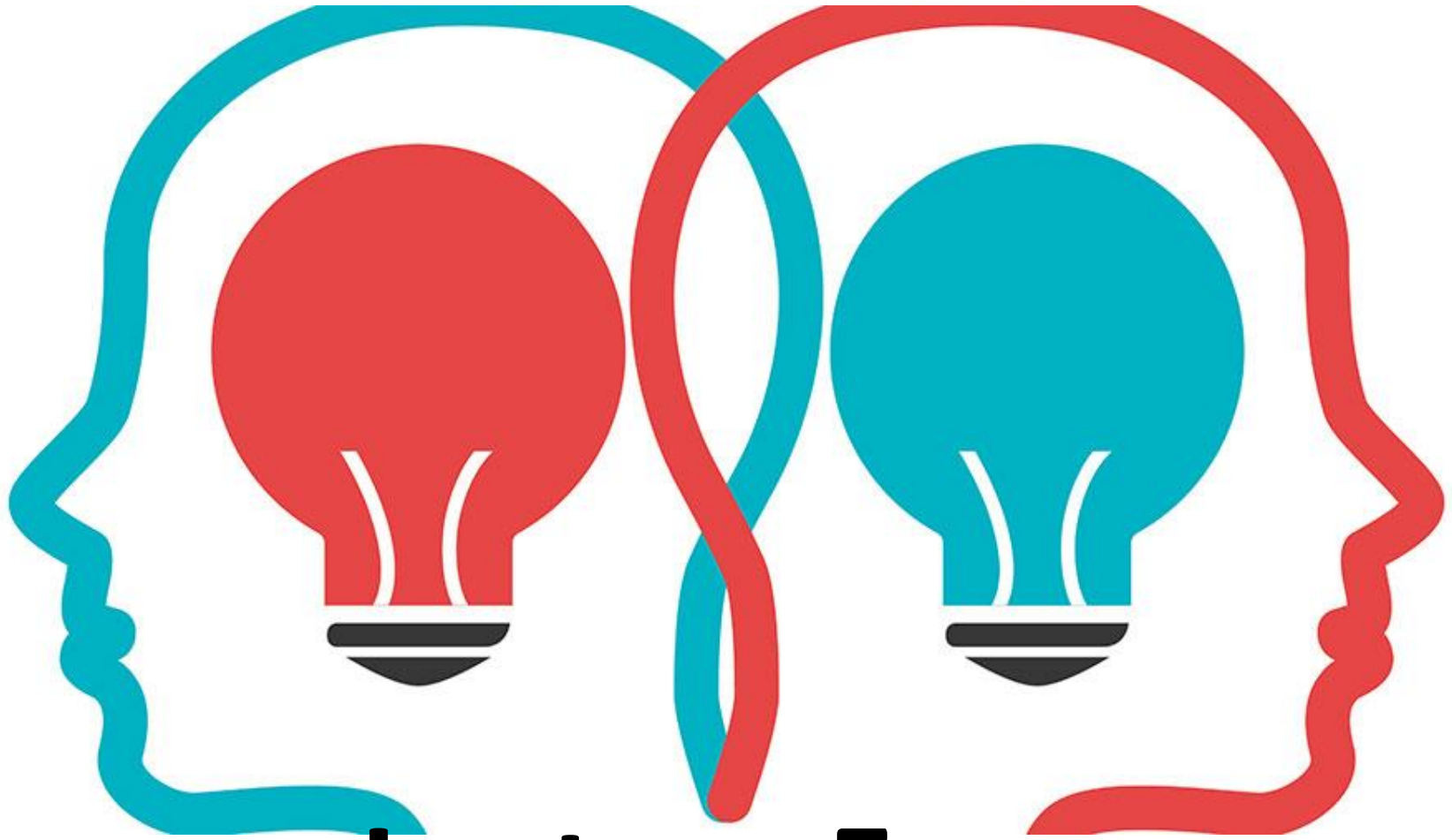
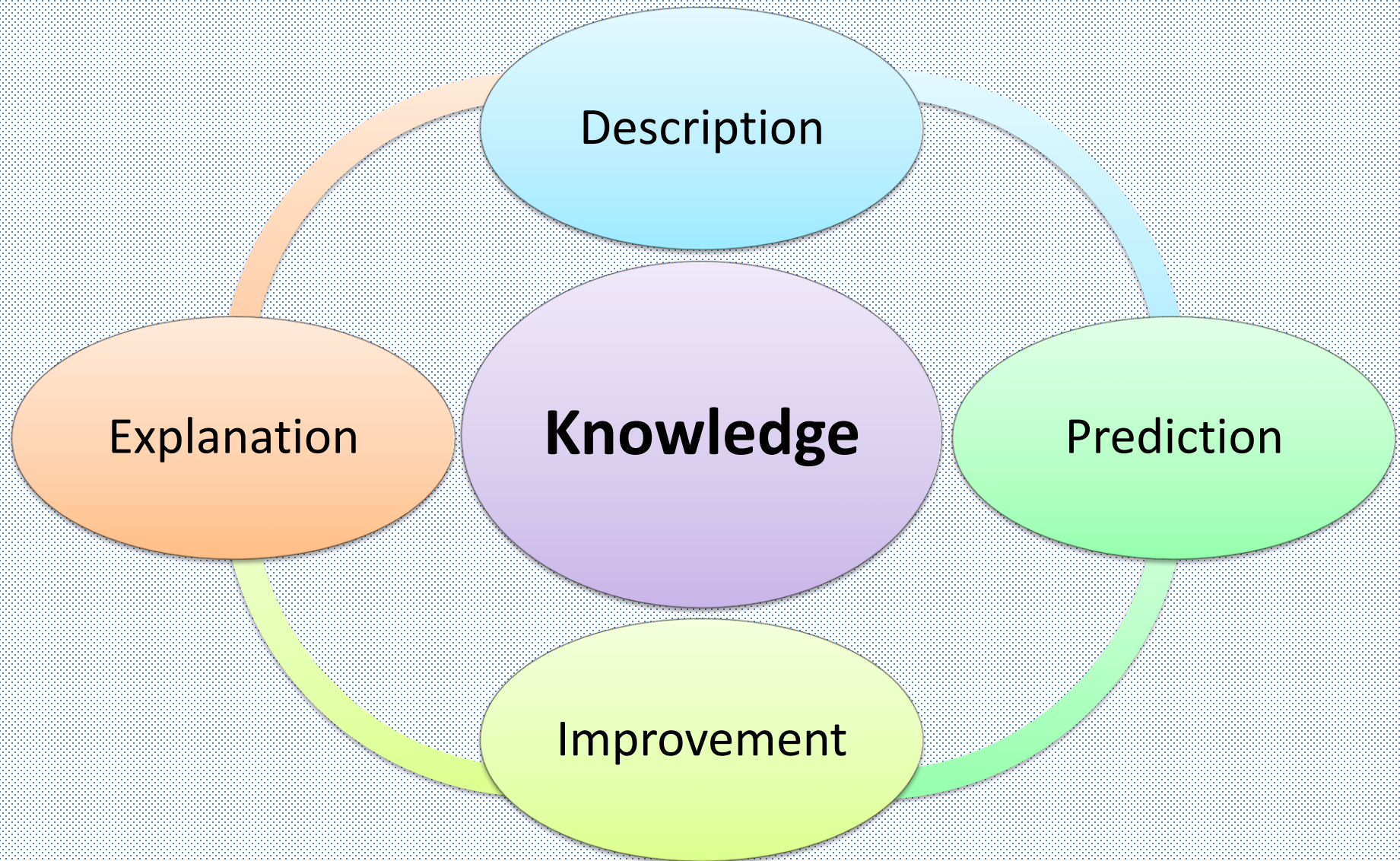


Types of Knowledge



Lecture Four

Types of Knowledge



Types of Knowledge

Description

Results of research can describe natural or social phenomenon

The descriptive function of research relies on instruments to measure and observe

The descriptive research results in our understanding of what happened

Types of Knowledge

Prediction

To predict a phenomenon that will occur at time Y from information at an earlier time X

e.g. acquiring knowledge about factors that predict students' success

e.g. identifying students who are likely to be unsuccessful and put prevention programs

Types of Knowledge

Improvement

Mainly concerned with the effectiveness of intervention

Intervention variables could be reinforcement, reading training, cooperative learning, personalized instruction, tutoring, *etc.*

The research approach include experimental design and evaluation research

Types of Knowledge

Explanation

Explanation research subsumes the other three

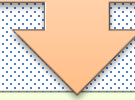
Researchers can describe phenomenon

Researchers can predict phenomenon
consequences

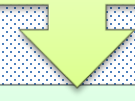
Researchers know how to intervene to change
those consequences

Benefit of Research

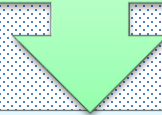
Facts are discovered



Knowledge is created

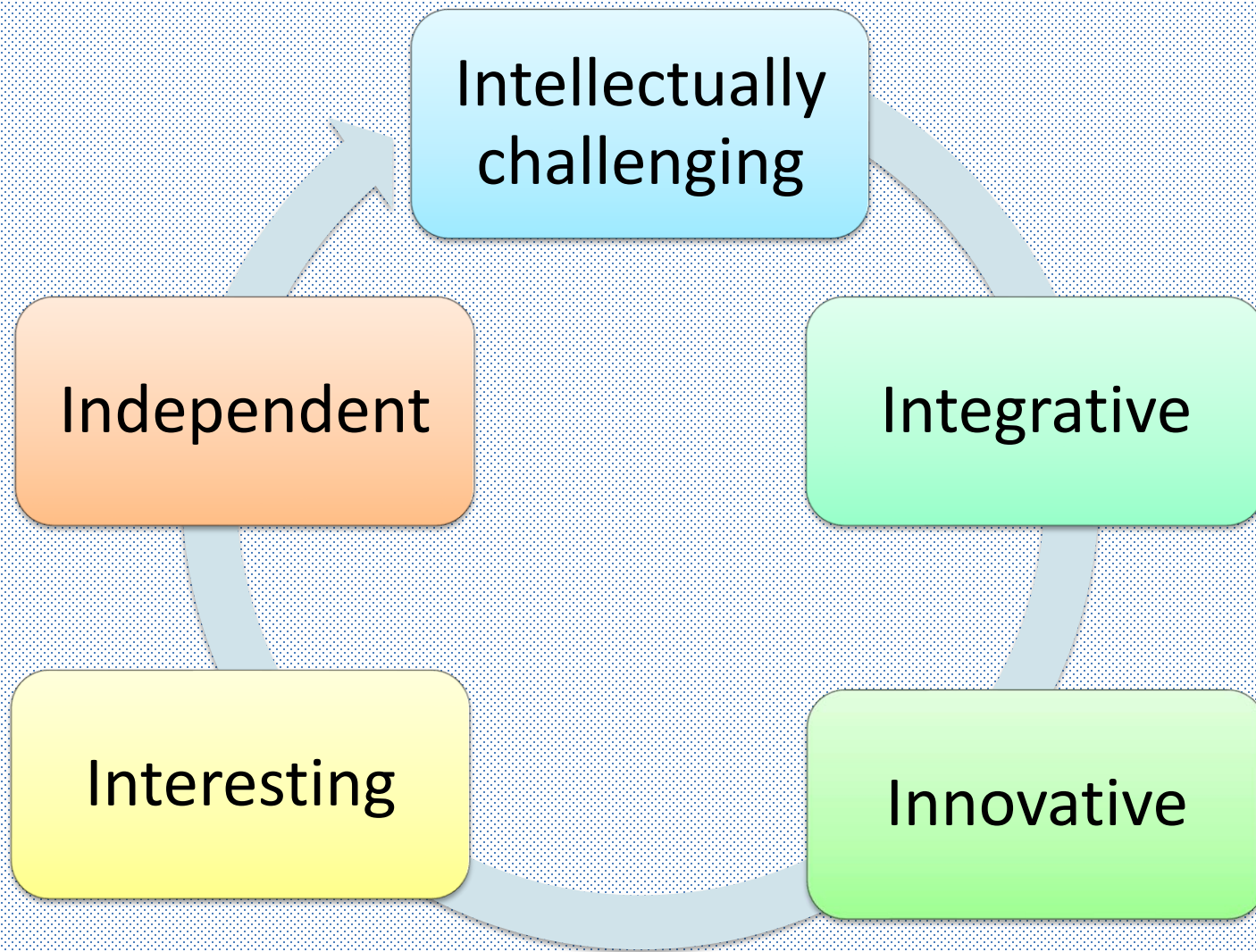


Increases the stock of knowledge (*e.g.* the Knowledge of humanity, culture and science)

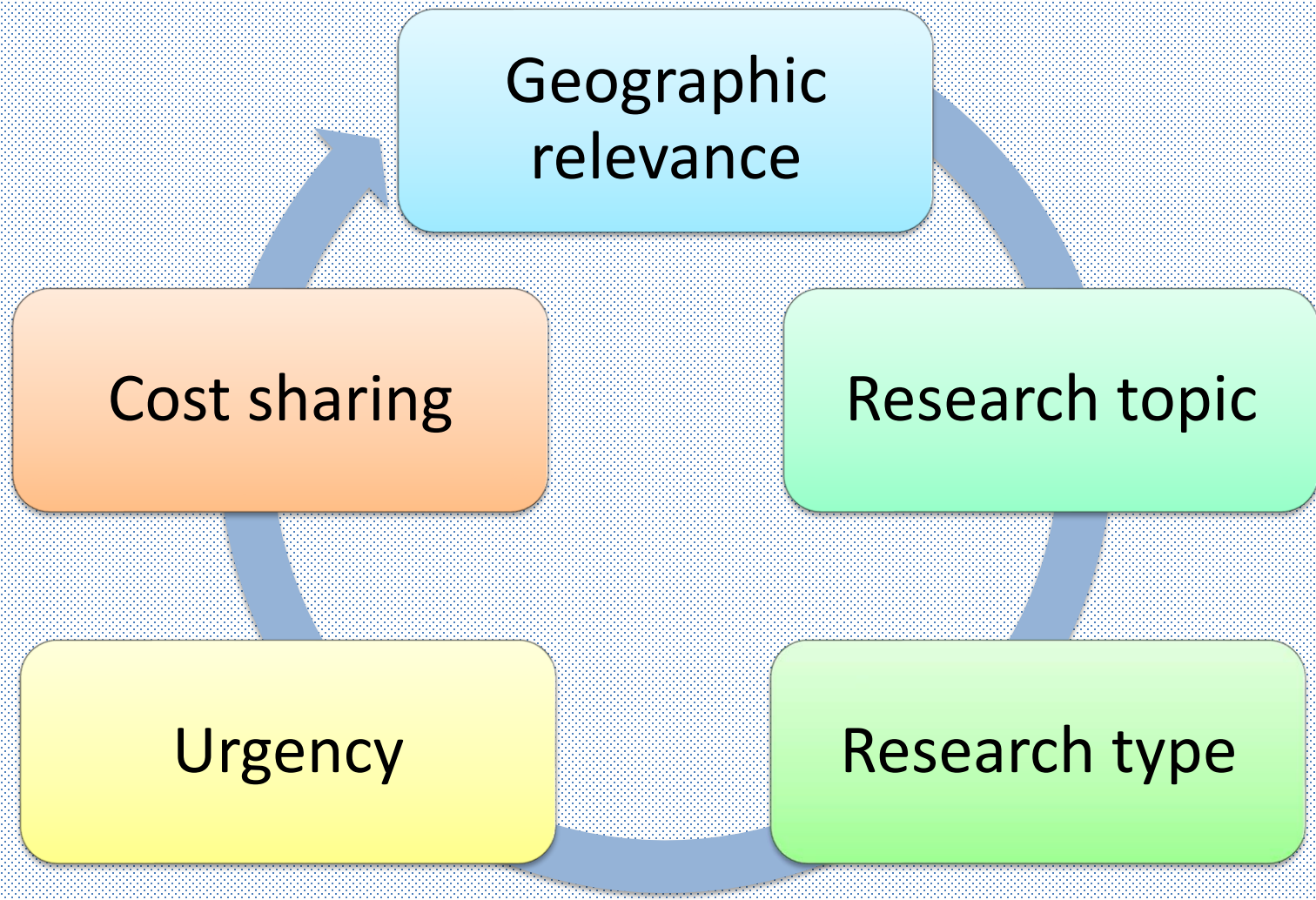


The use of knowledge to devise new applications (*e.g.* new communication technology, sustainable energy and new treatment)

Research Project Characteristics



Research Programs



Research Programs

Geographic Relevance

How widespread is the problem you are trying to address?

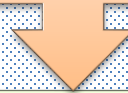
Is it experienced in countries around the world?

Is it shared by a region or several organizations?

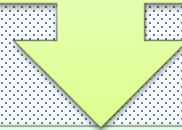
Is it an even more specific problem that exists on a small number of locations?

Research Programs

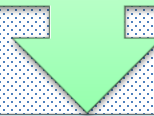
Topic of the Research Project



If research focuses on a specific problem, the decision about the funding may be simplified, because many research focus on such modes



If, on the other hand, the research focuses on policy, or other issues, the appropriate program may be less clear cut



In addition, some research programs fund only certain topics (*e.g.* the National Plan for Science and Technology at KACST)

Research Programs

Urgency

Research programs vary in their time frame for delivery

Finding a research program that matches the urgency of your research statement is critical

In some programs, it may take up to 3 years to publish a research report

Other programs address needs that can be met within 6 months

Research Programs

Opportunities for Cost Sharing

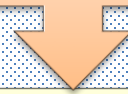
Some programs require cost sharing or a local match

A research statement that includes information on where additional funding is available might be needed

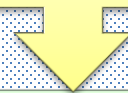
For other research programs, cost-sharing may not be required but could enhance the project's chances for success

Development of Research Skills

Learning How to Conduct a Good Research



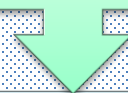
New skills in which many people do not have



Better understanding and interpretation of the literature

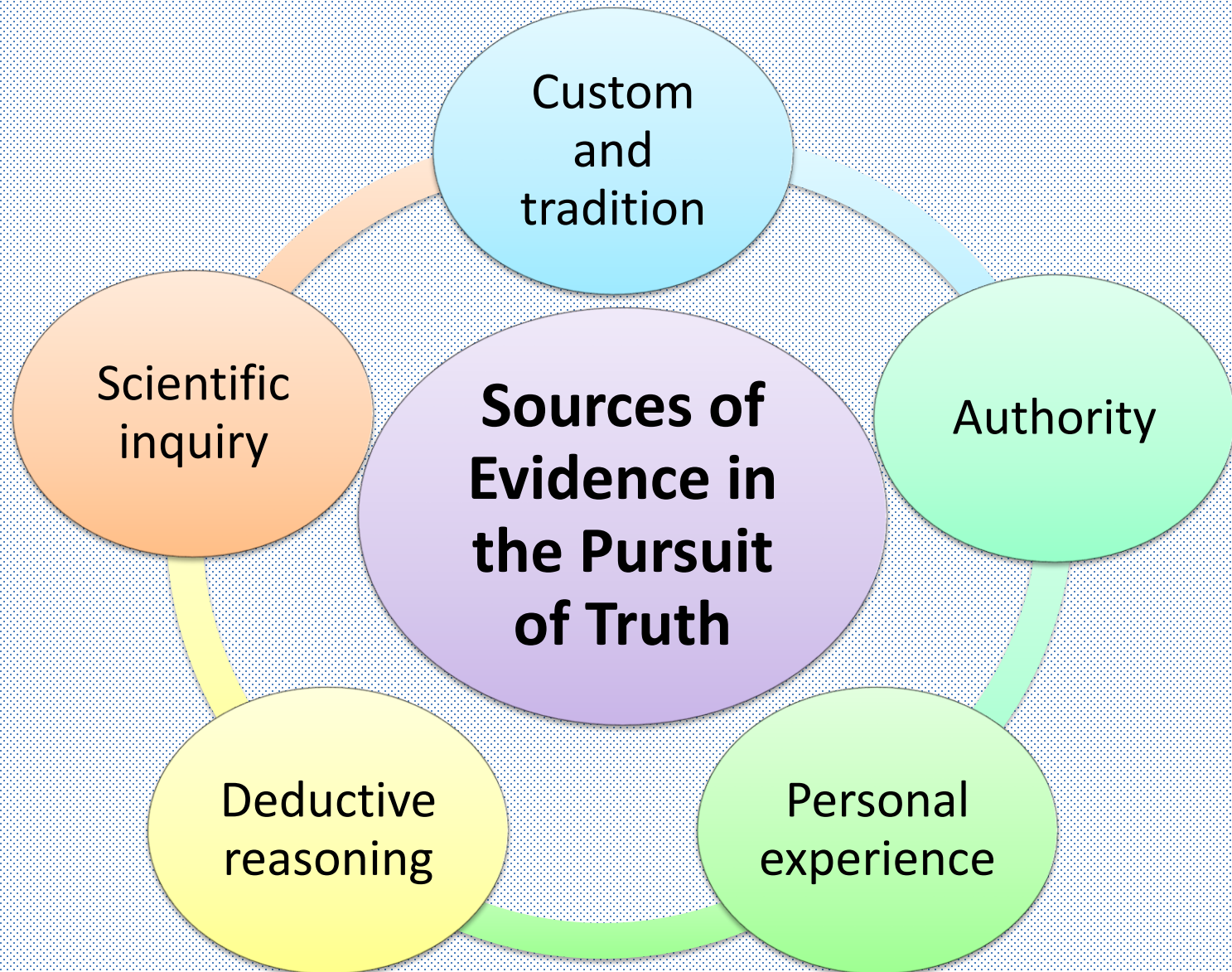


Recognize new questions that need investigation

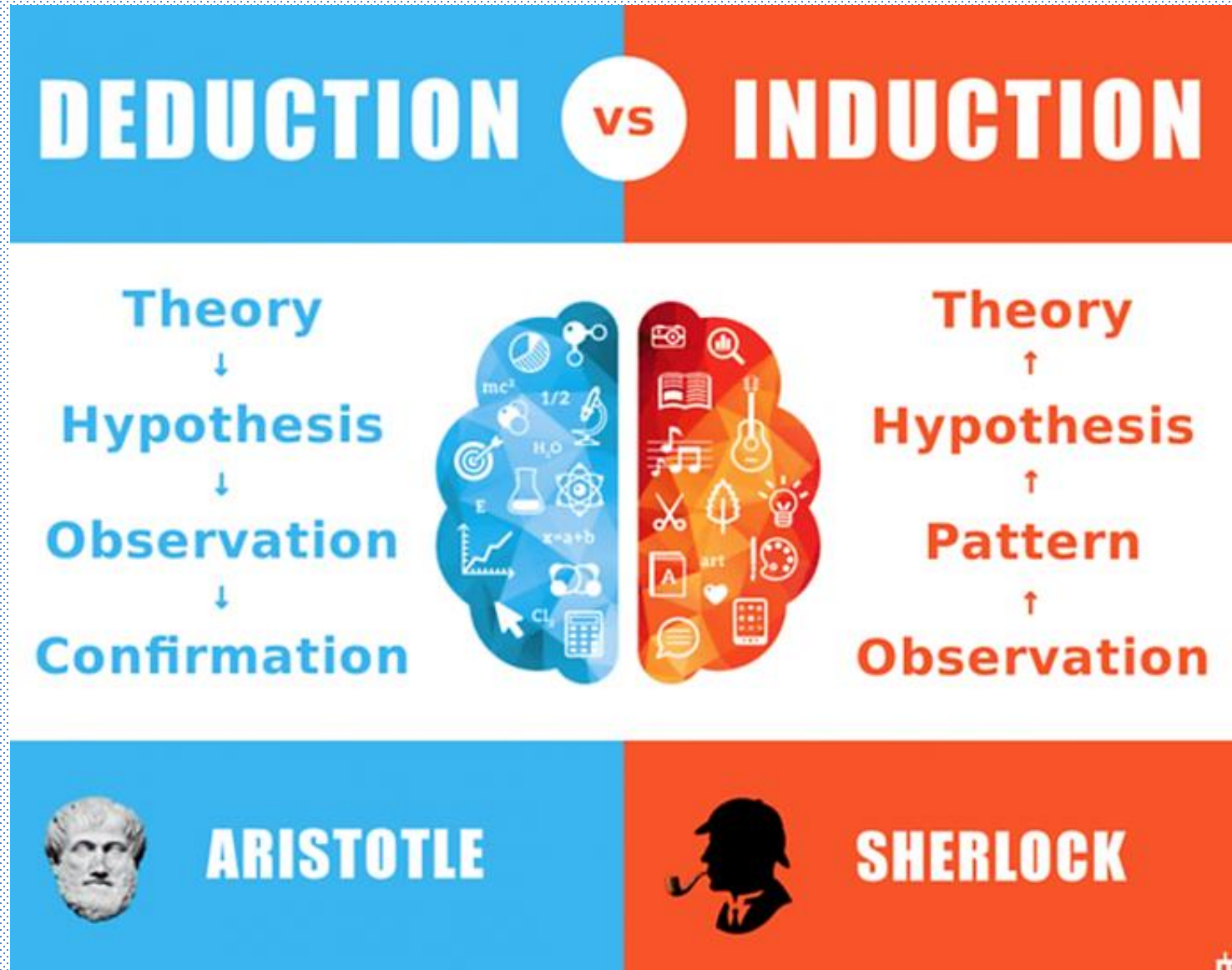


Objectivity is the key element of research

Search for Truth



Deductive vs. Inductive Reasoning



Deductive Reasoning

Have to be logic

Thinking proceeds from general assumption to a specific application

General then specific

All mammals have lungs

Every rabbit is a mammal

Drawing a conclusion that all rabbits have lungs

Deductive Reasoning

Deductive reasoning is either valid or not valid

If the argument is valid, the conclusion is true

Resistance training makes people unfit

Sandi is resistance training

Therefore, Sandi is not fit

Not sufficient as a source of new truth

Deductive Reasoning

Two Kinds of Induction

Perfect

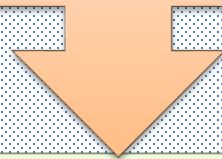
- Conclusions based on observations made from all members of a group or a population

Imperfect

- Conclusions based on observations made from a random sample of members of a population

Inductive Reasoning

Conclusions about events (general) are based on information generated through individual and direct observations



Specific then general



Researchers observe an individual or group of individuals from a larger population



Based on these observations, generalizations are made back to the larger population

Deductive vs. Inductive Reasoning

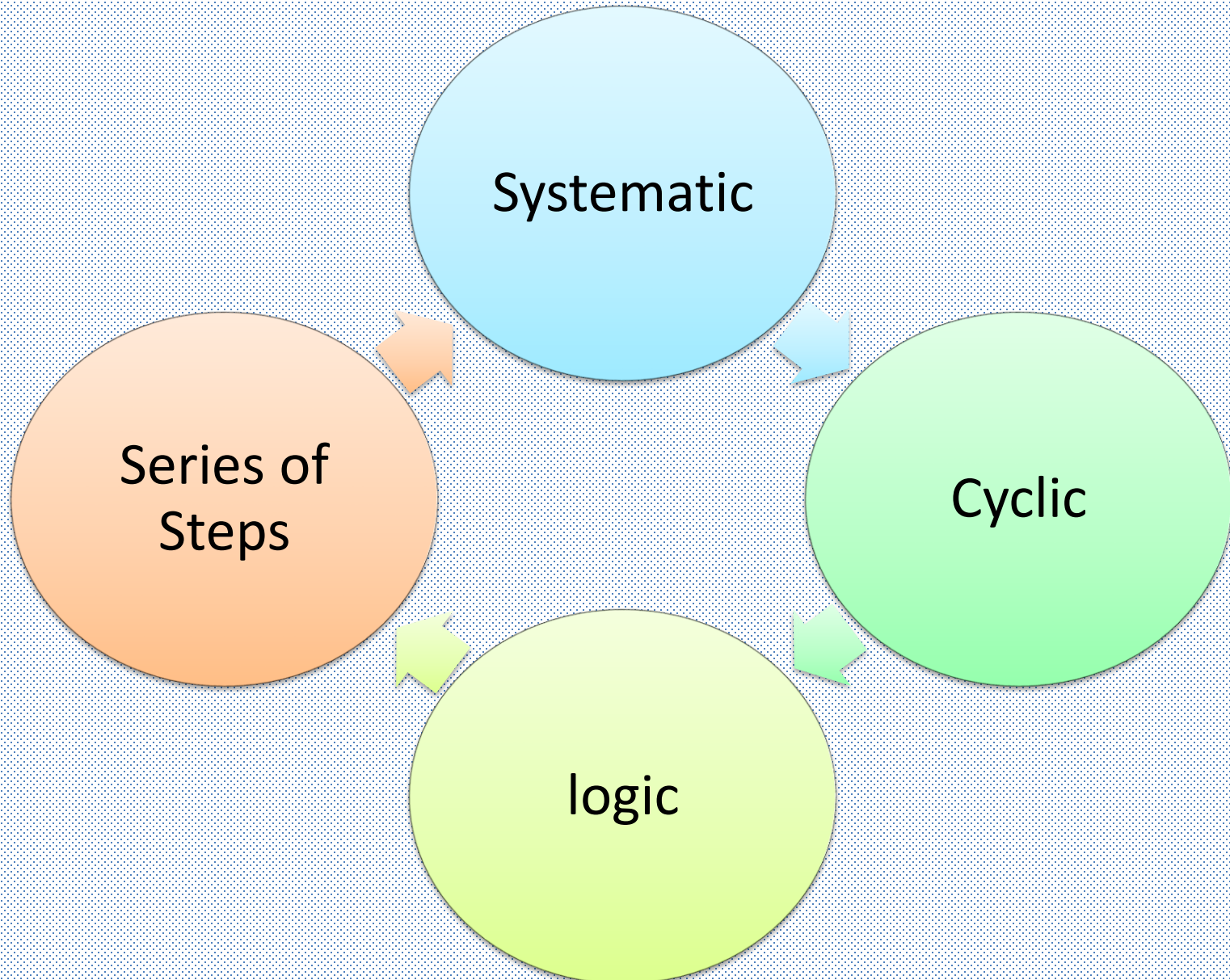
Deductive

- Every mammal has lungs
- All rabbits are mammals
- Therefore, every rabbit has lungs

Inductive

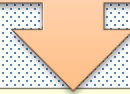
- Every rabbit that has been observed has lungs
- Therefore, every rabbit has lungs

Research Method

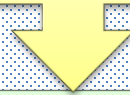


Research Method

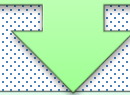
Identifying the problem



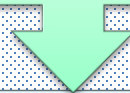
Formulating a hypothesis



Developing the research plan



Collecting and analyzing the data



Interpreting results and forming conclusions

Identifying the Problem

There are several sources

Theoretical basis

Professional practice

Personal experience

Shear curiosity

Starts as a broad question that must be narrowed

Experimental approach to the problem

Identifying the Problem

There are three categories when selecting a research problem

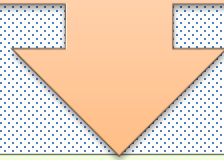
Those who know precisely what they want to do and have a well conceived problem

Those who have many interest areas and having difficulty deciding exactly what they want to study

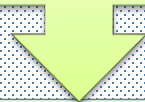
Those who do not have any idea about a worthwhile research problem

Developing the Research Plan

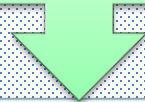
A strategy must be developed that have the following components



Gathering the information



Analyzing the information




Test the hypotheses or answer the research question

Developing the Research Plan

After a strategy was developed, four essential parts should follow



Selection of a relevant research methodology



Identification of subjects or participants



Description of the data-gathering procedures



Specification of the data analysis techniques

Collecting and Analyzing Data

Following the pre-determined protocols

Time in the clinic or lab collecting data

Analyzing the composite data

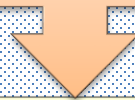
Controlling the environment

The interpretation step of the results which is the easiest part of the process

However, sometime it is the most time-consuming part of the process

Interpretation and Conclusions

Data analysis is not an end in itself!



Does evidences support the original hypotheses?



Accept or reject the hypotheses



Conclusions should be drawn

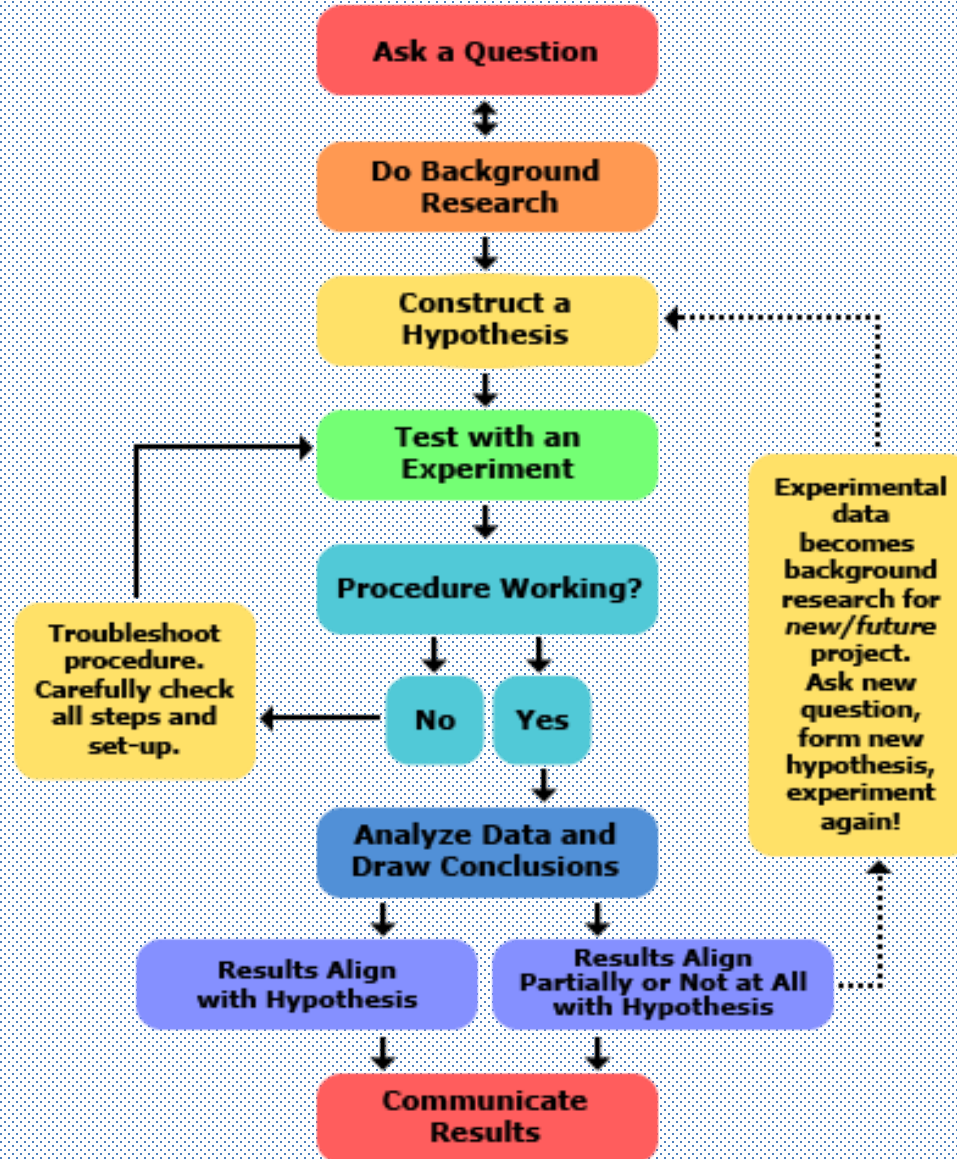


Develop new hypotheses to explain results



Inferences are typically made beyond the specific study

Summary of Project Processes



Research Project Processes

