

Forelesning basert på "interteaching" om grunnleggende forsterkningsskjemaer MALKA212

V-2010

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Forsterkningsskjema

Et *forsterkningsskjema* er et arrangement som spesifiserer hvilke responser innenfor en operant som leder til forsterker.

Forsterkningsskjemaer kan baseres i forhold til antall responser, tidsintervall mellom hver mulighet for forsterkning dersom korrekt respons (kan også forekomme uten, og da ved FT/VT/RT-skjemaer) og raten av respondering.

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Forsterkning kan arrangeres som

- **Kontinuerlig forsterkning** er presentasjon av forsterker ved hver forekomst av en bestemt type av responser.
- **Intermitterende forsterkning** er forsterkning noen ganger, men ikke hver gang en bestemt type av responser forekommer.

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Definisjon av differensiell forsterkning

Differensiell forsterkning er presentasjon av forsterkere bare etter bestemte type responser med bestemte responsegenskaper, og evt. bare i nærvær av bestemte stimuli.

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Fire grunnleggende forsterkningskjemaer

- **Fast ratio (FR)** er forsterkning etter et bestemt/fast antall korrekte responser.
- **Variierende ratio (VR)** er forsterkning etter et variierende antall korrekte responser.
- **Fast intervall (FI)** er forsterkning av første korrekte respons etter et bestemt/fast tidsintervall.
- **Variierende intervall (VI)** er forsterkning av første korrekte respons etter et variierende tidsintervall.

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Schedules of reinforcement

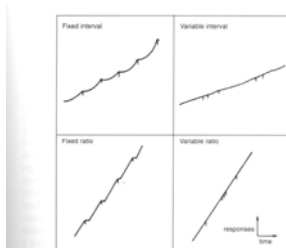


Figure 3.9 Typical cumulative records of performances maintained by four schedules of intermittent reinforcement.

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Noen begreper

- Ratio strain
 - det at det oppstår pauser i responsraten under et VR eller FR skjema og da pauser på andre tidspunkter enn etter forsterkning.
- Postreinforcement pause
 - det at det oppstår pauser i responderingen etter en forsterker.
- PREE
 - dette vil si at responsen er mer motstandsdyktig mot ekstinksjon etter intermitterende forsterkning enn etter kontinuerlig forsterkning.

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Research connected to PREE

- Interpolation
- FR 1 before EXT
 - Effects
 - How many trials are needed?

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Mechners notasjonssystem:

Event	Symbols
S	Stimulus or event
R	Reinforcer
R ⁺	Positive reinforcer
R ⁻	Negative reinforcer (aversive stimulus)
S ^D	Discriminative stimulus (event signaling reinforcement)
S ^Δ	S-delta (a discriminative stimulus that signals extinction)
S [∞]	Conditioned aversive stimulus (an event that has signaled punishment)
R	Response (operant class)
R _a	Response of type a (i.e., a response on lever a)
Time and Number Symbols	
F	Fixed
V	Variable
T	Time
N	Number

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Resposnmønster ved kontinuerlig forsterkning

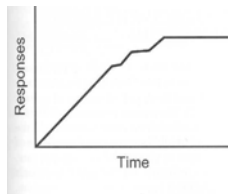


FIG. 5.1. Performance on a continuous reinforcement schedule. Hatch marks indicating reinforcement are omitted since each response is reinforced. The flat portion of the record occurs when the animal stops making the response because of satiation.

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De fire grunnleggende forsterkningskjemaene

		Reinforcement contingent on	
		Responses	Time**
Response-time requirement	Fixed	Fixed-ratio (FR)	Fixed-interval (FI)
	Variable	Variable-ratio (VR)	Variable-interval (VI)

FIG. 5.3. A table of the four basic schedules of positive reinforcement. Note: Adapted from Behavior Principles, by C. B. Ferster, S. Culbertson, and M. C. P. Boren, 1975, Englewood Cliffs, NJ: Prentice-Hall.

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FR (Fixed Ratio)

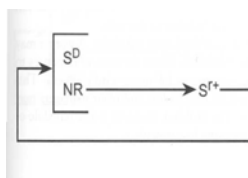


FIG. 5.4. A fixed-ratio schedule of positive reinforcement diagrammed in Mechner notation. In the presence of an S^D , a fixed number of responses results in reinforcement (S^+). As indicated by the returning arrow, the sequence repeats such that another fixed number of responses will again produce reinforcement, and so on.

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Karakteristisk responsmønster ved FR skjemaer

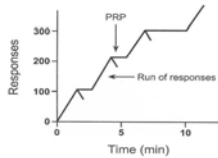


FIG. 5.5. A cumulative record of well-developed performance on FR 100. The typical pause-and-run pattern is presented. Reinforcement is indicated by the hatch marks. This is an idealized record that is typical of performance on many fixed-ratio schedules.

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VR (Variable Ratio)

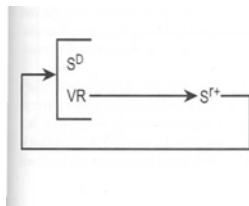


FIG. 5.6. A variable-ratio schedule of positive reinforcement. The symbol V indicates that the number of responses required for reinforcement is varied from one sequence to the next. The schedule is indexed by the average number of responses required for reinforcement. That is, a VR 10 requires an average of 10 responses before reinforcement is presented.

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Karakteristisk responsmønster ved VR skjema

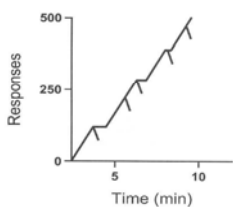


FIG. 5.7. A cumulative graph of typical responding on a variable-ratio schedule of reinforcement. Reinforcement is indicated by the hatch marks. Notice that PRP's are reduced or eliminated when compared to fixed-ratio performance.

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FI (Fixed Interval)

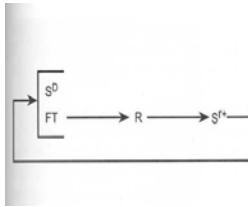


FIG. 5.8. A fixed-interval schedule. In the presence of an S^D , one response is reinforced after a fixed amount of time. Following reinforcement, the returning arrow states that the sequence starts again. This means that the fixed-time interval starts over and, after it has elapsed, one response will again be reinforced.

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Karakteristisk responsmønster FI og FR

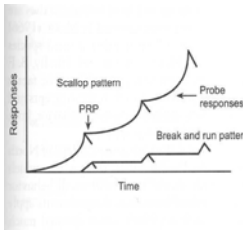


FIG. 5.9. Fixed-interval schedules usually produce a pattern that is called scalloping. There is a PRP following reinforcement, then a gradual increase in rate of response to the moment of reinforcement. Less common is the break-and-run pattern. Break and run occasionally develops after organisms have considerable experience on FI schedules. There is a long pause (break) after reinforcement, followed by a rapid burst (run) of responses.

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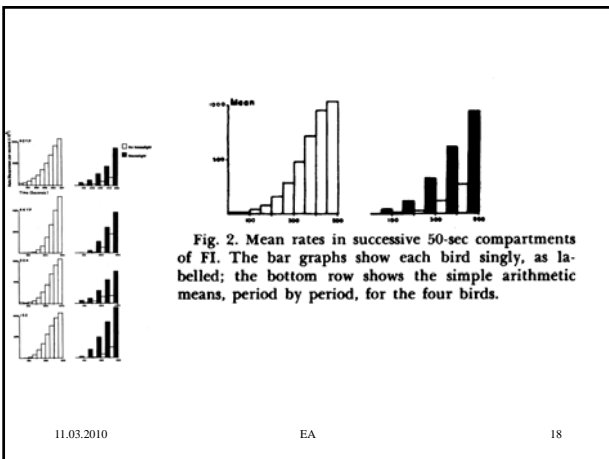


Fig. 2. Mean rates in successive 50-sec compartments of FI. The bar graphs show each bird singly, as labelled; the bottom row shows the simple arithmetic means, period by period, for the four birds.

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VI (Variable Interval)

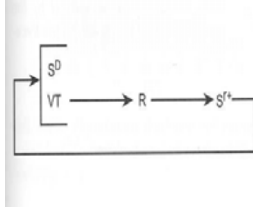


FIG. 5.12. A variable-interval schedule. The symbol V stands for variable and indicates that the schedule is indexed by the average time requirement for reinforcement.

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Karakteristisk responsmønster ved VI skjema

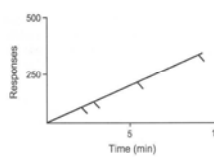


FIG. 5.13. Idealized cumulative pattern of response produced by a variable-interval schedule of reinforcement.

In summary, VI contingencies are common in everyday life. These schedules generate a moderate steady rate of response. Because of this pattern, variable-interval performance is frequently used as a baseline.

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Responsmønstre ved VR og VI skjemaer

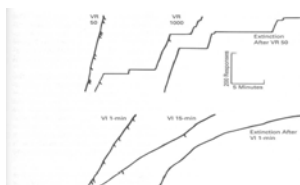


FIGURE 10-4 Patterns of responding during VR and VI reinforcement and during extinction after VR or VI reinforcement. These schedules identified cumulative records contrast effects of the two types of schedules, with VR a higher maintained response rate, and abrupt transitions between high rates and long pauses, with single response requirements or during extinction with VI a relatively constant response rate that decreases gradually during extinction. Both schedules generate substantial amounts of responding in extinction.

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Ekstinksjon

Ekstinksjon som *prosedyre* er at den forsterker som tidligere etterfulgte/oppretholdt en bestemt type respons blir holdt tilbake eller ikke gjør det lenger. **Ekstinksjon** som *prosess* refererer til at hyppigheten av denne type respons først øker noe for deretter å avta som et resultat av ekstinksjonsprosedyren.

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IRT ved VR og VI

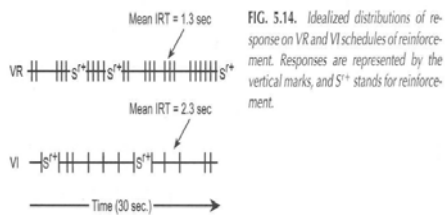


FIG. 5.14. Idealized distributions of response on VR and VI schedules of reinforcement. Responses are represented by the vertical marks, and S⁺ stands for reinforcement.

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Standard VI og VI med 10-12 s delay

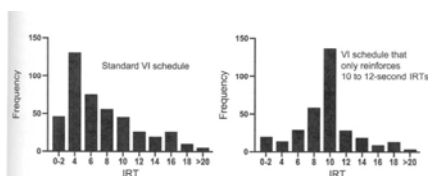


FIG. 5.15. Hypothetical distributions of interresponse times (IRTs) for an animal responding on a standard VI schedule of reinforcement and on a VI that only reinforces IRTs that fall between 10 and 12 s.

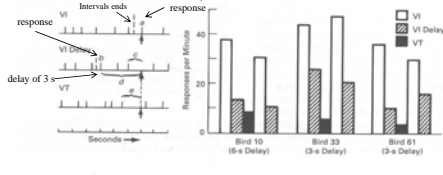
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VI, VI delay og VT

FIGURE 10-6 Hypothetical segments of event records from VI, VI with delay and VT schedules (left), and three pigeons' rates of key pecking maintained by these schedules (right). The highest response rates were maintained by VI reinforcement and the lowest by VT. (Adapted from Sizemore & Lattal, 1977, Table 1)



(Catania, 2007)

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Yoked schedules

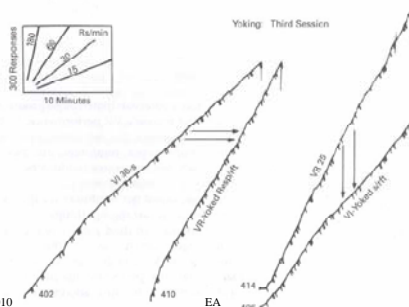
- Described by Ferster and Skinner (1957).
- Yoked chambers: The behavior in one chamber determines the events that occur in another chamber.

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FIGURE 10-5 Cumulative records from the third session of yoking for two pairs of pigeons. Responses per reinforcer from Pigeon 402's VI performance generated a yoked VR schedule for Pigeon 410's pecks. Interreinforcer times from Pigeon 410's VR performance generated a yoked VI schedule for Pigeon 406's pecks. Horizontal arrows connecting the left records show correspondences of responses per reinforcer for that schedule pair; vertical arrows connecting the right records show correspondences of interreinforcer intervals. In both cases, VR response rate was higher than VI response rate. (From Catania, Matthews, Silverman, & Yonkers, 1977, Figure 1)



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