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The Artes Sermocinales in Times of Adversity

How Grammar, Logic and Rhetoric Survived the Seventeenth Century

JAAP MAAT

I Introduction

This paper explores some of the developments in grammar, logic and rhetoric that took place in Europe in the seventeenth century. These disciplines were traditionally seen as belonging together, as they each dealt with language in a particular way. For this reason, they were called the 'artes sermocinales', or arts of discourse. The seventeenth century was a period of radical changes in intellectual history at large, and this paper investigates how the arts of discourse were affected by these changes. In particular, it was a period in which the prestige of the arts of discourse declined, and in which some influential figures argued that much of what they had to offer was of little use. Yet these arts contained a number of doctrines which proved to be so deeply entrenched that they survived almost unscathed in the next centuries. Thus, as usual, we find both change and continuity, and the challenge is to get a clear view of what this consisted of.

It will be useful, then, to ask a few rather obvious questions that may help clarify some of the issues involved, and which I think are ones that may be profitably asked in investigating other aspects of the history of the humanities as well. To begin with, which were the basic concepts, tenets, and methods used by experts in a certain discipline? How did they define their subject, and how did they view the relations with other disciplines? Was there consensus about this, or were there different factions or schools? If so, what were the differences between them? Which problems, if any, did the practitioners of the discipline try to solve? These and similar questions are concerned with what may be called 'internal' aspects. Questions about 'external' aspects include topics like the institutional context of a discipline: how and where were people taught, and how many teachers and students were there? What position did the study of a discipline occupy in society? If these questions can be clearly answered, it is possible to ask about the

dynamics of both internal and external aspects. In other words, it is then possible to examine if there were any significant changes in the content of a discipline or in the context in which it existed.

In order to outline both change and continuity in the arts of discourse in seventeenth-century Europe, then, I shall first briefly address the questions mentioned. Next, I discuss some criticisms that were levelled against these arts by leading writers. Finally, I examine a few developments that took place, not necessarily as a direct consequence of these criticisms, but clearly connected with the trends that motivated them.

2 The status of grammar, logic and rhetoric

From classical times onward, grammar, logic (or dialectic), and rhetoric formed the trivium, a cluster of three distinct but closely related disciplines, each dealing with language in a particular way: it was commonplace to characterize grammar as the art of speaking correctly, logic as the art of speaking truly, and rhetoric as the art of speaking elegantly, or persuasively.

From a modern point of view, it may seem puzzling that all three were seen as dealing with language. That grammar is about language is still straightforward, and the same goes for rhetoric, perhaps somewhat less so. But logic as we know it today might seem to be far less clearly related to language. It may rather be viewed as a branch of mathematics or philosophy. For the period we are considering, logic was undoubtedly a discipline that dealt with language, and this is a difference that is important for our understanding of its history. What logicians were doing in the seventeenth century, and also what grammarians and rhetoricians were doing, overlaps only partly with what practitioners of these disciplines do today.

This raises the issue of what a discipline is, and how we identify it. How much change do we allow a subject to undergo without questioning its identity? These are questions that inevitably arise when we are writing a history of the humanities. A natural answer would be that we identify a discipline by its subject matter. But this does not really help: as the example of logic shows, this may change over time, and worse, we cannot always determine what a particular subject matter is independently of the discipline that studies it. A possible solution may be sought in the fact that similarities and differences between various stages are in general not sufficient to decide the identity question. If there is a causal chain between the stages, change may be colossal without forcing us to state that identity has been lost: babies turn into old people, an orchestra changes personnel. Thus, a discipline may become unrecognizable and yet remain the same in a relevant sense.

However this may be, in the seventeenth century this problem was not acute. Although there were different views of the scope and use of logic, nobody doubted that it was a single, fairly clearly defined discipline, and that much of what it was about was of a linguistic nature. And the same applies to grammar and rhetoric.

A further common characteristic of grammar, logic and rhetoric was that these disciplines were almost universally called 'arts'. They were commonly regarded as instrumental disciplines, consisting of a series of precepts and rules, rather than sciences related to a certain field of inquiry. When textbook writers described the use of these arts, what they habitually did, they emphasized skills rather than theory. The arts were presented and perceived as gateways to the world of learning rather than the substance of learning as such. Nevertheless, there was a strong theoretical component as well, in that the rules of art were based upon and interlinked with the analysis and description of language structure and use.

A feature also shared by the arts of discourse is that all three of them had a long tradition behind them, and that most of their basic concepts and distinctions had been in place since Antiquity. As was also observed by their critics in the seventeenth century, practically all terms and rules they contained came from the classical tradition, and virtually every element of the theories they employed could be traced back to a classical source. These were Priscian and Donatus for grammar, Aristotle for logic, and Cicero and again Aristotle for rhetoric.

In order to answer further questions about the internal aspects of the arts of discourse, we must consider them separately. It goes beyond the scope of this paper to provide a satisfactory account of even the most basic concepts, distinctions and insights they encompassed. Nevertheless, an overview of what an educated person would have become familiar with in the course of learning grammar, logic and rhetoric does not require a thick book. In fact, short synopses of these arts were frequently produced in the seventeenth century. That this was possible is partly due to the fact that a common doctrinal core existed in each of the three arts, in spite of the existence of different schools in logic and rhetoric, and different approaches in grammar – differences which will be ignored here. If we compare writers on these subjects, we find differences in wording, differences in emphasis, and differences in organization, but at least as far as textbooks are concerned (which is of course not all that one should take into account), we also find an overall similarity, the same patterns and the same themes rehearsed over and over again. As an indication of what a useful synopsis would spell out in more detail, an extremely short summary of grammar, logic and rhetoric follows, in that order.

Grammar, defined by many as 'the art of reading and writing', was a rather clearly delineated body of doctrines with its own set of technical terms and sub-

jects that were presented in a fixed order, following a compositional progression from the smallest elements of speech to the largest units. A customary grammar was about a single language, and the pattern it followed was originally devised for Latin. Grammars usually consisted of four parts: the first was usually termed 'orthographia', and its subject was called 'littera'. Under this heading spelling was discussed, but also phonetics. The second part was called 'prosodia', which was concerned with the syllable, and in which matters such as pronunciation and emphasis were discussed. The third part, usually called 'etymologia', was in many cases the most lengthy one. It dealt with the definitions of the various word classes and their subdivisions, as well as the categories such as number, case, person, tense, etc. The fourth and final part, often called 'syntax', was concerned with topics such as agreement and government. An example of agreement is that adjectives are in the plural if the corresponding substantive is; an example of government is that if verbs combine with nouns, the latter must adopt a certain case, e.g. the accusative.

Definitions of logic varied. Some frequent ones were 'the art of reasoning' and 'the art of directing the mind in discerning truth from falsity'. Sixteenth-century definitions of humanist logic, which was a mixture of rhetoric and logic following a pattern devised by Cicero, became increasingly rare. In seventeenth-century logic we find a similar pattern, and a similar compositional structure as in grammar. First, the elements of discourse, namely words, were treated; next, words combined into propositions, and finally propositions combined into discourse and reasoning. The chapters on terms or words usually contained an exposition of the Aristotelian categories (substance, quantity, quality, relation and others), the predicables (such as genus, difference and species) and related subjects. The chapters on propositions dealt with the square of opposition and topics such as the conversion of propositions. The third part, dealing with discourse and reasoning, contained the theory of syllogisms, their figures and moods. Other standard topics of discussion were either contained in one of the first three parts, or were assigned a part of their own; these were, among other things, different sorts of proofs, the topics of invention and the fallacies.

Rhetoric, finally, was often defined as 'the art of teaching or speaking well, in order to persuade'. It also had its standard inventory of technical terms, distinctions and themes. A pattern that was often followed was the one deriving from Cicero's division of the art of rhetoric into five different arts: the art of invention, containing discussion and examples of the 'topics' or commonplaces and their use in finding arguments to defend a case; the art of arrangement, distinguishing and describing the various parts of an oration; the art of style, which discussed the figures of speech, such as metaphor with its variants, e.g. synecdoche and metonymia; the art of memory, containing mnemonic precepts; and the art of

delivery, treating the use of voice and gesture. In the course of the seventeenth century, a number of textbooks appeared which discussed the figures of speech thoroughly but exclusively; others were mainly filled with examples of good writing.

As regards the external aspects of the arts of discourse, it is first of all to be noted that they formed the foundation of all academic education. Pre-university education was dominated by Latin grammar. Schoolboys spent years grappling with the declinations, conjugations and other intricacies of the Latin tongue, in order to get access to the world of learning, from which girls were largely shut off. A major part of undergraduate studies at the university was devoted to rhetoric and logic. A thorough grounding in the arts of discourse was a preliminary to the study of more advanced subjects such as law, medicine and theology. Instruction in the arts included the study of textbooks but also practice in verse writing, declamation and disputation, all conducted in Latin. As a result, almost every educated person to be found in seventeenth-century Europe had a good command of Latin, and was familiar with the 'terms of art' of grammar, logic and rhetoric. They all knew (or at least had once been required to know) what a solecism is, and what synecdoche is and catechresis, which types of amplification could be employed, and what the difference is between a syllogism in Barbara and one in Celarent. And all of them, albeit with unequal success, could apply this knowledge in speaking and writing. The arts of discourse thus formed a common body of knowledge and skill shared by the learned, whether natural scientist, philosopher or lawyer. They shaped manners of thinking and forms of expression in ways that may go unnoticed, because universally shared intellectual idioms tend to remain unarticulated among insiders. Thus, the importance of the arts of discourse for the intellectual atmosphere in seventeenth-century Europe should not be underestimated, although it often is.

Universities throughout Europe were similar enough to allow teachers to move between countries, which they often did. At most universities, the curriculum remained humanistic in organization and spirit. The ideal of education was all-round erudition rather than specialization. Those teaching the arts typically mastered several of them, and combined their teaching with a post devoted to other subjects such as astronomy or geometry. Universities were still the main centre of intellectual activity, although other institutions became increasingly important. Scientific academies and societies were founded, and more and more influential thinkers worked outside the universities, some of them in a setting related to the church, others as independent scholars or in the service of royal and other courts.

3 Critics and reformers

The arts of discourse had taken a central position in education for centuries, but in the seventeenth century this position was challenged by a series of critics. This was a period in which prominent thinkers called for a radical revision of the entire framework of knowledge. A leading representative of this movement was Descartes, who influentially argued for the importance of starting afresh in natural philosophy as well as epistemology. The method he devised for arriving at true knowledge entailed that no element of traditional knowledge could be taken for granted without scrutinizing it anew. Indeed, much of it should be discarded in order to arrive at new insights. Another extremely influential writer was Francis Bacon, who undertook to examine existing disciplines in order to sort out what was useful in them and what not, and to detect gaps in knowledge and flaws in method.

Both Bacon and Descartes were highly critical of the arts of discourse, with logic serving as the main culprit. A major point of criticism was that it was incapable of offering, or guiding the way, to new knowledge. And new knowledge was precisely what had become the most important item on the agenda. This is what Bacon said on logic: 'The logic now in use serves rather to fix and give stability to the errors which have their foundation in commonly received notions than to help the search after truth. So it does more harm than good.'¹ And Descartes commented on logic: 'Dialecticians [that is, logicians] are unable to formulate a syllogism with a true conclusion unless they are already in possession of the matter of the conclusion, i.e. unless they have previous knowledge of the very truth deduced in the syllogism. It is obvious therefore that they themselves can learn nothing new from such forms of reasoning, and hence that ordinary dialectic is of no use whatever to those who wish to investigate the truth of things.'²

A further criticism, especially found in Bacon, is that the arts of discourse were all concerned with language. His main objection against traditional learning as a whole was that it centered on 'words' rather than 'things,' [Aristotle] being always more solicitous to provide an answer to the question and affirm something positive in words, than about the inner truth of things.'³ Bacon's criticisms of the arts of discourse were motivated by a strong dissatisfaction with their subject matter, namely words or language. His famous theory of the idols identified the idols of the market-place, those associated with language, as the most pernicious ones. In Bacon's view, language itself exerted a sometimes harmful power over sound thinking and judgment. True progress could not be expected until the linguistically focused arts of discourse were replaced by methodical investigation of the natural world. In this respect, Bacon can be seen as an early proponent of the belief that there is an antagonism between 'hard', useful science on the one hand,

and the arbitrary and inconsequential opinions of the humanities on the other. Yet Bacon was certainly not in favour of abolishing the traditional arts altogether, and his writings also contained suggestions for linguistic studies which were enthusiastically taken up by a number of scholars later in the century.

In more general terms, what many found objectionable about the arts of discourse was that they were so obviously linked with an attitude towards learning which was oriented towards the past. Training in the arts consisted of studying classical sources and emulating classical models. The study of logic required a painstaking effort to master the moods and figures invented by Aristotle. The study of grammar and rhetoric was intimately connected with the ideal of literary excellence and erudition treasured by the humanists. This ideal was thoroughly authority-bound, seeking examples and wisdom in the writings of Horace and Cicero. This clashed with a forward-looking attitude, a sense of beginning, an expectation of new discoveries which became ever more widespread.

4 Three trends

In the remainder of this paper, I point up three trends which took place against the background just sketched. The first concerns only logic; the second both grammar and logic; and the third a new development in the study of language, connected with grammar as well as logic. That rhetoric thus drops out of the picture is a consequence of the many limitations of this short paper.

4.1 *Eclecticism and distance to the tradition in logic textbooks*

Most of what was written on logic in the seventeenth century is to be found in textbooks. In the medieval period, the popular standard format was a commentary on the work of earlier logicians, mainly Aristotle. It was not unusual that in these commentaries new additions to logical theory were propounded. In the post-medieval period, the commentary format became ever less frequently used, and new additions were increasingly rare. The humanists reorganized logic according to a rhetorical pattern derived from Cicero, at the expense of formal logic. Much of what had been omitted by the humanists was restored in most of the textbooks produced in the seventeenth century, although the medieval additions received scant attention. Most textbooks thus presented a more or less detailed account of Aristotelian logic. The number of different textbooks appearing in this period was larger than ever before, but there was very little that their authors added or changed to the conventional wisdom.

An example, although not fitting in all respects, of such a textbook is John Wallis's *Institutio Logicae* of 1687.⁴ Wallis was a founder member of the Royal Society, but did not agree with the negative Baconian assessment of logic shared by the majority of the fellows. His book is traditional in more sense than one. It presents a detailed and lucid account of the standard subjects of Aristotelian logic, but it also aims to purify logic from what Wallis regarded as distortions, especially some novel distinctions that had been introduced by Ramus (Pierre de la Ramée) in the sixteenth century. These concerned singular propositions, which Ramus assigned a separate status, distinct from universal and particular propositions, and hypothetical syllogisms, which Aristotle, according to Ramus, had failed to recognize as a distinct type of inference. Wallis argued at length that Ramus was mistaken on both counts.⁵ What is important in the present context is Wallis's manner of presentation in the non-polemical sections. In explaining and defining basic notions of logic, he consistently takes a third person's stance. The terms introduced are those that 'logicians' use. The explanation is one that shows what 'they' mean by these terms. The doctrines and the system are thus described from a distance. The reader is presented with a very well-informed account of the terms, doctrines and insights that form an impressively coherent whole. In fact, Wallis's book could serve as a useful introduction to Aristotelian logic to a modern reader. But the theory is presented as something that was invented and completed by Aristotle, with no need of revision. Wallis insisted that logic was a useful and even indispensable discipline, but judging from how he presented it, logic was not a subject with a research agenda.

A similar attitude towards traditional logic, although far more critical than Wallis's, can be found in the Port Royal logic.⁶ As the authors state in a preface, they had undertaken to provide an account of what they considered to be useful in logic, at first assuming that this could be written up in a single day. This reflects a rather disparaging approach to the subject, in line with the Cartesian evaluation of it. The assumption is that there is a finished body of doctrines, inherited from the past, which can be assessed as to their tenability and usefulness. The intention is to sift through them with a view to retaining the useful bits. Some parts of the system turn out to be valuable, some appear to be superfluous on inspection, and others, such as the Aristotelean categories, are even dangerous as they lead to misconceptions. This approach led to a much admired work on logic, in which many of the standard ingredients of logic are rephrased in Cartesian fashion, while it jettisons a number of less central topics in the process.

4.2 *A new research programme: philosophical grammar*

In the course of the seventeenth century, a type of grammar often called 'philosophical grammar' emerged, or rather re-surfaced, as it was in a sense a revival of medieval speculative grammar. It was Bacon who had noted that a more scientific type of grammar was desirable, as opposed to so-called popular grammar, which is 'for the speedy attaining of languages'. This philosophical grammar, by contrast, was to examine 'the power and nature of words, as they are the footsteps and prints of reason'.⁷ Bacon's proposal was in line with a trend in seventeenth-century grammar which became more and more concerned with establishing connections between language and rational thought, while the boundaries between logic and grammar became increasingly indistinct. The emergence of philosophical grammar marked the beginnings of a new research programme; the challenge was to find out how language and thought are connected. The study of language in this context was not an art consisting of precepts and rules, but a scientific effort.

A work on grammar that was explicitly presented as philosophical was Caramuel's *Grammatica Audax* (1654),⁸ the first part of which was said 'to discuss philosophically, abstracting from all languages, the method and technical vocabulary ['second intentions'] of the art of grammar'. Caramuel discusses a peculiar mixture of logical, grammatical, metaphysical and theological topics, and constitutes an admittedly bold (*audax*) attempt to connect them all together.

Another example of a work in which the increase of logical considerations in grammar writing is clearly visible is Vossius's *De Arte Grammatica* (1635),⁹ the most comprehensive work on grammar to appear in the seventeenth century. This monumental work follows the traditional plan, treating letters, syllables, words, and syntax in the usual order, and is humanistic in spirit, presenting a grand synthesis of existing scholarship on more than 1,400 pages. But Vossius's grammar has many traits which it shares with philosophically oriented grammars. It prefers semantic criteria over criteria of linguistic form wherever possible and gives prominence to logical considerations. To cite a single example, Vossius defends the view that noun and verb should be seen as the primary word classes to which the other ones are subordinate or even reducible. This view, as Vossius indicates, derives from Aristotle and was common in the logical tradition from Antiquity onwards.

A final example is the *Grammaire générale et raisonnée* (1660) by Arnauld and Lancelot, also known as the Port Royal grammar,¹⁰ which was a very influential grammar of the philosophical type. This relatively short treatise is a *general* grammar in that it discusses the technical vocabulary of grammar with respect to universal properties of languages. It is also a *rational* grammar in that the authors are concerned throughout to show that languages are rationally constructed

inventions. They claim that in order to understand the foundations of grammar, it is necessary to know 'what goes on in our mind'. When they go on to specify these mental processes, it turns out that they are the three operations traditionally distinguished in logic as the mental counterparts of linguistic units: conceiving, judging and reasoning, which correspond to words or terms, sentences or propositions, and discourse or syllogisms, respectively. And there are several other aspects of this grammar which show a mixture of logical and grammatical approaches.

There are some general characteristics that these philosophical grammars have in common. First, linguistic form and usage are given less prominence than semantics; these grammars are concerned with general linguistics rather than the structure of particular languages. Second, logical terminology and distinctions are frequently used, and attempts are often made to reduce usage to underlying, 'logical' structures. Third, some of these works criticize existing languages for being irregular or otherwise defective. Fourth, these grammars are traditional in the sense that most of the traditional concepts and distinctions of grammatical theory are retained, although alternative systems of parts of speech are sometimes proposed.

4.3 *New horizons in linguistics*

The opposition between words versus things mentioned earlier opened the way to a new approach to language, according to which natural languages were just one of a range of possible symbolic systems capable of representing and communicating knowledge. From this perspective, natural languages were primarily seen as a tool, the efficacy and usefulness of which can be judged on independent grounds. And if they failed to meet certain standards, which they in fact did, it seemed obvious that they should be replaced by better ones. Thus, both the goals and the methods of the study of language changed: from describing existing usage, with a view to copying the classical models (essentially a reproductive activity) to exploring and devising new methods of communication and representation (a constructive enterprise). This approach was fed by a fresh appreciation of what symbolic systems in general could accomplish. The example of Chinese writing, among other things, showed that written symbols could be used to represent things, rather than words. This type of writing was known as a 'real character', as opposed to a vocal character representing words, such as alphabetical writing. The concept of a real character appealed to many writers, and various proposals to put this in practice were put forward.

In the 1660s two artificial languages were published, which were meant to fulfill the same functions as natural languages. Their authors duly emphasized the

primacy of things over words. In *Ars Signorum*,¹¹ George Dalgarno stated that this art of signs should follow the art of things. And John Wilkins, in his *Essay*, claimed that ‘things are better than words,’¹² which was completely in line with what he said in an earlier treatise, claiming that a newly invented real character would contribute to ‘the spreading and promoting of all Arts and Sciences: Because that great part of our Time which is now required to the Learning of Words, might then be employed in the Study of Things.’¹³

In theory, then, everything seemed clear enough. A newly invented artificial language was to be built from scratch, and to take real things as a starting point. The task facing the language planners entailed first of all devising a new vocabulary, which had to provide a transparent representation of ‘things’. But this presented an enormous practical problem. Existing languages were no longer eligible as a model in determining which things needed to be named for the defects of existing languages in this regard were precisely the problem that the artificial language was supposed to solve. The language planners needed a language-independent inventory of ‘things’ that were to be provided with a name. This issue was debated by Dalgarno and Wilkins, who disagreed about the solution. I will focus on the course of action eventually taken by Wilkins. In his project there was a strong connection between linguistic and scientific concerns.

Wilkins, perhaps somewhat unexpectedly, resorted to logic. That is to say, he used a method which was closely similar to what each and every undergraduate was familiar with from the first part of a logic course, which treated of the categories. Exactly why Wilkins did so is not entirely clear, but it is certain that the logic textbooks provided at least the rudiments of the inventory of things that Wilkins was looking for. The logic textbooks, as noted, started with a treatment of terms, and arranged them according to the ten Aristotelian categories. Aristotle himself had never gone into any such detail, and neither had his commentator Porphyry, whose famous tree was expressed in a single, not so very long sentence. In the course of history, the tree of Porphyry was fleshed out in ever more detail, and by the time Wilkins was taught logic, the manuals he must have used provided an all-encompassing inventory of existent things, in hierarchical arrangement. Thus, the category of substance was illustrated by a Porphyrian tree in which not only humans, but also animals, plants, and non-living things had their proper place. Not only the category of substance, but other categories, especially those of quantity, quality and relation, were divided into subordinate categories in a similar way. Authors of these textbooks usually explained that it was up to the various disciplines to study and describe the things designated by the terms in these classificatory tables, but still it was logic that provided an all-embracing categorization, and in this way brought the various disciplines together.

Wilkins used similar tables as a basis for his artificial words, using many of the traditional categories and their subdivisions, although not without modifications. In doing so, he let an important component of the traditional art of logic, heavily criticised by Bacon and closely associated with the words of the master officially denounced by the Royal Society¹⁴, in through the back door.

However, as indicated, the classificatory tables of the logic textbooks only provided the top of the hierarchy. To make these tables suit his purposes, Wilkins had to expand them to contain much greater detail. In order to achieve this, he asked and got assistance from various experts, notably John Ray, who helped him draw up the tables of plants, and Francis Willoughby, who assisted with the tables of animals. Thus, Wilkins managed to integrate knowledge belonging to botany and zoology into a linguistic project, entirely in the spirit of the logic textbooks, leaving it to the experts to fill out the details of the overall classification.

As it happened, Wilkins's project was considered a failure shortly after the *Essay* was published. And those involved in the project realized that the attempt to merge science and linguistics in this way would be unsuccessful even when they were still working on it. The scientists, such as Ray, were convinced that it was useless to try and classify plants and animals using a pre-conceived, linguistically motivated pattern.¹⁵ And Wilkins himself, when writing the *Essay*, realized that the purpose of constructing a practicable artificial language was ultimately incompatible with scientific accuracy. Instead, it was commonsense notions as articulated by natural languages which, he perceived, would have to be taken into account rather than scientific theory. Although many modern commentators have held the view that Wilkins's philosophical language was primarily meant to provide a means for expressing new scientific knowledge, we have his own word that it was not.¹⁶

5 Conclusion

To conclude, the traditional artes sermocinales survived the seventeenth century almost undamaged. Grammars modelled on the classical pattern continued to be written in the centuries afterwards, textbooks on logic and manuals of rhetoric repeating the teachings of the ancients who invented them were produced or reprinted in great numbers throughout the eighteenth and nineteenth centuries. Formal disputations, in the form of thesis defences which heavily relied on syllogistic reasoning, remained part of academic life until well into the nineteenth century, and rhetorical terminology is still taught and used in language teaching. At the same time, however, a series of new developments had been set in motion, which gradually caused the traditional arts to become more and more marginalized and ultimately superseded by new approaches to the study of language.

Notes

- 1 Francis Bacon, *Novum Organum* (1620). 'Aphorisms concerning the Interpretation of Nature and the Kingdom of Man. Aphorism XII.' In: James Spedding, Robert Leslie Ellis, and Douglas Denon Heath (eds.), *The Works of Francis Bacon, Philosophical Works* (London: 1857-1874), Vol. IV, 48.
- 2 René Descartes, *The Philosophical Writings of Descartes*, Vol. 3, ed. and trans. John Cottingham, Robert Stoothoff, Dugald Murdoch, and Anthony Kenny (Cambridge: Cambridge University Press), 36-37.
- 3 Francis Bacon, *Novum Organum*, 'Aphorism LXIII' (Spedding, Ellis and Heath), Vol. IV, 64.
- 4 John Wallis, *Institutio Logicae, ad communes usus accomodata* (Oxford, 1687). Wallis wrote an English version of this book in 1685, but this was never published. An edition is now being prepared by the Wallis project in Oxford.
- 5 See Jaap Maat, 'Defending Aristotle: Singular Propositions are Really Universal, and Hypothetical Syllogisms are Really Categorical', forthcoming.
- 6 Antoine Arnauld and Pierre Nicole, *La Logique ou l'Art de Penser* (Paris: 1662).
- 7 Francis Bacon, *The Advancement of Learning* (1605). Book 2 (Spedding, Ellis and Heath), Vol. VI, 285.
- 8 Juan Caramuel y Lobkowitz, *Praecursor logicus complectens grammaticam audacem* (Frankfurt, 1654).
- 9 Gerardus Joannes Vossius, *De arte grammatica libri septem* (Amsterdam: Blaeu, 1635).
- 10 Claude Lancelot and Antoine Arnauld, *Grammaire générale et raisonnée* (Paris, 1660).
- 11 Dalgarno, George (1661). *Ars Signorum, vulgo character universalis et lingua philosophica* (London: J. Hayes). Text and English translation in David Cram and Jaap Maat, *George Dalgarno on Universal Language: The Art of Signs (1661), The Deaf and Dumb Man's Tutor (1680), and the Unpublished Papers* (Oxford: Oxford University Press, 2001).
- 12 John Wilkins. *An Essay towards a Real Character and a Philosophical Language* (London: Samuel Gellibrand & John Martyn, 1668), epistle dedicatory.
- 13 John Wilkins, *Mercury, or the Secret and Swift Messenger* (London: John Maynard & Timothy Wilkins, 1641), 56.
- 14 From 1663 onward, the Royal Society's motto was 'nullius in verba', using Horace's phrase 'Nullius addictus iurare in verba magistri' (Horace, *Epistles* I.i, 1.13-14).
- 15 Nevertheless, it has been suggested, in a recent study on the history of botany, that Ray's experiences with Wilkins's tables influenced him positively in developing his famous natural method. Sarah Scharf, *Identification Keys and the Natural Method: The Development of Text-Based Information management Tools in the Long Eighteenth Century* (PhD Diss. Toronto: University of Toronto, 2007).
- 16 Wilkins, *Essay*, 194, 196. See Jaap Maat, *Philosophical Languages in the Seventeenth Century: Dalgarno, Wilkins, Leibniz* (Dordrecht: Kluwer, 2004), 214-215, 259-260 for discussion.