposed their use in textile production (Mellart 1967: 220; Makkay 1984: 91; Barber 1991: 175; Budja 2003: 119), while their symbolic aspect has been hypothesised through the development of indexes for social relationships between various settlements at the regional level (Priatelj 2007: 252). Hodder interprets them as personal items (Hodder 2006: 231), mainly on the account of the two stamps found in burials at Çatalhöyük in levels IV and VI.

Questions regarding personal identity and status, explainable whether through ownership or craftsmanship, may be raised also on the account of human burials from the large Kostolac structure at Đakovo – Franjevac. Although no human burials were found at the analysed Retz-Gajari settlements, a large Furhenstich cemetery from Slovenia (Pod Kotom-jug pri Krugu), where spindle whorls

nisu ustanovljeni ljudski ukopi, veliko groblje s keramikom ukrašenom brazdastim urezivanjem iz Slovenije (Pod Kotom-jug pri Krugu), gdje su pršljenovi zabilježeni u nekoliko grobova (Šavel 2009), dokazuje važnost obrade vlakana već u 4. tisućljeću pr. Krista. Zanimljivo je istaknuti da su zooarheološke analize ostataka faune s te nekropole pokazale da su ovce/koze najčešće prisutne životinje (66,7%) pronađene u ukopima (Šavel 2009: 137). Pretpostavka da bi to moglo ukazivati na rano korištenje ovčje vune za proizvodnju tekstila mogla bi objasniti dominaciju pršljenova male težine u retzgajarskom uzorku.

Izuzev činjenice da su središnji i najveći prostori uvijek bili korišteni za predenje, rijetki metalni nalazi, otkriveni u istim kontekstima s pršljenovima, mogli bi dodatno naglašavati važnost barem jednog aspekta obrade vlakana. Sherratt (Sherratt 1997; 2006) je povezoao vuču i vunu s društvenom stratifikacijom, objašnjavajući ih kao simbole elite, iako bi brončane sjekire pronađene u grobnim humcima moravske kulture ljevkastih pehara (njem. Trichterbecherkultur, eng. Funnel Beaker Culture), pronađene zamotane u lanenu tkaninu, mogle sugerirati da nisu samo vunene tkanine bile vezane uz prestiž (Baldia et al. 2008: 264-265). Drugi oblici specijalizacije pojedinih naselja tijekom kasnog eneolitika zabilježeni su u Srbiji, gdje je na nizu lokaliteta utvrđeno ciljano vađenje bakrene rudače, dok je na drugima i dalje vidljivo kontinuirano bavljenje stočarstvom (Kapuran & Milošević 2013: 24-26). Ukoliko su proizvodnja/nabavljanje i obrada vlakana pratile sličan uzorak upravljanja izvorima sirovine, kakav povezujemo s gospodarenjem izvorima bakra i metalurgijom. Čini se izglednim da je i u proizvodnji tekstila donekle moguće zamisliti neki oblik rane organizacije, specijalizacije, centralizacije i kontrole proizvodnog procesa.

Izostanak razreda lakih pršljenova (<30 g) povezanih s korištenjem kraćih životinjskih vlakana, i na Đakovo-Franjevcu i na Gomolavi, a koji može odražavati opću usmjerenost na predenje (i uplitanje) dugih biljnih vlakana (i niti), ukazuje na razvijenu specijalizaciju u tom razdoblju. Ne samo rezultati analize pršljenova, već i rijetki konkretni dokazi iz regije (nalazi pređe iz Ljubljanskog barja u Sloveniji)¹⁰ te botanički ostaci (Reed 2016; Tolar et al. 2016), govore u prilog ideji o intenziviranju korištenja biljnih vlakana krajem 4. tisućljeća pr.

¹⁰ Očuvana vlakna iz Ljubljanskog Barja izrađena su od divljih biljnih vlakana iz porodice trava (*Poaceae*) (Pajagič-Bregar et al. 2009) i vlakana lišća rogoza (*Typha angustifolia*) (Greif 1997: 41).

were recorded in several graves (Šavel 2009), attest the importance of fibre processing already in the 4th millennium BC. Interestingly, zooarchaeological analysis of the faunal remains from the cemetery revealed that the sheep/goats were the most commonly (66.7 %) found animals in the burials (Šavel 2009: 137). If we consider that this might point to the early use of sheep wool for textiles, it could explain the dominance of the low weight values of spindle whorls in the Retz-Gajary sample.

Besides the fact that always the most central and the biggest spaces were allocated for spinning activities, rare metal objects recovered in the same contexts together with spindle whorls may further emphasise the relevance of at least one aspect of the fibre processing practice. Sherratt (Sherratt 1997; 2006) connected both the traction and the wool with social-stratification, explaining them as symbols of the elites, but copper axes from the burial mounds of the Moravian Trichterbecherkultur-Boleráz (Trichterbecherkultur or Funnel Beaker Culture) sites that were wrapped in flax-textiles, may propose not only woollen fibres had a high value (Baldia et al. 2008: 264-265). Other forms of settlement specialisation during the late Eneolithic were documented in eastern Serbia, where a number of sites exhibit a focused copper ore extraction, while others present a continued focus on animal husbandry (Kapuran and Milošević 2013: 24-26). It is plausible that early organisation, specialization, centralization and control associated with copper resources and metal work might be, to some extent, traced in the textile manufacture as well, if the fiber production/procurement and processing followed a similar pattern of the raw material management.

The absence of the light class spindle whorls (< 30 g), connected to shorter animal fibres, both at Đakovo – Franjevac and Gomolava, which may be reflecting a general focus on spinning (and plying) long plant fibres (and filaments), suggests a developed specialisation for the period. Not only the results of the spindle whorl analysis, but also the rare actual evidence from the region (yarn finds from Ljubljansko barje in Slovenia)¹⁰ and the botanical remains (Reed 2016; Tolar et al. 2016) support the idea of intensified plant fibre use at the end of the 4th millennium BC. Expanding the Kostolac spindle whorl sample should provide some arguments for the

¹⁰ Preserved fibres from Ljubljansko Barje were made of wild plant fibre belonging to the family of grasses (*Poaceae*) (Pajagič-Bregar et al. 2009) and leaf-fibres of lesser bulrush (*Typha angustifolia*) (Greif 1997: 41).

Krista. Proširivanje uzorka tekstilnih alatki kosto-
lačke kulture trebalo bi rezultirati dodatnim argu-
mentima za hipotezu o specijalizaciji pojedinih
naselja, u slučaju kada bi na proširenom uzorku lo-
kaliteta bile zabilježene više frekvencije lakših pr-
šljenova. Ako se to ne ostvari, drugo objašnjenje za
izostanak razreda lakših pršljenova moglo bi biti
to da su prelje i predioci koristili drugačije tehnike
predenja, s obzirom na činjenicu da bi korištenje
oslonjenih vretena omogućilo obradu kraćih živo-
tinskih vlakana i finijih niti. Naposljetku, najuži
zaključak bio bi taj da je proizvodnja tekstila, ako
ne u potpunosti, onda u znatnoj mjeri ovisila o
izvorima dugih biljnih vlakana. To bi značilo da je,
u kontekstu intenzivne i organizirane proizvodnje,
fokus bio stavljan na uzgajanje određenih vlaka-
na, pri čemu je lan najizgledniji kandidat.

Prema iznesenim rezultatima analize tekstilnih
alatki čini se da nije bilo prijelaza na masovnu
produkciju tijekom dva proučavana tisućljeća.
Niti jedan od analiziranih lokaliteta iz Panonske
nizine nije pružio dokaze koji bi govorili u prilog
industrijalizacije procesa, barem ne na razini koja
je postignuta u istovremenoj proizvodnji tekstila
na Bliskom Istoku (McCorriston 1997; Sagona & Zi-
mansky 2009). Ipak, indikacije za postojanje rane
specijalizacije, barem na razini radionice, dovoljno
su jake i sugeriraju da se prvu pojavu organizirane
proizvodnje može pratiti od vremena retzgajars-
kih i kostolačkih društava (4. tisućljeće pr. Kr.).

Razvojni procesi na pojedinim lokalitetima nisu
bili predmetom ove analize. Pretpostavljeno je da
prostorni raspored alatki u određenim jamskim
strukturama izravno ocrta primarni kontekst
njihovog korištenja i/ili odbacivanja. Takva pre-
tpostavka do određene mjere negira razlike izme-
đu sistemskog i arheološkog konteksta (Schiffer
1976; 1985). Ovaj se pristup smatra valjanim zbog
toga što rezultati analiziranih skupova nalaza po-
kazuju značajnu razinu standardizacije. Nadalje,
neobično visoka frekvencija alatki u pojedinim
kontekstima, koje su mogle biti korištene u raznim
situacijama, te stoga nisu ograničene na pojavlji-
vanje isključivo u okviru naselja, sugerira da se
uvjerljivo intenzivna proizvodnja odvijala u i oko
određenih struktura, zbog čega analizirane skupo-
ve nalaza ne treba odbaciti kao dokaze organizira-
nih i specijaliziranih proizvodnji na proučavanim
lokalitetima, čak ni u slučaju da se radi o sekundar-
no odbačenim predmetima.

settlement specialization hypothesis, in the case
that higher frequencies of lighter spindle whorls
would be recorded on other sites. If that does not
appear to be the case, another explanation for the
absence of the lighter classes of whorls would sug-
gest that a different spinning technique was used
by Kostolac spinners, since the supported spinning
would allow the use of heavy spindle whorls even
for shorter animal fibres and finer threads. Finally,
the most restrictive conclusion would be that their
textile production was highly, if not exclusively de-
pendable on long plant fibre resources. This could
mean, that in the context of intensified and organ-
ized production, emense focus was placed on a par-
ticular fibre cultivation, with flax plant being the
main candidate.

The results of the presented textile tool analysis
propose that there was no transition to the mass
production during the two studied millennia. None
of the investigated sites of the Pannonian Plain re-
gion displayed evidence for industrialization of the
process, at least not on the level achieved by the
contemporary textile productions in the Near East
(McCorriston 1997; Sagona and Zimansky 2009).
Nonetheless, indications for an early specialisa-
tion, possibly on the workshop level are convinc-
ing enough to argue that the first manifestations
of organized productions are traceable all the way
to the Retz-Gajary and Kostolac societies (4th millen-
nium BC).

This analysis did not take into account formation
processes. It is assumed that the spatial layout of
tools in the particular pit structures directly re-
flects their primary context of use and/or deposi-
tion. Such an assumption neglects to some extent
the difference between the systemic and archaeo-
logical contexts (Schiffer 1976; 1985). It is held to
be a valid approach, given the fact it was demon-
strated by the results of the analysis that the in-
vestigated assemblages revealed a significant level
of standardisation. Further, an unusually high fre-
quency of tools, which can be used in a wide range
of situations and are not at all limited to the set-
tlement context for that matter, is suggestive of
convincingly intensified manufacture in or around
the particular features. Thus, even in the case that
the analysed assemblages represent a secondary
refuse, they should not be disregarded as a valid
evidence of organized and specialized productions
at the investigated localities.

Kako bi se moglo baviti određenim elementima tehnološkog kontinuiteta i njegovog odnosa s glavnim kulturološkim, društvenim i ekonomskim promjenama, potrebno je napraviti detaljnu analizu proizvodnje tekstila vučedolske kulture. Takva bi analiza mogla pružiti vrijedne podatke o daljnjem razvoju procesa specijalizacije koji je, kako se čini, već započeo u društvima srednjeg te se nastavio razvijati u razdoblju kasnog eneolitika.

Zaključci

Izostanak pršljenova među arheološkim nalazima može se objasniti nekolicinom faktora kao što su slaba očuvanost, ručno uplitane niti te obrasci naselja. Osim toga, praktičnost korištenja slobodnog pršljena za viseće vreteno dopušta obavljanje više zadataka istovremeno (Levy & Gilead 2013: 38). Dakle, ručno pređenje je aktivnost koja se često odvija izvan sfere domaćinstva. Ipak, visoka frekvencija očuvanih pršljenova u proučavanim kontekstima ukazuje na porast proizvodnje prede, što prelazi razinu proizvodnje u domaćinstvu.

Neizravni dokazi za eneolitičku proizvodnju predstavljeni u ovom radu ukazuju na intenzivnije prakse pređenja u zajednicama koje su nastanjivale Panonsku nizinu. Očite tehnološke promjene u proizvodnom procesu koje su se odvijale tijekom 4. tisućljeća pr. Kr. zahtijevaju novu i prilagođenu perspektivu. Prvo, pojavu novih izvora sirovina treba sagledavati u širem kontekstu. Proizvodnja tekstila jedna je od najstarijih ljudskih tehnologija, što znači da su vlakna morala biti glavni dio strategija preživljavanja, ekonomije, pa čak i trgovine. Korištenje i vune i vlakana novog tipa lana (prilagođenog za tekstil, a ne ishranu) objašnjava ključne inovacije koje ne samo da su promijenile tehnološke aspekte proizvodnje, već su utjecale i na njezinu društvenu i ekonomsku važnost. Niti u jednoj od proučavanih ukopanih struktura u kojima je pronađen velik broj alatki nisu ustanovljeni dokazi na temelju kojih bi ih se moglo okarakterizirati kao stambene strukture. Nadalje, na Ivandvoru i Đakovo-Franjevcu, dvaju od lokaliteta s najvećom ustanovljenom koncentracijom pršljenova, nisu utvrđene nikakve karakteristike stambenih prostora. Vrlo je izgledno da su tijekom razdoblja kada je uvedena nova sirovina/e neke zajednice razvile organizirane sustave proizvodnje i obrade istih. Ovi prvi izvori kultiviranih vlakana vjerojatno su utjecali na specijalizaciju zanata i organizaciju rada, tako da se neke aktivnosti više

In order to address the specific elements of the technological continuity and its connection with the major cultural, social and economic changes, a detailed analysis of the succeeding Vučedol textile production is necessary. It could provide valuable information on further developments of the specialization process that, as it appears, already started in the Middle Eneolithic and continues to shape its form in the Late Eneolithic period.

Conclusions

Spindle whorl deficiency in the archaeological record may be explained by several different factors, such as poor archaeological preservation, finger twined products and settlement patterns. Additionally, the practicality of the spindle whorl when used for drop-spinning allows multi-tasking (Levy & Gilead 2013: 38). Thus, hand spinning is an activity quite often dislocated from the domestic sphere. However, a high frequency of efficient spindle whorls from the investigated contexts suggests a degree of yarn production intensification, which exceeds the household level.

Indirect evidence for the Eneolithic production presented in this study reveal an intensified spinning practice among the communities inhabiting the Pannonian Plain region. Obvious technological changes that occurred in the manufacturing process during the 4th millennium BC call for a new and modified perspective. First of all, the appearance of new raw materials is something that should be observed in a wider context. The manufacture of textiles is one of the oldest human craft technologies, which makes fibres an elementary part of subsistence and economy, even trade. Both wool and fibre flax (a new type of plant, selected for its fibre instead of nutritional traits) account for a crucial innovation, which not only changed the technological aspects of the production, but also impacted its social and economical importance. None of the investigated pit structures that yielded a high number of tools revealed any evidence that would characterize them as residential dwellings. Furthermore, both Ivandvor and Đakovo-Franjevac, two of the sites that showed the highest concentration of spindle whorls are lacking the residential characteristics whatsoever. It is highly possible that during the period of the new raw material(s) introduction some communities developed organized systems for their production and processing. These first cultivated fibre resources most probably in-

nisu odvijale u domaćinstvima, već u radionicama. Iako spekulativno, izgledno je da se upravljanje ovim sirovinama moglo konsolidirati na razini naselja, kao što je to bio slučaj s drugim sirovinama u tom razdoblju. Lokaliteti Ivandvor i Đakovo-Franjevac mogli bi biti jedni od lokaliteta koji su bili korišteni u te svrhe. Janet Levy i Isaac Gilead, koji su istraživali tekstilnu proizvodnju 5. tisućljeća pr. Kr. na južnom Levantu, predložili su model koji sugerira da su se lanena vlakna proizvodila u određenim zonama, odakle su bila distribuirana u naselja i područja sa manje pogodnim okolišnim uvjetima. (Levy & Gilead 2012: 137).

Veliki skupovi nalaza pršljenova zabilježeni na lokalitetima Ivandvor i Đakovo-Franjevac ukazuju na visoku razinu proizvodnje pređe. Čak i ako ih se promatra kao sekundarne depozite, uzevši u obzir izostanak struktura stambenog karaktera, te dokaze koji upućuju na druge specijalizirane aktivnosti na dvaju istraživanim lokalitetima, obrađene je tekstilne alatke moguće interpretirati kao pokazatelje razvijenog zanata.

Predložena organizacija dijela procesa proizvodnje tekstila koja se odnosi na pređenje sugerira da je eneolitička proizvodnja tekstila sudjelovala u društveno-ekonomskom razvoju, iako je, zbog izostanka izravnih dokaza, odnosno očuvanih tekstila, niti i užadi, teško odrediti da li su na to više utjecale strategije nabavljanja vlakana, važnost krajnjih proizvoda, ili pak oboje. Kako bi se moglo bolje razlučiti regionalnu razinu spomenutih procesa specijalizacije i organizacije zanata, predloženi pristup trebalo bi dodatno ispitati na većem broju susjednih lokaliteta iz istog vremenskog okvira te iste kulturno-povijesne asocijacije. Izložena prostorna analiza, koja bi obuhvaćala veći broj lokaliteta, mogla bi pružiti više podataka o ekonomskim vezama i savezima između eneolitičkih kulturnih skupina. Predloženo je da društvena složenost nekog društva sasvim korelira s demografskim varijablama poput veličine populacije (Feinman & Neitzel 1984; Feinman 2011). Nažalost, društva srednjeg i kasnog eneolitika su, zbog svog načina života i udaljenosti između naselja, posebno zahtjevna pri provođenju ovakvih analiza.

Na trenutnoj razini istraživanja, rezultati funkcionalne analize sugeriraju da glavni tehnološki aspekti proizvodnje tekstila ispoljavaju visoku razinu ovisnosti o kulturi. Kako bi se otkrilo jesu li uzroci ove tehnološke podudarnosti bili dijelom integralnih ekonomija ili su pak bili povezani s

fluenced the craft specialisation and organization, both of which possibly influenced certain activities to leave the household and enter a workshop. It is highly speculative, but managing these resources might have been consolidated on an inter-settlement level, like it was the case with other raw materials at the time. Both Ivandvor and Đakovo – Franjevac might be among localities that served this function. Janet Levy and Isaac Gilead who investigated the 5th Millennium BC textile production in the Southern Levant proposed that flax fibers were produced in the particular zones and then distributed among settlements situated in the areas with unsuitable environmental conditions (Levy & Gilead 2012: 137).

Large assemblages of spindle whorls recorded in particular deposits at Ivandvor and Đakovo – Franjevac are suggestive of a significant level of yarn production. Even if they were to be seen as secondary deposits, considering the lack of residential structures and the evidence that is supporting other specialised activities at both of the investigated sites, these tool concentrations can be interpreted as an indication of a developed spinning craft.

Proposed organization of the spinning part of the fabrication process indicated that the Eneolithic textile productions participated in the socioeconomic transition of the period, although, due to the absence of direct evidence of the textile craft, more precisely, preserved textiles, thread and cordage, it is hard to determine whether this is connected to the fibre procurement strategies or to the final produce importance, or possibly both. In order to gain a higher resolution for the regional perspective of the outlined processes of craft specialization and organization, the proposed approach should be further tested against a greater number of neighbouring sites belonging to the same temporal frame and culture-historical attribution. Proposed spatial analysis, which would cover a greater number of sites could provide more information on economic interconnection and alliance within Eneolithic cultural groups. It is suggested that the organisational complexity of a society positively correlates with demographic variables such as population size (Feinman & Neitzel 1984; Feinman 2011). Unfortunately, Middle and Late Eneolithic societies, due to their way of life and the dispersity of their settlements, are particularly challenging for this type of analysis.

drugim aspektima stvaranja „kulturnog“ identiteta, potrebne su daljnje analize na razini većeg broja lokaliteta.

Iako se potvrđene aktivnosti predenja izvan domaćinstva mogu smatrati dokazom intenzivne proizvodnje, ili čak specijalizacije zanata, čini se da to nije bila široko rasprostranjena i ustaljena praksa tijekom eneolitičkog razdoblja. U Panonskoj nizini moglo je doći do razvoja elita, iako je u proučavanom razdoblju teško odrediti tragove političke centralizacije, institucionalizirane hijerarhije ili pak privilegiranog pristupa izvorima sirovina. Osim toga, dokazi zanatske proizvodnje znatno variraju od lokaliteta do lokaliteta, stoga je povećanje uzorka alatki korištenih u proizvodnji tekstila nužna stavka u proučavanju ovih pitanja.

Unatoč činjenici da dokazi za specijalizaciju i složenost društva znatno variraju među ovdje proučavanim pojedinačnim lokalitetima, moguće je ustanoviti neke trendove. Otkrivene koncentracije alatki sugeriraju da je proizvodnja tekstila u proučavanom razdoblju bila na granici specijalizacije. Tehnički izvještaj i rezultati analize alatki pokazali su da alatke, koje odražavaju tehnološki razvoj, imaju potencijal da prošire razumijevanje pojedinih društveno-ekonomskih čimbenika. Nadalje, dobiveni rezultati otkrili su određene trendove i razvoje u smislu standardizacije alatki. Naposljetku, prostorna distribucija nalaza ukazuje na organizaciju rada i intenzitet uključenosti aktera. Izuzev parametara *koncentracije*, *razmjera* i *intenziteta*, definirani su i određeni pokazatelji *konteksta* specijalizacije zanata. Iako ih je teško pripisati *zavisnoj specijalizaciji*, rijetki metalni predmeti i ljudski ukopi koji su kontekstualno vezani uz skupove nalaza pršljenova ukazuju na važnost i ulogu proizvodnje tekstila koja je bila utkana u svakodnevni život retzgajarskih i kostolačkih zajednica.

At this point of the research the results of the functional analysis suggest that main technological aspect of the textile manufacturing tends to display a high level of cultural dependency. Further inter-site investigations are needed to reveal if the reasons for this technological concordance lie in the integral aspects of their economies or they are connected to other aspects of the 'cultural' identity amassment.

Although attested extra-domestic spinning may be accepted as evidence of intensified production, or even craft specialization, it does not appear to be a widespread and established practice during the Eneolithic period. Nascent elites may be developing in the Pannonian Plain, even though traces of political centralization, institutionalized hierarchy or privileged access to raw material resources are hard to determine for the investigated period. In addition, the evidence of craft production is highly variable both from site to site, so the enlargement of the textile tool sample is necessary for addressing this specific questions.

Despite the fact that the evidence for craft production and social complexity varies greatly between the separate sites included in this study, some trends are observable. Detected tool concentrations suggest that textile productions of the period bordered with specialization. The technical report and the results of the tool analysis outlined that textile tools, reflective of the technological developments, hold the potential for broadening our understanding of the advancement of particular socioeconomic factors. Furthermore, the obtained results revealed certain trends and developments regarding the tool standardization and, finally, the spatial distribution of the finds suggested, besides the organization of labour, also the intensity of investment. Besides *concentration*, *scale* and *intensity* parameters, some indications for the craft specialization *context* were also detected. Although it is difficult to assign them to the *attached specialization*, rare metal objects and human burials, which were contextually associated with the whorl assemblages, attest to the importance and the role of textile production in the fabric of everyday life for Retz-Gajary and Kostolac communities.

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