XV International Numismatic Congress Taormina 2015
Proceedings

ADDENDUM

MEDIEVAL NUMISMATICS

Byzantine

CONGRESSO • INTERNAZIONALE • DI • NUMISMATICA

I N C

XV

- MESSINA/TAORMINA- 2015 -

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Why did the Byzantine Coinage Turn Concave? Old Suggestions and a New One

The concave shape of some Middle Byzantine coinage is one of its most striking features to the uninitiated, but not all scholars have been equally intrigued by the phenomenon.[1] Many have dealt with the subject in only a few lines.[2] More work has focused on the technical question of how the coins were struck this way than on that of why, and none of the reasons proposed have been wholly free of difficulties.[3] This paper briefly reviews those explanations and their problems and then offers a further possibility which may avoid most of the difficulties.

1. Explanations so far

The explanations most easily dismissed are those which we could call adaptation to user demand. Much reported, rarely cited, and perhaps only jocular is Pierre Bordeaux's suggestion that the concave form might have been adopted to facilitate a game like tiddly-winks.[4] Apparently more serious is the suggestion that the concave shape made the coins easier to count in a stack. Pierre-Yves Lathoumetie denied this out of hand, as did Philip Grierson, but my limited testing suggests that the concave coins do stack better, at least than high-relief tenth-century *solidi*.[5] The problem with this explanation is the same as with Bordeaux's, however, that if the imperial mint was really concerned with such matters (which seems unlikely), these would apply most immediately to the low-value and higher-volume copper-alloy coinage; yet it was the gold that was first adapted.

1.1 *Messages in the fabric*

Other explanations involve a kind of message intended for the coinage's users. Marc Labouret argues that the concave coins, with their portrait of Christ in a form not unlike that found in church mosaics and frescoes, would have evoked the rounded apse spaces in which such portraits usually appeared, thereby sanctifying the coinage.[6] Labouret admits, though, that the coins show Christ on their convex sides, whereas an apse would be concave to the viewer. One may also doubt the exactness of the parallels of design.[7] For Labouret this is an explanation founded in specifically Byzantine spirituality, and although he accepts that the initial reasons for the fabric may have been technical, he considers that the religious resonance of the concavity recommended it over other possible solutions. It is not just in the Byzantine Empire that concave coinages have appeared, however, and portraits of Christ enthroned can be found both in apses and on coins in other medieval Christian cultures who did not combine them like this.[8] There is certainly no positive evidence that the coins were understood like this—no helpful sermons or similar—so at best this suggestion must be regarded as unproven.

Others have suggested that the new shape marked out coins of different fineness. Michael Hendy first suggested that the concave fabric distinguished the new, good, *hyperperon* from the now-debased *nomisma*.[9] Grierson, by contrast, thought that the new fabric indicated a lower fineness, and the concave coins' very thin edges do make metal content more visible.[10] Why the Byzantine state would have wanted to publicise its debasements like this is unclear in either case, however, and actually visible debasement of the gold coinage postdated the new form, which once led Morrisson to suggest that the intent was actually to distinguish full-weight *nomismata* from new gold *tetartera*.[11] Her own collaborative

[1] Cf. Delamare *et al.* 1999, p. 249: « On ne peut pas ne pas être intrigué par le changement de la forme. »

[2] Brief treatment: Hendy 1969, p. 6; Bellinger and Grierson 1969-99, III.1, pp. 5-7; Grierson 1982a, pp. 15 & 197-198; Grierson 1982b, pp. 10-11; Hendy 1985, p. 510. Two focused studies are Morrisson 1975 and Lathoumetie 1976. The more lengthy Füeg 2014, pp. 103-124, largely reprises earlier work.

[3] Technical studies: Hendy and Charles 1970; Bendall and Sellwood 1973; Sellwood 1980; Delamare *et al.* 1984, 1988; Bendall 1998; Delamare *et al.* 1999.

[4] Bordeaux 1897, cit. Bellinger and Grierson 1968-99, III.1, p. 6 n. 3.

[5] I have been unable to find the source of this contention: Grierson knew it but gave no reference, *ibid.* p. 6: "It has sometimes been supposed that concave coins can be more easily piled, but this is not the case." I can only say that I have tried and it worked for me.

[6] Labouret 2010.

[7] Cf. Füeg 2007, pp. 143-44.

[8] Morrisson 1975, p. 786. One might most obviously instance the design of the Venetian ducat.

[9] Hendy 1969, p. 6.

[10] Bellinger and Grierson 1968-99, III.1, pp. 5-6: 'more probably it was initially intended to strengthen the fabric of coins appreciably larger in flan than their predecessors, and consequently rather easily bent, but was continued as a way of distinguishing coins of standard denomination but of base metal from those of good metal, gold or silver as the case might be.'

[11] Morrisson 1975, p. 787, criticising both Hendy and Grierson; cf. Grierson 1982a, pp. 197-98, conceding, and Hendy 1985, p. 510, particularly n. 313, misunderstanding Morrisson and adding of her supposed and Grierson's earlier opinions on the concavity, 'Neither explanation is totally satisfactory by itself, as neither takes full account of the curious inconsistency of its early usage'. This was of course also true of his suggestion. By 1985, however, Morrisson was arguing differently, as in Delamare *et al.* 1984.

metallurgical study however appears to have shown that flat *nomismata*, which continued alongside or instead of concave *hyperpera* for a generation or so, were actually struck at approximately the same standard and weight, making this signal greatly misleading to the coin-using public.[12] In either case, it remains unclear how that public would have received any explanation of the change.

1.2 *Manufacturing solutions*

This leaves what we might term manufacturing solutions. Tommaso Bertelè began these by proposing that the concave fabric protected increasingly thin coins against bending and snapping.[13] The concave fabric perhaps does make such coins harder to bend—this, I have not tested!—but the thinner edges are much more fragile, and the curvature forced upon the metal adds radial lines of strain, both of which frequently result in cracks forming from edge to centre, with the eventual danger of splitting the coin. This may have been obvious in manufacture, as the work of Morrisson's team suggests, but would certainly have become so in use, and must have caused more wastage than previous minting techniques.[14]

Morrisson and her colleagues have therefore developed a more complex explanation in terms of production efficiency.[15] The less gold the *nomisma* contained, they observe, the lower its overall density and so the larger the volume of metal needed for a full-weight coin, explaining the increasingly broad fabric. The poorer alloy would also have been harder, requiring more striking force to impress it, and consequently more hammer blows on average per coin and a higher occurrence of broken or unusable coins. Decreases in coin thickness and design relief could only partly offset this increasing energetic cost. Of course, the wider flan was not all struck with the coin design, as dies were kept the same diameter or even reduced, to limit the necessary striking force. The resulting unstruck border would sometimes have bent around the dies, resulting in either concavity or convexity. A reverse die smaller than the obverse could at least make the direction of this deformation consistent. Thus, for Morrisson and her colleagues, concavity was an emergent and coincident result of decisions made to maintain maximum mint efficiency despite the difficulty of striking increasingly debased coins.

The large corpus behind Füeg's recent study demonstrates the chronology of the increasing flan size (from Basil II onwards, speeding up noticeably under Michael IV), accompanying increase in the unstruck outer area, and finally a decrease in die size, greater in the reverse than the obverse, and the beginnings of concavity (under Constantine IX), all of which tends to confirm the efficiency theory.[16] Füeg also notes a simultaneously decreasing number of die-links, which he connects to the suggested mechanical stresses and consequently higher die wastage.[17] While accepting Morrisson's team's explanation of concavity as an incidental factor, Füeg rightly discerns that therefore it is the adherence to the new broader-flan nomisma, in spite of all attendant difficulties, which must be explained.[18] He suggests that Michael IV wanted his coins to be larger than the competing Muslim dirham and to provide his die-engravers a canvas suitably large for displaying the splendour of his new dynasty.[19] For this, as with the theories of Labouret which he contrasts, there is of course no explicit evidence, and, as noted above, die size did not increase with flan size.

2. Technical considerations

It is worth stressing quite how difficult these coins were to make. Although Delamare, Montmitonnet and Morrisson suggest that initially the coin dies bent the flans, examination of marks on later examples by Simon Bendall and David Sellwood in 1973 suggests that by the thirteenth century, blanks were pre-bent with uncarved concave and convex dies then struck with their types. Moreover, this work showed that the convex face must have been struck twice, with the upper die rocked from one side to the other between blows, to ensure that all the design was impressed upon the receding flan.[20] The number of coins with dots or lines of design repeated along the axis where the two strikes overlapped because the die had shifted between strikes demonstrates the technique and its difficulty.[21]

One must thus ask why a complicated solution to the problems of large flans, involving plural die positions and prestriking, was preferred to simply making the coins thicker again. That would also have decreased the force dissipated in striking the coins and allowed a higher relief or, with lower relief and a thick rim, have made the coins stackable. Here Labouret and Füeg, despite

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[12] Morrisson *et al.* 1985.

[13] Bertelé 1964, cit. Morrisson 1975, p. 787 n. 1, reprised in Bertelé and Morrisson 1978, p. 38, cit. Delamare *et al.* 1999, p. 249 n. 4. This explanation came to be followed by Grierson, as seen in Bellinger and Grierson 1968-99, III.1, pp. 5-7 with modifications as above (n. 10) and *idem* 1982a, p. 15 (though cf. pp. 197-198).

[14] On the deformation of the metal see Delamare *et al.* 1999, p. 257.

[15] *Ibid.*, pp. 255-58, reprised here.

[16] Füeg 2014, pp. 103-07 & 122-24.

[17] *Ibid.*, p. 113.

[18] *Ibid.,* pp. 114-18 is a reprise of the Morrisson team's work, with full citation, concluding (p. 114): "For the histamenon, all production problems were tolerated in order to maintain the large format. Its concavity was, therefore, not intended but a result of the objective to produce the large-format coin with an only just acceptable effort."

[19] *Ibid.*, pp. 122-124.

[20] Bent by coin dies: Delamare *et al.* 1999, pp. 257-258. Pre-struck dies: Bendall and Sellwood 1973. Füeg 2014, pp. 109 & 123, addresses double-strikes in his corpus but does not cite Bendall's work on these coinages, and although his bibliography includes Sellwood 1980, he does not use it here. To all of these cf. Labouret 2012, Annex amusante, arguing by anecdotal parallel for pre-striking with wooden formers.

[21] Bendall and Sellwood 1973, provides several examples with discussion pp. 95-97 and plates 25 & 26.

the unlikeliness of their proposals, have both identified a genuine problem: why was this solution to the difficulties of striking a debased *nomisma* chosen instead of others? Such coins would have looked quite different to the *nomisma*, of course, but so eventually did the *hyperperon* and, as Delamare, Montmitonnet and Morrisson themselves note, such considerations did not prevent like changes to seventh-century *solidi* of Carthage, with their distinctively thick pellet-like form.[22]

3. Possibilities in the Problem

Since, then, almost the only point of agreement among those who have studied these coinages in the last two generations is that they were considerably more complex of manufacture than older types, it may be simpler than any explanation so far proposed to suggest that this was in fact the point. One could suppose that the change in form began as a new way of distinguishing the highest-value coin of the Empire, a display of mechanical competence like the elevating throne of Constantine VII described by Liutprand of Cremona, but visible on a rather wider scale.[23] There is no evidence against this, but as with other theories about signification, there is none for it either, nor any testimony that the coins were understood in this way.

Perhaps, therefore, the point was less that Byzantium could do this than that others could not. Shortly before the first concavity in the *nomisma*, in the late tenth century, Bulgarian imitations of the anonymous Byzantine bronze coinage had begun to appear.[24] This may have raised the threat of imitation of the precious-metal *nomisma* on which the Byzantine fiscal economy depended, already under some pressure as the beginnings of debasement testify. If so, the developed concave form, which must have taken some experiment and ingenuity, might have been perfected as what we might now call 'copy protection', intended to make imitation difficult and unrewarding. Early cessation and reappearance of the fabric suggests initial prevarication over its desirability, or that the coins were unpopular, but in the end, it may have been more important to protect the brand of the *nomisma*, especially as its actual value dropped, than to maximise ease of manufacture. Once this had begun, concavity would have become increasingly pronounced, as mint masters tried to keep manufacture of these difficult coins as efficient as possible, as described by Morrisson and colleagues. In this hypothesis Constantinople could afford the labour cost to keep its gold coinage unique and inimitable, while Bulgaria or other potential imitators could either not be drawn into the attempt or could not attract or retain craftsmen who could do it.

In the end, the ineluctable progress of debasement and the spread of the fabric to lower denominations made it necessary for any imitators of Byzantine coins to master the techniques, and of course there were then many.[25] But for the century or so between the first Byzantine concave coins and the first Bulgarian *trachea*, the copy protection might be said to have worked. My suggestion is therefore that this was the desired outcome, and that, even if initially an accident of decreasing purity, complexity became the intention, with adaptations of the manufacturing process ensuing mainly to make this possible. If this does not answer all of the questions provoked by these coins, I hope that at least it reduces their number.

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[22] Delamare *et al.* 1999, p. 257 n. 25, citing *eidem* 1984, pp. 25-27; cf. *eidem* 1988, pp. 45-47, for the problems and a comparison to Carthage's coins.

[23] Liutprand 1998, VI.5.

[24] Bellinger and Grierson 1968-99, III.1, p. 100, citing Gerasimov 1950; Grierson 1982a, p. 205.

[25] Bellinger and Grierson 1968-99, IV.1, pp. 46-47, 53-55 & 59-95.

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