Unifying Models for Belief and Syllogistic Reasoning

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Belief Effect in Syllogistic Reasoning

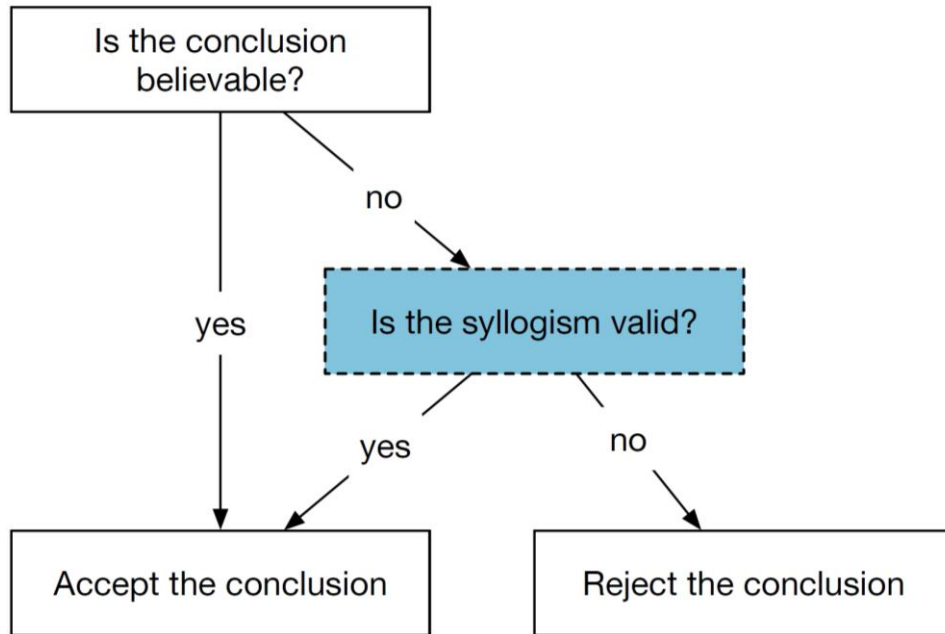Is the conclusion of the following syllogism correct?

No addictive things are inexpensive.
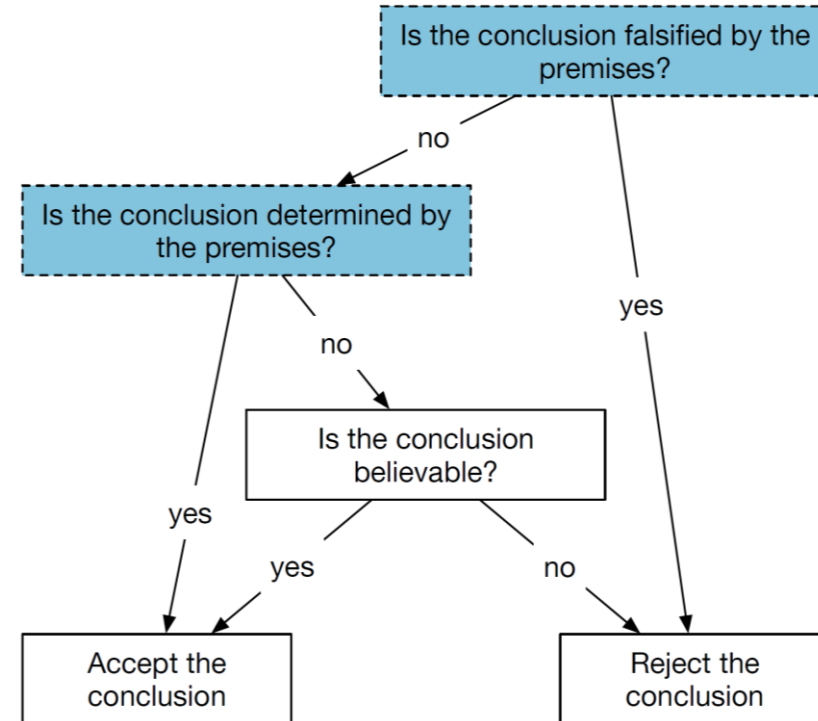Some cigarettes are inexpensive.
_____
Therefore, some addictive things are not cigarettes.

- 92% accept the conclusion (Evans et al., 1983), although it is **not valid**

- This **Belief Effect** has been successfully modeled

- There are also a variety of models for **syllogistic reasoning**

- However, these two world are rarely combined!

Selective Scrutiny

Is the conclusion believable?

no → **Is the syllogism valid?**

yes → Accept the conclusion

yes → Accept the conclusion

no → Reject the conclusion

Misinterpreted Necessity

Is the conclusion falsified by the premises?

no → **Is the conclusion determined by the premises?**

yes → Accept the conclusion

no → Is the conclusion believable?

yes → Accept the conclusion

no → Reject the conclusion

yes → Reject the conclusion

- Both belief models incorporate a logical component (blue)
- We used this to integrate reasoning models (PHM, mReasoner)

Results
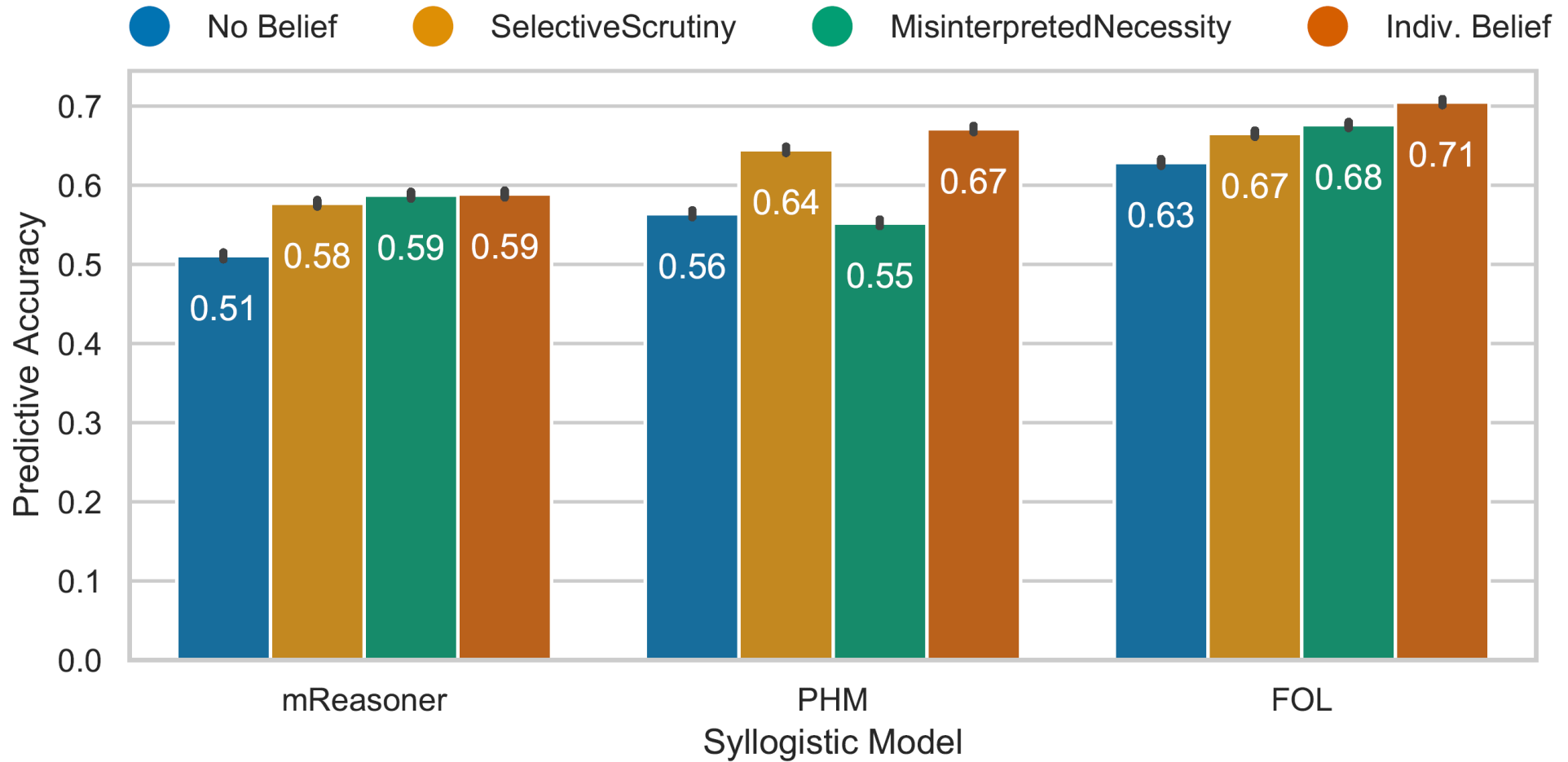
Conclusions

- The combination showed that the **predictive performance can be improved for both**, belief and reasoning models

- Unfortunately, most studies are conducted with **only one** type of effects in mind
  - The dataset by Trippas et al. (2018) used for this work consisted of a small set of syllogisms selected in order to "minimize figure, atmosphere, and conversion effects"
  - Therefore, reasoning theories could not show their full potential

- However, **complete models** of syllogistic reasoning need to combine both worlds!