What Is a Schedule of Reinforcement?

- A schedule of reinforcement arranges a contingency (relationship) between an operant and the delivery of a reinforcer.
- Continuous reinforcement (CRF)
  - Every response is reinforced.
- Partial or intermittent schedule
  - Not every response is reinforced.
- Schedules may also specify relationships between reinforcement contingencies and discriminative stimuli.

Basic Intermittent Schedules

- Schedules may be based on number of responses, passage of time, or both.
- Ratio Schedules
  - Reinforcement after a specified number of responses have been completed.
- Interval Schedules
  - Reinforcement follows first response after the passage of a specified amount of time.
Fixed Ratio Schedules

- Reinforcement after a fixed number of responses has occurred.
- Symbolized FR-x, where x is the fixed ratio requirement.
- Example: FR-5: Five responses per reinforcement. Delivery of reinforcement resets the response counter back to zero.

Responding on Fixed Ratio Schedules

- "Break-and-run pattern:
  - High rate sustained during ratio completion
  - Pause follows delivery of reinforcer ("post-reinforcement pause")
  - Pause length increases with ratio size.
  - Too high a ratio leads to ratio strain.

Variable Ratio Schedules

- Reinforcement after completion of a variable number of responses; schedule specified by the average number of responses per reinforcement.
- Symbolized VR-x, where x is the average ratio requirement.
- Example: VR-20: An average of 20 responses is required before the reinforcer will be delivered, but actual ratio varies unpredictably after each reinforcement.
Performance on Variable Ratio Schedules

- Variable ratio schedules maintain a relatively high, steady rate of responding.
- Little or no evidence of post-reinforcement pausing
- Too high a ratio produces ratio strain.

Fixed Interval Schedules

- Reinforcement follows the first response to occur after a specified fixed interval is over.
- Delivery of reinforcer resets the interval timer to zero.
- Symbolized FI x, where x is the interval size in seconds or minutes.
- Examples: FI 30-s, FI 1-m

Performance on Fixed Interval Schedules

- Low or zero rate begins to increase perhaps half-way into the interval, accelerates to the end.
- This pattern is called the fixed interval scallop because of its scalloped or fluted appearance.
Variable Interval Schedules

- Reinforcer delivered immediately following the first response to occur after the current interval is over.
- Interval size varies unpredictably after each reinforcer delivery; schedule specified by the average interval size.
- Symbolized as VI $x$, where $x$ is the average interval length in seconds or minutes.
- Examples: VI 20-s, VI 3-m

Performance on Variable Interval Schedules

- VI schedules tend to sustain a relatively moderate but steady rate of responding.
- As the average interval size increases, response rate decreases.
- Sustain lower rates than VR schedules that produce the same rate of reinforcement.

Applications

- The simple schedules just described were not intended to model "real-world" contingencies, but rather, to explore how schedule properties affect the patterning of behavior.
- Nevertheless, we can draw some parallels between these laboratory schedules and reinforcement contingencies found outside the laboratory. Some examples follow.
Some jobs pay so much per item produced. The pay rate depends directly on the rate of production of pieces; thus this is a ratio schedule. Where each item requires several steps to complete, breaks will tend to occur after an item is completed rather than in the middle of assembly – a post-reinforcement pause.

The slot machine is an excellent example. Each response (put money in slot, pull lever) closer to a pay-off. The faster you play, the sooner you win. How many responses you will have to make before a pay-off varies unpredictably after each win. It's a variable-ratio schedule! And what do we know about VR schedules? They generate a high, steady rate of play. Just what the "house" wants!

Your guests are expected at 8 pm. As the time approaches, you glance out the front window to see if anyone has pulled into your driveway. The closer to 8 pm it gets, the more often you glance. If they are punctual, the first glance after 8 pm will find them in the drive. It’s (approximately) a fixed-interval schedule, complete with FI scallop.
Calling the Plumber

- One of the water pipes at your house has sprung a leak, and you are desperate to get your plumber out to fix it.
- He doesn’t have an answering machine, so you call, call, call, call, call. Finally, he answers the phone.
- It’s not how often you called that counted, but whether enough time had passed for him to be back from wherever he went. But you had no idea how long that would be.
- It’s a variable-interval schedule, and it generated a moderate, steady rate of calling.