"If he has measles, then he has fever.
He has fever"

?

What, if anything, follows?

Cognitive Theories of Conditional Reasoning miss that inferences are dependent and that different tasks need to be analyzed separately.

A Meta-Analysis of Conditional Reasoning

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INFERENCE PATTERNS for CONDITIONALS

For **If A then B** and

A. ∴ B. (Modus Ponens: MP)
B ∴ A. (Affirmation of Consequent: AC)
Not A. ∴ Not B. (Denial off Antecedent: DA)
Not B. ∴ Not A. (Modus Tollens: MT)

MOTIVATION

Many theories about conditional reasoning
but no analysis about

- Relevant individual inference patterns
- Diagnostic criteria for cognitive theories
- Distinction between evaluation, option, and production tasks

3 PREDICTIONS

	Logical	Suppo-sitional	Mental models
The meaning of If A then C:			
1. implies the possibilities: A C, ¬A ¬C, ¬A C	-	-	+
2. implies that only cases of A are relevant to verification	-	+	+
3. implies that MT with a biconditional is easier than with a conditional	-	-	+

METHODS

1. Meta-analysis comprising 39 experiments (2378 Ss) reporting individual inference patterns
2. Statistical analysis of significant patterns
3. Shannon's measure and 10^5 simulations testing dependence of inference patterns

RESULTS of ANALYSIS

Sort of task	Evaluation	Option	Production
Mean information of experiments	1.69	2.03	1.93
Mean information of their simulations	2.05	2.29	2.12
Wilcoxon's W and *p*-value	W = 3, p < .04	W = 3, p < .04	W = 6, *p* < .055

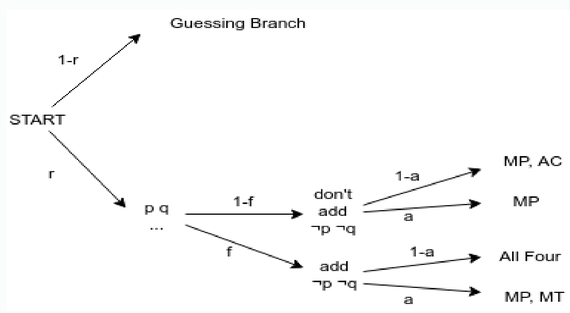
TAKE-HOME MESSAGE

- About 60% of the participants make a logically correct biconditional or classical conditional interpretation
  → Humans are on average logical
- Three diagnostic criteria based on meaning of conditionals for theories, only satisfied by MMT
- Consider differences between evaluation, production, option tasks
- Best fitting theories differ for tasks
  - Directional MMT provides for evaluation
  - MMT provides for production
  - Suppositional for option

Supporting Tables & Figures

Response Pattern	Evaluation	Option	Production	Overall
All Inferences	39.0	43.1	50.3	42.3
MP, MT	17.7	21.3	12.4	18.3
MP	14.8	8.4	5.4	10.9
MP, AC	8.4	5.8	11.0	7.8
MP, AC, MT	4.0	8.2	8.5	6.3
Number of Experiments	8	22	9	39
Number of Participants	1103	921	354	2378

An MPT of the Mental Model Theory (Oberauer, 2006)



The Theory	Evaluation (BIC)	Option (BIC)	Production (BIC)
Suppositional-exclusive	42	43	45
Dual process suppositions	48	48	42
Directional mental modal	37	60	42
Mental model	46	62	38
Suppositional	63	54	60

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