PERCEPTUAL ACCOUNT OF SYMBOLIC REASON

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WHAT IS SYMBOLIC REASONING?

The science of reasoning by the aid of representative symbols

a+b=b+a

CONTEMPORARY VIEWS

Symbolic Reasoning as grounded in the ability to internally represent numbers, logical relationships, and mathemat ical rules in an abstract, amodal fashion.

THE HYPOTHESIS

WHAT THE PAPER SUGGESTS



PERCEPTUAL MANIPULATION THEORY

- Symbolic Reasoning is done by:
 - Complex visual and auditory processes
 - Affordance learning
 - Pattern-matching
 - Grouping of notational structures
- Role of magnitude and quantity detection systems.

EXPERIMENTS

TESTING THE HYPOTHESIS



SOME KEY TERMS



EXPERIMENT 1

- Set of 20 questions
- Time limit
- Response Time
- The parameters in focus are orthogonal to other paramers.

DESIGN OF THE EXPERIMENT

- All expressions will be presented in black text on a white background, using the font glyphicons-halflings-regular on 15.6 inch monitors of resolution 1,366x768 (standard laptop screen).
- Participants used the keyboard to report validity judgments. The P and Q keys signified valid and invalid judgments, respectively.
- Though there will be a time constraint, a timer shall run in the background which would capture the response time of the participant with each stimulus.



- Letters such as i are avoided.
- Testing on High School Students and College Students.

AUTHORS' EXPERIMENT

- Focused on accuracy
- Response time not noted
- Analysis carried out only correct answer.

NOVELTY OF OUR APPROACH

- Motivation: Reasoning involves System 1.
- The questions are time limited
- Response time noted

SUGGESTIONS BY AUTHOR

- RT's won't be sensitive to whether the answer depends on the order of operations
- Limiting time should be effective in eliminating more sophisticated representations.
- Mediocre mathematics students get the right answer by reasoning using 'backup' strategies, while experts just have better trained visual systems
- Consider leaving out feedback
- Leave out the 'insensitive' items altogether

EXPERIMENT II

See whether people employed motion resources literally under any circumstances.

$$Y X 3 + 2 = 8$$

$$Y X 3 = 8 - 2$$

$$Y = \frac{8-2}{3}$$

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Thank You Questions?