

Modes of scientific investigation

- ❑ The mode of investigation corresponds to the approach taken for the collection, analysis, and interpretation of data
- ❑ Data collection is carried out through 3 research approaches, which are respectively:
 - **Qualitative approach** (which ensures the collection of non-quantifiable data)
 - **Quantitative approach** (dont les données sont quantifiables)
 - **Mixed approach**

The qualitative approach

- ❑ Qualitative research generates non-numerical data. The information collected is then analyzed in an interpretative, subjective, impressionistic, or even diagnostic manner. It aims to make sense of the phenomenon through observation, description, interpretation, and an appreciation of the context and the phenomenon as it presents itself.
- ❑ The primary objective of qualitative research is to provide a comprehensive and detailed description of the research subject. It is typically more exploratory in nature. It is based on case studies to study specific facts:
- ❑ Instead of investigating a large number of individuals or facts, the researcher studies a limited number of cases considered significant.
- ❑ The goal is to gain a deep understanding of a social situation, a social fact, a group of people, an individual, etc.

-Qualitative research is essentially subjective, which means it seeks to understand human behavior and the reasons that govern such behavior. Researchers tend to become subjectively immersed in the subject of this research method. They are much more open to opinion and personal judgment and can only provide observations rather than results.

-Techniques for collecting qualitative data include:

- 1- **Observations**: The researcher takes notes on the behavior and activities of individuals on the research site through unstructured records, semi-structured records (using some priority questions for the observer).
- 2- **Interviews**: In the form of a few unstructured and generally open-ended questions aimed at capturing the participants' perspectives through face-to-face meetings, phone calls, or email.
- 3- **Documents**: The researcher collects a set of documents (journals, meeting minutes, official reports, maps, aerial views, letters, etc.).
- 4- **Audio-visual materials**: The researcher collects qualitative audio-visual data through photography, video or audio recordings, art objects, software, films, and more.

-In the qualitative approach, the researcher starts from a concrete situation involving a particular phenomenon that they aim to understand, rather than demonstrate, prove, or control. He seeks to make sense of the phenomenon through or beyond observation, description, interpretation, and an appreciation of the context and the phenomenon as it presents itself.

-This method employs qualitative research techniques to study specific facts (case studies, observation, interviews, etc.).

-The qualitative mode provides content data, not numerical data.

Quantitative approach

- ❑ Quantitative research generates numerical data or information that can be converted into numbers. It has a definite objective.
- ❑ In quantitative research, researchers tend to remain objectively detached from the subject. This is because quantitative research follows an objective approach in the sense that it seeks only precise measurements and analyses of target concepts to address its questions.

It relies on techniques such as:

1-Surveys: Provide a numerical (quantitative) description of trends, opinions, attitudes, or a population through the study of a sample. This includes the use of questionnaires or structured interviews for data collection with the goal of generalizing from a sample to a population.

2-Experimental measurements using calibrated and standardized scientific measuring instruments and apparatus.

-This approach aims at collecting observed and quantifiable data. This type of research involves describing, explaining, controlling, and predicting based on the observation of positive facts and events, meaning those that exist independently of the researcher, objective facts.

-This method relies on instruments or quantitative research techniques for data collection, where, in principle, reliability and validity are assured. It results in numerical data that allows for descriptive analyses, the creation of tables and graphs, statistical analyses to explore relationships between variables or factors, correlation analyses, associations, and more.

Mixed approach

- ❑ This approach is a combination of the two previous ones. It enables the researcher to harness the advantages of both the quantitative and qualitative modes.
- ❑ This approach helps in comprehensively understanding the phenomenon in all its dimensions. Therefore, the two approaches do not oppose each other; they complement each other.

Comparison between the two approaches

The qualitative approach	The quantitative approach
Generate hypothèses	Verify the hypotheses
Inductive (part of a price to arrive at a general conclusion)	Deductive (starts from a general theory to arrive at a specific explanation).
Examines a set of ideas; the sampling approach allows for a representative coverage of ideas or concepts.	Examines a set of individuals; sampling allows for a representative coverage of individuals in the population.
Explains "why" and "what does this mean."	Explains "what," "how much," and "to what extent."
Capture the positions, context, and details of a small number of participants.	Obtains numerical estimates of the frequency and severity of the phenomenon from a large number of participants.
Example of a research question related to qualitative approach: What is the sentiment of residents in a non-ecological neighborhood?	Example of a research question related to quantitative approach: Does the introduction of the ecological dimension reduce negative feelings about living in the area and improve the quality of life?

Which approach should be used?

- If your study aims to find the answer through numerical evidence, then you should use quantitative research.
- However, if in your study, you want to further explain why a particular event happened or why a specific phenomenon is the case, then you should use qualitative research.
- Some studies use a mixed approach, allowing both to complement each other in their respective strengths.

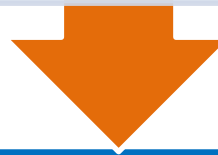
The process of scientific research

Phase of conception or construction of the project

Choose and formulate a recherche problem

Include questions, objects, hypotheses, and determine variables

Compile relevant literature, observe relevant facts.



Methodological or discovery and data collection phase

Choose the methods and instruments for data collection

Define the study sample

Describe the data collection process.

Present the plan for analyzing the collected data.

Gather the data.

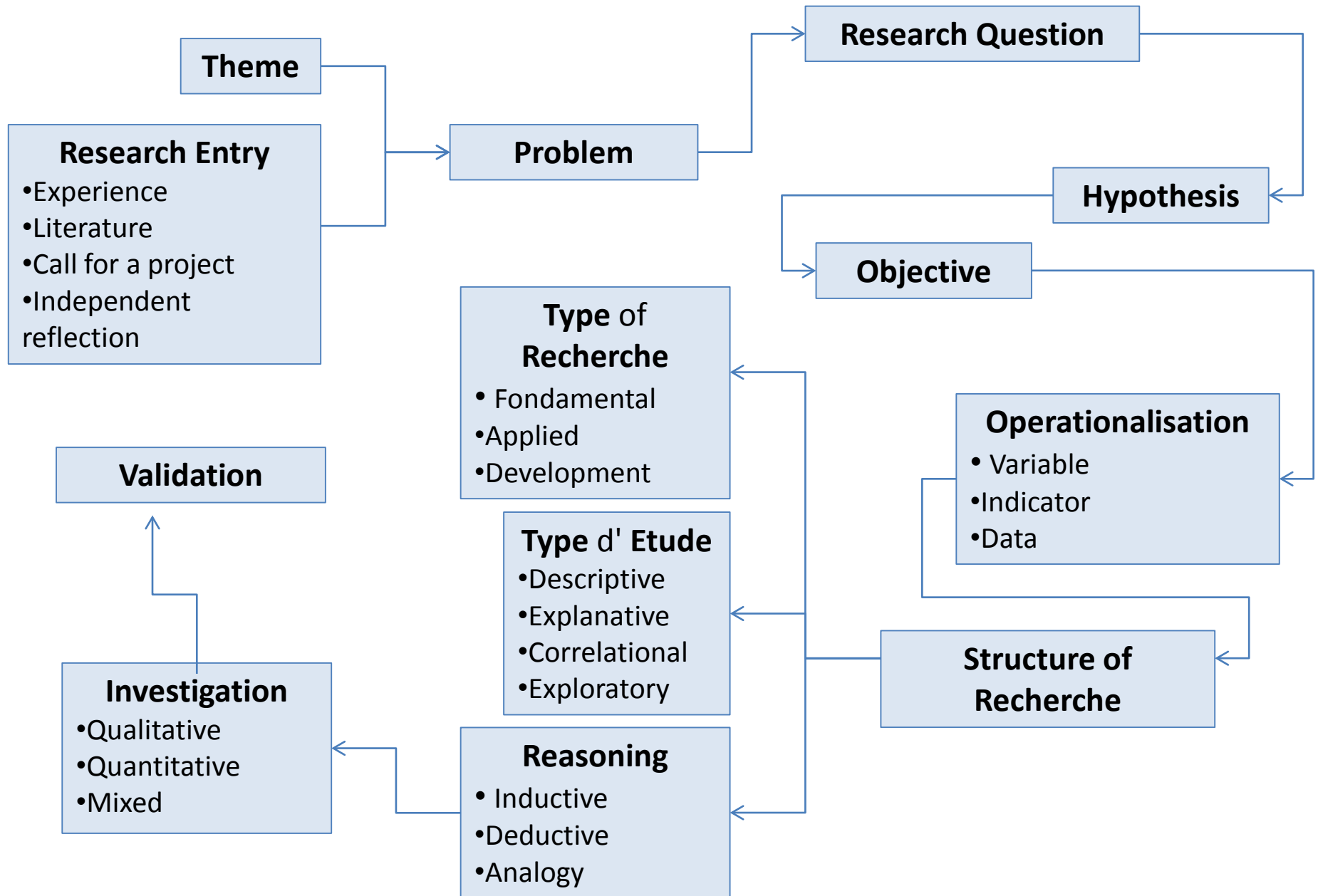


Treatment phase: Analysis/ Presentation of data and Interpretation/ Discussion

Analyze/present the collected data (organize, categorize, compare, measure the strength of the relationship between variables).

Interprete / discuss of results (verify authenticated results, hypotheses, interrogation of the theories)..

Diagram of the process concepts



Steps to structure the research thinking



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graph TD; A[Steps to structure the research thinking] --> B[The starting question (Setting a goal to achieve)]; B --> C[Exploration (to refine the research question or issue)]; C --> D[Fix the problem and propose hypotheses]; D --> E[The construction of the observation setup (Developing the research method)]; E --> F[Observation or data collection]; F --> G[Discussion and formulation of conclusions];
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The starting question (Setting a goal to achieve)

Exploration (to refine the research question or issue)

Fix the problem and propose hypotheses

**The construction of the observation setup
(Developing the research method)**

Observation or data collection

Discussion and formulation of conclusions