

COGS300

Self-Organisation in Behaviour

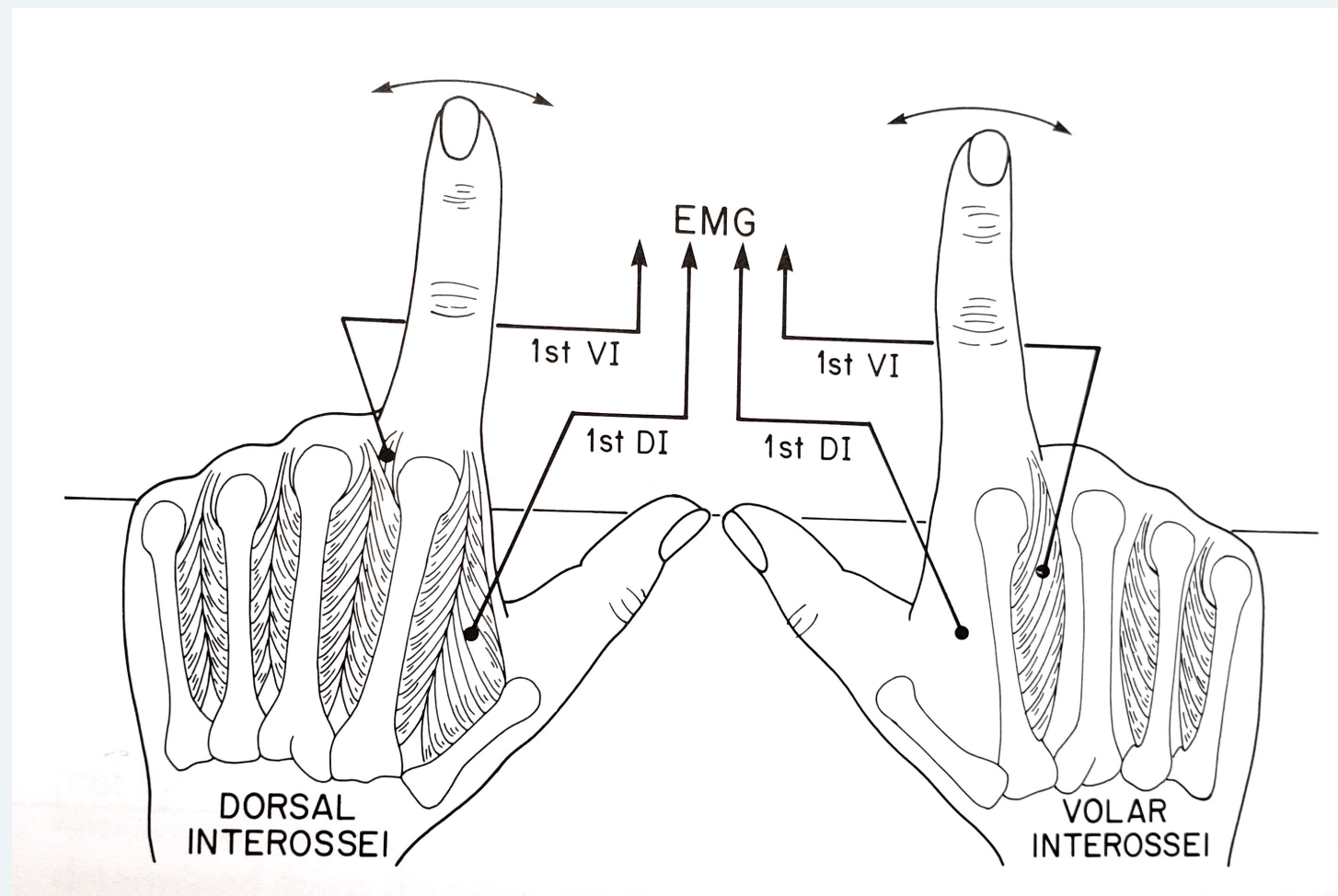
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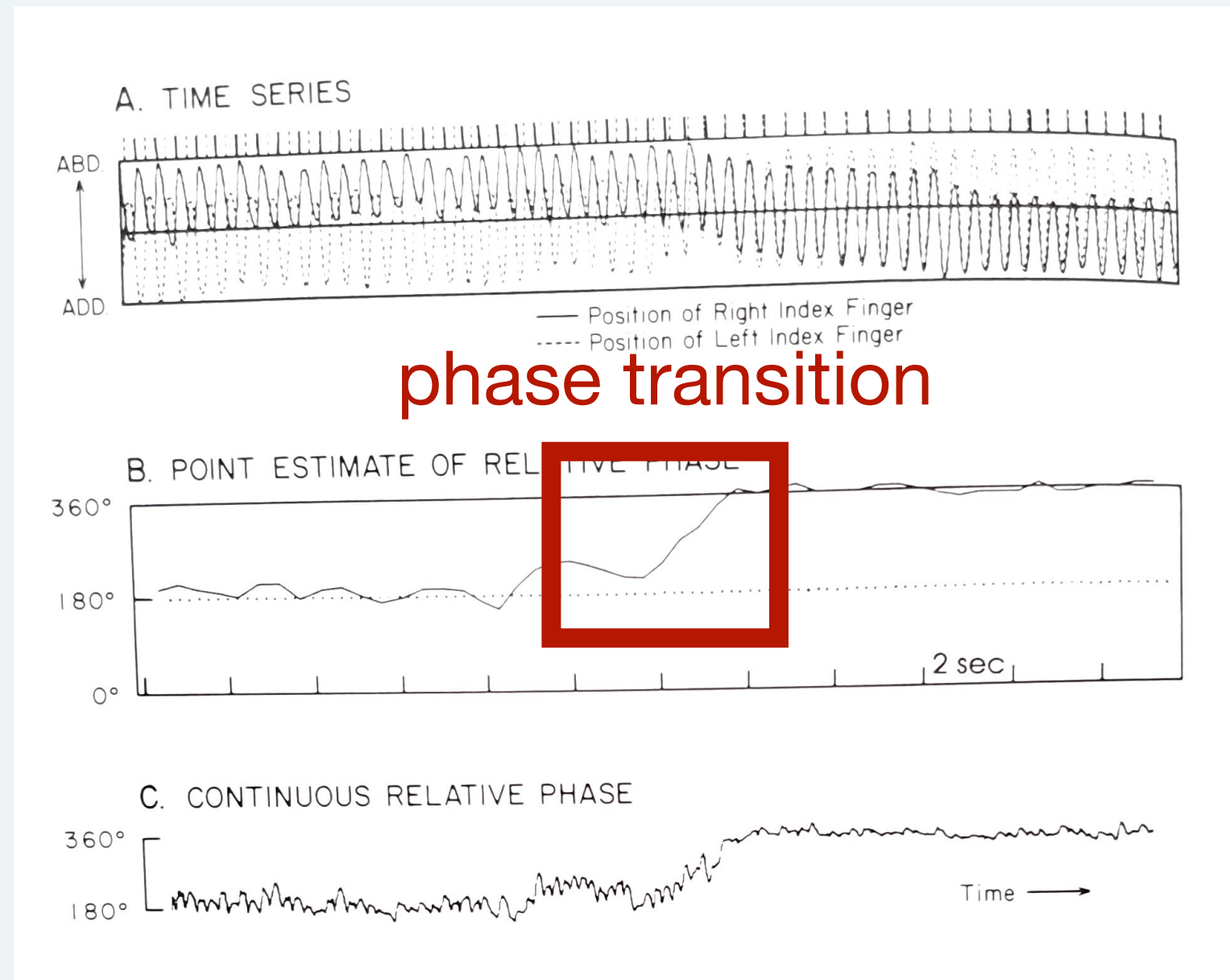
TAs: Daichi Furukawa · Victoria Lim · Amy Wang

cogs.300@ubc.ca

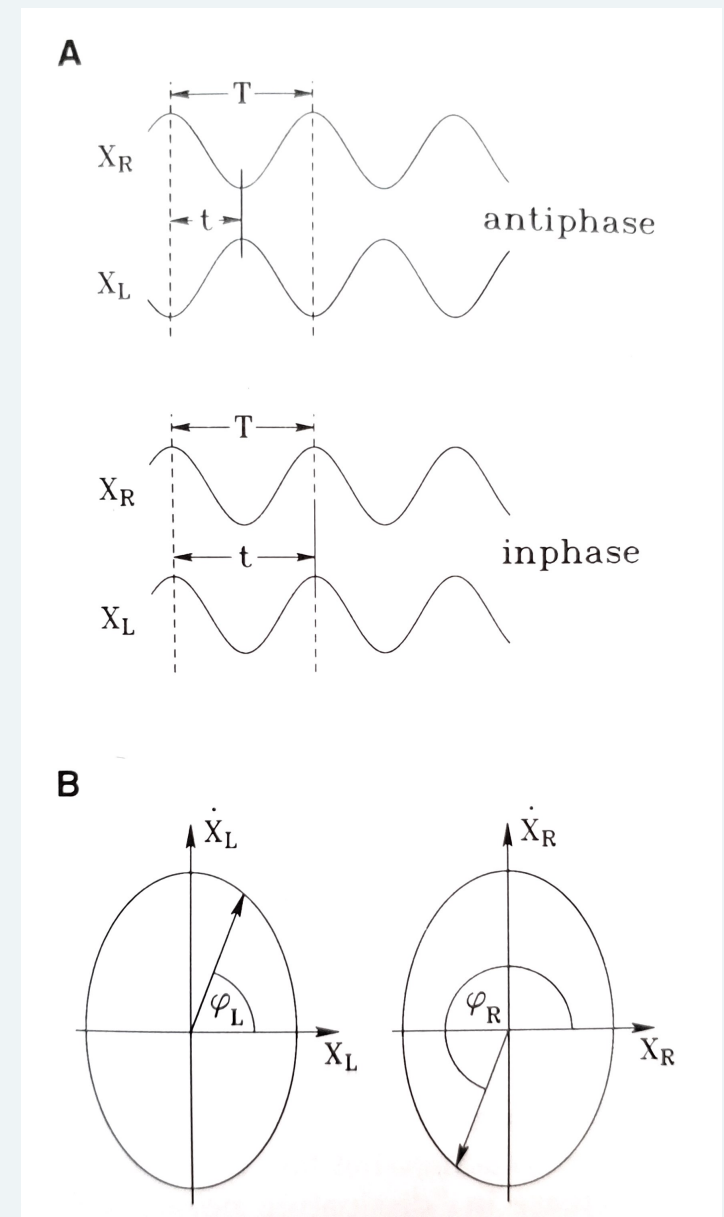
Finger-wagging



Finger-wagging

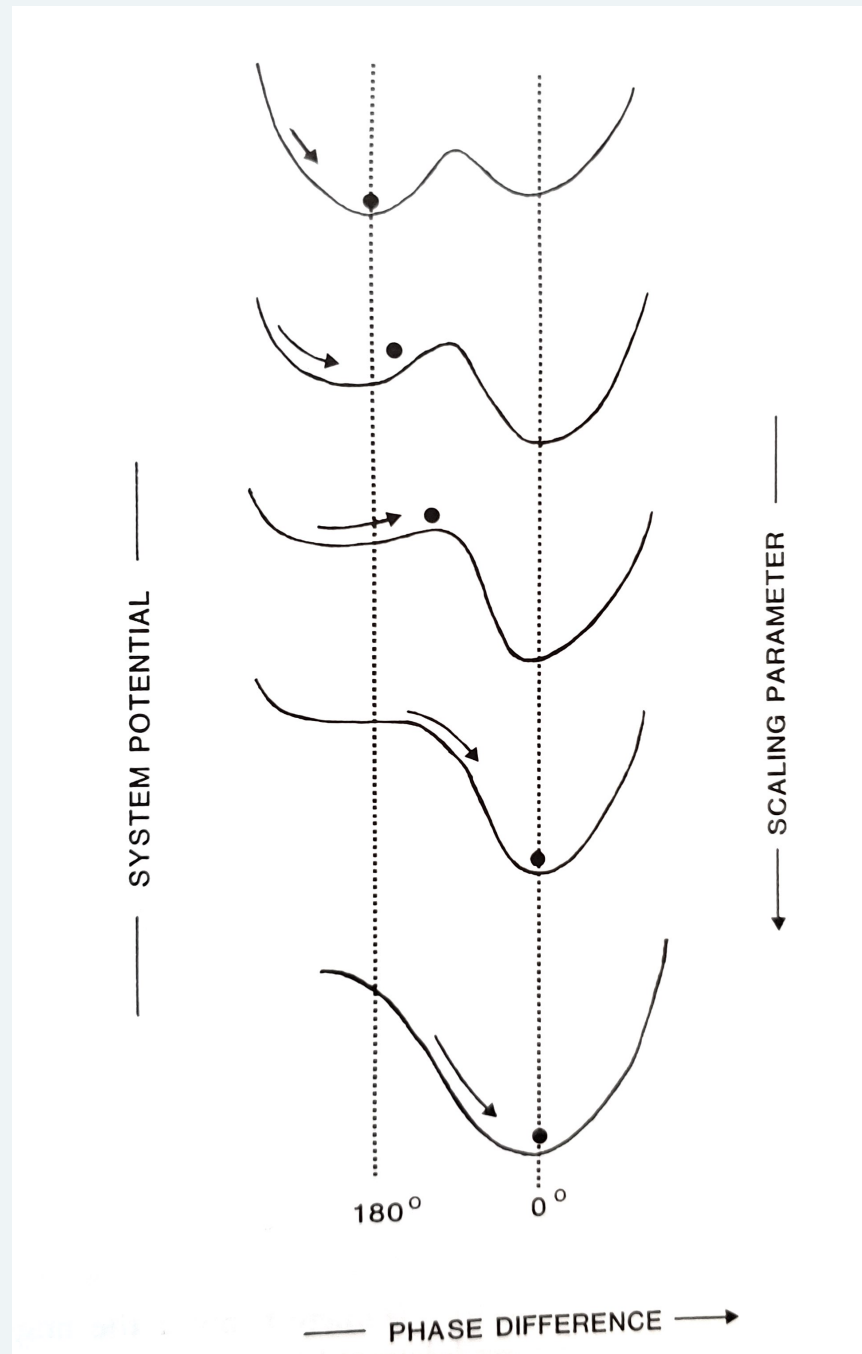


phase transition



Finger-wagging

order parameter
(phasing relationship)



control parameter
(speed)

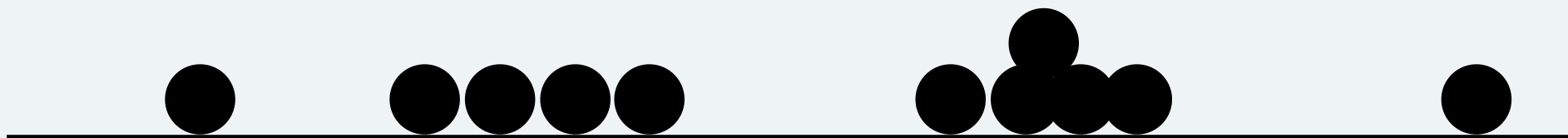
Termite nest building

- termite nest building
- mud-balls impregnated with chemical trace randomly deposited, with chemical traces acting as attractors



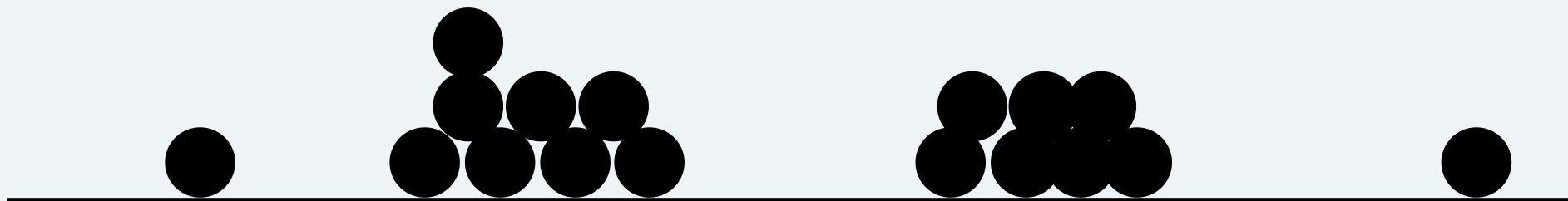
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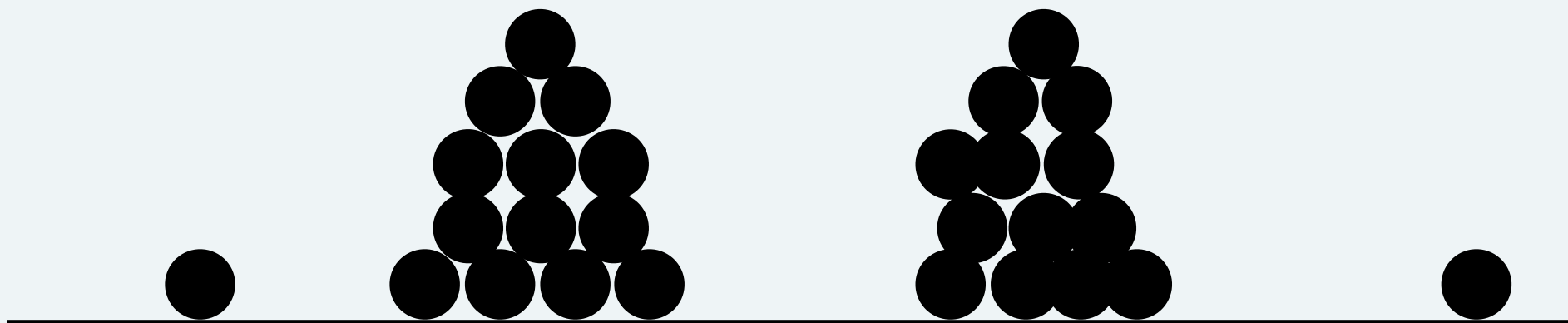
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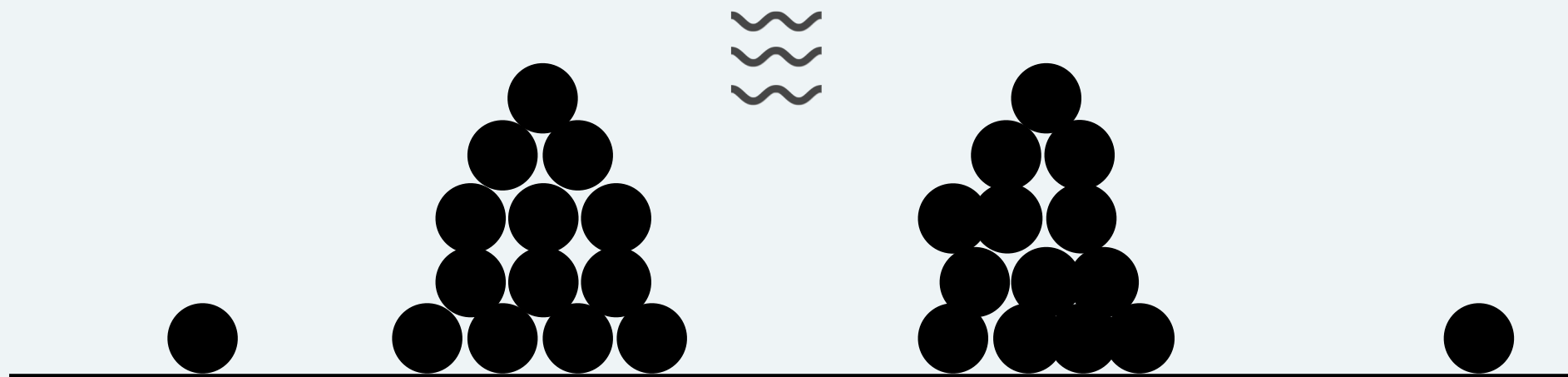
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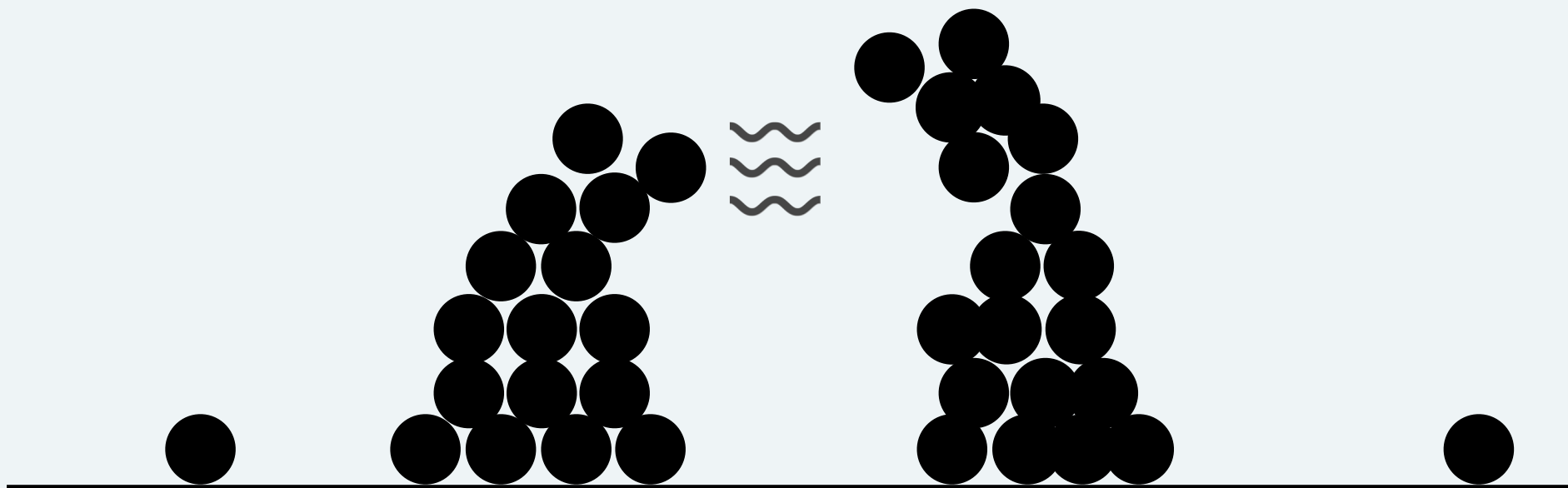
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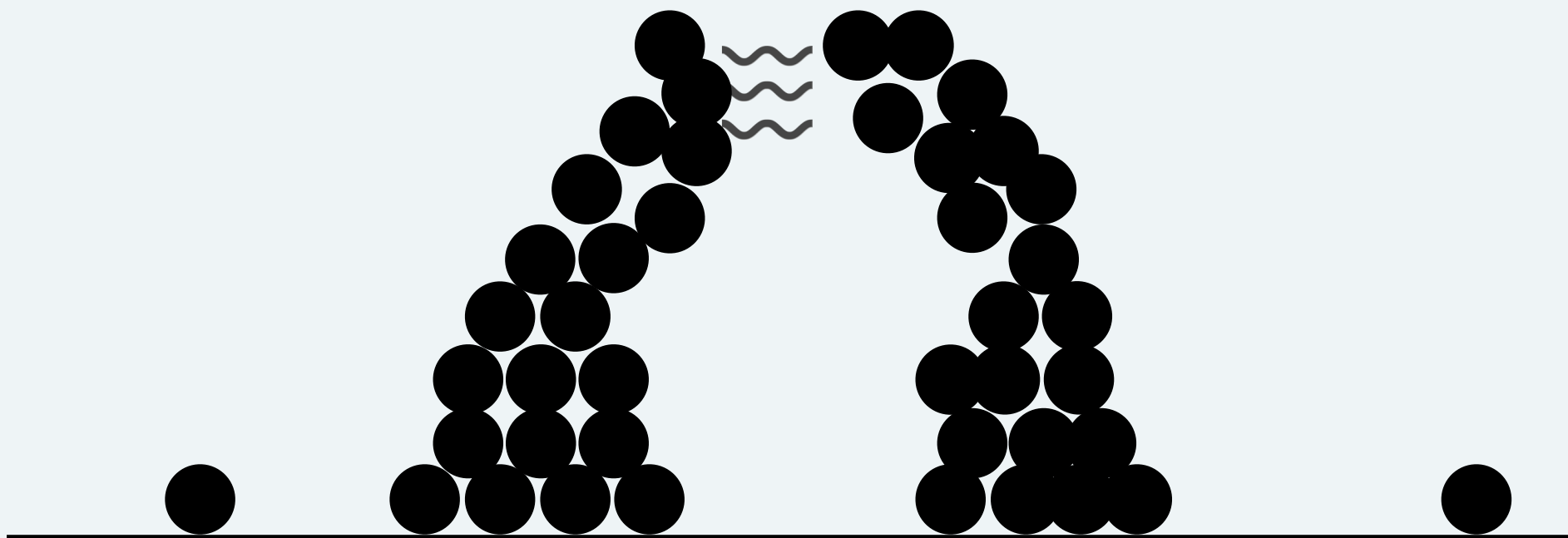
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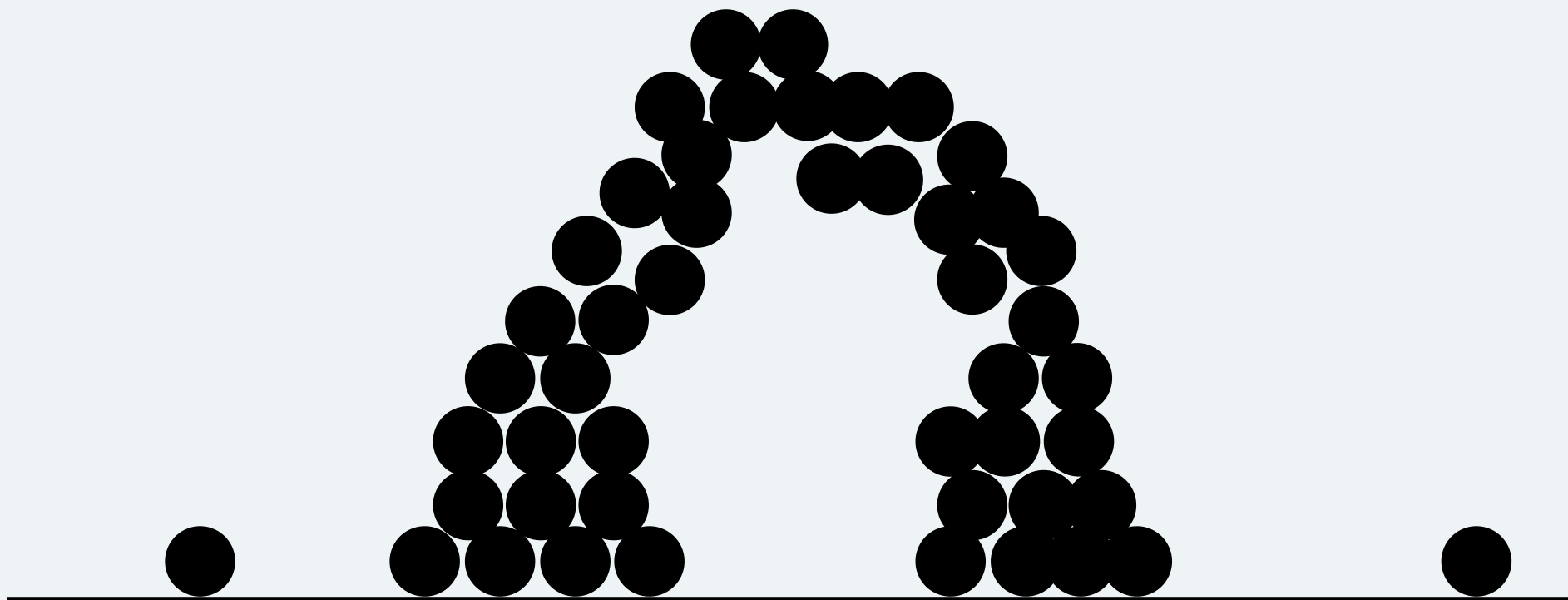
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Termite nest building

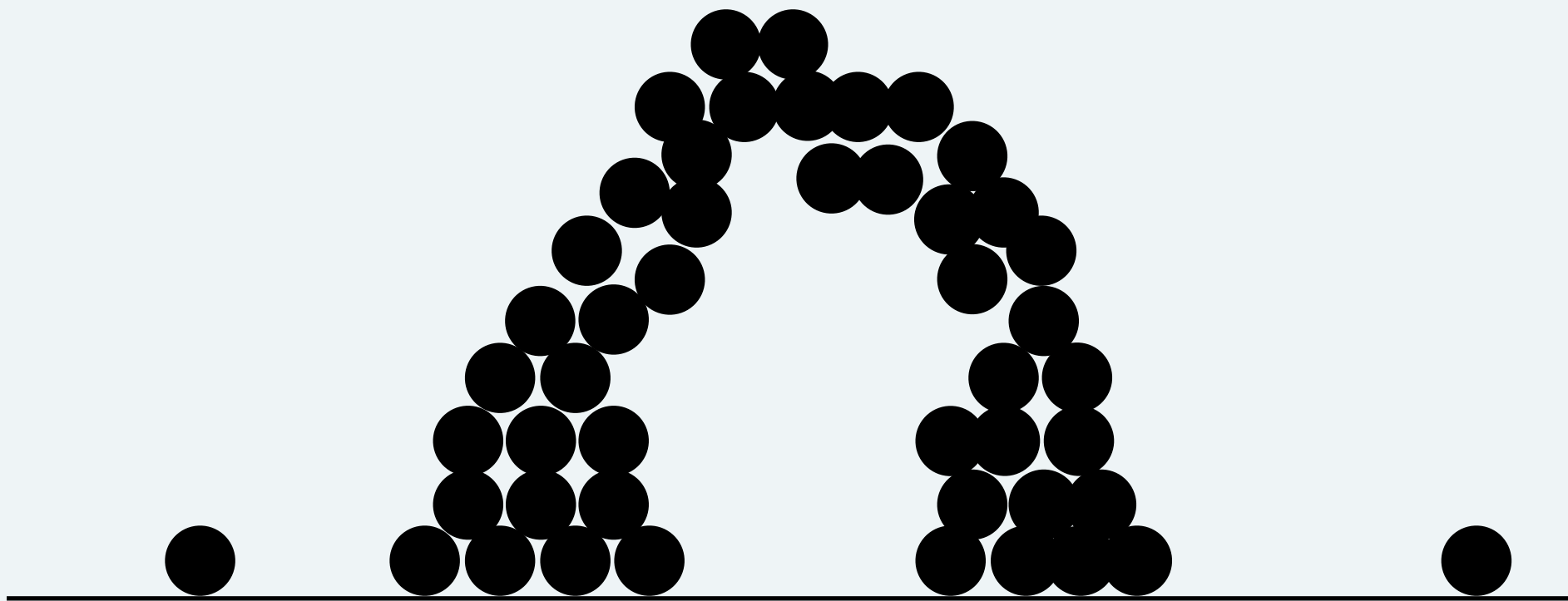
- termite nest building
- mud-balls impregnated with chemical trace randomly deposited, with chemical traces acting as attractors



Termite nest building

- a video...

<https://www.youtube.com/watch?v=zhy27gMTMTg>



Fireflies

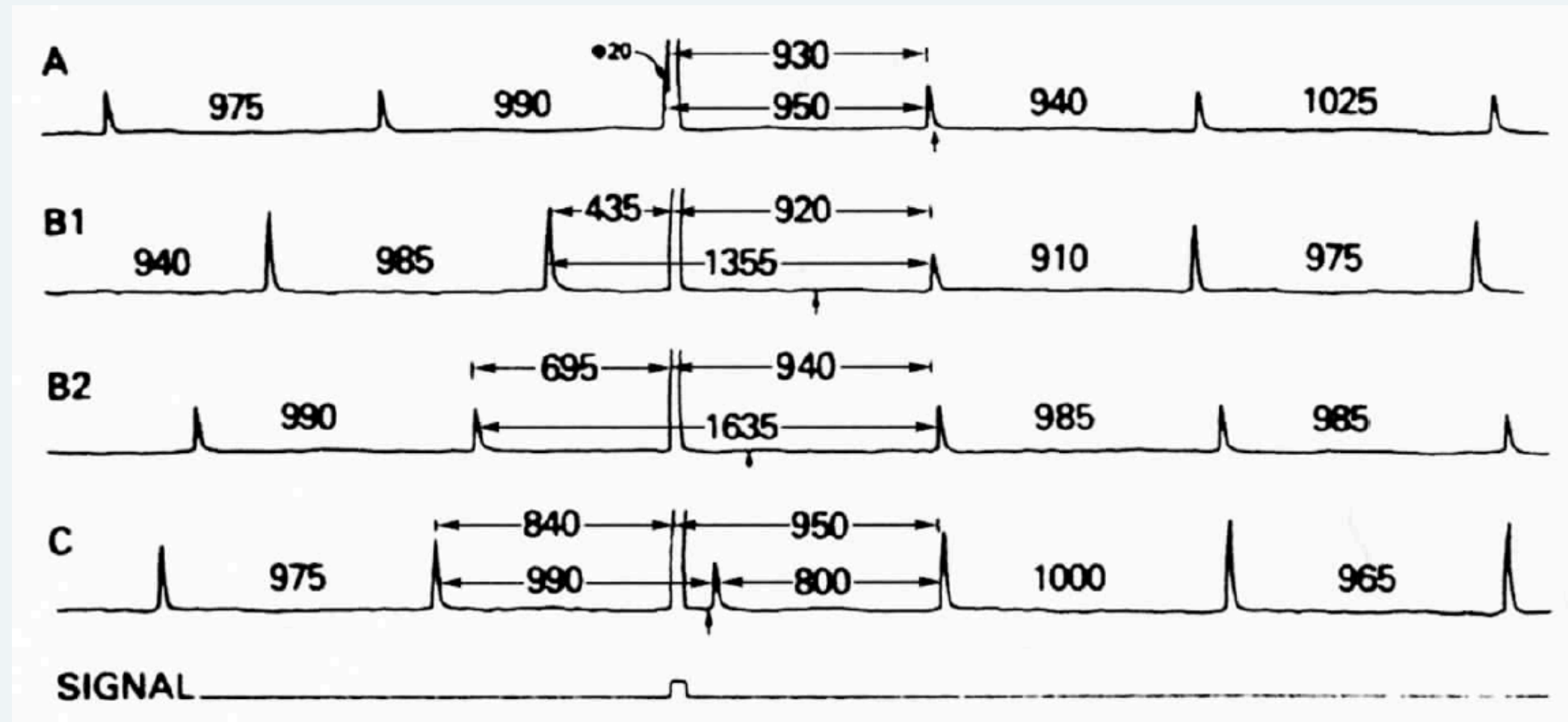
- another video...

<https://www.youtube.com/watch?v=2IVBDDVPI68>

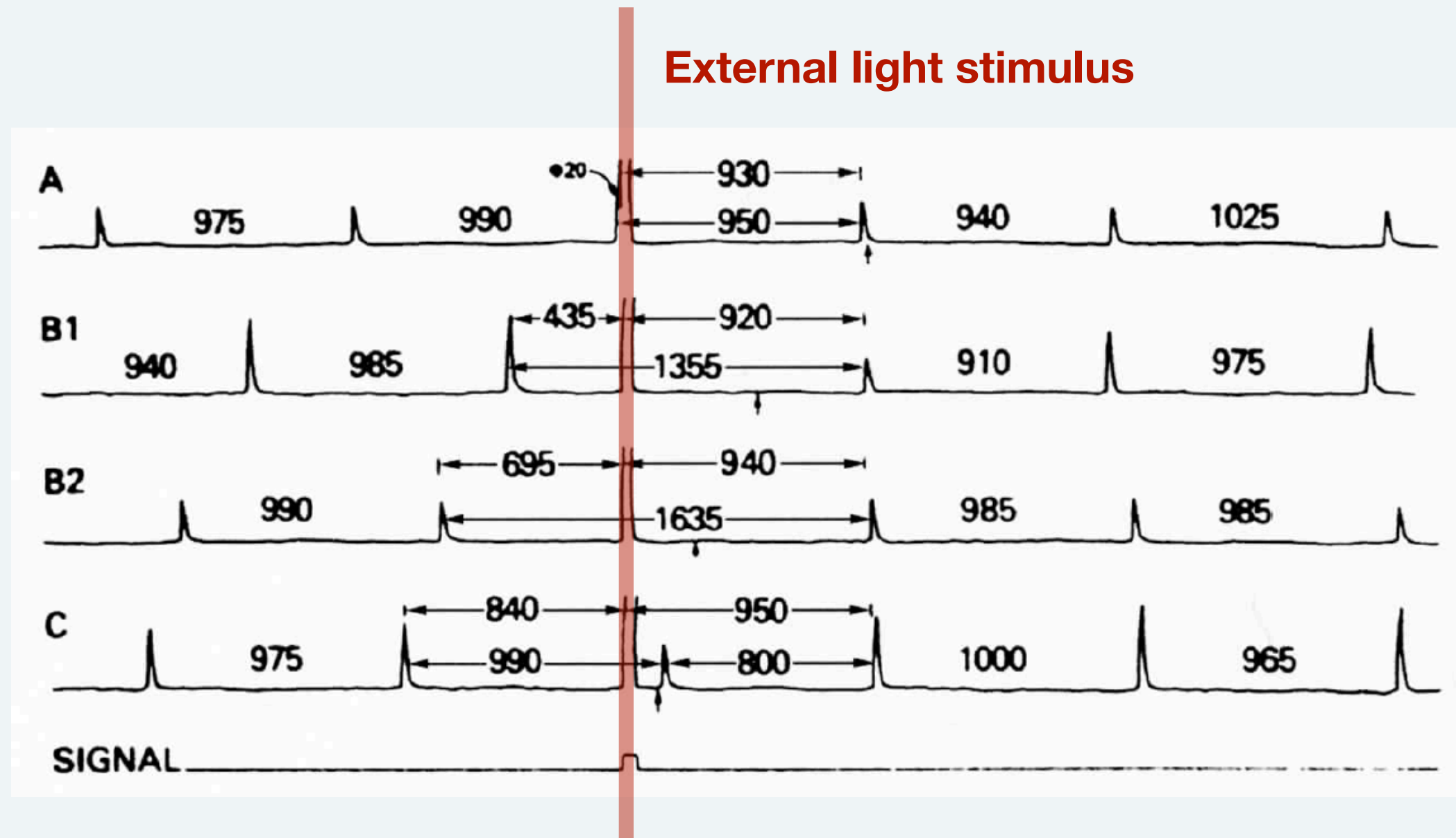
Fireflies

- explanations not based on self-organisation:
 - denying existence of phenomenon
 - anthropomorphic explanations (e.g. sense of rhythm + “empathy”)
 - external stimulus (thunder / “puffs of wind”)
 - following leader

Fireflies

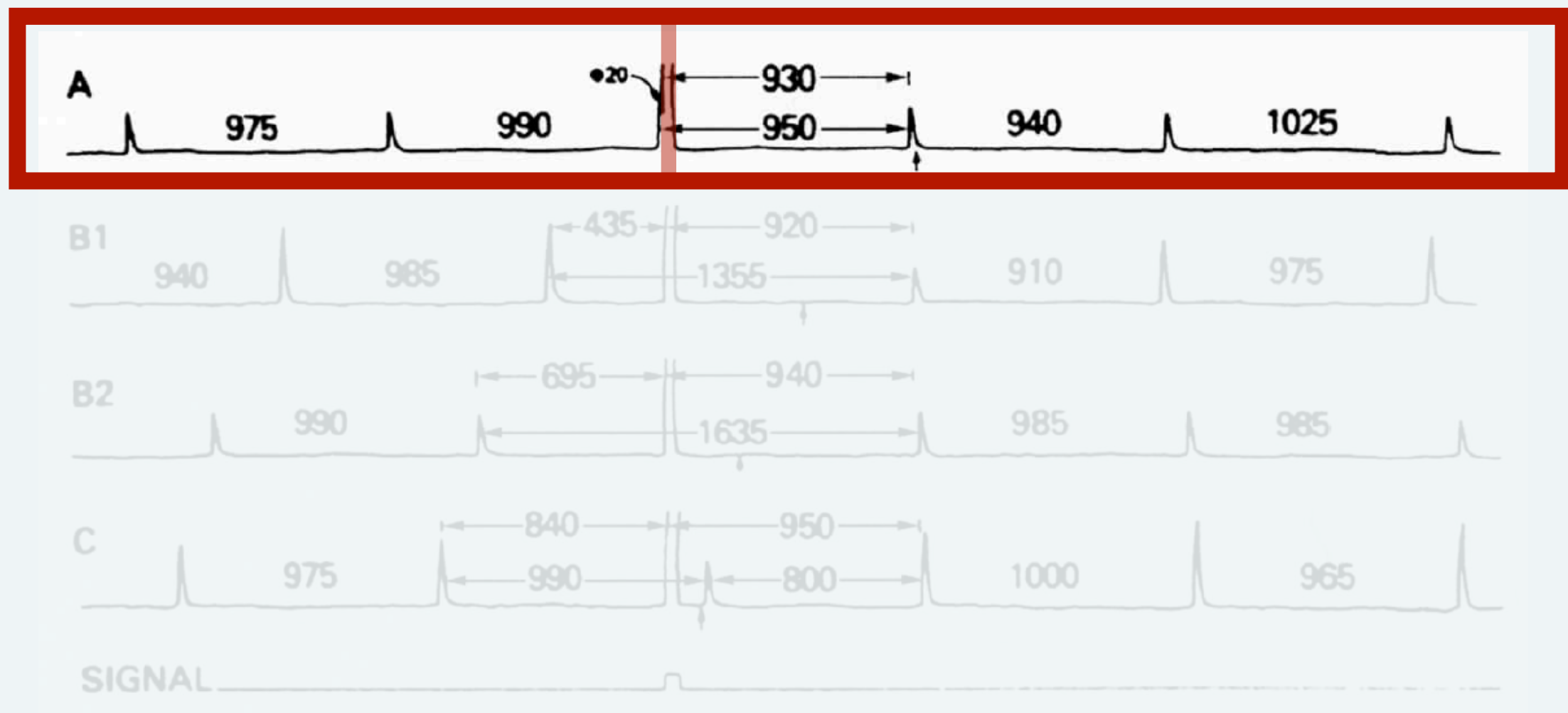


Fireflies



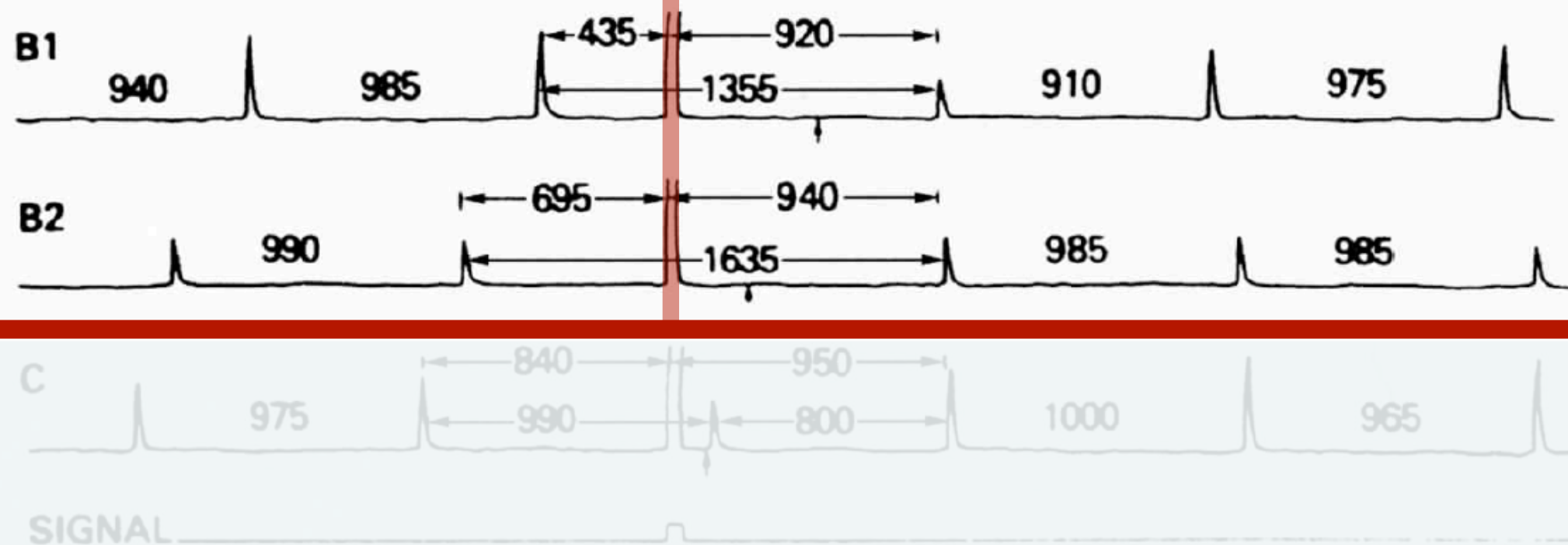
Fireflies

signal coincides with flash → flashing continues without change

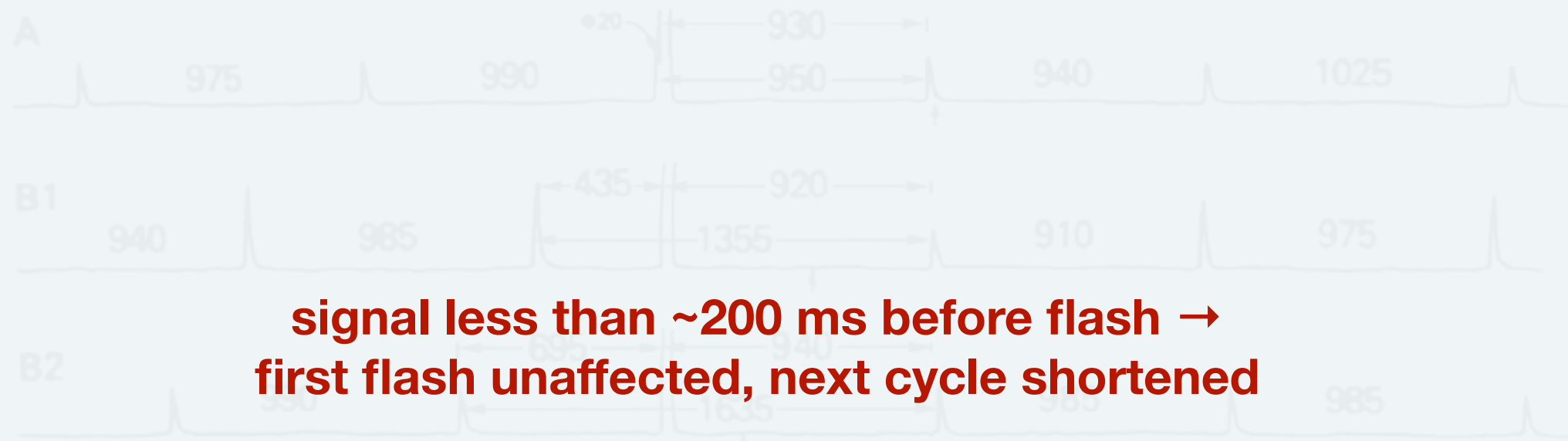


Fireflies

signal more than ~200 ms before flash → flashing resets



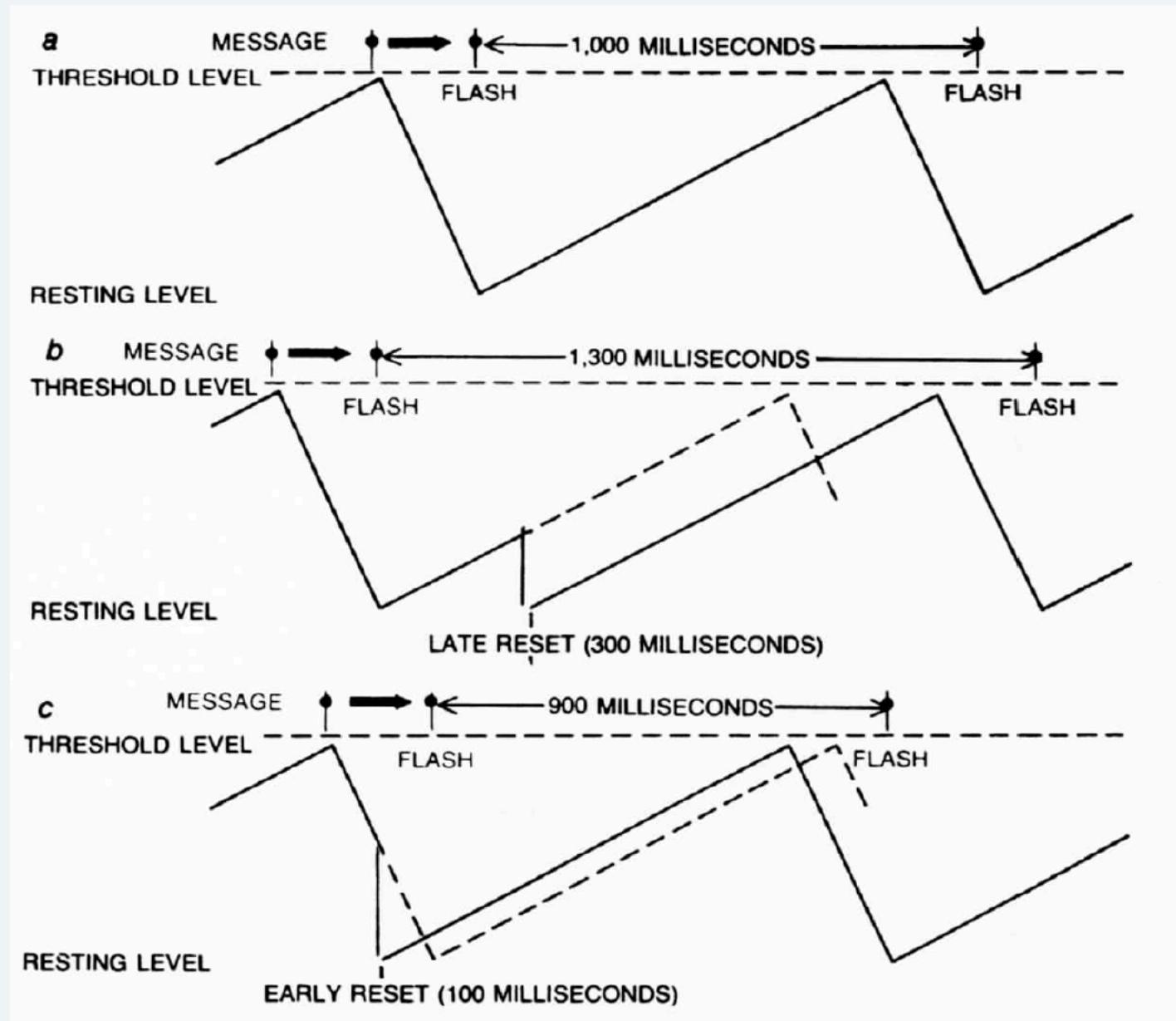
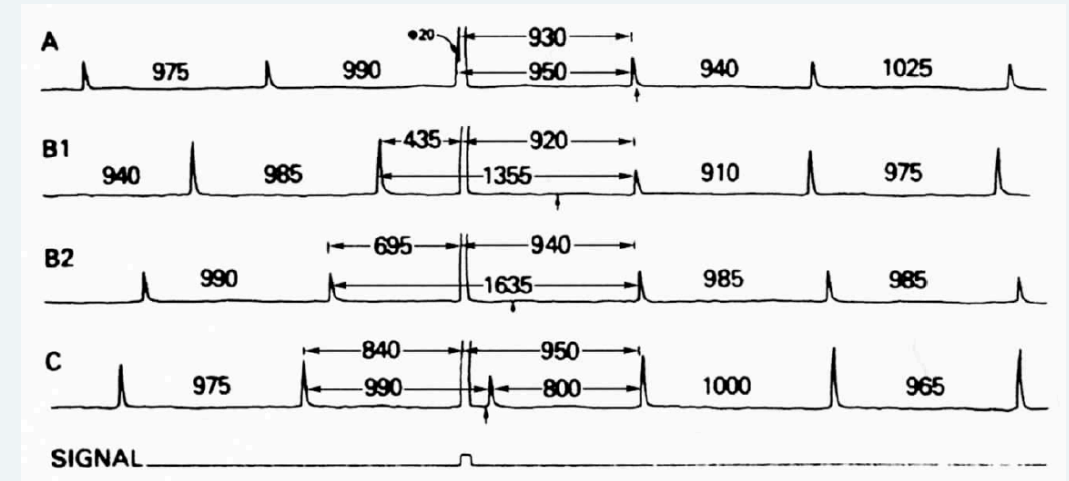
Fireflies



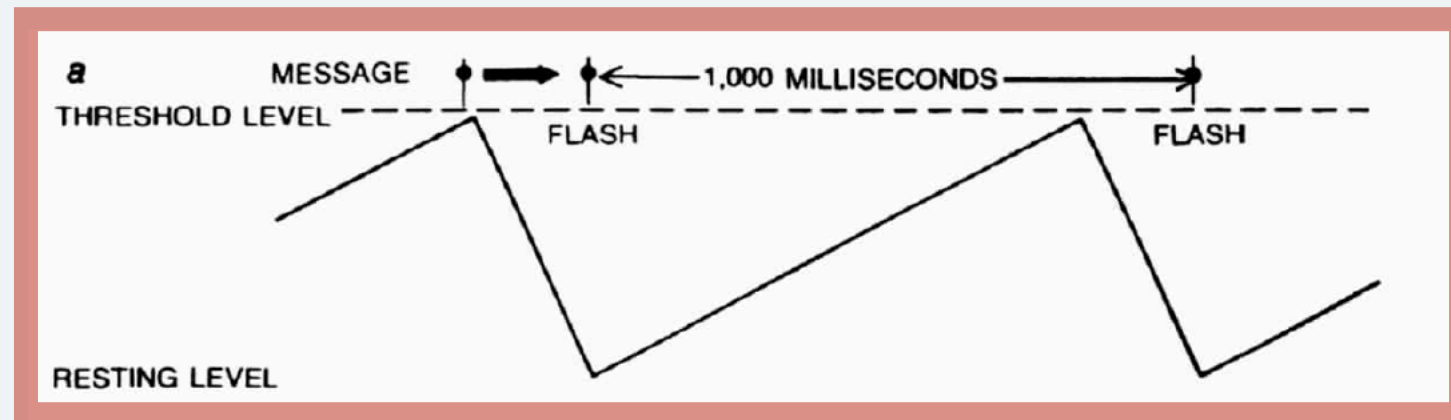
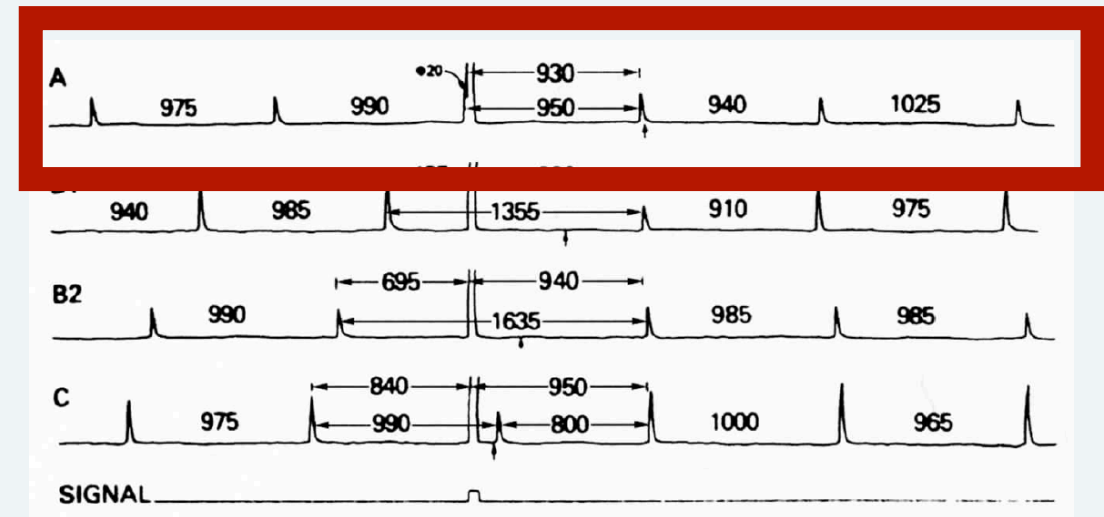
**signal less than ~200 ms before flash →
first flash unaffected, next cycle shortened**



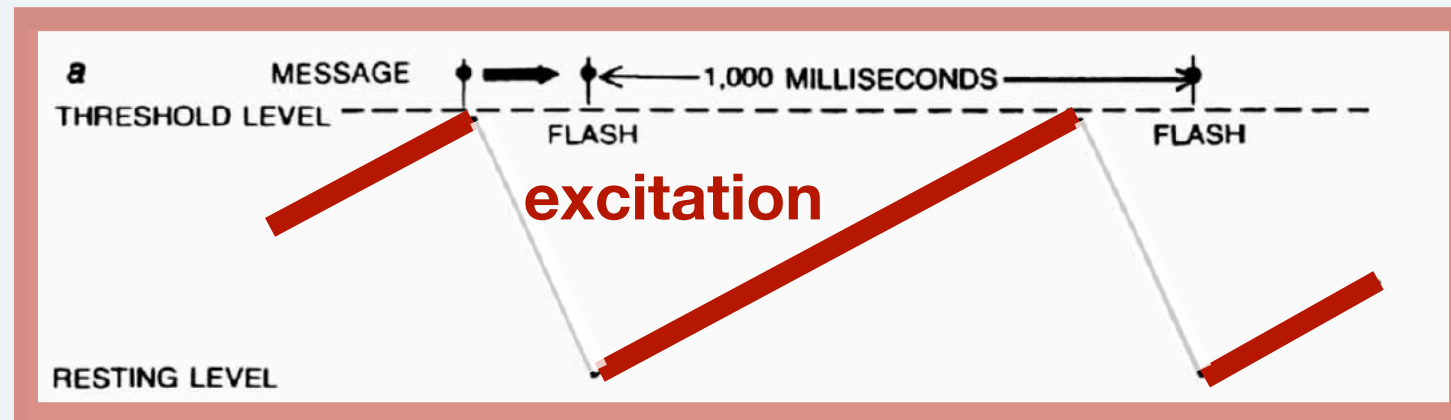
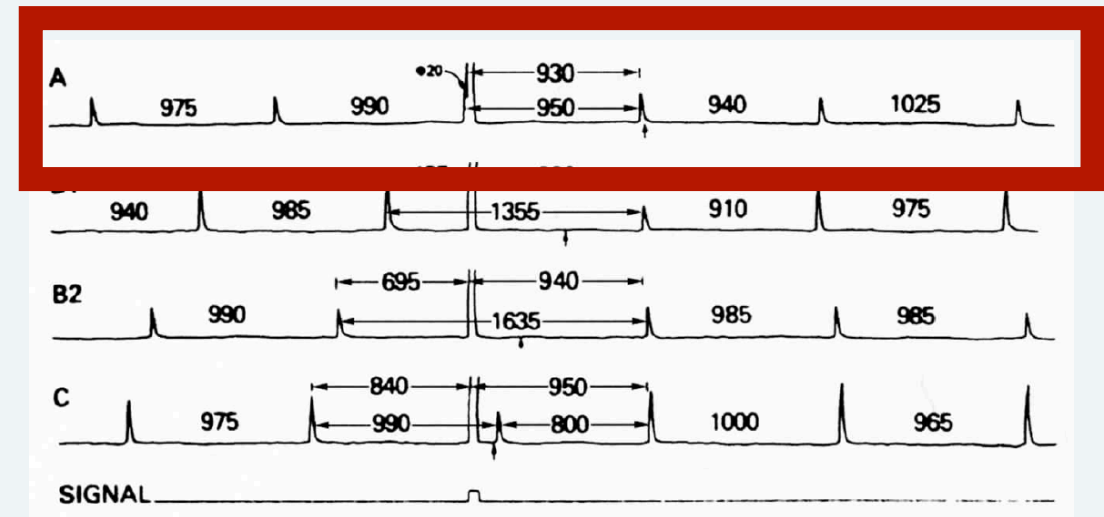
Fireflies



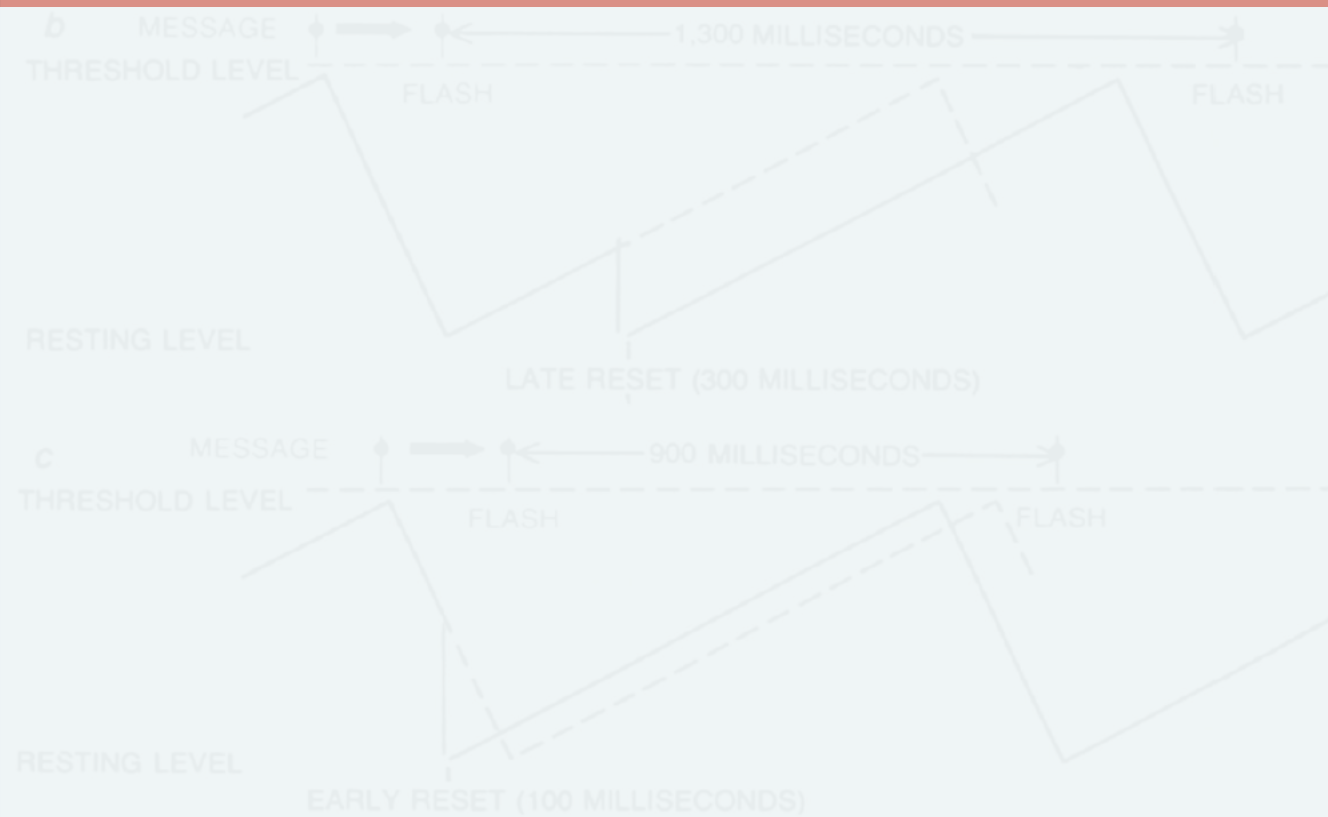
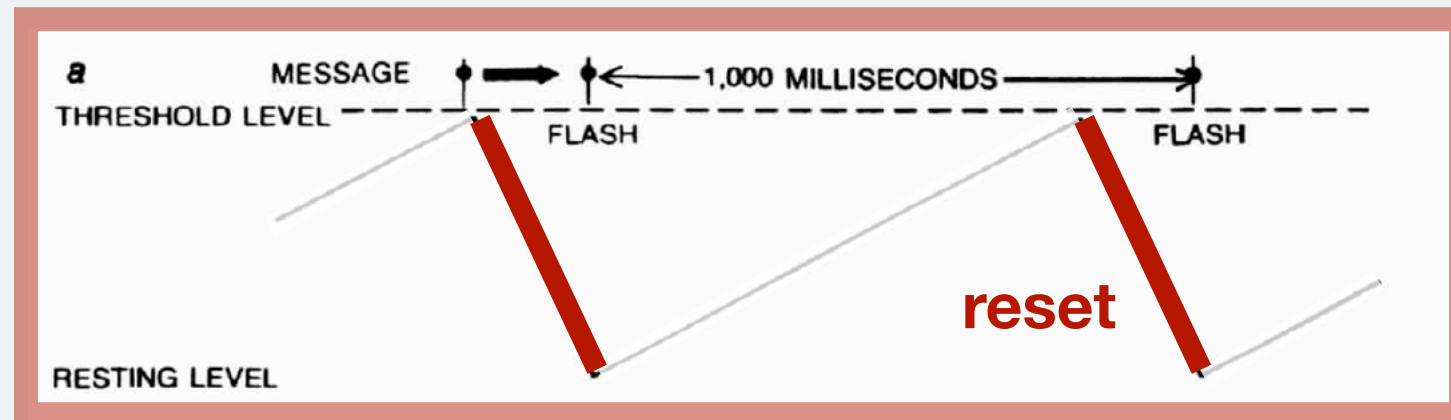
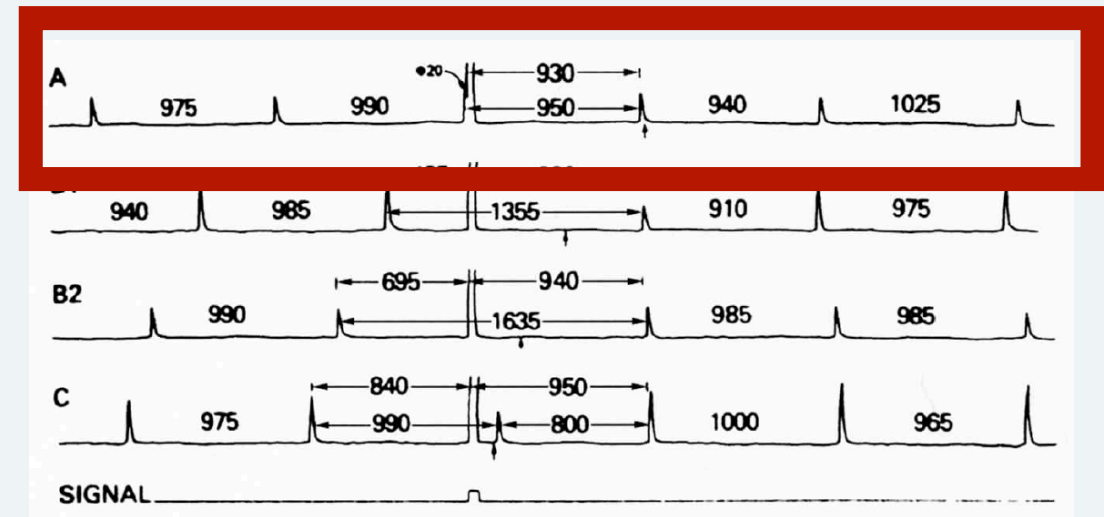
Fireflies



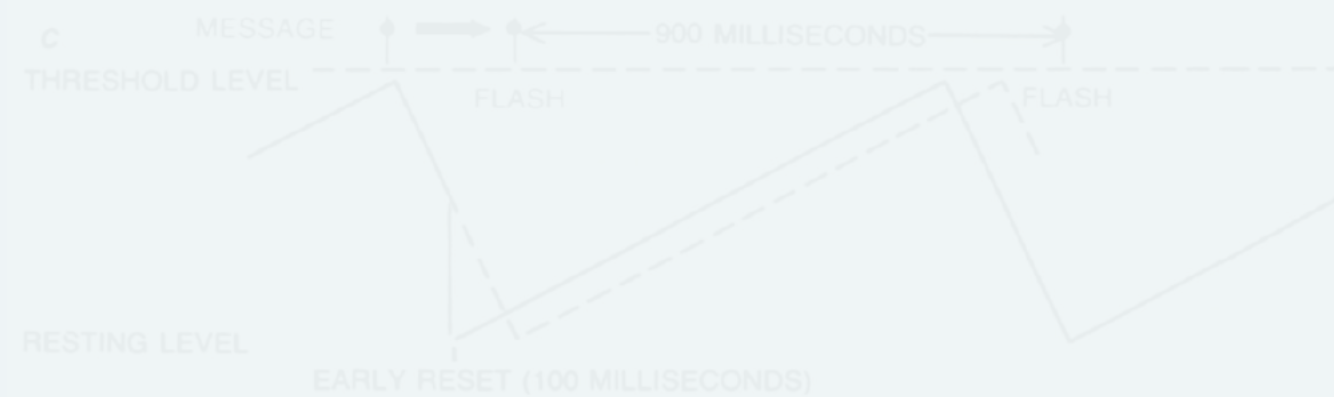
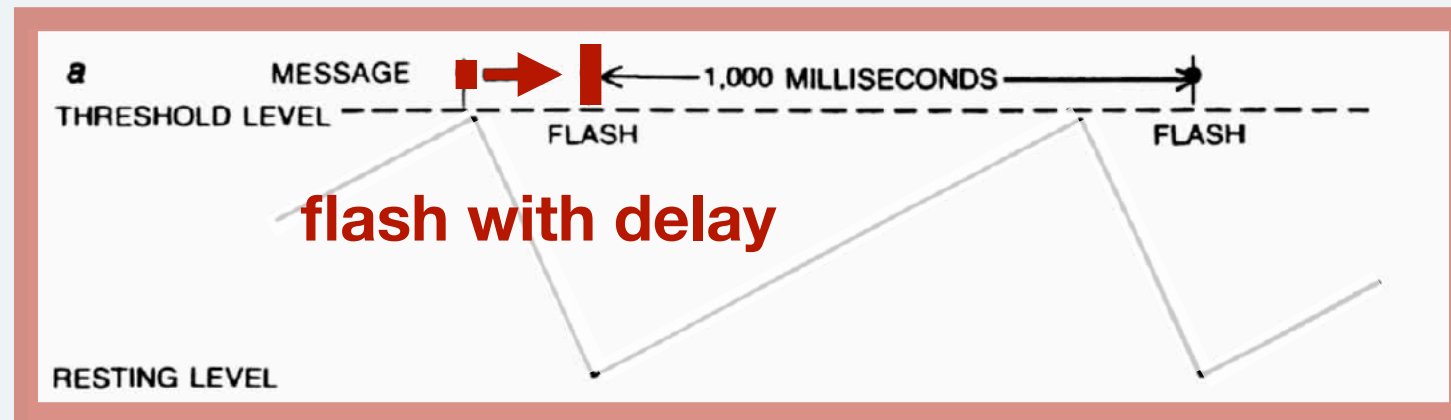
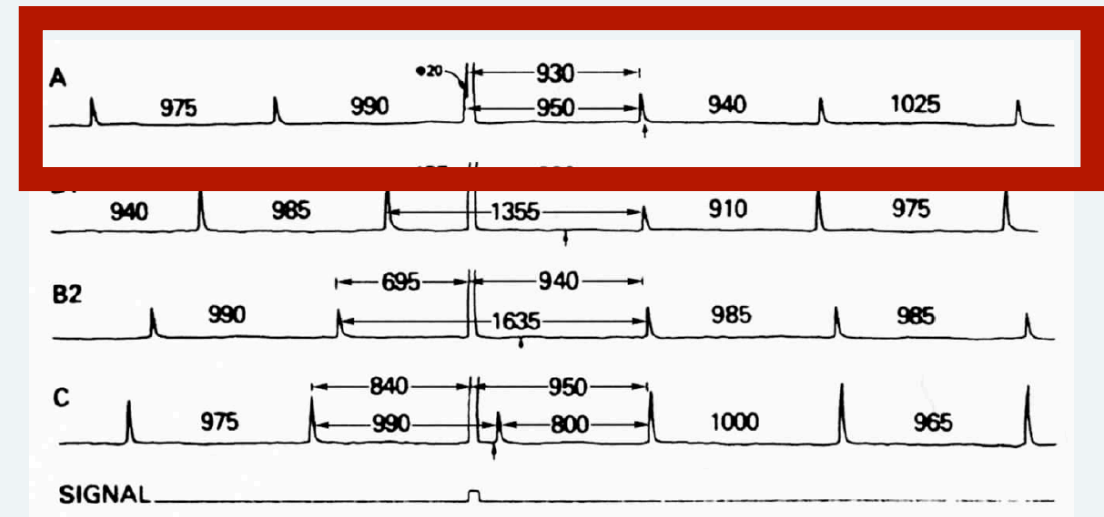
Fireflies



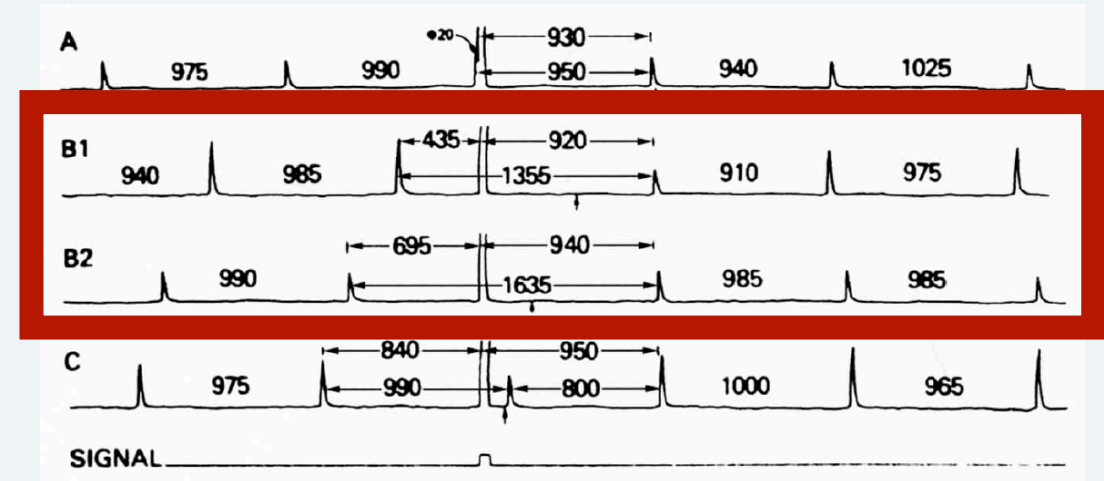
Fireflies



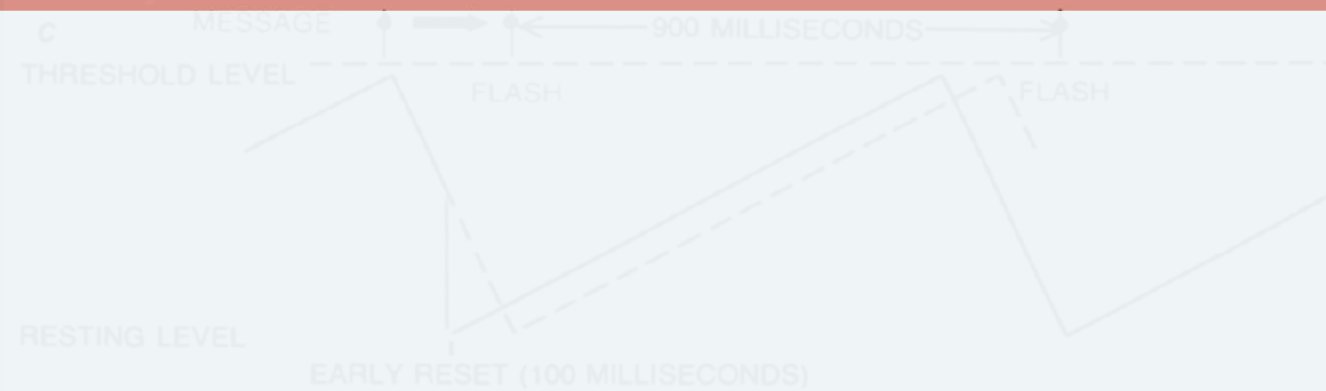
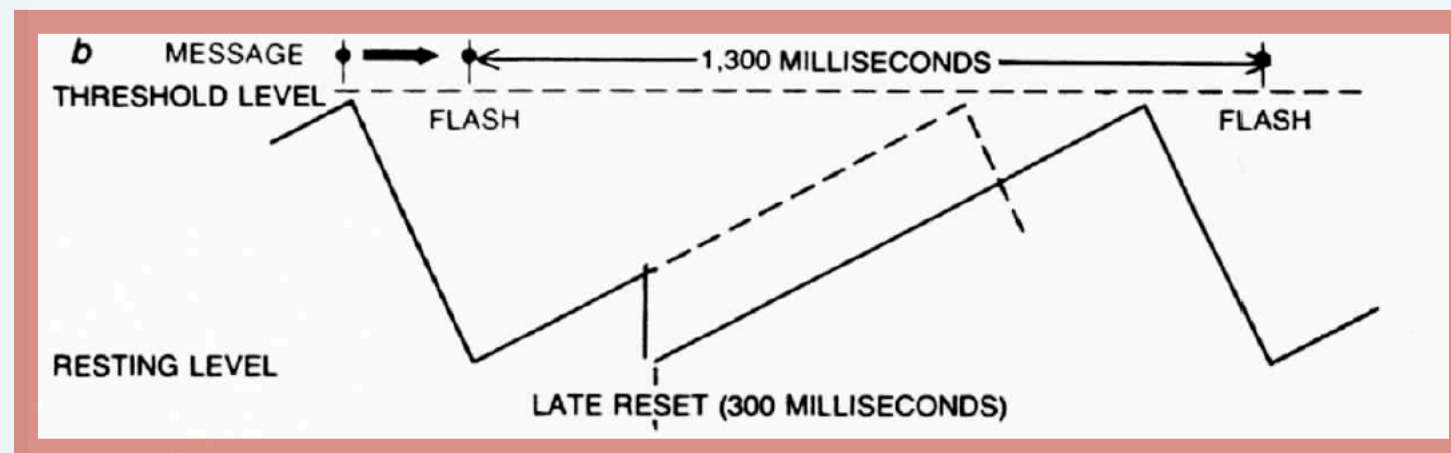
Fireflies



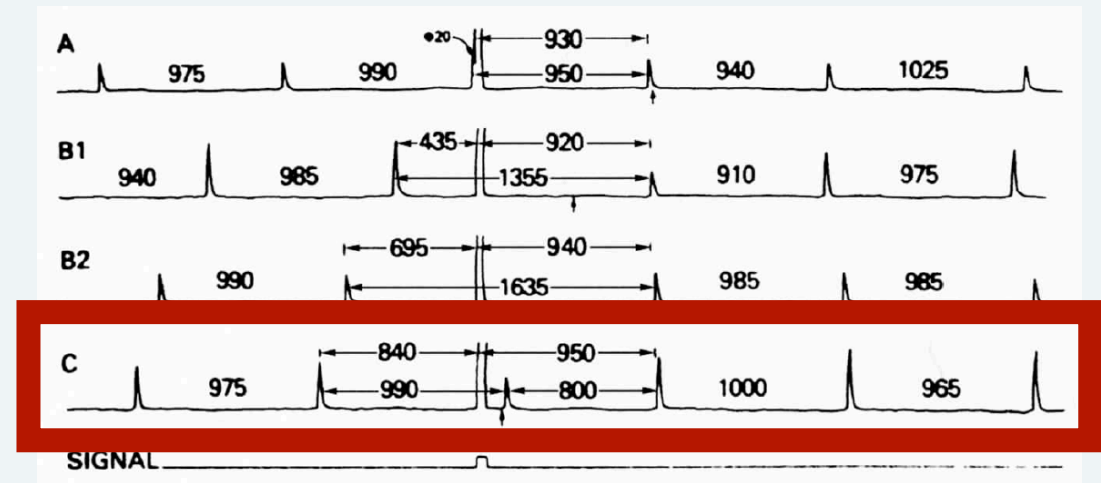
Fireflies



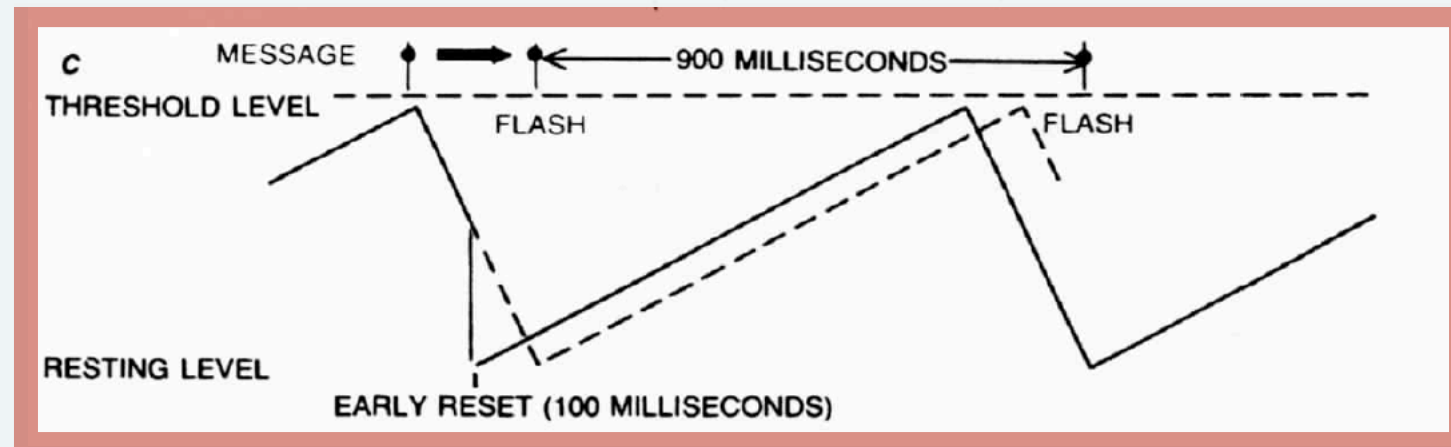
excitation cycle - reset during rising phase



Fireflies



excitation cycle - reset during falling phase



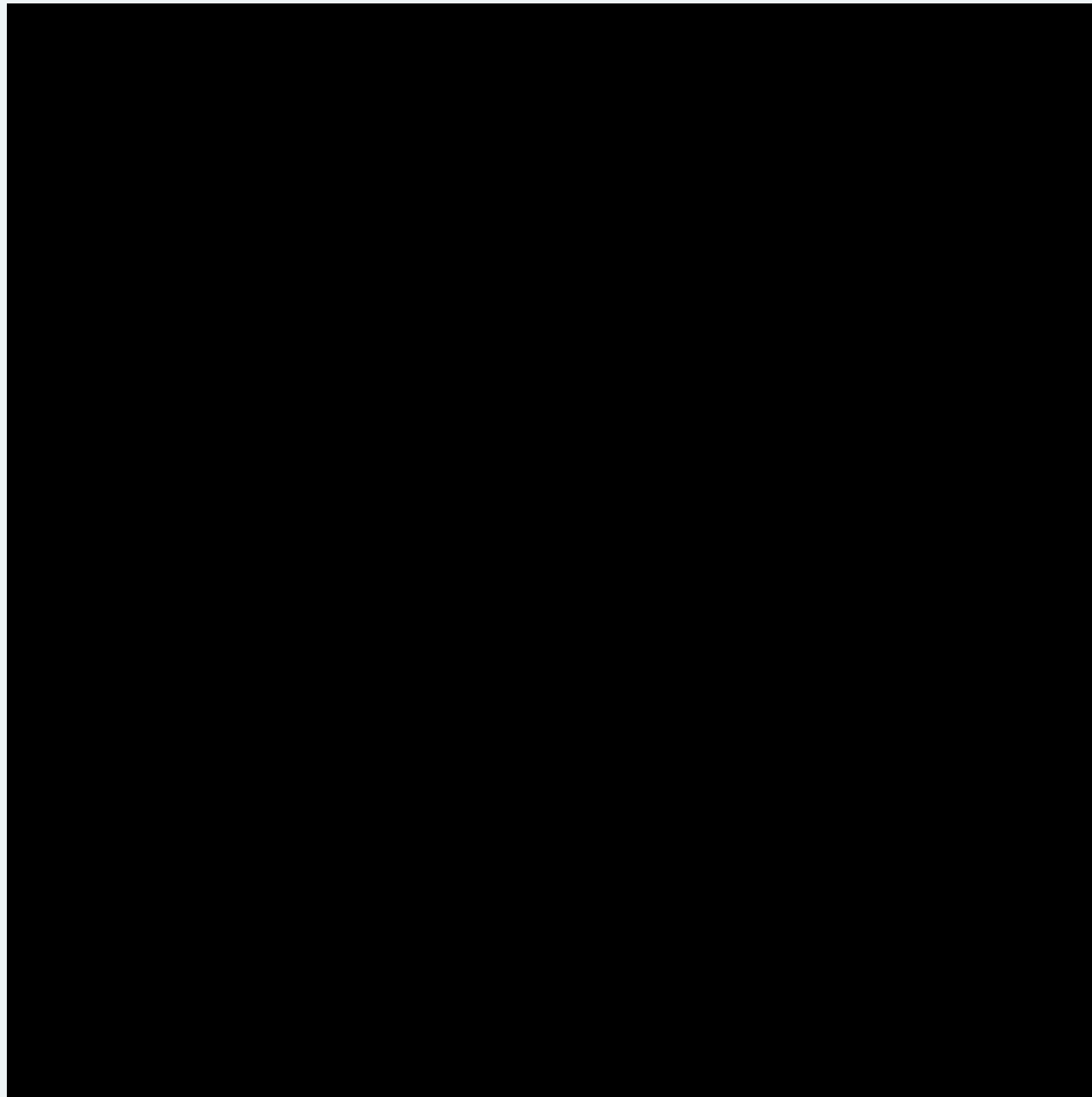
Fireflies

- two fireflies following this algorithm



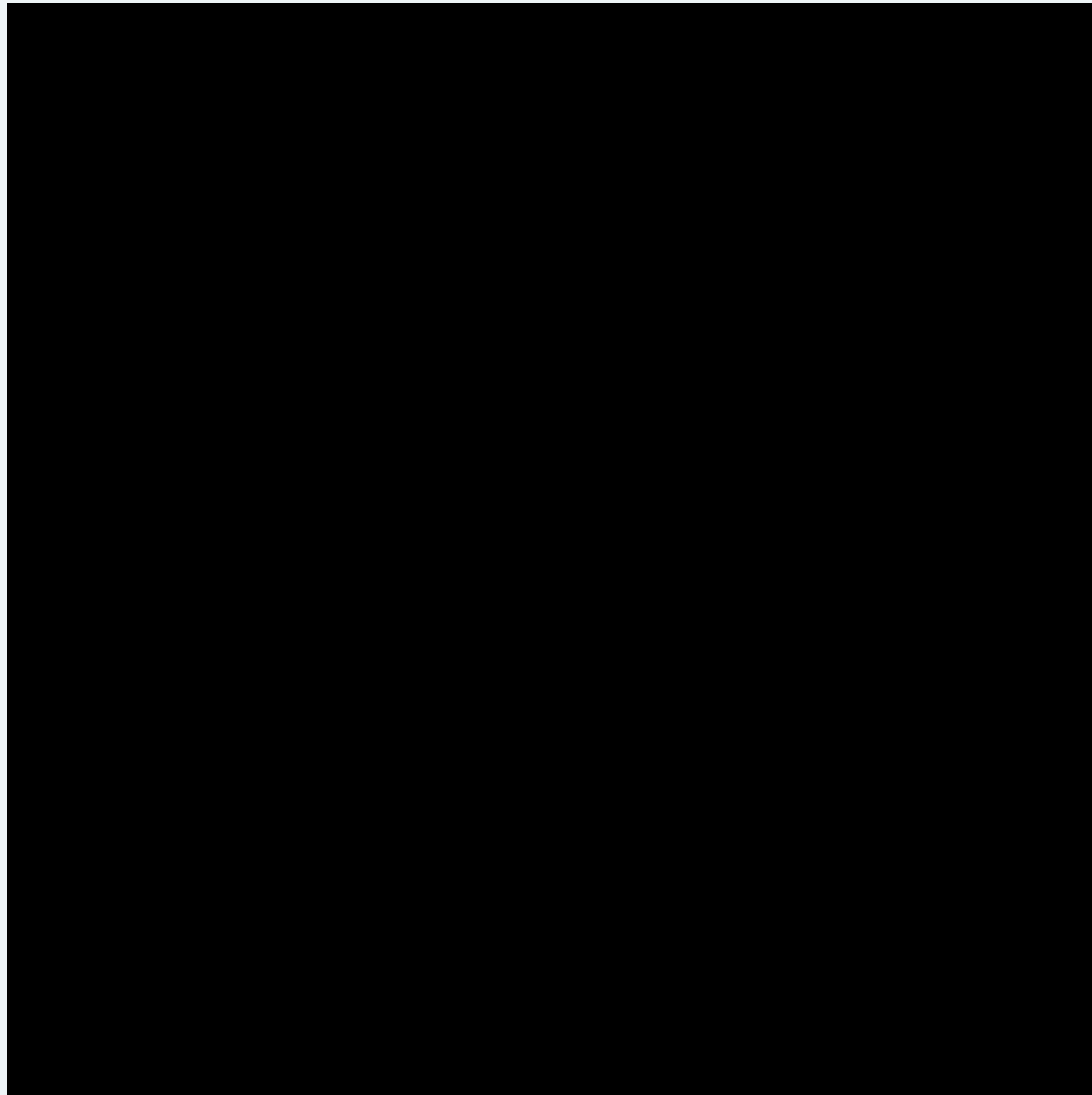
Fireflies

- 400 fireflies



Fireflies

- fireflies with inter-individual variation in cycle length (80–120 timesteps) – **robust algorithm** (?)



Fireflies

- fireflies who only notice nearby flashes 10% of the time –
robust algorithm (?)

