**From Micro to Macro and Vice Versa: Technology Studies and Network Analysis on Red-figured Vase Production between Sicily and Campania**

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**Abstract:** This chapter aims to present some of the main results from the A.G.A.T.H.O.C.L.E.S. project. With a highly interdisciplinary approach, some figurative traditions active between the end of the 5th and the first half of the 4th century B.C. in Sicily (Himera and the area of Syracuse) and along the Tyrrhenian coast (primarily Lipari and Campania) have been analyzed in depth. Technological features were explored through the support of computational imaging. Data come from multiscale perspectives. By using a microscale and a midscale perspective, it is possible to detect technological details related to the ancient painters' gestures (e.g., images coming from Reflectance Transformation Imaging – RTI), especially concerning idiosyncratic ways of drawing preliminary sketches and the differing sequences of applying relief-lines and added colors. Moreover, the combination of these data with those from the experimental archaeological sessions was crucial to better test various technological aspects, creating analogies with ancient technological procedures, tools, and gestures. Finally, using a macroscale perspective through the application of Social-Network Analysis (SNA) allows us to reconstruct a wider historical overview of these artisanal networks, expressed with nodes and edges. This network approach, based on the raw Big Data from the seminal volumes by A. D. Trendall and A. Cambitoglou, helps us to visualize in new and innovative ways the — sometimes elusive — possible collaborations and relationships between different South Italian workshops and to explore interesting links suggestive of movements and migrations of artists between Sicily and Magna Graecia.

## Introduction

Catalogues, related supplements, and handbooks published by A. D. Trendall and A. Cambitoglou until 1989 have provided us with the most important and consistent systematization of red-figured vases made in southern Italy.[1] In the last three decades, this systematic framework has been partially amended. This shared—albeit piecemeal—effort to update, integrate, and even overturn, in some cases, aspects of the framework, has produced an emerging picture for South Italian red-figured industries. A number of scholars have recently revised single specific productions and suggested a new general overview for some regional areas, combining different and innovative methodologies. In particular, Sicily and its supposed local workshops[2] have received particular attention by several scholars.[3] Thus, the time is now ripe to argue that every workshop operating on the island during the last decades of the 5th century was born and developed independently and autonomously, making artifacts aimed at satisfying local, subregional markets. However, an even more intriguing aspect is worth mentioning here: most of these workshops seem to have had additional experiences elsewhere, before or later on.[4] It is precisely this 'elsewhere' and the strong propensity for mobility among certain South Italian artisans that constitutes one of the main topics of the A.G.A.T.H.O.C.L.E.S. project, namely investigating the workshops' dynamics of apprenticeship and phenomena of artisanal mobility.[5]

**1** *LCS* and its supplements (*LCS I*; *LCS II*; *LCS III*); *RVAp* and its supplements (*RVAp I; RVAp II*), Trendall (1987), (1989), (1992).

**2** Unfortunately, there is no archaeological evidence regarding a local production of red-figured pottery in Sicily since no archaeologically attested potter's quarter or single workshops have returned fragments of this specific production. For a general overview of the archaeological finds related to kilns in Sicily see Fischer Hansen (2000).

**3** Some of the most important post-Trendall general overviews can be found in: Denoyelle/Iozzo (2009) 97–136, 165–170; see also the chapter by G. Gadaleta, in Todisco (2012) 93–98. In particular, related to Sicilian workshops (and their relation to the Campanian area): Spigo (1996), (2001); Barresi (2002), (2013), (2018); de Cesare (2009); Madella (2010); Denoyelle (2011); Elia (2012). For a brief overview of the last two decades of studies, see Soleti (2012) 66–71.

**4** For an overview of vase-distribution within Magna Graecia and Sicily, also with comparisons with the Attic imports in the second half of the 5th century B.C., see Serino (2014), (2019) 17–26.

**5** Within the framework of the A.G.A.T.H.O.C.L.E.S project, to date the first and the second generations of Sicilian red-figured workshops have received particular attention. For further details about the EU-funded project, see the Introduction in this volume. For a general overview of this

## Mapping the Movements of South Italian Red-figured Vase Painters: between Sicily, Lipari, Campania and Paestum

Concerning mobility, from his earliest papers, A. D. Trendall recognized significant stylistic affinities between some of the Sicilian and the first Campanian and Paestan ateliers.[6] He suggested a strong link between the Campanian "schools" and some Sicilian workshops. In particular, he referred to the vases produced by the Prado-Fienga Group and the Revel Painters. These painters provided the inspiration for one of the first Campanian workshops, that of the so-called Cassandra Painter, which is still considered today to belong to the Capuan School.[7]

Even earlier than Campanian workshops—as is now unanimously accepted, following A. D. Trendall—the first Paestan painters acquired their artisanal skills from the early 4th century Sicilian red-figured workshops and, in particular, from the Dirce Group and, again, from the Prado-Fienga Group.[8] The first unquestionably recognizable Paestan painters are Assteas and Python, which are the real names of the two artisans as attested by their signatures on some of their vases.

The strongest links between these two regional areas (Sicily, Paestum) are to be seen in the so-called Painter of Louvre K236, the Painter of Naples 2074, and the Painter of Louvre K240.[9] Several vases belonging to these figurative traditions were found on the island of Lipari. According to A. D. Trendall and, more recently, M. Denoyelle, the vases attributed to the Painter of Louvre K240 are very close to the work of Assteas in both subject and treatment.[10] A. Hughes even stated that Louvre K240 was Assteas himself and that he started to put his signature on his vases—*Asteas egraphe*—only when he arrived in Paestum.[11] M. Denoyelle stated that the transmission of the Sicilian figurative tradition to Paestum was achieved directly and naturally and that we can consider this an indirect clue about the Sicilian origin of Assteas and Python themselves.[12] While accepting the argument of M. Denoyelle, greater investigation of the (social) network of these itinerant artisans requires focusing on another (social) actor. In this regard, it is worth mentioning the so-called Painter of the Geneva Orestes, who seems to be a close contemporary of Assteas in the earlier stages of his career or perhaps his master, and whose work provides a strong connecting link to the Sicilian workshops.[13]

A very significant stylistic comparison between the Dirce Painter and the early Paestan figurative traditions can be made by looking at side A of two kraters by the Dirce Painter (Syracuse, Museo Archeologico Regionale "Paolo Orsi", inv. nos. 36332 and 36334) and a fragment of a neck amphora (New York, Metropolitan Museum, inv. no. 1985.74), attributed to the Painter of Geneva Orestes (Fig. 1a–b, f). Here a strong link between the two supposed ateliers is evident from various perspectives: for

renewed interest in mobility in the ancient world (not only from an archaeological perspective), see Horden/Purcell (2000) 342–400; Rouillard (2007), (2009), (2010); Jockey (2009); Archibald (2011) 53–55; Isayev (2017). Mobility in South Italian red-figured production was also recently (2018) explored in the volume published by the Centre Jean Bérard – *Mobilità dei pittori e identità delle produzioni* (2018) – and in Robinson (2022).

**6** Since Trendall (1960).

**7** According to Trendall, it is possible to recognize at least three different "fabrics" named "Capua I", "Capua II" and Cumae. Again, according to Trendall, all of these "schools" have their origin in Sicily in the early 4th century, especially the Prado-Fienga Group, the Revel Painter and the Eros and the Hare Painter: Trendall (1989) 157–163.

**8** In the Paestan area there is an early phase of local experimentation between the late 5th and the early 4th centuries B.C. that led to the production of some rather peculiar artifacts made with a peculiar technique probably imported by Etruscan craftsmen, and made with black glaze as the background and figures overpainted in red. Among these vases, there are some that can be stylistically compared to the Etruscan artifacts attributed by J.D. Beazley to the so-called Argonaut Group: Beazley (1976) 33–36, pls. VIII, 3–4 and IX, 1.

**9** Painters of Louvre K240 and K236 probably never worked in Paestum; however, they are considered as "forerunners" of the Paestan stylistic language. With regard to the Painter of Louvre K236, it should be noted that the eponymous krater was initially placed by Trendall within the late phase of the Prado-Fienga Group: *LCS III*, 110 and Trendall (1987) 34–37. Vases by the Painter of Louvre K236 were found in Sicily, Calabria and Campania, but none were from Paestum. Among these groups which can be considered 'borderline' between Campania and Sicily, only a lekanis attributed to the Painter of Naples 2074 comes from Santa Venera, Paestum.

**10** Denoyelle (2011) 32–34. See also Trendall (1987) 44 and (1989) 198. Vases by the Painter of Louvre K240 come from Lipari (3), Gela, Syracuse and from Campania. See also Todisco (2012), vol. I, 338–340.About the likely migrations of artisans coming from various parts of Magna Graecia towards Campania, and in particular to the Paestan area, it is worth mentioning the Sydney Painter, probably with Lucanian origin; (*LCS*, 127–129; Trendall (1987) 364–367) and the Thyrsus Painter (with Apulian origin; *RVAp* I, 274–283 and especially 280–281 for the ones found in Paestum).

**11** Hughes (2003).

**12** Denoyelle (2011) 12.

**13** About the Painter of the Geneva Orestes, Trendall argued that this painter produced "[. . .] the first vases which may with reasonable certainty be regarded as true Paestan". The vessels attributed to this Painter are currently 4. According to M. Denoyelle – Denoyelle (2011) 29, note 25 – the artifacts from the tomb with *oinochoe* 601 should be further investigated because several vases in this funerary deposition seem to belong to the same artisanal hand (see also *Poseidonia e i Lucani*, 152–155). For the Painter of the Geneva Orestes see also Todisco (2012), vol. I, 381–382.

example, it is possible to recognize how cupid's bow and the faces of the central female figures were drawn, especially the nose, and the philtrum (with a sort of ring under the nose). Such similarities in these very detailed drawing traits look very peculiar, especially if we consider that they are assumed to be by two different artisans. Moreover, the iconography on inv. no. 36334 is the same of that on the MET's fragment: it is related to a *kanephoros*,[14] and the way of drawing, especially the *kanoun* and its patterns, reveals close connections between the two artists. An attempt of overlapping all the three patterns related to the face of one of the main characters on the scene can show very significant affinities in drawings and in the ponderation of a few, but crucial lines to create the face and its internal details (Fig. 1c–e, g–h).

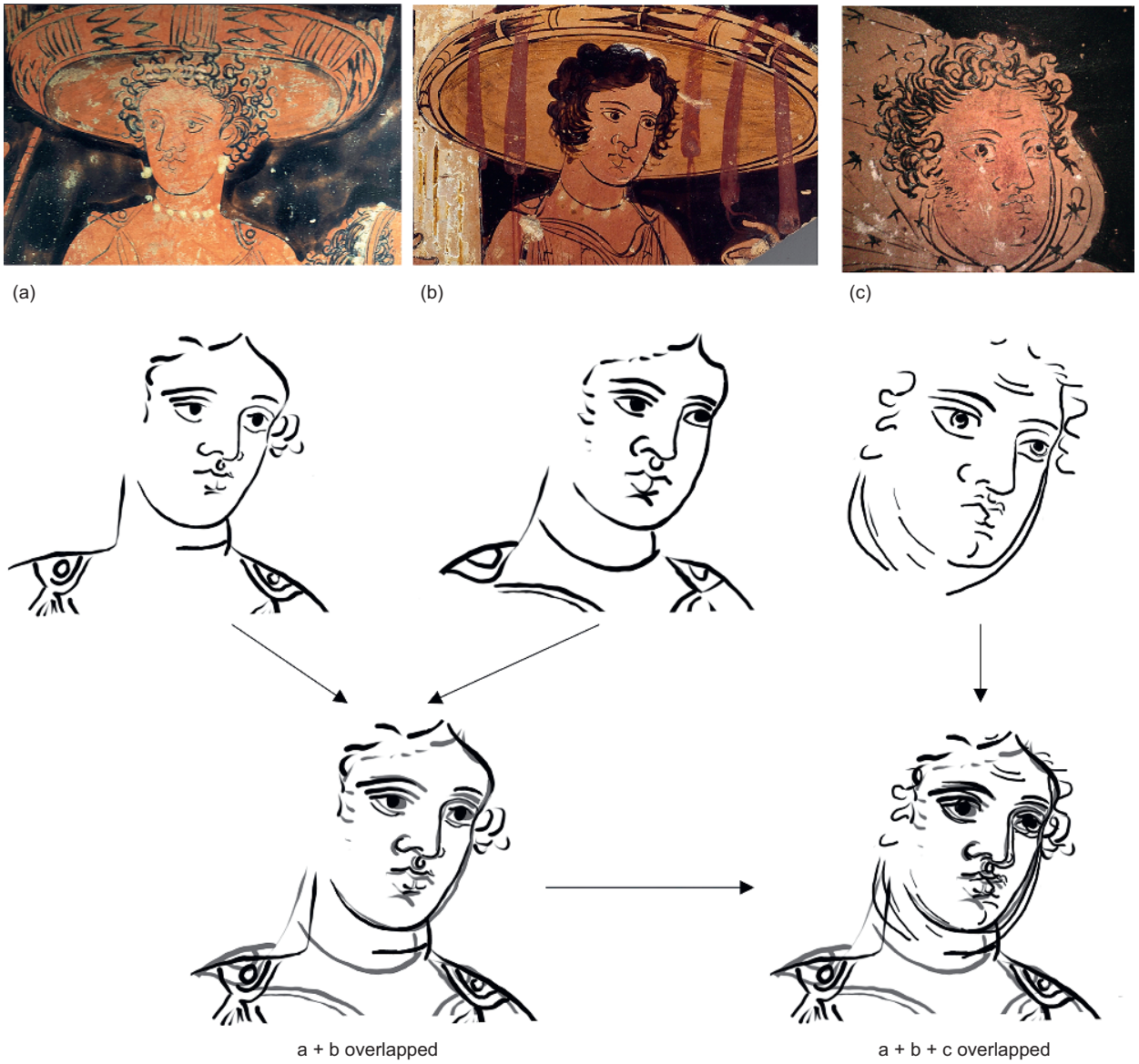


**Fig. 1:** Dirce Painter and the Painter of Geneva Orestes, some stylistic comparisons: (**a**) Detail of side A from calyx krater (Syracuse, Museo Archeologico Regionale "Paolo Orsi", inv. no. 36334), Dirce Painter (permission by Assessorato Regionale Siciliano dei Beni Culturali e dell'Identità Siciliana) - drawing of the relief-lines applied by the Painter to create the face and its details; (**b**) Fragment of a neck amphora (New York, Metropolitan Museum, inv. no. 1985.74), Painter of Geneva Orestes (© Metropolitan Museum, NY) - drawing of the relief-lines applied by the Painter to create the face and its details; (**c**) Detail of side A from calyx krater (Syracuse, Museo Archeologico Regionale "Paolo Orsi", inv. no. 36332), Dirce Painter (permission by Assessorato Regionale Siciliano dei Beni Culturali e dell'Identità Siciliana) - drawing (with 20° of rotation) of the relief-lines applied by the Painter to create the face and its details; (a+b) and (a+b+c) Overlapping of drawings. Editing: Marco Serino

**14** Young women bearing a basket on her head, taking part in religious processions.

As M. Denoyelle argued before, with the Painter of the Geneva Orestes, it is possible to appreciate the first high-quality local figured pottery in Paestum, deriving from an authentic Greek artisanal tradition. Thus, the presence of this painter can be considered a strong clue that allows us to consider Paestum as an urban center ready to host the red-figured technology and its related artisanal skills, replacing the previous local attempts produced with a vase technique likely imported from Etruria.[15] Therefore, it was around 390 B.C. when the Paestan red-figured production started in a solid and systematic way. Important connections between Sicily and Magna Graecia have been recognized not only around the first decades of the 4th century B.C. but also within the first generation of Sicilian Painters (420–400 B.C.). Concerning the artisanal displacements, it is worthwhile mentioning two early probably Sicilian workshops: that of the Himera Painter, whose training, however, may have taken place in Apulia, and that of the Locri Painter, who started in Sicily and then moved to the Ionian coast, as demonstrated in studies by S. Barresi and D. Elia (Fig. 2).[16] Another interesting recent development—in terms of mobility and early connections between Magna Graecia and Sicily—comes from a recent reappraisal by I. McPhee regarding the so-called Spinelli Painter and Dundee Painter and their likely connections with the Chequer Painter and the Eros and the Hare Painter.[17] As A. Pontrandolfo already stated in 1996, a possible explanation of these networking dynamics is that the supposedly Sicilian Chequer Painter may really have worked in Campania for a certain period, before or after his experience in Sicily, perhaps in the same workshop as the Spinelli Painter.[18]

Likewise, it is possible to appreciate similar dynamics in another early Sicilian workshop, that of the Santapaola Painter. Most of his vases were found in the east of Sicily, some fragments in Himera, and some vases come from tombs on the island of Lipari. In a recent volume of the *CVA* series (Italy 78), a kylix—probably found at Suessula, in Campania—shows very close stylistic connections with the early Sicilian Santapaola Painter.[19] Some rather emblematic stylistic comparisons between the exterior of this kylix (Fig. 3a–b) and various vases already attributed to the workshop of the Santapaola Painter can better explain the argument: see, for example, the face of the female figure on the main side, both the mantle figures on side B of a krater in Lipari (Museo Archeologico Regionale "Luigi Bernabò Brea", inv. no. 11839; cf. Fig. 3c for a detail of the mantle figure on the right), the face of the male figure on the main side of the krater in Catania (Museo Civico Castello Ursino), and again the faces on skyphoi fragments in Syracuse (Museo Archeologico Regionale "Paolo Orsi", inv. no. 56961; Fig. 3d–e).[20] Also, the tondo of the kylix (Fig. 3f) deserves particular attention because it was

**15** Cf. *supra*, notes 8–13.

**16** Barresi (2013), (2018); Elia (2010), (2014).

**17** McPhee (2018). The Spinelli Painter is regarded by J. D. Beazley as an Attic craftsman and appears in his list with only 2 vases: an oinochoe and a kylix from the Spinelli collection of the Archaeological Museum of Naples, both likely from Suessula. I. McPhee has recently attributed another 2 vases (kylikes) to the Spinelli Painter: one is now at the Ackland Art Museum of Chapel Hill, University of North Carolina (USA), probably coming from Capua. While, the other one is traditionally attributed to the Chequer Painter. However, I. McPhee, through an in-depth stylistic reappraisal of this figurative tradition, proposes placing them within the Campanian figurative tradition of the late 5th century B.C. and very close to the Spinelli Painter. Some of the comparisons proposed by I. McPhee between Spinelli and Scacchiera are very convincing indeed, and I believe that today the kylix traditionally attributed to the early Sicilian Chequer Painter should be more correctly placed, as argued by I. McPhee, within the Spinelli Painter's figurative tradition. About the likely late fifth century Campanian red-figured workshops, see also McPhee (2015), in relation to the so-called Dundee Painter.

**18** Pontrandolfo (1996) 35–38. *Contra*, Barresi (2002) 69. In Serino (2017) 123–127, a systematic reappraisal of the Chequer Painter's vases makes it possible to observe a significant internal stylistic and qualitative heterogeneity. Regarding style, iconography, context, and morphology, it is possible to recognize different modalities of decorative interventions on these products. There are high-quality vases, close to the Spinelli Painter and most of them come from Campania. Among other details, these vases have constantly three overpainted colors: white, yellow, and red. A second group encompasses all the sides B of the Campania vases. They seem to be made systematically by a sole artisan who applied a very standardized scheme, even in the detail of mantle men facing each other and aryballoi suspended in the middle of the scene. The third group has all the Sicilian vases, characterized by different morphology than the previous groups. Among these vases, some evident drawing comparisons associated with poor figurative skills can be made with the Spinelli Painter and the Campanian products by the Chequer Painter. Moreover, these artifacts reveal a much more limited use of overpainting colors than Campanian artifacts and only the overpainted white seems to appear here. Overpainting is a technological and productive aspect that should not be underestimated in attempting to define, even through technological-productive details, this complex craft network. The three groups proposed do not necessarily indicate three different hands/painters. It is a matter of grasping the association of a specific drawing tradition with forms and repertoires well anchored to specific geographic areas and thus identifying trends that document the connection between Campania and Sicily. On this topic, see also Serino (forthcoming a).

**19** It was attributed by M. Borriello to the Meleager Painter, an Attic craftsman active in the last decades of the 5th century B.C. (*CVA* Italy 78 – Maria Rosaria Borriello, *Napoli, Museo Nazionale, Collezione Spinelli* 3: 82–83, pl. 80, inv. no. 164407).

**20** Cf. Serino (2019) tab. on p. 197, nos. CK29-Sa9, CK26-Sa3 and Sk11-Sa12.

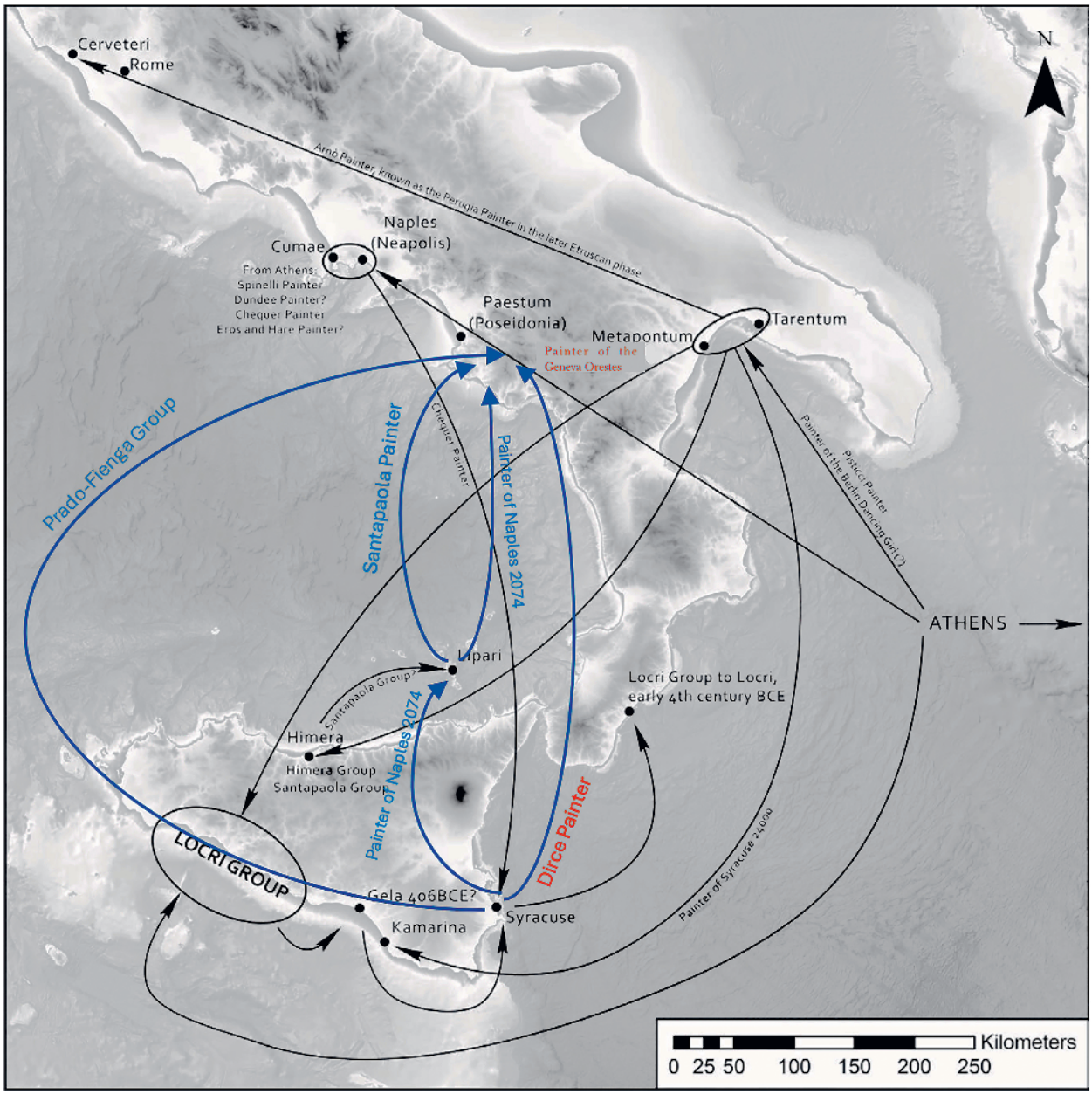


**Fig. 2:** Movements of early South Italian Painters in Southern Italy and Sicily 440–390 B.C. Map: After Robinson (2022) fig. 5.1. Editing: Marco Serino.

probably decorated by an artisan very close to the Paestan figurative tradition (Fig. 3g–h),[21] which would mean that the Sicilian Santapaola Painter and a Paestan painter worked together on the same vase. We also know that the kylix was one of the favorite shapes during these decades in Campania and that this shape is totally absent in the early Sicilian red-figured vase tradition. Consequently, the presence of the Santapaola Painter on a kylix in Campania together with another artisan cannot be considered a mere coincidence. And this combination should open up other big questions related to supposedly sedentary potters on one hand (who made specific shapes in specific regions, such as the kylix in Campania),

21 This kylix was already published with this new attribution in Serino (2022) 96–98, and (forthcoming a) where various cross-references to the Tyrrhenian figurative tradition were already mentioned. For the comparisons with the Painter of the Geneva Orestes see the Nolan amphora at the Musée d'Art et d'Histoire, inv. no. HR29. For some close stylistic affinities with some mantle figures and their lower borders of *himatia*, see also the Paestan artifacts made by Assteas, such as the neck amphora at the Museo Arqueológico Nacional de Madrid, inv. no. 11235.

and purportedly itinerant painters on the other hand (who decorated new shapes when they moved to another region), starting from at least the last two decades of the 5th century B.C.


**Fig. 3: (a, b, f)** Kylix (Naples, Museo Archeologico Nazionale, inv. no. 164407), Santapaola Painter (exterior) and Painter of the Geneva Orestes (tondo) (?). After Borriello (2015) pl. 80; **(c)** Mantle figure on side B of the krater (Lipari, Museo Archeologico Regionale "Luigi Bernabò Brea", inv. no. 11839), Santapaola Painter (permission by Assessorato Regionale Siciliano dei Beni Culturali e dell'Identità Siciliana); **(d–e)** Fragments of skyphos (Syracuse, Museo Archeologico Regionale "Paolo Orsi", inv. no. 56961), Santapaola Painter (permission by Assessorato Regionale Siciliano dei Beni Culturali e dell'Identità Siciliana); **(g)** Neck amphora (Geneva, Musée d'Art et d'Histoire, inv. no. HR29), Painter of Geneva Orestes. After Denoyelle (2011) fig. 8; **(h)** Neck amphora (Madrid, Museo Arqueológico Nacional, inv. no. 11235), Assteas. After *RVP*, pl. 69e.

All the examples mentioned above, together with other case studies, invite us to take a new look at our theoretical model in relation to the organization of these early workshops. It is very important to consider that in Magna Graecia and Sicily the beginning of the new dynamics of the red-figured industry related to the first generations of painters highly specialized in red-figured productions must surely have involved close contacts with existing industries and established local workshops, with their own facilities, kilns, and workers already active on site.[22]

One of the few contexts that can provide us with some answers on this subject is certainly the area of Metapontum, which has been examined in depth and very well by F. Silvestrelli.[23] Of course, Metapontum is an important model, but not necessarily the only model universally valid also for other regional areas and other chronological frameworks that can evince diversified dynamics in terms of market, buyers, vase choices, social organization, production systems, interregional connections, and so forth. Concerning the Pisticci Painter (around 440 B.C.), the revolution in the repertory of vases brought about by his arrival—especially in terms of local black gloss pottery—can be explained with the presence/arrival of different new artisans, both painters and potters, resulting from a migration of entire workshops from another place (probably Greece, probably Athens).

After about one generation, starting from 425–420 B.C., various local regional workshops would have been stabilized. Several painters must have been trained in the Magna Graecia workshops (and not in Athens), and thus market demand would have required a greater local presence of red-figured painters. South Italian painters could move and relocate to other local workshops, already active, without revolutionizing the local vase repertoire (because they are only painters). They needed (only) to adapt their drawing skills, personal patterns and decorations, and cultural background to local trends and preferences (especially with respect to shapes), as in the case of the kylix with the Santapaola Painter's intervention.

Accordingly, the mobility of an entire workshop against the mobility of a single painter is an issue that must be addressed case by case, context by context. For all these reasons, craftspeople involved in the making of the vase shape and vase image need to be considered not only as two different artisans but as two different social actors related to different social dynamics of mobility.[24]

## Computational Imaging and Experimental Archaeology: Investigating Technological Features and Crafting Procedures in South Italian Red-figured Workshops

Mobility is also a matter of the displacement of knowledge. Some innovative diagnostic techniques can open a new pathway to distinguish the dynamics and the combinations of different painters and potters within a workshop. To better define specific vase productions and recognize both the similarities and the differences in technological procedures within the network of the first and the second generations of Sicilian workshops, new analyses coming from the field of computational imaging are becoming increasingly more crucial.[25] Thanks to a portable digital microscope and to RTI (Reflectance Transformation Imaging),[26] we can recognize many details hidden to the naked eye: fingerprints, the way of applying *miltos* on the vase, the sequence of the different coatings, marks left by the different brushes; or we can observe from a

**22** Mannino (1996), (2008). On the introduction of specialists (mainly painters) of red-figured production into local workshops already active *in loco* during the last decades of the 5th century B.C., see Silvestrelli (2018), (2019) (for Metapontum); Elia (2001), (2010) 221–227, and (2019) 554–558 (for Locri Epizephyrii); Fontannaz (2014) 81–90; dell'Aglio/Masiello (2019) (for Tarentum).

**23** Silvestrelli (2018), (2019).

**24** Preliminary considerations about this theoretical model can be found in Serino (2022), (forthcoming a).

**25** These data will be processed again in the next step of the A.G.A.T.H.O.C.L.E.S. project thanks to archaeometric analysis in collaboration with the Departments of Chemistry of both the University of Turin and the University of Bari. For previous technology studies applied to red-figured pottery production see: Seiterle (1976); Noble (1988); *TonArt*, 28–34.

**26** For the RTI and photogrammetry training and for the 3D concept of the tool presented I would like to thank Alessandro Bovero, a professional photographer and an expert in computational imaging applied to cultural heritage.

microscale and a midscale point of view the thickness of black gloss and how it was applied on the vase surface, as well as the overpainting and the preliminary sketches.[27]

These technological details naturally lead us to some important questions: Do these features allow us to distinguish one workshop from another? Is it possible to find some specific trends that help us to claim that different technological procedures reflect different workshops? Consequently, would these transfers of technological procedures suggest likely migrations of specific artisans?

First of all, technological features alone cannot say anything. However, if we combine these new data in a general framework, and if we ponder them together with other qualitative information such as style, iconography, morphology, and distribution, as well as archaeometric data, we will be increasingly able to follow ancient artisanal movements, because we will be able to recognize a combination of the same artisanal, figurative, and technological practices belonging to a specific artisan or, at least, to a workshop or school.

Given the interesting and significant (likely) dynamics of mobility between Sicily and Campania around the early 4$^{th}$ century B.C., some vases produced by these workshops have been examined as a test case.

Thanks to RTI on a calyx krater very close in style to the Scoglitti Group[28] the overpainted white and red can be observed in terms of the tools used (dimension and tips), the way the painters moved the brushes, and the sequence of different lines and coatings applied on the various figures depicted, especially in relation to the relief-lines (Fig. 4a).[29] For example, if it is true that for the overpainted white the black lines lie under the white coating, it is totally the opposite for the overpainted red, where the black relief-line creates an outstanding effect resembling chiaroscuro. This is a very interesting situation in terms of technological procedures, because it is important to consider the application of black-glazed relief-lines, and then the drying time (this is a dense coating) and the efficiency of the reduction phase during the firing (in order to allow the coating to change from red to black) and then, within this very systematic sequence of artisanal gestures, the overpainted layer applied on these relief-lines in order to create a fold effect for all the *chitoniskoi* depicted on the krater (Fig. 4b). All these technological features have been tested with dedicated sessions of experimental archaeology:[30] the relief-lines under the red overpainting took the reduction and became black without any problems, despite the coating on top.

Diagnostic techniques using digital tools allow us to also find (at least partial) fingerprints on these vases. In spite of the expected results, fewer fingerprints have been found on the group of samples analyzed so far, but they can still be considered useful and important data because this in-depth survey on fingerprints can tell us that these artifacts usually received considerable attention during the workflow within the workshop. Although fingerprints seem to be very rare in this category of artifacts, sometimes we are able to observe some very peculiar traces that, as in the case of a krater in Zurich (Archäologische Sammlung der Universität, inv. no. 4991) and attributed to the early Sicilian Himera Painter, may be interpreted as signs of an apprentice working inside the workshop. The presence of an apprentice, with his clumsy handling of this vase, could explain such traces as these directly on the coating, because the smudges on the glaze are on various parts of the vase (Fig. 4c).[31]

RTI allows us to observe other interesting features in relation to the tools used for decorating the various parts of the vases. Sometimes we can see tool traces invisible to the naked eye, and we can even measure them with a digital microscope, recognizing different dimensions and different types in relation to the brushes as well as to other tools used in dif-

**27** *TonArt*; Boss (1997); Corbett (1965); Noble (1988); Todisco (2012) vol. II, 120–121. For RTI see Artal Isbrand/Klausmeyer (2013); Saunders/Collmann/Borda (2017). Recently, also Balachandran (2018). See also Elia *et al.* in this volume.

**28** Syracuse, Museo Archeologico Regionale "Paolo Orsi", inv. no. 55484.

**29** In this regard, it is also worth mentioning the attempts to reconstruct the ancient Painter's tools by Sanchita Balachandran, with very interesting and stimulating results obtained thanks to the study of some Attic vases at the John Hopkins Archaeological Museum. See the online Iris Foundation Awards Lecture entitled "Marked in Clay: Intedisciplinary Methods to Re-imagine Ancient Greek Potters at Work" (April 27, 2021): https://www.bgc.bard.edu/research-forum/articles/608/marked-in-clay-interdisciplinary-methods (last access 01.03.2024).

**30** Thanks to a strategic collaboration with Roberto Paolini – Pithos Ancient Reproductions (https://www.pithosriproduzioniceramiche.it [last access 01.03.2024]), see note *infra*. On the firing process related to red-figured vases, see also Balachandran (2019). Concerning experimental sessions of firing with an ancient kiln replica see Wissinger/Kahn (2008) and Hasaki (2021) 246–264. This latter experiment is related to the *AIA Tucson Greek Kiln Project*, directed by Eleni Hasaki at the University of Arizona: https://aiatucson.arizona.edu/kiln-construction (last access 01.03.2024).

**31** Zurich, Archäologische Sammlung der Universität, inv. no. 4991. See also *LCS*, 35, no. 25j, tab. VIII,1; *LCS III*, 97, no. 40; New York market, Sotheby's, December 8, sale 7572, 102–103, no. 130, figs. at p. 102–103 (Sotheby's 2000); Serino (2016) 48–49, fig. 17; (2019) no. CK6-Hi6. Thanks to Ian McPhee for informing me about the current location of this calyx krater, after rather intricate collecting episodes.

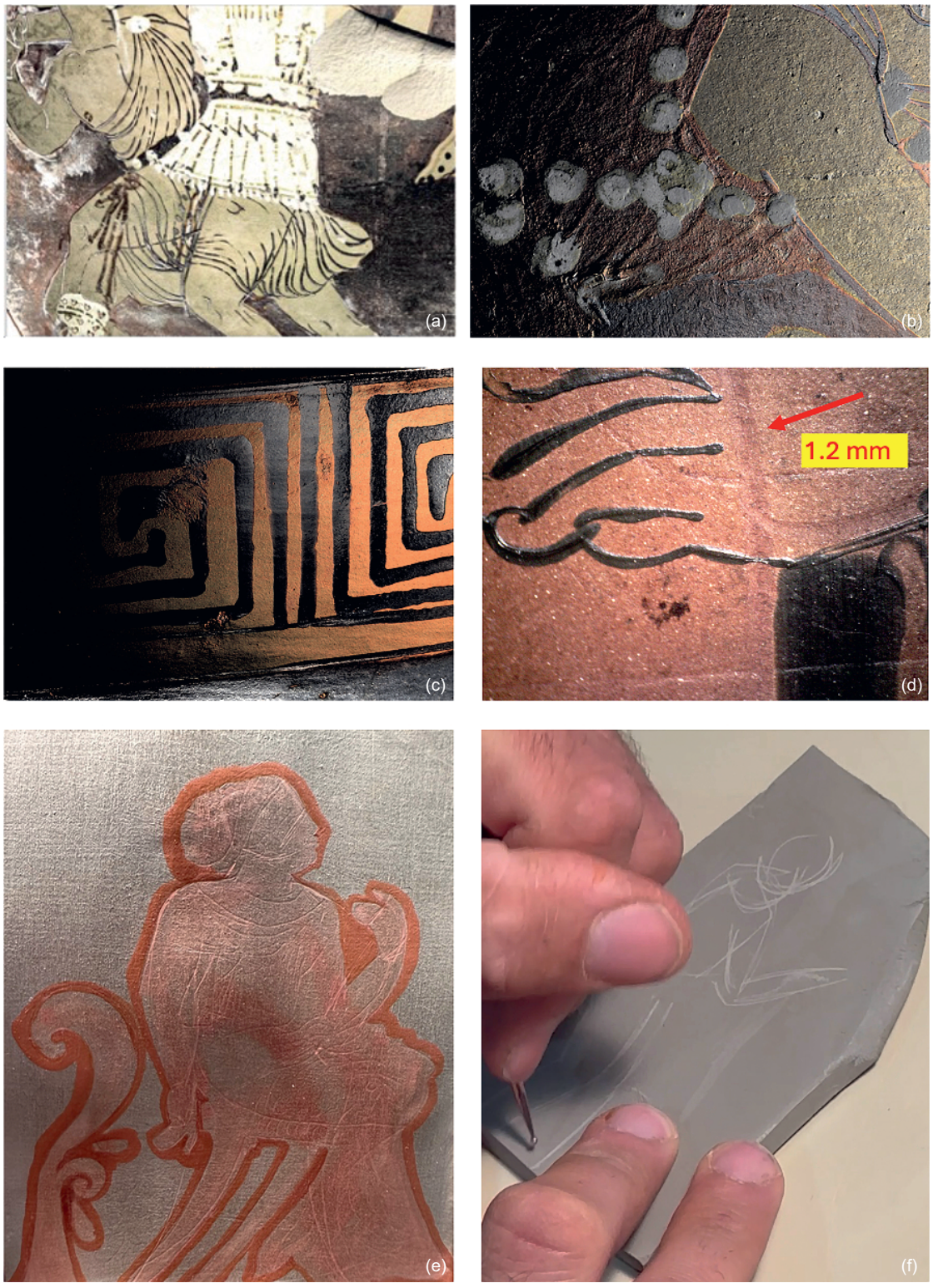


**Fig. 4:** Technological details. **(a–b)** Calyx krater (Syracuse, Museo Archeologico Regionale "Paolo Orsi", inv. no. 55484), Prado–Fienga Group (permission by Assessorato Regionale Siciliano dei Beni Culturali e dell'Identità Siciliana); **(c)** Calyx krater (Zurich, Archäologische Sammlung der Universität, inv. no. 4991), Himera Painter (permission by Archäologische Sammlung der Universität); **(d)** Calyx krater stored in Lipari, Museo Archeologico Regionale "Luigi Bernabò Brea", inv. no. 168F, Painter of Naples 2074 (permission by Assessorato Regionale Siciliano dei Beni Culturali e dell'Identità Siciliana) **(e–f)** Experimental archaeology: sequence of gestures between preliminary sketch and *miltos.* Photo: Marco Serino. © A.G.A.T.H.O.C.L.E.S. project.

ferent specific practices. For example, the preliminary sketch is an aspect related to an internal workshop's technological procedures that can help scholars to recognize different figurative (and technological) traditions within the social network of ancient red-figured painters in southern Italy.

Experimental archaeology can also be combined with these analytical observations, testing various brushes and observing what kind of tools could have been used for every single gesture that created preliminary sketches.[32] Focusing on the second generation of Sicilian painters and their likely migratory movements toward Campania and Paestum, in previous studies we consistently find a number of workshops involved in these dynamics. Thus, the question is again: What can technology studies provide to better define these productions? One possible answer is related to the different ways of making preliminary sketches. For example, taking into account a vase made by the so-called Painter of Naples 2074 (Museo Archeologico Regionale "Luigi Bernabò Brea", inv. no. 168F, from Lipari), the preliminary sketch also involves in some way the use of *miltos*.[33] There is a thin line that is a deeper red compared with the rest of the surrounded area, and this is an imperceptible groove used for the preliminary sketches.[34] It is evident how it was made before the application of the *miltos*; an important confirmation of this hypothesis comes from the same effect that was observed in the experimental sessions. Experimental archaeological attempts have tried to accurately replicate this sequence of gestures related to the preliminary sketch and its relationship with the use of *miltos*. It is particularly evident how, following this sequence of applications, part of the *miltos* applied as a second step (after the preliminary sketch) tends to accumulate within the grooves made by a pointed tool, which is exactly the same effect we can observe on some ancient artifacts (Fig. 4d–f).

We can also observe other very different ways of making preliminary sketches, with a much thinner pointed tool and with a constant repetition of very thin engravings to create the anatomical parts, as in most of the products of the Prado-Fienga Group.[35] Within the productions analyzed, on vases by the Santapaola Painter we can find the same way of making preliminary sketches as on works by the Prado-Fienga Group.[36] Conversely, it is possible to recognize other procedures of making sketches (like the ones on the Painter of Naples 2074's vases) on the artifacts attributed to the Dirce Painter.[37]

Thanks to the combination of RTI and the digital microscope,[38] it is also possible to take a look at the tool's width and, above all, measure it. In the case of preliminary sketches on vases by the Dirce Painter and the Painter of Naples of 2074, we find measurements between 1.1 and 1.4 mm. Other contemporary workshops have completely different measures: the Prado-Fienga Group has groove widths between 0.30 and 0.38 mm, and the Santapaola Painter's measure between 0.28 and 0.32 mm. Such differences can be explained only by different tools used to make these preliminary sketches.

Briefly, this specific technological evidence is a further indication of a strong relationship between the Dirce Painter and the Painter of Naples 2074. In addition, it indicates a certain distance between these latter artisans on the one hand and the Santapaola Painter and especially the Prado-Fienga Group on the other.

Diagnostic analyses on South Italian red-figured pottery need to consider other general but decisive features, mostly belonging only to this regional vase production.

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**32** Sessions of experimental archaeology have been carried out in collaboration with Roberto Paolini (Pithos Ancient Reproductions, Cerveteri) at the LTT (Laboratory of Traditional Technology) of the University of Arizona (Tucson, USA) and at the Laboratory of the "Officina della Ricerca", Department of Historical Studies, University of Turin. Many thanks to Eleni Hasaki (LTT co-director) for her support and coordination in all the management of these scientific sessions. Moreover, I am very grateful to Cynthia Jones, the resident potter at the LTT in Tucson, for her availability and for giving us the opportunity to use her kilns to reproduce the three stage firing (oxidation-reduction-reoxidation). Last, but not least, I have to thank all the UA students who helped us during the experimental activities in the Lab and especially during all dissemination moments within the campus.

**33** Lipari, Museo Archeologico Regionale "Luigi Bernabò Brea", inv. no. 168F. *Miltos* is a ferruginous red ocher that artisans used in red-figured production to make the parts of the vase that were not covered by black gloss appear deeper red. Since the South Italian clay body was usually paler than the original Attic one, *miltos* was used especially in the South Italian workshops. On issues related to *miltos* see: Richter (1923) 53–59, 96–98; Cuomo di Caprio (2017) 285–286; Photos-Jones *et al.* (1997); Schreiber (1999) 48–52; Todisco (2012), vol. 2, 118–119. See also Elia *et al.* in this volume.

**34** See Lipari, Museo Archeologico Regionale "Luigi Bernabò Brea", inv. no. 168F.

**35** See Syracuse, Museo Archeologico Regionale "Paolo Orsi", inv. no. 47102, and Lipari, Museo Archeologico Regionale "Luigi Bernabò Brea", inv. nos. 6814, 9671, 15138.

**36** See Lipari, Museo Archeologico Regionale "Luigi Bernabò Brea", inv. no. 11839.

**37** For the Dirce Painter's vases, see: Syracuse, Museo Archeologico Regionale "Paolo Orsi", inv. nos. 36319, 36332, 36334.

**38** Dino-Lite Edge Digital Microscope Model AM7915MZTL (Long Working Distance).


**Fig. 5:** Experimental archaeology: chromatic issues with raw materials. The case-study of the calyx krater: Syracuse, Museo Archeologico Regionale "Paolo Orsi", inv. no. 47102. Photo and digital image: Marco Serino. © A.G.A.T.H.O.C.L.E.S. project.

The pivotal element of all these issues is *miltos*. The use of *miltos* must be considered in relation to the sequence of gestures related to the coatings, and especially to the color they have when they are raw. Experimental archaeology is again crucial to argue considerations on technology: raw *miltos* (rich in iron oxides) can only be red; raw black gloss can be red, but not only red. In-depth analytical observation, thanks to experimental archaeology, combined with technology studies, highlighted how the red raw black gloss might be a huge problem for an artisan who wanted to make fine details (Fig. 4f, Fig. 5, and Fig. 6 option 1), especially with relief-lines inside the silhouettes of the figures in the scene (e.g., clothing, eyes, muscles). In light of this evidence, we tried to recreate different solutions during the experimental sessions with different possible combinations of chromaticism. In this regard, an extraordinary result is related to the possibility of making the black gloss from both red clay and gray clay. Only in the second case did the artisan have enough chromatic contrast between *miltos* and the relief-line to draw details without any problems (Fig. 5 and Fig. 6, option 2). Red raw black gloss can come from a different clay than the clay body. Gray raw black gloss can come from the same clay as the clay body, and vice versa.

Thus, a possible solution for these chromatic issues is that when ancient painters used *miltos*, they needed to apply a gray coating as black gloss, and the real chromatic contrast was gray background, red figures and red secondary patterns, gray details (relief-lines) inside the figures with *miltos,* thus already red when they were still raw. This hypothesis can also explain why in many South Italian vases we can see so many problems related to the coatings and the black gloss (e.g., poor quality, signs of brushes visible to the naked eye, poor attention to the background, especially close to the handles): if the artisan was not able to see a clear contrast between the clay body and the background (gray on gray), he could not have been sure whether he had applied the coating correctly. Only after the firing would the black gloss (now black) have been clearly visible. At that point, however, it would have been too late for any corrections (Fig. 5).

There are also other two possibilities, very close each other: a background with red clay (for the future black gloss) and a relief-line with gray clay (for the future black gloss) or with red clay but mixed with some organic material that alters the color of the original red clay to something more grayish (e.g., charcoal?) that allowed the artisan to see the different colors between the *miltos* and the drawing details while also allowing him to avoid problems with the background (Fig. 6, option 3). In this way, it could have been checked better during its raw stage on the vase.[39] All these scenarios must be checked, of course, context by context, and we need to consider how important the dynamics of local supply were in relation to the raw materials. Some workshops could have worked with different clays, so they could prepare two different recipes for the clay body and the coatings. Some other workshops probably prepared the clay body and black gloss from the same clay.[40]

| | Option 1 | Option 2 | Option 3 |
|---|---|---|---|
| **Background, contour line** | Raw red / fired "black" gloss | Raw gray / fired "black" gloss | Raw red / fired "black" gloss |
| **Relief-line** | | | Raw gray / fired "black" gloss |
| **Unpainted surface** | Miltos | Miltos | Miltos |

**Fig. 6:** Experimental archaeology and the color of clay. Raw materials and their related chromatic contrasts during the sequence of gestures and paintings. Photo and digital editing: Marco Serino. © A.G.A.T.H.O.C.L.E.S. project.

**39** For more details on these experimental archaeological sessions see Serino (forthcoming b).

**40** Archaeometric analyses on the same samples can be very useful to understand if there could be differences between the black gloss used for the background and the one used for the "internal" relief-lines.

## The Social Network Analysis of South Italian Red-figured Vases

Moving from a micro- to a macroscale perspective, the social network analysis (SNA) of South Italian vase painters is another innovative and interesting approach to explore and visualize the tangled and elusive dynamics of mobility, temporary transfers, and collaborations.

Inspired by the SNA developed by E. Hasaki and D. Harris Cline in connection with the industry of Attic figured pottery,[41] this attempt was made to integrate the data obtained by the microscale analyses outlined above and to provide an unusual perspective related to the whole network of artisans mentioned by A. D. Trendall and. A. Cambitoglou within their master works.

SNA is a toolbox related to digital humanities that can support the study of relationships between entities, and in this case between ancient artisans. A sociogram was created, converting written text and vocabularies in ties. From more than 3000 pages and 11 volumes, the social vocabulary and the qualitative terms used by Trendall and Cambitoglou were considered, and an undirected network model was applied, meaning that links between entities were symmetrical.[42]
Since we have masters and pupils within Trendall and Cambitoglou's catalogues, it may seem obvious to apply a directed network:[43] master to pupil, or vice versa. On the contrary, a symmetrical network model allows us to eliminate some apriorisms and preconceptions, and we can see only the larger nodes with greater ties and those that are in a strategic tie position, without giving them a direction. Brutally translated: we are trying to make Trendall's mind map work in a different way. We are using the same information that Trendall had, but we connect the information differently: not necessarily hierarchically but horizontally, and according to an idea of a whole network. It will be the qualitative observations and studies, such as the stylistic, iconographic, and morphological context analyses, as well as technological features like the ones mentioned above, that will suggest a hierarchical order and a diachronic development of the various workshops and painters.

Taking this into account, the new sociogram maps artisanal relationships within the South Italian red-figured workshops, providing an innovative panoramic view never seen before for this artisanal production (Fig. 7, on the left). This structural approach for the analysis of the social phenomena is based on a very intuitive consideration: the borders of action by a social actor within a system of relations depend on the position he or she occupies and, at the same time, on the position that others occupy. Some social actors will be in particularly favorable positions and, for this reason, will play a leading role within the dynamics we are studying.[44]

Starting from the vertices sheet, we will be able to clearly identify the most central nodes and also to specify what their prominence consists of, whether it is prestige, activity, brokerage capacity, or a combination thereof. So, this new way of visualizing connections through Trendall's and Cambitoglou's raw data set allows us to better visualize how some workshops have played a central role in the development of certain figurative traditions, or how influential they may have been as brokers between one production and another.

Furthermore, using the metrics tool included in NodeXL,[45] it was also possible to measure this centrality for every single Painter and Group. In general, having high levels of degree means being highly involved within the dynamics of interaction in the sociogram. High levels of betweenness give nodes a high power of brokerage.

In relation to the workshop groups examined here, it is possible to consider the metrics of Assteas, the Dirce Painter, Cassandra Painter, Chequer Painter, and the Painter of Naples 2074. Among the most interesting data are the different results provided by different metrics such as degree and betweenness: the values of these two rankings do not appear—as usually happens—proportional to each other, especially for the Dirce, the Chequer, and the Revel Groups. This dispro-

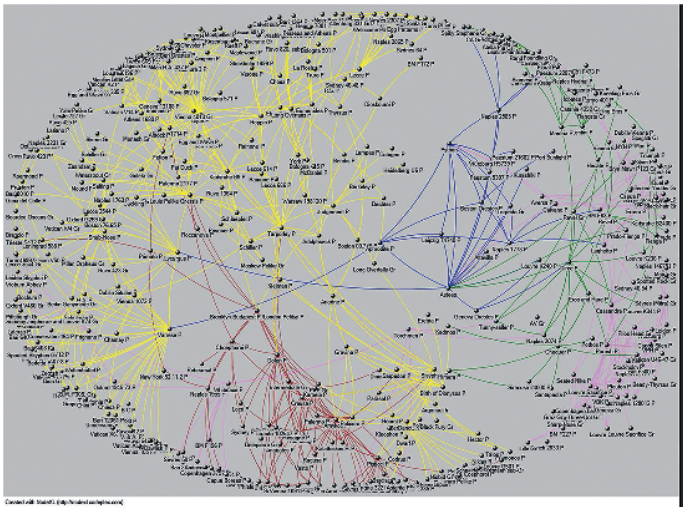
**41** Namely the SNAP project. The main research goal of the SNAP project was to map and analyze the structure of the communities of Athenian potters and painters who worked in the Kerameikos during the period from 600 to 400 B.C. For further details see Hasaki/Cline (2020); Harris Cline/Hasaki (2023). I thank Eleni Hasaki for her assistance in developing the sociogram for the South Italian painters.

**42** For an overview of Trendall's and Cambitoglou's works, see *supra*, note 1.

**43** A different approach, especially in relation to the SNA developed for the Attic vases by D. Harris Cline and E. Hasaki (see *supra*, note 41).

**44** Some important works on Network theories and their relationship with the ancient material culture, and on Social Network Analysis are: Knappett 2011; Kadushin 2012; Hodder/Mol 2016; Collar 2020.

**45** NodeXL Pro is a software developed by the Social Media Research Foundation (California, USA) and it is an add-in for Microsoft Excel that supports social network and content analysis. It can calculate overall network metrics (for example, density, modularity), basic vertex metrics (degree, indegree, outdegree), advanced vertex metrics (for example, betweenness, closeness, eigenvector, pagerank), and group vertices by cluster or attributes. In addition to metrics, it allows you to visualize network graphs, choosing from various layout algorithms.



| | A | B | C | D | E |
|---|---|---|---|---|---|
| 1 | Label | X | Y | Degree | Betweenness Centrality |
| 2 | Asteas | 6.172,9 | 7.041,7 | 19 | 33725,592 |
| 3 | Lycurgus P | 2.433,8 | 5.304,5 | 15 | 33708,343 |
| 4 | Ilupersis P | 2.791,4 | 6.215,2 | 24 | 25228,433 |
| 5 | Dirce P | 7.733,0 | 3.641,0 | 13 | 16963,305 |
| 6 | Dijon P | 2.422,4 | 7.939,7 | 40 | 16263,515 |
| 7 | Tarporley P | 3.852,8 | 6.290,3 | 19 | 13187,192 |
| 8 | Varrese P | 3.463,8 | 4.516,7 | 28 | 12007,591 |
| 9 | Snub-Nose P | 1.977,7 | 4.601,4 | 12 | 10582,508 |
| 10 | Brooklyn-Budapest P /London Pelikai P | 2.807,6 | 4.383,1 | 13 | 8734,621 |
| 11 | Birth of Dionysos P | 4.653,0 | 3.931,5 | 10 | 8031,322 |
| 12 | Cassandra P | 8.659,6 | 3.711,2 | 16 | 7816,278 |
| 13 | Parrish P | 9.130,8 | 3.519,5 | 15 | 7198,388 |
| 14 | Sisyphus P | 4.621,2 | 3.332,9 | 16 | 6779,335 |
| 15 | Amykos P | 3.721,1 | 2.182,3 | 27 | 6519,519 |
| 16 | Chequer P | 7.693,6 | 2.217,4 | 8 | 6211,197 |
| 17 | Naples 2074 P | 7.031,4 | 5.178,6 | 6 | 6188,681 |
| 18 | Revel Gr | 8.272,9 | 4.824,6 | 7 | 6169,035 |
| 19 | Torchmen P | 5.008,6 | 4.617,3 | 5 | 5639,000 |
| 20 | Kadmos P | 6.357,3 | 2.908,7 | 2 | 5239,397 |
| 21 | Manfria P | 9.193,4 | 6.369,4 | 6 | 5058,446 |
| 22 | Hoppin P | 4.021,7 | 8.166,9 | 14 | 4872,539 |
| 23 | Whiteface P | 1.587,6 | 4.241,3 | 8 | 4478,000 |
| 24 | Primato P | 1.848,3 | 5.813,2 | 5 | 4371,214 |
| 25 | Aphrodite P | 5.643,1 | 5.600,8 | 6 | 4186,010 |
| 26 | Athens 1714 P | 2.840,4 | 8.141,6 | 16 | 4173,168 |
| 27 | Schulman P | 3.195,0 | 2.246,6 | 11 | 4009,108 |
| 28 | Long Overfalls P | 4.313,5 | 8.729,9 | 13 | 3427,380 |

**Fig. 7:** Social Network Analysis of South Italian red-figured painters/workshops. © A.G.A.T.H.O.C.L.E.S. project.

portion could indicate the importance of these workshops not as central actors but rather as bridges or brokers between different workshops located in different areas (Fig. 7, on the right).

To sum up: what is worth underlining is that these data fit well with the technological information we collected, especially as related to the preliminary sketches we have seen before. Both SNA and technology studies provide, in fact, new information on the Prada-Fienga Group, which seems to stay on its own path and does not intersect with the Painter of Naples 2074.[46] On the other hand, this latter painter would seem to have strong connections with both the Dirce Painter and the Painter of the Geneva Orestes. Although this is just the first step towards revising the networks of Sicilian, early Campanian, and early Paestan productions from new perspectives, the preliminary results are promising in helping us develop a new framework for understanding the artisanal mobility between Sicily and Magna Graecia during the end of the 5th and the beginning of the 4th century B.C.

## New Ways of Exploring—and Visualizing—the Red-figured Workshops and the Social Network of Ancient Artisans

Within the framework of the A.G.A.T.H.O.C.L.E.S. project, a preliminary concept of a 3D tool was developed in order to interrogate all the data throughout a unique interface (Fig. 8).[47]

This 3D tool is based on a photogrammetric campaign, and its main goal is to provide a user-friendly interface for various types of users—from the everyday museum visitor to the specialist scholar.

You can explore the entire vase in 3D, with zoom options. While exploring the vase itself, it is possible to interrogate the system and obtain different levels of information: from the morphological features and vases' profiles—which constitute important details to better understand the technological procedures used by potters in a specific workshop—to information related to the RTI campaign in regard to the painters' gestures and technological solutions.

Potters and painters—queried on the same artifact—can help to develop and follow a renewed theoretical model, where the workshop organization (and not only the "Painter of") is the core of the whole analysis and research case study. Moreover, data related to the upcoming archaeometric analysis of the samples collected will be available soon, and they will be integrated in the tool as well.

**46** Other technological information will soon be available from the archaeometric analysis on samples related to the same workshops: SEM, XRF, Laser Ablation are some of the methodologies applied on these artifacts.

**47** For the RTI and photogrammetry training, and for the 3D concept of the tool presented, I would like to thank Alessandro Bovero.

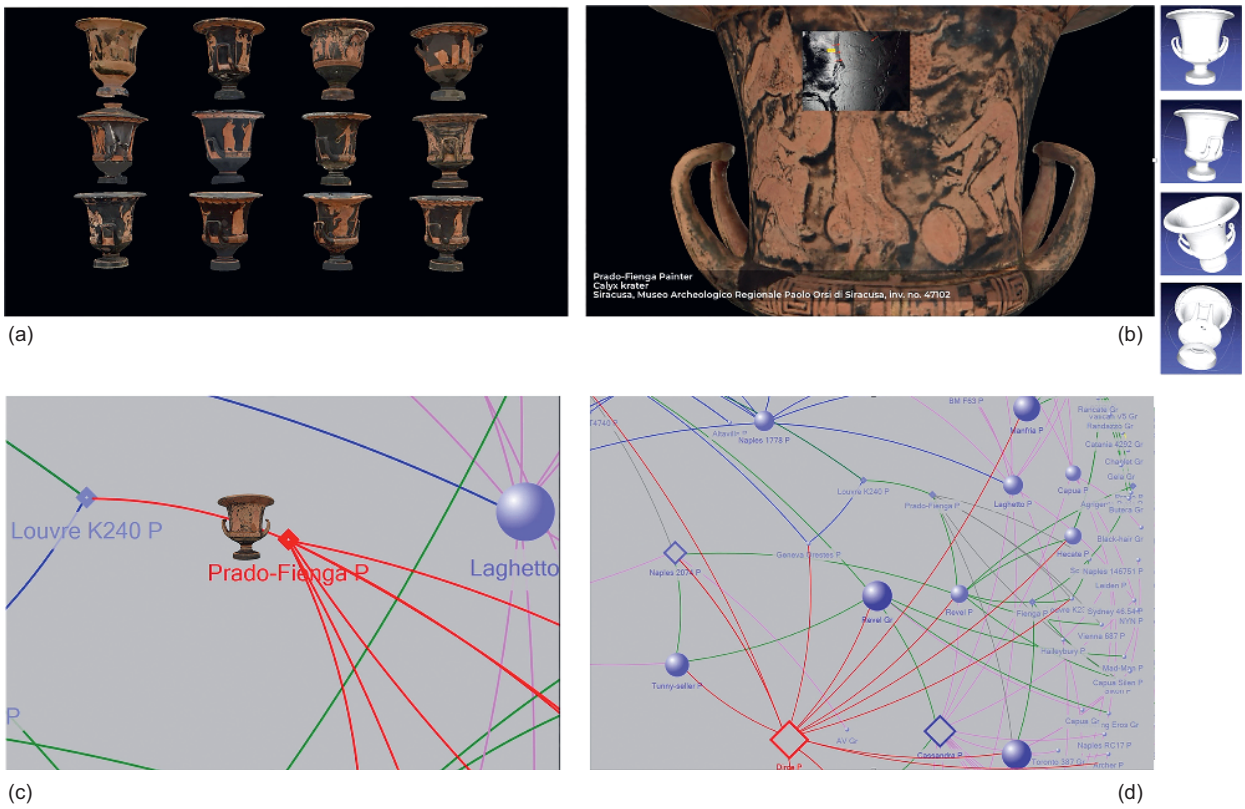



**Fig. 8:** 3D tool developed in the A.G.A.T.H.O.C.L.E.S. project: **(a)** Tool interface; **(b)** Exploring RTI and photogrammetric results; **(c)** Browsing in SNA; **(d)** Visualizing connections in SNA. Tool Developer: Alessandro Bovero. Editing: Marco Serino. © A.G.A.T.H.O.C.L.E.S. project.

Last, but not least, you can search for information related to the artifact's position within the ancient community of practice thanks to the SNA visualization.[48]

Briefly, this is a preliminary concept developed and aimed at providing a user-friendly tool that allows everyone to explore the world of South Italian red-figured vases, from their micro technological features to a macro overview of all the artisanal networks that the vase belongs to. From micro to macro and vice versa: because this is a reversible tool, it is also possible to explore the whole overview first, and then go inside and explore specific micro features, following the questions that have been inspired by the network perspective provided by the SNA.

## Abbreviations

| | |
|---|---|
| *CVA* | *Corpus Vasorum Antiquorum*. |
| *LCS* | Arthur Dale Trendall, 1967: *The Red-figured Vases of Lucania, Campania and Sicily*, Oxford. |
| *LCS I* | Arthur Dale Trendall, 1970: *The Red-figured Vases of Lucania, Campania and Sicily – First Supplement*, BICS, Supplement 26, Oxford. |
| *LCS II* | Arthur Dale Trendall, 1973: *The Red-figured Vases of Lucania, Campania and Sicily – Second Supplement*, BICS, Supplement 31, Oxford. |
| *LCS III* | Arthur Dale Trendall, 1983: *The Red-figured Vases of Lucania, Campania and Sicily – Third Supplement (consolidated)*, BICS, Supplement 41, Oxford. |

**48** Which is a totally different way of visualizing data and, in particular, links between painters/workshops – as it is possible to see in Trendall (1989) tabs. at 270–271 – since SNA provides more links and creates a real network of possible contacts between ateliers. For the definition of 'communities of practice', see Lave/Wenger (1991); Wenger (1996).

| | |
|---|---|
| *Poseidonia e i Lucani* | Marina Cipriani and Fausto Longo (eds.), *I Greci in Occidente. Poseidonia e i Lucani*, Exhibition Catalogue (Paestum 1996), Naples. |
| *RVP* | Arthur Dale Trendall, 1987: *The Red-Figured Vases of Paestum,* British School at Rome, Rome. |
| *RVAp* | Arthur Dale Trendall and Alexander Cambitoglou, 1978: *The Red-Figured Vases of Apulia. Early and Middle Apulian, Vol. I*, Oxford. |
| *RVAp* I | Arthur Dale Trendall and Alexander Cambitoglou, 1982: *The Red-Figured Vases of Apulia. Late Apulian*, *Vol.* II, Oxford. |
| *RVAp* II | Arthur Dale Trendall and Alexander Cambitoglou, 1991: *The Red-Figured Vases of Apulia, Supplement II*, *BICS*, Supplement 60, London. |
| Sotheby's 2000 | *Antiquities and Islamic Works of Art*, Sale Catalogue Sotheby's, New York. |
| *TonArt* | Martin Bentz, Geominy and Jan Marius Müller (eds.), 2010: *TonArt: Virtuosität antiker Töpfertechnik*, Petersberg. |

# Bibliography


Archibald (2011): Zosia H. Archibald, "Mobility and Innovation in Hellenistic Economies: The Causes and Consequences of Human Traffic", in: Zosia H. Archibald, John K. Davies and Vincent Gabrielsen (eds.), *Economies of Hellenistic Societies, Third to First Centuries BC*, Oxford, 42–65.

Artal Isbrand/Klausmeyer (2013): Paula Artal Isbrand and Philip Klausmeyer, "Evaluation of the Relief Line and the Contour Line on Greek Red-figure Vases Using Reflectance Transformation Imaging and Three-dimensional Laser Scanning Confocal Microscopy", in: *Studies in Conservation* 58, 338–359.

Balachandran (2018): Sanchita Balachandran, "Uncovering Ancient Preparatory Drawings on Greek Ceramics", *The Iris*. http://blogs.getty.edu/iris/uncovering-ancient-preparatory-drawings-on-greek-ceramics (last access 01.03.2024).

Balachandran (2019): Sanchita Balachandran, "Bringing Back the (Ancient) Bodies: The Potters' Sensory Experiences and the Firing of Red, Black and Purple Greek Vases", in: *Arts* 8: 70.

Barresi (2002): Sebastiano Barresi, "Teseo, Sini, Melicerte ed il Pittore della Scacchiera", in: *Ostraka* 11, 55–79.

Barresi (2013): Sebastiano Barresi, "Sicilian Red-figure Vase Painting", in: Claire Lyons, Michael Bennett and Clemente Marconi (eds.), with the collaboration of Alexandra Sofroniew, *Sicily. Art and Invention between Greece and Rome* (Exhibition Catalogue, J. Paul Getty Museum, Los Angeles, 2013), Los Angeles, 210–218.

Barresi (2018): Sebastiano Barresi, "Il Gruppo di Locri in Sicilia: analisi ed elementi di riflessione", in: Martine Denoyelle, Claude Pouzadoux and Francesca Silvestrelli (eds.), *Mobilità dei pittori e identità delle produzioni*, Cahier du Centre Jean Bérard 25, Naples, 41–63.

Beazley (1976): John Davidson Beazley, *Etruscan Vase Painting*, reprint, New York.

Boss (1997): Martin Boss, "Preliminary Sketches on Attic Red-Figured Vases of the Early Fifth Century B.C.", in: John H. Oakley, William D.E. Coulson and Olga Palagia (eds.), *Athenian Potters and Painters* I, Oxford, 345–351.

Collar (2020): Anna Collar, "Networks, Connectivity, and Material Culture", in: Catherine Cooper (ed.), *New Approaches to Ancient Material Culture in the Greek and Roman World*, Leiden, 47–62.

Corbett (1965): Peter Edgar Corbett, "Preliminary Sketch in Greek Vase-Painting", in: *Journal of Hellenic Studies* 85, 16–28.

Cuomo di Caprio (2017): Ninina Cuomo di Caprio, *Ceramics in Archaeology. From Prehistoric to Medieval Times in Europe and the Mediterranean: Ancient Craftsmanship and Modern Laboratory Techniques*, Rome.

de Cesare (2009): Monica de Cesare, "Il Pittore della Scacchiera e la nascita della ceramica figurata siceliota", in: Carmine Ampolo (ed.), *Immagine e immagini della Sicilia e di altre isole del Mediterraneo antico*, vol. I, Pisa, 277–294.

Denoyelle/Iozzo (2009): Martine Denoyelle and Mario Iozzo, *La céramique grecque d'Italie méridionale et de Sicile. Productions coloniales et apparentées du viii^e^ au iii^e^ siècle av. J.-C.*, Paris.

Denoyelle (2011): Martine Denoyelle, *La céramique grecque de Paestum. La collection du musée du Louvre*, Paris.

Dell'Aglio/Masiello (2019): Antonietta Dell'Aglio and Laura Masiello, "Produzioni artigianali e consumi", in: *Produzioni e committenze in Magna Grecia* (Atti del LV Convegno di Studi sulla Magna Grecia, Taranto, 24–27 settembre 2015), Taranto, 617–661.

Elia (2001): Diego Elia, *La Necropoli in Contrada Lucifero: Nuove Ricerche sulle Aree Funerarie di Locri Epizefiri tra V e IV Secolo a.C. (Campagne di Scavo Degli Anni 1913–1914)*. PhD Dissertation, Università di Messina.

Elia (2010): Diego Elia, *Locri Epizefiri VI.* Nelle case di Ade*. La Necropoli in Contrada Lucifero, Nuovi Documenti*, Alessandria.

Elia (2012): Diego Elia, "Birth and Development of Red-figured Pottery between Sicily and South Calabria", in: Dimitris Paleothodoros (ed.), *The Contexts of Painted Pottery in the Ancient Mediterranean World (Seventh-Fourth Centuries BCE)*, BAR International Series 2364, Oxford, 101–116.

Elia (2014): Diego Elia, "Local Production of Red-figure Pottery at Locri Epizephyrii: A Synthesis on the Last Decade of Studies", in: Victoria Sabetai and Stine Schierup (eds.), *The Regional Production of Red-figure Pottery: Greece, Magna Graecia and Etruria*, Gösta Enbom Monograph 4, Aarhus, 279–290.

Elia (2019): Diego Elia, "Produzione, distribuzione e consumo da Locri a Caulonia nella prima metà del IV sec. a.C.", in: *Produzioni e committenze in Magna Grecia* (Atti del LV Convegno di Studi sulla Magna Grecia, Taranto, 24–27 settembre 2015), Taranto, 553–567.

Fischer Hansen (2000): Tobias Fischer Hansen, "Ergasteria in the Western Greek World", in: Pernille Flensted-Jensen, Thomas Heine Nielsen and Lene Rubinstein (eds.), *Polis and Politics. Studies in Ancient Greek History, presented to Mogens Herman Hansen on his Sixtieth Birthday* (Conference Proceedings, Copenhagen, 2000), Copenhagen, 91–120.

Fontannaz (2014): Didier Fontannaz, "Production and Functions of Apulian Red-Figure Pottery in Taras: New Contexts and Problems of Interpretation", in: Thomas H. Carpenter, Kathleen Lynch and Ted Robinson (eds.), *The Italic People of Ancient Apulia. New Evidence from Pottery for Workshops, Markets, and Customs*, New York, 71–95.

Harris Cline/Hasaki (2023): Diane Harris Cline and Eleni Hasaki, "Assortative Mixing in the Social Networks of Athenian Potters and the Search for Communities of Practice", in: *Journal of Historical Network Research* 8, 21–55.

Hasaki (2021): Eleni Hasaki, *Potters at Work in Ancient Corinth: Industry, Religion, and the Penteskouphia Pinakes*, Hesperia Supplement 51, Princeton N.J.

Hasaki/Cline (2020): Eleni Hasaki and Diane H. Cline, "Social Network Analysis and Connoisseurship in the Study of Athenian Potters' Communities", in: Eleni Hasaki and Martin Bentz (eds.), *Reconstructing Scales of Production in the Ancient Greek World: Producers, Processes, Products, People* (Panel 3.4, Proceedings of the 19th International Congress of Classical Archaeology, vol. 8, Cologne/Bonn, May 22–26, 2018), Heidelberg, 59–80. https://doi.org/10.11588/propylaeum.639.c9977.

Hodder/Mol (2016): Ian Hodder and Angus Mol, "Network Analysis and Entanglement", in: *Journal of Archaeological Method and Theory* 23, 1066–1094. https://doi.org/10.1007/s10816-015-9259-6.

Horden/Purcell (2000): Peregrine Horden and Nicholas Purcell, *The Corrupting Sea. A Study of Mediterranean History*, Oxford.

Hughes (2003): Alan Hughes, "Comedy in Paestan Vase-Painting", in: *Oxford Journal of Archaeology* 22, 281–301.

Isayev (2017): Elena Isayev, *Migration, Mobility and Place in Ancient Italy*, Cambridge.

Jockey (2009): Philippe Jockey, "D'une cité l'autre. Brèves réflexions sur la mobilité des artisans de la pierre dans l'antiquité Classique", in: Claudia Moatti, Wolfgang Kaiser and Christophe Pébarthe (eds.), *Le monde de l'itinérance en Méditerranée de l'antiquité à l'époque moderne. Procédures de contrôle et d'identification* (Table-rondes, Madrid, 2004–Istanbul, 2005), Bordeaux, 139–159.

Kadushin (2012): Charles Kadushin, *Understanding Social Networks: Theories, Concepts, and Findings*, New York.

Knappett (2011): Carl Knappett, *An Archaeology of Interaction: Network Perspectives on Material Culture and Society*, Oxford.

Lave/Wenger (1991): Jean Lave and Etienne Wenger, *Situated Learning: Legitimate Peripheral Participation*, Cambridge.

Lippolis (2018): Enzo Lippolis, "La mobilità del ceramografo dalla formazione alla produzione. Problemi generali e un caso di studio: il Pittore di Dario e il suo ambiente artigianale", in: *Archeologia Classica* 59, 73–112.

Madella (2010): Paolo Madella, "Nuove osservazioni su un cratere del pittore della Scacchiera del Museo Paolo Orsi", in: Filippo Giudice and Rosalba Panvini (eds.), *Il greco, il barbaro e la ceramica attica* I, 77–92.

Mannino (1996): Katia Mannino, "Gli *ateliers* attici e la nascita della produzione figurata", in: Enzo Lippolis (ed.), *I Greci in Occidente. Arte e artigianato in Magna Grecia* (Catalogo della mostra, Taranto, 1996), Naples, 363–370.

Mannino (2008): Katia Mannino, "Dalle importazioni attiche alle produzioni italiote: la documentazione dell'area apulo-lucana", in: *Atene e la Magna Grecia dall'età arcaica all'ellenismo* (Atti del XLVII Convegno di Studi sulla Magna Grecia, Taranto, 27–30 settembre 2007), Taranto, 425–443.

McPhee (2015): Ian McPhee, "A Red-figure Bell-Krater in Dundee: A Campanian Vase-Painter of the Late 5th Century?", in: *Numismatica e Antichità Classiche – Quaderni Ticinesi* 44, 33–49.

McPhee (2018): Ian McPhee, "The Ackland Cup, the Chequer Painter and the Spinelli Painter", in: Maria Bernabò Brea, Massimo Cultraro, Michel Gras, Maria Clara Martinelli, Claude Pouzadoux and Umberto Spigo (eds.), *A Madeleine Cavalier*, Collection du Centre Jean Bérard, Naples, 295–303.

Noble (1988): Joseph Veach Noble, *The Techniques of Painted Attic Pottery*, 2nd revised edition, New York.

Photos-Jones *et al.* (1997): Effie Photos-Jones, Arbory McNulty Cottier, Allan J. Hall and Lina Mendoni, "Kean Miltos: The Well-Known Iron Oxides of Antiquity", in: *Annual of the British School at Athens* 92, 359–371.

Pontrandolfo (1996): Angela Pontrandolfo, "Le prime esperienze dei ceramografi siceliotì e le altre officine tirreniche", in: *I Vasi Attici ed altre Ceramiche Coeve in Sicilia, Vol. II* (Atti del Convegno Internazionale, Catania, Camarina, Gela, Vittoria, 1990), *Cronache di Archeologia* 30, Catania, 35–49.

Richter (1923): Gisela Richter, *The Craft of Athenian Pottery*, New Haven.

Robinson (2022): Ted Robinson, "Potters and Mobility in Southern Italy (500-300 BCE)", in: Jeremy Armstrong and Sheira Cohen (eds.), *Production, Trade, and Connectivity in Pre-Roman Italy*, London/New York, 82–98.

Rouillard (2007): Pierre Rouillard (ed.), with the collaboration of Catherine Perlès and Emmanuel Grimaud, *Mobilités, immobilismes. L'emprunt et son refus*, Colloques de la Maison René Ginouvès. Archéologie et ethnologie 3, Paris.

Rouillard (2009): Pierre Rouillard (ed.), *Portraits de migrants, portraits de colons*, 1, Colloques de la Maison René-Ginouvès. Archéologie et ethnologie 5, Paris.

Rouillard (2010): Pierre Rouillard (ed.), *Portraits de migrants, portraits de colons*, 2, Colloques de la Maison René-Ginouvès. Archéologie et ethnologie 6, Paris.

Saunders/Collmann/Borda (2017): D. Saunders, Richard Collmann and Ann Borda, "Reflectance Transformation Imaging and ImageJ: Comparing Imaging Methodologies for Cultural Heritage Artefacts", in: *Proceedings of EVA-Electronic Visualisation and the Arts* (London, 11–13 July 2017). https://doi.org/10.14236/ewic/EVA2017.71.

Schreiber (1999): Toby Schreiber, *Athenian Vase Construction: A Potter's Analysis*, Malibu.

Seiterle (1976): Gérard Seiterle, "Die Zeichentechnik in der rotfigurigen Vasenmalerei: Das Rätsel der Relieflinien", in: *Antike Welt* 7, 2–10.

Serino (2014): Marco Serino, "The Beginnings of Sicilian Red-figured Pottery and its Relationship with Early South Italian Productions: A Reappraisal through the Case-Study of the Himera Painter Workshop", in: Stine Schierup and Victoria Sabetai (eds.), *The Regional Production of Red-figure Pottery: Greece, Magna Graecia and Etruria*, Gösta Enbom Monographs 4, Aarhus, 247–267.

Serino (2016): Marco Serino, "Indizi di ritualità nuziale in abitato. Una proposta di ricontestualizzazione iconografica per i prodotti della bottega del Pittore di Himera", in: *Orizzonti. Rassegna di Archeologia* XVII, 35–52.

Serino (2017): Marco Serino, "Le prime botteghe di ceramica a figure rosse in Sicilia. Stato dell'arte e nuove prospettive di ricerca", in: Elvia Giudice and Giada Giudice (eds.), *Studi Miscellanei di Ceramografia Greca* III, Catania, 121–175.

Serino (2019): Marco Serino, *La Bottega del Pittore di Himera e le altre Officine Protosiceliote. Stile, Iconografia, Contesti, Cronologia*, Fecit te, Rome.

Serino (2022): Marco Serino, “Some New Perspectives on the Study of Craftspeople’s Mobility in the Red-figure Pottery Production of Magna Graecia and Sicily”, in: Chiara Maria Mauro, Diego Chapinal-Heras and Miriam Valdés Guía (eds.), *People on the Move Across the Greek World*, Sevilla, 91–107.

Serino (forthcoming a): Marco Serino, “Forma e immagine nelle officine protosiceliote. Una rilettura degli “inizi” delle prime produzioni a figure rosse attraverso possibili indizi di mobilità artigianale tra Campania e Sicilia”, in: Monica Salvadori, Monica Baggio and Luca Zamparo (eds.), *Forma e Immagine* (Atti del Convegno internazionale, Castelfranco Veneto, 4–6 dicembre 2019), Padua, forthcoming.

Serino (forthcoming b): Marco Serino, “Per un’archeologia del gesto artigianale. Aspetti tecnologici e network analysis. Organizzazione interna, flussi di lavoro e trasferimento di *know-how* nelle prime botteghe di ceramica a figure rosse tra Sicilia, Paestum e Campania”, in: Eukene Bilbao Zubiri and Alexandra Attia (eds.), *L’artisanat de l’argile en Italie Méridionale (VIII^e – III^e s. av. J.-C.)* (Colloque International du Centre Jean Bérard – École française de Rome – Scuola Superiore Meridionale, Naples, 23–24 marzo 2023), forthcoming.

Silvestrelli (2018): Francesca Silvestrelli, “Il repertorio morfologico delle ceramiche fini di Metaponto. Caratteristiche e trasformazioni nel V e nel IV secolo a.C.”, in: Claude Pouzadoux, Martine Denoyelle and Francesca Silvestrelli (eds.), *Mobilità dei Pittori e Identità delle Produzioni, Cahier du Centre Jean Bérard 25,* Naples, 135–160.

Silvestrelli (2019): Francesca Silvestrelli, “La *polis* di Metaponto e il suo territorio dalle prime esperienze alla metà del IV sec. a.C.”, in: *Produzioni e committenze in Magna Grecia* (Atti del LV Convegno di Studi sulla Magna Grecia, Taranto, 24–27 settembre 2015), Taranto, 583–601.

Soleti (2012): Vita Maria Soleti, “Storia degli studi”, in: Todisco (2012) 37–71.

Spigo (1996): Umberto Spigo, “Il problema degli influssi della pittura vascolare attica nella ceramica a figure rosse siceliota”, in: *I Vasi attici ed altre ceramiche coeve in Sicilia*, II (Atti Convegno Internazionale Catania, Camarina, Gela, Vittoria, 1990), *Cronache di Archeologia e di storia dell’arte* 30, Catania, 51–65.

Spigo (2001): Umberto Spigo, “Brevi considerazioni sui caratteri figurativi delle officine di ceramica siceliota della prima metà del IV sec. a.C. ed alcuni nuovi dati”, in: *La Sicilia dei due Dionisî* (Atti della settimana di studio, Agrigento, 24–29 febbraio 1999), Rome, 265–292.

Todisco (2012): Luigi Todisco (ed.), *La Ceramica a Figure Rosse della Magna Grecia e della Sicilia,* Vols. I–III. Rome.

Trendall (1960): Arthur Dale Trendall, “The Cassandra Painter and his Circle”, in: *Jahrbuch der Berliner Museen* 2, 7–33.

Trendall (1989): Arthur Dale Trendall, *Red Figure Vase of South Italy and Sicily. A Handbook*, London.

Trendall (1992): Arthur Dale Trendall, “New Vases by the Chequer Painter”, in: Heide Froning, Tonio Hölscher and Harald Mielsch (eds.), *Kotinos. Festschrift für Erika Simon*, Mainz am Rhein, 301–305.

Wenger (1996): Etienne Wenger, “How We Learn. Communities of Practice: The Social Fabric of a Learning Organization”, in: *The Healthcare Forum Journal* 39, 20–26.

Wissinger/Kahn (2008): John Wissinger and Lisa Kahn, “Re-creating and Firing a Greek Kiln”, in: Kenneth D.S. Lapatin (ed.), *Papers on Special Techniques in Athenian Vases*, Los Angeles, 129–138.