# Gerald Holton’s thematic analysis of science

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## Summary

The core problem of this dissertation is to investigate the concept of themata as well as the thematic analysis of science developed by Gerald Holton. Thus, the dissertation has a metatheoretical character and belongs to the domain of philosophy of science. The aim of this study is to reconstruct the Holton's concept and to compare it with similar tools for interpreting science and evaluating the Holton's proposal with respect to its usefulness for explaining the unity and change in science. There are several sensible reasons to undertake that topic. First, Gerald Holton is an important thinker, who contributed to the discussions in both the philosophy and history of science. He is a fellow of many distinguished academic organizations (i.a. American Physical Society, American Philosophical Society, and American Academy of Arts and Sciences) and received many prestigious awards (i.a. George Sarton Medal), and he’s still barely recognized a figure in Polish academic literature. Secondly, Holton's basic idea that there are non-empirical and non-analytic elements in science is generally accepted. It is then worthwhile to ask about the originality of his conception of what those elements are. Thirdly, the question of the unity of science and change in science returns vividly in debates on transdisciplinary research. Analysis of Holton's view might significantly contribute to those debates.

The paper is organized as follows: an introduction, three chapters, and conclusions, accompanied by a bibliography and a website bibliography, a summary in English, a table of contents in Polish and English, and an index of names. Chapter I gives a brief overview of the criticism Holton directed towards a philosophy of science — mostly until the 70s of the 20th century when he introduced thematic analysis. His dissatisfaction with that philosophy was his main motive to develop a new approach. Sketching the Holton's criticism allowed to introduce his main presuppositions concerning science and philosophy of science as well the notions by means of which he builds his ideas. In this context I tried to sketch out a broader philosophical tradition to which Holton appeals or he disputes with. In the subsequent points I present: (1) the debate over the unity of science and Holton's place in that debate; it is necessary, for the conception of themata is a development of his view on that matter; (2) Holton's analysis of philosophical-cultural approaches to science: New Dionysian and New Apollonian. Holton rejects those approaches as not only inadequate to the real science but

even harmful to it. Analysis of his criticism allows to indicate problems which a “proper” philosophy of science should solve; (3) the „context of discovery/context of justification distinction and Holton's view on it. According to Holton, this distinction is not tenable, because of epistemic pluralism we cannot make a logical reconstruction of any context of discovery, and in such context, there are firm and stable patterns (which he calls themata). Instead, he introduces a distinctive private science versus public science.

Chapter II reconstructs a positive part of the Holton's view. He develops a descriptive and historically bound philosophy of science in order to explain how rational agreement and disagreement is possible in science, what secures that science is a uniform and unified enterprise in spite of all changes, and how philosophy relates to science. In subsequent points, I present: (1) the assumptions of his research program, i.e. multifaceted and multidisciplinary approach (the most general), and the three-dimensional model of science. This point also presents specific problems (both in the form of examples and in the questions) that the thematic analysis of science is supposed to explain; (2) the catalog of themata and the epistemic conclusions that Holton drew from the thematic analysis of science, i.e. the longevity and durability of themata despite the changes of theories, and the migration of themata to the disciplines other than those in which they originated; (3) the role of themata based on the EJASE model — the name of this model is an acronym for: Experience, Jump, Axioms, Statements, Experience. The role of themata is seen in an intuitive leap between experience and the system of axioms.

Chapter III confronts Holton's concept of themata with similar ideas of other authors in order to evaluate the originality of his solution. In subsequent points, I discuss: (1) similarities and differences between themata and other supra-theoretical structures: Th. Kuhn's paradigms, I. Lakatos’s research programs, and L. Laudan’s research traditions. I choose these three thinkers because they present the most crucial views on supra-theoretical structures in the philosophy of science; (2) I ask of what are the thematic commitments (how scientists get to engage in them). Thus, themata are confronted with I. Kant's categories, H. Poincaré's conventions, Jung's archetypes, and M. Polanyi's tacit knowledge. The analysis shows that themata can be identified with neither of these concepts, but I hypothesize that they are the most similar to the tacit knowledge; (3) as at least some themata have a philosophical character point three of this chapter confronts themata with the external basis of science — an idea developed by Polish philosophers, especially S. Kamiński from the Lublin School of Philosophy. An analysis shows that some themata might be included in the external basis of science, but Holton does not provide any criterion which ideas can be rationally

accepted as themata, whereas Kamiński admits that irrational claims and concepts might belong to an external basis of science.

From my analysis of the Holton's ideas, I draw the following conclusions: Holton satisfactorily solved the problems which he undertook, i.e. the explanation of what kind of the unity of science can be achieved in spite of changes and methodological, epistemological diversity of disciplines, and what gives science continuity.

Nevertheless, the analysis encountered some difficulties in Holton's ideas. The first one can be called the problems of inductive and abductive reasoning used in the thematic analysis of science — problem of the validity of that kind of reasoning. The second one is the problem of the genesis of themata — we can ask why the new thematic patterns, even if rare, appear and why did the old emerge. The third problem is the nature of the themata —if we are always dealing with the reality of psychological nature; do the themata keep the same nature at every stage of their existence and influence, or is there a sort of change? These are the problems I try to discuss in the second point of Chapter III. The last one is the problem of interpretation of themata as the philosophical assumptions of science — which arises in the third point of Chapter III — their unclear status. Holton uses the term "presuppose" to describe the role of themata, but in that context, it does not have a formal-logical sense.

The conclusions of my analysis allow me to pose certain new perspectives of thematic analysis. Knowledge of the thematic content of science can be used by: 1. philosophers dealing with problems such as objectivity and realism of scientific knowledge, what combines sciences (also as far-fetched as natural sciences and humanities), 2. all those who deal with the science and design policy research, especially the transdisciplinary research; 3. the historians of science and those who are involved in university education who wish to present historical facts within the framework of the ideas they organize; 4. Researchers using the qualitative/content methods of analysis.