

CHAPTER I

Introduction
From Words to Acts?

Philip van der Eijk and Marco Formisano

The Scope of This Volume

In the current boom of studies devoted to ancient technical and scientific writing,¹ the notion of practical applicability has generally been taken for granted. Technical texts, or, more broadly, texts dealing with technical topics,² are believed to be the way they are because they are deemed applicable and capable of being used ‘out there’, outside the texts themselves (and, in the case of texts with didactic intentions, outside the lecture room). Indeed, the very concept of technical texts or *Fachtexte* is an expression of the presupposition that they are useful, or at least intended to be useful, in extra-textual reality, i.e. in the execution of a specific discipline or field of expertise (*technē, ars*). In short, usefulness and practicability (*to chrēsimon, utilitas*) have come to be regarded as prominent features of this kind of text.

Yet, upon closer inspection, both the principle of practical applicability and the category of technical texts itself are distinctly more complex and ultimately problematic when we consider them in the context of ancient textual culture more generally, and of so-called ‘cognitive’ or ‘epistemic’ texts more specifically.

The chapters included in this volume discuss by means of examples, though certainly not exhaustively, the issue of practical applicability across a wide spectrum of ancient texts (and their reception) belonging to different periods, disciplines, genres and intellectual traditions: medicine, mechanics, architecture, agriculture, cosmetics, pharmacology, philosophy, astronomy, geography, zoology, warfare, architecture and the art of love.

¹ For a discussion of some of the more salient trends in recent scholarship see Chapter 2.

² We have added this extension here in order to include texts that *prima facie* would not be regarded as technical texts, such as didactic poetry, dialogues or letters, which, at least on a formal level, appear to belong to the category of ‘literary’ texts, i.e. texts with aesthetic pretensions. Yet this distinction between literary and non-literary texts is profoundly problematic; for a discussion of this and related issues, see Chapter 2.

Despite the great variety of themes and forms, from different angles they all converge on the same point and ask one single question: to what extent does the principle of practical applicability determine the construction of the specific nature of each text?

It is worth emphasizing that this question is different from that of *real* applicability outside the textual sphere. In other words, the chapters in this volume are not so much concerned with the extent to which a given description of a procedure was or is *really* applicable, but rather in observing how the pretention of applicability itself is relevant or even vital to the construction of a specific textual discourse. Within this discourse, particular attention is given to the self-fashioning of the author, the positioning of the text in relation to the extra-textual world and the text's perceived role in modes and processes of teaching and instruction.

Throughout the chapters, two aspects can be discerned that receive attention from all contributors, though with varying degrees of emphasis. First, there is the aspect of textuality, the particular voices of the texts themselves in all their complexity and contradictory qualities. Secondly, there is the contextual dimension, the question of how a text positions itself within the historical and intellectual context in which it was produced (including tradition and the work of predecessors) and how it addresses the relationship between theory and practice. In Chapter 2, Marco Formisano analyses this aspect of textuality and the various issues it raises, and he illustrates this by reference to an ancient discipline in which practical applicability appears vital, i.e. the art of war; he also discusses the wider scholarly context in which this volume aims to situate itself. But, first, some introductory remarks (by Philip van der Eijk) on the context provided by the ancient discourse of science and practice may be appropriate.

Ancient Views on Text and Context, Theory and Practice

The relationship between theory and practice, universal knowledge and application in particular cases, is a recurring theme in ancient philosophical and scientific discourse. Treatises on specific *technai* or *artes* are the obvious place for discussion of this relationship, as a *technē*, or an *ars*, is by definition concerned with practical application or even production in the world of everyday life outside the text. A *technē* that is without practical use is a contradiction in terms, or so it would seem; indeed, one could argue that the proof of a *technē* lies in its successful application; and the proof of successful teaching of a *technē* becomes manifest in the extent to which it manages to equip its students with the ability to apply this in actual practice outside

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the classroom, and to develop this ability into genuine experience and skill.

Yet matters are not as straightforward as they seem. As the chapters in this volume show, there is great variety in the ways in which the relationship between theory and practice is discussed, handled, problematized and rhetorically exploited in a number of different disciplines, such as architecture, mechanics, measurement, agriculture, geography, weather prediction and medicine. This variety is not just a consequence of the different subject matter of each discipline and the requirements this raises. It is also, to a considerable extent, caused by non-technical issues, such as the literary ambitions of the author, the specific formal and rhetorical features of the text, and factors to do with the context or situation in which the text is produced, such as the audience it addresses and the strategic or opportunistic aims the author, by writing the text, wishes to achieve.

One recurring issue in this connection is the bridging of the gap between instruction by the teacher (or by the book), on the one hand, and independent application by the apprentice or reader in everyday life, on the other. How is that gap perceived, how is it discussed, problematized, negotiated, how is it resolved? And how is the extra-textual dimension reflected in the texts themselves? The contributors to this volume show that authors of technical texts dealt with these questions in a number of different ways, and they examine the various reasons for these differences, whether they lie in the discipline itself, in the author's specific take on it (e.g. the specific views an author may hold on controversial, subject-related issues), or rather in literary and contextual factors.

For some ancient authors, the relationship between theory and practice presented an interesting intellectual problem in its own right. Aristotle, in the much-discussed first chapter of his *Metaphysics*, distinguishes different levels of cognition and skill, and lists, in an ascending scale of scientific rigour and universality, sensation (*aisthēsis*), imagination (*phantasia*), memory (*mnēmē*), experience (*empeiria*), skill/art/expertise/competence (*technē*), and scientific knowledge (*epistēmē*). He uses the example of medicine to illustrate these different levels of practical and theoretical knowledge. He distinguishes between doctors who rely on experience only (the *cheirotechnai*), and doctors who build their medical practice on theoretical, scientific knowledge of the body (the *architektones*). As he puts it, the former only know that (*hoti*) a particular drug is effective in the treatment of particular diseases, while the latter also know why (*dioti*) it is effective precisely in these cases (981a5–b17). Yet while the latter kind of knowledge is superior from a scientific point of view, the former, Aristotle

concedes, may be more successful and effective in actual therapeutic practice: and that, it seems, is ultimately what counts, for a patient needs to be treated by a competent, hands-on doctor rather than by someone who may have a profound philosophical understanding of medicine but who lacks practical experience.

That insight immediately raises questions about the right method of instruction, and about the extent to which texts, *qua* texts, are useful instruments in the process of teaching the practical arts. In this volume, our example is Ptolemy, who explicitly addresses the question of the practical usefulness (*to euchrēston*) of written instructions and graphic representations in the domain of geography, cartography and weather prediction (Chapters 10 and 11). For the problem of applicability is not confined to texts written on papyrus or parchment, but also applies to inscriptions, *parapēgmata* (almanacs inscribed on stone) and maps.

Oral and Written Instruction

Within the ancient discourse about the (in)adequacy of texts for purposes of practical application, a further issue raised by ancient authors is the question of oral and written instruction. The pros and cons of written versus oral knowledge were explicitly discussed, not only in such well-known passages as Plato's *Phaedrus* (275A ff.), but also in more technical contexts, for instance in the medical writings attributed to Hippocrates, in Diocles of Carystus and in Galen.³ Throughout ancient medicine, we see a recurring tension between the two. On the one hand, there was a realization of the need for written instruction, enabling greater spread, dissemination and accessibility of knowledge, greater ease of reference and retrieval. On the other hand, there was awareness of the continuing need for oral instruction, allowing for interaction, question and answer between teacher and student, and immediate correction of misunderstanding or mistakes. Oral instruction also offered the scope, for the teacher, to show how to do things and the opportunity, for the student, to imitate this under the teacher's supervision, to repeat and repeat, and thus by trial and error to gain mastery of the skill and to develop experience and dexterity.

The difficulties arising here are easy to imagine when one thinks of a text about how to lay on a specific bandage, or a text on how to take the pulse and distinguish different kinds of pulse by means of the sense of touch.

³ See my discussion in 'Towards a Rhetoric of Scientific Discourse: Some Formal Characteristics of Greek Medical and Philosophical Texts (Hippocratic Corpus, Aristotle)' in E. J. Bakker (ed.), *Grammar as Interpretation: Greek Literature in Its Linguistic Contexts* (Leiden 1997), 77–129, especially 93–9.

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Ancient technical writers clearly tried to present their instructions in ways that would make them easily applicable, self-evident and self-explanatory even to the lay person, the *idiōtes*, who had no ambition to become an expert in the art in question but who would nevertheless benefit from the ability to apply them in practical cases. This is how the *encheirēsis*, the practical procedure or manual, was developed as a distinct genre. In the present volume, an example of this can be found in the Hippocratic work *On Affections* (see Chapter 6), which is explicitly intended for lay people to help themselves in cases of disease and injury when no expert physician is around, or to prevent disease by leading a healthy lifestyle.

Yet at the same time, it is clear, even from a work such as *On Affections*, that authors realized that written texts have their limitations. The inadequacy of the written word in medicine is emphasized more than once by Galen, who stresses the importance of the *phōnē zōousa*, the *viva vox*, which allows direct contact between the teacher and the student, interactive learning by dialogue, and which presents an indispensable dimension of the teaching of the arts.⁴ Galen himself was a prolific and versatile writer, who realized that for the communication of his ideas the written word was essential. Yet he also complains about the misunderstandings and the abuse that other malicious or stupid doctors make of his written instructions.

One way of addressing the problem of inadequacy was the addition of supplementary material, such as anatomical illustrations and diagrams. The earliest examples are Apollonius' commentary on the Hippocratic surgical work *On Joints* and mechanical writings. Yet even here, the use of such materials was anything but straightforward, and scope for confusion and misunderstanding remained. Texts served at best as reminders or aide-mémoires, but could never entirely replace the oral, practical teaching situation.

The Art of Living and the Art of Loving

Medicine, and the other disciplines mentioned above, are all examples of what Aristotle would call practical or productive arts, and a number of these are represented in this volume. Aristotle often uses these arts to illustrate the relationship between theory and practice in another practical

⁴ Galen, *On the Powers of Foodstuffs* 1.1.47 (6.480 K.); *On the Mixtures and Powers of Simple Drugs* 6, proem (11.971 K.); *On the Composition of Drugs according to Places* 6.1 (12.894 K.). Cf. also Diocles of Carystus' reply to someone who claimed to have purchased a medical book (*iatrikon biblion*) and therefore no longer to be in need of instruction: 'Books are reminders for those who have received teaching, but they are gravestones to the uneducated' (Diocles, fr. 6, in P. J. van der Eijk, *Diocles of Carystus: A Collection of the Fragments with Translation and Commentary*, 2 vols. (Leiden: Brill, 2000–1)).

field, which one may call the art of living, the *ars vivendi*: for the question of applicability of general principles arises also in the area of ethics and etiquette. How moral principles and courtesy rules translate into specific actions is by no means straightforward or easy. Again, Aristotle reflects on these matters on more than one occasion in his *Nicomachean Ethics*, e.g. in the final chapter (X.9), where, apart from medicine, he also uses the analogy of sailing: one cannot become a competent and skilful steersman through ‘learning by the book’, one has to be able to apply one’s knowledge in actual practice, and to develop the ability to do so.⁵ Likewise, in the field of ethics, Aristotle famously argues, one becomes a good person not by studying a philosophical treatise on ethics, but by doing good things (*Eth. Nic.* II.1–2). In the present volume, the example of Epictetus’ *Encheiridion* illustrates some of the issues arising here (Chapter 9).

From ethics, it is only a small step to a further practical and productive art that is considered here, the *ars amandi*, the art of making love, an area where the gap between theory and practice is particularly sensitive, tangible, and potentially and dramatically delicate, as illustrated by Ovid’s didactic poem *ars amatoria* (see Chapter 8). With Ovid (as with Galen), we also enter the domain of the literary exploitation of the problematic relationship between theory and practice. Thus some authors claim to aim for usefulness in one respect but have an additional side-agenda as well, like the writers (or compilers) of cosmetic recipe texts with pornographic sub-texts considered in Chapter 7. Other authors implicitly underplay the potential applicability of their material, such as (again) Ptolemy in his work on weather predictions, in which *parapēgmata* serve as vehicles of ‘hybrid practical knowledge’, communicating knowledge about signs occurring regularly but omitting other events linked to the weather in chains of signs, suggesting that information about such signs was either handed down orally or recorded in separate compendia (Chapter 11).

Making Sense of Technical Texts

Finally, the problem of the relationship between theory and practice, between the textual and extra-textual world presents itself to us, too, as

⁵ *Nicomachean Ethics* 1181b2–6 (comparing legislation with medicine):

Neither do men appear to become expert physicians on the basis of medical books. Yet they try to discuss not only general means of treatment, but also how one might cure and how one should treat each individual patient, dividing them according to their various habits of body; these [discussions] appear to be of value for men who have had practical experience, but they are useless for those who have no knowledge about the subject. (Cf. *Politics* 1287a35.)

students of the ancient world, as readers of and commentators on Greek and Latin technical texts. We often wonder, and try to envisage, how a technical text has functioned or worked. In doing so, we sometimes take recourse to such notions as the ‘Sitz im Leben’ of a text, or we develop hypotheses about how the text is supposed to have functioned in a wider didactic setting. We sometimes postulate the presence of diagrams or other audiovisual teaching aids which we assume must have accompanied the teaching. Yet that raises the question of how we determine that setting, other than through inferences based on features of the text. In the absence of independent, contextual information, a certain degree of circularity cannot be avoided here.

However, as said above, the chapters in this volume are not so much concerned with the question of how successfully or unsuccessfully these texts were actually applied outside the textual sphere, but rather with the extent to which the principle of applicability has shaped the text into the form it has acquired. That aspect has not received the attention it deserves, and this volume aims to address this gap in the rapidly expanding scholarly literature on the subject.

The Contents and Arrangement of This Volume

The contributions to this volume have been arranged by subject matter. We begin with the field of mechanics, and the challenges posed by the transition from ‘machines on paper’, as described in construction manuals, to actually working physical mechanisms. Markus Asper, in his account of Hellenistic-Roman mechanical writings (Chapter 3), points out that, as artifacts, machines result from an ‘act’, namely the process of construction. At the same time, machines are usually the result of ‘words’, that is, the product of explicit knowledge that regulates how to build such machines and what to do with them. Therefore, one assumes, writings on such bodies of knowledge may seem to be perfect candidates for the precarious process that turns words into acts. The chapter considers ancient Graeco-Roman mechanical writing, such authors as Ps.-Aristotle’s *Mechanics*, Athenaeus mechanicus, Philo of Byzantium, Biton, Cato maior, Vitruvius and Hero. Throughout these texts, there seem to be several ways to understand ‘act’, i.e. what the author wants his readers to do. Four such ‘acts’ emerge: (i) practical construction; (ii) comprehensive knowledge about construction; (iii) decision-making with regard to the construction of machines; and (iv) scientific explanation of machines. The chapter illustrates these four ‘acts’ and their peculiar means of communication, with some examples.

From here, we move on to architecture and bridge-building. In her discussion of Vitruvius' work on architecture (Chapter 4), Elisa Romano argues that the text of the *De architectura* offers specific clues that one of Vitruvius' aims is the potential application of his instructions. The chapter examines the shape that the idea of applicability takes in the text and the means that Vitruvius offers his addressee to put into practice the rules he sets out. She argues for a higher level of translatability that coincides with the performance of all the potentials contained in the architect's *ars*. Vitruvius invites the architect to judge what is possible and to adapt himself to necessity: it is in that adaptability that he proves both his practical experience and his technical skill and intellectual qualities. In other words, in the adaptability to 'what is possible', the blending of theoretical aptitude and practical ability, of *ratiocinatio* and *fabrica*, is achieved, and so is one of the theoretical requirements of the architect's *scientia*.

Kaiser's discussion of Caesar's construction of a bridge over the Rhine, and Giocondo's reading of this (Chapter 5), shows not only a 'literary' reception but, more relevantly for this volume, an application of Caesar's text. The chapter considers how Caesar's well-known account of the Rhine bridge, which probably aimed at documenting Caesar's military virtues as well as the cultural superiority of the Romans, was read in early modern Europe. On the basis of the *Expositio pontis* (1513), a treatise by the Renaissance architect and humanist scholar Giovanni Giocondo, Kaiser examines especially the visual and textual strategies through which Caesar's chapter was removed from its ancient context and read within a humanist discourse of theory and practice. With his main focus on the technical issues of Caesar's text, Giocondo adapts it to his own contemporary circumstances and thus inverts the original relationship between acts and words.

The practical art of medicine is next (Chapter 6). Pilar Pérez Cañizares considers the transition from words to acts in the domain of Hippocratic therapeutics, with the aim of establishing whether therapeutic instructions (as conveyed in medical texts) could be interpreted and easily followed by their readers. In particular, she examines evidence that hints at specialized knowledge shared by writers and targeted readers, such as references to cauterization with red-hot irons or with fungi, incision, application of cupping vessels, administration of drugs and surgical interventions. The evidence shows that these texts rely on shared knowledge, i.e. empirical knowledge in the case of everyday measures, such as following a diet or administering drugs, and also knowledge obtained from more formal medical training, as in the case of surgical interventions, which could not have

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been carried out without prior understanding of anatomy and training in the use of medical instruments.

We then move to the world of human relationships with the art of love and beauty. In her discussion of Ovid's *Ars Amatoria* (Chapter 7), Allison Sharrock argues that whereas the topos of mixing *utile dulci* is perhaps the defining mark of didactic literature, the major difficulty for Ovid in making claims about the utility of his *Ars Amatoria* was that what he is teaching was illegal when he wrote it. One way of addressing, if not obviating, that problem is to claim that poetry is not useful because it is not actually teaching anything – with all the obvious ironies for a didactic poem. The chapter explores Ovid's rhetoric of utility in his erotodidaxis, including his use of strategies from the more technical end of the didactic spectrum. The claim for utility in Ovid's advice naturally brings it into conflict with the Augustan moral legislation, with ancient and modern debates about the extent to which character and behaviour can be taught, and finally with the extent of the responsibility that literature may hold for the abuse of its lessons by unsophisticated readers.

A related field is ancient cosmetics. As Laurence Totelin points out (Chapter 8), Greek and Roman authors often negatively associated cosmetics with frivolous women. Cosmetics was not a noble art, a *technē*, but a corrupted one, a *kakotechnia*. Totelin deconstructs this moralistic discourse and argues that, despite claims to the contrary, men too regularly used cosmetics in the ancient world. In addition, men may also have employed cosmetic treatises for gratification purposes: they may have read these texts as pornography. Indeed, there was much that pertained to sexuality in ancient cosmetic treatises, which are mostly known to us through fragments preserved in ancient medical texts. These texts included recipes to treat sexual diseases, as well as ingredients that were sexually connoted. Totelin argues that there was much overlap between ancient cosmetology, sexology and gynaecology, and that all three topics may have been covered within the same treatises. These texts were often attributed to women, who would have been seen as experts in these fields.

We then move to the art of living and practical philosophy, exemplified by Epictetus' ethical handbook (*Encheiridion*), a summary composed by Arrian based on the Stoic philosopher's lectures. As Gerard Boter shows (Chapter 9), the purpose of this short work is to provide the reader with practical advice on how to lead his life in accordance with the Stoic ideal of paying attention exclusively to the things within our control: that is, to the way in which we react to everything that happens to us. Discussion

of the theoretical framework is confined to the first two chapters of the work. The *Encheiridion* deals with all aspects of everyday life, stressing the importance of constant philosophical training (*askēsis*), which leads to moral improvement (*prokopē*) and thus to perfect freedom and happiness.

Practical issues in geography, cartography and weather prediction are discussed in Chapters 10 and 11, both in relation to Ptolemy. Klaus Geus studies Ptolemy's use of the words *euchrēstia* and *to euchrēston* in the preface to his famous *Introduction to Geography* (c. AD 150) and shows that Ptolemy attaches great importance to the principle of practical applicability: his experience that maps deteriorate rapidly through the process of copying made him very circumspect in this regard. His work contains practical advice to future map-makers about how to draft maps on the basis of Ptolemy's instructions and tables of co-ordinates without the need to have access to a graphical master copy. In Chapter 11, Gerd Graßhoff shows how weather prognostication, being the oldest systematic inquiry into the regularities of nature and at the same time one with the most obviously practical purposes, laid the foundation of systematic observations of the changing rising and setting events of the sun and brightest stars. He analyses the systematic observational weather programme recorded in the Babylonian Astronomical Diaries and Ptolemy's comprehensive collection of historical weather rules in his *Phaseis*, and the extent to which a concern with practical application is present in the arrangement and presentation of the information.

This is followed by botany and the art of gardening, an area *par excellence* for issues of applicability of technical knowledge. As Christiane Reitz points out (Chapter 12), Columella's work on agriculture is clearly concerned with the practical reality of managing a large estate. To appeal to his readership, the author employs various rhetorical strategies and persuasive techniques in his argumentation. Quotations from poetic authorities, mainly Virgil, convey a certain *ornatus*. This ambitious display of education and learning reaches its peak in the garden poem, in Book 10. By assuming different roles and by means of sophisticated allusions, Columella presents himself as an accomplished poet. The garden poem subtly shifts between different poetic discourses of epic, elegy and hymn. The main aim – as had been modestly argued in the prose preface to Book 10 – is not so much an attempt at a humble follow-up to Virgil's *Georgics*. The author presents himself to his audience as an authority who masters a whole range of poetic codes and traditions that function as part of the overall didactic concept.

Finally, we get to zoology and the challenges the living natural world poses to human understanding and practical management of the