Constantly Timing, but Not Always Controlled by Time

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Being able to predict and adapt to changes in the environment is perhaps the main advantage afforded by the ability to learn. One way to study the properties of this ability is to expose animals to predictable changes and track their behavioral adaptation. The Midsession Reversal Task (MSRT) implements such a predictable change: In a discrete-trial session, animals choose recurrently between stimuli S1 and S2; responses to S1 are reinforced during the first half of the session, whereas responses to S2 are extinguished; and during the second half of the session, responses to S1 are extinguished whereas responses to S2 are reinforced.

Absent the ability to count, the most efficient way to solve the MSRT is by following local cues: If the previous choice was reinforced, repeat the choice on the next trial; if it was not, make a different choice. Surprisingly, research shows that, at least with visual discriminations, pigeons choose S2 before the contingency reverses and S1 after, suggesting that they may be timing the interval from the beginning of the session to the reversal.

To test the role of temporal and local cues, we exposed pigeons (Columba livia) to a modified MSRT. To weaken the temporal cue, we varied the location of the reversal trial randomly across sessions; to weaken the local cue, we varied the payoff probabilities associated with S1 and S2. Pigeons' performance was inconsistent with the exclusive use of either cue. Instead, both cues influenced choice dynamically: When payoff was higher for S1 than S2, behavior was less time-controlled than when the payoff was higher for S2 than S1, or when they were equal. We propose a mixture model of joint control for the MSRT.

This research was conducted at the Animal Learning and Behavior Lab of the University of Minho and is now published (https://doi.org/10.1037/xan0000263). It is part of C. Santos' PhD thesis and is nominated for the Early Career Award from the American Psychological Association Division 3.

FIGURE 1
One of the operant chambers used in the experiment.