

## Refutation of relevance logic via Routely and Meyer

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We assume the method and apparatus of Meth8/VL4 with Tautology as the designated *proof* value, F as contradiction, N as truthity (non-contingency), and C as falsity (contingency). Results are a 16-valued truth table in row-major and horizontal, or repeating fragments of 128-tables for more variables.

LET ~ Not; + Or; & And; > Imply; = Equivalent; @ Not Equivalent; (p@p) F; T (p=p) .  
# necessity, for all or every, ∀, ∀x; % possibility, for one or some, ∃, ∃x.

**Remark:** Expressions from the text are not reproduced due to character non-portability.

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Paradoxes of material implication in relevance logic are:

$$p > (q > p) ; \quad \text{TTTT TTTT TTTT TTTT} \quad (1.2)$$

$$\sim p > (p > q) ; \quad \text{TTTT TTTT TTTT TTTT} \quad (2.2)$$

$$(p > q) + (q > r) ; \quad \text{TTTT TTTT TTTT TTTT} \quad (3.2)$$

Paradoxes of strict implication in relevance logic are:

$$(p \& \sim p) > q ; \quad \text{TTTT TTTT TTTT TTTT} \quad (4.2)$$

$$p > (q > q) ; \quad \text{TTTT TTTT TTTT TTTT} \quad (5.2)$$

$$p > (q + \sim q) ; \quad \text{TTTT TTTT TTTT TTTT} \quad (6.2)$$

"Routely and Meyer go modal logic one better and use a three-place relation on worlds", allowing (q > q) to fail and (p > (q > q)) to fail.

$$A \rightarrow B \text{ is true at a world } a \text{ if and only if for all worlds } b \text{ and } c \text{ such that } Rabc \text{ (} R \text{ is the accessibility relation) either } A \text{ is false at } b \text{ or } B \text{ is true at } c. \quad (10.1)$$

LET p, q, r, s, (t): A, B, b, c, (a)

**Remark:** We minimize variables and table size for clarity by ignoring (a).

$$(((\#r > p) = (p @ p)) + ((\#s > q) = (p = p))) > (p > q) ; \text{TFTT TFTT TNTT TNTT} \quad (10.2)$$

Eq. 10.2 as rendered is *not* tautologous. This means relevance logic is refuted.