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## I. Definitions & Distinctions:

### A. • *Analytic*:

1. Kant: The concept of the subject contains the concept of the predicate. (judgements)
2. Modern formulation: S is analytic = S can be transformed into a logical truth through substitution of synonymous expressions. (sentences)

### • *Synthetic*: Not analytic.

### B. • *Empirical*: S knows that P empirically = S knows that P, and S's justification for P essentially contains/involves observation.

- *Observation*: sensory perception or introspection. On my view: a thing whose justification consists in the fact that one has a sensory or introspective appearance.
- *"Essentially"*: Means that an observation is a necessary part of the justification; if the observation is removed, then the belief is no longer justified.

### • *A priori*: S knows a priori that P = S knows that P, not empirically.

- *Possible kinds of a priori kn.:*
  1. Innate knowledge
  2. Knowledge acquired through reason/intuition

### C. • *Necessary*: Could not have been otherwise.

### • *Contingent*: Could have been the case, and also could have not been the case.

### Notes:

1. "Analytic"/"synthetic" applies to *sentences* or *judgements*.  
"Empirical"/"a priori" applies to *knowledge* or *justification*.  
"Necessary"/"contingent" applies to *propositions*
2. "Analytic"/"synthetic" is a *logical/semantic* distinction.  
"Empirical"/"a priori" is an *epistemological* distinction.  
"Necessary"/"contingent" is a *metaphysical* distinction.
3. None of these distinctions should be confused with each other.

### D. • *Empiricism*:

1. General idea: All knowledge of objective reality is empirical.
2. Modern interpretation: No synthetic a priori knowledge.
3. Role of reason: operates on information provided by observation.

### • *Rationalism*:

1. There is a priori knowledge of objective reality.
  2. There is synthetic a priori knowledge.
  3. Role of reason: (a) operates on information provided by observation, and (b) provides some information of its own.
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## II. Central Arguments

### A. *For Empiricism*:

#### *First argument*:

Synthetic, a priori knowledge is weird. Weird things don't exist.  
Therefore, synthetic a priori knowledge doesn't exist.

#### *Second argument*:

In the past, people have said they knew many things a priori, that they didn't know a priori. To avoid this problem, let's say that nothing is known a priori.

#### *Third argument*:

1. Modern scientific knowledge is empirical.
2. Modern science is great.
3. Therefore, all knowledge is empirical.

#### *Fourth argument*: (Benacerraf)

1. Knowledge has a *non-accidentality* condition. E.g.,
  - a. The fact that P is causally connected to the belief that P. (Goldman, Benacerraf)
  - b. If P were false, S would not believe that P. (Nozick)
2. Synthetic, a priori knowledge cannot satisfy this condition. It is, if true, only accidentally true. E.g.,
  - a. Beliefs independent of all observation are not causally related to the facts.
  - b. Similarly, such beliefs fail the tracking condition. If the facts were otherwise, I would still believe that P, where my belief is non-empirical.
3. Therefore, synthetic, a priori knowledge is impossible.

• *Note*: *Analytic* a priori knowledge is supposed to be exempt from this because: (a) it makes no claims about the world, (b) it is made true by conventions/meanings/our concepts.

### B. *For existence of a priori knowledge*:

1. I know that  $2+2=4$ .
2. If my justification for P depends essentially on O, then if O is false, I do not know that P.
3. For any observation, O, if O is false, I still know that  $2+2=4$ .
4. Therefore, for any observation O, the justification for " $2+2=4$ " does not depend essentially on O. (From 2 + 3.)
5. Therefore, I know that  $2+2=4$  a priori. (From 1, 4, + def. of "a priori".)

• **Note:** This is supposed to work for a variety of propositions. "All triangles have 3 sides," "Time is one dimensional," "The *is next to* relation is symmetrical and nontransitive," "No thing is both completely green and completely blue," "It is wrong to torture babies for the fun of it."

**Kant's argument:** (CPR, B3-6)

- The *necessity* of some judgements shows they are a priori.
- The *universality* of some judgements shows they are a priori. (He may mean certainty + universality.)

### C. **Against empiricist account of analytic knowledge:**

*Contingency argument:*

- If analytic propositions are made true by conventions/meanings/concepts, then (a) they are contingent, and (b) we could make them otherwise. But this is wrong; they are necessary.

*Quine's transformation argument:*

- Definitions/conventions only provide a way of transforming one sentence into another, synonymous sentence. They don't explain why the transformed sentence is true. They don't explain why the laws of logic are so.

*Analytic sentences not about conventions:*

1. In (a), "bachelors" refers to bachelors, and "unmarried" refers to the property of being unmarried. Neither term refers to words, ideas, conventions, etc.
  - (a) All bachelors are unmarried.
2. The truth-conditions for "All A's are B" are that the things "A" refers to should have the property that "B" refers to. The truth-conditions for such sentences do not (in any interesting way) in general involve features of words, etc.
3. Therefore, the truth-conditions for (a) involve bachelors and unmarriedness. They do not involve features of words, etc.

*Analytic sentences made true by word meanings in no stronger sense than*

*synthetic sentences made true by word meanings:*

- Changing the meaning of "bachelor" makes "All bachelors are unmarried" false. But it is also true that changing the meaning of "planet" makes "There are 9 planets in the solar system" false.
- *Given* what proposition is expressed by "There are 9 planets in the solar system," word meanings do no extra work; they do not make *that proposition* true or false. But the same is true of "All bachelors are unmarried."

### D. **Objections to concept of analyticity:**

- Quine: it can't be defined without using some questionable (to him) notions.
- Quine: there are borderline cases. "All green things are extended."
- Kant's def. is faulty. (a) Only applies to universal/particular, affirmative, categorical propositions. (b) Notion of "containment" is dubious.
- Huemer: Modern def. is questionable. (a) Relies on existence of exact definitions. (b) Relies on notion of logical truth. In danger of collapsing into either a prioricity or necessity.

### E. **Some a priori knowledge is not analytic:**

Time is one dimensional.

*<is next to>* is symmetrical and non-transitive.

No thing is both completely green and completely blue.

It is wrong to torture babies for the fun of it.

(Modal knowledge) The number of planets is contingent.

**Note:** Burden of proof issues:

1. Positive existential claims have burden of proof.
2. Rationalist's burden:
  - Claims that there is synthetic a priori knowledge.
  - ∴ Burden to show examples of such.
3. Empiricist's burden:
  - Claims of each example, that it is (a) analytic, or (b) empirical.
    - (a) Analytic: means there exists a derivation from definitions & laws of logic
    - (b) Empirical: means that there exists a derivation from observation-statements
  - ∴ Burden to provide derivations.

**Kant: Main ideas:**

1. There is synthetic, a priori knowledge.
  - Arithmetic:  $5+7=12$ .  
 “The concept of the sum of 7 and 5 contains nothing save the union of the two numbers into one, and in this no thought is being taken as to what that single number may be which combines both. The concept of 12 is by no means already thought in merely thinking this union of 7 and 5...” (B15)
  - Geometry: The shortest path between two points is a straight line.  
 “For my concept of *straight* contains nothing of quantity, but only of quality.” (B16)
  - Physics: In all changes of the material world the quantity of matter remains unchanged.  
 “For in the concept of matter I do not think its permanence, but only its presence in the space which it occupies.” (B18)
2. Knowledge of these things depends upon “intuition”, and not merely abstract concepts.
  - *Intuition*: direct awareness (or representation) of particular objects. Incl. perception, introspection, imagination. (B33)
  - Geometrical proofs depend essentially upon use of figures. These need not be real, physical figures, but may be merely imagined. Thus, it involves “intuition” of space.
  - Arithmetical knowledge depends upon imagining changes in time, e.g., successive additions of units. Thus, it involves “intuition” of time.
3. Synthetic, a priori knowledge is a big mystery. If it pertained to objective reality, it would be impossible. Rejects traditional rationalism (Descartes, Spinoza, Leibniz).  
 “If intuition must conform to the constitution of the objects, I do not see how we could know anything of the latter a priori; but if the object (as object of the senses) must conform to the constitution of our faculty of intuition, I have no difficulty in conceiving such a possibility.” (Bxvii)
4. How synth a priori knowledge is possible:
  - Pertains to the *form of intuition*. Does not pertain to the objective world.
  - Space is “the form of outer intuition.”  
 An artefact of our way of representing external objects. Space does not exist objectively. Rejects both absolutist & relational accounts of space.
  - Time is “the form of inner intuition.”

An artefact of our way of representing ourselves (mental processes).  
 Time also does not exist objectively.

- The mind imposes these forms on everything that it represents. Analogy: the green glasses.

## 5. Kantian subjectivism:

- Hence, we know that all possible objects of experience must satisfy the synth a priori principles.
- But these principles do *not* apply to “things as they are in themselves.”
- Also, we have no awareness of “things-in-themselves” (“noumena”).

**(II)logical Positivism: (Ayer, Carnap, etc.)***Two Theses:*

1. The *Verification Criterion of Meaning* (verificationism): The meaning of a statement is given by the conditions under which it is verified/refuted.
2. *Empiricism*: There is no synthetic, a priori knowledge.

*Account of Apparent A Priori Knowledge:*

1. Religion: meaningless.
2. Traditional metaphysics: meaningless.
3. Ethics: non-cognitivism/emotivism/prescriptivism
4. Mathematics: analytic, or just a meaningless symbol-manipulation game
5. Logic: same as mathematics

*Problems:*

1. Examples of a priori knowledge. (See above.)
2. Counter-examples to Verificationism:  
 See above.  
 “Aristotle had exactly 573 hairs on his head.”  
 “Before the Big Bang, the universe had another period of expansion and contraction.”  
 “There are things we don’t know about.”
3. Verification criterion of meaning is unverifiable. In general, no argument for either main thesis.
4. Ignores compositionality of meaning. Meanings of sentences are determined by meanings of individual components. No guarantee that meaningful components can never be combined to create an untestable sentence.
5. Confuses epistemology and metaphysics. *Truth*-conditions ≠ verification conditions.

### Quine's views:

- All knowledge is empirical.
- There is no analytic/synthetic distinction.
- Belief revision:
  - Confirmation holism: individual beliefs can't be tested. Only the whole belief system can.
  - Related: Any belief can be maintained in the face of any evidence.
  - People are *more willing* to give up some beliefs than others. Allegedly "analytic" propositions are just propositions that people are very reluctant to revise. (This is a purely psychological fact.)

### A Traditional Rationalism:

*Central theses:*

1. There is synthetic, a priori knowledge.  
Recall earlier examples.
2. It is objective. (*Pace* Kant.)
3. Also, there are universals.

*Rationalist Views on The Nature of A Priori Knowledge:*

*Plato, Russell:*

1. We "grasp" universals. = a direct (intellectual) awareness of universals.
2. All a priori knowledge is (or derives from) knowledge of the properties of and relationships between universals.

*George Bealer:*

1. Intuitions count as evidence.
2. Intuitions are fallible, but generally reliable.
3. It is *necessary* that they are *generally* reliable, because:
  - It is a necessary condition on understanding the concept of X that one have (generally) appropriate intuitions about X.

*Huemer:*

1. Phenomenal Conservatism: intuitions as source of prima facie justification. Analogous to perceptual exp.:
    - Intuition ≠ belief; beliefs based on intuitions; is a kind of appearance state; provides foundational but defeasible justification.
  2. With Russell/Plato: intuitions constitute direct awareness of properties/relations of universals.
  3. Bealer may be right also.
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### Review: Catalog of Main Views:

	Synthetic, a priori knowledge?	A priori knowledge of objective facts?	Analytic knowledge?	Synth a priori statements meaningful?
Trad. Rationalism	Y	Y	Y	Y
Trad. Empiricism	N	N	Y	Y
Kant	Y	N	Y	Y
Positivism	N	N	Y	N
Quine	N	N	N	?

## PROBLEM OF INDUCTION, INTRODUCTION

10/29/03

### Basic Concepts:

**Valid:** describes an argument in which necessarily, if the premises are true, the conclusion is true. Premises are said to “**entail**” conclusion.

**Cogent:** describes an argument in which if the premises are true, the conclusion is probably (more probably?) true. Premises are said to “**confirm**” conclusion.

**Deductive argument:** one in which the premises are alleged to entail the conclusion.

**Non-deductive (non-demonstrative) argument:** one in which the premises are alleged to support the conclusion but not entail it. The premises are alleged to render the conclusion probable.

**Inductive arg.:** Non-deductive argument in which the premises say some thing(s) have some property, and the conclusion says another, similar object or class of objects, or all objects of the same kind, have that property.

**Inference to the best explanation:** Non-deductive argument in which the conclusion is said to be supported because it provides the best explanation for some information stated in the premises.

**Uniformity Principle:** The principle that the future will resemble the past, or that the course of nature is uniform, or that unobserved objects will (probably) resemble observed objects.

**Grue:** A concept devised by Nelson Goodman.  $x$  is grue iff: [( $x$  is first observed before Jan. 1, 2100 and  $x$  is green) or ( $x$  is not first observed before Jan. 1, 2100 and  $x$  is blue)].

**$P(a|b)$ :** This is read “the probability of a given b.” It is the probability that a would be true, assuming b is.

### Hume’s Argument

1. There are (at most) three kinds of knowledge: knowledge of relations of ideas, direct observations, and conclusions based on induction.
2. All inductive inferences presuppose the Uniformity Principle.
3. Therefore, conclusions based on induction are known (/justified) only if the UP is known (/justified). (From 2.)
4. The UP is not a relation of ideas proposition.
5. The UP is not an observation.

6. The UP cannot be known by induction. (Circularity problem.)
7. Therefore, the UP is not known. (From 1, 4, 5, 6.)
8. No conclusion based on induction is known. (From 3, 8.)

### Some Approaches to the Problem of Induction:

- a. (1) is false because of synthetic a priori knowledge. Perhaps synthetic a priori principles help explain induction. (Russell, Kant?)
- b. The argument begs the question. (2) seems to presuppose that only deduction could be legitimate, since the UP is the premise that, if added to an inductive inference, turns it into a deductive one. (Edwards?)
- c. (2) is false. Induction is a primitive form of inference. Inductive inferences are cogent as they stand. No suppressed premise is required. (Stove)
- d. Nelson Goodman: Rules of induction are justified by their conformity to accepted inductive practice. (Paradigm Case Argument?)
- e. IBE: (1) is false because it overlooks inference to the best explanation. IBE explains why inductive inferences are cogent. (Foster, Harman)
- f. Bayesianism: The probability calculus explains why induction is cogent. (Howson & Urbach, Laplace, D.C. Williams, Stove)

### Principles of Probability

#### Axioms:

1.  $P(a) \geq 0$ , where  $a$  is any proposition.
2.  $P(t) = 1$ , where  $t$  is a tautology (or an a priori necessary truth).
3.  $P(a \vee b) = P(a) + P(b)$ , where  $a, b$  are two incompatible propositions.
4.  $P(a \& b) = P(a) \times P(b|a)$ , where  $a, b$  are any two propositions.

**The Principle of Indifference (controversial):**  $P(a) = P(b)$ , if there is no reason to favor  $a$  over  $b$ .

#### Bayes’ Theorem:

$$P(h|e) = \frac{P(h) \times P(e|h)}{P(e)}$$

**Other important theorem (follows from Bayes’ Theorem):**

If  $P(e|h) > P(e|\sim h)$ , then  $P(h|e) > P(h)$ .

### Interpretations of Probability

- **Frequency interp:** Frequency with which an event happens in a large

(infinite?) number of trials. Probability applies to types of events in types of circumstances.

- *Propensity*: Probability as degree of causal influence. Probability can apply to an event happening in an individual case.
- *Logical*: Probability as logical relation between propositions or logical property of propositions. Like degrees of entailment.
- *Epistemic*: Probability as degree of justification for belief.
- *Subjective*: Probability as (rational) degree of belief. Also related:
  - Probability as fair betting odds.

Epistemic & logical interpretations are relevant to the problem of induction.

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## PROBLEM OF INDUCTION, SOLUTIONS

10/29/03

### I. Inference to the Best Explanation

*Thesis*: All inductive arguments depend upon an Inference to the Best Explanation, and this explains why they are cogent.

*First part of this*: Induction depends on IBE. Argument: imagine case in which you know there is no explanation for a regularity. Do you still infer that the regularity will continue?

*Example of IBE supporting induction*:

1. All observed bodies have behaved gravitationally.
2. The best explanation for this is H1 below. Several explanations:
  - H1 It is a law of nature (always) that bodies behave gravitationally.
  - H2 There's no law. It is an accidental regularity that bodies have behaved gravitationally so far.
  - H3 There is a law of nature that exists up til  $t$  that bodies behave gravitationally, and the law ceases to exist after  $t$ .
  - H4 It is a law of nature that bodies behave gravitationally before  $t$  but do not do so after  $t$ .
  - H5 It is a law of nature that observed bodies behave gravitationally.
  - H6 It is a law of nature that in  $\Phi$ -circumstances,<sup>1</sup> bodies behave

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<sup>1</sup> $\Phi$ -circumstances are to be defined in such a way that they have in fact (contingently) obtained during all previous observations of bodies, though they

gravitationally.

3. Therefore (probably), H1 is true. (From 1, 2, IBE.)
4. Therefore, bodies will behave gravitationally in the future. (From 3, deduction.)

*Foster on laws & 'natural necessity'*:

- Laws of nature have a kind of necessity (causal or "natural necessity").
- Objection: No regularity is in need of explanation, since any possible sequence of events is equally likely as any other. What matters is comparison of the probability of the observed regularity *on the alternative hypotheses* (not its probability compared to that of other possible observations).

*How probability theory supports IBE*:

- a. If H is a good explanation of E, then  $P(E|H) \gg P(E|\sim H)$ .
- b. But if  $P(E|H) > P(E|\sim H)$ , then E confirms H; and if  $P(E|H) \gg P(E|\sim H)$ , then E strongly confirms H. (Theorem of probability.)
- c. So if H is a good explanation of E, then E strongly confirms H.

*Alternative, skeptical explanations considered*:

**H2** There is no relevant law; it is an accidental regularity that bodies have behaved gravitationally.

*Problem*:

1. The probability of bodies behaving gravitationally by chance is incredibly low.

**H3** There is a law of nature that exists up til  $t$  that bodies behave gravitationally, and the law ceases to exist after  $t$ .

*Problems*:

1. Laws of nature cannot cease to exist. (?)
2. Creates a further fact in need of explanation: what is special about  $t$ ? Did something cause the law to cease to exist?
3. *If* laws of nature can cease to exist, then the probability of it ceasing to exist at  $t$  is the same as the probability of its ceasing to exist at any other time. If so, then either
  - a. This probability is reasonably high. If so, then P(E) is low (the probability that all observed bodies so far would have behaved gravitationally).

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will probably never obtain again.

- b. This probability is low. If so, then  $P(H3)$  is low, for any chosen  $t$ .  
If so, then inductive inference to any given future time is cogent.

**H4** It is a law of nature that bodies behave gravitationally before  $t$  but do not do so after  $t$ .

*Problems:*

1. The time cannot be a causally relevant factor. The fact that today is Oct. 29, 2003 cannot cause anything.
2. Creates a further fact in need of explanation: what is so special about  $t$ ? Related: lack of parsimony.
3. See (3) under H3.

**H5** It is a law of nature that observed bodies behave gravitationally.

*Problems:*

1. Lack of parsimony. No need to posit observation as a causal factor.
2. Fails to match observations. There would be all sorts of consequences to gravitational fields ceasing to exist whenever we closed our eyes or went to sleep, or not having existed before we existed.
3. Anyway, H5 supports induction to future observations, so not truly skeptical.

**H6** It is a law of nature that in  $\Phi$ -circumstances, bodies behave gravitationally.

*Problems:*

1. This hypothesis gives a different explanation for different cases of gravitational behavior.
2. Our explanation gives a *unified* explanation. Unified (and hence, simpler) explanations are more likely to be true. If there were 5 million causally relevant factors in the true law, it is improbable that a law that cites only 1 (or a few) factors would be empirically adequate.
3. It is improbable that you would just happen to have always been observing during one of the  $\phi$ -circumstances. If gravitational behavior depends on the state of the whole universe (or some very complicated conditions), it is improbable that you would happen to have been looking during exactly the times when one of these conditions held, *unless* those conditions hold almost all the time.

## II. David Stove on Induction

*Historical note:* approximately this style argument traces back to Laplace in

the 1700's, followed by Carnap. D.C. Williams gives a very similar argument to Stove's; Stove thinks he has found the best formulation of it.

*Setup:*

- Pop is a population of 1 million ravens.
- S is a sample, from Pop, of 3000 ravens.
- 95% of the ravens in S are black.
- *To prove:* It is highly probable that:
  - (a) Approximately 95% of the ravens in Pop are black, and
  - (b) The next raven observed will be black.
- *Important concepts:*
  - *Proportional syllogism* : Everyone agrees that the following kind of inference is cogent:
    1. 99% of all A's are B.
    2.  $x$  is an A.
    3.  $\therefore x$  is B.
  - *The law of large numbers* : If the probability of an event E at each trial is  $x$ , then in a large number of trials, the frequency with which E occurs will almost certainly be close to  $x$ . (With increasing certainty as the number of trials increases.)
  - *Representative Samples:* A sample is "representative" of a population with respect to some property iff the frequency of the property in the sample is close to (Stove: within 3% of) the frequency of the property in the population.

*Stove's argument in outline:*

1. Almost all (>99.8%) the 3000-fold samples of Pop are representative (no matter what the proportion of black ravens in Pop). (Arithmetical form of law of large numbers.)
2. Therefore (almost certainly), S is representative. (From 1; proportional syllogism.)
3. The proportion of black ravens in S is 95%. (Given.)
4. Therefore, almost certainly, the proportion of black ravens in Pop is close to 95%. (From 2,3; deduction.)
5. Therefore (probably), the next observed raven from Pop will be black. (From 4; proportional syllogism.)

*Further important points:*

- The qualitative result holds for any population size, and for any sample size  $\geq 3000$ ; i.e., the sample will almost certainly be representative. (Statisticians figure out stuff like this.)
- How does this relate to inference to the best explanation? In the

“general argument” above:

- (3) as the observation
- (4) as the hypothesis
- (5) as the prediction

### III. Nelson Goodman

• Goodman thinks that rules of induction are justified by appeal to our inductive practice. Arguments for this:

- Analogy to deduction.
  - Analogy to defining “tree”.
- May have in mind:

***The Paradigm Case Argument:***

1. Meaning is (determined by) use.
2. If meaning is (determined by) use, then it cannot be the case that a word is *generally* misused.
3. If any skeptical theory is true, then some expression is generally misused.

Where ‘skeptical’ theories include the following views:

- No action is ever free.
- No belief is ever justified.
- No one knows anything.
- No inductive inference is cogent.
- Nothing is ever certain.
- Nothing is flat.
- etc.

4. So all skeptical theories are false.

• *Question:* Why is this argument wrong? (May have to do with analytic/synthetic distinction.)