
The Da Vinci Codices. Between Historical Lexicography and Knowledges History

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Abstract

The paper discusses the principal issues connected with the study of lexica of ancient specialist languages in the early centuries of vernacular in Italy, focusing on the formal typologies of definitions in Leonardo da Vinci's works. The insertion of definitions means, above all, an attempt to establish fixed points in the confused linguistic composition of annotations; in the second place, it indicates a growing awareness of a new cognitive fact, preceded or followed by a new linguistic elaboration; the coincidence between model (drawn, at times only sketched) and a word; the temporary suspension of the transferability of terms between fields of knowledge and different linguistic registers; the possibility to verify one or a short list of meanings, at the synchronic level and in a diachronic perspective; the identification of syntactic structures which are becoming conventional for one sole type of communication.

Keywords: historical lexicography; Leonardo da Vinci; definitions

1 Introduction

The title of this paper, referring to the famous novel by Dan Brown, underlines the brain-teasing nature that a lexicographer's work often takes on when working with sectoral or specialist languages in the early centuries of vernacular in Italy.¹ Mobility within the various fields of study corresponds to a strong transferability of lexica, not only from science to science but from science to technical fields and to common language and vice versa. The propensity to generate neosemes and neologisms, the frequency of processes of synonymy and polysemy, as well as the recurrence of first and only occurrences document the fluidity of the semantic relationship between the word and the referent, creating a potholed journey for the lexicographer.

¹ In this paper I chose to use the expression *specialist languages* rather than the other widespread term *sectoral languages* based on the indications in Gualdo 2009, p. 395. According to Gualdo (see also Cavagnoli 2007: 13-17) the adjective *specialist* "makes it possible to draw a boundary between the forms of communication that spring up in highly specialized fields (among specialists, in fact), and that in those fields are used in their entirety, and the forms of communication that, despite their specialist terminological basis, continually and indelibly interact with common language and are aimed at a general undifferentiated audience. Obviously, and as I will explain in the paper, the present meanings of the words *specialization*, *specialist*, *common language*, *popularization* cannot be strictly applied to ancient language; however, I will adopt the label of *specialist languages* since the discussion involves technical-scientific fields of knowledge and aims at critically discussing the contribution of lexical definition to the formation of knowledge and languages increasingly more specialized (a critical review of alternative terminology can be read in (Gualdo & Telve 2011: 17-21).

2 Ancient Specialist Languages: Open Questions

Along with these problems, common to the study of all ancient specialist languages in any language, there are others specific to lexicon studies in Italy. Italian literary language and consequently its lexicography traditionally neglected this part of the regional and later national vocabulary despite its increasing relevance, and subsequently the Italian bibliography of studies is relatively recent and still filled with holes.² It is enough to consider that the first study on the language used by Leonardo da Vinci dates back to 1983, and the author opens his work with the complaint that “il problema ancora oggi rappresentato dal testo di Leonardo e da un isolamento linguistico della sua scrittura [...] dipende soprattutto dalla nostra scarsa conoscenza dei sottocodici e dei registri pertinenti”, which can be explained by the poor “bibliografia storico-linguistica” and the inadequate “strumenti di ricerca, a cominciare dai vocabolari storici della nostra lingua, notoriamente inadeguati sotto questo profilo”.³ Today this gap has been filled in part by the database of the Opera del Vocabolario Italiano (www.oivi.cnr.it), which has collected all texts published in vernacular from its origins through the 1300s. The chronological time period, however, is limited, and numerous technical-scientific texts still need to be published in print. Art databases which collect texts from diverse centuries and make it possible to search by forms, entries, or co-occurrences are still lacking.⁴

These factors as a whole make extremely complex the verification of the relationship between definition of lexical repertoire and technical and scientific evolution, although it should constitute the main objective of these studies. Unlike what occurs for modern science according to Thomas S. Kuhn’s famous and controversial theory, in fact, for ancient science the determination or redetermination of the meaning of words does not only follow but accompanies and at times even

² Paola Manni summarizes the evolution of specialist languages in a historic perspective in the *Introduction* to (Manni & Biffi 2011: XIX-XXIII).

³ (Altieri Biagi: 1998 75).

⁴ The closest database with these characteristics is the ATIR database, which collects on CD-ROM works on optics and perspective of various nature (translations in vernacular, works on theory of perspective, lives of artists) and of wide chronological range, including works spanning two and a half centuries. In Italy there are also similar projects in the same field: but they usually follow the model of the *Bibliotheca perspectivae* of the Museo Galileo – Istituto e Museo di storia della scienza in Florence (the scans of treaties of Italian and European perspective from the 1400s to the 1700s can be consulted for free, but it is not possible to search the texts digitally). Still scarce are projects like the digitalization of the *Vocabolario* by Baldinucci, that can be searched by forms and partially by headwords (<http://baldinucci.sns.it/html/index.html>), and the database “*Gli anni della Cupola, 1417-1436*”: *Archivio digitale delle fonti dell’Opera di Santa Maria del Fiore*, which supplies the list of frequency for forms taken from the entire corpus of digitalized documents. Different still is the case of publication online of the *Indici di frequenza*, drawn up and printed at the time by Paola Barocchi, from the *Vite* by Giorgio Vasari: in addition to this section, on the site of the foundation Memofonte in Florence, it is possible to access the database *Vasari scrittore* (<http://vasariscrittore.memofonte.it/home>), where the artist’s minor writings and letters are digitalized and can be searched by forms (in addition to using a series of other filters: sender, recipient etc.). “*e-Leo*”: *Archivio digitale di storia della tecnica e della scienza* represents a compromise between the two options: the works – including, a very precious support for scholars, all the writings known to date of Leonardo da Vinci – are published in scanned and critically transcribed formats and can also be searched electronically. The search, however, can only be done by forms and the programme does not underline the occurrence on the paper form nor on the transcription.

precedes the moments of crisis and successive development of systems of knowledge: but the verification of this information is made difficult by the lack of stable fulcra.

The delay in research and the lack of tools caused not only important problems in creating spaces for study on the synchronic materials, but also the radical lack of a long range diachronic perspective. In this regards as well, Altieri Biagi's work (Altieri Biagi 1999) can be credited with defining new directions for studies on ancient specialist lexica, based on a sampling which focuses more on the importance of change in time⁵. It is a matter of lines of continuity which were interrupted at various points: in the last twenty years the gaps have been filled in part by the flourishing of critical editions of ancient scientific and technical texts, often with linguistic commentary; the area of vernacularization has been thoroughly investigated. Finally, more recently, in addition to fields of lexicon and word formation, Gualdo (2009: 395) noted that:

la ricerca linguistica [...] sta valorizzando anche altre peculiarità, come, per es., la sintassi e la tessitura testuale, e sta indagando, con risultati molto convincenti, anche gli effetti che i canali e i contesti d'uso, o le necessità pragmatiche (cioè come il linguaggio si adegua agli intenti della comunicazione e al rapporto tra emittente e ricevente) producono sui linguaggi specialistici. Tale allargamento di prospettive ha reso correnti le formule di "comunicazione specialistica" (Cavagnoli 2007: 17) e di "discorso specialistico" (cf. Gotti 2005).

3 A Case of Study: the Language of Leonardo's Works

Based on what has been said thus far, the language used by Leonardo da Vinci represents an exemplary case of study. The privileged collocation, at the crossroads between the Middle Ages and the Renaissance; his keen participation in the revival of the arts and sciences in just about every field of knowledge; the deliberate use of an experimental work method, which comes from training in "studios" while examining what earlier traditions offered; the original and preferred choice of the vernacular, which was fortified, however, by his aspiration to master texts in Latin; the inauguration of lexical and syntactic strategies that in vernacular still held little or no history and will constitute the bases of technical and scientific languages in the centuries to come; evidence of the reciprocal relationship between linguistic innovation and the development of knowledge all make Leonardo's works a fundamental space for the study of ancient specialist language, whether it be on a synchronic level, on a diachronic level, or as regards the textuality.

Among the various branches of knowledge investigated by Leonardo, the field of optics and perspective presents traits that make him unique in regards to studies in ancient specialist languages: Leonardo is amongst the first – in Italy and Europe – to experiment, study and describe with drawings and words the technique of perspective whose models and lexica come from the ancient science of optics widely used in medieval European universities and from Latin translations of Greek and Arabic works. This means he continually moved about – at least since his first years in Milan – between high culture and life in workshops, between lexica derived from Latin and lexica from common language: from this experience Leonardo wrote the texts that include the first occurrences of the entry *perspective* tied to definitions and explanations and strengthened by the multiplication of meanings and compounds.⁶

⁵ Diachronic paths on sectoral and specialised languages are proposed in (Trifone 2006), (Mattarucco 2012); the first history of *linguaggio tecnologico* is traced for the first time by (Gualdo 2013); short historic summaries accompany the presentation of different specialist languages in (Gualdo & Telve 2011).

⁶ The early diagrams involving perspective date back to 1483-85 (cf. Kemp 2004: 90); the first occurrence of

In the second place, Leonardo's models and lexica hold a remarkable force of irradiation: to begin with, the theoretical and practical reflection on perspective covers the entire period of Leonardo's writings which lasts over thirty years; it continues therefore – and this fact is even more important – beyond the artist's lifespan thanks to the compilation of *Libro di pittura* by his pupil Francesco Melzi, who passes on concepts and words written by Leonardo to the great season of treatise writing of Renaissance art (from Vasari to Borghini to Lomazzo); and finally it produces echoes beyond the Sixteenth century, from the *Vocabolario dell'arte del disegno* by Filippo Baldinucci (1681) to the *Teorica della pittura* by Antonio Franchi (1739) and the *Termini di arte nelli scritti di Lionardo da Vinci ed altri* by the Neopolitan Vincenzo Corazza (ca. 1798: reproduction in facsimile and transcription with numerous annotations in Buccaro 2011). The fame of Leonardo's writings does not only stretch over time, but also space: during the artist's life through exchanges with the early European treatise writings (Jean Pèlerin also known as the Viator, Albrecht Dürer), and after his death, thanks to the enormous success of the *princeps* from the *Libro di pittura*, printed in Paris in 1651 with French translation with parallel text.⁷

4 Definitions: Formal Typologies

Many of these paths still need to be mapped out. Although the characteristics of the language used by Leonardo in his writing may change like a chameleon, I would like to focus on one feature in particular since it will be the most useful to examining the problem of method posed in the first part of the paper: I am referring to his attention to the explanation, the meta-linguistic diligence that pervades the clearest and most articulate pages in these writings. The insertion of definitions means, above all, an attempt to establish fixed points in the confused linguistic composition of annotations; in the second place, it indicates a growing awareness of a new cognitive fact, preceded or followed by a new linguistic elaboration; the coincidence between model (drawn, at times only sketched) and a word; the temporary suspension of the transferability of terms between fields of knowledge and different linguistic registers; the possibility to verify one or a short list of meanings, at the synchronic level and in a diachronic perspective; the identification of syntactic structures that are becoming conventional for one sole type of communication: in one word, as Paola Manni said, “al crocevia tra lessico e testualità, le definizioni rappresentano un momento altamente significativo che contrassegna la nascita di una terminologia che ambisce a proporsi come scientifica”⁸.

The formal typologies of definitions in the field of optics and perspective, in particular in the codices

the entry in the definition of “techniques of drawing that consists in projecting a three dimensional image on a flat surface” dates back in Italian to the *Trattato di architettura* by Antonio Averlino also known as the Filarete (ca. 1458-1464); the description of the *De pictura* by Leon Battista Alberti, which Filarete knew well, is earlier (1436) but the technique is not associated with the entry *prospettiva*. The earliest occurrence in vernacular of the word in a thorough descriptive contexts is dated to the *De prospectiva pingendi* by Piero della Francesca (1482): thus, immediately after Leonardo's first occurrences (for a detailed study of the occurrences of the word before and after Leonardo see the entry *prespettiva/prospettiva* in (Quaglino 2013a: 220-222); a concise presentation of the meaning of the entry and the compounds that come from this in (Quaglino 2013b). For a review of the optic theories from the Medieval to the modern age see Lindberg 1976.

⁷ The work was recently republished, with an excellent introduction by Anna Sconza (Léonard 2012).

⁸ Manni 2008, p. 28, with examples of comments from Leonardo's notes on applied mechanics; some of the comments in the anatomy notes were examined in (D'Anzi 2011).

of France, are numerous and differently marked.⁹ In an ideal scale from the simplest to the most complex, from the least to the most structured, at a first level we can place explanatory procedures written as lexical annotations: alongside the term or expression considered difficult are explanatory terms, expressions or periphrases, usually introduced by the conjunction *cioè*:

I lumi de' lumi, cioè il lustro¹⁰ di qualu(n)que chosa (H 90[H² 42]v).

And it is often associated with an illocutionary syntactic tendency, which develops the annotation, in narrative meanings as well, and refers to the abacus tradition:

- La dirittura, cioè se ttu sè nel meço o da lato o da cha(n)to della chosa che ttu riguardi (A 36v).
- La dista(n)tia, cioè quanto tu stai lontano a vedere la chosa (A 36v).

At another level of reformulation, for both critical understanding and the quality of abstract methods, the explanatory procedures are found as definitions. The simplest model establishes a relationship of equivalency between the noun and the object by inserting the verb *essere* or other verbs as a copula; it is the model par excellence of the demonstrative definition in the fields of mathematics and geometry:

O(n)b(r)a è privatio(ne) di luce e sola opositione de' corpi de(n)si oposti a' raçi luminosi (A 102[Ashb. 22]r).

[Lume] particulare [...] hè il sole o altro lume di finesstra o ffuocho (E 3v).

The relationship of equivalency can also be established in a less direct way, by mitigating devices such as *è detto, si dice, si domanda*:

Piramide <è detta da due linie> sono dette que[lle] linie che si partano da' superfiiali stremi di ciaschuno chorpo e p(er) distante cho(n)chorso si co(n)duchano a j° solo pu(n)to (A 3r).

I lumi sono di due nature: l'uno si doma(n)da originale, l'altro derivativo (A 94[Ashb. 14]v).

Quello si dice ess(er)e lume primitivo, il quale allumina primame(n)te i chorpi onb(r)rosi (C 16v).

L'ochio à in sé una sola lini[a] posta in meçço a infinite altre linie aderenti a quella, la quale è detta centrale (D 8v).

The basic model can then be varied, enriched and complicated in various ways. Two definition equivalents can, for example, be placed side by side for comparison; the result is increased conceptual clarity, resulting from the comparison between opposites. At times the contrast is emphasized by the fact that the concepts are expressed by compound expressions, formed by an

⁹ Conventionally the codices of France refer to Leonardo's twelve codices presently found at The Institute de France in Paris: they are marked with the letters A, B, C, D, E, F, G, H, I, K, L, M (call numbers from 2172 to 2185) and cover a chronological time period 30 years long, between 1486 and 1515; the modern critical edition (Leonardo 1986-90) offers, in addition to the description and the history of each codex, the anastatic reproduction of each page with a critical and diplomatic transcription on the opposite page. The transcription that I present in the following examples is mine, carried out directly on the anastatic copies in accordance with the criteria elaborated by Arrigo Castellani and recapitulated in (Manni & Biffi 2011: xxxi-xxxii). I indicate in square brackets the integration of omitted letters or words, in pointed brackets the parts eliminated (crossed out) by Leonardo, and the parts to be edited between slashes.

¹⁰ The meaning of the entry *lustro*, which is better understood when compared with other occurrences, is the ancient meaning of 'luccichio, riflesso luminoso', in particular caused by a bright ray which hits a wet surface (see Quaglini 2013a: 146-147).

identical noun and an adjective with the opposite meaning:

Che difere(n)tia è da lumi a lusstri e chome i lusstri no(n) sono inel numero de' cholori, ed è senpre bianco¹¹ e nascie ne' cholmi de' bagnati chorpi (A 112[Ashb. 32]v).

Che difere(n)tia è da o(n)b(r)a co(n)giu(n)ta coi corpi e o(n)b(r)a separata. O(n)b(r)a co(n)giunta è cquella che mai si parte dai corpi alluminati [...].Onb(r)a seperata pò essere e non essere creata <dallo> dal corpo¹² (A 102[Ashb. 22]r).

Another syntactic development that can intensify the effect of the definition equivalent is the effect of distinction:

L'onb(r)e <si> dirivative sono di tre nature, delle quali l'una è dilatabile, l'altra cholunnale, la terza choncorre(n)te al sito della interseghatione delli sua lati (E 32r).

Li colori accidentali delle fro(n)de delli alb(er)i sono 4, co[è] o(n)b(r)a, lume, lusstro e ttranspare(n)tia (G 24r).

Antithesis and division are two fundamental rhetorical processes of classical argumentation: in addition to the mathematic and geometry traditions, this is the other important repository of textual models of the new science in vernacular. These well-tested developments are added to an original inclination to figurativeness, which corresponds to the natural talent of the artist as well as to the didactic manner of many of Leonardo's pages:

P(er)ché la Natura fecie la popilla co(n)vessa, cioè rilevata come parte d'una palla (D 1r).

E cquesta impre(n)siva dell'omo risspetto a cquela del cufo è come una gra(n) sala che à lume p(er) i^a pichola <p> busa, risspetto a una pichola sala tutta ap(er)ta; ché nella gra(n) sala v'è notte di meço gorno e nella pichola, aperte, v'è gorno di meça notte, no(n)n esendo <nu> il tempo nuvoloso (D 5r).

La natura à riparato alla virtù visiva, quando ella è offesa dalla sup(er)chia luce, di ristrigniere la popilla dell'occhio, e cquando è offesa dalle diverse osscurità, d'allargare essa luce a ssimilitudine della bocha della borsa. E ffa qui la natura come cquel che à troppo lume alla sua abitatione, che serra una meça finesstra e più e me(no) secondo la necessità; e cqua(n)do viene la notte esso apre¹³ tutta essa finestra p(er) vedere meglio <lume> de(n)tro a detta abitatione (D 5v).

The definitions for comparison become more frequent in Leonardo's later annotations and are frequent especially in the D codex, the shortest and the most compact of the codices small in size as well as the most theoretical: just ten pages almost entirely dedicated to the physiology of the eye and to the study of the pathway of the image inside the eyeball, through the optic nerve, up to *impressiva*, the physical organ of perception which coincides with the anterior ventricle of the brain.

At the opposite end chronologically, or rather in the first pages dedicated by Leonardo to perspective, there are many procedures of more marked explanation that involve the writer personally. This type of meta-linguistic comment, which gives names to things, denominating them, is used to introduce newly coined expressions: Leonardo probably formed them by analogy using those belonging to the scholarly tradition, which the writer adheres to during his early years in Milan.¹⁴

¹¹ ed è sempre bianco *in between the lines*.

¹² -o *in between the lines*.

¹³ *In the ms.* ap(er)te.

¹⁴ There are many examples: I took just one. Among the neo word formations for composition, Leonardo's lexicon includes the pair *lume originale* / *lume derivativo*. The expressions mean respectively "direct light"

Originale dicho essere quello [*scil.* lume] che diriva da va(n)pa di foco o da lume di sole o d'aria (A 94[Ashb. 14]v).

Through an act of denomination one of the most original and long lasting innovations of the painter Leonardo, the aerial perspective, is introduced:

Ècci j^a altra prospectiva, la quale chiamo aerea, i(n)p(er)ò che p(er) la varietà dell'aria si pò conoscere <la dista(n)tia di> la diversa<ità di varie> dista(n)tie di vari edifiti terminati ne' lor nascime(n)ti da j^a sola linia (A 105[Ashb. 25]v).

5 Conclusion

As you can see from this final example, the author's definitions are not always enlightening for the modern reader: in many cases these, on the contrary, complicate the work of the lexicographer who is caught off guard by the opaqueness of the ancient text, which can be substituted only by the patient work of comparison with other occurrences of the same term or expression, inside or outside of the sampling of texts examined.

But there is no doubt, in conclusion, that the variety and complexity of the contexts analyzed highlight the central role of the explanatory proceedings in respect of the main issues raised at the beginning of the paper: they stop or at least slow down the transferability of the ancient vocabulary between different technical and scientific fields; allow consequently to set coordinates and plot maps in the unstable repertory of ancient specialized languages; feed the reflection on the relations between lexical development and advancement of knowledge and sometimes clear them. The most elaborate examples finally show the loan agreement from literary to technical writing.

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and “reflected light”. No trace of these compounds are found in the previous Latin or Vernacular traditions. In a work that Leonardo had to have known well enough, the *Perspectiva communis* by John Pecham, the compounds *lux primaria* and *lux secundaria* occur, however, with identical meanings. It may be that the frequency of compounds in Latin manuals also influenced Leonardo as a formal indication, giving him a practical structure (adjective plus noun) and already equipped with a stable set of rules in ancient specialist languages. Whether or not he knew Pecham work, the *princeps* was published in Milan between 1482 and 1483 and edited by Fazio Cardano, mathematician friend of Leonardo, and probably guided the artist in the translation of the work's preface, conserved in the Codex Atlanticus, c. 543r (see Leonardo 1973-1980).

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