

The Relationship between Logic and Reasoning

Piksi Logic 2022

Julia Staffel

1. Three projects in the study of reasoning

The descriptive project

- Question: how do people actually reason?

often pursued by psychologists, anthropologists, sometimes computer scientists

The normative project

- Question: how should people reason?

often pursued by philosophers, but also psychologists, cognitive scientists, and economists

The evaluative project

- Do people reason the way they should?

This combines the first two projects by comparing people's actual reasoning with the norms that govern correct reasoning.

Wason selection task:

4 cards:

E C 5 4

Claim: If a card has a vowel on one side, then it has an odd number on the other side:

Question: Which cards do you have to turn over to find out if "Claim" is true?

The Standard Picture:

What are the rules for correct reasoning?

According to the standard picture, the correct rules are the ones that logic, probability, and decision theory tell us about.

But: as we know in philosophy, there is considerable debate about these fields. There isn't one acceptable theory that is the correct logic, or the correct decision theory. For example, there is a debate about whether there should be two or three truth-values in logic, and this leads to different inference rules being justified as valid.

Of course, in order to have a clear judgment about a particular example, we must not only do the experiments, but we must also be sure about what the formal frameworks say about these cases. Hence, we must know how to generate rules of reasoning for particular cases from our formal framework.

Advantages of the standard picture:
It seems intuitively correct that logic tells us how we ought to reason.
It reflects the idea that principles of reasoning are somehow universal.

2. How do we get from rules of logic to norms of reasoning?

(further reading: Gilbert Harman, *Change in View*)

Reasoning Distinguished from Argument or Proof

An argument or proof is very different from a reasoned change in view:

Rules of argument are principles of implication, which talk about that relationship between propositions, and what follows from what. A rule of argument by itself says nothing about belief revision.

Important question: how are rules of implication or argument related to rules of reasoning (inference/revision)?

Differences between implication and inference:

- Implication is cumulative in ways that reasoning might not be. In an argument, we always add conclusions (and maybe new premises), we never subtract. This is different in reasoning.

What types of reasoning errors are there?

A First Pass at Connecting Logical Rules and Principles of Reasoning

Logical implication principle: The fact that one's view logically implies P is a reason to accept P.

Logical inconsistency principle: Logical inconsistency in one's beliefs is to be avoided.

Can you think of any counterexamples?

3. A More Systematic Approach: MacFarlane

(Reading: John MacFarlane: In what sense (if any) is logic normative for thought?)

Goal: Find a bridge principle of the form

If A and B logically entail C, then (normative claim about believing A, B, and C).

Four parameters we can vary:

1. Type of deontic operator: obligation (ought), permission (may), defeasible reason for
2. Polarity: believe, not disbelieve
3. Scope of deontic operator #: $(P \supset \#Q)$, $(\#P \supset \#Q)$, $\#(P \supset Q)$
4. Add before the bridge principle: "If you know that A and B logically entail C, ...)

Table 1: If $A, B \models C$, then ...

C Deontic operator embedded in consequent.

- o Deontic operator is strict obligation (ought).
 - Co+ if you believe A and you believe B , you ought to believe C .
 - Co- if you believe A and you believe B , you ought not disbelieve C .
- p Deontic operator is permission (may).
 - Cp+ if you believe A and you believe B , you may believe C .
 - Cp- if you believe A and you believe B , you are permitted not to disbelieve C .
- r Deontic operator is "has (defeasible) reason for."
 - Cr+ if you believe A and you believe B , you have reason to believe C .
 - Cr- if you believe A and you believe B , you have reason not to disbelieve C .

B Deontic operator embedded in both antecedent and consequent.

- o Deontic operator is strict obligation (ought).
 - Bo+ if you ought to believe A and believe B , you ought to believe C .
 - Bo- if you ought to believe A and believe B , you ought not disbelieve C .
- p Deontic operator is permission (may).
 - Bp+ if you may believe A and believe B , you may believe C .
 - Bp- if you may believe A and believe B , you are permitted not to disbelieve C .
- r Deontic operator is "has (defeasible) reason for."
 - B_r+ if you have reason to believe A and believe B , you have reason to believe C .
 - B_r- if you have reason to believe A and believe B , you have reason not to disbelieve C .

W Deontic operator scopes over whole conditional.

- o Deontic operator is strict obligation (ought).
 - Wo+ you ought to see to it that if you believe A and you believe B , you believe C .
 - Wo- you ought to see to it that if you believe A and you believe B , you do not disbelieve C .
- p Deontic operator is permission (may).
 - Wp+ you may see to it that if you believe A and you believe B , you believe C .
 - Wp- you may see to it that if you believe A and you believe B , you do not disbelieve C .
- r Deontic operator is "has (defeasible) reason for."
 - Wr+ you have reason to see to it that if you believe A and you believe B , you believe C .
 - Wr- you have reason to see to it that if you believe A and you believe B , you do not disbelieve C .

-k (As suffix to one of the above:) antecedent of bridge principle is "If you know that $A, B \models C$..."

Selection criteria for bridge principles:

- Excessive demands: the principle shouldn't demand too much from reasoners.
- Preface: Allow for all the beliefs that seem rational in the preface paradox.
- Strictness test: does the bridge principle leave the reasoner "not entirely as she ought to be"?
- Priority Question: The principle should not make what is rational to believe depend on the reasoner's knowledge, because then one could be very rational simply in virtue of being very ignorant about entailment relations.
- Logical obtuseness: The principle should not allow agents to refuse to take a stand on obvious logical consequences of their views.

	Wo+	Wo+k	Wo-	Wo-k	Wr+	Wr+k	Wr-	Wr-k
Demands	x							
Preface	x	x	x	x				
Strictness					x	x	x	x
Priority		x		x		x		x
Obtuseness			x	x			x	x