

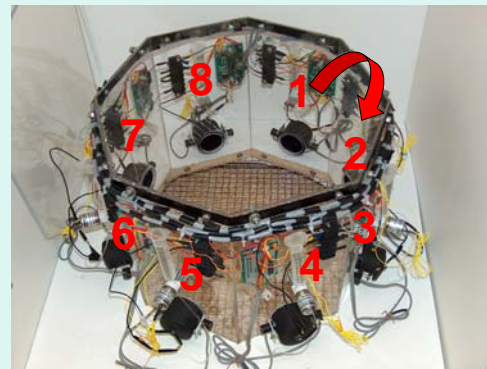
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Methods

6 naïve male Long Evans rats received daily systemic injections of MK-801 30 minutes Prior to testing for 49 days. A Control injection of sterile water was administered on day 50.

The Octagonal Chamber



In a Plexiglas octagonal chamber equipped with a nose poke receptacle on each wall, rats learned to produce a highly-structured serial Pattern of responses for water reinforcement: The sequence was:

123-234-345-456-567-678-781-818

Integers indicate the clockwise position of correct responses on successive trials. Trials were separated by 1 s except where dashes indicate 3-s phrasing cues. The final element, 8, was the violation element. The rats received 10 repetitions of the sequence each for 50 consecutive days.

In prior research, we showed that MK-801, an NMDA receptor antagonist, disrupted serial pattern learning in rats (Fountain & Rowan, 2000). When MK-801 treated rats learned a highly structured 24-element pattern composed of eight 3-element chunks, they showed an apparently permanent deficit in their ability to learn responses at the boundaries of the logical chunks of the pattern (i.e., “chunk boundary responses”), but learned elements within chunks as fast as controls.

MK-801 treated rats also demonstrated a profound and apparently permanent inability to learn a final “violation” element of the pattern that was inconsistent with the overall pattern structure. Possible explanations for these learning deficits could be that;

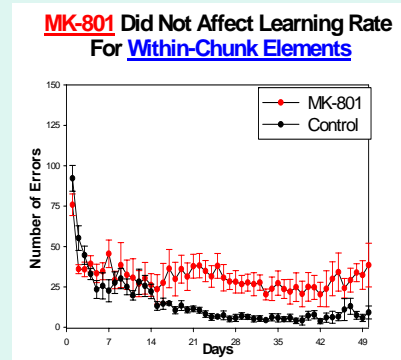
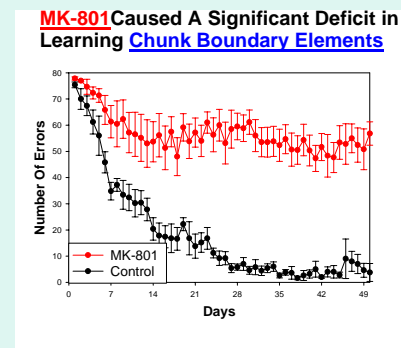
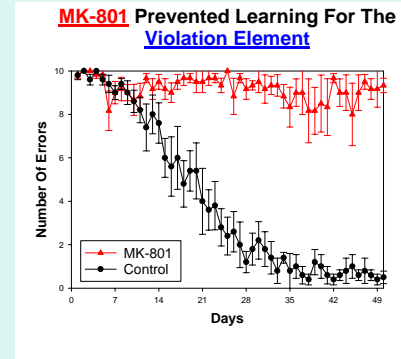
- 1) MK-801 blocked sequential learning in the acquisition phase or,
- 2) these deficits were attributable to some drug-related performance effect.

The goal of the present experiment was to duplicate the MK-801 experiment and test whether MK-801 blocked learning by including a final transfer day when rats received a control injection of sterile water rather than MK-801.

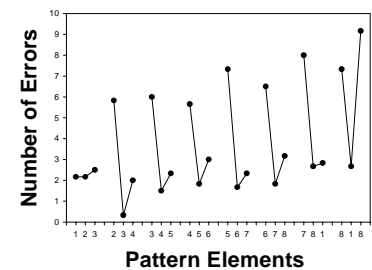
Hypothesis

MK-801 caused specific deficits in serial pattern learning by blocking NMDA-mediated plasticity rather than by producing performance deficits.

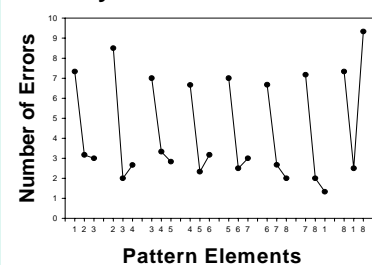
Results



MK-801 Rats Show Profound Learning Deficit At Chunk Boundary And Violation Elements After 49 Days



Transfer Day Error Production: Rats Perform At Least As Poorly After MK-801 Removal



Conclusions

- MK-801 caused a severe serial pattern learning deficits for chunk boundary elements and the violation element.
- The performance deficit caused by MK-801 was not resolved by elimination of MK-801.
- Deficits observed in acquisition were the result of encoding deficits rather than drug effects on performance.