HOW TO MAKE AN ARGUMENT

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Making an Argument

Workshop Overview:
- The Formal Structure of Arguments
  - What is an Argument?
  - Properties of Arguments
  - Identifying the Parts of your Argument
  - Using Validity and Soundness
- Defining and Approaching the Argument
  - Defining
  - Analysis
  - Metacommentary and Signposting
- Writing a Clear Argument
  - Style
  - Editing

The Formal Structure of Arguments

Goals to keep in mind

- How to think critically about our own writing and that of others
- How to generate support and anticipate objections for theses
- How to outline and organize arguments to craft better papers

What is an Argument?

- A set of one or more premises in support of a conclusion
    - "All dogs are mammals. Fido is a dog. Therefore, Fido is a mammal."
    - "Curiosity is not just integral to scientists. It is a basic element of cognition from early on in life and has been linked to better learning memory and decision-making. Thus, a better understanding of curiosity will have implications for science, pedagogy, and our understanding of human cognition." (Dubey & Griffiths, 2020)

- Not a mere claim or statement
    - "Fido is a mammal"

- Not an explanation
    - You can explain the plot of a movie, but you argue whether it is good or bad

Properties of Arguments

- Validity (form)
  - Truth of premises guarantees truth of conclusion
  - "All dogs are mammals. Fido is a dog. Therefore, Fido is a mammal." – valid
- Soundness (form and content)
  - Having true premises and being valid
  - "Every toad can sing and dance. I am a toad. Therefore, I can sing and dance." – valid but not sound
- Questions to ask yourself:
  - Are the claims in support of my thesis true?
  - Do my claims support my thesis? If so, how—logically?

Arguments with Unstated Premises

- In writing, there will likely be unstated premises
  - Usually things the writer assumes the reader is familiar with
  - "The history of science abounds with incidents in which an event piqued the curiosity of a scientist thereby leading to important discoveries … For this reason, intellectual curiosity has long been recognized as the essence of science." (Dubey & Griffiths, 2020)
- Omitting a premise creates an argument that is not valid
  - Not problematic:
    - "Metals expand when heated. So, iron expands when heated."
  - Problematic:
    - "Only the storeowner was seen leaving the scene of the crime. The storeowner left through the front door. So, then, the criminal must have left through the back door."

Identifying the Parts of Your Argument

- Conclusions
  - Usually your purpose/goal of the paper
  - Every paper has many mini-arguments
  - Signaled by words such as: thus, therefore, so, consequently
    - "Thus, although human curiosity is prone to errors, our work also suggests how people's curiosity can be driven towards relevant stimuli with strategic interventions" (Dubey & Griffiths, 2020)
  - Types of Conclusions:
    - **Fact**: Does it exist? Did it happen?
    - **Definition**: How should we define it?
    - **Value**: Is it good or bad, beautiful or ugly, important or trivial?
    - **Policy**: What should we do about it?
    - **Cause**: What caused it? What are its effects?

Identifying the Parts of Your Argument (continued)

- Premises
  - The reasons to support the purpose/mini-arguments
  - To identify you can look at section titles/headings or create a backwards/reverse outline
  - Signaled by words such as: because, given that, since, for
    - "Given that the adults should have stronger chunks for the pieces, the explanation of superior performance for children with random configurations likely comes from children having more "raw" WM resources." (Popov & Reder, 2020)
  - Types of Premises:
    - **Fact-based premises**: Data, Statistics, Text (e.g., literature), Historical fact
    - **Theoretical premises:** Theoretical frameworks, Hypotheses, Values, Common sense

Using Validity and Soundness

- Soundness
  - You can criticize an argument by showing one of its premises is false
  - Conclusion may still be true even if the argument is not sound
 - Argument could be repairable by changing or removing premises
- Validity
  - Check for validity by examining the structure of the argument
  - Create an argument with the same form but with true premises and a false conclusion
    - "If the Standard Model is correct, then the Higgs boson exists. And, indeed, the Higgs boson does exist! So the Standard Model is correct."
    - "If there is a fire, the house will be ruined. The house was ruined. There was a fire."
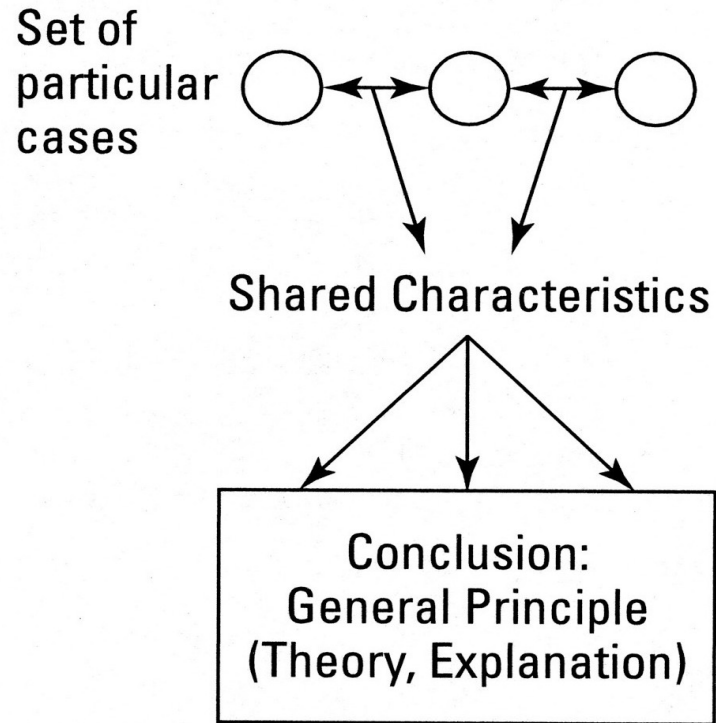
Defining and Approaching the Argument

- Consider how you are organizing your data
- Conceptualize your philosophical approach
    - Deduction
    - Induction
    - Blend: induction to deduction
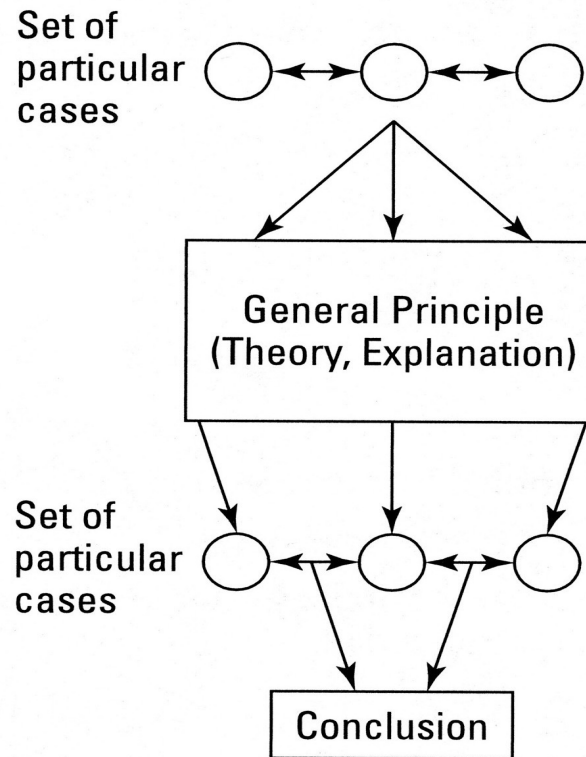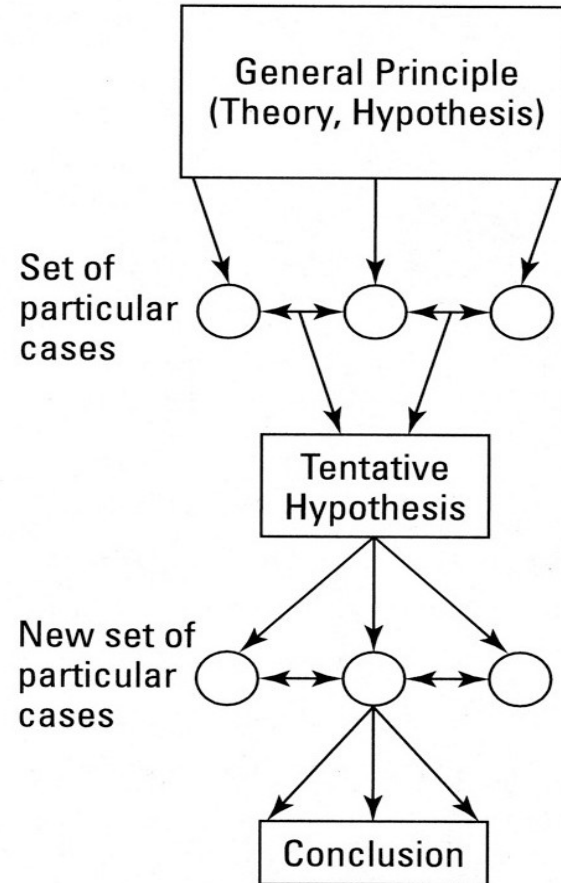   - Blend: deduction to induction
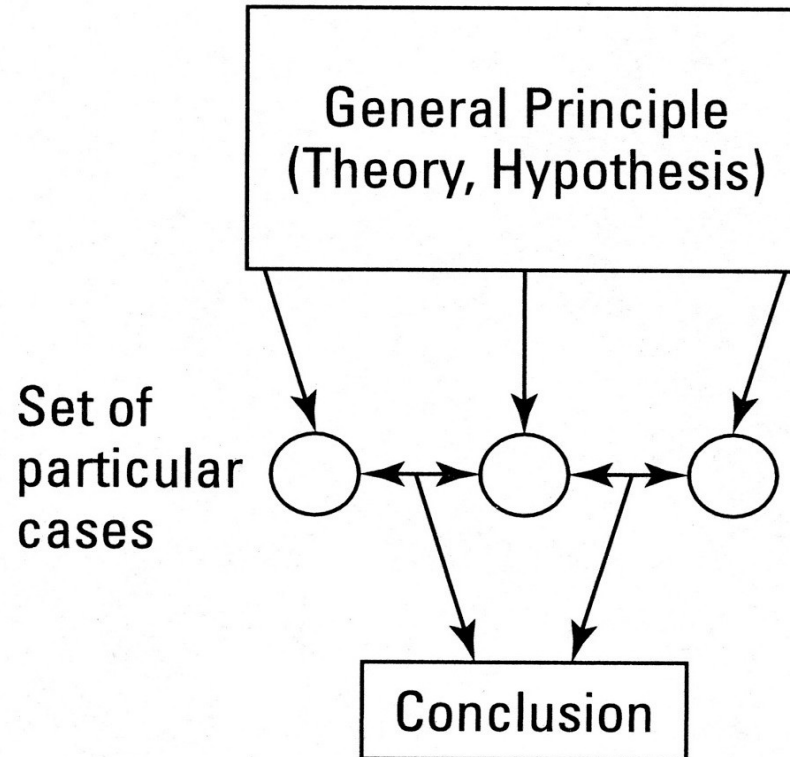
Deduction

Induction
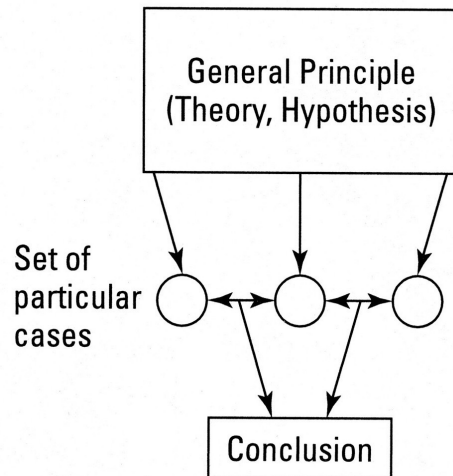
Blend: Induction to Deduction

Blend: Deduction to Induction

Deduction Example

General Principle (Theory, Hypothesis)

Set of particular cases

Conclusion

We present a review of frequency effects in memory, accompanied by a theory of memory, according to which the storage of new information in long-term memory (LTM) depletes a limited pool of working memory (WM) resources as an inverse function of item strength.

We support the theory by showing that items with stronger representations in LTM […] **We present a novel analysis of preceding item strength, in which we show from nine existing studies** that memory for an item is higher if during study it was preceded by a stronger item (e.g. a high frequency word).

This effect is cumulative (the more prior items are of high frequency, the better), continuous (memory proportional to word frequency of preceding item), interacts with lag (decreases as the lag between the current and prior study item increases). **A computational model that implements the theory is presented, which accounts for these effects**.

(Popov & Reder, 2020)

Induction Example

Set of particular cases

Shared Characteristics

Conclusion: General Principle (Theory, Explanation)

Personal-episodic or autobiographical memories are an important source of evidence for continuity of self over time. **Numerous studies conducted with adults have revealed** a relative paucity of personal episodic or autobiographical memories of events from the first 3 to 4 years of life, with seemingly gradual increases in the number of memories until approximately age 7 years, after which an adult distribution has been assumed […]

However, neither type of explanation alone can fully account for the shape of the distribution of autobiographical memories early in life. In contrast, the complementary processes account developed in this article acknowledges early, gradual development of the ability to form, retain, and later retrieve memories of personally relevant past events, as well as an accelerated rate of forgetting in childhood relative to adulthood.

The adult distribution of memories is achieved as (a) the quality of memory traces increases […] (b) the vulnerability of mnemonic traces decreases […] **The perspective brings order to an array of findings from the adult and developmental literatures.**

(Bauer 2015)
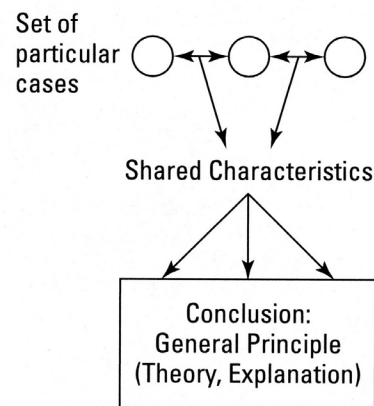
Blend: Induction to Deduction Example

Trial-to-trial fluctuations in an observer's state of mind have a direct influence on their behavior. However, characterizing an observer's state of mind is difficult to do with behavioral data alone, particularly on a single-trial basis.
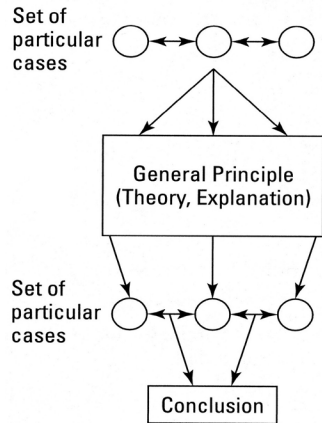
In this article, we extend a recently developed hierarchical Bayesian framework for integrating neurophysiological information into cognitive models. In so doing, **we develop a novel extension of the well-studied drift diffusion model (DDM)** that uses single-trial brain activity patterns to inform the behavioral model parameters.

We first show through simulation how the model outperforms the traditional DDM in a prediction task with sparse data. **We then fit the model to experimental data** consisting of a speed-accuracy manipulation on a random dot motion task {…} Finally, we show that our model performs better than the traditional DDM through a cross-validation test.

By combining accuracy, response time, and the blood oxygen level dependent response **into a unified model**, the link between cognitive abstraction and neuroimaging can be better understood.

(Turner, van Maanen, & Forstmann, 2015)

Blend: Deduction to Induction Example

Previous theoretical accounts of curiosity remain divided – novelty – based theories propose that new and highly uncertain stimuli pique curiosity whereas complexity-based theories propose that stimuli with an intermediate degree of uncertainty simulate curiosity.

In this article, we present a rational analysis of curiosity by considering the computational problem underlying curiosity, which allows us to model these distinct accounts of curiosity in a common framework.

Our approach posits that a rational agent should explore stimuli that maximally increase the usefulness of its knowledge and that curiosity is the mechanism by which humans approximate this rational behavior. Critically, our analysis show that the casual structure of the environment can determine whether curiosity is driven by either highly uncertain or moderately uncertain stimuli. *This suggests that previous theories need not be in contention but are special cases of a more general account of curiosity.*

Experimental results confirm our predictions and demonstrate that our theory explains a wide range of findings about human curiosity, including its subjectivity and malleability.

(Dubey & Griffiths, 2020)
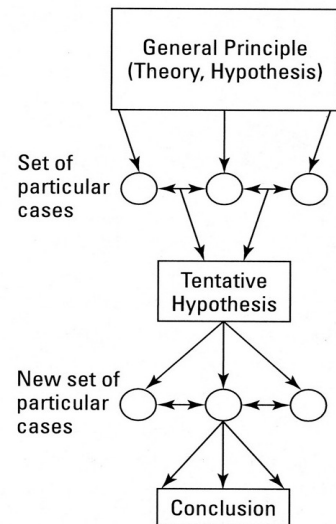
Analyzing the Argument

- Argument = claim + evidence
- Effective claims
  - Must define how far you carry your argument with qualifiers and exceptions
  - Include reasons: Are they relevant to the claim they support? Are they effective?
- Evidence
  - Facts, examples, statistics, expert testimony, close reading, etc.
  - Should be sufficient, credible, accurate

Approaching the Argument

- Don't be afraid to repeat yourself
  - You say something in the main text, you help readers interpret and process what you say in the metatext
  - Adding metacommentary
    - "However, none of these theories adequately explain why curiosity is influenced by these factors in the first place. **In other words**, what is the function of curiosity and why does curiosity work the way it does?" (Dubey &
      - Griffiths, 2020)
    - "**We argue that**, similar to partial matching, this learning function reflects an adaptation to the challenge that there is typically much more information demanding our attention than our limited resources allow us to process."
      - (Popov & Reder, 2020)
    - "My conclusion, then, is that, _____."
    - "In short, _____."
    - "Incidentally, _____."

Some uses of metacommentary

- Distinguish your views from others they may be confused with

- Anticipate and answer objections
- Connect one point to another
- Explain why your claim might be controversial

Approaching the Argument (continued)

- Signposting words
  - Cause and effect: therefore, thus, as a result, consequently
  - Similarity: similarly, in the same way
  - Difference: however, on the contrary, but, despite that
  - Elaboration: moreover, furthermore, in addition, finally
  - Exemplify: for example, for instance, such as, in particular

Writing a Clear Argument

Style: Reader Expectation

- Put information where the reader expects to find it
    - Within article sections
    - Within paragraphs
    - Within sentences

- By working to meet reader's expectations, writers can identify logical gaps

Style: Functional Units

- Readers expect each unit of discourse (section, paragraph, sentence) to serve a single function.

- When a unit serves more than one function, readers become confused.

Style: Subject and Verb

- Readers expect the action of a sentence to be in its verb.
- Readers interpret any information between the subject and verb of a sentence an unimportant interruption. To avoid loss of information, follow a subject with its verb as soon as possible.

Style: Other Tips

- **Write from an appropriate design**: writing that progresses in a logical sequence
- **Define everything**: Define all symbols and abbreviations For example...
- The measurements, made with a scanning electron microscope (SEM), …
- Allows you to use the abbreviation SEM thereafter
- **Avoid empty words**: Avoid weak qualifiers (very, rather, somewhat, quite...)
- For example...
- *This very important point* … makes less impact than: *This important point* … or, more simply: *This point* ….

Backwards Outline

1. Number and label each paragraph with a phrase that expresses its main point (Figure out how to divide long paragraphs if they contain too many points)

2. Write down the outline of what you have using the labels

3. Analyze
   a) Does the organization make sense?
   b) Does the organization of the content support a developing argument?
   c) Does each paragraph move the main argument forward?
   d) What material should be moved around or is redundant/extraneous?
   e) Are there gaps in your content/argument?
   f) Should you put headings or sub-headings?

4. Revise and add to this outline, based on what you have discovered, to reflect what still needs to be improved and changed

For more help…

- Schedule a Writing Appointment (via Skype)!
  - https://gwc.gsrc.ucla.edu/Appointments
- Join us in an online writing group
  - https://gwc.gsrc.ucla.edu/Writing-Groups
- Check out our workshop schedule
  - https://gwc.gsrc.ucla.edu/Workshops

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