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THE SCIENTIFIC RUPTURE: ITS STAGES AND IMPORTANCE IN THE COURSE OF SCIENTIFIC RESEARCH

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ABSTRACT

The scientific rupture is the initial phase in scientific research, from which the researcher begins constructing their research project. It represents a preliminary stage through which the researcher acquires a clear understanding of the research subject and progressively eliminates previous judgments and misconceptions. It thus constitutes the initial formative action in the research trajectory, facilitating a practical starting point for the researcher's work. The scientific rupture comprises three essential steps: formulating the initial question, conducting exploratory work, and defining the research problem. After posing the research project as an initial question, the researcher proceeded to investigate and seek specific information related to the topic under study. On the basis of these findings, the researcher develops a theoretical approach to the research subject, constructing the research problem meticulously and systematically. This process follows a rigorous methodology, becoming progressively more detailed from one stage to the next, resembling a funnel that transitions from the general to the specific and then to the most specific.

KEYWORDS

Scientific Rupture, Initial Question, Exploratory Work, Research Problem

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Introduction.

Many novice researchers' ideas originate from daily observations or surrounding circumstances. However, such ideas are often biased or based upon preconceived judgments. Researching these views and premises is akin to constructing a fragile foundation. Therefore, researchers must follow specific steps and stages to study their research topic systematically, enabling them to arrive at scientifically acceptable conclusions. Gaston Bachelard clarified the steps of scientific research by asserting that scientific facts must be purified, freed from prior judgments (rupture), constructed rationally, and empirically verified. These three processes constitute fundamental steps within the scientific research trajectory.

In their book "Manual for Social Science Researchers," Raymond Quivy and Luc Van Campenhoudt identified three principal phases in scientific research methodology. The first is the rupture phase; the second involves constructing an analytical model; and the third pertains to verification. Each phase consists of interconnected and sequentially structured steps.

The rupture phase is considered the first stage in the scientific research process. This stage consists of three fundamental steps, beginning with adopting an initial guiding question, which serves as a preliminary framework for the research. The second step is the exploratory work phase, which involves readings and interviews conducted by the researcher. On the basis of the information gathered, the researcher reaches the third step, formulating the research problem and refining the initial guiding question into a central question for the study. Hence, the rupture's significance lies in its initial formative scientific action within the scientific research trajectory.

Accurately identifying and formulating the research problem can be achieved only through carefully crafting the initial question, reviewing the relevant literature, and conducting interviews. These enable the researcher to acquire comprehensive information about the research topic, thus facilitating an understanding and theoretical approach to the research problem.

On the basis of the importance of the rupture phase in the scientific research process, this paper addresses its study and analysis by examining the importance of the initial guiding question in directing the trajectory of scientific research and highlighting its key characteristics. Moreover, the paper explores exploratory work, covering its theoretical dimension through a literature review and its practical dimension through field interviews, while emphasising the role of such work in developing a theoretical approach to the research problem. This leads to formulating the research problem and refining the initial guiding question into a central one.

Accordingly, this paper analyses the following primary sections:

First: The Initial Guiding Question.

Second: Exploratory Work (Literature Review and Exploratory Interviews) and its main stages.

Third: Construction of the Research Problem and Formulation of the Central Research Question.

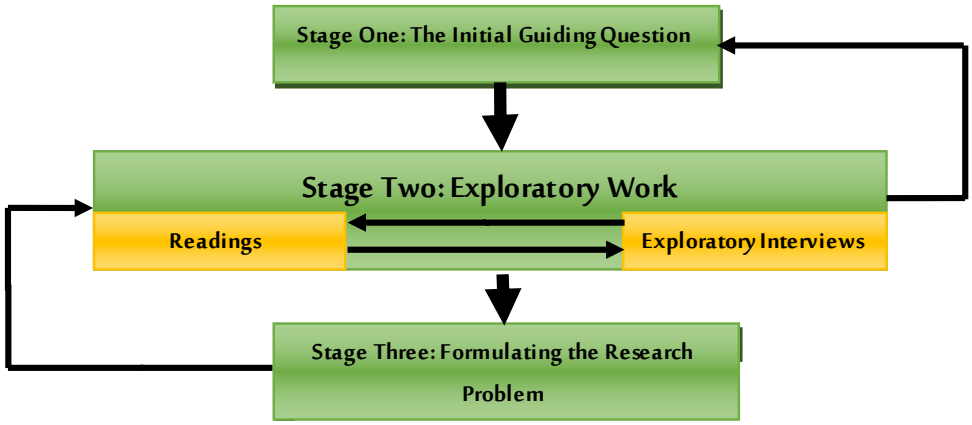

Fig. 1. *(Raymond Quivy & Luc Van Campenhoudt, 1995, p. 127)*

Significance of the Study

The significance of this study arises from addressing the first stage of the scientific research process, which represents the initial formative action of the research project. Mastering this stage means making progress in research, as it provides a detailed description of the sequential processes required to reach subsequent research stages, emphasising each operation, its characteristics, and phases, and establishing a rupture from previous thoughts and opinions.

Objectives of the Study

This study aims to achieve the following objectives:

- The steps involved in the first stage of the scientific research trajectory, namely, the scientific rupture phase, are identified.
- Understand the characteristics of the initial guiding research question and the methods of formulating it.

- Explore the methods by which researchers collect information through exploratory readings and interviews; the former ensures quality in presenting the topic, whereas the latter facilitates interaction with the lived experiences of social actors.
- Understand how to formulate the research problem and refine the initial guiding question into a central one.
- Develop a body of knowledge regarding the fundamental steps and essential phases within the scientific research trajectory.

First: Formulating the Initial Guiding Question and its Characteristics

One of the difficulties researchers encounter at the outset is formulating their research topic into an initial question from which to launch their investigation. Translating a somewhat ambiguous topic in the researcher's mind into a practical research project is not an easy task. The researcher aims to produce scientific work as quickly as possible yet simultaneously desires high-quality, scientifically valuable results, a challenging endeavour. Therefore, the researcher requires reference points to rely upon during scientific research. A key reference point transforms the ideas and opinions in the researcher's mind into an initial guiding question for scientific inquiry. This initial guiding question acts as a scientific compass, and any flaw in its formulation negatively impacts subsequent research stages. Raymond Quivy and Luc Van Campenhoudt (1995, p. 41) succinctly identified the criteria for a compelling guiding question as clarity, feasibility, and relevance to the research topic.

1. Characteristics of Clarity

Clarity characteristics for the initial guiding question relate to precision and conciseness, helping researchers accurately understand their subject and specifically identify what they aim to explore. The key attributes of clarity include precision and brevity in formulating the initial question, ensuring that its meaning is unambiguous. This clarity is achieved by explicitly defining concepts within the question so that they are comprehensible and unanimously understood by readers, without preconceived judgments. Hence, the question must be precise and clear, as a precise question is not the opposite of a broad or open-ended question; rather, it contrasts with vague or ambiguous questions (Quivy & Van Campenhoudt, 1995, p. 42). Another characteristic required for the initial question is brevity; excessively long questions may cause readers to lose track of the researcher's original intent, leading to confusion over priorities and initial research aims. Thus, the initial guiding question should be formulated as succinctly as possible, facilitating comprehension and assisting researchers in identifying their objectives (Safari, 1999, p. 82).

2. Characteristics of Feasibility

The feasibility characteristics are related to whether the research topic can be studied. Raymond Quivy and Luc Van Campenhoudt provided an example of an unfeasible initial research question unless extensive resources, both temporal and material, are mobilised, resources that the average researcher may not be able to secure. The example was *"Do business owners in various countries of the European Union share the same perception regarding the economic competition between the United States and Japan?"* The researchers commented that "If you can dedicate at least two full years to this research, and if you have a budget of several million, along with competent assistants fluent in multiple languages, then you could indeed carry out such a project and obtain sufficiently detailed results to derive some benefit. However, if you do not possess such means, it would be better to scale back your ambitions" (Quivy & Van Campenhoudt, 1995, p. 43).

Thus, the researcher must verify the availability of the necessary material and ensure that the timeframe allocated is sufficient to address the research topic. Maurice Angers stated that feasibility is "the quality of what can be accomplished considering human and material resources, as well as specific technical and temporal constraints." On this basis, it is necessary to consider some feasibility criteria immediately upon selecting the topic. These criteria include time availability, resources, access to information sources, level of complexity, consensus within the research team, and imagination. These factors form a framework that points not only to the possibilities but also to the limitations of the project (Angers, 2006, p. 126).

Accordingly, for researchers to study and address the research topic effectively, they must consider their resources, such as skills and language proficiency, and the material and technical means available throughout the research period when formulating the initial guiding question.

3. Characteristics of relevance

These are the characteristics related to the interpretive, normative, and predictive nature of the question, and they must meet the following conditions (Safari, 1999, p. 83):

- The initial guiding question should not carry a value judgement of approval or disapproval or imply truth or falsehood, praise or criticism.
- The question should not be philosophical, addressing metaphysical issues that cannot be subjected to the analytical methods used in the social sciences.
- The question should not be closed-ended, allowing only a "yes" or "no" response.
- The question should not focus on exploring hypothetical scenarios that may never occur.
- The question should not be merely descriptive, requiring nothing more than knowledge of figures or statistics. In the social sciences, the objective is not simple description but understanding, which entails acquiring information through observation and experience, where understanding implies comprehensive knowledge.

Raymond Quivy and Luc Van Campenhoudt provided an example of an initial guiding question that does not fulfil the appropriate criteria for proper formulation. The question was *"Is the tax system organised in the country socially just?"* The researchers commented that such a question does not aim to analyse how the tax system operates or the effects of how it was designed and implemented. Instead, it seeks to pass moral judgment on the system, an approach that does not align directly with the objectives of social science research. They noted that confusion between analysis and value judgement is common and not easily recognised (Quivy& Van Campenhoudt, 1995, pp. 44–45). This serves as an example of a question containing a value judgement of which there are many.

The most effective method a researcher can adopt at the beginning of a study is to formulate their project as an initial guiding question. Through this question, the researcher can organise their thoughts. To be correctly formulated, the guiding question must meet specific criteria: clarity, feasibility, and relevance to reality.

Second: Exploratory Work

In the previous section, we discussed how to formulate an initial guiding question for a research project and reviewed the conditions for its formulation. Once the researcher has clearly defined this initial question, they begin the exploration process by gathering information and data related to the subject and exploring the field. This process helps clarify the conceptual framework of the research problem. Exploratory work is carried out through precise, structured, and methodologically integrated operations, including the following:

1 Reading operations (exploratory reading):

After selecting and refining their research topic through an initial guiding question, the researcher investigates what has already been written. This study aims to uncover the topic's proper conceptual understanding and explore the most prominent studies previously conducted. This stage aims to move beyond the researcher's preconceived ideas, creating a rupture with prior assumptions by acquiring new meanings. It is, therefore, essential to consult texts, publications, journals, and books available on the subject.

Collecting and storing information, ideas, and viewpoints drawn from various references and sources is considered one of the most critical stages of scientific research (Jendli, 2005, p. 63). Reading and information gathering constitute a fundamental activity through which the researcher gains control over the study and its various dimensions. This reflects the researcher's mastery of the information process related to the research topic, requiring them to extract and compile all knowledge, data, and facts connected to the subject. These are often scattered across diverse, numerous, and dispersed documents, sources, and references and must be concisely and systematically summarised in files, cards, or organised folders (Ouabbadi, 1987, p. 81).

Raymond Quivy and Luc Van Campenhoudt (1995, p. 62) outlined essential principles that must be observed during the reading process, which may be summarised as follows:

First principle: Starting from the initial research question, as it is the best way to prevent the researcher from becoming lost in selecting readings.

Second Principle: Select readings carefully. It is not possible to read everything written on the subject. It is more beneficial for the researcher to read a few well-chosen texts deeply and critically than to read thousands of pages superficially.

Third principle: Seek, as much as possible, documents whose authors do more than present data; look for texts that offer elements of analysis and interpretation.

Fourth principle: Ensuring that the collection of texts presents a variety of approaches to the phenomenon under study.

Fifth principle: Read in intervals, allowing time between sessions for personal reflection and exchanging ideas with colleagues and experienced researchers.

For the method used in conducting reading operations and reviewing literature on a specific research topic, Maurice Angers outlined the process through the following steps (Angers, 2006, p. 139):

A When the research topic is narrowed into a concise formulation, the research project should be expressed as an initial guiding question, according to the previously stated conditions.

B Develop a list of essential keywords while exploring the various dimensions of the research topic. The researcher must possess enough relevant keywords to use indexes effectively, which requires identifying multiple aspects of the subject to gather additional terms.

C Go to the library or a documentation centre. The methodology followed should be as follows:

- General reference books are used to enrich the understanding of the essential terms.
- Consult the periodical index for relevant articles.
- Review the general catalogue for other types of documents.
- Check the references cited in other sources when necessary.

D Create a list of documents related to the topic, noting comprehensive bibliographic details.

E Select the documents to be read after evaluating them.

F Prepare a bibliographic and documentary reference card.

2 Exploratory interviews

Exploratory interviews represent the second step of the exploratory phase, through which the researcher establishes a rupture with previous ideas and assumptions. These interviews also help uncover the specific aspects that the researcher intends to focus on. Consequently, there is an intrinsic link between this phase and the reading phase.

Raymond Quivy and Luc Van Campenhoudt (1995, p. 95) identified three categories of individuals with whom exploratory interviews are to be conducted:

- The first category includes teachers, researchers, specialists, and experts on the research topic defined by the initial guiding question.
- **Second Category:** This group comprises individuals directly connected to the subject matter by their positions, roles, or responsibilities.
- The third category included participants drawn from the study's target population.

The researchers also outlined the essential conditions to be respected when conducting exploratory interviews:

- Ask the fewest questions possible.
- Intervene as openly and flexibly as possible.
- Refrain from inserting oneself into the content of the interview.
- The interviews were conducted in an appropriate and suitable context.
- The interviews were recorded.

Third: Constructing and Formulating the Research Problem

Constructing and formulating the research problem is one of the most critical stages in which a researcher relies on the scientific research process, particularly in its initial phase. Its significance lies in its influence on all subsequent steps of the research. It guides the researcher in defining the type of study, the appropriate methodology, the tools and techniques to be used for data collection, and assists in determining the hypotheses and concepts to be defined and the sample needed for conducting the fieldwork. Therefore, this stage constitutes a fundamental pillar of the research process, and any neglect, misjudgment, or lack of focus in constructing it can lead to serious errors and deviations in the course of the study.

To understand this crucial step, we explore the following:

1 Definition of the Research Problem

The definitions of the research problem vary. Some scholars consider it a science, whereas others consider it the art of formulating questions. According to the *Petit Robert* dictionary, it is "the art and science of problem formulation" (Safari, 1999, p. 73). Maurice Angers defines it as "the presentation of the research objective in the form of a question that allows for investigation to find an answer" (Angers, 2006, p. 141).

Professor Rachid Zerouati defines it as "a set of questions that indicate the existence of a problem perceived by the general public, whereas the specific issue that constitutes the research problem is observed by the specialised researcher" (Zerouati, 2002, p. 68).

The research problem is a structured text in which ideas follow a logical progression. The researcher begins by introducing the topic in general terms and gradually narrows it down until it reaches the core issue that the study addresses. This is done on the basis ofinsights gained from prior readings and exploratory work (Ben Ammar Nawal, 2020, p. 141).

2 Importance of the Research Problem in Scientific Research

Methodological researchers agree that the accurate and well-defined formulation of a research problem leads to the establishment of a research plan that is methodically and practically structured. It also determines the study type, methodology, and tools used to collect field data and information. The importance of the research problem lies in its role as the driving force of the study and the defining element of its subsequent parts. Once the researcher gains control over the problem and formulates it clearly and logically, they can identify what they seek and what outcomes they aim to achieve. This allows for formulating hypotheses to be tested in the field and determining research objectives.

Moreover, a well-defined problem enables the researcher to determine the direction of the research and its theoretical and empirical sources of information. It also delimits the scope of the study, guiding the researcher away from generalities and uncertainty toward the specific issue being studied. This facilitates focusing on the essential elements of the research and eliminating unnecessary components (Daoudi, 2020, p. 175).

3 Some Recommendations for Selecting and Evaluating the Research Problem

(Zerouati, 2002, p. 69)

On the basis of the advice of Van Dalen, D. B., and Mayer, W. J., the following guidelines are summarised:

- A problem that captures your attention and genuinely requires a solution is chosen.
- The facts and data related to the problem are collected.
- Conduct observations to understand the relationship between facts and the problem.
- The connections between the facts that may reveal key difficulties are identified.
- Provide explanations as to why the observations may present challenges.
- Seek relationships that could deepen the understanding needed to resolve the problem.
- Conduct observations and analyses to establish links between the hypotheses and the problem.
- Investigate connections between facts and the proposed explanations.

2 Stages of Formulating the Research Problem

Before the research problem is presented, the researcher must identify the study variables, namely, the dependent and independent variables. This begins by defining the phenomenon under investigation, followed by identifying the contributing factors behind its occurrence. Then, the problem is refined by posing a set of guiding questions and reformulating the initial question into a more precise and structured version. The process of formulating the research problem typically involves three main stages (Safari, 1999, p. 74):

First Stage: (Identifying the Problem)

This stage involves mapping out the various perspectives on the topic. The researcher must identify the different approaches to the problem, essentially cataloguing and analysing the various viewpoints that have been adopted. It includes determining points of agreement and disagreement between these perspectives and clarifying the theoretical framework upon which each opinion is based, whether explicitly stated or implied.

Second Stage: (Adopting the Problem)

At this stage, the researcher must address a specific problem by formulating a new problem from a unique theoretical perspective developed by the researcher or by positioning the study within an existing theoretical framework identified through prior readings.

Third Stage: (Refining the Problem)

This final stage involves clarifying the researcher's approach to presenting and answering the problem, even if a preexisting theoretical framework has been adopted. Practically, this is done by defining key terms and presenting the conceptual structure underpinning the hypotheses proposed in response to the initial guiding question. These hypotheses take their final form through the construction of the problem statement.

Conclusions

By following the steps outlined above and formulating an initial guiding question, the researcher can effectively direct the research process. This question serves as a reference point throughout the exploratory phase, during which the researcher actively seeks information through both diverse readings and exploratory interviews. These interviews allow for direct engagement with social actors and the research population. The process unfolds in a spiral manner, where each stage feeds into the next stage by providing the necessary data to ensure the continuity of the research journey. This ultimately leads to the formulation of the research problem, which is shaped through the development of a theoretical understanding of the study topic. This can only be achieved by drawing on the information collected in the earlier stages. Thus, the researcher can construct the problem by moving from the general to the specific and finally to the most specific, culminating in the central research question. This central question is essentially a refined version of the initial guiding question, now articulated as the focal point of the study. Once the central question has been formulated and the research problem is accurately structured, the researcher can proceed to the subsequent phases of the research process.

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