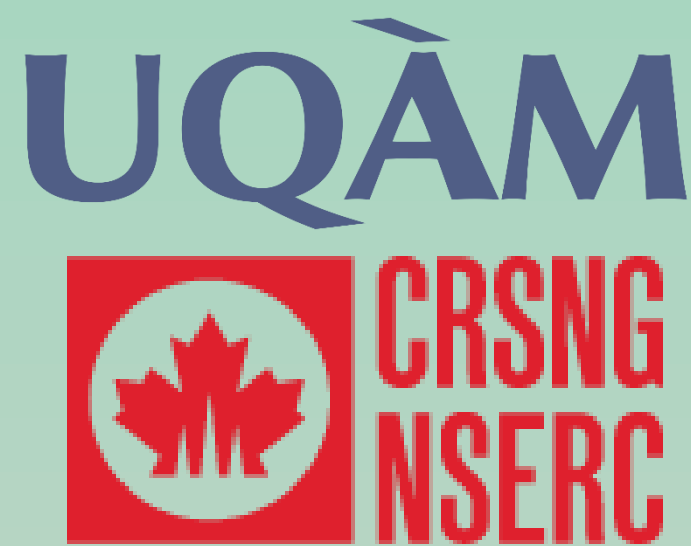


Implicit cues to logic? *Not so fast*



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INTRODUCTION

Logical intuition & Conflict detection (De Neys, 2012)
Even when they give a heuristic response, reasoners appear to have intuitive **access to the logically valid response**, as evidenced by **slower response times** (RTs) and **lower levels of confidence** on Conflict compared to Consistent inferences.

For the following Affirmation of the consequent (AC) inference, the conclusion is **invalid** but **believable**, as there is a **conflict** between logical validity and believability:

All flowers have petals.
Roses have petals.
Roses are flowers.

If the conclusion is **unbelievable**, both logical validity and believability are **consistent**:

All cars have motors.
Airplanes have motors.
Airplanes are cars.

Since even **young children can often recognize that these inferences are invalid** (Markovits, 2000), conflict detection should show clear results. However, **empirical results are inconsistent**.

Matching hypothesis (Kosourikhina & Handley, 2025)
Because people tend to interpret AC inferences as biconditionals (if and only if), **conflict inferences should rather be unbelievable + invalid**, which predicts a **reverse detection effect**.

Semantic activation (Markovits, 2014)
The intuitive response for these inferences is an attempt to **activate alternative antecedents** (cases of non-A that are B).

If an alternative is activated, the conclusion is intuitively rejected; otherwise the conclusion is intuitively accepted.

METHOD

Study 1: When there are **few available alternatives**, the intuitive response is to accept the conclusion, so **conflict is for invalid and unbelievable inferences** (reverse detection). Therefore, **RTs will be longer and confidence lower** when the conclusion is rejected on consistent inferences than when it is accepted on conflict inferences.

DESIGN

Two studies: One using 20 inferences with **few** available alternative antecedents, one using 20 inferences with **many**.

For each study, participants are randomly assigned to one of two lists each containing **5 consistent** and **5 conflict** inferences (counterbalanced to avoid material repetition).

PARTICIPANTS

Study 1:
100 participants
Recruited from Prolific:
45 F, 54 M, 1 other,
Age $M = 36.14$.

Study 2:
100 participants
Recruited from Prolific:
54 F, 46 M
Age $M = 35.82$.

MATERIALS

40 categorical inferences:
• All **invalid** AC form
• 20 with few alternatives, 20 with many
• **Half conflict** conclusion believability with logical validity, **half are consistent**.

Dependent measures:
• Response time (RT), in seconds
• Confidence: **Feeling of rightness** (FOR; Thompson et al., 2011)

	Few (Study 1)	Many (Study 2)
Consistent	All animals have legs. Dogs have legs. Dogs are animals.	All dogs have legs. Labradors have legs. Labradors are dogs.
Conflict	All animals have legs. Chairs have legs. Chairs are animals.	All dogs have legs. Cats have legs. Cats are dogs.

RESULTS

HYPOTHESES

Study 2: When there are **many available alternatives**, the intuitive response is to reject the conclusion, so **conflict is for invalid and believable inferences**. Therefore, **RTs will be shorter and confidence higher** when the conclusion is rejected on consistent inferences compared to accepted conclusions on conflict inferences.

ANALYSES

- RTs: **Generalized linear mixed model** with gamma distribution and log link, lme4 package.
- FOR: **Cumulative link mixed model**, ordinal package.
- Post-hocs: **Estimated marginal means** with Tukey adjustment, emmeans package

Table 1. Estimated marginal means (EMM) and standard errors (SE) for RTs according to inference type when participants give the heuristic response.

Responses	Consistent rejected		Conflict accepted	
Inference type	EMM	SE	EMM	SE
Few (study 1)	10.13	.704	8.34	.608
Many (study 2)	7.84	.541	10.79	.876

Table 2. Estimated marginal means and standard errors for FOR ratings according to inference type when participants give the heuristic response.

Responses	Consistent rejected		Conflict accepted	
Inference type	EMM	SE	EMM	SE
Few (study 1)	3.54	.049	4.03	.048
Many (study 2)	5.27	.345	4.47	.357

CONCLUSION

As seen in Tables 1 and 2, **results confirm hypotheses**.

Study 1: With few available alternatives, **RTs are longer and FOR lower** when rejecting consistent inferences (invalid + unbelievable) vs accepting conflict inferences.

Study 2: With many available alternatives, **RTs are shorter and FOR higher** when rejecting consistent inferences (invalid + believable) vs accepting conflict inferences.

DISCUSSION

- Results for Study 1 are consistent with a **matching hypothesis** but inconsistent with a **formal logical intuition**, while results for Study 2 are consistent with a **formal logical intuition** but inconsistent with a **matching hypothesis**.
- “Logical” intuition in this case may be better explained by the **intuition that activation of potential alternatives is useful**. Actual conflict detection depends on **whether alternative antecedents (on invalid inferences) are actually activated** or not.

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