POMPAI AND THE MECHANICS OF SACRED OCCASION

Processional Automata: The Anecdotal Evidence

The para-theatrical use of articulated figurines should be inter-preted alongside the processional use of large, self-moving, mechanical machines known as automata.[1] In the previous chapter, I raised but left open the question of whether we should see articulated figurines as 'proto-automata'. In the past, scholars have argued that the evidence of small, jointed statuettes betrays a desire to mechanically animate the human body which was first realised through the construction of ancient Greek automata, then through Renaissance and early modern automata, and which was actualised most successfully through the development of modern-day robots.[2] However, ancient Greek automata – in technical manuals as much as in anecdotal evidence – very rarely seek to animate the human form.[3] From the evidence we have, the only bodies that appear technically animated are those of divine figures (Nysa, mae-nads, Dionysus) and animals (e.g. snails, birds that sing or appear to drink).[4] Otherwise, there are cases of the natural world being mechanically enhanced to recreate a Hesiodic golden age where spontaneous abundance was characteristic[5] (e.g. as with endless springs, or those that turn water to wine) or cases of inanimate objects being animated (e.g. a ship,

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[1] I have collected the evidence for processional automata in Bur 2016, where I present each piece of evidence separately and in detail. I offer here a brief summary of the evidence and elaborate instead on the analysis and historical context.

[2] Chapuis and Droz 1958, 13–29; de Solla Price 1964, 10–11; Hillier 1976, 11; Reeves 2015, 48, 54.

[3] On this see Bur 2016 and Ruffell 2023.

[4] I take the actors in the *staton automaton* as a case apart due to their being embedded within a theatrical narrative. Even then, however, it is only their arms which move to imitate carpentry, not the whole body.

[5] Hes. *Op.* 118. See also Pl. *Plt.* 271d–272a and Pl. *Lg.* 713c.

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shrine, or temple doors). Furthermore, any continuity between articulated figurines and ancient automata occurs strictly in their contexts of use and their suitability in such contexts, not in their aesthetics. What unites the two categories of object is the technical knowledge that they embody and the way that this epistemological tradition – leading to a capacity for mechanical animation – proves useful in religious contexts. The two categories of objects should not be teleologically linked by supposing desire to create an autonomously acting human. Ancient mechanics was not used to replicate the mythic Talos, Pandora, or Daedalus' statues.[6]

By presenting the evidence for the use of ancient automata in religious procession, I seek to discover what makes these large, self-animated machines suitable for their immediate processional and religious context, as well as for their broader politico-historical context. I argue that automata are effective as *pompeia* because they enhance existent features of religious procession: narrative, synaesthesia, and, above all, the call–response relation between worshippers and the deity.[7] I also make certain historical suggestions about the suitability of these machines for political theatre in a world which adapted a precedent for mechanical epiphany within new-found political, scientific, and religious realities.

The earliest ancient evidence for the use of automata in procession appears in Polybius' *Histories* and describes the use of a self-animated (*automatōs*) snail which led (*proēgeito*) the procession of the Great Dionysia of 309/8 BCE, leaving a trail of slime as it went:

οὗ ʽκεῖνος οὐ τὴν τυχοῦσαν πεποίηται κατηγορίαν ἐν ταῖς ἱστορίαις, φάσκων αὐτὸν γεγονέναι τοιοῦτον προστάτην τῆς πατρίδος καὶ ἐπὶ τούτοις σεμνύνεσθαι κατὰ τὴν πολιτείαν, ἐφ᾽ οἷς ἂν καὶ τελώνης σεμνυνθείη βάναυσος. ἐπὶ γὰρ τῷ πολλὰ καὶ λυσιτελῶς πωλεῖσθαι κατὰ τὴν πόλιν καὶ δαψιλῆ τὰ πρὸς τὸν βίον ὑπάρχειν πᾶσιν, ἐπὶ τούτοις φησὶ μεγαλαυχεῖν αὐτόν· καὶ διότι κοχλίας αὐτομάτως βαδίζων προηγεῖτο τῆς πομπῆς αὐτῷ, σίαλον ἀναπτύων, σὺν δὲ τούτοις ὄνοι

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[6] Polyb. 13.7 relates a machine in the shape of the wife of Nabis, who is used as a device to torture victims in order to extract money from them. The machine's arms, hands, and breasts were covered with iron nails concealed under her dress. Crucially, however, it is Nabis who controls the springs which allows the machine to embrace and thus to injure: it is a weapon of Nabis' will; the machine does not act *automatōs*.

[7] On the latter as a feature of the *pompē*, see especially Kavoulaki 1999.

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διεπέμποντο διὰ τοῦ θεάτρου, διότι δὴ πάντων τῶν τῆς Ἑλλάδος καλῶν ἡ πατρὶς παρακεχωρηκυῖα τοῖς ἄλλοις ἐποίει Κασσάνδρῳ τὸ προσταττόμενον, ἐπὶ τούτοις αὑτὸν οὐκ αἰσχύνεσθαί φησιν.

[Demochares] made no ordinary accusations in his *Histories* saying that [Demetrius] was the kind of statesman who took pride in political administration in the same way as a vulgar tax farmer might take pride. For he (Demochares) says that he (Demetrius) boasted that many goods were sold cheaply and that throughout the city abundant amenities of life existed for all. And indeed [he boasted] because a snail proceeding of its own accord led the procession for him, casting out slime, and with this, asses were paraded through the theatre presumably because Athens yielded all the good things of Greece to others and submitted herself to commands made by Cassander. He (Demochares) says that he (Demetrius) was not ashamed about all this.[8]

Demetrius of Phalerum was appointed to rule Athens by Cassander in 317 BCE, remaining at the head of the Athenian *polis* until his expulsion in 307 BCE. It was very soon before he was expelled, in his capacity as *archon* in 309/8 BCE, that Demetrius organised the Great Dionysia in which we find the snail. The passage is difficult to interpret, not least because there is a strong element of political slander at play, making it hard to tease apart fact from fiction. At this point in his *Histories*, Polybius is trying to defend Demochares' reputation against the words of Timaeus. Thus, the account as we have it is obviously slanted to favour Demochares, one of Demetrius of Phalerum's greatest political opponents. From what we can ascertain, Demetrius had boasted about the prosperity which Athens enjoyed while it was under his rule. Given the strain that the Lamian War (323–322 BCE) would have recently put on the Athenian economy, as well as the ever-present burden of the garrison at the Piraeus, the recovery and economic stability that Athens experienced during the Phalerean decade does in fact seem a commendable achievement.[9] Yet since the low level of military activity under Demetrius was also perceptibly linked to Athens' subordination to Macedonian power and thus its loss of independence, the city's relative prosperity under the Phalerean regime was nevertheless easily turned against the leader, as done here.

[8] Polyb. 12.13.9–11 = *FGrH* 75 F4 = SOD 89. Translation here is my own.
[9] For the regime of Demetrius of Phalerum, see O'Sullivan 2009.

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The relevance of such politics is that Demochares criticises Demetrius' administration of the city by explicitly linking it to spectacle, and the spectacle apparatus of choice is none other than a grand, processional *automaton*. The contrast between political and military incapacity of the Athenian *demos* on the one hand, and prosperity and love of theatrical display on the other, is both a familiar rhetorical trope throughout Athenian history and one that applies to the Phalerean regime particularly well.[10] Even if the whole passage were fictional slander against Demetrius, it remains good evidence for the processional automaton being familiar enough for the literary trope to function – not so common that every leader could afford one, but frequent enough as a spectacular treat that the audience understood the implications of the scientific knowledge and financial resources that went into the production and deployment of such a machine.[11]

From the point of view of his enemies, the sort of lavish pomp seen at the Dionysia of 309/8 BCE was contradictory to the character of the bulk of Demetrius' legislations largely geared towards enforcing religious propriety. This sentiment is conveyed in a fragment by Duris, who notes that Demetrius was criticised for laying down laws for other people and regulating their lives, but organising his own life utterly without constraints.[12] Usefully for our purposes, the same passage attests that during the *pompē* of the Dionysia where Demetrius brought out the spectacular mechanical snail, he also arranged for a chorus to sing verses of 'Siron of Soli' in his honour in which he was spoken of as *hēliophormos*, 'shaped like the sun'. While this is not quite an explicit equation with a god, it is certainly symptomatic of a time when the lines between mortals and divinities were becoming increasingly blurred. It would seem, then, that the festival as a whole was used by

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[10] On Demetrius' demagogic streak (and Periclean parallels already made in antiquity), see O'Sullivan 2009, 127–8.

[11] Though it is slightly outside the topic's remit, I have wondered how the contemporary shift from *chorēgia* to *agōnothesia* might fit with Demetrius' use of such an expensive piece of machinery. Much is still debated concerning the institutional shift, however, including the precise dating which, by most recent persuasive accounts, post-dates the festival at hand here. For recent views on the dating, see Wilson 2000, 270–6; O'Sullivan 2009, 168–85; Wilson and Csapo 2012; Ackermann and Sarrazanas 2020; most importantly, see Csapo-Wilson (forthcoming) I Bvi.

[12] Ath. 12.60 542B–543A = SOD 43A.

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Demetrius as a tool of political and possibly even religious self-aggrandisement, and this then leads us to ask to what extent the processional automaton of the Dionysia of 309/8 BCE was linked to the development of Hellenistic ruler cult.

Unlike the notorious case of Poliorcetes and his Ithyphallic hymn shortly after, Demetrius of Phalerum never received religious cult. Indeed, this would likely have been seen to contradict much of his moral and religious legislation. Yet it is also easy to see that if Demetrius had wanted to bolster his status as leader of the city, aggrandising the *pompē* of an existing festival that he was in charge of hosting would certainly be a suitable and effective way to do this. As Angelos Chaniotis has described, the worship of Hellenistic rulers and worship of Greek divinities resembled each other, and the *pompē* was one of the key elements of ruler cult which modelled its worship on the ways that gods were (already) worshipped.[13] In this vein, processional automata should not be seen as a sudden Hellenistic innovation tied on the one hand to ruler cult and on the other hand to the development of mechanics in Alexandria. Instead, there is a more complex historical story at stake here where the use of automata in these very public contexts was a way for leaders to capitalise on the existing theological potential that religious machinery already held and communicated to communities. If processional automata became increasingly useful in a context that was open to the idea of monarchs being seen as gods, it was not simply because of the machine's novelty status, but thanks to the way it was able through its epistemological novelty to speak to existing conceptions of divine presence and notions of human–divine reciprocity. This was further facilitated by a religious climate that became sensitive to the potential for a human leader to act and be received in a godlike fashion, in the way that the *polis* both expressed gratitude for past action and set up expectations of future benefactions. Processional automata were a useful tool to associate the human ruler with divine prosperity that the city was experiencing under them, without necessarily being as overt (and sacrilegious) as establishing full-blown

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[13] Specifically Chaniotis 2003. On Hellenistic festivals, in general, see Chaniotis 1995, 2013; Chankowski 2005; Parker 2004; Wiemer 2009a, 2009b.

cult. In other words, hosting a religious festival in which impressive spectacle machinery reflected the presence and magnanimity of the god was a convenient way to draw links between the notion of the self-animated, spontaneous, and bountiful as symbolised by the device and the agency of the ruler, also unbound by conventional human limitations. This would take a far less subtle turn in the Grand Procession of Ptolemy Philadelphus, treated later in this chapter, where the Egyptian context made it less controversial for the ruling monarch to equate himself directly with the divine.

Before moving to the Ptolemaic example, there are a few final ways that we can further flesh out the Polybian passage along a more practical line of argument. The route of the *pompē* of the Athenian Great Dionysia left from the Dipylon Gates in the Kerameikos, continued to the Agora, stopped at the Altar of the Twelve Gods for choral displays, passed along the Panathenaic way as far as the Eleusinion, and followed down the so-called Street of the Tripods along the northern slope of the Acropolis before finally twisting right to arrive at the foot of the Acropolis at the Theatre of Dionysus.[14] Reconstructing the route of the Great Dionysia helps us to imagine the mass movement through the Athenian cityscape into which processional automata were incorporated, and, on a practical level, allows us to conjecture possible storage (the Pompeion in the Kerameikos seems a likely candidate), as well as opportunities for repose, regrouping, and resetting (even repairing) the machine as needed.[15] As the examples of attested processional automata will make increasingly clear, there is no need to imagine that the machine participated in the entire route of the procession, particularly if this leads to reconstructions inconsistent with our ancient sources.[16] This takes some mechanical pressure off the machines, especially as regards topographical inclines approaching the Acropolis, and it fits with the known structure of festival procession which did not simply make a beeline from start to finish. Polybius' text in this case highlights that

[14] On maps of Athens, see Travlos 1971; Ficuciello 2008.
[15] Exactly who is doing the building and repairing of these objects is a topic that needs further investigation, especially taking into consideration the possible place of enslaved technicians.
[16] See, for example, Rehm's 1937 reconstruction with a man on a treadmill inside the snail. The title of the article – 'Antike Automobile' – is telling as regards its teleological (pro) position.

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the snail led (*proēgeito*) the procession and moved *automatōs*. Surely, since the very premise of ancient procession was social inclusivity,[17] participants would have been able to join together in seeing the machine from relatively close up not only during but before and after the procession too.[18] Thus the miracle of animation was far more compelling if there was no chance of a rumour being spread about a human (or animal) inside the machine. Furthermore, Hero of Alexandria is explicit in his instruction to construct automata so as to avoid potential scepticism in the viewer of human intervention in the movement.[19] The instigation of the machine's movement – that critical, miraculous moment when the automaton went from inanimate to animate – would herald the beginning of the *pompē*. The machine and its state of technological animation acted both as the utmost honour for Dionysus and as an assurance that the deity – *pompos theōrias* on the evidence of the *Bacchae*[20] – had arrived to oversee the occasion.[21]

The Great Dionysia in which we find the automated snail would have occurred a mere fourteen months before the end of Demetrius of Phalerum's decade in power and Demetrius Poliorcetes' entry into Athens.[22] The former ended up at the Ptolemaic court, where he would partake in the cultural projects of Ptolemy I and II, including the Library of Alexandria and the Museion. Perhaps not coincidentally, Alexandria under Ptolemy II is the location of our next securely attested use of processional automata. The cultural ambitions of the Ptolemies led them to gather engineers and mechanicians of all sorts at their court.[23] Both Ctesibius and Hero – who wrote texts on automata-making – worked at the Ptolemaic court after Demetrius of Phalerum's death, and could

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[17] This is at least true of the Athenian processions. In the case of Ptolemy's Alexandrian procession, distinguished guests attended the banquet in the pavilion; soldiers, craftsmen, and foreign visitors were entertained separately (Ath. 5.196a). All, it seems, joined in procession together.

[18] On the life of these objects outside the festival context, see Bur 2016, 62–5.

[19] Hero *Aut.* 4.4–5.

[20] Eur. *Bacch.* 1047. Compare Athena's self-referential *pempsō* in Aesch. *Eum.* 1022. On which especially see Kavoulaki 2011.

[21] Kavoulaki 2011 stresses the way that the two meanings of *pompē* (escort and procession) should always be considered together as semantically related.

[22] On timing see Jacoby *FGrH* commentary 328 F66.

[23] On Hellenistic science at the Ptolemaic court see Berrey 2017.

well have had predecessors or teachers active there beforehand. Equally, as I have already suggested, the picture often painted of Alexandria as the birthplace of all mechanics, and especially of automata, needs some recalibrating when it comes to analysing the historical place of processional automata in order not to lose sight of the theological continuities with earlier practice.

At some point in the 270s BCE, Ptolemy II organised what must have been one of the most lavish festivals of antiquity.[24] Originally recorded in the fourth book of Callixenus' contemporary text *On Alexandria*, an abridged version of the 'Grand Procession of Ptolemy Philadelphus' survives in Athenaeus' *Deipnosophistae*.[25] What we lose in detail from Polybius' lamentably brief account of Demetrius' automated snail we make up for in the description of Ptolemy's Alexandrian parade. Both the occasion and the description begin in an ornamental pavilion where a banquet was likely hosted. The pavilion in Callixenus' text is presented as a curated vision of art and nature combined under the complementary guiding forces of Dionysian *tryphē* and Ptolemaic wealth. Animal skins of great variety and size hung between wooden columns shaped like palm trees and *thyrsoi*; gold couches, woollen rugs, and Persian carpets decorated the interior; marble figurines, paintings, and portraits by famous artists had been sourced and displayed; the sheer volume of gold- and silverware was literally too great to describe, leaving Callixenus with no choice but to surmise the total combined weight of all the vessels in a single mass ('about ten thousand talents', or nearly three hundred tonnes!). Callixenus explains that since the banquet was held in the middle of winter, the floral profusion which appeared as the picture of a spectacular divine meadow was particularly incredible (*paradoxos*).[26] Elevated alcoves containing representations of tragic, comic, and

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[24] The fullest treatment of this occasion is still Rice 1983; particularly relevant to the themes discussed here is Coleman 1996. See too Dunand 1981; Wikander 1992; Walbank 1996; Thompson 2000; Erskine 2013; Keyser 2016. On dating the festival see Rice 1983, 38–42; Foertmeyer 1988. On dating Callixenus see Rice 1983, 169–71 (third century, perhaps even an eyewitness). Contra see Thompson 2000, 381–8 (who opts for the second century BCE).

[25] Ath. 5.196–197c (pavilion), 197c–203b (procession) = *FGrH* 627 F 2. On how (un) faithful Athenaeus is to his source material, see Pelling 2000.

[26] Ath. 5.196d–e.

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satiric figures sitting together in symposia, dressed with real clothing and given real cups of gold, assured guests that they were in good company, enticing them to join in the festivity and toying with the boundary between art and nature, between inanimate and animate. The theatricality of the decoration and design of the pavilion offered a preview of the thematics which the procession develops: Ptolemy's Alexandria was wealthy and powerful to the point of being unhampered even by the powers of the seasons, and Dionysiac unrestrained abundance comfortably finds a home in such a city, as does Dionysus himself.[27] The pavilion quite literally set the scene for the combination of natural wonder, human ingenuity, and divine benevolence that featured in the procession to follow with automata playing a key role in uniting these themes.

The act of procession is about going from point *a* to point *b*, but in order for the procession to gain and sustain collective momentum it must have a story that justifies the general occasion as well as the specifics of the route.[28] Narrative is thus integral to procession, and objects, as well as costume, form part of dressing this narrative, giving it features that make it identifiable aesthetically, ideologically, and religiously. The part of the *pompē* of Ptolemy II's Grand Procession which Athenaeus relates performs a series of vignettes which together form a complete narrative showcasing and honouring the life and spheres of influences of the god Dionysus. Having established this as a large section of the procession (and perhaps even the festival)'s *raison d'être*, Ptolemy then inserts his own political agenda into the *pompē* through the *pompeia*.

First, we see Dionysus as patron of the theatrical arts. Sileni and satyrs introduce the theme and are swiftly followed by personifications of Dionysian festival: a tall, beautiful woman named Pentetēris with a tall man called Eniautos in tragic costume and

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[27] While only the Dionysian portion of Philadelphus' *pompē* has come down to us, the text indicates there were similar sorts of processional displays to the other gods, Zeus in particular. On the ideology of Ptolemy's parade in contemporary poetry see, for example, Hunter 2003.

[28] See de Polignac 1983 on processional movement as a way to define territorial limits of the early polis; Graf 1996 on space, participants, and goal in processions. For more recent archaeological and phenomenological approaches to ancient procession, see Connelly 2011; Stavrianopoulou 2015; Warford 2019.

mask. These two extravagantly dressed figures literally perform the passing of time and the periodic appearance in any four-year cycle of Dionysus, his revelry, and theatrical performances in his honour.[29] Poets and the guild of artists of Dionysus (οἱ περὶ τὸν Διόνυσον τεχνῖται) come next, followed by the climactic final montage of this section of the parade: a monumental statue of Dionysus drawn upon a four-wheeled cart fifteen feet tall and pouring a libation from a gold cup (*karchēsion*). The god wears layers of purple, saffron, and gold. He stands below a canopy decorated with ivy, grapevine, fruits, ribbons, *thyrsoi*, tambourines, fillets, and theatrical masks. Bacchant women holding snakes and knives recalling the potential dangers of Dionysiac frenzy especially associated with the theatre act as a coda to this first portion of the parade.

The next cart carried a statue of Nysa twelve feet in height, wearing a yellow tunic embroidered with gold, and with a Lakonian himation wrapped around her. She held a *thyrsos*, wore a crown of ivy leaves and jewelled grapes, and was placed under a canopy which had torches at each corner. Callixenus describes her movement as follows:

ἀνίστατο δὲ τοῦτο μηχανικῶς οὐδενὸς τὰς χεῖρας προσάγοντος καὶ σπεῖσαν ἐκ χρυσῆς φιάλης γάλα πάλιν ἐκάθητο.

This statue stood up mechanically with no one putting a hand on it, and after pouring a libation of milk from a golden *phialē*, it sat back down again.[30]

Probably meant to personify Mount Nysa, where Dionysus was raised according to certain mythic traditions, the automaton also introduced the Eastern imagery which will gain prominence in the following section of the procession. We note too the way that Nysa is animated in order to perform a ritual action, just as the articulated figurines presented in the previous chapter were performing meta-ritualistically. Beyond iconography, however, we must ask

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[29] As well as the presence of Pentetēris here, Callixenus refers the reader to the Penteteric records for more details on the event (Ath. 5.197d). These are among the few clues regarding concrete details of the festival often assumed to be the Ptolemaia, for which see Foertmeyer 1988; Walbank 1984, 1996 81–2n39; Thompson 2000. Contra see Fraser 1972, 230–3; Rice 1983, 182–7.

[30] Ath. 5.198f.

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what Nysa's technologically animated capacity added to the occasion. As a procession passes, a story unfolds. When an animated frame is included as part of this, it creates moments of internal narrative and the procession becomes a storyboard of moving GIFs instead of a storyboard of stills.[31] The effect is one of intersecting patterns of movement, much like planets orbiting the sun and turning on themselves. These intersecting movements allow for multiple stories to be told and to be heard at the same time. On the one hand, seeing the statue of Nysa rise, offer a libation and sit down again is a clear testament to Ptolemaic science, but the automaton's individual story is embedded into the procession's wider thematics allowing spectator-worshippers to witness both the marvel of the moving object, and to recognise its broader religious context. In this way, the automaton maintains and revels in its dual status as man-made and divine, as Ptolemaic and Dionysian.[32]

Dionysus as patron of wine was personified by a massive wine press full of grapes with sixty satyrs to tread on them while they sang and played the *aulo*s overseen by a Silenus. The juice (*gleukos*) produced streamed out of the cart onto the processional route. From the production of wine, the procession moved to its storage and dispensing best captured through a novelty-size wineskin (*askos*) capable of holding thirty thousand gallons and made from the skins of leopards stitched together. This giant *askos* slowly released wine through the streets of the city as it was processed. Countless satyrs, Sileni, and boys followed on, holding various vessels associated with sympotic activity and doubtless splashing about in the puddles of wine in the streets. The parade then passed through Alexandria's stadium, where premixed water and wine was distributed to all. Taken together, this section of the *pompē* offers a picture of Dionysus overseeing everything from the natural production of grapes and its juice to the human activities of winemaking and the various rituals that surrounded the consumption of wine. The synaesthesia of this part of the parade is especially striking. The juice and wine running through the streets

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[31] This resonates with parts of Osborne 1987 on viewing the Parthenon frieze.
[32] On kinesis in procession as sacred gift, see Connelly 2011.

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which would release an aroma and drench the feet of participants speaks to the curious mention of slime following Demetrius' snail. Both also literally leave visible traces of divine presence in the cityscape. Pausing in the stadium to distribute wine aligns well with the recalibrated picture of the Great Dionysian procession which also involved moments of pause and performance, at least at the Altar of the Twelve Gods in the agora, and possibly elsewhere too.[33] Ptolemy's procession evidently slowed down through the stadium, and there is an indication in the text that there was another moment of pause later when a giant crown of gold adorned with precious stones was hung in the portal of the Berenikeion.

Slightly obscure are the six-foot tables (*trapezai*) 'upon which many lavishly constructed spectacles (*theamata*) worthy of seeing were led around' (ἐφ᾽ ὧν πολλὰ θέας ἄξια πολυτελῶς κατεσκευασμένα περιήγετο θεάματα.)[34] The only *theama* described is the bridal chamber of Semele. To make sense of this strange part of the text, one might simply imagine a series of static tableaux, which together formed a sequential narrative enhanced by their parading one after the other. But making *periēgeto* work slightly harder as 'made to revolve', it is not impossible that these scenes had some internal movement too. Philology aside, self-moving tableaux would fit the thematics of the procession rather well, and they are mechanically viable if we take into consideration the evidence of Hero of Alexandria's *staton automaton* itself based on an earlier version by Philo of Byzantium, who would have been roughly contemporary with Ptolemy's parade.[35]

Dionysus as sponsor of spontaneous abundance of natural goods, and particularly the advantage this held for humans, was the next facet of the god to be paraded. A dark, mysterious cavern was set upon a cart from which various breeds of birds flew out 'along the whole route' not so that they might go free, but with string tied to their feet to make it easier for spectators to catch them! The same cave was richly decorated with ivy and smilax and from it poured

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[33] X. *Eq. Mag.* 3.2.   [34] Ath. 5.200b.

[35] I do not mean to suggest by this that Philo was necessarily the architect of this nor any other part of the procession (though see Fraser 1972, 413, 426 and Rice 1983, 63 on Nysa and Ctesibius). However, (a) the mechanical knowledge existed and (b) this was the *kind* of animated object for which we have an ancient tradition.

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never-ending springs of milk and wine. Practically speaking this would have been possible through, for example, the 'invention' of the 'Archimedes screw', powered by the wheels of the cart.[36] Hermes stood in this float, probably alluding to the infant Dionysus having been entrusted to Hermes by Zeus to be taken to the cave of the nymphs at Mount Nysa. During what should have been the most frugal time of the year, the endless supply of live birds, paired with the pneumatic marvel of never-ending streams of liquid, was a potent image of conspicuous consumption and a visual demonstration of the abundance of Dionysus and of Ptolemaic Alexandria. In its magnificence, the parade was both an invocation of Dionysian presence and a manifestation of the deity's forces at work. The use of automata in the *pompē* – the Nysa statue and the eternal springs – was particularly effective in visually manifesting this human–divine call and response. In a Ptolemaic religious context where there existed both an Egyptian precedence for associating monarch with god and a Hellenic precedence for the category of mechanical epiphany, lavish, self-animated spectacle machinery made it almost too easy to manifest the cultic fusion of and equation between Alexandria, Ptolemy, and Dionysus and between city, monarch, and god.

The third piece of evidence recording the use of a processional automaton comes from the Great Panathenaea of 143 CE, where Herodes Atticus apparently organised a self-moving ship to make its way through the streets of Athens:

κἀκεῖνα περὶ τῶν Παναθηναίων τούτων ἤκουον· πέπλον μὲν ἀνῆφθαι τῆς νεὼς ἡδίω γραφῆς ξὺν οὐρίῳ τῷ κόλπῳ, δραμεῖν δὲ τὴν ναῦν οὐχ ὑποζυγίων ἀγόντων, ἀλλ᾽ ὑπογείοις μηχαναῖς ἐπολισθάνουσαν, ἐκ Κεραμεικοῦ δὲ ἄρασαν χιλίᾳ κώπῃ ἀφεῖναι ἐπὶ τὸ Ἐλευσίνιον καὶ περιβαλοῦσαν αὐτὸ παραμεῖψαι τὸ Πελασγικὸν κομιζομένην τε παρὰ τὸ Πύθιον ἐλθεῖν, οἷ νῦν ὥρμισται.

Moreover, I heard the following concerning this Panathenaea: a *peplos* was fastened on the ship, more charming than a painting with the wind through its folds, [and I heard that] the ship travelled with no animals leading it, but gliding forwards by means of underground machinery. Beginning from the Kerameikos

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[36] The design of the screw is known to us through Vitr. 10.6.1–4. On the Archimedes screw more generally see White 1984, 15; Cuomo 2007, 45n15; Ulrich 2008, 42. Scare quotes are designed to signal the reality that this kind of screw pump was in use in Egypt prior to the third century BCE.

with 1,000 oars it went forth up to the Eleusinion and after circling it, passed by the Pelasgikon and thus being conveyed, passed by the Pythion where it is now moored.[37]

By the second century CE, the Panathenaea had a history of more than six hundred years during which time developments had taken place in almost every area of the festival, the procession included.[38] The automated ship was most likely a late mechanical introduction, but it worked with existing traditions of the Panathenaea. John Mansfield has argued that, as opposed to the yearly *peplos* robe, the penteteric *peplos* was a large tapestry hung for viewing on what resembled a ship's mast.[39] There is scholarly disagreement as to exactly when the Panathenaea began to use a ship to convey the *peplos* tapestry/sail, with Julia Shear, for example, arguing that this did not occur until the Roman period.[40] For present purposes, it is enough to note that when considered more broadly in tradition with ancient Greek religious processional machines, the *peplos* tapestry/sail doubtless had some relation to the known use of ship *carts* in ancient religious procession. The ship cart seems to have been used at the very least by the first century BCE in the Panathenaea,[41] and is a known feature much earlier of other Greek processions, at the Dionysia in Athens, for example, as well as at the Dionysia in Smyrna.[42] Once more, then, we are prompted to look beyond the picture of processional automata as an abrupt innovation by a few power-hungry individuals and are instead able to contextualise mechanical processional equipment more broadly, noting here the way that the use of ship carts in procession already predates and theologically anticipates the more complex automata that follow. The

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[37] Philostr. *VS* 2.550. Translation is again my own.

[38] On developments in the Panathenaea, see Connor 1987; J. Shear 2001, 2021. For processions, in general, see Viviers 2014.

[39] Mansfield 1985. Accepted by Barber 1992, 103–17; Graf 1996, 59n33; Sourvinou-Inwood 2011, 267. For references to ship sail in literature, see Strattis fr. 31; Schol. Ar. *Eq* 556a; Suda, s.v. *peplos* (π 1006).

[40] J. Shear 2001, 173–86; 2021, 131–44 with table 4.6; Aleshire and Lambert 2003, 72.

[41] [Vergil] *Ciris* 21–35.

[42] Philostr. *VS* 1.25 (531); Aelius Aristides 17.6, 21.4. Compare four Archaic Attic *skyphoi* which show Dionysus in a ship cart. See Csapo 2012 especially 28–9n11, Csapo 2013, and Ruffell 2024.

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mechanised ship of the Panathenaic procession would be a popular and recurring feature at least into the 370s CE.[43]

Exactly how automated ships moved remains unclear. In the case of the Smyrnan Dionysia, a trireme was apparently brought from the harbour to the agora by stern cables being released, allowing the ship to slide over land under the direction of the priest of Dionysus.[44] Philostratus' description of Herodes' ship mentions obscure 'underground machinery' but does offer detailed explanation of the processional route. Modern reconstructions of how the Panathenaic ship might have been propelled have been plentiful and imaginative, ranging from the use of concealed draught animals (despite Philostratus specifying that animals were *not* used) to the construction of a proto cable car.[45] Whatever the precise mechanical solution, the use of ship carts and automated ships elsewhere and, critically, much earlier in Greek religious festivals attests simultaneously to the mechanical viability, as well as generally to the theological persuasiveness of the automated ship.

Yet the specific Imperial context of Herodes Atticus does deserve slight emphasis here given that it was a time when Athens' cultural capital – intimately tied to its religious traditions – gave the city its autonomy and prestige.[46] The case of the automated Panathenaic ship is a good example of the way in which traditional Greek festivals had come to be celebrated under the Roman Empire. Earlier Hadrianic reforms to the Panathenaea had already led to a greater monumentalisation of processional route and an increase in the theatricality of the *pompē* of the Panathenaea.[47] The automated ship is just one element of the greater contemporary and especially the Herodian agenda of creating wonders of various kinds within the Athenian landscape relating to (or justified by) the religious occasion of the Panathenaea. Upon receiving the

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[43] On the evidence of Himer. *Or.* 47.12–16. J. Shear 2021, 134 suggests that the 'Roman' ship cart first associated with Herodes in text might have been introduced at the festival of 119 CE, when the Panathenaea was raised by Emperor Hadrian to eiselastic status.

[44] Philostr. *VS* 1.25 (531).

[45] Pfuhl 1900, 9–11; Graindor 1930, 65; T. Shear 1978, 43; Leopold 1985, 125; Mansfield 1985, 111; J. Shear 2001, 148. Most recently see Ruffell 2024.

[46] On the 'Second Sophistic' as a term and its controversies, see Whitmarsh 2005, 4–10.

[47] On Hadrianic reforms to the Panathenaea, see J. Shear 2001, especially 154; 2012.

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crowning honour of organising the festival, for example, Herodes built a stadium of pure marble to receive the competing athletes. This stadium is referred to by Philostratus as a monument 'beyond all other marvels' (ὑπὲρ πάντα τὰ θαύματα),[48] precisely the vocabulary that surrounds automata from the Homeric *thauma idesthai* of Hephaistos' tripods, to Hero explaining that those who make automata are called *thaumatourgoi*. All the same, at a time when the creation of new festivals abounded and, as is often argued, festivals had taken on an increasingly secular flavour, it is a clear mark of Greek Imperial culture that Herodes embedded his technical marvels within one of the city's most ancient traditional festivals. If Shear is correct, the Roman emphasis on the Panathenaic ship in the festival procession was a nod to Athens' past naval success and perhaps especially during the Persian Wars[49] and it would make sense, in a Greek Imperial world, for this age of victory to be (re)emphasised within the religious and martial symbolism of the procession. Technological animation was here a useful tool to recreate the glory days of fifth-century Athens, tying together the naval successes of that time, and thus the presence and benevolence of the city's patron deity, to the current leader's awe-inspiring benefactions, both architectural and mechanical.

Automata and Political Theatre

What the body of anecdotal evidence makes clear is the way that processional automata, at least from extant examples, were associated with individual political leaders: Demetrius of Phalerum, Ptolemy II, and Herodes Atticus. Yet the individual historical and political circumstances that underlay each was quite distinct. The Ptolemaic case is rather self-explanatory in the automata's ability to link and to manifest Ptolemaic/Alexandrian/Dionysian splendour and excess. The Demetrian case is slightly more complicated in its politics where there is, at least in the Polybian presentation, a power play between spectacle as a sign of abundance and stability, and spectacle as needless waste of a self-aggrandising (though not quite divine) ruler. The Herodean case presents a different

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[48] Philostr. *VS* 2.550.   [49] J. Shear 2021, 169.

context again, when Athens' fifth-century achievements and cultural capital were being re-harnessed and re-performed, and where the city's religious capital was integral to this mission. Yet if there are rather different political contexts that underlie the three extant instances for the use of processional automata, we have seen that all have traditions of interaction between religion and mechanics that predate and anticipate them. We now turn to some final reflections on the use of processional automata theologically across a breadth of time and space.

In the past, the use of machinery in public spectacle has been explained as a way to show the power and prestige of rulers, especially of Hellenistic monarchs and, later, Roman emperors. In one such formulation, it has been said that 'automata were part of the *apparat* of Hellenistic kingship, one of those trappings of power that *did* nothing, that only communicated the cold 'facts' of power relations'.[50] This argument can be complicated on various levels. The first is the implication that communicating power relations was 'doing nothing'. Second, from an object-agency perspective, is the overlooking of the fact that imposing, rare, scientifically advanced, miracle-making machines would have produced emotional, somatic, and cognitive responses in their viewers. Seeing an object move of its own accord is necessarily provocative; this is as true today as it must have been of antiquity. Responses should be considered a large, overlapping Venn diagram including categories such as surprise and shock, curiosity and scepticism, excitement and inspiration. In short, the precise kind of overlap that exists between the non-mutually exclusive responses of religious reverence and mechanistic intrigue. This is not to mention how the object might have played into feelings of political subservience and readjusted expectations of 'nature' and 'the natural'. Gell's 'nexus' is useful here as it allows us to draw attention to the multiple agents (A) and patients (P) at stake in the object of the processional automaton and thus to nuance our understanding of its agency. The processional automaton itself (A1) was clearly commissioned by one of these leaders (A2) for deployment within the procession to be viewed both by those also

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[50] Devecka 2013, 65 (italics in the original).

involved in the *pompē* (P1) and by those watching from various parts of the city (P2). To complicate matters further, as I have argued so far, acting as *both* agent and patient is the patron deity of the festival (A3, P3). We should also take into account the *thaumasiourgos* (and team of workers?) who would have had some autonomy in the devising and making (A4) and who would have experienced the machine differently again (P4). Finally, if the argument about the object 'doing nothing' is to imply that that they had impact 'only' in communicating political power and that they 'did nothing' theologically, then I hope the previous discussion has proven the contrary. Instead, we should seek to unpack precisely how these objects 'did' things in their performative contexts that were the outcome of entanglements between the political, the religious, and the manufactured object; between humans, gods, and things.

One possibility is that in its ability to provoke the *thauma* of mechanical animation, the automaton served to assimilate the leader to a god (A2 = A3). This may have functioned in this way in Hellenistic Egypt (where the idea of the king as god already existed), and perhaps in other parts of the Hellenistic world, to the extent that ruler cult changed the nature of the division between human and divine.[51] But this does not quite explain the case of the Panathenaea or Dionysia where the leaders sought association but not necessarily equation with the Athena or Dionysus, respectively. Ultimately, the use of mechanics to manufacture divine presence in procession allows a leader to show that they have what it takes for the city under their watch to be the kind of city that can properly worship its gods and, in turn, for the gods to bestow upon the people the proper kind of benefits that go with being properly venerated. Processional automata act as the ultimate *do ut des* in the civic realm, with the fruits of the relationship literally playing out before the eyes of the participants.

While we might see processional automata as products of a Hellenistic world, since their popularity (or perhaps simply their availability) increased in this politico-religious context, they were no sudden theological novelty. As Part I has shown, the theatre had

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[51] On the divinity of Hellenistic rulers, see Chaniotis 2003; Versnel 2011, 439–92.

already provided opportunities for mechanical epiphany to exist within the range of theological possibilities of divine manifestation. That this would extend to the procession – a highly theatrical occasion in its own right – is an evolution, one might even argue a logical evolution, but not an innovation. At the same time, the evidence of articulated figurines used in procession indicates an alternative source of inspiration from which the processional automata may have grown. That is, it shows that mechanical ingenuity was one modality of value, among many others, which functioned in human–divine relations. On the one hand, processional objects (*pompeia*) were always seeking to do the kinds of things that automata embodied so well in the one object; on the other hand, the *deus ex machina* provided a model for the symbiosis between mechanics and manufacturing divine presence.

Contextualising 'Automata-Making'

The anecdotal evidence discussed in the previous sections of this chapter reveals the way that ancient *pompai* offered numerous opportunities for repose and performance during the parade, and that processional automata did not necessarily follow the entire processional route. In the case of Herodes' ship, for example, the text states clearly that the ship stopped and 'moored' at the Python, while the full Panathenaic procession continued up to the acropolis. That the *pompeia* of an ancient procession could be dropped off or picked up at various points and that these religious parades paused to include performance allows conjecture as to the context of use for the automata described in Hero of Alexandria's technical text *On Automata*. Hero presents two categories of automata at the start of the treatise. The first, *hypagonta automata*, are movable shrines or altars (ναοὶ ἢ βωμοί), the second, *stata automata*, function as miniature theatres.[52] Hero discusses in detail an example from each category: a shrine to Dionysus, and the legend of Nauplius, respectively. At various points, however, Hero stresses that the external presentation of the machines can differ.[53]

[52] Hero *Aut.* 1.1–3.
[53] Hero *Aut.* 2.12, 20.1, 21.2. See further pages 209–12 for discussion.

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Unlike comments in the pneumatic texts we examined in Chapter 5, which offer direct evidence that the objects described were designed for use in religious settings, nothing is so explicit in *On Automata*. We are therefore forced to look for clues embedded within a manual which otherwise proceeds according to its own agenda of describing how to construct automata mechanically. In both the moving and stationary automata, Hero alludes to predecessors whose models he is improving, and in the case of the miniature theatre he singles out Philo of Byzantium (*c*.280–220 BCE).[54] Philo's work on automata was one of the now lost books of his nine-book *Mēchanikē Syntaxis*. Even a generation before Philo, Ctesibius (*c*.300–230 BCE) was concerned with applied mechanics in much the same way as both Philo and Hero after him.[55] A comment by Vitruvius suggests that Ctesibius too wrote on automata, or at least on mechanical objects used in contexts of entertainment.[56] Though this does not firmly contextualise the automata described in Hero of Alexandria's manual, it reveals a tradition of automaton construction, or at least of texts dedicated to devising automata, from the third century BCE to the first century CE.

Twice in *On Automata*, Hero explains that *stata automata* are safer, less risky, and more adaptable than moving automata.[57] Such comments indicate a concern for the practicalities of use and for viewer experience, allowing us to conclude that, at least in Hero's mind, his automata were not armchair inventions. Hero's very first concern in the description of the *hypagon automaton* is the smoothness of the machine's forward and backward movements. The author cautions that, if the surface will not allow the wheels to glide easily, wooden slats should be placed on the ground.[58] There is some evidence that this was actually done in antiquity both in general to drag boats over land, and specifically in festival contexts to prepare the processional route.[59] Indeed, a very good example comes down in the epigraphic record from

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[54] Hero *Aut*. 20.
[55] The debts between Ctesibius, Philo of Byzantium, and Hero of Alexandria have been expertly traced by Drachmann 1948.
[56] Vitr. *De Arch*. 10.7.5.   [57] Hero *Aut*. 1.7 and 21.1.   [58] Hero *Aut*. 2.1–2.
[59] *AP* 10.15; Thuc. 3.15; Serv. on Verg. *G*. 3.24. See also discussion in Ruffell 2024.

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Delos which shows payments to those in charge of smoothing the road for the phallos wagon.[60] Prepared trackways of wood or of stone were also used in ancient theatres to move either entire stage buildings or *ekkyklēmata*.[61]

A close examination of the automata in Hero's text allows further contextualisation of the machines, beginning with the construction of the *hypagon automaton*. At the floor was a rectangular base which concealed the wheels and supported four columns upon which was a circular architrave. This bottom section of the machine totalled twelve palms in height, or just under a metre. Placed on top was a round shrine with six columns which housed a statuette of Dionysus holding a *thyrsos* and a *skyphos* and with a panther at his feet. In front of and behind Dionysus were altars with dried kindling. Atop the shrine was a figurine of Nike with her wings spread – fittingly implying imminent flight – and holding a wreath in her right hand. Six maenads encircled the shrine, with wreathes as decoration in the empty spaces.[62] The exact dimensions of Dionysus' shrine are not given in Hero's text, but the whole object must have measured less than two metres in height since the author stipulates that it should not be so big that viewers suspect a human inside.[63] It also seems sensible in terms of performance to imagine the moving elements of the shrine roughly at eye height.

Before the automaton's performance begins, Hero insists, the machine should be placed in some spot alone, with viewers standing back. As with the smoothness of the movement of the automaton, this comment shows a clear concern for the spectacle of the machine. After a few moments, the automaton rolled forward and stopped. At this point, viewer attention was pulled from the machine in its entirety to the Dionysiac display on the top. The altar in front of Dionysus spontaneously blazed up and milk or water squirted from the top of the god's *thyrsos*. Wine poured forth

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[60] Csapo-Wilson 2020, 656–7 (IV Dvi).

[61] Lewis 2001, 9–10; Grillo 2019, lxxvii–lxxviii.

[62] Iconographic parallels can be seen in two Pompeiian frescoes: one in the Temple of Apollo (Museo Archeologico Nazionale di Napoli (MANN) 9269) and the other the House of the Centennial (MANN 112286).

[63] Hero *Aut.* 4.4.

from the *skyphos* he held, showering the panther below. The maenads danced around the shrine, accompanied by the sound of drums and cymbals. Once the noise had subsided, the figures of Dionysus and Nike both rotated 180 degrees and the whole performance was repeated facing the other way, beginning with a second fire blazing up before Dionysus. The construction of the *hypagon automaton* indicates a 360-degree viewing experience, a detail inconsistent with Prou's hypothesis that the machine would have performed 'like an actor' on the *logeion* prior to theatrical performance.[64] The machine then rolled back to the place where it had begun, retreating both in space and with regards to its state of animation.

Several feature of the *hypagon automaton* will by now seem familiar to the reader as characteristic of processional automata and of religious machinery more broadly. The hyper-sensorial combination of the heat of the fire, the sound of cymbals and drums, milk, and wine squirting with no apparent source, the spontaneous movement, the prominence of Dionysus and maenadism all speak to the sources presented earlier not just in this chapter, but in Part I too.[65] Further, Hero in his texts says that the makers of automata are called *thaumatourgoi*.[66] This is a fascinating insight into one of the types of personas that the ancient mechanic could inhabit. The relation between the mechanic/miracle-maker and the person who then put the machine into action in context is frustratingly unclear. In any case, the figures of *thaumatourgoi/thaumasiourgoi* and related (or synonymous?) *thaumatopoioi* had a general relation to festivals and spectacle whether this was working complex or simple miracle technologies. Dio Chrysostom recounts with disdain, for example, that *thaumatopoioi* performed in the street at the Isthmian games.[67]

Hero's static automaton extends the picture of religious mechanics integrated into the festival context. We have already seen, for

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[64] Prou 1881, 147.
[65] Compare Hippol. *Haer*. 4.31–2 confirming that spontaneous combustion and thunder could be manufactured as 'magic' tricks. For more on Hippolytus see pages 223–4.
[66] Hero *Aut*. 1.7–8.
[67] D.Chr. 8.9. Philoponus, in his commentary on Arist. *GA* uses the term *thaumatopoios* in a similar sense; see Grillo 2019, 130. For *thaumatopoiia* and *thaumatourgia*, see Lightfoot 2021, 174–98 and on minor entertainers, more generally, see Milanezi 2004.

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example, the way that the miniature automated theatre participates in the discourse on the mechanics of epiphany through Athena's appearance *ex machina*.[68] Hero's *staton automaton* – book II of *On Automata* – comprised a miniature theatre built 'as big as one wishes', set upon a wooden pillar with doors which opened and closed. The hinge here featured once more as a cultural technique, this time to reveal and conceal a sequence of mythical scenes which offered a version of (a part of) the revenge of Nauplius:[69]

> Scene 1: Twelve Greeks preparing their ships: sawing, hammering, drilling loudly.
> Scene 2: Ships are launched.
> Scene 3: Painted sea and sky with gradual appearance of ships, swimming dolphins. Sea turns stormy.
> Scene 4: Nauplius holding a torch with Athena next to him. A fire is kindled atop the torch.
> Scene 5: Shipwreck, Ajax swimming. Athena is lifted *ex machina*. Peal of thunder accompanies a lightning bolt falling on Ajax.

As with processional automata, narrative is again technologically animated, not just through motion, but through sound and fire too. Both Hero's moving and stationary automata could conceivably have functioned as para-theatrical objects in the festival context, either directly prior to theatrical performance, or at some point in the proceeding festivities, including moments of performative display during the *pompē*.

If this is correct, when taken in context these automata are highly self-reflexive in what they do. Technological animation is used to draw attention to the ways in which the human activities into which the automata are incorporated are orchestrated just like the performance these objects mechanically reproduced. They point to the performative nature of Greek religion and especially of the festival, to the stylised nature of Greek religious rituals and the role of the mechanical in such, they refer obliquely to the role of the human hand in creating the very marvels which serve to offer cognitive reliability of the presence of the gods. The self-referential nature of

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[68] See pages 36–8.
[69] Note that Athena's *ex machina* entrance is Philo's while Hero changed it to the figure hinged at the feet. On the relation between Hero's *staton automaton* and Sophocles' *Nauplius*, see Marshall 2003. On the hinge as cultural technique, see pages 180–84.

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religious automata is perhaps not so surprising since it is a quality which pervades Greek performance, Greek religion, and Greek art. In sum, automata do much more than simply showcase scientific potential, despite Wikander's well-intentioned but ultimately harmful post-*blocage* claim that for some time now 'a more serious judgment of automata has prevailed, describing them as object lessons in mechanical and pneumatic principles, rather than as tricks intended to inspire wonder'.[70] Such an assessment seriously misunderstands both the objects at stake and the nature of wonder in ancient Greece.

That Dionysus is the divinity who appears most often associated with automation and automata cannot be coincidence. We have seen in our analysis of the *Bacchae* in Part I that Dionysus not only offers endless and spontaneous abundance in the human realm (and particularly of products such as milk and wine as featured in Hero's machine), but also that, as the paradigmatic disturber of binaries, the god unsettles the boundary between animate and inanimate. The technology of automata thus offered an ideal tool both to honour and to present to Dionysus, as well as to represent Dionysus, his influence, and his presence, something which Ptolemy II clearly capitalised on.

A piece of negative evidence offers further opportunity to probe the place that mechanical automation had in the broader theology of the ancient Greek pantheon. In the enigmatic and understudied corpus known as the 'Socratic Epistles', a letter describes a little automated wagon racing around the hippodrome in Delphi and Apollo's apparent disdain at mechanical automation.[71] Though dating these letters with any precision is difficult, the most recent consensus is that the Socratic Epistles were written after the earlier part of the second century CE.[72] The Greek of the letter is rather garbled, but the implication is that the automated wagon was sent as a religious gift from Syracuse to Delphi.[73] This is not the only

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[70] Wikander 2008, 785.

[71] Socratic Epistle 35 Hercher = 33 Köhler = 33 Malherbe. On the text see Hercher 1873; Köhler 1928; Malherbe 1977. On toy carts see Kidd 2019, 109–10.

[72] Malherbe 1977, 28–9.

[73] Schürmann suggests that the wagon was sent by Dionysius II to the Pythian games of 358 BCE but this is much earlier than the supposed composition of the letters: see

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reference to a disgruntled Apollo in relation to grandiose display and automation. Philostratus says that although Apollo could shake all of Parnassus, make Castalia flow with wine, or forbid Cephisus from being a river, he preferred to reveal his oracles modestly without such boasting.[74] Divinely inspired movement – mechanical or natural – when associated to Apollo is portrayed as an unnecessary (perhaps even vulgar) superfluity within human–divine relations. In the Socratic epistle, it is specifically the spectacle (*theōrēma*) that bothers Apollo. This can perhaps be taken in direct opposition to Dionysian use of automation which strengthened the mortal sense of connection with the deity.

What is equally at stake in the Socratic Epistle, however, is not Apollo's dislike of mechanics, but that a religious context for deploying this machine was absent. The very fact that Apollo arrived to see the little automated wagon circling around independently disassociated it from any connection with divine agency, blatantly ignoring the interpretative symbiosis between human *technē* and divine presence that we have seen to be crucial in religious machinery so far. This stands in stark contrast, for example, to the self-opening doors which precede and predict the arrival of Apollo in Callimachus' hymn to the god.[75]

Automata as a Category of Object

From this anecdotal and technical evidence for the use of automata in ancient procession the first important conclusion to draw is that there is consistency neither in how these machines worked mechanically nor in how they looked. From what we can tell, Demetrius' snail, Ptolemy's cart-drawn automata (Nysa and the springs), the Panathenaic ship, and Hero's automata all had different mechanisms

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Schürmann 1991, 242; 1999, 44. In any case, it is the characterisation of Apollo, and not the historicity of the story, that concerns us here.

[74] Philostr. *VA* 6.10.4.

[75] Call. *Hymn* 2.6–7. Automatically opening doors in religious contexts is an image that clearly captivated the ancient imagination: compare Hom. *Il*. 5.749–51; 8.393–5 (the Horai); A.R. 4.41–2 (Medea); Xen. *HG* 6.4.7; Pl. *Ti*. 12.9. Hero offers two models of temples with automatically opening doors: Hero *Pneum*. I.XXXVIII Schmidt = 37 Woodcroft, I.XXXIX Schmidt = 38 Woodcroft.

of automation, and all presented very differently to the spectator. These machines were never a standard feature of procession by any means and, on the contrary, were intended to inspire awe by staying fresh in appearance. This point is made explicit in Hero's text:

δεῖ δὲ καὶ τὰς τῶν ἀρχαίων ἐκφυγεῖν διαθέσεις, ὅπως καινότερον τὸ κατασκεύασμα φαίνηται· δυνατὸν γάρ, ὡς προείρηται, ταῖς αὐταῖς μεθόδοις χρώμενον ἑτέρας καὶ ἑτέρας διαθέσεις ποιεῖσθαι. βέλτιον δ' ἐν τούτοις ἀναστρέψει ὁ χαριεστέραν ἐπινοῶν διάθεσιν. ἣν δὲ ἡμεῖς ἐκτιθέμεθα, ἔστι τοιαύτη.

Steer clear of old-fashioned arrangements so that your structure will appear more novel (*kainoteron*). For it is possible, as I said earlier, to make many different arrangements by using the same methods. Whoever is devising a more pleasant arrangement will perform better in these things. The arrangement I set forth is such a one.[76]

Hero here uses the comparative of the adjective *kainos* to equate, somewhat deceitfully, novel appearance and technical innovation. The technical knowledge that Hero sets out in his text will allow his reader to put the machine together in a great number of new arrangements which constantly impress through visual novelty. This notion of the importance of variety in external presentation of automata is reinforced through Hero's emphasis on the machine being *poikilos*. The vocabulary of *poikilia* is used three times by Hero in this text: once in the very opening line of the text, once when he introduces the moving automaton, and once when he introduces the static automaton. This quality is clearly a feature of machines that Hero prioritises, likely due to the way that it is able to connote visual variety and ingenuity as well as skilful manufacture.[77] The three instances of *poikilia* vocabulary are the following:[78]

Τῆς αὐτοματοποιητικῆς πραγματείας ὑπὸ τῶν πρότερον ἀποδοχῆς ἠξιωμένης διά τε τὸ ποικίλον τῆς ἐν αὐτῇ δημιουργίας καὶ διὰ τὸ ἔκπληκτον τῆς θεωρίας <***>.

Since the subject of automata-making was favourably received by the former generations on account of both the varied/ingenious types of craftsmanship in it and the astounding character of the spectacle <***>.[79]

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[76] Hero *Aut.* 2.12.
[77] On *poikilia* in Hero see Tybjerg 2003, 458–9; in general see Detienne and Vernant 1974 (especially 25–31 *poikilia* and *mētis*); Frontisi-Ducroux 2000 (especially 52–5 *daidaleon* vs. *poikilon*); Grand-Clément 2015. Notably, *daidaleon* and cognates are never used in Hero *Aut.*
[78] Compare Hero *Pneum.* pr.15, 346.   [79] Hero *Aut.* 1.1.

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ἐν μὲν οὖν τούτῳ τῷ βιβλίῳ περὶ τῶν ὑπαγόντων γράφομεν ἐκθέμενοι διάθεσιν ποικίλην κατά γε ἡμᾶς, ἥτις ἁρμόσει πάσῃ διαθέσει πρὸς τὸ δύνασθαι τὸν προαιρούμενον ἑτέρως διατίθεσθαι μηδὲν ἐπιζητοῦντα πρὸς τὴν τῆς διαθέσεως ἐνέργειαν·

Therefore, in this book I am writing on mobile automata, setting forth a complex/ ingenious configuration of my own which will adapt to every <other> arrangement; in this way, whoever chooses to arrange differently will be able <to do so>, not lacking anything for the actualisation of the arrangement.[80]

ἔστι δὲ μῦθος καὶ ἡ διάθεσις τῶν περὶ τὸν Ναύπλιον, ἐν ᾗ πολλαί τε καὶ ποικίλαι διαθέσεις ὑπάρχουσι καὶ οὐ φαύλως οἰκονομούμεναι πλὴν τῆς μηχανῆς τῆς περὶ τὴν Ἀθηνᾶν.

The story and the arrangement portray the legend of Nauplios, in which many and varied/ingenious scenes already exist and which are not poorly managed except for the *mēchanē* of Athena.[81]

Poikilia is an aesthetic phenomenon, and Hero's choice of vocabulary thus becomes a way to bring mechanics into an art historical discourse. Artistic complexity, versatility, and visual variety – typically associated with metallurgy, weaving, and painting, including, or perhaps especially, of the oeuvres of the gods in Homeric epic – is purposefully interlaced here with mechanical complexity, narrative variety, and contextual diversity. The automaton is composed of various individual parts which work together to form a well-constructed, visually impactful whole: a mechanical miracle. Part of the ingenuity of the automaton, therefore, is precisely that it has variegation in physical appearance, and this happens exclusively thanks to its mechanical complexity.

Despite this emphasis on visual variety in the construction of different arrangements of automata, several features unite the *testimonia* for the use of processional automata: the synaesthetic quality that the machine engenders, the ability to create internal narratives within the broader processional story, and, crucially, the way that the miracle of automation worked with the call and response between god and worshipper which was at the very core of the religious processional experience in ancient Greece. In other words, the only way that we can conceive of this heterogenous collection of

[80] Hero *Aut.* 1.8.   [81] Hero *Aut.* 20.2.

objects as a unified group over roughly five hundred years of history is if we acknowledge that there was a common thread of theological logic that underpinned their deployment and guaranteed their religious authenticity. Mechanical objects were effective as processional objects (*pompeia*) for their capacity to exemplify how that religious occasion existed both to solicit divine attention and to manifest divine presence. This is not to say that nothing changes over time. In the politicisation of processional automata that begins, from the patchy available evidence, in the Hellenistic period we witness an important moment in the intervention of the human hand in the mechanical miracle. Earlier worshippers were not more naïve; they were not duped into believing that religious technologies occurred exclusively through supernatural forces. Mechanical objects, as we have seen, were always and unproblematically products of human *technē* even (or especially) when used in religious contexts. However, the human hand begins, with Demetrius of Phalerum, and certainly by Ptolemy II and Herodes Atticus, to have a firm social and political identity in figures who undertook to define their religious identity by capitalising off the symbiosis which preconditioned the existing mechanical miracle. If a leader, even a deified or deifiable one, could be this 'hand' or 'in charge of this hand' (depending on how we assume ancient scientific patronage worked), what about your average Joe, or your average Alexander, as it were? With the passing of time, what will this teasing out of the mechanism qua mechanism mean for both the mechanism and the miracle?