Reconstructing late analytic philosophy.
A quantitative approach[1]

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Abstract: Our aim in this paper is to present a quantitative approach to history of late analytic philosophy. In the first section, we focus on methodological issues. We discuss the relation between history of philosophy and metaphilosophy, distinguish between qualitative and quantitative history of philosophy, and present the theoretical framework we choose for a quantitative study of late analytic philosophy, namely scientometrics and citation analysis. In the second section, we discuss the results of our method. We present a list of high-impact authors in late analytic philosophy, and we analyze the evolution of the field in the light of citational networks (science maps) generated by VOSviewer. Finally, we propose several lines for further research.

Keywords: quantitative history of philosophy; late analytic philosophy; scientometrics.

1. *Introduction*

In this paper, we present the first results of a quantitative approach to history of philosophy, focusing on the case of late analytic philosophy.

The first section of the paper is devoted to methodological issues. We start by distinguishing history of philosophy from metaphilosophy (§ 2.1), before going on to contextualize quantitative history of philosophy, comparing it to more traditional, qualitative approaches (§ 2.2). Paragraphs § 2.3-2.4 are devoted to present the backbone of our quantitative approach, namely citation analysis. We discuss the theoretical framework of citation analysis (i.e. scientometrics) and consider the extent to which it is applicable to the history of analytic philosophy. We argue for a sharp distinction between the brute citation score of an item (author or paper), and its philosophical quality, and

offer three theoretical arguments in its support (§ 2.5). We then operationalize the notion of late analytic philosophy, reducing it to a corpus of philosophical journals, from which articles and then citations are extracted (§ 2.6-2.7). We take the resulting corpus of more than 4,000 papers as a good representation of late analytic philosophy. Paragraph § 2.8 of this section briefly describes VOSviewer, the tool we used to analyse the data.

On the basis of these data and in the light of the methodological cautions previously mentioned, in the second part of the paper we attempt to answer two research questions, namely 1) Who are the most cited authors in late analytic philosophy? 2) What is the relation between philosophical sub-disciplines (e.g. metaphysics, epistemology, philosophy of language, etc.) in late analytic philosophy and how have such relations changed over time? In addressing the first question (§ 3.1), we present and discuss a list of the most cited authors in our corpus, offering two "canons" of analytic philosophers, namely the canon of classics and the new "canon". Moreover, we compare our results with qualitative accounts of history of late analytic philosophy. In dealing with the second question (§3.2), we use so-called "science-maps" to visualize both the overall structure of the discipline in the last thirty years and the evolution it has undergone. We interpret the pattern shown by maps as mirroring the increasing specialization of analytic philosophy, and we discuss whether specialization is an essential feature of late analytic philosophy.

We conclude by suggesting several lines of further research in quantitative history of analytic philosophy.

2. *Methodological issues*

2.1. Metaphilosophy and history of philosophy

According to Tripodi (2015), considerations carried out by analytic philosophers upon analytic philosophy have taken, in the last decades, mainly two forms: *metaphilosophy* and *history of (analytic) philosophy.*

Metaphilosophy can be defined as "the project of examining philosophy itself from a philosophical point of view – it is the philosophy of philosophy" (Rescher 2014: XI). Its mission is to facilitate an understanding of how philosophy works. Metaphilosophy is not at all a creation of analytic philosophy, since its origins can be traced back at least to Aristotle's writings. Indeed, as noted by Robert Nozick, metaphilosophy is, implicitly or explicitly, a proper part of every philosophical inquiry (Nozick 1981) given the self-reflective nature of philosophy in general. Following Nicholas Rescher's account,

metaphilosophy has two dimensions: one historical (or descriptive) and one normative (or prescriptive). Roughly, historical or descriptive metaphilosophy is concerned with how philosophical inquiry should be conducted, whereas prescriptive or normative metaphilosophy deals with what can and should be done in cultivating the subject (Rescher 2014). In the contemporary analytic landscape, Williamson (2007) can be considered the most influential in providing a normative metaphilosophy of contemporary analytic philosophy, a real manifesto of the key metaphilosophical concerns of present analytic philosophy (Tripodi 2015).

The other strand of reflection is history of (analytic) philosophy, a flourishing field that in the last thirty years has produced a vast literature, such as companions (Beaney 2013, Moran 2008), dedicated journals (*Journal for the History of Analytical Philosophy*, *HOPOS*), and a scholarly society (Society for the Study of the History of Analytical Philosophy). Before considering it in detail, however, we want to address briefly the complex relation between history of philosophy and metaphilosophy. On the one hand, history of philosophy can be considered a possible approach, among others, to descriptive metaphilosophy[2]. On the other, however, metaphilosophy can be assumed as underlying every historical reconstruction of philosophical past. In particular, it can be argued that a (normative) metaphilosophical standpoint is always present, albeit implicitly, in the work of the historian of philosophy, in the same manner that a certain philosophy of science is always presupposed by the historian of science (Lakatos 1970). Indeed, the historian of philosophy needs a normative ideal of philosophy at least for two aims. First, a metaphilosophical criterion is needed to determine what counts as philosophy and what does not, and second, to define what contribution a particular author makes to the development of philosophy. Without such a metaphilosophical framework, even the constitution of a philosophical canon is impossible, since there would be no way to distinguish the "key" authors from the "minor" ones.

History of philosophy and metaphilosophy are therefore doubly bound. History of philosophy is part of the descriptive side of metaphilosophy, whereas normative metaphilosophy is part of the history of philosophy, or, more precisely, is part of the *philosophy of* the history of philosophy.

2.2. History of (analytic) philosophy: a classification

In this section, we shall attempt to provide a possible classification of the state of the art in history of (analytic) philosophy, in order to determine the

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[2]   Another approach is, for instance, sociology of philosophy. See Heidegren & Lundberg (2010) for an introduction.

area in which research presented in this paper is meant to contribute. Before starting, we want to highlight the following disclaimer. Although a good starting point, the classificatory matrix we are going to propose is not intended to be exhaustive. Our main aim in this part is to situate our research in the present landscape, rather than providing a definitive account of the state of the art[3].

Given this premise, we draw from the social sciences (Bryman 2012) a first distinction concerning the methodology used in writing history of philosophy[4]. From this point of view, we can distinguish between *qualitative* and *quantitative* approaches to the history of philosophy. The next two paragraphs are devoted, respectively, to the former and the latter.

2.2.1. Qualitative history of philosophy

Qualitative history of philosophy currently represents the majority of the work conducted in the field. It relies on the traditional tool of historiography of philosophy: mainly, close reading of texts. However, given this minimal methodological *trait d'union*, the qualitative production still differs widely under a number of aspects, such as the tools used, the scope of the reconstruction, the critical import attached to history of philosophy and the role attributed to social factors in shaping philosophical change.

As for the tools, we find a continuum of studies spanning between two extremes. On one side, there is research conducted by professional historians (such as Bruce Kuklick: see Kuklick 2001) using strictly historical methods (archival research, study of unpublished materials, previous versions of texts and private letters) (e.g. Reisch 2005). On the other side, we find philosophers approaching history of philosophy with strictly philosophical tools, such as conceptual analysis and rational reconstruction, often considering historical works as part of a wider philosophical project (e.g. Dummett 1993).

As for the scope, qualitative history of philosophy spans from the micro to the macro scale, from the careful study of one single author (Sluga 2011, Monk & Palmer 1996, Monk 1996, Haller 1991) to general histories (Tripodi 2015, Soames 2003, Stroll 2000, Biletzki & Matar 1998) and companions (Beaney 2013), passing by careful study of one school (Richardson & Uebel 2007, Stadler 2003; Giere & Richardson 1996) or period, with a particular focus on early analytic philosophy (Glock 1997, Simons 1992, Coffa 1991, Hylton 1990).

One interesting feature of contemporary qualitative history of philosophy

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[3]   For a comprehensive review of the literature see Tripodi (2015) and Beaney (2013).

[4]   In the following, history of philosophy is meant always as history of analytic philosophy, even if we believe that the classification we propose is relevant (possibly with some modifications) for the history of philosophy in general.

is the amount of critical import attached to the historical enterprise. Next to "Weberian" value-free historians, indeed, we find *engagés* scholars, who see the history of analytic philosophy alternatively as a heroic enterprise (Biletzki & Matar 1998) or as the "history of an illusion" (Preston 2007). Tangential to the appraisal of analytic philosophy and its history is the literature dealing with the so-called analytic-continental divide (Donahue & Espejo 2016, Levy 2003, D'Agostini 1997).

2.2.2. Quantitative history of philosophy

The research presented in this paper, however, belongs to the second, less common approach: *quantitative* history of (analytic) philosophy.

Quantitative history of philosophy is a very recent field[5], characterized by the use of a range of quantitative methods in studying and reconstructing history of philosophy. The production in the field can be divided in two strands. The first focuses on philosophers, the second on philosophical production.

The philosopher-oriented approach deals with the *profession* of philosophy, addressing the growth of professional philosophers in the twentieth century and its consequences in terms of intellectual development (Marconi 2014). The reports of the APA are an interesting source for understanding how philosophers (not only analytic) deal with the quantitative side of their profession (see Quinn 1987 and Schwartz 1995).

The second strand concerns philosophical production and can be divided in two types of research. The first focuses on the *intellectual content* of philosophical production, adopting a distant reading approach to texts, in order to process their content in a quantitative fashion. This type of research is very recent and still fragmented (see Alghren, Pagin, Persson, & Svedberg 2015 on the text analysis of *sorite* and free will debates; see also the cited bibliography). The second focuses on the *relations between philosophical products*, drawing theories and methods from scientometrics. Scientometrics is defined as the study of the "quantitative aspects of science and technology seen as a process of communication" (Mingers & Leydesdorff 2015, 1), developing "the quantitative methods of the research on the development of science as an informational process" (Nalimov & Mulcjenko 1971, 2). The research we present in this paper falls into this latter research programme.

Within the classificatory matrix we provided, then, our paper is meant to be a contribution to *history of analytic philosophy* (not to metaphilosophy), taking

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[5]   However, a first germ of this approach can be traced back to Wundt, who in 1877 wrote a state of the art of German philosophy using a table representing the number of philosophers belonging to each school (Wundt 1877, 495).

the *quantitative* (instead of qualitative) *methodology* side and, within it, choosing the *philosophical production* (instead of philosopher) oriented approach, with *scientometrics* (instead of distant reading) as theoretical framework.

2.3. Quantities concerning analytic philosophy as historical phenomenon

Before we present our results, however, let us spend some words on the use we are going to make of scientometrics in the context of history of analytic philosophy.

If a quantitative approach to history of analytic philosophy is adopted, the first question one should answer is: what is *quantitative* in history of analytic philosophy? In other words, what can be *measured* in analytic philosophy? So far, quantitative approaches to history of philosophy have provided two answers to this question (see above): the number of philosophy *producers* and the number of philosophy *products*.

The first are the people professionally engaged in philosophy that actively produce philosophical content. They form a population whose evolution in time can be traced in a historical perspective.

The second quantity concerns instead the *products* of philosophical research, that is to say the outcomes of research, such as monographs, articles, books, collections, etc. Again, they can be considered under two perspectives: either as bearers of what sociologists of knowledge name intellectual content (Mannheim 1936) or as nodes in a system of communication.

If we consider the first option, the research outcome is secondary with respect to the intellectual content it bears, which is, in turn, the object to be quantified. Intellectual content is what qualitative historians of philosophy commonly take as philosophy *an sich*, namely a set of abstract "philosophical objects" (such as theories, arguments, theses, problems and the like) for which the material container plays only the role of support for communicative purposes. A quantitative approach to intellectual content is still a very recent research programme. Currently, software for text analysis providing maps of keywords can be regarded as a first step in this direction. However, as such products are in an early stage of development, obtaining results sufficiently reliable for historical reconstruction seems, for the moment, impossible.

A more feasible way to quantifying research outcome comes instead from the second option: conceiving research output as interconnected items in a complex web of mutual links (i.e. nodes in a network). Scientometrics approaches the research output precisely in this way: as a point in the communication system of science (Wouters 1999). Following scientometrics, we can consider then the philosophical outcome in the same terms, representing it as a node in a network, provided with some mathematical properties. We argue

that this kind of approach might offer a viable way of pursuing a quantitative approach. However, we have to determine what the links among the items (the so called *edges*) are.

2.4. Scientometrics and theories of citation

According to scientometrical theory (Mingers & Leydesdorff 2015, De Bellis 2014) the links between nodes should be identified with the *citations* among items. Each document contains some references, each of them pointing to another document, so that for every document in a set it is possible to assign a number of *references* (the sources that it cites) and a number of *citations* (the documents by which it is cited). The second quantity is equivalent to the scientometrical notion of "impact" or citation score: the higher the number of citations that an item receives, the higher its impact in the relevant community. Is impact an indicator of the scientific quality of the item? Does a high citation score imply a high quality? Scientometricians and sociologists of science are divided on this (Bonaccorsi 2015). In order to introduce our perspective on the relation between impact and quality in analytic philosophy, a key point of our argument, we will now consider briefly the two main positions about this topic.

Advocates of the first argue that the relation between citations and quality is linear: the higher the citation score, the higher the scientific quality of an article. This position is grounded in the "normative theory of citation", i.e. the theory of citation entailed by Robert Merton's normative theory of science. According to Merton and his school, the citation plays a precise role in the scientific community: it is the way in which scientists pay their intellectual debts towards authors whose work they use. When an author makes use of another document, the theory says, she pays her intellectual debt by citing the source in the references. In this, scientists' citing behavior would follow the so-called Mertonian norm of communalism, in which scientists recognize the work of their peers by citing the sources[6]. Under this assumption, the citation would correspond, in the famous phrase of Merton, to a "pellet of peer recognition" (Merton 1973). If this is the case, then, a widely-cited document can be assumed to have raised wide scientific consensus (Cole 1992, Wouters 1999), since lots of scientists recognize it as useful for their work. Because scientific consensus is meant to be, in a way, bound to the recognition of scientific quality, it follows that high impact works (i.e. a works with a high number of citations) tend to be also high quality works.

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[6]   See Kaplan (1965) for a detailed picture of the relation between communalism and the citation behavior of scientists.

However, the normative theory of citation's equation between impact and quality has been widely criticized by the advocates of the socio-constructivist approach, the second position in the debate. The socio-constructivist theory of citation, grounded in the constructivist sociology of science (Knorr-Cetina 1981, Latour & Woolgar 1986), casts doubt on the assumption that scientists recognize intellectual debts when citing. Its advocates argue on the contrary that scientists have complex citing motives. In particular, they cite more for persuasion and social networking purposes than for recognizing intellectual debts (Gilbert 1977). From this it follows that the number of citations does not straightforwardly correspond to the scientific quality of an item.

Now, the dispute between normative theory and socio-constructivism is focused on citation and citing behavior in *science*. The literature about this topic has not considered (analytic) philosophy so far: we do not know the citing motives of analytic philosophers, nor if they follow the Mertonian norms or not. No comprehensive study of the "citation culture" (Wouters 1999) of analytic philosophy is, to date, available. Therefore, it is not possible to decide on empirical grounds in favor of a normative or socio-constructivist theory of citation for analytic philosophy.

Nevertheless, we shall present three theoretical reasons that invite to keep separated the two notions.

2.5. Impact and quality in analytic philosophy

We believe that it is reasonable to assume that each work in (analytic) philosophy has (at least) two attributes: impact and quality. We define explicitly impact as *the number of citations a work receives in the philosophical community,* i.e. as its citation score. There are three reasons that led us to keep separated the two notions of *impact* and *quality* for the case of analytic philosophy.

First, we are not interested in the reasons why members of the community cite the works they do cite. In particular, we are not interested in determining whether philosophical works are cited because of their (perceived) quality (as normative theory assumes) or because of other, non-intellectual reasons (as socio-constructivism claims). It follows that, in this paper, the notion of "impact" is not meant as a proxy of quality, but instead as a measure of the "attention" that a contribution obtains in the community.

The second reason rests upon the idea that philosophical "quality" is an elusive notion. In whatever manner we define it, however, it is for sure a *normative metaphilosophical* concept. It is *normative* since quality implies a set of standards, on the grounds of which a work can be judged. It is *metaphilosophical* because the standards concern how *philosophical* research should be

conducted. Since in this paper we do not want to address metaphilosophical issues, we will leave aside the notion of quality because of its metaphilosophical status, focusing on the notion of impact. Impact is indeed neutral in respect to metaphilosophical values and desiderata, because it does not entail any judgment about the rightness or wrongness of the citing motivations. In our picture, impact is considered as no more (and no less) than the result of the aggregated behavior of the community members, without any normative implications about the correctness of the behavior in itself. Quality, as a normative notion, should be therefore kept separated from impact, which is an empirical notion regarding the aggregated behavior of citing individuals.

Finally, the third reason depends on the difficulty of measuring quality in a strictly quantitative manner. Even if a metaphilosophical consensus is reached about metaphilosophical desiderata, it is not straightforward that these desiderata could be easily translated into a metrics. Moreover, even if such a metrics could be attained, it would probably take the form of a rating, rather than a ranking[7]. This is likely to imply a huge loss in the information carried by the metrics and its usefulness for informative quantitative analysis. On the contrary, impact is intrinsically a quantitative notion. Being already a number (a citation score), it does not need any translation from a qualitative context. Furthermore, it can easily be used to generate a ranking (e.g. arranging documents from the most to the less cited) suitable for statistical analysis.

In the light of these three arguments, in this paper we will focus on *impact* as the key concept for developing a quantitative approach to the history of analytic philosophy.

[7]   The difference between a rating and ranking consists in the fact that, in the former, works are judged against a set of standards, whereas in the latter each work is compared to each other. Classically, a rating produces quality categories labelled with symbols (take for instance the ratings produced by credit rating agencies like Standard & Poor's) whereas a ranking produces a chart (see e.g. the university rankings such as the QS World University Ranking). That a ranking is more informative than a rating in the case of philosophy seems to be clear as soon as we consider cases in which agencies of evaluation of university and research provided a quality evaluation of scholarly journals based on ratings, in fields where bibliotemetrical metrics were not available (see Galimberti 2012). Take for instance the Italian National Agency of the Evaluation of University and Research (ANVUR), which opted for a minimum rating process instead of a ranking procedure. ANVUR divided journal in only two quality slots: A-journals ("riviste scientifiche di fascia A") and non-A-journals ("riviste scientifiche"). In the case of philosophy, the output of this rating process was that more than 300 journals were rated A. Being this number so big, and having the rating only two values, it is evident that the amount of information that can be extracted from this data is outstandingly low. If almost everything is rated A, it is arguable that A does not mean anything anymore even in terms of quality standards. Moreover, even this almost meaningless rating was harshly criticized by Italian scholars (Galimberti 2012).

2.6. The Citation Index

In order to measure impact, namely a citation score, a citation index is necessary. A citation index is defined as "a bibliographic tool … that lists all referenced or cited source items published in a given time span"[8]. The citation index lists, in alphabetic order, all the references given in bibliographies or footnotes of source articles arranged by first author. Each reference is followed by brief descriptions (the citations) of the source articles which cite it. The citation index represents scientific literature "in the same way as a telephone book creates an image of the inhabitants of a city" (Wouters 1999: 5).

Eugene Garfield created the first citation index in 1964 at the Institute for Scientific Information (ISI) in Philadelphia (USA). It was called the Science Citation Index and indexed mainly scientific journals. Today it covers 3741 journals. In 1956 and 1975, Garfield launched respectively the Social Science Citation Index (SSCI) and the Arts & Humanities Citation Index (A&HCI), covering social sciences, arts and humanities. Today their coverage amounts to, respectively, 1700 and 1130 journals. The indexes can be accessed online mainly by the Web of Science (WoS) portal. At the beginning of the XXI century, two other citation indexes were launched: Scopus, by Elsevier[9] and Google Scholar, by Google[10]. In our research, we decided to use Web of Science's indexes.

Now we know *what* to measure (citations), what these measurements *mean* (impact, not quality) and *where* to find citation counts, namely in the citation index (in particular, in the database WoS). The next step is to mine the database, i.e. finding a query able to capture our object of interest, namely late analytic philosophy.

2.7. Operationalizing "Late Analytic Philosophy"

Given that the notion of "late analytic philosophy" is rather elusive, we need first of all to reduce it to a query for the database. We call the ensemble of steps necessary to achieve this aim the "Operationalization of Late Analytic Philosophy".

The first step in operationalizing late analytic philosophy is to shift from the intellectual process of producing analytic philosophy to the products of this process. In general, the difference between the process of knowledge production and the process outcomes has been diffusely pointed out by Bruno Latour and other Science and Technology Studies scholars (such as Karin

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[8]   Glossary of Thomson Scientific terminology – Clarivate Analytics. http://ip-science.thomson-reuters.com/support/patents/patinf/terms/

[9]   https://www.scopus.com/home.uri

[10]   https://scholar.google.it/

Knorr-Cetina). One of the fundamental epistemological move of STS is indeed the shift from the public product of scientific research (classically, the paper published in the journal) to the science in the making, "la science en action", to use Latour's famous phrase (Latour 1987). This kind of operation reveals features of science, such as the continuous social negotiation taking place in the laboratory, that are structurally invisible at the level of the paper, since the publication tends to remove every trace of the social construction of knowledge (an epistemological operation called "black boxing", see Latour 1987 and Knorr-Cetina 1981).

Even if we believe that undertaking a research on the process of *production* of analytic philosophy would provide extremely interesting results, in this paper we focus on the *product* side of analytic philosophy. We do not take then in consideration the various practices of analytic philosophy "in the making" (teaching, drafts, syllabi for classes, unpublished talks, informal exchanges in the department, etc.), but only the public products of these activities, namely publications. In particular, we focus on papers published in academic journals.

We choose to focus on papers instead of monographs on the grounds of two reasons.

The first has to do with intrinsic limitations in the available database: Web of Science still does not index monographs. It is important however not to misunderstand this point. The absence of monographs in the Citation Index means only that references cited in monographs are not counted in the index, not that monographs do not appear at all in the index. Indeed, monographs do appear insofar as the citing articles contain citations pointing to them. Therefore, monographs are part of the set of *cited* items but not part of the set of *citing* items of WoS.

The second reason concerns dissemination habits of analytic philosophers. As Marconi (2014) notes, in the last decades analytic philosophers tended to favor the paper instead of the book as the key medium for disseminating research, in a para-scientific fashion (see also Alghren, Pagin, Persson, & Svedberg 2015). Levy (2003) reiterates the point, adding examples of analytic philosophers favoring paper instead of monograph:

AP [analytic philosophy] and CP [continental philosophy] present their research in differing forms. … It is easy to think of important philosophers in the analytic tradition whose reputation rests on journal articles alone, or whose books tend to consist of collections of previously published articles – Frank Ramsey, Bernard Williams, and Donald Davidson spring to mind. Gettier would be an extreme example (294).

In light of these two reasons we focused on papers in professional journals as target research outcome, leaving aside monographs.

The next step was to select a number of analytic philosophy journals which are representative of the field[11].

There were three possible ways to deal with this issue: 1) rely on bibliometrical metrics, 2) rely on some authoritative source (such as companions of analytic philosophy) or 3) conduct a survey on the target population (generalist analytic philosophers). All three options have strengths and weaknesses.

Bibliometrical metrics, such as Impact Factor® and related metrics, are the standard option for determining the importance of journals in the sciences. Being based on the number of citations articles in a journal receive, i.e. on the aggregated behavior of the entire scientific community, they have the advantage of avoiding subjective biases. However, in the case of analytic philosophy, this option was not feasible within Web of Science, since WoS simply does not provide Impact Factor® for most humanities journals, philosophy included.

We turned then to Scopus, that, in contrast to Web of Science, provides metrics for Humanities too, via the tool SCImago Journal Ranking[12]. For the category "Philosophy", SCImago provides, for the year 2015, the following list of representative journals:

Rank	Title	SJR	SJR Quartile	H index	Country
1	The Philosophical Review	3,062	Q1	40	USA
2	Nous	2,405	Q1	38	USA
3	The Journal of Philosophy	1,992	Q1	31	USA
4	Ethics	1,938	Q1	51	USA
5	Australasian Journal of Philosophy	1,747	Q1	27	UK
6	Mind	1,671	Q1	30	UK
7	Political Psychology	1,623	Q1	60	UK
8	Business Ethics Quarterly	1,534	Q1	46	UK
9	Philosophers Imprint	1,481	Q1	5	USA
10	Bulletin of Symbolic Logic	1,405	Q1	26	UK

Tab. 1: SCImago Journal Ranking for category "Philosophy".

[11]   Two things are important to notice. First, we avoid speaking of "top" journals, because "top" implies a metaphilosophical normative judgement that we do not want to endorse, because of our (already stated) neutrality in metaphilosophical matters. Second, we decided to focus on *generalist* analytic philosophy journals, excluding specialized journals (e.g. journals specifically devoted to logic or philosophy of science, such as the *Bulletin of Symbolic Logic* or the *British Journal of Philosophy of Science*), in order to gain a picture of the whole field.

[12]   http://www.scimagojr.com/

The problem with this list is that the subject category is too general, including Journals that can hardly be considered representative of *general analytic philosophy*, such as *Ethics* or *Political Psychology*. We considered then SCImago list as helpful but insufficient to settle the issue of selecting target journals.

The second option was to extract a list of journals from some authoritative source, such as companions to analytic philosophy. This is the strategy pursued in (Brad Wray 2010) to determine the key journals in the field of philosophy of science. However, one may think that this method suffers from two possible selection biases, at least in the case of analytic philosophy. The first one derives from the choice of the companions considered for the research. The second one is the consequence of the subjective bias intrinsic to the choices made by the authors of the companions. Even if the former bias could be overcome by taking all companions as equally valuable, the latter cannot structurally be avoided. We did not consider therefore this option.

Conducting a survey on analytic philosophers to discover their opinion about key journals seemed to us to be the best solution. Furthermore, such a survey has already been conducted by the blog *Leiter Reports: A Philosophy Blog*[13]. The site conducted two pools among its visitors in 2015, both of which got over 500 votes each, asking precisely to rank the "top 20 general analytic philosophy journals"[14]. Even if some methodological doubts can be cast upon the way in which the sample was chosen, the final list obtained a good consensus among the site visitors. We chose then to integrate it with the SCImago list, retaining the first five journals as the most representative ones: *The Philosophical Review*, *Noûs*, *The Journal of Philosophy*, *Mind* and *Philosophy and Phenomenological Research*[15]. Setting aside book reviews and editorials we considered only articles.

The final step was to impose a time limitation over the corpus formed by the set of these five journals' articles, in order to consider the case of late analytic philosophy. We opted for a timespan which surely comprehends late analytic philosophy production, namely the period 1985-2014.

Having gathered all the elements, the final query we used for retrieving data was the following:

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[13]   leiterreports.typepad.com/

[14]   leiterreports.typepad.com/blog/2015/09/the-top-20-general-philosophy-journals-2015.html

[15]   In discussing previous versions of this paper with analytic philosophers, this list was in general accepted as well representative of contemporary generalist analytic philosophy. Nonetheless, we noticed that it raised more consensus among analytic philosophers with Anglo-American affiliations, than among analytic philosophers of other countries.

(SO=(PHILOSOPHICAL REVIEW OR NOUS OR JOURNAL OF PHI-
LOSOPHY OR MIND OR PHILOSOPHY "AND" PHENOMENOLOGI-
CAL RESEARCH) *AND* DOCUMENT TYPES: (Article)
     Timespan=1985-2014

We retrieved therefore 4 966 articles, containing 58 281 references to 17 926
authors. We take this corpus as the output of the operationalizing process of
"late analytic philosophy".

2.8. The tool: VOWviewer

We used the software VOSviewer to analyze these data. VOSviewer is a tool
developed by Ludo Waltman and Nees Jan Van Eck at the Center for Science
and Technology Studies of Leiden (CWTS), Netherlands (Van Eck & Waltman
2010, http://www.vosviewer.com/). It allows for several types of citation analy-
sis on data retrieved from Web of Science. The basic function of VOSviewer is
a counting function: it allows for the ranking of the authors and the documents
of the dataset from the most to the least cited.

However, its main feature is the visualization of the citational structure
of the data, via the production of citational networks called "science maps".
These networks allow to "grasp the structure of a field" and to track its evolu-
tion in history (Morris & Van Der Veer Martens 2008, Small 1999). To generate
science maps, different techniques of citation analysis are available. The most
useful for our purpose was *co-citation analysis* (Small 1973). In a co-citation
analysis, the similarity between two items is calculated on the basis of the num-
ber of times they are cited together by other documents in the corpus. The
larger the number of publications by which two publications are co-cited, the
stronger the co-citation relation between the two publications is (Van Eck &
Waltman 2014). A similarity matrix is then calculated including all the similar-
ity index of the items. VOSviewer can calculate this matrix and translate it in
a spatial representation, in which the higher the similarity between two items,
the nearer their visualizations on the map.

Having established our dataset and the type of analysis we run on the data,
we are now ready to present and discuss the results of the analysis. The third
section of the paper is devoted to this.

3. *Results and discussion*

Through the results we present in this section, we shall attempt to answer
two research questions, namely: 1) what are the most influential (i.e. most cit-
ed) authors in late analytic philosophy? 2) what is the relation between sub-

disciplines (e.g. metaphysics, philosophy of language, epistemology, etc.) in late analytic philosophy?

In order to answer the first question, we will provide the reader with a list of the high impact authors in late analytic philosophy, that is the authors which are most cited in our corpus. Then, we will outline the two "canons" emerging from these data: i) the canon of early and middle analytic philosophers[16] (hereafter canon of classics) and ii) the "canon" of late analytic philosophers[17].

Then, we will first discuss whether in late analytic philosophy the list of the most influential classics is consistent with the standard account recognized by qualitative historiographical research. Secondly, we will try to offer a list of the most influential authors of the last period of analytic philosophy, offering a historical investigation concerning a subject that has not been widely considered yet.

The second question concerns then the structure of analytic philosophy. Considering the relation between sub-disciplines in late analytic philosophy, we shall attempt to account for the way they are connected, wondering whether any hierarchy among them seems to emerge from the data.

3.1. From the canon of classics to a new "canon"

The following table displays the most cited authors in the period 1985-2014.

RANK	AUTHOR	CITATIONS
1	lewis, david	2119
2	quine, willard van orman	921

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[16] Roughly, it is usual to consider authors like Frege, Russell, Moore and the early Wittgenstein as *early* analytic philosophers, whereas authors like Carnap, Ryle, the later Wittgenstein, and Quine are taken as paradigms of the so-called *middle* analytic philosophy (see Tripodi 2015).

[17] There are two things that ought to be clear, concerning the notion of "late" analytic philosophy and the so called new "canon". First, in this paper we are not aiming at introducing any specific criteria for classifying an author as a *late analytic philosopher*. In fact, since every criteria appear to incur in problematic counterexamples and borderline cases, we prefer to set this issue aside, referring to a commonsense periodization (according to which late analytic philosophers are those succeeding middle analytic philosophers such as Carnap, Quine, but also Davidson and Dummett). Second, we are aware of the fact that referring to a *canon* of late analytic philosophers can be disputable, at least for two reasons. Firstly, and more generally, the idea of a canon for late analytic philosophy is problematic since it is not possible to say which authors will constitute a canon for future generations of analytic philosophers. Secondly, and more specifically, it is surely not granted that the most cited authors in late analytic philosophy (and in particular in the period 1985-2014) will be the most influential ones in the future. For this reason, we will refer to the "canon" of late analytic philosophers (with inverted commas) just to sketch a contrast with the established canon of classics, committing us to a charitable application of this notion concerning late analytic philosophy.

3	davidson, donald	899
4	putnam, hilary	685
5	burge, tyler	668
6	fodor, jerry alan	649
7	frege, gottlob	574
8	williamson, timothy	544
9	russell, bertrand	540
10	kripke, saul	489
11	wright, crispin	477
12	dummett, michael	475
13	jackson, frank	464
14	mcdowell, john	459
15	dretske, frederick irwin	449
16	harman, gilbert	439
17	goldman, alvin ira	436
18	peacocke, christopher	426
19	williams, bernard	407
20	stalnaker, robert	389

Tab. 2: Most cited authors (1985-2014).

Notice first that David Lewis is, with a significant advantage, the most cited author: his works in fact are cited 2119 times, more than twice as much as the second author of the list, Willard Van Orman Quine (921 cit.), more than three times as much as the fourth author of the list, Hilary Putnam (685 cit.), and four times as much as philosophers like Bertrand Russell (number 9, 540 cit.) and Saul Kripke (number 10, 489 cit.).

Unsurprisingly, the geography of analytic philosophy refers to English-speaking countries, with sporadic exceptions for Germans – in particular among classics. In particular, the first 10 positions include 7 Americans (6 of which in the first 6 positions), 2 British and 1 German (Frege).

Only 2 women appear within the first 100 most cited authors, occupying just minor positions in the list, namely Ruth Garrett Millikan (number 54, with 217 cit.) and Elizabeth Anscombe (number 77, with 159 cit.).

There are only 6 philosophers born before 1900 within the first 100 authors, namely Kant (1724-1804), Frege (1848-1925), Russell (1872-1970), Moore

(1873-1958), Wittgenstein (1889-1951), and Carnap (1891-1970). Among them, the only non-contemporary philosopher (i.e. born before the XIX century) appearing in the first 100 position is Immanuel Kant, occupying a respectable 39th position (261 cit.) Hence, in contrast to other philosophical traditions (like hermeneutics) where philosophers plentifully cite the "classics" of philosophy, ranging from Plato to Heidegger, analytic philosophers seem to prefer citing their contemporary analytic philosophy fellows, the majority of whom is still alive[18]. The frequent citing of contemporary authors reinforces the standard idea that history of philosophy is rather marginal within analytic field[19].

3.1.1. The Canon of Classics
Let us focus now on the most cited early and middle analytic philosophers within the last 30 years.

Rank	Author	Citations
2	quine, wvo	921
3	davidson donald	899
4	putnam, hilary	685
…		
7	frege, gottlob	574
9	russell, bertrand	540
12	dummett, michael	475
…		
34	rawls, john	293
38	moore, ge	267
39	kant, immanuel	261
44	goodman, nelson	231
46	strawson, pf	230
47	carnap, r	229
…		

[18]   More specifically, although the majority of the 10 most cited authors are dead (60%), the percentage of living authors is higher in the 20 most cited authors (55%) and increases in the 50 most cited ones (62%). [Spring 2017]

[19]   Besides that, the frequent citing of contemporary authors might be thought as an evidence for the vitality of analytic philosophy. However, in order to support this idea, one should define first the meaning of "vitality" of a field, entering in complex metaphilosophical issues. We believe these issues are worth studying but we prefer to set them aside in this paper.

62	sellars, wilfrid	200
63	wittgenstein, l	199
77	anscombe, gem	159

Tab. 3: most cited "classic" authors 1985-2014.

According to our data, Quine, Davidson and Putnam are the most influential classical analytic philosophers in the last 30 years. Quine and Davidson have a comparable citation weight (921 the former, 899 the latter), whereas Putnam follows (685 citations). Interestingly, they belong to the so called "middle" analytic philosophy, preceding two early analytics, namely Frege (574 cit.) and Russell (540 cit.), who have more or less ⅔ of the citations of Quine or Davidson.

Notice also that considering the canon of classic analytic philosophers, five (namely Quine, Davidson, Putnam, Frege and Russell) are among the 10 most cited philosophers. This fact may be considered a good evidence of the stabilization of a definite philosophical tradition, namely the tradition of analytic philosophy. However, the fact that excluding the first 10 positions, few classic analytic philosophers appear in the first 100 positions – precisely 14 (around the 20%) – supports the idea that the analytic philosophy research front is going forward. In particular, after Quine, Davidson, Putnam, Frege and Russell, Michael Dummett (475 cit.) precedes John Rawls (293 cit.) and with almost twice as much citations precedes fundamental philosophers of the early and middle tradition of analytic philosophy such as G.E. Moore (267 cit.), Nelson Goodman (231 cit.), Peter Strawson (230 cit.) and Rudolf Carnap (229 cit.). Out of the 10 most cited authors in classic analytic philosophy, we can find Sellars and Wittgenstein (respectively occupying positions 62 and 63 of the general table of the most cited authors, with around 200 citations). Other authors considered central to classical analytic philosophy – such as Austin, Grice and Ryle – occupy marginal positions in the list of citations, i.e.: Austin (number 88, 131 cit.), Grice (number 96, 122 cit.), whereas Ryle does not even appear within the first 100 positions[20].

At the end of the day, we think that the canon of classic analytic philosophers derived from our quantitative analysis is in general consistent with standard qualitative historical reconstructions of analytic philosophy (Tripodi 2015, Beaney 2013).

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[20]   A possible explanation to the secondary positions of these authors is based on the fact that Austin, Grice, and Ryle substantially contributed to a research which is rather marginal nowadays, namely the philosophy of ordinary language.

3.1.2. The "canon" of late analytic philosophers

Having considered the canon of classics, the aim of this section is to outline the new "canon" of late analytic philosophers.

In the following table (tab. 4) are listed the 10 most cited authors in late analytic philosophy.

Rank	Author	Citations
1	lewis, david	2119
2	quine, wvo	921
3	davidson, donald	899
4	putnam, hilary	685
5	burge, tyler	668
6	fodor, ja	649
7	frege, gottlob	574
8	williamson, timothy	544
9	russell, bertrand	540
10	kripke, s	489
11	wright, crispin	477
12	dummett, michael	475
13	jackson, f	464
14	mcdowell, john	459
15	dreske, fi	449
16	harman, gilbert	439

Tab. 4: most cited "late" authors 1985-2014.

Again, we see Lewis' prevalence over other philosophers, a prevalence that is even greater when compared with the second author of this new "canon", Tyler Burge (number 5 in the general list, with 668 cit.); Lewis has in fact more than three times the citations of Burge. Very close to Burge, who is the first living philosopher of the general list, we find Fodor (649 cit.), and then Williamson (544 cit.).

It holds the attention that among the "canon" of late analytic philosophers, all authors among the 10 highly cited are English-native speakers (6 American [Lewis, Burge, Fodor, Kripke, Dretske, Harman], 2 British [Williamson and Wright], 1 Australian [Jackson] and 1 South African [McDowell]). The prevalence of this extended linguistic is impressive, although not surprising,

as it confirms the general idea about late (and middle) analytic philosophy as something not based principally in Continental Europe.

As for the areas of specialization of the most cited authors, we can observe the predominance of philosophy of language and metaphysics (e.g. Lewis, Kripke), followed by the philosophy of mind (e.g. Burge, Fodor) and epistemology (e.g. Williamson). In contrast, among the 10 most cited authors, only one is recognized for his contribution in moral philosophy (i.e. Harman); none in political philosophy[21]. However, since authors such as Lewis contributed to different areas of research, it is not possible to restrict them to just one subfield of philosophy. If so, the analysis of the most cited authors does not seem to provide us with a good picture of the different areas of research, their relations, and their hierarchy (if any). In order to deal with these issues, we will change the unit of analysis, leaving the author and focusing on the most cited *documents* in late analytic philosophy and their co-citational relations. This will provide a better grasp on the sub-disciplinary partitions of late analytic philosophy.

3.2. Maps, clusters, and the increase of specialization

In this last section, we shall attempt to explain the relations between the different sub-disciplines in late analytic philosophy. To achieve this aim we will focus on the most cited documents in the last 30 years in the five journals presented above, and the way they are related.

Specifically, we will present two science maps. The first aggregates all the documents in the period 1985-2014, drawing the structure of the field in the last 30 years. The second, consisting of three different maps, each one representing a 10 year timespan, allows us to observe the recent evolution of analytic philosophy. We argue that these maps support the idea of strong specialization within analytic philosophy, and they provide us with a quantitative evidence of the fact that such a specialization is increasing over the years.

3.2.1. The sub-disciplines of late analytic philosophy and their relations

The following science map shows the relations between the most cited documents in the period 1985-2014. As explained above (see § 2.8), the following maps are generated by VOSviewer on the basis of a co-citation analysis, so that the closeness of the documents is proportional to their co-citational score (i.e. the times they are cited together in the dataset). For instance, given the documents A, B, and C, and supposed that A & B are cited together 10 times (i.e.

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[21]   We notice, in passage, that the lack of moral and political philosophers in the list may be explained by the existence of several journals devoted to moral and political issues (such as *Ethics* and *Philosophy & Public Affairs*). On a related issue, see footnote 13 above.
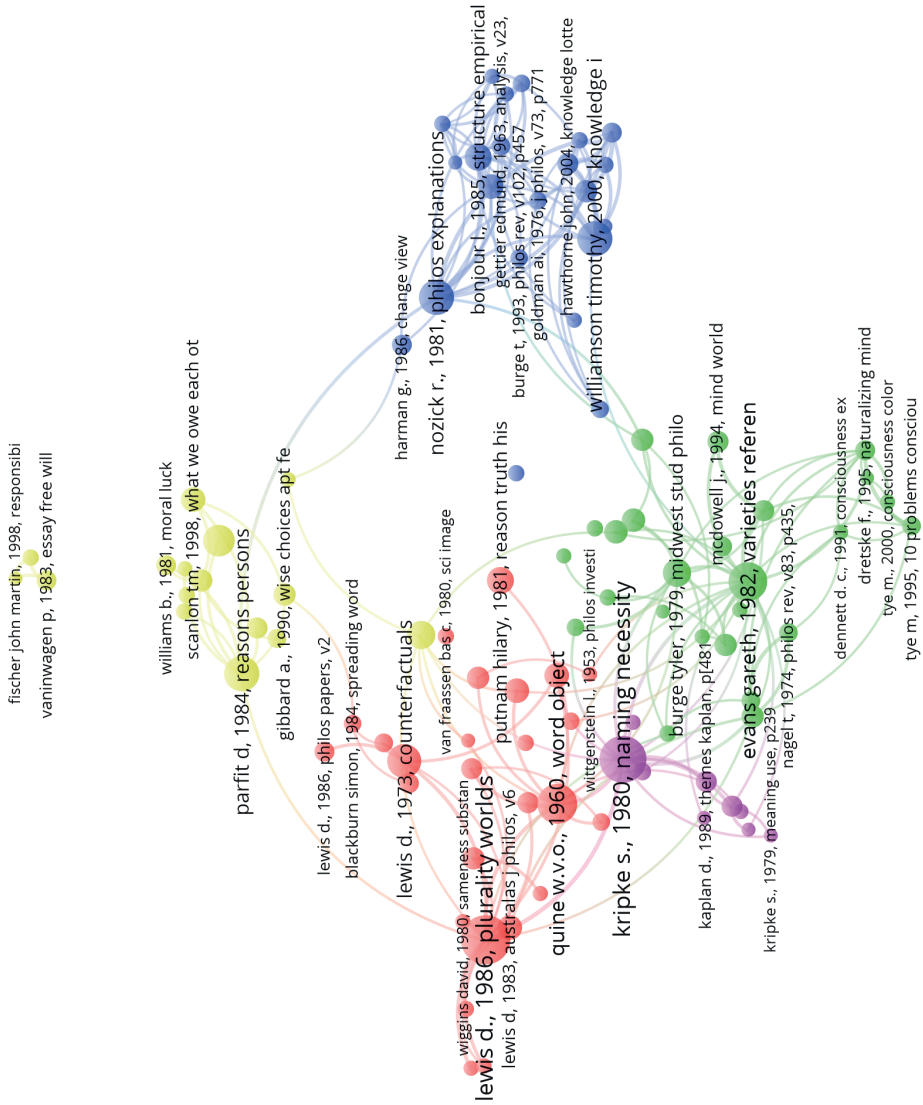
Fig. 1: Overall map of documents (1985-2014).

in 10 different documents), A and C 2 times, and B and C 7 times, A would be represented closer to B than to C, this latter in turn being represented closer to B. The dimension of the nodes, on the other hand, rests upon the number of citations received by specific documents in our dataset. Therefore, VOS-viewer algorithm is designed to render meaningful not only the *topological* relations among the items but also their *relative* spatial positions. Then, even if the science maps can be rotated and flipped, the reciprocal distance among the items is conserved. Consequently, in VOSviewer visualizations, the overall *morphology* of the map is meaningful, as well as notions such as "periphery" and "center" of the map[22].

Considering the map in Fig. 1, the first thing we notice is a clear division into clusters produced by VOSviewer algorithm. The spatial disposition of the documents, in fact, is not uniform, but rather "polarized" in some areas, in which the documents are more compact and their interconnections are significantly thicker. These clusters seem to represent rather approximately the different fields of research in late analytic philosophy (such as metaphysics, philosophy of language, philosophy of mind, epistemology and practical philosophy). Nonetheless any attempt to label the clusters would result arbitrary and disputable, given the presence of several counterexamples as well as borderline cases. For this reason, we shall avoid to assign labels to each clusters, referring instead to their colors.

Focusing on the map, one can notice, first of all, a big red aggregate of documents: the biggest nodes are Lewis' *Plurality of Worlds* (1986), Quine's *Word and Object* (1960), and Lewis' *Counterfactuals* (1973). Then we can see a small purple cluster, with Kripke's *Name and Necessity* (1980) as principal node, as well as Perry's "The Problem of Essential Indexicality" (1979) and Kaplan's "Demonstratives" (1989). Third, there is a green cluster with Evan's *Varieties of Reference* (1982) in the middle, alongside Burge's "Individualism and the Mental" (1979), Dretske's *Naturalizing the Mind* (1995) and Fodor's *Psychosemantics* (1987). Separated from the others, there is the blue cluster, with Nozick's *Philosophical Explanations* (1981), and Williamson's *Knowledge and its Limits* (2000) as main nodes. We can see thick interconnections among items of that cluster as well as their isolation from external items, which suggest a stronger specialization of that field of research over the others. Another group of documents strongly interconnected and separated from the others is the yellow cluster, which brings together works such as Parfit's *Reasons and Persons* (1984), Rawls'

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[22]   In technical terms, VOSviewer produces a *distance-based* visualization of networks. Other visualizations, not distance-based, are *graph-based* approaches, where edges are displayed to indicate the relatedness of nodes and the distance between two nodes need not directly reflect their relatedness, and *timeline-based* approaches (See Van Eck and Waltman 2014 for more details).

A Theory of Justice (1971), and Davidson's *Essays on Actions and Events* (1980).

Looking now at the general features of the map, we find very significant that there is no cluster occupying the center of the map, connecting all fields of research. In fact, although the red cluster seems to unify the purple and the green ones, the general structure of the research in analytic philosophy within the last 30 years takes a sort of circular structure – or better a "donut structure" – which is characterized by a hole in the middle of the map, and masses of nodes and links along the edges. The absence of a center in this representation may reinforce the idea of a fragmentation of the field of research in late analytic philosophy, as well as the absence of any defined *philosophia prima* on which all sub-disciplines rest upon, and more generally the lack of any hierarchy among them[23].

As things stand, one may wonder whether or not such a fragmentation in closed sub-disciplines is an essential and intrinsic feature of analytic philosophy, namely the product of a determinate meta-philosophical tenet (e.g aiming at considering specific problems instead of more general issues). In order to answer this question, in the next section we will focus on something different and more fine-grained, that is the evolution of the field of research in the last 30 years.

3.2.2. Is specialization an essential feature of analytic philosophy?

Consider the following three maps generated by VOSviewer. As for the map generated in the previous section, they are based on a co-citational analysis, and they represent the relations among the most cited documents in three distinguished time-spans, namely [1985-1994], [1995-2004], and finally [2005-2014].

This sequence displays an evolution in the general structure of analytic philosophy in the last 30 years. In fact, it seems that the clusterization of late analytic philosophy into defined sub-disciplines is a recent phenomenon.

Considering the first map, representing the most cited documents and their relations in the interval 1985-1994, we observe indeed a unique aggregation of nodes, with a variety of links among documents of different clusters. There is no significant fragmentation in this period. Then, in the second map, representing the interval 1995-2004, we notice the strong development of separated clusters, as well as an increase in links between nodes of the same cluster. Finally, in the map representing the interval 2005-2014, we see a sharp division in clusters.

This seems a good evidence of the fact that the specialization into different sub-disciplines and the fragmentation of analytic philosophy in the last years

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23   Tripodi (2015: 238) offers a similar account based on qualitative grounds.
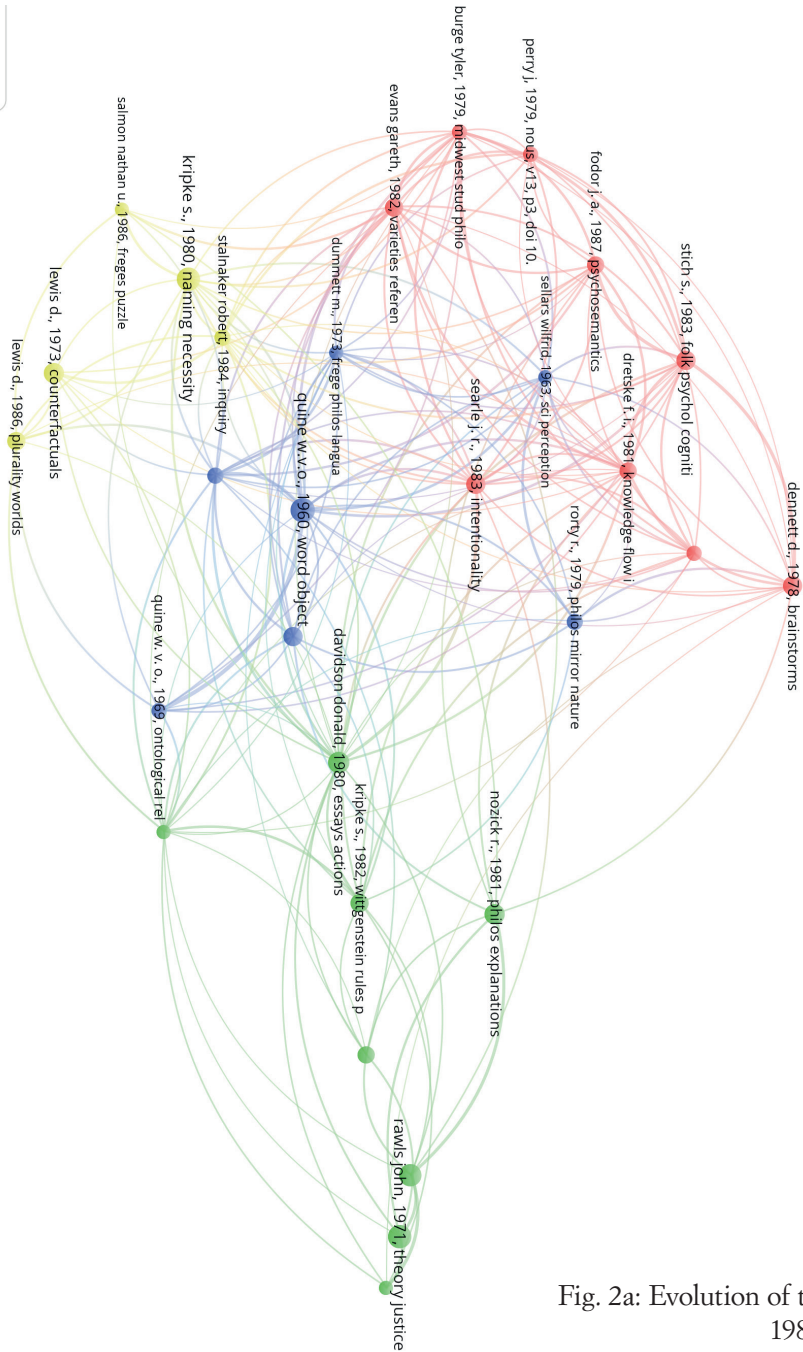
Fig. 2a: Evolution of the field
1985-1994.

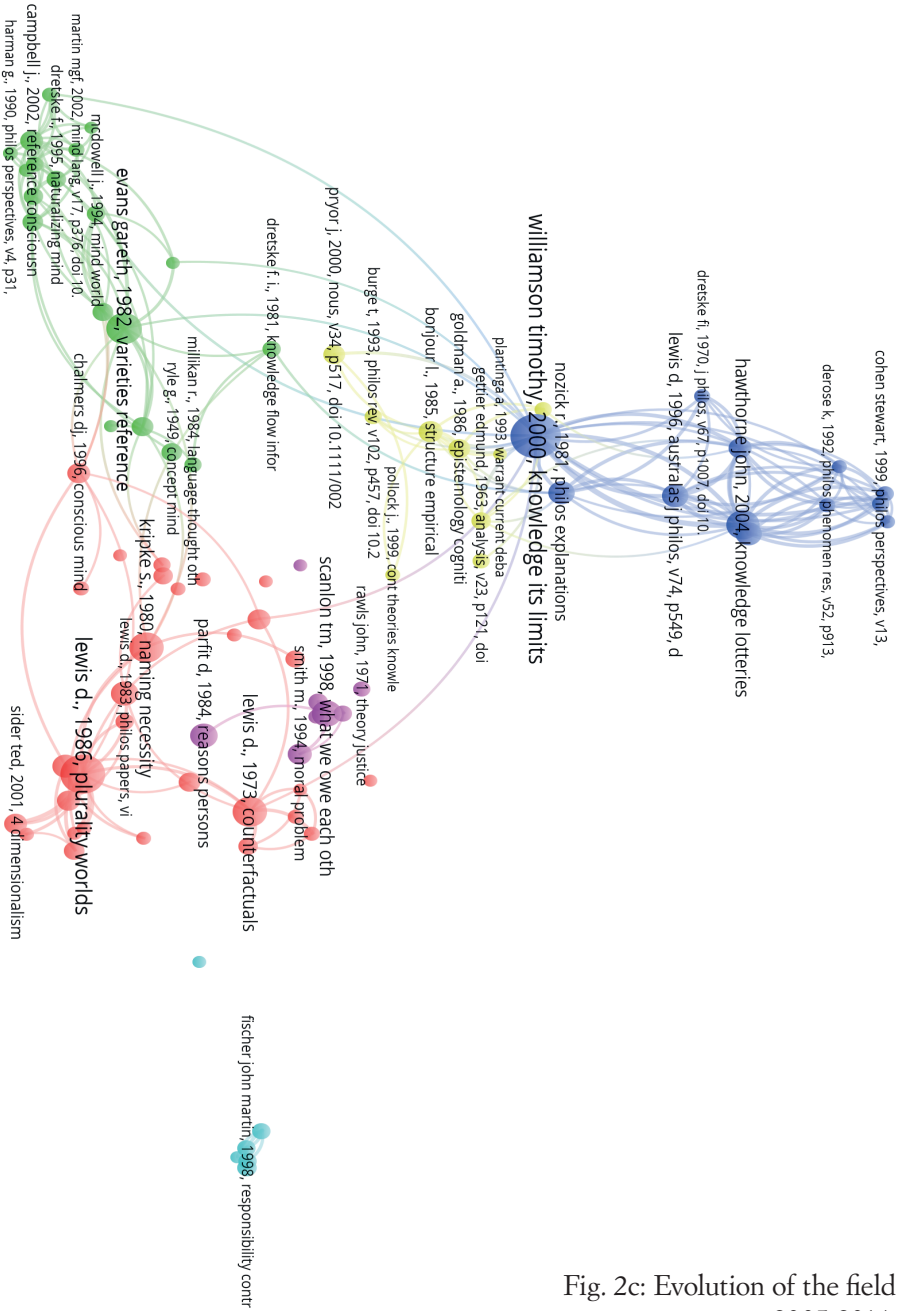Fig. 2b: Evolution of the field
1995-2004.

Fig. 2c: Evolution of the field
2005-2014.

is no intrinsic feature of this latter. Had it been an intrinsic feature of analytic philosophy (i.e. a metaphilosophical assumption characterizing this field of research), one should have expected to notice fragmentation into the former decades as well. Specialization seems instead the product of general and complex causes, that call for further historical, and maybe sociological, research[24].

4. *Conclusions*

In this paper we introduced a new methodological framework for a quantitative history of late analytic philosophy, focusing on the highest-impact authors, and on the relations between the different sub-disciplines in this area. The key methodological issues concerned the relation between history of philosophy and metaphilosophy, the theoretical framework of citation analysis in history of philosophy (namely scientometrics and theory of citation), the distinction between philosophical quality and citation score (i.e. impact), and the operationalization of the notion of "late analytic philosophy".

We created the list of high-impact authors in late analytic philosophy, distinguishing within it two canons: the canon of classics and the "canon" of late analytic philosophers. We argued that the frequent citing of contemporary authors may be an evidence for the vitality of the field, which does not seem to suffer stagnation.

If we consider the overall citational network (science map) of the field in the period 1985-2014, we can see a fragmented structure, with distinguishable sub-disciplines as clusters. No clear center appears, suggesting that no discipline is dominant over the others. Moreover, the evolution of the field over the last thirty years, as represented via science mapping, shows a pattern of increasing specialization. However, specialization is shown to be a prominent feature of the very last period (2005-2014), not an intrinsic property of late analytic philosophy.

As we have seen above (3.3.1), our findings are, in general, in line with the standard picture resulting from qualitative study of the history of analytic philosophy. However, we think that this convergence does not undermine the value of a quantitative approach. On the contrary, it strengthens the results of both methodologies. We believe that substantial developments in the history of analytic philosophy could come, in the future, from an increasing integration between qualitative and quantitative methods.

As a very conclusion, let us sketch some possible further lines of research in the context of quantitative history of analytic philosophy.

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[24]   See Marconi (2014) for a first attempt in this direction.

First of all, it would be interesting to study the *aging of the literature* in analytic philosophy, i.e. the rate of obsolescence of papers in the field. How long is a paper in analytic philosophy usually cited by the community? Which is the average age of the literature cited by contemporary papers? Has it changed over the years? In our opinion, asking these kinds of questions might shed some light on the "state of health" of the research in analytic philosophy, and perhaps also predict the destiny of the papers published more recently.

Second, we suggest that the topic of *interdisciplinarity* is worthy of further study. We have seen how, in the last decade, analytic philosophy has undergone a process of increasing specialization. How do the different sub-disciplines interact? Is it possible, by means of advanced network analysis methods, to individuate some key documents or authors as playing the role of "bridges" among sub-disciplines? What is the relation between the sub-disciplines of general analytic philosophy and other philosophical disciplines which have undergone the process of specialization some decades before, such as the philosophy of science? And is it possible to map, via citation analysis, the relations between particular sub-fields, such as philosophy of mind, and related scientific disciplines, such as psychology, cognitive neuroscience, etc.?

A final possible line of research concerns *the implications of quantitative history of philosophy for historiography of philosophy in general*. How does a quantitative approach modify our historiographical categories? Are traditional notions of history of philosophy suitable for describing big corpora such as the one we used in this research? Should we change our fundamental assumptions about how and why philosophy changes over time, when we leave the individual level and we adopt a "big data" point of view?

For these reasons, this paper can be the first step within a larger project, fostering further research in quantitative history of analytic philosophy.

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