Is technê (i) demonstrative and (ii) essence-grasping?

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Simona Aimar and Carlotta Pavese (S&C) say ‘yes’. Hendrik Lorenz and Ben Morison (H&B) say ‘no’. Also, Ursula Coope (U) implies that a technê is not demonstrative.

S&C, H&B, and U all agree that technai consist of truths that are general and explanatory. S&C suggest that Aristotle’s preferred model of explanation of/by general truths is demonstration, so they take the general and explanatory character of technê as evidence that technê is demonstrative. H&B and U do not seem to agree with this.

H&B base their view on a reading of Nicomachean Ethics VI. S&C mostly rely on the Analytics, with a couple references to the Metaphysics and to NE VI.

I’ve reproduced three sorts of passage that S&C cite in support of their view that technê is demonstrative and essence-grasping:

1. Six passages (Metaphysics 1x, NE 1x, Post. An. 4x) where Aristotle talks about technai like they are genuine sciences;
2. Four passages (Pr. An. 1x, Post. An. 3x) where Aristotle suggests that technai deal in demonstrations;
3. Two passages (Metaphysics 1x, Post. An. 1x) where Aristotle suggests that technai deal in definitions and essences.

Notes on the passages:

Technai are genuine sciences:

J1 = T12: Metaph. E.2, 1027a20–24

Aristotle says that there is knowledge (epistêmê) of generalizations that hold for the most part, and gives an example that seems to belong to medicine: ‘honey-water is useful for a patient in a fever’. This suggests that medicine (and by extension other technai) is a genuine science.

J2 = T7: NE 6.10, 1142b34–1143a4

Aristotle pairs medicine with geometry as examples of special sciences (κατὰ μέρος ἐπιστήμαι). This suggests that medicine (and by extension other technai) is a genuine science.

J3: Post. An. 1.12, 77a38–41

Aristotle pairs medicine with geometry, and implies that there are properly medical ‘questions’ that will be sources of syllogisms appropriate to medicine.
J4: Post An. 1.13, 79a13–16
Aristotle pairs medicine with geometry as examples of sciences.

Aristotle pairs medicine with geometry and calculation as examples of sciences that have principles. In context, it seems clear that these principles are deductive principles, i.e., premises of syllogisms.

J6: Post. An. 1.11, 77b18–24
Aristotle mentions the art of music alongside geometry, as a possible source of an ‘un-geometrical’ question

Technai are demonstrative:

J7 = T8: Pr. An. 1.30, 46a17–24
Aristotle includes technai (‘any other art or science’) in his discussion of how to find principles and bring demonstrations to light. This suggests that technai include demonstrable truths.

J8 = T10: Post. An. 2.12, 96a8–19
Aristotle indicates that there can be demonstrations of generalizations that hold only for the most part. The passage doesn’t talk about technē, but it at least removes a potential obstacle to thinking that technai are demonstrative sciences.

J9: Post. An. 2.11, 94a36–b3
Aristotle describes a demonstration that seems to belong to the art of war, say S&C

J10: Post. An. 2.12, 95b31–5
A demonstration that seems to belong to the art of house-building, say S&C

Technai include knowledge of an essence:

J11 = T3: Metaph. Z.7, 1032a32–b6
Aristotle says that an artisan has the form of the product in his or her soul, and explains that by ‘form’ he means the essence and primary substance. Aristotle then says of a specific form (health) that it is ‘the formula and the knowledge in the [doctor’s] soul’. So it seems to be implied here that an artisan has knowledge of the essence of the product of his/her art.

J12: Post. An. 2.13, 97b26–8
Aristotle uses a doctor as an example of someone who gives a definition (ὁρος), in a chapter devoted to the question ‘how we should hunt out the items predicated in what something is’ (τὰ ἐν τῷ τί ἐστι κατηγορούμενα, 96a22-3).

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J1.  = T12: Metaph. E.2, 1027a20–24

ἐπιστήμη μὲν γὰρ πᾶσα ἢ τοῦ ἄει ἢ τοῦ ὡς ἐπὶ τὸ πολὺ—πῶς γὰρ ἡ μαθήσεται ἢ διδάξει ἄλλον; δεῖ γὰρ ἀρίσθαι ἢ τῷ ἄει ἢ τῷ ὡς ἐπὶ τὸ πολὺ, οἷον ὅτι ὥφελιμον τὸ μελίκρατον τῷ πυρέττοντι ὡς ἐπὶ τὸ πολὺ.

All science is either of that which is always or of that which is for the most part. For how else is one to learn or to teach another? The thing must be determined as occurring either always or for the most part, e.g. that honey-water is useful for a patient in a fever is true for the most part. (tr. Barnes ROT)

J2. = T7: NE 6.10, 1142b34–1143a4

Ἔστι δὲ καὶ ἡ σύνεσις καὶ ἡ εὐσυνεσία, καθ’ ἣς λέγομεν συνετοὺς καὶ εὐσυνέτους, οὔθ’ ὅλως τὸ αὐτὸ ἐπιστήμῃ ἢ δόξῃ (πάντες γὰρ ἂν ἦσαν συνετοί) οὔτε τις μία τῶν κατὰ μέρος ἐπιστημῶν, οἷον ἡ ἰατρικὴ περὶ ὑγιεινῶν, ἡ γεωμετρία περὶ μεγέθη.

Understanding, also, and goodness of understanding, in virtue of which men are said to be men of understanding or of good understanding, are neither entirely the same as opinion or knowledge (for at that rate all men would have been men of understanding), nor are they one of the particular sciences, such as medicine, the science of things connected with health, or geometry, the science of spatial magnitudes. (tr. Barnes ROT)

J3.  Post An. 1.12, 77a38–41

εἰδ’ ἄν τι ἐρώτημα ἐπιστημονικόν, ἐξ ὧν ὁ καθ’ ἐκάστην οἰκεῖος γίνεται συλλογισμός. δῆλον ἄρα ὅτι οὐ πάν ἐρώτημα γεωμετρικόν ἢ ἐν ἔνδοι ιατρικόν, ὁμοίως δὲ καὶ ἐπὶ τῶν ἄλλων.

There will be scientific questions from which the deductions appropriate in each science proceed. It is plain, then, that not every question will be geometrical (or medical—and similarly in the other cases). (tr. Barnes 1985)

J4.  Post An. 1.13, 79a13–16

πολλαὶ δὲ καὶ τῶν μὴ ὑπ’ ἀλλήλας ἐπιστημῶν ἐξουσιν οὕτως, οἷον ἰατρική πρὸς γεωμετρίαν· ὅτι μὲν γὰρ τὰ ἔλκη τὰ περιφερῆ βραδύτερον ύγιάζεται, τοῦ ἰατροῦ εἰδέναι, διότι δὲ τοῦ γεωμέτρου.

Many sciences which do not fall under one another are in fact related in this way—e.g. medicine to geometry; it is for the doctors to know the fact that curved wounds heal more slowly, and for the geometers to know the reason why. (tr. Barnes 1985)

ei δ’ ἄλλως πως λέγοι τις, οἴον ὅτι αἰτὶ μὲν γεωμετρίας αἰτὶ δὲ λογισμῶν αἰτὶ δὲ ἱατρικῆς, τί ἀν εἰθ’ τὸ λεγόμενον ἄλλο πλὴν ὅτι εἰςὶν ἄρχαι τῶν ἐπιστημῶν;

If anyone were to mean the claim in some other sense, e.g. that *these* are the principles of geometry, *these* of calculation, *these* of medicine, he will simply be saying that the sciences have principles. (tr. Barnes 1985)


καὶ πότερον ὁ κατὰ τὴν ἁγίοναν συλλογισμὸς ὁ ἐκ τῶν ἀντικειμένων συλλογισμός, ἢ ὁ παραλογισμός, κατὰ γεωμετριάν δὲ, ἢ <ὁ> ἐξ ἄλλης τέχνης, οἴον τὸ μονοσικὸν ἐστίν ἐρώτημα ἀγεωμέτρητον περὶ γεωμετρίας, τὸ δὲ τὰς παραλλήλους συμπίπτειν οἴεσθαι γεωμετρικῶν πως καὶ ἀγεωμέτρητον ἄλλον τρόπον;

And are ignorant deductions deductions from opposite assumptions (or paralogisms, though geometrical paralogisms)? Or are they deductions drawn from another art? E.g. is a musical question about geometry non-geometrical, whereas thinking that parallels meet is geometrical in one sense and non-geometrical in another way? (tr. Barnes 1985)

J7.  = T8: *Pr. An. 1.30, 46a17–24*

dιό τὰς μὲν ἄρχας τὰς περὶ ἕκαστον ἐμπειρίας ἐστὶ παραδοῦναι, λέγω δ’ οἴον τὴν ἀστρολογικὴν μὲν ἐμπειρίαν τῆς ἀστρολογικῆς ἐπιστήμης (ληφθέντων γὰρ ἰκανῶς τῶν φαινομένων οὕτως εὐρέθησαν αἱ ἀστρολογικαὶ ἀποδείξεις), ὁμοίως δὲ καὶ περὶ ἄλλην ὀποιανοῦν ἔχει τέχνῃ τε καὶ ἐπιστήμῃν- ὡστ’ ἐὰν ληφθῇ τὰ ὑπάρχοντα περὶ ἕκαστον, ἡμέτερον ἢδὲ τὰς ἀποδείξεις ἐτοίμως ἐμφανίζειν.

Consequently it is the business of experience to give the principles which belong to each subject. I mean for example that astronomical experience supplies the principles of astronomical science; for one the phenomena were adequately apprehended, the demonstrations of astronomy were discovered. Similarly with any other art or science. Consequently, if the attributes of the thing are apprehended, our business will then be to exhibit readily the demonstrations. (tr. Barnes *ROT*)

J8.  = T10: *Post. An. 2.12, 96a8–19*

"Εστι δ’ ἐνα μὲν γινόμενα καθόλου (ἀεὶ τε γὰρ καὶ ἐπὶ παντὸς οὕτως ἢ ἔχει ἢ γίνεται), τὰ δὲ ἄει μὲν οὐ, ὡς ἐπὶ τὸ πολὺ δὲ, οἴον οὐ πᾶς ἀνθρωπός ἄρρητον ἂν γένειον τριχοῦται, ἀλλ’ ὡς ἐπὶ τὸ πολύ. τῶν δὲ τοιούτων ἀνάγκη καὶ τὸ μέσον ὡς ἐπὶ τὸ πολύ εἶναι. [...] ἐσονται τοῖνυν καὶ τῶν ὡς ἐπὶ τὸ πολὺ ἄρχαι ἰμέσοι, ὅσα ὡς ἐπὶ τὸ πολύ οὕτως ἐστὶν ἢ γίνεται.

Some things come about universally (they either are or come about in this way always and in every case), others not always but for the most part—e.g. not every male man has hair on his chin, but they do for the most part. In such cases the middle term must also

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hold for the most part. […] For what holds for the most part, then, there will be immediate principles which hold or come about in this way for the most part. (tr. Barnes 1985)

J9.  
Post. An. 2.11, 94a36–b3

Τὸ δὲ διὰ τὸ Ἡρωδίκος πόλεμος ἐγένετο Ἀθηναίοις; τίς αἰτία τοῦ πολεμεῖσθαι Ἀθηναίοις; ὅτι εἰς Σάρδεις μετ᾽ Ἐρετριέων ἐνέβαλον. τούτῳ γὰρ ἐκίνησε πρῶτον. πόλεμος ἐφ᾽ οὗ Ἀ, προτέρους εἰσβάλειν Β, Ἀθηναίοι τὸ Γ.

Why did the Persian war come upon the Athenians? What is the explanation of the Athenians’ being warred upon? Because they attacked Sardis with the Eretrians—this initiated the change. War A, being first to attack B, Athenians C. (tr. Barnes 1985)

J10.  
Post. An. 2.12, 95b31–5

ἐχεὶ δὲ οὕτως ἐπὶ τῶν ἔργων· εἰ γέγονεν οἰκία, ἀνάγκη τετμήσθαι λίθους καὶ γεγονέναι. τούτῳ διὰ τὶ; ὅτι ἀνάγκη θεμέλιον γεγονέναι, εἴπερ καὶ οἰκία γέγονεν· εἰ δὲ θεμέλιον, πρότερον λίθους γεγονέναι ἀνάγκη.

In concrete terms it is like this. If a house has come about, stones must have been cut and have come about. Why?—Because a foundation must have come about if a house has come about; and if a foundation has come about, stones must have come about earlier. (tr. Barnes 1985)

J11.  
= T3: Metaph. Z.7, 1032a32–b6

ἀπό τέχνης δὲ γίγνεται ὅσον τὸ εἴδος ἐν τῇ ψυχῇ (εἴδος δὲ λέγω τὸ τί ἢν εἶναι ἐκάστου καὶ τῆν πρῶτην οὐσίαν)· καὶ γὰρ τῶν ἐναντίων τρόπων τινὰ τὸ αὐτὸ εἴδος· τῆς γὰρ στερήσεως οὐσία ἢ οὐσία ἢ ἀντικειμένη, οἶον υγίεια νόσου, ἐκείνης γὰρ ἀπουσία ἢ νόσος, ἢ δὲ υγίεια ὁ ἐν τῇ ψυχῇ λόγος καὶ ἢ ἐπιστήμη.

From art proceed the things of which the form is in the soul. (By form I mean the essence of each thing and its primary substance.) For even contraries have in a sense the same form; for the substance of a privation is the opposite substance, e.g. health is the substance of disease; for it is by its absence that disease exists; and health is the formula and the knowledge in the soul. (tr. Barnes ROT)

J12.  
Post. An. 2.13, 97b26–8

αἰεὶ δ᾽ ἐστὶ πάς ὁρὸς καθόλου· οὐ γὰρ τινὶ ὀφθαλμῷ λέγει τὸ ψυχεῖν ὁ ἱατρός, ἀλλ᾽ ἢ παντὶ ἢ εἶδει ἄφορίσας.

Every definition is always universal: doctors do not say what is healthy from some particular eye, but rather for every eye or else for some determinate form of eye. (tr. Barnes 1985)