

## Ergonomics and Seasonality:

### The Case of Open-air Pottery Workshops (8th–5th centuries BCE)

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**Abstract.** – This article analyses the interplay of seasonality and ergonomics in ancient production processes. The archaeological case study is based on open-air pottery workshops in the mountainous region of the Northern Apennines, Italy, during the Iron Age (8th to 5th centuries BCE). Local communities were organised here in dispersed rural homesteads and villages, which in a few cases progressively aggregated into extended urban centers. Production activities in the pottery workshops located outside the settlements were seasonal. The main research question is how seasonality affected the workshop design and the spatial and social interactions within the sociotechnical system of pottery making. The analysis is based on the archaeologically documented sites of production, their structures, and spaces, with particular attention to the traces of periodical reuse, restructuring, and (ritual) disposal. Seasonality and ergonomics are interpreted as heterarchic and intertwined framing factors of pottery production intended as a ResourceComplex, a meshwork of resources and resource-related sociocultural dynamics. [*sociotechnical systems; ResourceCultures; urbanity; community of practices; Etruscans*]

#### *Introduction: Seasonality Studies in the Archaeology of Iron Age Italy*

The attention paid to seasonality in studies on the Iron Age Apennines – the long mountain range crossing Italy from north to south – has been quite limited until recent years. In dealing with the internal mountainous areas of the southern regions Lucania and Hirpinia, some current scholarship has studied the impact of transhumance activities for animal breeding on human social life (Santillo Frizell 2004; Heitz 2020). Pedological, zooarchaeological and palaeobotanical data are necessary to confirm the seasonal mobility of shepherds and flocks (Trentacoste et al. 2020). In the northern Apennines, this data has been collected in only a few areas (see Marchesini and Marvelli 2002), and we have to base our analysis on

indirect traces of these activities, such as the spatial distribution and morphology of houses, production systems, and cult practices. In the recently published volume “The Archaeology of Seasonality” (Lichtenberger and Raja 2021), a contribution on Timpone della Motta, an Iron Age site in the southern Apennines, considered the different impacts of seasonality on local societies. This not only involved daily aspects of life such as household structures and economy but also symbolic and religious aspects, such as festivals, sacrifices, and cultic frequentation of caves (Jacobsen et al. 2021). In other contributions to the quoted volume, seasonality is framed within complex urban economic systems, such as construction sites (Carusi 2021) and harbors (Feuser 2021), with a focus on the impact of seasonality on the working life. This last aspect is also the focus of my contribution, which concerns the impact of seasonal rhythms on working life in open-air pottery workshops.

#### *A Closer Look at Seasonality in Ancient Pottery Production Processes*

Pottery making is one of the better studied working environments of the Mediterranean Iron Age (Hasaki and Bentz 2020). In pottery studies, seasonality is frequently mentioned under the assumption that some steps of the *chaîne opératoire* could have been difficult – if not impossible – to achieve during the cold and rainy season. This applies, for example, to the availability of fuel and to the drying out of finished vases before the firing (Albero Santacreu 2014: 138–141). These assumptions lead us to the conclusion that an all-year-round production would only have been possible in a very few cases of particularly well-structured and organized urban workshops, with weatherproof fuel storage and a protected indoor working space. In contrast to this, production in open-air workshops was necessarily strongly dependent on seasons. For this reason, seasonality should be considered as a constitutive element of pottery-making and the life of potters in the Iron Age pottery workshops of Pre-Roman Italy which were mostly open-air.

#### *Ergonomics and Seasonality: A Research Question*

My research question deals with the interplay of seasonality with the ergonomics of pottery workshops. I adopted here the definition of er-

gonomics proposed by John R. Wilson (2000: 560) which states that ergonomics is “the theoretical and fundamental understanding of human behavior and performance in purposeful interacting sociotechnical systems, and the application of that understanding to design of interactions in the context of real settings.” In the following, the heterarchical relation between seasonality and ergonomics will be interpreted using the frame of ResourceCultures. The analytic tools and the conceptual frame relating to ResourceCultures have been developed over the last 10 years within the Collaborative Research Center SFB 1070 RessourcenKulturen at the University of Tübingen (Bartelheim et al. 2021). The term ResourceCultures indicates dynamic models, which enable us to understand the relationship between tangible and intangible resources, and resource-related sociocultural dynamics. Local knowledge of potting and firing will be viewed as a central resource of open-air pottery workshops, here considered as a ResourceComplex – a meshwork of resources and resource-related socio-cultural dynamics (Teuber and Schweizer 2020: 11–14) – with ergonomics and seasonality as two of the main framing factors of this meshwork, which underwent a non-linear shift from the middle of the 6th<sup>th</sup> century BCE onwards.

*The Area of Study: The Iron Age Northern Apennines (Italy, 8th–5th century BCE)*

My analysis has been conducted using 32 archaeological contexts in the northern Apennines, between the 8th<sup>th</sup> and 5th centuries BCE (Fig. 1).

The region of the Apennines encompasses different macro-climatic zones: the mountains, the lower hill chains, the alluvial plains, and the wetlands, which are present both in the north, towards the Po Valley, and in the south, towards the Arno Valley. Except for the upper zones (1000 to 2165 m), the climate is continental, with dry, cold winters and hot, wet summers, and two mid-seasons, a temperate spring and a generally rainy fallrainfall. In the Iron Age, the upper mountains were covered by forests, rich in perennial waters and summer pastures. People and animals, as well as knowledge and ideas, were mobile, flowing along a route network whose main trail, a long ridgeway running east–west, was integrated with the routes along the transverse riverine valleys that connected the north and south across the mountain passes. The lower climatic zones were characterized by hill-chains formed by erosion and declining toward the

sea, as well as longitudinal riverine valleys and fertile alluvial foot-hill plains. These lower areas were the most suitable for agriculture and animal breeding and were continuously and densely inhabited. The settlement patterns in the north presented subregional variations, with small- and middle-sized villages and sparse farms (Zamboni 2012: 25f.; Miari and Negrelli 2016: 149), and some major cities in the east, such as Felsina, which had already reached a proto-urban stage in the 8th century BCE (Sassatelli 2010: 208). Some of these cities presented a regular urban plan, for example Marzabotto in a narrow valley (Bentz and Reusser 2008), and Spina on the Adriatic Sea, founded in the middle of the 6th century BCE (Sassatelli 1990: 78). The settlement patterns in the south are less well-known, with the exception of hill-towns such as Fiesole and Artimino and two big cities, Pisa in the west, inhabited since the Villanovan era, and Gonfienti in the east, which can be considered a sort of twin foundation with the above-mentioned Marzabotto in the mid-6th century BCE (Donati et al. 2023). The wetlands, cold in winter and very hot in summer, was also inhabited on both sides of the Apennines. Here, the extreme environmental conditions required a stronger collective effort to construct and maintain the infrastructure (Ciampoltrini 2009) needed by farms, small villages, and larger cities, such as Spina, a proper city on the water (Zamboni 2016). These morphological and climatic features suggest that local communities developed season-specific responses to local environmental conditions in order to manage floods and water scarcity, as also confirmed by the traces of artificial channels, ditches, wells, terraces, and basins in the stratigraphy of some sites.

In the Iron Age Apennines, open-air pottery workshops were attached to villages, small cities, and farms. Their extra- or sub-urban positions made them particularly vulnerable to seasonal changes. Their ergonomics, intended here as the functional planning of the working space, was surely culturally influenced but would also have been the result of strategies for adapting to seasonal changes. The ergonomics of pottery production changed consistently within the context of urban production, wherein workshops were attached to public buildings, such as temples (Sassatelli 2011), or within residential *insulae* (Gaucci 2016). In the cities, kilns and other working areas were inside the buildings, making them suitable for all-year-round production, much less sensitive to seasonal changes and firmly embedded in urban economies, as in the Greek poleis and colonies.

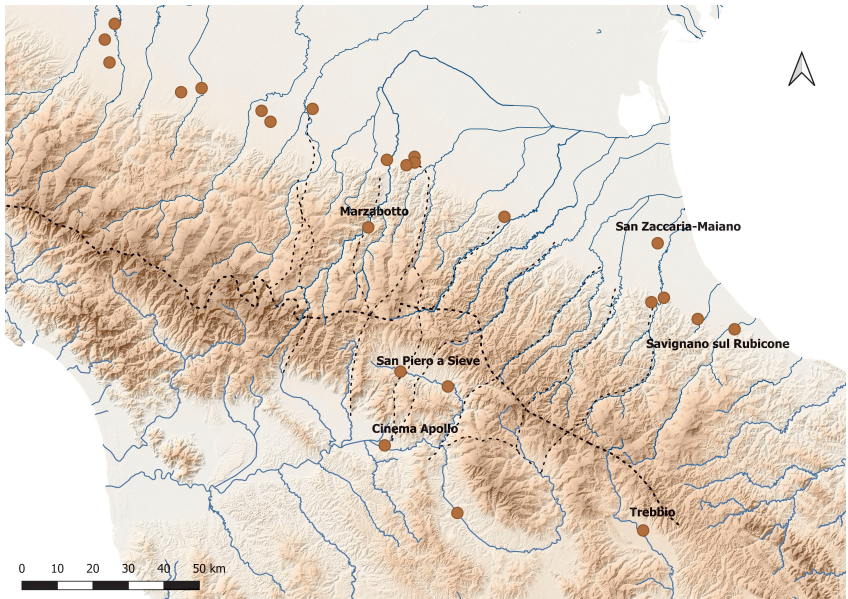
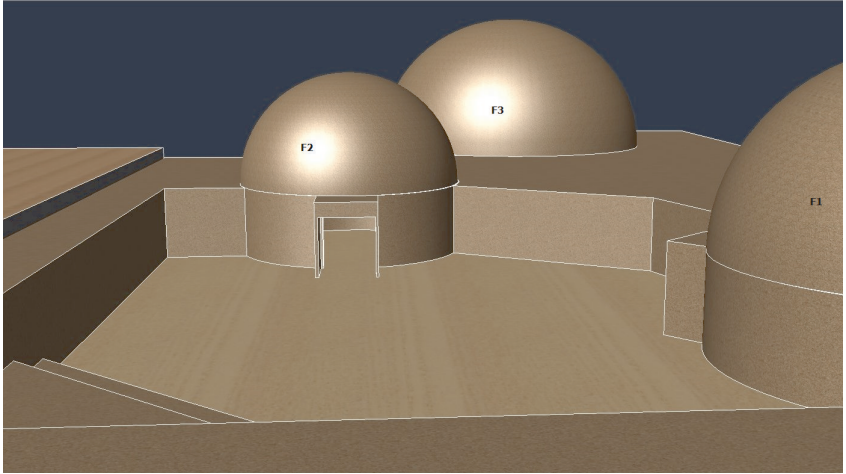


Fig. 1: Mapping of the pottery workshops with ergonomic features considered (R. Da Vela, with QGIS 3.8; DEM Copernicus EU-DEM v1.1; vectorial data: points see bibliography; viability reconstructed by the author; rivers: Copernicus EU).

### *Analysis of the Interplay of Seasonality and Ergonomics in Open-Air Pottery Workshops of the Iron Age Apennines*

Open-air workshops were very common in the foothills and plains, which were rich in water and clay, and heavily settled. The extensively excavated sites, for example in Cesena Foro Annonario (Miari and Negrelli 2016), in San Piero a Sieve i Monti (Salvini 1994), in San Zaccaria-Maiano (Miari et al. 2008), in Savignano sul Rubicone (Miari 2003), in Trebbio San Sepolcro (Iaia and Moroni Lanfredini 2009), and on the site of the Cinema Apollo in Florence (Da Vela 2019), present several structures and functional areas. The kilns had a combustion chamber with a round plan (Fig. 2), excavated directly in the ground and covered by a provisory vault made of clay (type Cuomo di Caprio IB: Cuomo di Caprio 2007). Combustion and firing chambers were divided by a perforated floor or by a provisory floor made of clay blocks held by one or more small pillars. The temperature could be

controlled through a short rectangular kiln mouth, covered and closed by a stone during the cooling-down phase. During the production season, the vault of the kilns was destroyed after the cooling-down phase of every firing to access the fired products (mostly tiles, vases, and textile tools but also architectural terracottas), and then reconstructed.



*Fig. 2: Reconstruction of the kilns (indicated as F1, F2, F3) with shared working area of the pottery workshop of Cinema Apollo in Florence (R. Da Vela).*

Only at the end of the season were the floors also removed, the firing chamber cleaned up and the pillars put to the side. At the beginning of the new season, the old, dismantled chambers were filled up and new chambers were reconstructed, cutting or partially reusing the old ones. These seasonal actions left their traces in the stratigraphy of some workshops, such as the Cinema Apollo, in the form of a little sandy lime accumulation between two seasonal reconstructions or in the form of cuts in the wall of the previous chambers done in the following season to construct the new ones (Da Vela 2019: 35), or in Cesena Foro Annonario (Gasparini and Rossi 2016: 43f.). Archaeological evidence also allows us some considerations based on the spatial relationships within the workshops. Some built areas of the workshops show a seasonal reuse, for example the roofed or half-roofed areas for working and drying out the products, which was necessary before firing. These areas were carefully chosen on the basis of local seasonal

insolation and ventilation. The kilns seem to be oriented on the easier and lower paths to and from this area, which was sometimes partially protected by roofs and palisades. The ergonomic integration of these areas with the kilns is probably one of the reasons for the seasonal continuity in rebuilding the kiln chambers. Other structures of the workshops, such as water channels, were more flexible in terms of the seasonal reoccupation, and probably linked to contingent factors such as precipitation and the level of the ground waters (Miari et al. 2008: 17–19).

### *Conclusions: Ergonomics and seasonality in the frame of the ResourceCultures*

These open-air pottery workshops can be analyzed as a meshwork of resources and resource-related sociocultural dynamics in working environments, which is defined as a ResourceComplex in the analytical frame of the SFB 1070 RessourcenKulturen (Klocke-Daffa 2017: 254–256).

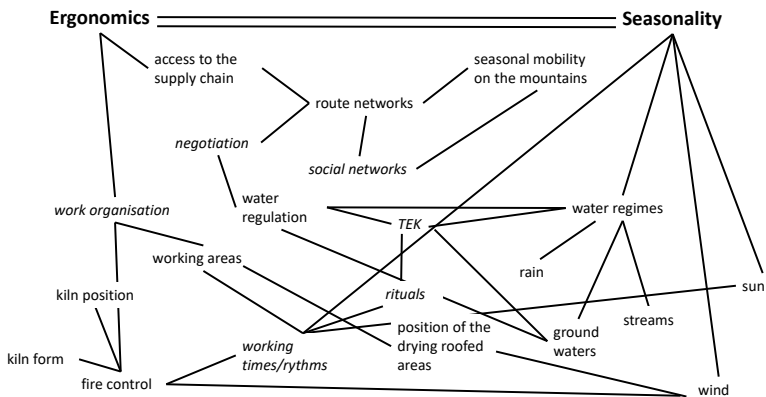


Fig. 3: ResourceComplex “Pottery Workshop.” Ergonomics and seasonality are here framing factors of a meshwork of resource and resource-related sociocultural dynamics (R. Da Vela).

Ergonomics and seasonality can both be considered as intertwined framing factors of this meshwork (Fig. 3), because seasonal reconstruction of production structures and infrastructures was thus a form of negotiation

between social knowledge and traditions in relation to the better use of working space and the changing demands of the natural environment. The ergonomics of pottery workshops, intended as the management of spatial relationships (workshop design) and social interactions within the sociotechnical system, seems to have had a strong impact on the seasonal decision-making. These observations could lead to a hierarchized interpretation of the ergonomics with respect to seasonality, such as the proposal that seasonal rhythms would only have been a background factor. This anthropocentric interpretation should however be avoided, since some practices indicate that on the contrary, these ancient actors had a very precise perception of the significance of seasonality for their pottery production. The first practice was the careful tidying of the areas before the temporary abandonment at the end of the season. Several workshops, whose production was accidentally interrupted between two seasons, show a quite standardized social ritual, in which the firing chambers were cleaned, ashes were collected, and the working tools disposed of at the bottom of the kilns (Da Vela 2019). The second practice, which makes the perceived importance of seasonality evident, is the disposal rituals for the final abandonment of a production area, such as the deposition of miniature pots at the bottom of the kilns and the clay pits before filling them with earth, or the splitting of vases into two halves and their disposal in different pits (Miari et al. 2008: 32). Miniature pots and intentionally broken vases are also used in this period and region for other cult practices (Da Vela 2022: 290–292). Although only a few cases are attested, these rituals are similar on both sides of the Apennines and prove the existence of shared practices on a regional scale. The end of a seasonal rhythm was thus perceived as something not belonging to the normal sequence of the production and requiring special treatment. Ergonomics and seasonality can therefore be considered as equally important and intertwined factors, framing the negotiation around resources in pottery making, although the first one relates to the space and the second to the time of production. These observations could be developed further considering the impact of the urban turn during the middle of the 6th<sup>th</sup> century BCE upon both seasonality and ergonomics. The new indoor workshops show a loss in the impact of seasonality, eventually limited to the availability of fuel, which could also be stored inside, allowing an all-year-round production. The new embedding of pottery making in the urban economy was not just a simple adaptation of the production structures to the increased economic demand: This new conception of the workshop also denotes a strong cul-



tural revolution in the human-environmental interaction. The sacralization of pottery production now takes on the dimension of a domestic cult, with the presence of small shrines in the workshops. A clear example of that, in a contemporary context but a different cultural environment, is the Greek colony of Selinus (Bentz et al. 2013: 80f.), while bronze votive figurines in the workshops of Marzabotto have been interpreted as markers of a cross-craft production (Morpurgo et al. 2017: 114–116). Although urbanism was the trigger for new sociocultural dynamics in pottery production, this cultural turn did not involve all the known workshops of the region at the time. Some open-air workshops in the countryside maintained the traditional ergonomic seasonal patterns. The co-presence in the same region of such different cultures of pottery making is thus linked to the strength or weakness of the impact of seasonality in framing production processes and invites us to think of pottery workshops as dynamic *RessourceAssemblages* (Bartelheim et al. 2021: 15f.), in which the balance between ergonomics and seasonality does not change linearly but is rather negotiated based on the response of local societies to supra-local economic, political, and structural changes (Fig. 4).

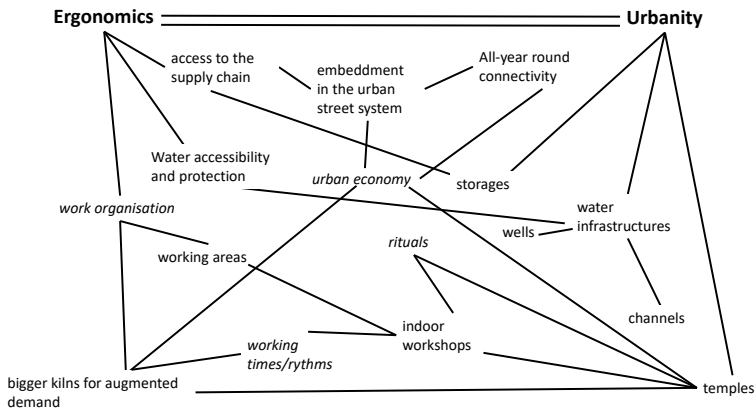


Fig. 4: *ResourceAssemblage “Pottery Workshop.” The urban growth triggers changes in the associations and relationships within the ResourceComplex (R. Da Vela).*

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