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Failure and Expertise in the Ancient Conception of an Art

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The ancient notion of an art (τεχνη) embraced a wide range of pursuits from handicrafts like shoemaking and weaving to more exalted disciplines not excluding philosophy (cf. Plato Gorgias 486b; Hippolytus Refutatio. 570, 8 DDG; Sext. Emp. M II 13). Nevertheless, there was a sufficient amount of agreement about what was expected of an art to permit debates about whether different practices qualified as arts. According to the conception which made these debates possible, an art is a body of knowledge concerning a distinct subject matter which enables the artist to achieve a definite type of beneficial result.[1] Obviously, the failure of a practitioner to achieve the aim of an art can form the basis of a fairly simple challenge to his artistic competence. But when all of a profession's practitioners are prone to failure, even those who fully satisfy its internal standards, the artistic status of the practice can be called into question. Doubts then shift from the competence of an individual practitioner to the assumption that his practice is an art. The aim of this paper is to show in outline how the persistent occurrence of failures of this sort in some arts led to important developments in the ancient conception of an art. The developments we will be concerned with are not the specific and substantive changes in the theory and practice of particular arts which failure may have prompted, e.g., the kind of improvement in surgical practice we would expect surgical failures to suggest. Rather, our concern will be with the way in which regular and apparently ineradicable failures led to the revision of the conception of an art itself. One such development, I will suggest, was the emergence of a crude but recognizable notion of probabilistic knowledge.

In order to see how failure could form the basis of challenges to the artistic status of different practices, we need to get clear about what was involved in the claim that an art is a body of knowledge. A practice may occasionally fail to secure the result it aims at and still be quite useful. But it was possible to concede this and still claim that failure showed that the practice in question did not involve knowledge in the way that an art must. We will be able to understand what was involved in the claim that an art must be a matter of knowledge better if we look at the way other implications of this claim were used to challenge the artistic status of some practices. For example, it was agreed because an art is a body of knowledge it is typically transmitted by teaching, as opposed to being the result of natural endowment or unsupervised practice. Thus the practitioners and teachers of an art were often challenged to show that the ability at issue was a result of instruction and did not arise from one of these other sources. In the Platonic dialogue named after him, Protagoras responds to a challenge of this sort put to him by Socrates. Protagoras believes that virtue is a matter of art and he offers to teach it to students. Socrates at first argues that it is not teachable because we do not see it being transmitted in situations where we would expect to see it being taught if it were teachable (Prot. 319 a 4-6). (The children of virtuous parents often turn out rather badly despite all that their parents do.) Socrates' challenge corresponds to a standard move in debates over the arts: the fact that some people are able to become good orators, e.g., without professional instruction, while many who had received the training fail to become good speakers, was used to suggest that artistic instruction was unnecessary and ineffective in matters of this sort (cf. Philodemus Rhet. II 71; II 97; Cicero De orat. I, 5; I 91; Quintilian Inst. orat. II, 17, 11; S.E. M II 16). Instead, it was suggested, ability of this sort was not a matter of art, but of natural endowment. Protagoras' response, which became the orthodox answer to this challenge, was to point out that what is actually observed is not the

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[1] For a detailed discussion (to which I am greatly indebted) see Felix Heinimann, "Eine vorplatonische Theorie der TEXNH," Museum Helveticum. 18 (1961), 105-130.

absence or failure of teaching, but variations in ability not directly correlated with the amount or quality of the teaching received; and he argued that different levels of accomplishment in the arts may reflect different levels of natural talent, even though the ability in question is a matter of artistic knowledge, because a student's ability to benefit from teaching is subject to natural variation. In fact, nature was not the only factor in addition to knowledge influencing success in the arts: practice and hands-on experience were also important (cf. Aristotle E.N. 1103b8-13, 1179b20-21).

The outline of the orthodox account is visible in Isocrates and Plato, who identified three factors that contributed to oratorical achievement: natural ability, knowledge and practical experience (Adv. soph. 13, 17; Antid. 15, 187-192; cf. Plato Phaedr. 269d, 272a; cf. Philodemus Rhet. I, 51 col. XXV). This account enabled the teacher of an art to answer the charges which might arise from the poor performance of some of his students and allow that some prospective artists may succeed with very little, perhaps in exceptional cases none, of the kind of instruction he offers without diminishing the value of the teaching he offers. For, though it concedes a substantial role to factors other than knowledge and teaching, this account continues to make the role of knowledge primary: if it is correct, natural talent enables the aspiring artist to acquire the knowledge which makes up his art while practice develops his ability to exercise that knowledge to the best possible effect.

Those who laid claim to artistic knowledge were faced with more difficult challenge, however. In the Protagoras, Socrates finds it easier to agree that virtue is an art and consequently teachable, under the limitations described above, than to agree that what Protagoras has to offer amounts to a body of artistic knowledge (Prot. 361a-c). This is because there was much scope for disagreement about the standards a set of teachings would have to meet in order to qualify as a complete body of artistic knowledge: depending on the view of knowledge appealed to, different sets of standards, some of them quite stringent, could be imposed on practices for which the status of an art was claimed. In the Gorgias, Socrates sets out certain arguments that rhetoric is not an art which were to be repeated for centuries thereafter. Of particular importance from the present point of view is the argument that rhetoric is not an art because, instead of being a matter of knowledge as a true art must be, it is a matter or mere experience and habit. An art, Socrates insists, must give a rational account of the real nature of its subject matter, an account which enables the artist who has mastered it to specify the underlying causes in light of which he acts as he does (Gorgias 465a, 501a; cf. Phaedr. 270b). The sharp line between experience and knowledge drawn here was an innovation. Another participant in the dialogue, Polus, explicitly held that artistic knowledge was a matter of experience (Gorgias 448c, 462b). And the line was not always drawn so sharply afterwards either (cf. Aristotle An. post. B 19, 100a5; Met. A 1, 981a4; Rhet. 1359b30-32). As we know, the challenge laid down in the Gorgias was taken up by the medical Empiricists, who set out to show that experience could give rise to a a body of knowledge that amounted to an art. And defenders of some of the other arts did the same. Such efforts could be justified by the very reasonable counter-charge that Plato's positive conception of artistic knowledge, at least as it was reflected in some of his dialogues, imposed standards which were impossibly high, if not completely inappropriate. The model of the measuring art held up in the Protagoras, e.g, seems inappropriate for practical wisdom (Protag. 356a ff.; cf. Aristotle E.N. 1094a11-16; 1098a26; 1104a2); and the emphasis on the mathematicization of the arts in the Philebus may involve a similar misapplication of standards (56a-57e).

Nevertheless, it needs to be emphasized that Plato's objections to rhetoric had a basis in the common conception of an art. Roughly speaking, the common conception suggests a view something like this: while someone can pick up a knack on the basis of experience which enables him to bring about a certain kind of desirable result more frequently than a layman who lacks that experience, if the ability depends on nothing more than a few rules of thumb, a few memorized procedures adapted to stereotypical situations, it does not yet amount to an art. The same concern motivates Aristotle's comparison of teachers of eristic and rhetoric to people who promise to teach the knowledge of how to prevent feet from suffering, but give their students a pile of shoes instead of the art of shoemaking: by giving their students speeches and arguments to memorize, these teachers give them the products of art, not the art itself (Soph. el. 183b36-184a8). A body of artistic knowledge must be, somehow, systematic and complete (cf. Phaedr. 269d-e, 272a-b). It must give the artist more than a few effective procedures; it must give him a systematic and organized mastery of the procedures which will secure his end, a requirement which was well

expressed by Aristotle's demand that the true artist have at his disposal all the possible means of securing the end at which his art aims so that he need never omit any procedure that may contribute to success (Rhet. 1355b10-11; Top. 101b5-10). And this requires not only that the artist learn all that he is taught--no doubt some of Gorgias' students accomplished this--but that the art transmitted to him embrace all possible means of success. And this in turn may call for a theory in which the means at the disposal of the artist are connected with the nature of the matters with which he must deal, so that Socrates' requirement may not be out of order after all.

Thus the defender of a practice whose artistic status had been challenged needed to show that the body of knowledge on which he relied, in addition to being of some use, was complete and systematic according to the appropriate standards. The kind of knowledge Plato sometimes demands of an art promises to satisfy this requirement. Clearly, un-systematic experience will not. (Whether experience could be systematized and organized so that the requirement can be satisfied is another question, however.) Consequently, disputes about the artistic status of practices like rhetoric and medicine often became disputes about how to interpret the requirement that an art involve a complete and systematic body of knowledge, about what the appropriate standards to judge a candidate art by were. This fact has an important consequence which we must bear in mind when we turn to the problem posed by failure. As Aristotle himself notes, the requirement of completeness involves a certain amount of idealization (Top. 149b24). Discussion was not so much about the arts in their present state, where there might be significant room for improvement, as in an envisaged ideal condition of completeness or perfection. Thus responses to the problem of failure had to show that its occurrence is compatible with possession of an art in its ideal form Cf. Cicero De orat. I, 76).

The kind of failure at issue occurs when an artist does not achieve the end at which his art aims. Examples include the failure of a navigator to pilot his ship safely to its destination, of an orator to persuade an audience or of a physician to cure a patient. This is not quite clear enough, however. The Hippocratic writers often point out that the medical art is not all-powerful and cannot be expected to cure all ailments or restore every patient to health; some patients in some conditions are beyond the power of medicine, and the Hippocratic physician is urged to distinguish carefully between curable and incurable patients (Hipp. De arte c. 3; Prognosis c. 1; VM c. 9). And in general it was thought to be a characteristic of the artist to able able to distinguish between the possible and the impossible in his area of expertise (Plato Resp. II, 260e; Stobaeus IV, 38, 9). And so far as it goes, this seems absolutely right: the inability to achieve impossible results is not a failure. Nature imposes limitations on the power of art. We are only really faced with failure, e.g., when a physician's attempt to cure a patient does not succeed or a prognosis of his turns out to be false.

What is puzzling about the Hippocratic account, or the crude sketch of it provided above, is the way in which it seems to envisage a physician who knows which patients he can, and which he cannot, cure; a physician who will at no point undertake cures with less than complete confidence of success or qualify his prognoses with reservations. (See VM c. 9 for a conspicuous and important exception.) There seems to be no room in this account for good-faith efforts undertaken with a reasonable expectation of success which nevertheless fail. Understood in this way, the conception of an art would seem to require the artist to be invariably successful, unless some clearly extrinsic circumstances interfere. A practitioner's claim to be a genuine artist could then be called into question by a single failure. More significantly, the artistic status of practices like medicine and rhetoric whose best qualified practitioners often fail can also be questioned if this standard is in force: they do not, as it was put, deliver what they promised (cf. Quintilian, Inst. orat. II, 17, 22; Philodemus Rhet. I col. V). Yet by characterizing rhetoric as the "manufacturer of persuasion" rhetoricians like Corax, Tisias and Gorgias seemed to invite this charge (Gorgias 463a; Philebus 58a; cf. Quintilian II, 17, 23). And some physicians seem to have made claims nearly as strong, or at least to have been faced with similar expectations (Hipp. Acut. c. 9; De arte c. 8). But the strong claims made for these arts, and the high expectations they faced, were not just a result of their practitioners' boastfulness. The artist's claim to a complete and systematic body of knowledge could be taken to imply immunity from failure, not omnipotence, of course, but the ability to foresee when his efforts would be successful and when not. If the artist really understood the nature of the matters with which he dealt, it could be argued, he would not raise hopes that were destined to be frustrated. As in many arts, failure would indicate a a gap in the

practitioner's knowledge that needed to be filled before he could count himself a complete artist. In many areas, mastery of the appropriate art did guarantee success, while failure indicated a gap in the practitioner's training. Why, it could be asked, not in medicine or rhetoric as well?

The way in which Thrasymachus escapes from the difficulty Socrates puts in the way of his view that justice is "the benefit of the stronger" makes it clear just how strong the connection between artistic expertise and success could be taken to be (Resp. 340d-341a). Socrates raises a problem for Thrasymachus' view by pointing out that the strong sometimes err in deciding what will be to their benefit, so that if compliance with their wishes is sufficient for justice, as Thrasymachus also seems to think, the same act may turn out to be both just and unjust. Thrasymachus gets out of this difficulty by claiming that a man is not properly speaking stronger when he makes an error about what is to his advantage, just as a physician is not properly speaking a physician when he misses the mark (ἁμαρτάνῃ). Thus Thrasymachus is able to appeal to a view, which he expects Socrates and the other participants in the dialogue to share, according to which an art cannot be exercised without leading to success; failure must imply the absence, if only temporary or partial, of artistic knowledge. Socrates himself appears to adopt a similar view in the Euthydemus when he asserts that wisdom of the kind that practitioners of different arts and skills draw on makes men do well always so that they never err in act or result (τυγχάνειν) (280a-b).

Nevertheless, at a fairly early stage it was acknowledged that failure was a legitimate feature of certain arts in a way that it was not of others. We are permitted to conclude more or less automatically, in the absence of appropriately unusual circumstances, that someone who fails in an attempt to make a pair of shoes is not a master of the art of shoemaking. On the other hand, the occasional failures of a navigator, a physician or an orator to bring off a desired result need not show that these practitioners are not artists or that the knowledge they made use of does not amount to an art. Arts in which failure was permitted to occur in this way came to be called stochastic arts from the verb meaning to aim: στοχάζεσθαι (Alex. aphr. In top. 32, 12 ff.; Quaest. II 16; Philodemus Rhet. I 26, 6 ff.; 59, 17 ff.; 170, 3 ff.; S.E. M II 13). Two closely related applications of the word were involved. The expression was used to indicate that the relation between these arts and their ends was one of aiming, not always of hitting ([Galen] Medicus XIV 685 K; Alex. aphr.. Quaest. II 16). But "stochasmos" was also used to mean conjecture, the kind of educated guesswork an artist employs in the absence of conclusive evidence (Hipp. VM c. 9; Plato Gorg. 463a, 465a; Phlb. 55a-56b). The underlying motivation was the same, of course, for the success aimed at, but not always achieved, in conjectural reasoning is the truth of the matter at issue.

Here, then, is the first development in the conception of an art prompted by failure. In certain arts success was downgraded from a necessary condition in the assessment of the artistic status of a practice and its practitioners. One way of doing this involved a distinction between the end (telos) and the function or task (ergon) of an art (cf. Alex. aphr.. In top. 32, 12 - 34, 5; Quintilian II 17, 22-25). In the non-stochastic arts end and function coincide; it is impossible that the function be fulfilled without the end also being achieved. On the other hand, in the stochastic arts end and function are distinct and it is possible for the artist to fulfill the demands of his art without achieving its end. Thus the end of the medical art is to save the patient, while its function is to do everything possible to save the patient. An artist must always be successful qua artist, but a a stochastic artist may do so without always achieving the end of his art.

More is called for if the stochastic artist is to defend his claim to the title of artist without qualifications, however. If standards are raised so that a practice qualifies as an art only if it involves the grasp and application of a body of knowledge that guarantees success, the stochastic arts will still not qualify as arts in the truest and strictest sense of the term. And critics of the stochastic practices were sometimes willing to grant that there was a weaker and more extended sense of the term according to which the stochastic practices qualified as arts, as long as it was understood that they were inferior to arts properly so called (Plato Phlb. 55e-56a; Philodemus Rhet. I 72, col XL; cf. I 59, 19 ff.; I 70, 15 ff.). If the defence of the stochastic arts stops here, however, the stochastic artist will have won a certain measure of safety for his claim to artistic competence at the cost of accepting an inferior status for his art. Our concern is with artists and philosophers who did not fall in with this suggestion. What was needed, and what they attempted to supply, was an account of artistic knowledge compatible with artistic failure. If such an account was to succeed, it needed to face squarely the motivations behind the tendency to link artistic

knowledge with success. To do so, it had to give convincing answers to the following two connected sets of questions.

> 1) What accounts for the fact that complete bodies of knowledge are not sufficient for success in the stochastic arts in the way comparably complete bodies of artistic knowledge are in the non-stochastic arts? In particular, why isn't the imperfect record of success in the stochastic arts to be attributed to the incomplete character of the knowledge they rely on, to gaps in that knowledge which have to be filled to produce a complete body of knowledge and a genuine art?
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> 2) How is the fact that the stochastic artist knows what measures are required in certain circumstances without knowing that they will lead to the desired effect to be explained? In other words, how can the stochastic artist's pronouncements reflect his grasp of a secure and and certain body of knowledge and yet not always turn out true? How is the stochastic character of an art reflected in the form of the knowledge on which it relies?

Though answers to the first question came in cruder and more sophisticated forms, they tended to agree that the imperfect record of success in the stochastic arts was due to a special feature of matters they dealt with. Unlike the processes with which the non-stochastic arts are concerned, those the stochastic artist deals with are by nature variable and lacking in fixity. Since this variability escapes precise formulation in the precepts of an art, the application of the precepts of a stochastic art is a much less straight-forward business than is the case in the non-stochastic arts (cf. Dionysius Hal. De comp. = Art. script. B, VII, 23). Thus, if he was to succeed at his art, the stochastic artist needed to do more than acquire a mastery of the formal precepts of his art; he also needed to develop a sensitivity to the peculiar features of particular situations, a sense of the opportune moment (ὁ καιρός) which enabled him to undertake the right procedures, at the right time in the right way (cf. Phaedr. 272a). Since this ability cannot be incorporated in the formal precepts of an art, it has to be built up by practice and hands-on experience (Isoc. Antid. 15, 184; cf. Aristotle E.N. 1104 a3-10). This point was often made by contrasting the stochastic arts with the art of writing the letters of the alphabet, an example of the kind of art whose subject matter is such that the mechanical application of the art's rules guaranteed success (Hipp. VM c. 20; Loc. hom. c. 40-45; Isoc. Adv. soph. 13, 10; 13, 12; Aristotle E.N. 1112 b1-6; Phld. Rhet. I 70, 30 ff.). Because of this variability in the nature of the matters they deal with, the stochastic arts rely on precepts which are characterized by a certain roughness and imprecision; they allow for exceptions. But there was a strong tendency to treat the element of variability in the matters dealt with by these arts as a relatively small one. Failures were in the nature of exceptions. This explains the appeals to the for the most part (ὡς ἐπὶ τὸ πολύ, κατὰ τὸ πλεῖστον) which are frequently made in accounts of the stochastic arts. The precepts on which the stochastic artist relied were supposed to hold for the most part (cf. Aristotle E.N. 1112b8-9; Rhet. 1357a4-5). And it was frequently assumed that the true stochastic artist, though permitted a few failures, must succeed for the most part (cf. Isoc. Antid. 15, 184; Phld. Rhet. I 58, 7 ff.; II 125 fr. IX; Diogenius apud Eusebium Praep. evang. IV, 3, 1; S.E. M II 13; Galen De meth. med. X 58, 17 K).

At least in its present form, this account is not a completely satisfactory response to the challenge the stochastic arts faced, however. It leaves several questions unanswered. In the first place, we will want to know what justified the requirement that the stochastic artist succeed for the most part. If nature places constraints on the amount of success that can be achieved in different areas, why should not these constraints not vary from field to field (cf. Phld. Rhet. I 26, 13 ff.)? Moreover, we will also want to know why the constraints imposed by nature on the stochastic artist's rate of success and on the level of precision his knowledge can attain are ineradicable even from the art in its ideal form. In other words, why is it that claims about the lack of fixity characterizing an art's subject matter do not just mean that the knowledge it requires is harder to get or that the knowledge on which it relies in its present form is still incomplete because the practice got off to a later start? Finally, we will want to know why, even if it is conceded that nature permanently bars some arts from shedding their stochastic character, the roughness and inexactitude which is a permanent feature of the precepts they rely on does

not mean that they are not really in the truest and strictest sense of the term (cf. Cicero De orat. I, 92). Defenders of the stochastic arts need to give us a reason to concede that the stochastic arts involve artistic knowledge, albeit knowledge of a special kind, instead of concluding that the precepts they rely on, though not entirely valueless, do not amount to a body of knowledge. In other words, we need to see how the introduction of a type of knowledge with special stochastic characteristics can be justified.

It seems to me that at least one ancient account of the stochastic arts along the lines sketched above handled these questions very well, at least on its own terms. This was the account developed by Aristotle and his followers. As we have already seen, Aristotle is to be credited with a clear statement of the crucial insight that, in the absence of procedures which guarantee success, it is still possible to develop a theory of all the means at the disposal of the artist. The result was that the practitioner who had mastered all of them and developed the ability to select the right ones for the right occasions was as entitled as a non-stochastic artist to lay claim to a complete body of artistic knowledge: though he might fail to achieve a particular sought-for result, he will never fail at his art (Top. 101b5-10; Rhet. 1355b10-11, b25-6). And Aristotle also maintained that the stochastic arts relied on principles which held only for the most part (E.N. 1112b8-9; Rhet. 1357a4-5; cf. Alex. aphr. In an. pr. 39, 25 ff.).

But the best way to see how the Aristotelian approach resolved the difficulties which faced the stochastic arts is to turn to the account found in Alexander of Aphrodisias, who, without departing in any essential point from ideas already present in Aristotle, gave these issues more explicit attention than Aristotle did. Alexander distinguished the stochastic arts from the non-stochastic arts as others had distinguished them from fixed or firm arts (

or epistemai hestekuiai or pagioi) (In top. 34, 2; cf. Philodemus Rhet. I 26, 6 ff.; 59, 17 ff.; 170, 31 ff.; S.E. M II 13). In the non-stochastic arts the procedures through which, and only through which, their aims are achieved are themselves determined: if the procedures are carried out correctly, the end aimed at must result, and its occurrence is a sure sign that they have been carried out correctly (In top. 33, 12-15). On the other hand, the procedures through which the ends of the stochastic arts are realized are not determined in the same way (ibid. 33, 18-20). If the end of the art is to be achieved, the cooperation of circumstances which are beyond the power of the art to control or predict are needed as well (ibid. 34, 1; Quaest. II 16). (And the end may sometimes come about due to luck, when the art is not exercised). For this reason, the stochastic artist turns out to be acting under conditions of uncertainty when he attempts to achieve his end or hazards a prediction. And this is why it is worthwhile for the artist to do all that is possible, because it cannot be known whether the measures decided on will not be effective.

So far, nothing distinguishes this account from the standard treatment of the stochastic arts outlined above. What makes it different is the support it receives from the Aristotelian view of nature. According to that view, knowledge of certain parts of nature could only take the form of for the most part truths, even at the level of first principles. And because these principles turn out to mirror the nature of the matters they describe, when organized and systematized in the appropriate way, they can qualify as a body of genuine knowledge, the kind of knowledge Socrates demanded of an art. Thus the appeal to the for the most part in the Aristotelian account does not look, as it sometimes does in other accounts, like an ad hoc attempt at damage control.

The Aristotelian view of nature is familiar enough in its broad outlines. A natural substance--the clearest examples are provided by individual living things--is the kind of thing it is because of the possession by its matter of the appropriate kind of form. This form is its nature and is responsible for the possession by the thing of the capacities characteristic of its kind. The view is a strongly teleological one: the capacities are present in a thing because they enable it to fulfill its function which, in the case of living things, typically consists in the active exercise of the more important and characteristic of these capacities. Moreover, natural processes are typically directed at, and take place for the sake of, the realization of forms of different kinds in matter and at the exercise of the capacities for which, once realized, these forms are responsible. This is so even when that realization does not take place. There are natural processes which take

place for the sake of ends which are not achieved. Nevertheless--and this is the most important point for our purposes--natural processes reach the ends at which they are directed for the most part. Thus genuine scientific knowledge, knowledge of what things are and do by nature, only embraces what things do always or for the most part; only these things belong to their nature and can be explained by reference to it. Aristotle is content to leave exceptions to the for the most part patterns enforced by the nature of things as anomalies. This is not to say that they must remain unexplained. At least typically, exceptions to patterns which hold for the most part are due to outside interference in the normal and natural course of events; and often enough it will be possible to say what the source of interference is and why it had the effect it did.[2] But such explanations will always take the form of stories about how the normal and natural course of events was hindered. Aristotle does not envisage, even as an ideal, a scientific understanding of the world which puts all outcomes on an equal footing. According to such a view, there would be no events which were exceptions. An explanation in which an object or event is held responsible for interfering with the normal outcome could, in principle, always be replaced with another according to which the actual outcome is the normal and perhaps even required outcome of the process interfered with and the interfering circumstance. But this is not the path Aristotle took.

I have emphasized the teleological character of the Aristotelian approach because, were it not for his teleological commitments, Aristotle's failure to adopt such an ideal might seem to involve an arbitrary rejection of a conception of nature which goes along with it. According to this conception, a thing's nature governs all of its behavior in the circumstances in which it finds itself. The view could come in more and less deterministic versions. According to the first, a thing's nature is a set of dispositions which in combination with the thing's circumstances determines how it will behave. According to the latter, a thing's nature is something like a collection of propensities which make different types of behavior more or less likely in a given set of circumstances. Neither version of this conception of nature lends much support to Aristotle's view that what occurs by nature does so always or for the most part only. And the corresponding restriction of knowledge to what happens always or for the most part seems equally hard to justify (Met. 1027a20 ff.; cf. Alex. Aphr. In an. pr. 39, 16 ff.). For the way a thing behaves for the most part would be due to its nature no more than the way it behaves, e.g., half of the time in a given set of circumstances. And a full account of its nature would explain the behavior it exhibited half the time or infrequently just as much as the behavior it exhibited for the most part. Yet in the teleological context in which it developed, the Aristotelian approach makes a great deal of sense. If we think of the nature of thing as a set of capacities adapted to a specific set of functions, the privileged status accorded to the events which are part of the realization of a thing's nature, or conditions or concomitants of its realization, is a reflection of the fact that these events belong to its nature in as way that others do not. And this account shows how knowledge of the for the most part can be knowledge of the nature of things and hence real knowledge. Truths about what happens for the most part can be recast as truths about the nature of things with the proviso that events come about in accordance with nature only most of the time. Outcomes which do not occur in connection with the natures of things in the way for the most part occurrences do are not more recondite realizations of nature, but interruptions in the normal and natural course of events (or undetermined by the nature of the thing); and their explanation will always remain somewhat haphazard and unsystematic in comparison with the explanation of what accords with things' natures.

It should now be clear how the Aristotelian view of nature made a convincing defense of the stochastic arts possible. Stochastic artists set in motion processes which only work in the

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[2] Of course, developments in nature, e.g., in the life history of a living thing, which do not take place for the most part, at least under a certain description, need not be exceptions to a for the most part pattern of developments in accord with the nature of the thing. Some matters are under-determined by the nature of the thing at issue. Thus the particular color of a human being's eyes is not specified by that person's human nature (Phys.), though the range of colors which will permit the eye to fulfill its function may be, so that it will be because of the nature of a human being that the color of human beings' eyes for the most part fall somewhere within that range.

desired way most of the time; and this is because of the nature of the matters involved. This account leaves room not only for failures which are not the result of artistic error, it makes it possible to see how the stochastic artist can be the master of a body of knowledge no less secure and certain, and no less complete, than the knowledge at the disposal of the non-stochastic artist and still be entitled to entertain hopes which will be frustrated and hazard predictions will not come true. For the nature of the matters which are his concern is not always fully realized. But claims about what accords with their different natures are no less true for that reason. Knowledge of the nature of things, in his area, only translates into knowledge of what happens for the most part in actual fact. Thus the Aristotelian answer to the second question posed above is that the stochastic character of the art is reflected in the for the most part provisoes attached to the account of the nature of the matters it deals with (cf. Alex. Aphr. In an. pr. 39, 25).

At the beginning of this paper I suggested that the ancient debate about the stochastic arts was a good place to look for the emergence of a notion of probabilistic knowledge. Though it might at first seem that the Aristotelian approach would be hospitable to such a development, the Aristotelian view of nature stood in the way. According to that view, events in nature are classified under two heads: either they are part the course of events normal relative to the realization of some nature, or they are exceptions to what is normal and natural relative to that nature.[3] Thus the Aristotelian account provides no motive for distinguishing a range of different relative frequencies and using the knowledge gained in this way to assess the likelihood of particular types of events.

In fact both variants of the alternate view of nature sketched above are more hospitable to the development of probabilistic views. Of course, if the first, more deterministic version of the alternate view is adopted, scientific knowledge ideally consists of a set of exceptionless generalizations which, when applied to a sufficiently complete and detailed description of a state of affairs, would make it possible to see subsequent events as the required outcomes of that state of affairs. But if there are limitations on human knowledge, so that we must conjecture on the basis of partial information, this approach is compatible with an epistemic view of probability which, while assuming that there are hidden factors at work that determine observed outcomes, makes those outcomes more or less likely on the basis of observed relative frequencies of occurrence. If the second, less deterministic version is adopted, it is even easier to see how a probabilistic account of knowledge might be suggested, since scientific knowledge at the ideal limit would be of natural propensities which could not be eliminated from any description of the natural world no matter how fine grained. In neither case would we expect the concentration on outcomes occurring always or for the most part found in the Aristotelian account.

Although the Aristotelian view of nature stood in the way of a probabilistic view of artistic knowledge, it provided a very effective justification for the privileged status granted to the for the most part in the traditional account of the stochastic arts. Without the underpinning provided by the Aristotelian account, the reliance of the traditional account on the for the most part became harder to justify, however. And it did not go unchallenged. Philodemus reports the following objection: "the physician who saves ten out of a hundred difficult cases, e.g., of elephantiasis, is not successful for the most part, but he is a good and worthy physician" (Rhet. II 120). The point is a good one, but the appeal to for the most part success in accounts of the stochastic arts proved remarkably persistent and was still being criticized by Galen centuries later: "if someone errs once in twenty times he has fallen short of invariable certainty, but he is better than the man who errs twice as that one is better than the man who errs three times... and yet all have adhered to the expression 'for the most part'" (In Hipp. prog. CMG V 4,2 204, 19 ff.; cf. 377, 14 ff.; De meth. med. X 58, 17 K).

These objections call attention to two different defects in the for the most part view. The view was motivated in part by the need for a reliable way of distinguishing the (stochastic) artist form the layman. The idea seems to have been that though the layman may chance on an

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[3] with the qualifications set out in n. 2 above.

occasional success by proceeding unsystematically, by and large he will fail, while the opposite is true of the trained artist. However, as Galen's objection makes clear, this is not sufficient. An adequate account of artistic expertise must distinguish the artist not only from the layman but the semi-skilled practitioner and the novice as well. This is part of the requirement that an art must be somehow complete. On the other hand, as the objection cited from Philodemus shows, insistence on success for the most part does not allow for the fact that nature may impose limits on an art which prevent it from achieving success for the most part without rendering the development of the art pointless. Aristotle's appeal to the for the most part was a consequence of his conception of nature; it reflected a condition imposed on the arts by nature. If an account of the stochastic arts invokes a different conception of nature, it can dispense with Aristotle's emphasis on the for the most part, but something corresponding to his insistence that the artist must have achieved a complete mastery of his method to the point of being able to accomplish everything nature permits to achieve his aim is essential. Another view preserved by Philodemus takes account of this fact (Rhet. I 25, 32 ff.): "the stochastic artist achieves his aim as much as nature permits, not [necessarily] for the most part or mostly but much more than the layman." And this is possible for an artist when he has fully mastered an art which is itself complete.

Of course, agreement on this point still leaves much room for dispute about what kind of standards a body of knowledge must satisfy to be complete. The positions different schools took on this question reflected their views on quite general epistemological issues. It was possible for those who believed rational insight into the underlying nature of things was possible to insist that an artist will only be in a position to claim that he is doing all that nature permits when he has a theory of the nature of the matters at issue which makes it clear what constraints that nature imposes on artistic practice. On the other hand, empiricists who were dubious about the possibility of attaining such knowledge, and about it practical benefits even if it were obtainable, vigorously disputed this conception of completeness. Rational and empirical accounts of artistic knowledge were elaborated in considerable detail within ancient medicine and schools of medical Rationalists and Empiricists conducted a vigorous dispute about the nature of artistic knowledge. Though developed with special reference to medicine, their positions are concerned in a perfectly general way with the issues dividing empirical and rational conceptions of scientific knowledge. For the remainder of this paper, I want to focus on the way the medical Rationalists and Empricists used their theories to reconcile artistic knowledge with failure.

One reason to look closely at this dispute is that both schools are more likely to be hospitable to a probabilistic account than Aristotle and his followers. Both were in a position to take account of the criticisms of the for the most part view which blocks the development of such a view in the Aristotelian framework. And the advantages of such an account when it came to reconciling artistic knowledge and failure should be obvious. The appeal to different relative frequencies in the passages cited from Galen and Philodemus do not yet amount to such a view, however. The relative frequencies cited there were used to evaluate artistic competence and made a kind of external probability judgement possible, external because they concern the exercise of artistic knowledge as a whole without reference to the character of the knowledge itself or the inferences it supports. The fact that an observer might expect success from an artist in proportion to the relative frequency of his past successes is compatible with an artistic method which leaves little or no room for degrees of expectation on the part of the artists themselves. It is still possible, e.g., to opt for a Thrasymachean account which attributes all failure to human error. Probabilistic judgements will then concern the likelihood of human error, and not the relative frequency of different outcomes in the processes with which the stochastic arts are concerned. Of course this was not a very attractive option; nor was it a way of defending the stochastic arts. Thus the acknowledgement that a certain rate of failure is to be expected in different artistic practices put a certain amount of pressure on the stochastic arts to internalize frequency based judgements, a strategy which was adopted by the medical Empiricists, who made relative frequencies the object of artistic knowledge. Yet internalization was not inevitable. The medical Rationalists often favored a strategy of insulation, insulation, i.e., of knowledge from failure in practice. And it is their views that we will examine first before turning to the Empiricists' criticisms of them and their own positive account of artistic knowledge.

The Rationalists claimed that their theories gave the physician knowledge of the

underlying causes of disease. And they went on to argue that this knowledge would enable the physician to select the remedies and treatments naturally adapted to counteract the forces producing and maintaining the diseased condition. Thus according to their view the method of medicine was a matter of making inferences from the manifest symptoms of the patient to their hidden, underlying causes and using the information gained in this way to infer the appropriate treatment (cf. Galen De sect. ingred., SM III 7, De causis continentibus = 141, 1-3 D).

Rationalist thinkers developed their theories in a philosophical climate strongly influenced by the Stoics. In particular, the Stoics' insistence on a deterministic account of nature raised the stakes for those who wished to lay claim to scientific knowledge of natural processes. According to the Stoa, every event, no matter how apparently insignificant and fortuitous, was the completely determined and rationally required outcome of preceding events (cf. Cicero Div. I 127). And it could be argue that the conception of knowledge which corresponds to this view, unlike the Aristotelian view it supercedes, leaves no room for unfulfilled predictions and failed artistic procedures. Though there might be matters beyond the reach of the physician's knowledge or the powers of his technique, it was hard to see how he was entitled to failures in prognosis and therapy in those matters where he did claim rationally warranted knowledge. When failures occur in this kind of situation, the choice seems to be between accepting the failure as a refutation of the theory or protecting the theory at the expense of finding fault with the physician. Thus the problem posed by failure was particularly acute for the Rationalists, who laid claim to knowledge of the real, underlying nature of sickness and health.

Their response was to adopt what I have called a strategy of insulation. Though willing to admit that medicine was a stochastic art, they refused to concede this was due to an element of uncertainty in medical theory. The theorems which make up medical knowledge were certain and universal; it was practice, they maintained, which introduces a stochastic element into medicine ([Galen] De opt. sect. I 114 K). In line with this view, Erasistratus, e.g., distinguished the epistemic or scientific parts of medicine like physiology and aetiology from the stochastic parts like diagnostic semiotics and therapy ([Galen] Medicus XIV 684 K). This move is an attempt to defend medical theory by making the application of theory, and not theory itself, responsible for failure. If the explanation is successful, an important class of failures will not reflect discredit on medical theory.

The insulating strategy was not an ad hoc move to defend the Rationalist's claim to certain knowledge by refusing to submit their theories to the test. By their own lights, the Rationalists had the best possible reasons for absolving medical theory of responsibility for the stochastic character of medicine. Rational theories, they maintained, are inevitably abstract and general in character. A rough fit between theory and the particular cases to which it is applied is consequently natural and inevitable. And medical views on the subject were backed up by philosophical views that tied knowledge to the universal and insisted on the corresponding ineffability of the individual.[4]

Rationalists and Empiricists agreed that the doctor must distinguish as many different kinds of patients and ailments as possible in order to distinguish corresponding kinds of treatment adapted to the special features of individual cases (Galen De meth. med. X 207, 5 ff. K, cf. 209, 14 ff.). But the requirement that knowledge be restricted to the general and universal imposed a limit beyond which division could not proceed. In particular, a substantial residue of medically relevant features peculiar to the individual patient could not be the object of medical knowledge. According to the version of this position favored by Galen, the bodily nature of the individual human being was primarily a matter of his unique blend of humors and elements, or idiosyncrasy. Elsewhere idiosyncrasies were thought to account for a great many things about an individual human being, e.g., differences in perception, the amazing ability of some individuals to consume poisons which would kill most others and such like (cf. S.E. PH I 181-3). Rationalist physicians appealed to them in order to explain the stochastic character of medicine. Medicine, Galen informs us:

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[4] Some of the roles this kind of view played in Galen's thought are briefly touched on in K. Deichgraber, "Galen als Erforscher des menschlichen Pulses: Ein Beitrag zur Selbstdarstellung des Wissenschaftlers," Sitzungsber. d. Dt. Akad. d. Wiss. Berlin, 35 (1956), 3-47, repr. in K. Deichgraber, Ausgewahlte kleine Schriften, ed. G. Gartner et al. (Berlin: Weidemann, 1984), 288-326.

has aimed conjecturally (estochastai) at the nature of the sufferer and many doctors I believe, call this idiosyncrasy and they all agree it cannot be grasped (akatalepton). For this reason they concede true medicine (ἡ ὄντως ἰατρικὴ) to Apollo and Asclepius (De meth. med. X 209; cf. 206 K; De dign. puls. VIII 774, 8-9 K; De diebus decret. IX 932, 3 ff. K).[5]

The medicine of the gods envisaged in this passage would be able to take account of individual bodily natures in the way no human science could. The idea on which Galen's claim relies, that the individual in its complete concrete particularity eludes scientific knowledge, is an old one, which took different forms forms in different contexts. There is, e.g., a well attested Hippocratic tradition emphasizing the uniqueness of the individual patient and the need for specialized individual treatment.[6] And, though the matter is of course quite complicated, there is a way of reading Plato and Aristotle according to which genuine knowledge is of the universal, of genera and species, but not of the individuals which fall under them (cf. Rhet. A 2 1356a31-33). Galen's version of Rationalism seems to represent a fusion of this kind of view with the very different outlook championed by the Stoa. Roughly speaking, a Stoic component in his view suggests that there is nothing imperfect or irregular about the nature of the individual or the particular natural processes in which it participates; they are completely determinate and rationally explicable, at least to divine reason. The other component, the restriction of knowledge to the universal and general, is turned into a limitation on human knowledge, not a claim about the imperfection and consequent unknowability of the natural world. Though in some ways similar to the Aristotelian view we have already met with, the resulting views is different in certain crucial respects. In particular, the Aristotelian view needs to appeal to nothing besides the nature of the matter in question to explain the imperfect efficacy of the stochastic arts; it is not necessary to distinguish human and divine knowledge as Galen does.

When this philosophical outlook is applied to medicine, a view something like the following results. Diseases come in genera and species. The generic nature of a disease clearly indicates its generic cure, e.g., if its nature is constrictive, dilation is indicated and so on. So the Rationalist is willing to speak of generic remedies (De partibus artis medicativae ch. V p. 123, 10 ff., Lyons; De meth. med. X 128 passim K). This indication is a matter of certain knowledge. But it is only of limited use, for all sorts of other factors need to be taken into account if the indicated treatment is to be adapted to the particular conditions at hand, e.g., the part of the body affected, the strength of the affection and so on. These can be regarded as differentia which determine the species of the generic affection. And further circumstances need to be taken account of, e.g., the age of the patient, the seasons and so on. So the Rationalists distinguish the principal indication of the treatment derived from the imbalance of the humors and subordinate indications from age and season (cf. Galen De sanitate tuenda CMG V 4,2 159, 17 ff. = 143, 21-30 D).[7] Thus a somewhat idealized picture of rational indication would include a tree with branches for the different species of the disease and sub-branches for other relevant differentiating features. This tree would be mirrored by a tree which distinguished treatments adapted to the different varieties of the disease. Indication works at any level by proceeding from node to corresponding node. And viewed in this way, the indications can be seen to be rationally sanctioned and completely certain. The problem is that the lowest nodes on the tree of treatments do not determine the final choice of the precise treatment. There are no branches on the opposite tree at the level of the individual patient and his idiosyncrasy. The individual's own nature and its interaction with all the factors in question is beyond the reach of the knowledge represented by the tree. Consequently the final determination is not a matter of rational indication but of conjecture. And the situation is made more complex by the fact that sometimes it is not only the final selection of the therapy which is

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[5] I have deparated from Kuehn's text according to which both stochastic medicine and the medicine of Apollo and Asclepius are called "true medicine."This undermines the contrast which is being drawn. For this reason, I believe the first occurrence of "true" ought to be bracketed thus: ἡ [ὄντως] ἰατρικὴ.

[6] Cf. L. Edelstein, "The Hippocratic Physician," in L. Edelstein, Ancient Medicine, ed O. Temkin (Baltimore: Johns Hopkins, 1967), 87-110.

[7] Cf. also Quod optimus medicus sit quoque philosophus, SM II 1, 17 ff.; 6, 11-12.

conjectural; many diseases are also such that exact diagnosis is impossible. Thus in a case were a patient is suffering from one of two diseases compatible with the manifest symptoms he displays, diagnosis will be a matter of conjecture as well. Thus stochastic conjecture enters into medical practice at two points: the final selection of the precise therapy adapted to the particular case at hand can be conjectural (De meth. med. X 181, 17 ff., 206 K); and the diagnosis of the affliction is also sometimes conjectural (De loc. aff. VII 581 K. De plen. VIII, 7 ff. K = 143 D, De sanit. tuen. CMG IV 2 160, 24 ff. = 161 D).

It is now clear in outline how the Rationalist strategy of insulation worked. The fact that medicine was stochastic did not undercut the Rationalist's claim to certain knowledge of necessary connections in nature, all it showed was that this knowledge was at a level of generality too high to guarantee perfect results in practice. The Rationalist allows that he will occasionally fail in diagnosis and treatment, but insists that failures need not imply there is a gap or defect in his knowledge. Rational knowledge was perfectly firm and certain so far as it went; the problem was that it would only take the doctor part of the way to the treatment he ends up administering. Rational indication works like an accurate but not particularly detailed map which provides clear directions to the general vicinity of the cure but not to its precise location.

And, the Rationalists maintained, the contribution of rational theory to practice does not end when conjecture takes over. This claim was the basis of a charge they directed against the Empiricists. An old view gives a considerable amount of credit to practitioners who have experience without theoretical knowledge because of the benefits that come from familiarity with particular cases; Aristotle held that they were more effective than those who were in the opposite position and had genuine theoretical knowledge without experience (Met. 981a14). Galen too has much to say in praise of the Empiricists' close attention to particular cases and individual patients (De meth. med. X 62; 207, 5 ff. K = 153, 3 ff. D). But, as a defender of Rationalist medicine, he held that physicians who had mastered rational theory had advantages in practice which were unavailable to the Empiricist, even when it came to the ineffable peculiarities of the individual patient. For even when it had ceased to provide explicit direction, rational theory continued to guide the practice of the physician. It is true that the Rationalist must go beyond what theory can tell him and conjecture about the individual nature of the patient, but at least he knows what kind of condition it is a particular form of which must be conjectured. E.g., in cases involving an imbalance of the humors, the Rationalist's understanding of humoral pathology gives him an advantage when it comes to the conjectural part of his procedure. He will be able to take account of the factors which interact with the ailment and the idiosyncrasy of the patient much better than the Empiricist who must rely on what has been previously attested in experience. For experience, though of particular cases, is always of particulars observed in the past and it gives no guidance when it comes to new cases in the respects in which they differ from previous cases, or so the Rationalists maintained. The Rationalists charged that the Empiricist will be at a comparative disadvantage because he had to rely on cumbersome syndromes into which all the possibly relevant factors have been added. Consequently he will be dependent on so called exact syndromes the recommended treatment of which is always the same. But these will be of no help to the physician in those situations, frequent enough to be sure, where the observable symptoms are compatible with several different conditions which may require different treatments or where some new feature of the affliction not previously encountered is present (De loc. aff. VIII 14, 7 ff. K = 85 D, De san. tuen. CMG IV 2 161 = 161, 26 ff. D). The Rationalists charged that without the guidance of theory the Empiricist will be unable to make soundly based conjectures. On the other hand, the Rationalist for his part will use what he calls artistic conjecture, a method which falls somewhere between exact knowledge and complete ignorance but is guided by the former (Galen De loc. aff. VIII 14, 7 ff. K = 143, 17 ff. D). If correct, this account makes it possible to see how a complete body artistic knowledge based on rational insight into the nature of things could be compatible with failure.

Of course, the Rationalists' account of medicine's stochastic character did not satisfy the Empiricists. They held the Rationalists to the promise of certainty implicit, they maintained, in the claim to real knowledge of the nature of things. And they argued that the Rationalists' own failures refuted the Rationalist account. Though he was out of symapthy with it (Subfig. emp. ch. ix D), Galen did preserve a few traces of the Empiricists' anti-Rationalist polemic. He reports that the Empiricists think they have refuted the Rationalists when the Rationalists cannot respond to their challenge to give an example of a for the most part theorem which they have made certain

(adiaptotos) and invariable (dienekes) by the addition of reason (logos) (In Hipp. prog. comm. 37, 24 ff. = 107, 21 ff. D; cf. In Hipp. prog.). The Empiricist spokesman in Galen's youthful work On Medical Experience makes a similar charge (153 W):

> As for you, if you also say that you are baffled in these matters and fall short of attaining the truth in regard to them, you prove the case against yourself. If you should say, however, you are not baffled, then pray tell us why you fail to obtain your object, since it is incumbent on you, in virtue of your self-advertised claim to possess knowledge of the paltry things even of this degree of minuteness, that you should always be correct and successful and reach the your goal, as far as is humanly possible.

The Empiricists drew two conclusions from the Rationalists' failures. First, that Rational medical theory had no practical benefit to offer medicine (cf. De sect. ingred. SM III 10, 10-13). This was directly opposed to the the Rationalists' claim that their reason for theorizing was the improved, perhaps vastly improved, ability to make correct prognoses and to treat patients successfully it was supposed to make possible. But, the argument went, the Rationalist was no better off than the Empiricist in this respect. They both relied in effect on what was for the most part true. So Rational theory was at best superfluous, since it added nothing to medicine which could not be acquired by other means. And the Empiricists added that the Rationalist position was fundamentally unsound as an account of the nature of medical knowledge because it offers no explanation for the stochastic character of medicine. Unlike the Empiricist, the Rationalist laid claim to certain and infallible knowledge. The rational inferences he employed were supposed to bestow complete certainty on their conclusions. According to the Empiricists, the result was that there was no place for uncertainty or failure in the Rationalists' account of medical knowledge. If the Rationalists' account were correct, medicine wouldn't be a stochastic art. Therefore, the Empiricists concluded, the Rationalists are compelled by their own standards to regard failures as conclusive evidence that Rational medical theory did not meet the standards of completeness imposed on artistic knowledge.

And the Empiricists went on to point out that their own account did not suffer from the same defects. On their view, the art of medicine is stochastic because the theorems that make up medical knowledge are themselves stochastic ([Galen] De opt. sect. I 114 K). By speaking in this way they meant to call attention to the fact that Empirical theorems included an explicit specification of the relative frequency of the connection they report. Four levels of frequency were distinguished: always, for the most part, (roughly) half the time and rarely (Galen Subfig. emp. 45, 25-30, 58, 15 ff. D; cf. On Medical Experience 95, 112 W; [Galen] Def. med. XIX 354, 12 ff. K = 58 D). Thus the Empiricists' account permitted the form of medical knowledge to reflect the fact that signs have different frequencies of correlation with the things they signify and that different treatments have different rates of success in different circumstances.

The reasons why the Empiricists took this step are not difficult to see. The investigator who doubts that he has, or is ever likely to achieve, rationally grounded insight into the underlying nature of things must content himself with what can be gathered from experience; and he will have to take account of the fact that, unlike rational inference, which offers only one level of total evidential support, experience gives different levels of support to the conclusions it warrants. Because the coincidence of observable events which is the object of medical knowledge are characterized by different frequencies, a committed Empiricist will have to make medical knowledge reflect this fact. Thus the Empiricists' refusal to traffic in hidden natures and rational necessities made it possible for them to take a step which adherents to the Aristotelian account were unable to take. As we saw, Alexander of Aphrodisias explicitly repudiated lower levels of frequency because, according to him, truths about what occurs more or less half the time or less frequently were useless and of no interest to the artist since they lacked the privileged relation to a thing's nature that truths about what happens always or for the most part possess (In an. pr. 36, 19 ff.). But because they made observed patterns of cooccurrence the object of knowledge, the Empiricists were in no position to discriminate against lower levels of frequency. And in fact it turns out that for the most part frequencies are not uniquely useful to the physician.

It is at this point that we arrive at a recognizable, frequency-based conception of probability. In the absence of the kind of knowledge to which the Rationalists laid claim, the Empiricists made observable relative frequencies the object of medical knowledge. It could have

been the case that the observable regularities relevant to the practice of medicine were invariable and universal: if treatments were at all effective, they were always effective; if prognostic signs had any predictive value, their occurrence was always followed by the occurrence they had been observed to precede. Or the regularities might have been subject to relatively infrequent exceptions, so that a grasp of for the most part patterns of cooccurrence would suffice for the purposes of the Empirical artist. In a situation like this, Empiricists and Rationalists might disagree about the correct basis for medical inferences--was it rational insight or observation of recurrent regularities--but neither group would have qualified their conclusions with a full range of different degrees of likelihood. But this is not the case. Observable regularities occur with different degrees of frequency. Experience is not exclusively characterized by patterns of unvarying conjunction. Nevertheless, certain regularities among things that precede follow or occur along with each other are apparent to the patient observer. In order to get probability going, in addition to a recognition that the matters one is dealing with permit of being otherwise, one needs to ask how often they occur in the relevant circumstances and how often they do not. This is the question the Empiricists set out to answer in various matters of interest to the medical art. The innovation that opened the way for the development of a probabilistic conception of artistic knowledge was their recognition that a full range of relative frequencies taken by themselves, without any reference to the underlying causes, was the proper concern of artistic knowledge.

] The Empiricists assigned a crucial role to observed relative frequencies in their account of inference quite generally. The probability of the conclusion of a simple sign inference was the relative frequency of the cooccurrence of the sign and the item it signified (as long as the background evidence consisted of a sufficiently large number of observations). But the Empiricists' account of the transition to the similar--their method of reasoning on the basis of experience in novel cases--also appealed to observed relative frequencies. The degree of probability or warranted expectation appropriate to the conclusion of such a transition should be proportional to the weight of the evidence that counts in its favor. (It is their willingness to talk about hope or expectation in this context which is the basis for talk of the probability of the conclusion.) And the degrees of similarity in the transition to the similar were weighted by reference to the relative frequency of successful inferences based on the type of similarity in question (Subfig. emp. pp. 70-75 D). And the Empiricists' advocacy of frequency based probability grounded in observatopm was coupled with a repudiation of the plausible (pithanon) or the likely (eikos) as they might have been used in rationalist theory construction (De sectis. SM III 10, 9; cf. Subfig. emp. 64, 31 D). They did not see any basis for assessing the likelihood of claims which were true or false universally and invariably but nonevidently, i.e., claims about the permanent underlying nature of things which were not characterized by observable frequencies. They did not allow their opponents degrees of rational likelihood with respect to their theories. Atomic theory, e.g., though plausible to some, struck the Empiricists as a stab in the dark. It was not the kind of thing he would be able to assign a probability to, for the only source he recognized for such judgements was experience, which told him nothing about the nonevident.

It should be clear now why the Empiricists thought they did justice to the stochastic character of medicine in a way that the Rationalists could not. When a certain therapy has been observed to be successful only for the most part, the Empiricist will expect it to be successful in most but not all of the cases in which he makes use of it. The same holds for the other degrees of observed correlation. As a result, occasional failures are an expected and predictable part of medical practice, fully compatible with the claim to artistic knowledge which just is knowledge of the relative frequency of successes. As long as they do not occur more often than the theorems predict, failures are not a reproach to the art of medicine or the medical practitioner. But, if an Empiricist has learned his art well, this is most unlikely to happen. Thus the Empiricists' innovative reliance on empirical probabilities made possible a very effective explanation of how failure is compatible with artistic knowledge. Their account shows how it is possible to maintain that the success an art may achieve is limited by nature without claiming any familiarity with the nature of the matters with which the art is concerned. Of course, one consequence of their view is that it becomes harder to fix precisely the point at which an art becomes complete. They cannot appeal, as Aristotle did, to an account of nature which shows why it places limits on the success of the stochastic arts. Nor can they append to a theory of the kind the Rationalists developed as an explanation of why a complete body of theoretical knowledge cannot be applied in practice with

complete success. In their place, they substituted the notion of a sufficient amount of experience of a wide enough variety of occurences, exdperience which was composed not only of a physician's own observations (autopsy) but also of the collective experience of the medical profession preerved in the writings of trustworthy physicians (history).

The debate between the Rationalists and the Empiricists did not end here, of course. The Rationalists had further arguments to bring to bear to bear against the Empiricist position and there were additional sources of complexity in the Empiricists' position. For one thing, the Empiricists sometimes treated signs as the equivalents of symptoms (De causis continentibus = 140, 22 D). Symptoms, however, are individual features of a case which combine to form syndromes (Subfig. emp. 56, 4 ff. D). Since they refused to postulate an underlying pathology which gave rise to collections of symptoms the Empiricists treated syndromes as unities only insofar as they consist of symptoms which can be frequently observed to occur together in a certain pattern. Different types of these syndromes were distinguished by reference to their evidential functions. Prognostic and therapeutic syndromes are so called because they point to future developments and appropriate therapies respectively (Subfig. emp. 58, 4 ff.; 126, 5 ff.; 143, 19 ff. D). Diagnostic or pathognomic syndromes pose a special problem. For a Rationalist, a syndrome of manifest symptoms can be the basis of an inference to the underlying pathological condition, e.g., an imbalance of the humors. For the Empiricist, however, there is nothing more to a disease (so far as he knows) than the syndrome (Subfig. emp. 57, 2 D. De caus. cont. = 140, 15 D). There is no room for an inference to a new piece of information; Empirical diagnosis seems to be just a matter of applying a name.[8] This view of the matter draws some support from reports that the Empiricists gave names to syndromes for the sake of concise instruction (Subfig. emp. 57, 10 D; De meth. med. X 460, 20 K = 142, 5 D). But this account suggests that the Empiricists were locked into a rigid system of verbal stipulations; each disease was to be equated with an ordered set of symptoms, the presence of which was a necessary and sufficient condition for the presence of the disease.

And as we have seen, this is the way the Rationalists saw the situation. According to them, the Empiricist was burdened with an immense and unwieldy system of distinctions with the result that the slightest change in the symptoms, their order or their intensity required the postulation of a new syndrome (De opt. sect. I 135 K. On Medical Experience 90 W). The Rationalists argued that the welter of syndromes that resulted did not provide a perspicuous basis for therapeutic inference. The Rationalist could make use of artistic conjecture. The Empiricist, by contrast, will be dependent on so called exact syndromes, the recommended treatment of which is always the same. But more often than not the physician is not so lucky, and the observable symptoms are compatible with different affections which may require different treatments.[9] If this argument was right, the Empiricists' claim that experience could be the basis of a body of knowledge complete and systematic enough to constitute an art may not hold up. Empirical knowledge might turn out to be in principle incomplete and unsystematic. The fact that Empirical physicians are able to treat patients effectively must be due to covert reliance on rational thery, for without hidden theoretical commitments the Empiricists could not group symptoms together and identify medically relevant similarities between cases.

Galen and the author(s) of the De optima secta [10] are in sympathy with these charges. Unfortunately they don't tell us very much about how the Empiricists might have responded. But the Empiricists need not have conceded defeat. For one thing there is no reason to suppose that experience could only support conclusions stated in terms of the finest-grained distinctions possible. It might equally well support conclusions about kinds of items and episodes related by similarities of different degrees of generality. The Empiricists may have found that different patterns of symptoms which could be distinguished were better left undistinguished for purposes of diagnosis. The Empiricist will explain that long experience has taught his school that it is

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[8] The view of K. Deichgraber, Die Griechische Empirikerschule (Berlin: Weidemann, 1930, second ed. 1965), p. 310.

[9] Cf. De loc. aff. VIII 14, 7 ff. K = 85 D; De sanitate tuenda CMG V 4,2 1611, 12 ff. = 161, 26 ff. D.

[10] The multiple authorship of this work is discussed by Iwan von Mueller, "Uber die dem Galen zugeschriebene Abhandlung Περὶ τῆς ἀριστης αἱρέσεως," Sitzungsber. d. philosophischen-philologischen Klasse d. k. b. Akad. d. Wiss. 1898, 53-162.

useful to group symptoms together in the way they do though more distinctions are possible. And this does not have to be done on the basis of a prior consideration of the most precise groupings possible. Experience may have shown that certain kinds of imprecise similarities provide the best basis for therapeutic inference. The Empiricists' willingness to use terms borrowed from Rationalist medicine, e.g., plethora, pleurisy and so on, suggests that they did not in practice feel any more committed to excessive precision than the Rationalists. What the Empiricists denied was that this practice implied a commitment to the pathology in terms of which the rationalists explained their distinctions.

With these thoughts in mind it is possible to form a somewhat more sympathetic picture of Empirical diagnosis. One clue about the Empirical conception comes from Galen's comparison of their practice to a view of the Herophileans. It seems that these doctors introduced a tri-chronal division of signs. They take some signs from the past, some from the present and eventually some signs from the subsequent development of the case including the patient's response to treatment. On the basis of these they draw a conclusion about what the condition is or was (De plen. VII 534, 13 ff. K = 155, 35 - 156, 19 D). (Galen has some difficulty treating the last mentioned signs as diagnostic because they are too late to be of any use in therapy.) One possibility, then, is that the whole history of a patient's symptoms was used as the basis of an overall assessment, a backward-looking diagnosis. This wouldn't have been of much use in the treatment of the patient when he was in need of treatment. But it could contribute to a physician's stock of knowledge and be of benefit when similar cases arose in the future. A second possibility, compatible with the first, is that the physician is engaged in diagnosis from the moment he first examines the patient onwards. At each stage he tries to take stock of the disease he is treating in order to be able to predict its future course and decide on an appropriate treatment. He will also be interested in getting a fix on what kind of disease it is he is dealing with. Some diseases will be such that a relatively small set of symptoms seen early on are enough to decide what disease it is. Sometimes it will be necessary to wait for the outcome. And in general further investigation will have to be guided by preliminary, though revisable, diagnoses. And there will be all sort of cases that fall somewhere in between. If the Empiricists shared this conception, drawing a diagnostic conclusion did not involve waiting until all the facts were in. At different stages of the disease the Empiricist would feel different and increasing degrees of confidence in his diagnostic hypotheses about what kind of syndrome he was dealing with.

Some support for this view can be drawn from the Empiricists' willingness to talk of a difference in power among signs (In Hipp. de medici officina comm. XVIII B 645, 8 ff. K = 145, 8 ff. D). Some signs are common to many syndromes, some are common to a few and some, perhaps, belong only to one. In general, the Empiricists suggest, the fewer syndromes a symptom is part of the more powerful a sign it is. Of course, this does not say enough. It would be mistake to suppose that every symptom bestows probability 1/n on each of the n hypotheses that it is one of the n possible syndromes that is involved. I suspect that the Empiricists spelled out the difference in the power of signs in much the same way that they handled the transition to the similar. The evidential value of a sign was proportional to the observed relative frequency of its occurrence in the syndrome in question and the same was true of combinations of symptoms.

One potential problem with this account concerns the level at which the observation is supposed to take place. Will the physician have to have observed (or learned of through history) how often each possible combination of symptoms $S_1....S_j$, $S_1....S_{j+1}$ and so on have turned out to be parts of the syndrome in question in order to form a diagnostic judgement in each case? In the comparable case of the transition to the similar if one has observed that items similar in two respects of a certain kind are more often similar in respect of curative power than objects only similar in one such respect, and that objects similar in three respects of the appropriate kind are still more frequently similar in the crucial respect of curative power, it can be asked, has one observed that the more respects of the appropriate kind in which objects are similar, the more often they are similar in curative power? If so, Empirical sign inferences may also have been less rigidly tied to the observation of precisely the symptoms in question at in a particular case than it at first appears. An Empiricist will not need to have had experience of or have learned of the frequency with which just this set of symptoms has turned out to be the initial stage of a certain syndrome in order to form a judgement about how likely it is that it is this syndrome he is dealing with. In fact, it seems that the Empiricist will rely on something like the Rationalist's artistic conjecture. Theoretically, so to speak, their diagnostic inferences will be

backed up by observation of the tendency of certain types of symptoms to combine in certain ways with more frequency than in others, even when the particular combination that is the basis of his diagnosis in the case in question is not one he has experience of or has learned about in the literature. In practice he will be guided by expectations which cannot be justified with perfect precision. Thus his view will involve an element of idealization just as the Rationalist's view that his conjectures are guided by rational theory does.