Philosophy of Logics

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IV. Formal and Informal Considerations

n 1. Four level's of logic study

n 2. Meanings of the connectives

n 3. Some discussions

1. four level's of logic study

n **One can look at the sentence calculus from four levels:**

n **(i) the axioms/rules of inference**

n **(ii) the formal interpretation (matrices)**

n **(iii) the ordinary language readings of (i)**

n **(iv) the informal explanation of (ii)**

Aims of formalization

n **The way of formal logical systems aim to represent intuitively valid inferences.**

n **Some informal arguments are intuitively judged to be valid, others invalid.**

n **One then constructs a formal language in which the relevant structural features of those arguments can be schematically represented, and axioms/rules which allow the intuitively approved, and disallow the intuitively disapproved, arguments.**

2.Meanings of the connectives

n **Despite their diversity, natural languages have many fundamental features in common.**

n **We will focus mainly on logically significant expressions (in English), such as 'and,' 'or,' 'if,' 'some,' and 'all' and consider to what extent their semantics is captured by the logical behavior of their formal counterparts, '&' (or '∧'), '∨,' '⊃' (or '→'), '∃,' and '∀.'**

And and ∧

n In ordinary speech (or writing), it is not just what a sentence means but the fact that someone utters (or writes) it plays a role in determining what its utterance conveys .

n So, for example, there is a difference between what is likely to be conveyed by utterances of (1) and (2),

n (1) Abe felt lousy and ate some chicken soup.

n (2) Abe ate some chicken soup and felt lousy.

n and the difference is due to the order of the conjuncts. Yet 'and' is standardly symbolized by the conjunction '&,' and in logic the order of conjuncts doesn't matter.

the order of conjuncts

n **As observed by Strawson (1952) and many others since, the order of conjuncts seems to matter, even though the logical '&' is commutative: (p&q) ≡ (q&p). Although there is no significant difference between :**

n **(11) a. Uzbekistan is in Asia and Uruguay is in South America.**

n **b. Uruguay is in South America and Uzbekistan is in Asia.**

n **there does seem to be a difference between:**

n **(12) a. Carly got married and got pregnant.**

n **b. Carly got pregnant and got married.**

n **(13) a. Henry had sex and got infected.**

n **b. Henry got infected and had sex.**

conjunctions embedded

n Cohen (1971) appealed to the fact that the difference is preserved when the conjunctions are embedded in the antecedent of a conditional:

n (14) a. If Carly got married and got pregnant, her mother was thrilled.

n b. If Carly got pregnant and got married, her mother was relieved.

n (15) a. If Henry had sex and got infected, he needs a doctor.

n b. If Henry got infected and had sex, he needs a lawyer.

n Also, the difference is apparent when the two conjunctions are combined, as here:

n (16) I'd rather get married and get pregnant than get pregnant and get married.

n (17) It's better to have sex and get infected than to get infected and have sex.

Other examples

- Here are versions of (14a) and (16) with the implicit 'then' made explicit:
- **(14a+)** If Carly got married and *then* got pregnant, her mother was thrilled.
- **(16+)** I'd rather get married and *then* get pregnant than get pregnant and *then* get married.
- An additional meaning of '**and**' would have to be posited to account for cases like (18):
- **(18)** He was five minutes late and he got fired?

And and or

- Moreover, 'and' and 'or' do not function exclusively as sentential connectives, for example as in (5) and (6):
- **(5)** Laurel **and** Hardy lifted a piano.
- **(6)** Abe wants lamb **or** halibut.
- Clearly those sentences are not elliptical versions of these:
- **(5+)** Laurel lifted a piano **and** Hardy lifted a piano.
- **(6+)** Abe wants lamb **or** Abe wants halibut.

A further difficulty

- A further difficulty, perhaps of marginal significance, is that the truth-functional analysis of '**and**' and '**or**' does not seem to handle sentences like 'Give me your money **and** I won't hurt you' and 'Your money **or** your life,' or, more domestically:
- **(7)** Mow the lawn **and** I'll double your allowance.
- **(8)** Mow the lawn **or** you won't get your allowance.
- It might seem that these sentences involve a promissory use of '**and**' and a threatening use of '**or**.'

Different forces

- But that's not accurate, because there are similar cases that do not involve promises or threats:
- **(9)** George Jr. mows the lawn **and** George Sr. will double his allowance.
- **(10)** George Jr. mows the lawn **or** he won't get his allowance.
- Here the speaker is just a bystander. The '**and**' in (9) seems to have the force of a conditional, that is 'If George Jr. mows the lawn, George Sr. will double his allowance.' This makes the '**and**' in (9) **weaker** than the ordinary '**and**.' And the '**or**' in (10) has the force of a conditional with the antecedent negated, that is 'if George Jr. does not mow the lawn, he won't get his allowance.'

Or

- Even though it is often supposed that there is both an **inclusive** '**or**' and an **exclusive** '**or**' in English, in the propositional calculus '**or**' is symbolized as the inclusive '$\vee$.'
- A disjunction is true just in case at least one of its **disjuncts** is true.
- Of course, if there were an exclusive '**or**' in English, it would also be truth-functional-an exclusive disjunction is true just in case exactly one of its disjuncts is true-but the simpler hypothesis is that the English '**or**' is unambiguously inclusive, like '$\vee$.'

an epistemic aspect to 'or'

- **(19)** Sam is in Cincinnati **or** he's in Toledo.
- **(20)** Sam is in Cincinnati **or** Sally (his wife) will hire a lawyer.
- An utterance of **(19)** is likely to be taken as exclusive. However, this is not a consequence of the presence of an exclusive '**or**' but of the fact that one can't be in two places at once. Also, it might seem that there is **an epistemic aspect to 'or,'** for in uttering **(19)**, the speaker is implying that she doesn't know whether Sam is in Cincinnati or Toledo.

the order of the disjuncts

- The case of **(20)** requires a different story. Here the order of the disjuncts matters, since an utterance of "Sally will hire a lawyer **or** Sam is in Cincinnati" would not be taken in the way that **(20)** is likely to be.
- Because the disjuncts in **(20)** are ostensibly unrelated, its utterance would be hard to explain unless they are actually connected somehow. In a suitable context, an utterance of **(20)** would likely be taken as if it contained '**else**' after '**or**,' that is as a conditional of sorts.
- That is, the speaker means that **if** Sam is *not* in Cincinnati, Sally will hire a lawyer, and **might be implicating further** that the reason Sally will hire a lawyer is that she suspects Sam is really seeing his girlfriend in Toledo. The reason that order matters in this case is not that '**or**' does not mean inclusive disjunction but that in **(20)** it is intended as **elliptical** for '**or else**,' which is not symmetrical.

to add 'but not both'

- One indication that '**or**' is univocally inclusive is that it is never contradictory to add '**but not both**' to the utterance of a disjunction, as in **(21)**,
- **(21)** You can have cake **or** cookies **but not both**.
- However, it might be argued that '**or**' cannot be inclusive, or at least not exclusively so, since there seems to be nothing redundant in saying,
- **(22)** Max went to the store **or** the library, **or perhaps both**.
- The obvious reply is that adding '**or perhaps both**' serves to cancel any implication on the part of the speaker that only one of the disjuncts holds and to raise to **salience** the possibility that both hold.

'if S_1, then S_2' 'p ⊃ q,'

- n we must reckon with the fact-nothing is more puzzling to beginning logic students than this-that on the rendering of 'if S_1, then S_2' as 'p ⊃ q,' a conditional is true just in case its antecedent is false or its consequent is true.
- n This means that **if** the antecedent is false, it doesn't matter whether the consequent is true or false, and **if** the consequent is true, it doesn't matter whether the antecedent is true or false.

the material conditional analysis

- n Apparently the basic problem with the **material conditional** analysis of 'if' sentences is that it imposes no constraint on the relationship between the proposition expressed by the antecedent and the one expressed by the consequent.
- n Both (23) and (24) count as true,
- n **(23)** If Madonna is a virgin, she has no children.
- n **(24)** If Madonna is a virgin, she has children.
- n and so do both (25) and (26),
- n **(25)** If Madonna is married, she has children.
- n **(26)** If Madonna is not married, she has children.

'if' sentences are not truth-functional?

- n On this analysis **(27)**–**(30)** are as true as **(23)**–**(26),**
- n **(27)** If Madonna is a virgin, she is a multi-millionaire.
- n **(28)** If Madonna is a virgin, she is not a multi-millionaire.
- n **(29)** If Madonna is married, she is a pop singer.
- n **(30)** If Madonna is not married, she is a pop singer.
- n This might suggest that 'if' sentences are not truth-functional (indeed, **Edgington (1991) has** argued that they are not even truth-valued).

Strawson (1986)"ground-consequent relation"

- n Perhaps the implication of such a connection can be explained pragmatically.
- n So suppose that an 'if' sentence is equivalent to a material conditional, 'p ⊃ q,' true just in case either its antecedent is false or its consequent is true.
- n It is thus equivalent to '¬p ∨ q.' Now as Strawson sketches the story, one would not utter a conditional **if one could categorically assert the consequent or the negation of the antecedent.**
- n As we saw above, it would be misleading to assert a disjunction if you are in a position to assert a disjunct, unless you have **independent reason for withholding it.**

the absence of such a relation

- n Indeed, we may implicate the absence of such a relation.
- n This happens, for example, when one conditional is asserted and then another is asserted with **a contrary antecedent and the same consequent**, as in the following dialogue:
- n *Guest*: The TV isn't working.
- n *Host:* If the TV isn't plugged in, it doesn't work.
- n *Guest:* The TV *is* plugged in.
- n *Host:* If the TV is plugged in, it doesn't work.
- n Clearly the host's second utterance does not implicate any ground-consequent relation. As the propositional calculus predicts, the host's two statements together entail that the TV doesn't work, period.

the antecedent is obviously false

- n One last bit of support for **the truth-functional account** of conditionals comes from cases like "**If** you can lift that, I'm a monkey's uncle" or (32),
- n **(32)** If Saddam Hussein wins the Albert Schweitzer Humanitarian Award, Dr. Dre will win the Nobel Prize for medicine.
- n In such cases, **the antecedent is obviously false,** and the speaker is exploiting this fact.
- n There is no entailment of a ground-consequent connection between the antecedent and consequent, and the speaker is **not implicating any**. Rather, he is implicating that **the consequent is false**, indeed preposterous.

used as if they were biconditionals

- n One last point about conditionals is that sometimes they are used as if they were **biconditionals** (symbolized by '≡' rather than '⊃').
- n For example, it might be argued that 'if' can sometimes mean 'if and only if,'
- n **(33)** If Harry works hard, he'll get promoted.
- n where there seems to be an implication that **if** Harry doesn't work hard, he won't get promoted, that is, that he'll get promoted **only if** he works hard.

subjunctive or counterfactual conditionals

- n We have not addressed the case of so-called **subjunctive or counterfactual conditionals** .
- n The conditions on their truth is a complex and controversial question , but clearly the following conditionals differ in content:
- n **(34)** a. **If** Oswald didn't shoot Kennedy, someone else did.
- n   b. **If** Oswald hadn't shot Kennedy, someone else would have.
- n Whatever the explanation of the difference, presumably it is not due to any ambiguity in 'if' but to something else.

Other sentential connectives

n There are a great many sentential connectives that we will not consider, such as 'after,' 'although,' 'because,' 'before,' 'but,' 'consequently' 'despite the fact that,' 'even though,' 'however,' 'inasmuch as,' 'nevertheless,' 'provided that,' 'since,' 'so,' 'therefore,' 'unless,' and 'until.'

n We cannot take them up here, but it is interesting to consider which ones are truth-functional and which are not.

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3. Some discussions

n 1、The merit and defect of **accuracy and strictness**

n 2、The merit and defect of **vagueness, un-strictness**

n 3、The merit and defect of Chinese traditional thinking.

n 4、 The merit and defect of Western rational thinking.

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a clear distinction

n a clear distinction between implication, consequence, inference and causal grounding:

n • 'implies' is an indicator-word for *implication,* which is a propositional connection between proposition (al content)s.

n • 'follows from,' is a consequence of and 'if … is true, then-is true' are indicator-phrases for *consequence,* which is a relation between proposition (al content)s.

n • 'thus,' 'therefore' are indicator words for *inference,* which is a passage from premise judgment[s] (assertion[s]) to a conclusion judgment (assertion).

n • 'because,' 'is a cause (ground, reason) for' are indicator words for *causal grounding,* which is a relation between events, or states of affairs.

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Thanks

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