

LECTURES ON UNIVERSAL LOGIC

Lecture 2 – Routley's Ultralogic Programme

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Ultralogic as Universal?

- In his monumental *Meinong's Jungle and Beyond* (1979) Richard Routley had an appendix with the title above, referring to his universalist programme of Ultralogic [republished as a book in 2019].
- This programme is related to his work in Relevant Logics, semantics, **noneism** (the theory that there are objects without any mode of being), and his defence of '**Naive Set Theory**' (a set theory with an unrestricted axiom schema of comprehension).
- This lecture looks at the foundations of this programme, the next lecture at its application.

Routley's Conception of Universal Logic

- “A universal logic, in the intended sense, is one which is applicable in every situation whether realised or not, possible or not.” (893)
- “[C]lassical logic can be recovered in those situations (consistent and complete ones) where it is valid.” (894)
- There are, of course, many logics, but: “[A]ll connectives and quantifiers can be encompassed within the scheme of a universal logic” (897). Semantics will be an issue, but “a universal logic does not have to be complete” (ibid).

- Routley sees the building blocks for such a logic in a relevant implication (\rightarrow) with a **ternary** accessibility (im)possible worlds semantics, extensional connectives for ‘and’ and ‘or’, a modal logic where substitution of logical equivalents may fail, and a negation with an (im)possible worlds **modal** semantics.
- Whether his semantics is plausible or natural (i.e. for a supposedly extensional connective like negation) is highly controversial, but we look at its motivation first.
- Ultralogic can be applied in situations which are incomplete (i.e. *tertium non datur* does not hold) and those which are overcomplete (i.e. the *Law of Non-Contradiction* does not hold).

Sufficiency

- “[T]he central deducibility relation of ultramodal logics, entailment, is intended to capture the notion of sufficiency.” (895)
- **Sufficiency** means that the antecedent of a conditional (entailment) or the premises of a deduction should suffice for the consequent or conclusion.
- The antecedent needs **no strengthening** or additional logical truth. “If A is sufficient for B then it does not matter what else goes on” (ibid) – even if some logical truths do not hold in an impossible world.

- The idea of relevant variable sharing between A and B is a subcase of sufficiency. [Relevance Logics require of an entailment $A \rightarrow B$ that A and B share a propositional letter/variable.]
- **Variable sharing** between antecedent and consequent (as required in Relevance Logics) is a by-product, as an antecedent not relevant in that sense (its variables not turning up in the consequent) can not be sufficient by itself for the consequent.
- Ultralogic thus is a variant of a Relevant Logic.

[‘Relevance Logics’ are the American, ‘Relevant Logics’ the Australian variants of the relevant approach.]

Critique of Standard-Logics

- Ultralogic shares the general critique of standard logic (PC/FOL) as developed by Relevant Logics, and adds critique based on the idea of non-universality of standard logic.
- This second critique is related to ‘dialectical’ (paraconsistent) reasoning about antinomies and ‘paradoxes’ in logic, set theory and semantics, and related, of course, to Routley’s Noneism.

- PC does not include an **adequate theory of conditional statements**: “ \supset ” is a non-relevant/non-sufficient connective.
- As witnessed by the ‘Paradoxes of (Material) Implication’, e.g.

$$A \supset B \vee \neg B$$

$$A \wedge \neg A \supset B$$

- The propositional part of Ultralogic will rather adopt the axiomatics of a Relevant Logic of entailment.

- Especially Disjunctive Syllogism [$\vdash A, \vdash \neg A \vee B \Rightarrow \vdash B$] leads to **Explosion**/*ex contradictione quodlibet* [$\vdash A \wedge \neg A \Rightarrow \vdash B$] in otherwise non-trivial inconsistent theories. Disjunctive Syllogism has to be restricted to consistent contexts.
- FOL rules out “proper logical examination of incomplete and inconsistent deductive theories, in particular non-vacuous incomplete theories where not all logical laws hold and non-trivial inconsistent theories where some contradictory propositions hold” (898).
- Thus, **FOL restricts the power and availability of logical analysis.**

- **Negation**, one of the supposedly basic extensional connectives, therefore, needs another modelling!
- A **solution to the paradoxes of truth, semantics and set theory** is related to avoiding the paradoxes of material implication and the unrestricted use of rules like Disjunctive Syllogism.
- In FOL once we have a contradiction the theory becomes **trivial** (i.e. contains all formula) which these theories **are not**.

- FOL and its standard modal extensions preclude a proper logical **analysis of the intensional**, as this requires the employment of incomplete and inconsistent situations, say when looking at somebody's beliefs or a fiction.
- A proper analysis of the intensional will also require an **ultra-modal logic** in which substitution of logical equivalents fails, as witnessed by paradoxes of inconsistent belief ascription.
- Also: $A \wedge \neg A \vdash A$, $\vdash A \wedge \neg A \equiv B \wedge \neg B$, but $B, \neg B \not\vdash A$ within modal and intensional contexts, and neither for entailment.
- Such a logic needs also a new modelling of substitution of identicals, as objects may have inconsistent properties under a description and may not be interchangeable in belief contexts.

- FOL cannot deal with **reference failure and non-existing objects**.

But some objects neither exist nor subsist (like abstract entities in Meinong) nor possibly exist – they are beyond being (‘Außersein’ in Meinong).

- Noneism (the theory that claims an ontology of such ‘objects’) is incompatible with FOL. It is **way stronger than a Free Logic**, which does only deal with different modes of existence.

- Noneism, however, is needed both for a proper analysis of intensional contexts as well as for a **foundation of linguistics**, as natural languages exhibit reference failure.

[Routley’s book to which “Ultralogic ...” is an appendix deals with Noneism and his criticism of the ‘Reference Assumption’ in analytic semantics and ontology.]

- FOL yields contra-intuitive results **in philosophy of science** and epistemology, e.g. the *Raven Paradox* of confirmation.

- The paradox generates in the context of FOL-equivalences like

$$\vdash \forall x(\text{Raven}(x) \supset \text{Black}(x)) \equiv$$

$$\text{Raven}(x) \wedge \neg \text{Black}(x) \supset \text{Raven}(x) \wedge \neg \text{Raven}(x))$$

Thus, a confirmation of all ravens being black **confirms** that non-black raven are not ravens!

- Such paradoxes rely on the paradoxes of material implication and thus fail to hold in Ultralogic.

Dialetheism

- Routley is one of the earliest proponents of Dialetheism:

“The central thesis ... of a uniform dialectical solution to both the logical and semantic paradoxes is that there are, as the paradoxes themselves show, some assertions which are overdetermined, and inconsistent, in that **both they and their negations are true** ...”
(906/907).

They not just seem both to be true – as a neutral analyst might say – they **are** true.

- Thus, the **actual** world is inconsistent, not just some far-fetched impossible worlds. Ultralogic “admits the paradox arguments at face value, as establishing isolated inconsistencies” (907).
- Ultralogic can **accept the intuitive appeal** of the Liar-argument (that the Liar is true iff false) or the argument concerning the Russell-class (belonging and not-belonging to itself). Consistent accounts have to reject some intuitive principles of truth or set-membership and recast basic concepts in artificial theories.
- In Ultralogic truth as well as provability are expressible (contra *Tarski’s Theorem*). $\vdash \text{True}(B) \equiv B$ **in** a system.

What is New about Ultralogic

- Given the prior existence of Relevant Logics, Routley summarizes: “All that is new then is the simple and natural **amalgation** of dialectical and relevant insights within the framework of ultralogic” (908)
- Routley does not attempt to have a dialectical meta-language for a dialectical object-language, or an identification of object- and meta-language. Ultralogic does thus **not incorporate full semantic closure**. This “eventually required” (911) step is postponed at first.