

Chapter 1

Justification = rational defense on the basis of evidence

Assertion = act of stating something as if it were true

Statement, claim = what you say in order to make an assertion

Premise = statement intended to provide rational support for a conclusion

Conclusion = statement intended to be rationally supported by a set of premises

Argument = collection of premises that justify a conclusion

Validity = if ALL premises are TRUE, conclusion CANT be FALSE

Soundness = valid + all true premises

Laws of Thought:

Law of Identity – P if and only if P

Law of Non-contradiction – Not both P and not P

Law of Excluded Middle – P or not P

Intuitionistic Logic: does not include Law of Excluded Middle

Dialetheic Logic: does not include Law of Non-contradiction

Fallacious argument = bad argument

Explanation = appeal to some facts in order to make sense of other facts

Modus Ponens:

If P then Q

P

Therefore, Q

Modus Tollens:

If P then Q,

Not Q

Therefore, not P

Hypothetical Syllogism:

If P then Q

If Q then R

Therefore, if P then R

Disjunctive Syllogism:

P or Q

Not Q

Therefore, P

Method of Counter Example: argument is invalid if we can think of ways for the premises to all be true while the conclusion is false

Valid Argument Forms

Simplification:

P and Q
Therefore, P

Conjunction:

P
Q
Therefore, P and Q

Addition:

P
Therefore, P or Q

Constructive Dilemma

P or Q
If P then R
If Q then S
Therefore, R or S

Destructive Dilemma

If P then R
If Q then S
Not R or not S
Therefore, P or not Q

Truth Conditions

Simple statement: doesn't contain another sentence as one of its parts

Conjunctive statement: P and Q is true, if P is true and Q is true

Disjunctive statement: P or Q, true if at least 1 of P and Q is true

Conditional statements: if P then Q, true unless P (antecedent) is true but Q (consequent) is false

Negation: Not-P, true if P is false

Double-Negation: not-not-P = P

Chapter 2

Cogent argument = makes its conclusion rationally credible (believable)

Logical fallacies = arguments that are invalid and presented as valid

Ampliative argument = conclusion expresses information that is not obviously or discreetly expressed by the premises

Defeasible = no matter how confident we are in the cogency of an inductive argument, it remains possible that some new information will overturn it

Empirical arguments = based on experience

Inductive argument = draws conclusions about unobserved cases from premises of observed cases (truth of premise doesn't guarantee truth of conclusion)

Ex: every currently observed rose is red; therefore the next rose observed will be red

Deductive argument = satisfies the definition of validity and remains sound

Abductive reasoning = leap to a conclusion that explains a set of facts

Context of discovery = accidental explanations for an Aha judgment

Context of justification = present the evidence that makes it reasonable to regard the abductive judgement as one of the successes

Analogical argument = examining a familiar case, noting a feature in it and arguing that some other case is relevantly similar

Disanalogies = relevant differences between the 2 things/situations compared

Reductio Ad Absurdum = proof technique that shows that a statement/argument leads to an absurd conclusion and therefore must be false

Mill's Methods

Method of agreement: E is in S1 and S2, F is in S1 and S2, then F causes E

Method of difference: F is in S1 but not in S2, E is in S1, F causes E (control group)

Joint method of agreement & disagreement: E is in S1 only when F is present, then F causes E

Method of co-variation: E is observed is proportional to amount of F present, then F is causally related to E

Method of residues (can't isolate F): If we know G causes D (but not E), & in all cases where we see G & F we see both E & D, then we can conclude that F likely causes E

Chapter 3

Rhetorical questions: obvious answer

Implicit = not written out in any form, but intended to be obvious from context

Presupposition = thing implicitly assumed beforehand at the beginning of a line of argument or course of action

Rhetoric = ways of speaking/writing intended to persuade independently of the strength of the argument

Quantifier = most, some, plenty, lots and many

Qualifier = “pretty small”

Weasel words = terms chosen to let the arguer weasel out of any refutation

Vagueness = imprecision

Sorites reasoning: 1 grain of sand is not a heap. And if something isn't a heap, then adding 1 grain of sand to it will not make it a heap. But then no amount of sand is a heap, since 1 could get from 1 grain to any number of grains just by adding 1 more grain to a non-heap.

Ambiguity = imprecise or indeterminate

Syntactic ambiguity = structure that can be read in more than 1 way

Lexical ambiguity = multiple meanings for a single expression

Direct quotation: Larry said, “Mike's a good guy.”

Indirect quotation: Larry said that Mike's a good guy.

Misattribution = one speaker's words are attributed to another

Quote-mining = correctly quoted sentence that is reported without the surrounding context that changes its meaning and is therefore falsely presented as characteristic of the speaker's views

Terms of Entailment: thus, therefore, hence, so, because

Chapter 4 – Fallacies

Affirming the Consequent:

If P then Q

Q

Therefore, P

Denying the Antecedent:

If P then Q

It is not the case that P

Therefore, it is not the case that Q

Quantifier Scope Fallacy: consists of misordering of a universal quantifier (all, every, each) and an existential quantifier (some, a, the, one)

Argument from ignorance:

We have no evidence that P

Therefore, it is not the case that P

Argument from Conspiracy:

There is not evidence that P

No evidence is exactly what we should expect, if P is true

Therefore, P

Argument from Authority: evaluating a claim on the basis of irrelevant facts about its origins, rather than on the basis of evidence for it

Post Hoc Ergo Propter Hoc: after, therefore because

Fallacies of relevance = introduce irrelevant factor to the real issue under discussion

Red Herring = statements that lead the discussion away from the key points

Straw Man Fallacy = misrepresenting an argument or a view in order to refute a dumbed-down version of it

Ad Hominem = dismissing an argument on the basis of personal facts about the arguer

Poisoning the Well = statement poisons the well if it is a general attack on the worth of reliability of an arguer's utterances

Circular argument = assumes the truth of what it intends to prove

Slanting Language = when a speaker describes some situation in terms that already suggest the desired conclusion

Chapter 5

Quantification = using #s and numerical concepts to characterize things

Representative # = encode what's important about that information

Percentages = /100 – consider ratios in terms of a common standard

Loss of information = loss of important contextualizing information that was carried in the absolute #s we started out with

Linear Projection = assumption that a rate observed over some specific duration must extend into unobserved territory as well – either past or future

Percentile = numerically rank values by how they compare to other values

Ordinal #s = 1st, 2nd, 3rd

Cardinal #s = 1, 2, 3

Chapter 6 – Prob & Stats

Unrepresentative sample: no matter how careful out reasoning about the sample, it will be misleading with respect to the population

Selection bias: informal polling

Trimmed sample = sample range/time period that isn't a conventional round # is a red flag

Standard deviation = measure of spread in the sample data

Correlation = 2 phenomena/variables that move together, they co-vary in predictable ways across different circumstances

p-value = denote how probable it is that you would get a sample that far from the null hypothesis if the null were true

Confounds = alternative explanations for the observed data

Common cause: X and Y may be correlated because they are both caused by Z, and not because X causes Y or vice versa

Statistical significance = measure of the confidence we are entitled to have in our probabilistic conclusion & how precise a conclusion we are trying to draw

Confidence interval = range of values within which we can be statistically confident that the true value falls

Margin of error = half that range, expressed relative to the midpoint of the confidence interval

Errors in Judging Whether a Correlation or Condition Exists

	No correlation	Genuine correlation
Don't reject null	Correct	Type II error
Reject null	Type I error	Correct

Errors in Rejecting Null Hypothesis

TYPE I error: false positives – if you go to the doctors and you are healthy, but he decides you are sick

TYPE II error: false negatives – if you go to the doctor and you are sick, but the doctor says you are healthy

Two Basic Laws of Probability

1. $0 \leq P(e) \leq 1$: probability of any event has a value from 0 to 1
2. Where S is the set of all possible outcomes, $P(S) = 1$

$P(e) = 1 - P(\bar{e})$ – probability of e occurs is 1 minus the probability that it does not occur

Probability = # of relevant outcomes/Total # of possible outcomes

$$P(A \cup B) = P(A) + P(B) - P(A \& B)$$

- Probability that either A or B occurs in the probability that A occurs plus the probability that B occurs, minus the probability that both A and B occurs

$$P(A \cup B) = P(A) + P(B)$$

- Outcome (AuB) occurs just in case either one of A and B occurs

$$P(A \cup B \cup C) = P(A) + P(B) + P(C) - P(A \& B) - P(B \& C) - P(A \& C) + P(A \& B \& C)$$

1. **Independent events:** $P(A \& B) = P(A) \times P(B)$
2. **Dependent events:** $P(A \& B) = P(A|B) \times P(B)$

Chances that an event will occur given another event occurs:

$$P(B|A) = \frac{P(A \& B)}{P(A)}$$

$$P(A|B) = \frac{P(A \& B)}{P(B)}$$

Dependent conjoint probability:

$$P(A \& B) = P(A|B) \times P(B)$$

$$P(A \& B) = P(B|A) \times P(A)$$

Chapter 7 – Biases

Heuristics = problem-solving methods that trade some accuracy for simplicity & speed & are usually reliable for a limited range of situations

Repetition effect = tendency of people to judge claims they hear more often as likelier to be true

Argument Ad Baculum = Believe that P or suffer the consequences

Bias = disposition to reach a particular kind of endpoint in reasoning or judgment, being skewed toward a specific sort of interpretation

Perceptual Biases = senses can mislead us in certain circumstances

- Largely result of basic structure or our perceptual & neurological mechanisms

Inattentional blindness = when you concentrate on one task, it is possible for grossly irregular events to occur right in front of them and not to be noticed

Cognitive Biases = beliefs, desires, suspicions, fears, anticipations, recollections, optimism and pessimism influence our decisions

Confirmation bias = beliefs, expectations or emotional commitments regarding a hypothesis can lead to its seeming more highly confirmed than evidence warrants

Situational or structural bias = affect availability of evidence for or against a hypothesis

Attentional bias = affect the degree to which we examine and remember evidence even if it is available

Interpretive bias = affect the significance we assign to evidence that we do examine and remember

Self-fulfilling prophecies = predictions that come true not simply because the predictor foresees how events will unfold, but because the prediction itself has an effect on how things unfold

Egocentric Biases = tendency to read special significance into the events that involve us and into our roles in those events

Attribution theory = approach to studying how people ascribe psychological states and explain behavior, including their own

Self-serving bias: I would rather think of myself as talented but lazy, or modestly gifted but hard-working

Hindsight bias = error of supposing that past events were predictable and should have been foreseen as the consequences of the actions that caused them

Language & Communication Biases

Continued influence effect = the way that information continues to influence our judgments even after we know enough to conclude that it was actually misinfo

Framing effects = influences from a situation on how we think about it

Memory Biases

Flashbulb memories = memories of traumatic or famous events

Chapter 8

Social stereotype = cluster of associated characteristics attributed to people of a particular sort – can activate automatic assumption that the whole cluster of characteristics applies to that person

Fundamental Attribution Error = bias in favor of explaining someone's situation or behavior in terms of their personality or character while overlooking context, accidents or environmental influence

False Polarization Effects = tendency to overestimate: the extent to which the views of other resemble the strongest or most stereotypical positions of those sorts AND the differences between one's own view and the views of someone who disagrees

- As soon as a speaker voices one idea that is of one stereotype or extreme, the audience takes her to hold that stereotypical view on every aspect of the issue

Bandwagon Effect = tendency for our beliefs to shift toward the beliefs we take to be widely held by those around us

False Consensus Effect = tendency to overestimate the extent to which others share our beliefs and attitudes

Anecdotal evidence = the unmoderated story-telling sort of evidence that informal socializing largely provides

Leveling = process by which the elements of a story that are perceived as minor tend to get minimized or omitted over successive retellings

Sharpening = occurs when some aspects of a story become exaggerated as story's retold

Chapter 10

Demarcation problem = problem of finding a definition that distinguishes science from non science

Methodological naturalism = rejection of appeal to supernatural entities or processes in explanations

Metaphysical naturalism = no supernatural entities

Verifiability = feature that distinguishes science from non science

Falsifiability = requirement that there be specifiable observations/outcomes under which a theory would be judged false

Auxiliary hypotheses = assumption and theories external to the theory being tested, which help connect to the empirical observation

Control group = test group is compared to, to distinguish test-relevant effects from other effects – nothing done to them

Test group = group being tested

Pair-matching = dividing subjects into 2 groups whose members are matched with respect to properties that we suspect could make a difference to the outcome

Placebo effect = people who believe are receiving treatment feel better or recover

Single-blind = subjects cant know if they are actually being treated

Experimental bias = beliefs, attitudes or emotions influence data recorder and conclusions drawn