

"All cognitive scientists are great  
Some great people are intelligent"



What, if anything, follows?

# Cognitive Theories of Reasoning

do not always explain **when** and **why** people respond that **nothing follows** and should integrate systemic factors

## When does a Reasoner Respond: Nothing Follows?

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### MOTIVATION

Compare possible theories to explain when a "no valid conclusion" (NVC) answer is given:

- **Cognitive theories:** theory specific inference processes
- **Systemic theories:** e.g., NVC aversion, depleted cognitive resources with increasing trial number

### METHODS

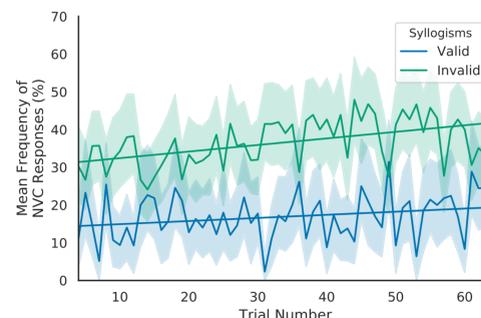
1.  $n = 139$  on MTurk
2. 64 syllogisms with all possible 9 responses
3. Tested with linear mixed models and generalized linear mixed models

### MAIN RESULTS & DISCUSSION

- **Response Times:** RTs seem to increase in NVC trials as compared to trials where another conclusion was given - but only for valid syllogisms

→ responding NVC may not only be a "last resort" after elaborate reasoning (thus, higher RTs), but also stem from logically correct reasoning

### MAIN RESULTS & DISCUSSION



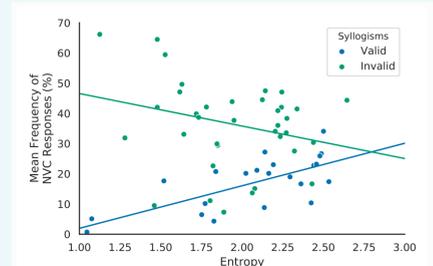
- **NVC responses over time:** the likelihood to respond NVC increases during the time-course of the experiment BUT for both valid and invalid syllogisms
- Participants do not become more logical?

### TAKE-HOME MESSAGE

- Proposed cognitive theories: correct NVC predictions for valid but sometimes not for invalid syllogisms
- Systemic hypotheses proposing an early NVC aversion and a later mental depletion: may explain why cognitive theories sometimes fail to predict NVC responses correctly

### Supporting Tables & Figures

Theories	Prediction				
	RT H1	NVC H2	Validity H3	Entropy H4	Time H5
<b>Mental Model</b>	y	y	y	y	y
<b>Mental Logic</b>	y	n	y	n	n
<b>Mental Depletion</b>	n	?	n	n	y
<b>Early Stopper</b>	n	n	n	y	n
<b>NVC aversive</b>	y	y	n	?	y



### Model RTs

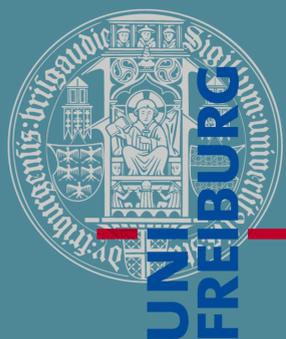
Fixed-Effect Parameter Statistics for the full/ best-fit Reaction Time model

Predictors	Est	CI	p
Intercept	9.43	9.33 – 9.53	<.001
NVC (yes = 1)	-0.02	-0.05 – 0.01	.270
Validity (valid = 1)	0.06	0.03 – 0.10	.001
Sequence	-0.13	-0.14 – -0.12	<.001
NVC:Validity	0.05	0.03 – 0.07	<.001

### Model NVC responses

Fixed-Effect Parameter Statistics for the best-fit NVC model.

Predictors	Est	Odds Ratios	CI	p
Intercept	1.77	0.17	0.12 – 0.25	<.001
Validity (valid = 1)	-0.77	0.46	0.35 – 0.62	<.001
Entropy	0.41	1.50	0.75 – 3.01	.249
Sequence	0.18	1.19	1.12 – 1.27	<.001
Validity:Entropy	1.08	2.94	1.47 – 5.89	.002



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