Inductive Reasoning

Review of last few weeks:

- Deductive Reasoning
  - Propositional Logic/Truth Functional Logic
    - Truth Tables to determine validity
  - Categorical Reasoning
    - Euler Circles and Venn Diagrams to determine validity

- Both forms of deductive reasoning share the goal of providing a conclusion that follows by necessity from the premises (Certainty)

Inductive Reasoning

- Does not provide or seek certainty but **probability**

Inductive Reasoning

- Does not provide or seek certainty but **probability (levels of probability)**

- Strong - An inductive argument whose premise(s) provide probable support for the conclusion

Inductive Reasoning

- Does not provide certainty but **probability**

- Strong - An inductive argument whose premise(s) provides (provide) probable support for the conclusion

- Weak - An inductive argument whose premise(s) fails (fail) to provide probable support for the conclusion

Inductive Reasoning

- Does not provide certainty but **probability**

- Strong - An inductive argument whose premise(s) provides (provide) probable support for the conclusion

- Weak - An inductive argument whose premise(s) fails (fail) to provide probable support for the conclusion

- Also - A <u>Strong Inductive</u> argument whose premises are true is called <u>cogent</u>

What Induction Allows Us To Do

- **Induction allows us to reason beyond the evidence**
  - **From premises to conclusions about what those premises *suggest* is true**

Forms of Inductive Arguments:

1) Enumerative Induction

2) Analogical Induction

3) Causal Arguments (Causal Induction)

Claim:

All the crows that I have seen have been black; John just told me that there is a crow outside the window; therefore, the crow outside the window is more than likely black.

Claim:

All the crows that I have seen have been black; John just told me that there is a crow outside the window; therefore, the crow outside the window is more than likely black.

Form:

I am reasoning from a premise about a group of things (or class of things) to a conclusion about a single member of the group.

Characteristics of Enumerative Induction

Far more cases of inductive reasoning reason from premises about individual or particular things to something about – to conclusions about – a group of things

Characteristics of Enumerative Induction

Far more cases of inductive reasoning reason from premises about individual or particular things to something about – to conclusions about – a group of things

This is the case with <u>Enumerative Induction</u>

Examples

- **Each of the academics I know are philosophers, so probably all academics are philosophers.**

- **OR**

- **Twenty seven of the students in my Phil 125 class failed the midterm exam. Therefore, it is probably true that most of the students failed the exam.**

- Note: I said that these are examples of – not good examples of …

Characteristics of Enumerative Induction

Take the following argument example:

40 percent of the pickles that you have pulled out of the barrel are very good. Thus, 40 percent of all the pickles in the barrel are probably very good.

Characteristics of Enumerative Induction

40 percent of the pickles that you have pulled out of the barrel are very good. Thus, 40 percent of all the pickles in the barrel are probably very good.

Standard Enumerative Form:

'X' percent of the observed members (individual members) of a group 'A' have property 'P'.

Therefore, 'X' percent of all the members of a group 'A' probably have property 'P'.

Enumerative Reasoning Terminology

The group as a whole, the collection of the individuals in question, is called the **target group or target population**

The observed members of the target group (the members that you have observed) is called the **sample members** or simply **sample**

The property that we are interested in is called the **relevant property**

So…

- Looking back to the argument from earlier:

  - 40 percent of the pickles that you have pulled out of the barrel are very good. Thus, 40 percent of all the pickles in the barrel are probably very good.

  -

So…

- Looking back to the argument from earlier:
  - 40 percent of the pickles that you have pulled out of the barrel are very good. Thus, 40 percent of all the pickles in the barrel are probably very good.

-

- Target Group =

So…

- Looking back to the argument from earlier:
  - 40 percent of the pickles that you have pulled out of the barrel are very good. Thus, 40 percent of all the pickles in the barrel are probably very good.

-

- Target Group = All the pickles in the barrel

So…

- Looking back to the argument from earlier:
  - 40 percent of the pickles that you have pulled out of the barrel are very good. Thus, 40 percent of all the pickles in the barrel are probably very good.

- Target Group = All the pickles in the barrel
- Sample =

So…

- Looking back to the argument from earlier:
  - 40 percent of the pickles that you have pulled out of the barrel are very good. Thus, 40 percent of all the pickles in the barrel are probably very good.

- Target Group = All the pickles in the barrel
- Sample = Observed pickles

So…

- Looking back to the argument from earlier:
  - 40 percent of the pickles that you have pulled out of the barrel are very good. Thus, 40 percent of all the pickles in the barrel are probably very good.

- Target Group = All the pickles in the barrel
- Sample = Observed pickles
- Relevant Property =

So…

- Looking back to the argument from earlier:
  - 40 percent of the pickles that you have pulled out of the barrel are very good. Thus, 40 percent of all the pickles in the barrel are probably very good.

- Target Group = All the pickles in the barrel
- Sample = Observed pickles
- Relevant Property = Being very good

Induction Basics:

- An inductive argument's strength is dependent on two things:

    – 1) How well the premises support the conclusion

    – 2) How much is actually being said in the conclusion

Induction Basics:

All the corporate executives Jill has worked for have been crooks.

Therefore, all corporate executives are probably crooks.

Target Group – Corporate executives

Sample – The corporate executives that Jill has worked for

Relevant Property – Being a crook

Induction Basics:

All the corporate executives Jill has worked for have been crooks.

Therefore, all corporate executives are probably crooks.

Problems:

   1) The sample is too small

   2) The sample is not representative of the target group (there are most likely thousands of corporate executives as I said before)

Induction Basics:

Weak Version:

All the corporate executives Jill has worked for have been crooks.

Therefore, all corporate executives are probably crooks.

Strong Version:

All the corporate executives Jill has worked for have been crooks.

Therefore, some corporate executives are probably crooks.

Induction Basics:

Take the following argument:

All of the blue herons that I have seen at many different locations in the nature preserve (about two hundred birds) have had birth defects.

Therefore, most of the blue herons in the nature preserve probably have birth defects.

Induction Basics:

All of the blue herons that I have seen at many different locations in the nature preserve (about two hundred birds) have had birth defects.

Therefore, most of the blue herons in the nature preserve probably have birth defects.

What are the following:

Target Group =

Sample =

Relevant Property =

Induction Basics:

All of the blue herons that I have seen at many different locations in the nature preserve (about two hundred birds) have had birth defects.

Therefore, most of the blue herons in the nature preserve probably have birth defects.

Target Group = Blue Herons in the nature preserve

Sample = Two hundred blue herons examined

Relevant Property = Having birth defects

Induction Basics:

All of the blue herons that I have seen at many different locations in the nature preserve (about two hundred birds) have had birth defects.

Therefore, **all** of the blue herons in the nature preserve probably have birth defects.

Induction Basics:

All of the blue herons that I have seen at many different locations in the nature preserve (about two hundred birds) have had birth defects.

Therefore, **all** of the blue herons in the nature preserve probably have birth defects.

This form is a weak inductive argument.

- There could easily be some birds in the nature preserve that do not have birth defects – even if most do

General Rules for Enumerative Arguments:

Inductive enumerative arguments are weak when:

1) The sample size is too small - hasty generalization

General Rules for Enumerative Arguments:

Inductive enumerative arguments are weak when:

The sample size is too small - hasty generalization

You should buy an IBM computer. They're fantastic. I bought one last year, and it has given me nothing but flawless performance.

Or

The food at Taco Bell is awful. I had a taco there once, and the meat tasted bad.

General Rules for Enumerative Arguments:

Inductive enumerative arguments are weak when:

1) The sample size is too small - hasty generalization

Rule: In general, the larger the sample, the more likely it is to reliably reflect the nature of the larger group (target group)

General Rules for Enumerative Arguments:

Inductive enumerative arguments are weak when:

1) The sample size is too small - hasty generalization

2) The sample is not representative of the target group (Biased Sample)

General Rules for Enumerative Arguments:

Inductive enumerative arguments are weak when:

1) The sample size is too small - hasty generalization

2) The sample is not representative of the target group (Biased Sample)

Example:

College students are happy that Congress is controlled by the Republican Party. Surveys of the members of Young Republican clubs on dozens of college campuses prove this.

What Does It Mean for a Sample to be Properly Representative

There are two things that must be the case

1) The sample group must have all the same relevant characteristics

2) The sample group must have these characteristics in the same proportion as the target group as a whole