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Figuring out: coroplastic art and technè in Agrigento, Sicily: the results of a coroplastic experiment

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Figuring out: coroplastic art and technè in Agrigento, Sicily: the results of a coroplastic experiment

Gerrie van Rooijen, Loe Jacobs, Dennis Braekmans and Natascha Sojc

Figurines – or terracotta made figurative objects – are a frequently encountered material category in Antiquity. Their importance can be directly linked to an expression of socio-cultural phenomena. To understand the practices and techniques applied in the production of terracotta figurines from Akragas (Agrigento, Sicily), an archaeological experiment was carried out with the aim to reconstruct the full chaîne opératoire. This so-called coroplastic experiment focused on the large variety of female figurines from Akragas dated from the 6th-5th century BC. These form the majority of mould-made objects, which were placed as votives in high numbers at sanctuaries and were also applied as a grave gift. The demand for figurines to be dedicated and the flourishing business of terracotta production in Akragas can be explained by the presence of several nearby high-quality mineral resources, in combination with the craftsmanship of the local workshops. This availability sets the conditions for a strong tradition, resulting in a variety of moulded figurines. In this study, several clays and techniques are selected to re-create the production process with the aim of elucidating the technological capacity and choices made by potters and artisans. The outcome of tests with local clays showed that the materials nearby found fit the workability requirements, but also that by mixing several clays the colour of the figurines could be manipulated. Several

generations of a figurine's genealogy re-created in the experiment show how details fade and explain the common solution to replace the head. The use of different tools, such as round sticks as well as metal blades could be distinguished by an interpretative approach to the traces on reworked figurines. The development of characteristics in both design and technique shows a local style, while moulds and figurines were exchanged with other Sicilian towns, such as Selinous (Selinunte, Sicily). However, the appearance, as well as specific production techniques, shows an influence of a different craft tradition, one which points to an eastern Greek origin. In order to distinguish the technological choices and their effect on stylistic developments, a technical approach was chosen to research the production technique and the use of materials by the workshops in Akragas.

1 INTRODUCTION

1.1 Akragas' terracotta production

Figurines were produced in high quantities in Antiquity. One of the reasons for this was practical: clay, a very workable material is found abundantly in Sicily. Therefore, figurines and other terracotta objects must have been relatively affordable. Specific designs were developed on the island, during the Archaic Period, lasting until half the 5th century BC (Pautasso 2012). In Akragas (Agrigento) (fig. 1 and 2)

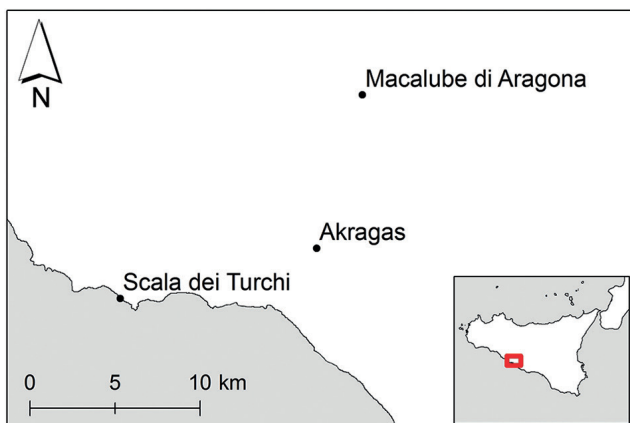


Figure 1 Map with the location of Akragas and the find spots of the clay (I. Dallmann)



Figure 2 Map of the southern part of Akragas with the city wall and three different sanctuaries: 1: S. Anna outside the city. 2: the sanctuary of the chthonic divinities inside the city. 3: S. Biagio at the edge of the city. The figurines used for the experiment (AGS273 and AGS901) were both found at the city sanctuary (After OpenTopoMap.org)

Clay	Consistency	Shrinking percentage	Munsell colour (fired)	Workability
Macalube naturale	Pure	7%	5YR 6/6 Reddish yellow	Highly suitable for making moulds; not very suitable for making figurines.
Scala dei Turchi	Pure	2.5%	5Y 8/2 Light gray (unfired)	Lacking plasticity; not suitable to use as the basic clay to make a figurine or mould. Preparation process: grinding dried pieces of clay and adding to another sort of clay, or adding water to the dry clay.
Macalube naturale / Scala dei Turchi / silt	45% Macalube naturale / 45% Scala dii Turchi / 10% silt	5%	7.5YR 8/4 Pink	Highly suitable for making figurines.

Table 1 The different clays and their features (Van Rooijen)

Generation	Number of figurines produced	Sharpness and visibility of details on the figurines	Shape of the mould and weathering after production
1	11	Sharp. Softer clay used for the face could cause a line. Small cracks at knees and neck with first figurines. Smoothing with water creates vagueness.	No weathering of the mould, slightly distorted mould because of uneven drying: sides bent to the inside.
2	4	Slightly less detailed than generation 1, e.g. flattened nose. Cracks on chest and neck. Damage on sides of the head.	Traces of clay leftover in the mould. Slight distortion. Difficult to unload figurine.
3	1	Vague, specifically the face, very flat nose. Small details, like the necklace, are not visible anymore.	Distorted: head and polos have become visibly thinner. Figurine stands asymmetrically.
4	1	Details are faded, arms and hands hardly visible.	Very distorted. Had to be reworked.

Table 2 An overview of different generations in the experiment comparing sharpness and details of the AGS901 series. The first generation here means the first in our experiment, i.e. made in the matrix, produced in the museum after patrix AGS901 (Van Rooijen)

Chaîne d'opérateur of a terracotta figurine		Steps of moulding	Time
1.	Collection of primary material: clay, patrix, tools	1. Preparation: kneading the clay, not too dry (cracks) nor too wet	5
2.	Production of a mould of the patrix: matrix	2. Pressing the clay into the mould	10
3.	Production of statuettes out of the matrix: the first generation of terracotta figurine-series	3. Drying	40
4.	(selling and transport) application /use possible surmoulage	4. Additional reworking after taking out	5-10
5.	deposition	5. Firing (and painting)	720

Figure 3 Summarised overview of the steps of the chaîne opératoire and the specified steps in the moulding with an indication of the duration of each step in minutes (Van Rooijen)

such a figurine production became a successful business because of the application of moulds. The coroplastic art must have been a flourishing part of Akragas' economy, as hundreds of statuettes are found near sanctuaries, as well as in graves and living quarters. Its cultic importance created the premises of a local and potential regional business. The moulding technique did not only alter the socio-economical role of terracottas but had a large impact on the variety of designs as well. These effects on the iconographical development are the subject of this article. With his innovative method of classification Nicholls already started to emphasise in 1952 that understanding the production technique is key in completing the picture of terracotta objects, as well as defining the right terminology to describe it (Nicholls 1952). More recently, Arthur Muller described the technology of terracotta production extensively, and his work will act as the main reference for this study (Muller 2000; 2014). The technical aspects are reckoned as an important part of research in understanding the terracotta production as a whole (Burn 2011).

The newly introduced moulding technique replaced the hand-forming production in the 7th century BC. It made figurine production simpler but also created the effect of uniformity. The female terracotta figurines of Akragas, dated between about 525-475 BC, are, however, remarkable for their variety. This diversity seems to be a contradiction and raises questions. Why would such a new technique be implemented, extending the possibilities for the production of rather straight bodied figurines? The manufacturing process of statuettes with a simple rendering of the body, the characteristic block-like design, seems most common in the second half of the 6th century BC. Their production would be speeded up through the use of moulds. The designs of larger and more detailed figurines, however, originates around the transition from the 6th to the 5th century BC. Despite the introduction of a new shaping technique, the characteristics of the traditional design are still visible. This article focuses on the impact technological and skill development had on the design, the tension between a comfortable production and a wish for a more complex and varied design. A second question is whether another group of terracottas, that of the piglet-carrying figurines, from the second half of the 5th century BC relates to the main production as well, and whether the variety appreciated earlier is replaced by a single design.¹

To answer the questions and comprehend the (dis-) advantages of this technique, practical research was necessary to fully understand the coroplast's work (fig. 3). For this purpose, the characteristics of the clay from nearby Agrigento were examined (fig. 1 and table 1). Furthermore, figurines were moulded after two examples from the Museo Archeologico Regionale "Pietro Griffo" di Agrigento: one

smaller simple type (AGS273, fig. 4) and one bigger (AGS901, fig. 5) sized with a higher resolution of details.² Specific questions we had regarding the moulding techniques and the figurines of Akragas could be answered by reconstructing a genealogy with moulds and figurines of four generations (table 2). The objects chosen as patrix in this experiment are exemplary for two sorts of figurines and are common designs among the statuettes from Akragas. They are typical for the range of variations in size, adornments and sharpness.

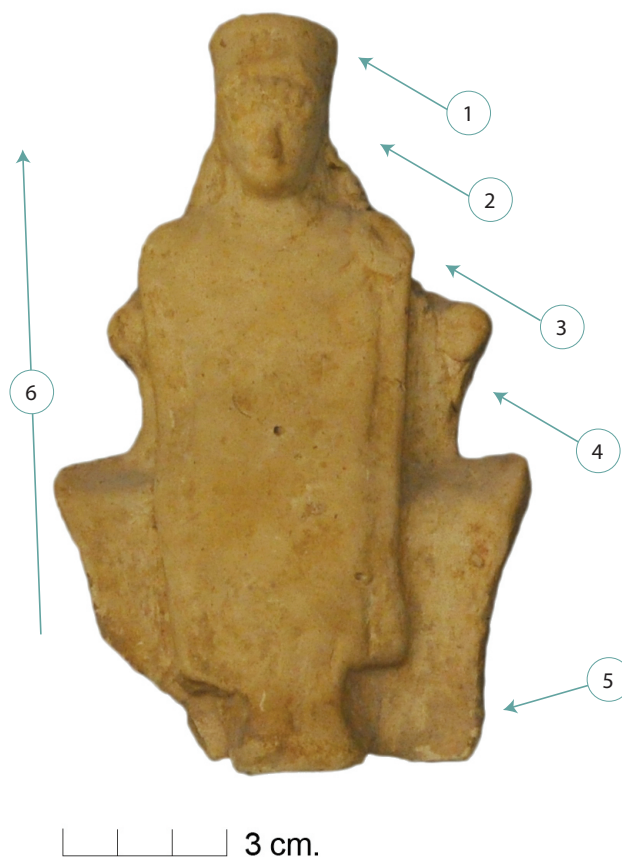


Figure 4 Frontal view of AGS273 (Van Rooijen). AGS273 is a nearly complete 13.9 cm. tall, simple figurine with a short trapezium or block-like shaped flat body. 1: She wears a low polos (hat). 2: A short neck and round face with her hair hanging loose in regular waves at each side. Her facial expression is not very well visible. 3: She wears a straight dress. The pectoral chain, an impressed double line, is attached to her clothing with round clasps. The disc shape is repeated as decorative ending of the throne. The throne/ chair consists of a wide bench with a back rest. 4: Her arms are not depicted. 5: Her feet are sticking out and set on a small pedestal. 6: The back is column-shaped and flat. Among some other inclusions, there is a shell fragment on the backside of the seat. A hole in the front middle is probably caused by the spalling of a lime-grain. The colour is 10 YR 7.3, very pale brown



3 cm.

Figure 5 Front and side view of AGS901 (Van Rooijen). AGS901 is a nearly complete 26.8 cm. tall figurine with a flat body and arms. The lower part, with the feet, is broken off. Her posture creates the impression of a sitting figure: the upper body is leaning backwards, and there is a slight bending at the knees. The statuette is not able to stand by itself because of the straight backside and the therefore very thin body. The body is 'abstract' without natural shapes. Femininity is merely indicated by her facial expression and the plurality of her jewellery. The upper arms are very flat, which is hidden by the folds of her garment. They are probably an addition in this type, because they are 'deeper', as an extension of the so-called ependytes, the straight dress. Elbows are absent, but she holds her hands, with bracelets, on her knees. She has an Archaic smiling mouth, small but with thick lips, large eyes, fleshy cheeks and hair in rhizomes. She wears big earrings and a high polos with a discs-in-squares pattern. Pendants in three rows cover her chest. The two upper rows, between the rectangular 'fibulae', consist of seven similar pendants, roundish triangular shaped. The third row consist of eight elongated, pointy pendants. She also wears a tight necklace with a round pendant. The rear side is flat at the top and column-shaped at the bottom. The colour is 7.5YR 7.4 pink. AGS901 is found at the City Sanctuary as well and is dated to the first decade of the 5th century BC by Albertocchi 2004, 16 no. 18

1.2 From clay to figurine

Local production could be proved by tracing the provenance and use of clays. Clay samples were collected from nearby Agrigento and tested on workability and shrinkage behaviour. The latter is of high importance because of its effect on new generations in a series of mould-produced figurines. The use of different mixtures of clay would reduce these effects and as such prolongs the usability of these moulds. Such characteristics and practices would not only mark locally made terracottas but possibly distinguish the different workshops of the town as well.³ After the required clay mixture is prepared, the second step of the coroplast's work, in order to be able to produce a sequence of figurines, is to make a mould after the selected object, the *patrix* or archetype. The use of a deep mould tends to keep the figurine hollow which eases drying and firing. Out of the first mould, the *matrix*, numerous figurines of almost identical shape can be produced in a relatively fast and smooth fashion (fig. 3). During these steps, the results of working with different tools, circumstances, and their effect on the outcome are of specific interest. What does the coroplast need and how do processes interact differently with the materials? The reconstructions included the firing process as well. Specific oxidation and reduction firings and tests with different firing trajectories were, however, not part of the objective of this study. It is clear that the Akragantine figurines are fired more or less at the same temperature, or at least with restricted variation. It is probable that several coroplasts combined their products in the same kiln load because firing must have been the most expensive part of the production process. All objects in the experiment were fired at about 750 degrees Celsius in an oxidation atmosphere. The last part of this investigation concerned the effect of the intensive use of moulds and the production of new generations within the same genealogy. The different versions and the possibilities to alternate the design were as well of interest because a range of varieties within the same series is found archaeologically. Specifically, differences in details of the observed reworked edge, the addition of a seat or the replacement of the face are common features of alternative figurines.

2 THE EXPERIMENT: FROM CLAY SAMPLES TO TERRACOTTA STATUETTES

2.1 Clay

Two sorts of raw clay materials, which can be easily found today, were selected as samples from nearby Agrigento (fig. 1).⁴ The first clay is from a natural park, *Macalube di Aragona*, where hot volcanic gases bring clay to the surface in a liquefied form, where it can be picked up over a vast area. This clay is very fine, dark grey and turns a light-red colour after firing. The clay works well in its pure form but

suffers from uneven drying. The second source is a remarkable natural phenomenon as well: the white mudstone deposits of Scala dei Turchi. This fine, very white marlstone is hardly useable on its own, but suitable to be mixed with the clay from Macalube. The addition of a lime-rich substance facilitates the drying of the resulting clay body. Such a mixture of 75% of 'Macalube' with 25% of 'Scala dei Turchi' results in a very workable clay body that does not stick too much to the surface of the mould, nor does it shrink too much. Its colour turns pinkish beige after firing. By mixing these two clays as well as some silt, shrinkage was reduced from 7% to 5% (table 1). A significant difference with utilising pure clay was that this mixture performed much better during the drying process. The tendency to deform by warping was reduced. Drying became more uniform, due to the open structure of the lime-containing clay body. The lighter tint of the clay might have been one reason to mix clays. About 73% of the Akragantine figurines are pink, very pale brown or reddish yellow⁵ and it seems that the original colour was in most cases meant to be seen, though some parts would have been highlighted with red and black paint (e.g. AG1145).

2.2 Figurines

The clay should be intensively kneaded with some water to be properly mixed and be brought in a good plastic condition. When the clay is pressed into the mould while it is too dry, cracks appear on the surface. The preparation is laborious because the marl clay needs to be ground. Grinding the marl rock to a very fine fraction is necessary to avoid 'lime-spalling'. Its grains behave like chalk pieces expanding upon firing, causing fractures of the ceramic structure if the size of the grains is bigger than 250 µm. Though it depends on the size and details, it usually takes around 10 minutes to press the clay into the mould. Commonly, the more articulated and thus deeper parts, such as the nose, need to be pressed in separately to make sure that the soft clay will follow all the irregularities of the mould. Therefore, a more detailed mould would require more time and expertise. The face in this respect has to be considered the most difficult part, because even small changes to its details could alter the facial expression. Figurine AGS273 (fig. 4) already had a quite worn face, resulting in even vaguer impressions of the final figurines in new generations. The use of a separate lump of soft clay to form the head mostly causes a line on the chest, if no special precautions were taken to avoid it. The typical chest adornments, sometimes only marked by a line, seem a striking coincidence. It might be that the line caused by the moulding was taken up as an extra accentuation of the adornment on the chest. Or, the other way around, the chest adornments would be perfect to hide this mark of the moulding technique.

The moulds are self-unloading, and after around 40 minutes the object can be taken out. Using this time to fill other moulds, an estimated number of four statuettes could be worked on simultaneously. A deeper relief makes it more difficult to take the figurine out of the mould. When it is still too wet, the heavy clay is vulnerable and can easily break. The latter usually happens in the places where the legs are attached to the body, specifically for the bigger figurines because the angle at the knee is quite sharp. This problem



Figure 6 Figurine replicas produced during the experiment. The figurine, from the second generation, is taken out of the mould and partly reworked. The too narrow mould causes the damage to the nose and the sides of the head. Small cracks in the clay in the neck show that some force was used to take it off the mould. Note also the sharp lines on the side and on the back caused by reworking with a thin knife. Also visible in the picture is the tendency of the figurine to bend to the front, because the head and polos are heavy and the clay still flexible (Van Rooijen)

might be the reason that many figurines have evolved as short bodies and just bent slightly, sometimes with bulging knees, to give the impression of sitting. Technologically, a less sharp angle solves this problem: the figurine can be taken out of the mould easier, without risking to break it. After reworking the edges and smoothing the surfaces, the object needs to dry for a couple of days before firing. A longer drying time in the mould would decrease the chance of damage to the figurine but would also make it harder to rework. When the statuette dries in a standing position, it tends to bend a bit due to gravity and as a result it looks downwards. The head and polos (hat) of the bigger figurine are rather heavy to be carried by the thin and at the time of production still flexible clay body (fig. 6). The mould should be dried and eventually cleaned afterwards. Otherwise, clay residues would stick to the next figurine.

2.3 Additions and editions

The figurines from Akragas are made from a single mould, which forms the front side, and, except for some small figurines, they are hollow and open only on the bottom. After the clay is applied in the frontal mould, the back could be made by draping a thin slab of clay over a temporary support on the inside. In order to keep the figurine hollow, ropes and pieces of cloth were successfully used in this experiment (fig. 7). Possibly a bladder of an animal would have generated the desired result. The cylindrical shape of the back in particular is an argument for this suggestion (fig. 5). For a smaller object, such as AGS273, a filling is not necessary. After the front and back of the figurine are put together, the inside could be strengthened by pressing



Figure 7 Figurine AG1141: The imprint of the inside of the back shows straws and fingerprints. At the same time, the elliptical shape is regular. This form strengthens the idea that a piece of cloth or an animal bladder filled with straws was used to hold the slab of clay of the backside of the figurine (Van Rooijen)

additional clay to the seam. On the outside, a rim of clay overlapping the frontal mould could be left in place to form an extra rim or just be cut off at the edge. Both possibilities are known from Akragas (fig. 8). A wide rim around the body would have strengthened the vulnerable parts, such as the neck. To some, this rim might have had a certain appeal and it was reworked straight, in other instances, it has been completely removed. For this reworking, a sharp tool like a thin knife was probably used (fig. 6).

The cutting variations of the extra rim make clear that the backside was a differently worked slab of clay. However,

figurine AGS896 (fig. 8) also shows, a figurine with such an extra rim of clay attached to the frontal mould. The softer, more rounded edge indicates that the broad rim along the body and head was part of the frontal moulding and made before the back slab was added. This figurine is part of a group of the same moulding genealogy, of which the rim is worked in different ways.⁶ The edge of a figurine with a rim, probably from the same mould genealogy, in the collection of the Allard Pierson Museum, Amsterdam is much more straight and very wide.⁷ This rim was cut straight with a tool after front and back were pressed together. Another



3 cm.

Figure 8 AGS896 on the left and AGS899 on the right: Though hard to see on the picture, AGS896 has a slightly protruding line from the right side of the throne over the arm and the lap. This indicates a crack in the mould. The clay had many inclusions, of which some are burned leaving small holes at the surface. This object is also remarkable for its rim of clay, which seems to have overlapped the front mould. The outer edge of the back is cut away next to it. h. 20cm.

In comparison AGS899, from the same genealogy, but without rim. It is probably a younger generation, because it is smaller, but features the same line on the arm and lap. The bigger difference in height is due to the podium AGS896 is set on. The rather coarse clay they are made of is also visible in the rough breaking. The clay of this figurine shows many insertions, among which are shell pieces. h. 16.6cm (Van Rooijen)



3 cm.

Figure 9 Figurine AG 1141: The facial features of this figurine are seen as Ionian influences. The face is round and fleshy with a large nose, slanted eyes, puffy cheeks and a voluptuous mouth curving up. The veil draped over the polos is reminiscent of Ionian influence as well. The backrest of the throne is formed by the rear slap of clay. Though broken off on this figurine, we know that the throne had projecting 'ears' at each side at the top (Van Rooijen)

application of the rim, at least partly, is to shape it into a chair. The chair or throne that is formed from a slab of clay is usually composed of a wider bench, sometimes curving up at the sides, and a backrest with rounded endings (e.g. AG1141, fig. 9)⁸. Smaller and less wide furniture is usually part of the mould. While the figurines from the same genealogy as AGS901 are seated, they are in Akragas depicted without a chair. This omission as part of the reworking would have saved the coroplast quite some time. An additional seat, which was added in the experiment, changes the impression of the object considerably. Probably alternative designs and different techniques were practised side by side. Local habits and maybe even workshops might be distinguished by tracing the different characteristics.

2.4 A comparison with Selinous

The resemblance in both design and technical aspects of production between Selinous and Akragas is striking. Figurines or even moulds are likely to have been exchanged between the cities⁹, as well as technical skills. Both settlements developed their own variants and artistic characteristics. One of those is the use of a vent in the terracotta production of Selinous. Such a vent is rather large and placed in the middle of the back, oval in shape and unnecessary for firing, as the base of the figurine is already open. One reason might be that reworking after moulding was preferred when the figurine was not completely dry yet. The vent would have facilitated drying at an earlier state or might have been used to efficiently consolidate the front and back by smoothing the seam on the inside.

Another example of different reworking between Akragas and Selinous is the shape of the throne. In Akragas, as mentioned above, it seems to have been common in this particular series of AGS901 to leave the chair away, while in Selinous artisans used the extra rim as the outline of the statuette as well to make a throne.¹⁰ Some unpublished objects from Selinous originating from the same genealogy as AGS901, have a different curving of the lower part of the throne on the right side. The shape, however, is comparable to other figurines with thrones from Akragas (fig. 8).¹¹ Coroplasts from Akragas and Selinous might have inspired each other with the design, but could have exchanged technical skills as well. The flexibility of the coroplastic art facilitated the creation of a wide range of designs, even within the set outline of the image of the seated figurine.

2.5 Mould

Designing and constructing a mould deserves more attention than shaping a figurine. The clay should be in a relatively soft and wet condition in order to have all the details from the original pressed in well. For the production of moulds, the untempered Macalube clay seems to be preferable in

order to obtain the most detailed result. Another reason not to include the ground clay of Scala dei Turchi here is the risk of lime spalling. The mould is formed by pressing a rather massive clay slab carefully around the front of a statuette. It needs to dry much slower and therefore longer, preferably a couple of hours, before removal. This time is required because the walls are much thicker than those of a figurine. Before firing, it needs to dry for a couple of days to decrease the risk of expanding moisture when the object is fired.¹² The decision to make the moulds of Macalube clay had, however, the disadvantage of an increased shrinkage and turned out to be problematic. During drying the sides tended to bend inwards, narrowing the space (table 2). This defect became apparent when we used the mould to make a figurine. The narrow space was not large enough to remove the head. It caused damage to both the sides of the head and, when moving in a wrong direction, damaged the nose as well (fig. 6). This problem seems to have occurred at Akragantine workshops as well: e.g. AGS899 has a flattened nose and chin.

Shrinkage of moulds and figurines, in both the experiments and the originals, resulted in figurines of the new generation being 11% smaller than figurines of the previous generation. This percentage depends, however, on the sorts of clay and its composition. It might seem marginal, but because a figurine is a three-dimensional object the decrease in volume is well visible. More problematic is the decline in sharpness in the production of new generations. Furthermore, the distortion of the moulds considerably affects the figurines (table 2).

The expression fading out is most noticeable for the face, but other details such as the hands on the lap and jewellery also become increasingly vague in a new generation. Replacing the head seems to have been an option regularly applied in Akragas.¹³ Often this occasion would have been taken up to introduce a new sort, like the Ionian face which appears on the AG1141 and is dated in the second half of the 6th century BC (fig. 9)¹⁴. A newly produced mould was an opportunity for small alterations as well, like the addition of a necklace. Such details could easily be pressed into the freshly shaped mould.¹⁵ The different replacements or changes suggest which parts of the figurine were regarded as most important. Reviewing the alterations, corrections, and additions by Akragantine coroplasts it seems that the face, the chest pendants, and the seated position played a significant role in the meaning and function of the votive as a whole.

3 CONCLUSIONS

The result of the tests on local clay mixtures found near Agrigento analysed in this experiment can be described as a process of assembling various positive material

characteristics. A combination of Macalube di Aragona clay and a calcareous source, like the marl of Scala dei Turchi, reduces the shrinkage significantly when compared to the result of natural clay. The second outcome of this mixture is the softened colour tone of the fired clay. This colour might have been preferred over the darker more reddish tint of the unmixed clay. Indeed, most of the figurines from Akragas have a soft beige pinkish colour. Such a specific comparable mixture of clays was, therefore, plausibly utilised in the past. The forming of figurines in the moulds, the next step in this experiment, turned out to be relatively straightforward, but only if the clay is prepared well. Cracks or other imperfections can easily be reworked before firing, but the lime-spalling cannot be covered up later. To avoid this problem, a mould of a new generation of figurines was made of natural Macalube di Aragona clay instead. However, uneven drying caused distortion, and the shrinkage remained considerable. In particular, the first effect can have a negative impact on the face. The facial expression is easily damaged and fades in new generations. Reworking other parts of the figurine to sharpen the impression or to add details, such as a chair or fibulae, can be achieved. During the process, the utilisation of different tools was necessary: a round stick to create an evenly flat slab of clay, a small knife for reworking, and something to fill up the figurine to keep it hollow.

These outcomes of the experiment make it possible to recognise the different marks on the figurines, as they are the result of the applied techniques. The hands-on method of research gives us a better understanding of the practical issues the coroplasts had to handle. Below are some observations regarding the technical aspects of the Akragantine figurines.

The technique of moulding figurines is not too complex to apply, it saves time and does not require much creativity, compared to forming figurines by hand. This method, together with the specific nearby availability of high-quality clay raw materials, might explain the high number of objects produced in Akragas. The resulting series of nearly identical objects would only stop when its mould was no longer usable. The experiment showed that forming a new mould, preparing the right clay, and changing the design required specific skills and considerations. The decreasing volume and sharpness, in particular of the face of these ‘new generation’ figurines was problematic. These difficulties might explain the long use of mould-series and the gradual changes in the design of Akragantine figurines, such as the addition of arms. A coroplast would rather change something in a freshly made mould or a figurine than form a complete new figurine by hand to be used as a patris. AGS901 is a clear example of such a reworking: the arms are comparatively deeper. Such details and additions could be an indication of a change in

iconographic preference. Another example is the increasing number of chest pendants. Without any direct incentive, the general appearance of objects did not tend to change drastically. An alternative iconography could depend on the coroplasts' skills or on an occasionally imported figurine that could be used as patris. One of the most frequent alternations is the replacement of the head. Not only fashion, like the Ionian face, but also fading in new generations, might have been the reason. Weathering because of frequent use of the mould could not be proved: in the experiment the mould was still sharp after 11 figurines had been made with it. New generations, however, had a large impact on the sharpness of the face and other detailed parts.

The moulding technique itself has a conservative effect on the design. However, Akragantine figurines show a great variety in the application of tools and the quality of the artisan's work, as well as details on the design. The different places of origin of these features in combination with high frequencies of local variables indicate that coroplasts were inspired by each other's work, and that moulds figurines or ideas on technique and design were exchanged between workshops of Akragas and Selinous. The creativity of the workshop, however, was angled by the moulding technique.

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Notes

1 De Miro 2000 dates the earliest piglet carrying figurines as early as the end of the 6th-beginning of the fifth century BC, but the majority dates around the second half of the 5th century BC. This change in design is then radical, a completely different iconography with the depictions of the adorant instead of, probably, the deity.

The typical iconography is a female figure, dressed in loose clothing with many folds, carrying a piglet. These figurines are as well made by using moulds. Sguaitamatti 1984.

2 Cf. resp. Albertocchi 2004, 58 and 16. If no other indication is given, inventory numbers refer to pieces from the Museo Archeologico Regionale "Pietro Griffo" di Agrigento.

3 Next to this experiment and a detailed investigation of the objects, an XRF-test was done on the elemental composition of the clays. These measurements will show to what extent the elemental composition of the clays are identical. The combined results will be part of Gerrie van Rooijen's PhD-thesis at Leiden University, funded by the NWO.

4 Macalube di Aragona, (37° 22' 31.68" N 13° 36' 2.37" E) and Scala dei Turchi (37° 17' 23.88" N 13° 28' 21.58" E) are about 12 km. walking distance from Akragas, respectively to the north and west. Because of the limited amount we could bring we also used some commercial local clay from Agrigento with similar properties as the Macalube di Aragona clay. We believe the rich supply of clay at Macalube di Aragona is still used as a base source today. Commercial clay from Agrigento showed similarity in colour and workability.

5 Description as in the Munsell Color System.

6 Agrigento: AGS281, AGS288, AGS893, AGS894, AGS895, AGS896, AGS897, AGS898 and AGS899.

7 APM01419 from Sicily. Picture and description: <https://www.uvaerfgoed.nl/beeldbank/xview?identificer=hdl:11245/3.2331>; R.A. Lunsingh Scheurleer, *Grieken in het klein*, p. 53-4 no. 41. Comparable in both the design and rim reworking of Type BXV from Selinous. See Dewailly 1992, 88 fig. 51. This figurine is another good example of a common practice to compensate the reduced height. Figurines from later generations, smaller in size because of the shrinking of the clay, are elevated on a podium with footstool.

8 Albertocchi 2004 13-14 n. 1 Tav. Ia; De Miro 2000 130 Tav. LXII 34. Cf. Schipporeit 2014, 323-4

9 Albertocchi 2004, 101 n. 78 states that a group of statuettes, to which AGS273 belongs, from Akragas is derived from a series from Selinous, but without the chest pendants. To this group in Akragas belong as well: AG274, AG885, AG886, AG887, AG888, AG889, AG890, AG891. They are all found at the city sanctuary.

10 Cf. SM Pal T1254 from Selinous. See Dewailly 1992 86 fig. 49. AGS899 and AGS896 (fig. 8) strongly resemble figurines of Dewailly type B XV. Dewailly 1992, 86 describes variants (different parts of the rims left) of Type B XV. She states, however, that the backside is made out of a mould as well. The cutting variations of the extra rim make clear that the backside was a differently worked slab of clay. Cf. other Akragantine figurines n. 6.

11 Cf. Albertocchi 2004, 25 no. 105 and no. 108. This type, A VIII, was very popular in Akragas and Selinous and of a total of 417 statuettes, Albertocchi distinguishes 4 generations, the first two from Selinous with 399 figurines, 17 from Akragas and 1 from Ibiza. Albertocchi 2004, 24-7.

12 Though the moulds would be stronger if they were fired on 950-1000° Celsius, the walls would not be porous enough to let moisture through and so unloading would not work well.

13 See discussion on the facial features: Albertocchi 2004, 14.

14 Ionian influences are mentioned by De Miro 2000, 101. The veil draped over the polos, running down on each side of the headgear and face, is a typical Ionian fashion as well. Langlotz and Hirmer 1963, 72 no. 68.

15 A certain workshop seems to have had the tight necklace with one small round pendant as a typical characteristic of its figurines. It is sometimes added to the figurine: pressed in the freshly moulded unfired figurine (AG1157), or to the mould directly (AG1141), probably when the head was replaced. Both figurines have a similar, specific face.

References

- Albertocchi, M. 2004. Athana Lindia. *Le statuette siceliote con pettorali di età arcaica e classica*, Rome.
- Burn, L. 2011. Terracottas. In: T.J. Smith and D. Plantzos (eds), *A companion to Greek art*, Oxford, 221-234.
- De Miro, E. 2000. *Agrigento. I santuari urbani : l'area sacra tra il tempio di Zeus e porta V*, Rome.
- Dewailly, M. 1992. *Les statuettes aux parures du sanctuaire de la Malophoros à Sélinonte: contexte, typologie et interprétation d'une catégorie d'offrandes*, Paris.
- Langlotz, E. and M. Hirmer 1963. *Die Kunst der Westgriechen in Sizilien und Unteritalien*, Munich
- Nicholls, R.V. 1952. Type, Group and Series: A Reconsideration of Some Coroplastic Fundamentals. *The Annual of the British School at Athens* 47, 217-226.
- Muller, A. 2000. Artisans, Techniques de production et diffusion, Le cas de la coroplastie. In: Blonde F. and A. Muller (eds), *L'artisanat en Grèce ancienne : les productions, les diffusions*, Actes du Colloque de Lyon (10-11 décembre 1998) organisé par l'École française d'Athènes, la Maison de l'Orient méditerranéen Jean-Pouilloux et l'Université Charles-de-Gaule - Lille 3, 91-106.
- Muller, A. 2014. L'atelier du coroplaste : un cas particulier dans la production céramique grecque. In: *Perspective*, electronic document, <http://perspective.revues.org/4372>, accessed August 26, 2016.
- Pautasso, A. 2012. L'età arcaica. Affermazione e sviluppo delle produzioni coloniali. In: M. Albertocchi and A. Pautasso (eds), *Philotechnia. Studi sulla coroplastica della Sicilia greca*, Catania, 113-139.
- Schipporeit S. Th. 2014. Griechische Votivterrakotten: serielle Bilder und individuellen Anliegen. In: M. Meyer and D. Klimburg-Salter Böhl (eds), *Visualisierungen von Kult*. Wien: Böhlau Verlag 320-355.
- Sguaitamatti, M. 1984. *L'offrante de porcelet dans la coroplastie géléenne: étude typologique*, Mainz am Rhein.
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