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Communicative Philosophy of Science: Genesis and Contemporary Trends of Development

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The study is dedicated to modelling the contemporary portrayal of the philosophy of science. The essence of its theses is elucidated through the following assertions: a) right from its beginning, a communicative potential was embedded within the philosophy of science; b) its origin arises from a culmination of predecessors' accomplishments; c) the value of the communicative approach in the philosophy of science lies in its acceptance rather than opposition to the formal direction. The analysis is conducted retrospectively. The emergence of ideas within communicative philosophy of science is noticeable in its relevant relationship with the evolution of theories in logical positivism, rhetoric, pragmatism, linguistics, philosophy of language, and sociology of science. Analytical, synthetic, historical, rhetorical and structural-functional methodologies were used in the investigation. The findings of the study confirmed the hypothesis: communicative philosophy of science represents a historical combination of the field's achievements, incorporating rhetorical, universalistic and particularistic developmental perspectives.

Keywords: communicative philosophy of science, pragmatism, rhetoric, logical positivism, postmodernism, intersubjectivity, universalism, particularism

INTRODUCTION

The aim of the research is to uncover the prevailing trends in the evolution of modern philosophy of science, particularly in its communicative manifestation. This objective will be accomplished through a thorough analysis of the developmental history of philosophy of science (hereafter referred to as PS).

In the analytics of the research, the authors relied on the works of classics such as Apel (2023), Habermas (2018), Lyotard (1984), Peirce (1934), Perelman (1979) and Toulmin (2003); historians and philosophers of science like Dobronravova (2018), Gross (1996), Harris (1991), Humphreys (2016), Kuipers (2007), Losee (2001), Leydesdorff (2021) and Stadler (2007); theorists and methodologists of modern philosophy and sociology of science, specialists in the field of communicative philosophy, etc., including Bechmann (2002), Ferrari (2008), Harste (2021), Kačerauskas (2020; 2019), King and Thornhill (2003), Mancino (2020), Wagner (1994), Shahwirman (2023), and a joint article by the authors (Martynenko, Manchul 2022).

There is a longstanding issue linked to the examination of the history of PS, marked by ambiguity. The stages of the formation of PS may differ, as scholars lack a single position on the understanding of this process. This is related to controversies surrounding the methodological core of the field. J. Losee, in his work 'A Historical Introduction to the Philosophy of Science', highlights this problem: 'Unfortunately, philosophers and scientists are not in agreement on the nature of the philosophy of science' (Losee 2001: 1).

In our opinion, historically PS was formed under the influence of not only formal but also communicative discourse. The formal discourse contributed to the emergence of a stable image, the defense of which caused misunderstandings. While it dominated, there was no discussion about solving the problem. Now, with the strengthening of the communicative orientation, there is hope for a positive outcome.

Another issue arises in defining the historical boundaries of contemporary PS, as its essence lies in the diachrony of the history of PS development. There is a lack of clear demarcation between the conclusion of one stage in the formation of PS and the immediate commencement of the next one (Dobronravova 2018).

The question arises: where and how to draw the line of modernity regarding PS? F. Stadler starts counting continental PS from 1929 – the appearance of R. Carnap's work 'The Logical Structure of the World' (Stadler 2007: 579), and the 'Specific American Philosophy of Science' – from the 1940s (Ibid: 583). However, not everyone supports this chronology. Particularly, at the beginning of the 21st century, there was much talk about 'postmodern PS', also referred to as 'contemporary'. In our opinion, this contradiction can be resolved by considering formal and postmodern PS as part of the communicative discourse in PS.

The authors applied general scientific research methods: analysis, synthesis and induction. Among the special approaches, the authors used the historical method to demonstrate the specificity of PS development, its dynamics and chronology; structural-functional analysis showed that each highlighted historical formation has its structural and functional specificity and modelling, wherein binary and ternary sign models were employed in the research.

COMMUNICATIVE PHILOSOPHY OF SCIENCE: FORMATION, CONTENT AND WAYS OF DEVELOPMENT

Although the philosophy of science began with formal discourse, it also delved into communication issues through the study of language. In his manifesto article 'Turning in Philosophy', M. Schlick illustrated this by referencing G. Leibniz, B. Russell and G. Frege, who were not only philosophers but also recognised linguists (Ferrari 2008). Logical positivism devoted a considerable effort to constructing a system capable of revealing the essence of any language. Positivists, in their pursuit, began with the epistemic priority of scientific knowledge, ideals and norms of science. Turning to epistemology meant closely linking the notion of scientific knowledge with the concept of truth. Researchers aimed to approach truth as closely as possible, aided by a certain perfect methodology and conception of truth. That theorising led to a program aimed at improving the theory of science by developing methods to overcome deficiencies in scientific knowledge, such as the legacy of metaphysics, for example, concepts that could not be formally defined. Such an approach also intersected with communicative philosophy, parts of which[1] did not satisfy formalists.

[1] For example, the significance of ordinary language at that time was considered questionable.

Leaders of logical positivism, such as M. Schlick, R. Carnap, A. Neurath, L. Wittgenstein, and others, sought to develop a precise, logical, and rigorous language of science, resulting in the creation of the 'standard conception of science'. According to F. Stadler, this is also considered 'contemporary PS' (Stadler 2007).

The ongoing advancement of PS is evident in its thematic branching into two directions – sociological and intersubjective – both perpetuating tendencies initiated by logical positivism. The first movement continued to emphasise formalism, whereas communicative positions began to emerge in the second movement, initially overlooked by formalists.

Both claimed a leading role in shaping PS, making it difficult to objectively evaluate their achievements and determine a clear leader. What is apparent now is their contemporary interdependence. These directions are not isolated; they actively interact, absorbing the best from each other. This indirectly indicates the triumph of communicative discourse, without which such a state of affairs would not have been possible.

The first sociological trend aimed at enhancing the scientific apparatus and strengthening science as a socially significant institution. Chronologically, this branch developed from the 1940s to the 1990s. Science transitioned into 'Big Science', evolving from a formal to a material form, becoming a social institution. The goals of PS shifted to improving science and preparing society for the changes it entails. Science transcended current theoretical notions and began exploring its sociological parameters. Sociology of science and scientometrics played pivotal roles in this shift. While logical positivism viewed 'statements' as the unit of measurement of scientific knowledge, sociological PS considered 'scientific society' and 'information links' as relevant measures.

The success of the social sciences stemmed from the crystallisation of social reality into a stable organised structure. Social sciences gained methodological and epistemological credibility, and society evolved into a constant framework encompassing established conceptual elements for assured functioning (Wagner 1994: 113).

The second intersubjective trend focused on altering the logic of science, starting with the emphasis on Charles Peirce's pragmatism, which served as the theoretical basis for the new logic. Notably, Karl-Otto Apel situates pragmatism within the broader discourse of modernity (Apel 2023).

The methodological basis of pragmatism is a particular type of synthesis.[2] If we examine the distinctiveness of synthesis in the philosophies of G. W. F. Hegel and I. Kant, we can observe that in their works, synthesis arises from the interplay between two elements – subject and object, thesis and antithesis. However, in the philosophy of Charles Peirce, synthesis is based on the interaction of three elements, rather than two. 'All dynamical action, or action of brute force, physical or psychical, either takes place between two subjects, or at any rate is a resultant of such actions between pairs. But by 'semiosis' I mean, on the contrary, an action, or influence, which is, or involves, a cooperation of three subjects, such as a sign, its object, and its interpreter. This trirelative influence not being in any way resolvable into actions between pairs' (Peirce 1934: 484). Hence, alongside the object, we encounter two subjects: the subject–subject and the subject–cosubject, or intersubject.

Peirce's position on the triadic nature of the synthesis process is a fundamental difference between his pragmatics and another foundational project in semiotics – Ferdinand de

[2] C. Peirce refers to it as 'semiosis'.

Saussure's semiology. Peirce understands the semiotic system as fundamentally triadic interaction of the sign (Fig. 1), object and interpreter, whereas Ferdinand de Saussure's model of the sign (Fig. 2) is largely binary – focusing on the interaction between the signifier and the signified.

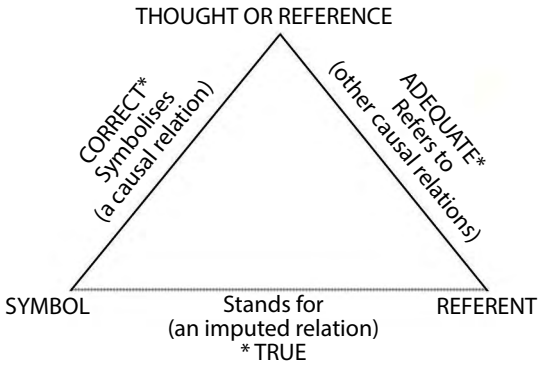

Fig. 1. The 'Triangle' of Peirce as interpreted by Ogden–Richards

Fig. 2. Ferdinand de Saussure's Concept of the Sign

Binary constructions are characteristic of ordinary apodictic logic, while ternary ones are characteristic of rhetoric. The latter has long been neglected, considered unacceptable for science, although time has shown otherwise.

The second prerequisite for the emergence of the intersubjective trend relates to the philosophies of Edmund Husserl and Karl-Otto Apel. Indeed, Charles Peirce's pragmatism, without Husserl's concept of intersubjectivity, would not have the significance for the methodology of communicative philosophy that it possesses today. Husserl changed the prevailing conception of the subject. The conventional 'I' in the context of communicative events (Mitsein, or Miteinandersein in Martin Heidegger's terms) emerged in the intersubjective dimension of I/Other. The concept of intersubjectivity, combined with Peirce's pragmatism, became a cornerstone of communicative philosophy.

Therefore, the subject can be considered as a participant in the interpretative process alongside other subjects of interpretation: subject–cosubject–object (or according to the formula 'A elucidates C for B'). In other words, the problem of intersubjectivity is resolved when the entire problematic of the cognitive process is brought to the level of language rather than the subject. The second subject (intersubject) opens the way to pluralisation – where there is a second, there is a third, and so on. This path ultimately leads to a methodological rejection of the subject.

Thus, it became possible to consider two paths of development for the idea of intersubjectivity: the triadic and the pluralistic. Both are significant for communicative philosophy. The first relates to the rhetorical vector, while the second relates to the universal-particular one.

The third prerequisite for the emergence of communicative philosophy was the late Ludwig Wittgenstein's views, which involved the rejection of a representative theory of meaning

in favour of communication. This event marked the beginning of a 'communicative turn'[3] in philosophy.

Although Ludwig Wittgenstein focused on language and linguistics in the 'Tractatus Logico-Philosophicus', this work was not associated with communication: language was interpreted as a form of the world, not as a 'mediator'. Therefore, there was no place for communication. The situation is different in 'Philosophical Investigations', where the scholar focuses on the examination of ordinary language and language situations in which meaning is constituted.

The concept of 'language game' became possible to use as a structural unit of communicative logic, as utilised by Jürgen Habermas in his 'Theory of Communicative Action'. The growth of the operational potential of communicative logic significantly strengthened the position of the intersubjective movement in philosophy of science. Hence, the resurgence of interest in rhetoric within the philosophy of science is unsurprising.

COMMUNICATIVE PHILOSOPHY OF SCIENCE AND RHETORIC

Interest in rhetoric experienced its revival in the mid-20th century, closely intertwined with the emergence of argumentation theory. Chaïm Perelman, a key figure in this 'rhetorical turn', collaborated with Lucie Olbrechts-Tyteca on the theory of argumentation, which greatly impacted the development of philosophy of science in the 20th century. In 1979, Perelman remarked: 'Without either knowing or wishing it, we had rediscovered a part of Aristotelian logic that had been long forgotten or, at any rate, ignored and despised. It was the part dealing with dialectical reasoning, as distinguished from demonstrative reasoning – called by Aristotle analytics – which is analysed at length in the Rhetoric, Topics, and On Sophistical Refutations. We called this new or revived branch of study, devoted to the analysis of informal reasoning, the new rhetoric.

The new rhetoric, emerging in the early 1950s, swiftly permeated into philosophy of science. In post-positivism, its influence is evident across the board.[4]

Rhetoric left its imprint in philosophy of science through Stephen Toulmin's work 'The Uses of Argument'. The main theses of this work, such as the protest against equating rationality with logic, found resonance in other works by Toulmin. The essence lies in persuading opponents through argumentation: ideas are not constructed according to strict deductive or even inductive logic, but are transformed into argumentative constructions, employing rhetorical devices that lead to successful persuasion. Toulmin challenges the notion that theoretical constructs must adhere solely to the standards of logic and mathematics.[5] In the natural sciences, knowledge is intimately linked with practice; hence rationality should not be equated with logic.

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[3] The theme of 'turns' in the philosophy of science was initiated by M. Schlick with the publication of his work 'Die Wende der Philosophie'. Considering Ludwig Wittgenstein's assessment by M. Schlick, this turn is aptly juxtaposed with the 'Linguistic Turn', the beginning of which is closely associated with the author of the 'Tractatus Logico-Philosophicus' (Martynenko, Manchul 2022).

[4] T. Kuhn employs the rhetorical term 'paradigm' in his concept of revolutionary changes in science. P. Feyerabend, analysing Galileo's arguments, emphasises that he employs rhetorical persuasion techniques rather than logical ones to succeed in the scientific field.

[5] Rhetoric draws not only from Logos as logic or mathematics but also from Ethos and Pathos. Therefore, arguments in rhetoric can rely not only on truth but also on norm. S. Toulmin's criticism of absolutism and relativism is based on a rhetorical scheme. If absolutism represents Logos and relativism represents Pathos, then there must be a practical middle ground where their best aspects are combined – Ethos.

Traditional conceptions of logic in formal philosophy of science uphold a rigid opposition between conjecture and knowledge. A strict proof is considered necessary in certain scientific disciplines, particularly in mathematised natural sciences. This stands in contrast to non-strict sciences, which utilise justification methods relevant to social and everyday life. Consequently, formalists often dismiss the logic of argumentation, equating rhetoric with sophistry. For them, rhetoric serves as a utilitarian tool for conveying apodictic propositions. This preference for natural sciences over humanities arises from conventionality.

The situation differs in communicative philosophy of science. Apodictic logic is just one facet of argumentation logic within it, aligning perfectly with Aristotle's rhetoric. After all, Aristotle delineated three types of proof: strict logical, artistic-emotional and moral-ethical. In philosophy of science, rhetoric denotes the convergence of arguments rather than hierarchical subordination of one proof to another. Therefore, strict proof holds dynamic significance, contingent upon the other poles of the rhetorical triad.

This is how rhetoric reshaped the image of the logic of science. The further evolution of rhetoric in philosophy of science led to the emergence of the 'rhetoric of science' project, championed by R. Harris and A. Gross. Harris elucidates the purpose and teleology of this discipline: 'What scientists do is interpret the empirical domain. What rhetors do is influence one another. What scientists do as rhetors is influence one another about interpretations of the empirical domain. In two easygoing definitions: science is the study of natural phenomena; rhetoric is the study of suasion. Both definitions will surely find opponents, but both are sufficiently general and sufficiently representative that we can proceed with a minimum of controversy: rhetoric of science is the study of suasion in the interpretation of nature.'

At present, the rhetoric of science project is on hiatus, yet there remains the potential for its resurgence in relevance. Meanwhile, in the realm of philosophy of science, universalism and particularism undeniably emerge as more pressing trends.

CURRENT TRENDS IN THE DEVELOPMENT OF COMMUNICATIVE PHILOSOPHY OF SCIENCE

Tendency Towards Universalism

In the early 1970s, a pivotal event unfolded in communicative philosophy, marking the emergence of a universalistic version of communicative philosophy – the debate between N. Luhmann and J. Habermas (Harste 2021). Mainly, it focused on the horizons of systems theory and related concepts.

Both scholars developed their sociological views under the influence of structural functionalism. T. Parsons utilised the concept of 'communication' to illustrate symbolic exchange between systems. In his theory, the connection between systems/subsystems was realised through the algorithm of 'input' and 'output'. Such an explanation of communication aligned entirely with C. Shannon's information theory but lacked life, or rather, the 'life-world'.

This was crucial to J. Habermas's communicative approach. For him, the communication process was closely tied to the 'life-world' – the universal performative supersystem of linguistic competencies. The scholar challenged the modern tradition that saw reason as originating in communication structures of language rather than the cosmos.[6] He placed rationality in communicative structures of language, not the cosmos. At the core of such rationality, which

[6] Therefore, the core notion of universal pragmatics posits that communication invariably revolves around comprehension or 'consensus'.

Habermas calls 'communicative', lies the idea of 'common sense'. N. Luhmann was quite skeptical of any form of it, yet he stated: 'All we know about our society and even the world we live in, we learn from mass media.'

Luhmann's universalism is not as conspicuous as Habermas's. Despite being considered a theorist of postmodernism due to his theory of societal differentiation, this characterisation is not entirely accurate. His post-structuralist concepts lacked a radical anti-systemic orientation. Consequently, he moved away from universality as the sole criterion and harboured skepticism regarding the performative function of communication. Instead, he formulated an updated universal system theory devoid of the subject. While the notion of 'systemic decentralisation' shares similarities with postmodern perspectives, it is not synonymous with them. Luhmann juxtaposed the unity of systemic rationality against the rationality of individual structures, highlighting their differentiation as his primary universal category.

Luhmann's mechanism of communication was connected to U. Maturana's and F. Varela's concept of self-organisation of biological systems (autopoesis). This theory implied mediation as a necessary condition for self-development. Thanks to autopoesis, Luhmann changed the paradigm in systems theory – he replaced the dichotomy of subject/object and individual/society with the differentiation of the system and the environment. The scholar argued that 'communication occurs not between people but within communication itself' (Bechmann, Stehr 2002: 69).

Habermas' and Luhmann's views on communication contributed to the development of a universal version of communicative philosophy. As an example, we cite the work of L. Leydesdorf 'The Evolutionary Dynamics of Discursive Knowledge: Communication-Theoretical Perspectives on an Empirical Philosophy of Science'. In this monograph, the author insists on testing the universal thesis with research programs: 'Habermas' assumption that the social system of communications can be considered as unrestricted ("herrschaftsfrei") specifies a counterfactual; somewhat comparable to "all men are born equal". However, normative assumptions are not sufficient for understanding the complex dynamics under study. We need research programs!' (Leydesdorff 2021: 7).

As programs, the author suggests approaches by N. Luhmann (Ibid: 8), D. Blure (Ibid: 51), and others. Habermas' ideas about communication are mostly criticised. In particular, L. Leydesdorf considers the concept of 'three knowledge interests – rationalities – operating in the different sciences', which Habermas put forward in his little-known work 'Knowledge and Interests', to be more promising than the 'life-world'.

Tendency Towards Particularism

Another characteristic trend in the development of communicative philosophy of science is particularism, which emerged from radical postmodern philosophy. While it has not received significant continuation in philosophical-scientific discourse, it retains potential, periodically surfacing in the works of contemporary philosophers. It is associated with the ideas of J.-F. Lyotard, who, in his work 'The Postmodern Condition: A Report on Knowledge', expressed distrust of deterministic doctrines in science. According to him, the crisis of science necessitated a revision of its philosophical basis (Lyotard 1984: 53).

When examining the perspectives of Jean-François Lyotard and Jürgen Habermas concerning modernity, both seem to align with postmodernism. Each philosopher claims to offer his solution to the crisis of modernity, but while Habermas aims to reconstruct it, Lyotard

aims to deconstruct it,[7] leading to division into universalism and particularism. In Habermas, some parts are guided by a certain universal potential, making the pluralism present in his theory more universal than particular. Niklas Luhmann, on the other hand, has created conditions for the emergence of original pluralistic theories to some extent universal (King, Thornhill 2003: 225).

Criticism of Habermas' ideas by Jean-François Lyotard is based on the assertion that universal systems make predictions, thus increasing efficiency. Lyotard argues, 'This fiction is sustained by the principle that physical systems, including the system of systems called the universe, follow regular patterns, with the result that their evolution traces a regular path and gives rise to "normal" continuous functions (and to futurology…)' (Lyotard 1984: 55). He argues that modern mathematics, including fractal geometry, challenges the validity of such an approach. After presenting arguments in favour of his opinion, Lyotard concludes that 'Determinism is a type of functioning that is itself determined' (Ibid: 59).

From this thesis emerges the teleology of 'postmodern science', marked by preoccupations with undecidability, the boundaries of precise control, clashes arising from incomplete information, 'fracta' catastrophes, and pragmatic paradoxes. Such science conceptualises its own progression as discontinuous, catastrophic, uncertifiable and paradoxical. Postmodern science does not prioritise prediction; rather, it seeks the unforeseen. Therefore, Lyotard advocates for paralogy as the 'logic' of postmodernism.

Communication in the particularist version of communicative philosophy of science emerges as a consequence of applying paralogy in the interaction of scientific communities. Lyotard states, 'Finally, it suggests that the problems of internal communication experienced by the scientific community in the course of its work of dismantling and remounting its languages are comparable in nature to the problems experienced by the social collectivity when, deprived of its narrative culture, it must reexamine its own internal communication and in the process question the nature of the legitimacy of the decisions made in its name' (Ibid: 62).

Finally, it is worth noting that historians of science who adhere to a formal discourse strongly oppose the postmodernist version of the philosophy of science. They argue that reflections on such a philosophy of science lack sufficient grounds. Postmodernist philosophy of science is described as 'A House Built on Sand', as noted by N. Koertge (Koertge 1998).

CONCLUSIONS

Systematising knowledge is a crucial aspect of a researchers' endeavour. Constructing a model of the development of modern philosophy of science in its communicative form presents an extraordinary challenge. This task was initially undertaken by the former supervisor and mentor of the authors of this research, Professor Mykhailo Marchuk. Subsequently, we have endeavoured to tackle this task to the best of our abilities and experience.

The contemporary portrayal of modern communicative philosophy of science embodies a convergence of predecessors' achievements, incorporating and assimilating their experiences. This process highlights the merits of communicative methodology by resolving conflicts at their core, transforming disagreements into opportunities for discussion. This thesis finds

[7] The debate between J.-F. Lyotard and J. Habermas is as renowned as that between J. Habermas and N. Luhmann. In 'The Postmodern Condition...', the author mentions his opponent no fewer than ten times, underscoring the significance of their discourse.

compelling support in the debates of Jürgen Habermas with Richard Rorty, Niklas Luhmann and Jean-François Lyotard.

In our perspective, communicative philosophy of science epitomises modern philosophy of science, firmly grounded in the principles of formal philosophy of science. Its structure encompasses sociological and intersubjective dimensions, while its ideology encompasses both universalism and particularism. Communicative philosophy of science integrates traditional apodictic logic, structural functionalism, pragmatism, rhetoric and postmodernism.

Current trends in the evolution of communicative philosophy of science encompass the rhetoric of science, universalism and particularism. While the rhetoric of science seems to be at a standstill presently, universalism persists in development, manifesting in modern theories of the philosophy of science. However, particularism is less conspicuous in contemporary philosophical-scientific discussions, yet its substantial potential for development remains noteworthy. It is conceivable that it will continue to wield a considerable influence in the future.

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Komunikacinė mokslo filosofija: raida ir šiuolaikiniai vystymosi bruožai

Santrauka

Tyrimas skirtas šiuolaikiniam mokslo filosofijos vaizdiniui modeliuoti. Jo tezių esmė atskleidžiama šiais teiginiais: a) nuo pat pradžių mokslo filosofijoje buvo įtvirtintas komunikacinis potencialas; b) jos ištakos kyla iš pirmtakų pasiekimų kulminacijos; c) komunikacinio požiūrio vertė mokslo filosofijoje glūdi jo priėmime, o ne priešpriešinime formaliajai krypčiai. Analizė atliekama retrospektyviai. Komunikacinės mokslo filosofijos idėjų atsiradimas pastebimas dėl aktualaus santykio su loginio pozityvizmo, retorikos, pragmatizmo, lingvistikos, kalbos filosofijos ir mokslo sociologijos teorijų raida. Tyrime taikytos analitinė, sintetinė, istorinė, retorinė ir struktūrinė-funkcinė metodologijos. Tyrimo rezultatai patvirtino šią hipotezę: komunikacinė mokslo filosofija yra istorinis šios srities pasiekimų derinys, apimantis retorinę, universalistinę ir partikuliaristinę raidos perspektyvas.

Raktažodžiai: komunikacinė mokslo filosofija, pragmatizmas, retorika, loginis pozityvizmas, postmodernizmas, intersubjektyvumas, universalizmas, partikuliarizmas