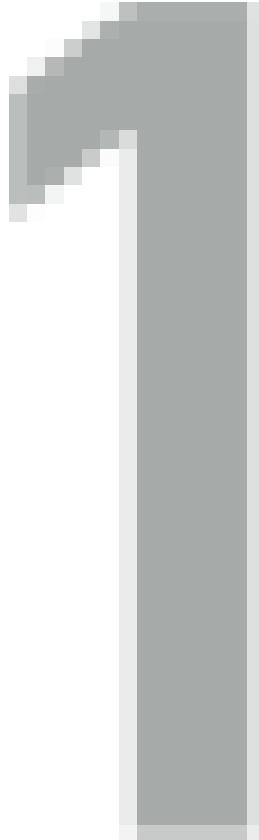




CONFERENCE MARKETING



A Markov chain is  $\mu$ -irreducible if  $\forall x \in \mathbb{X}$ , and  $\mu(A) > 0$ , there exists  $t \geq 0$  such that

$$K^t(x, A) > 0$$

►  $\mu$ -irreducible Markov chain is **aperiodic** if for all  $\mu(A) > 0$ ,

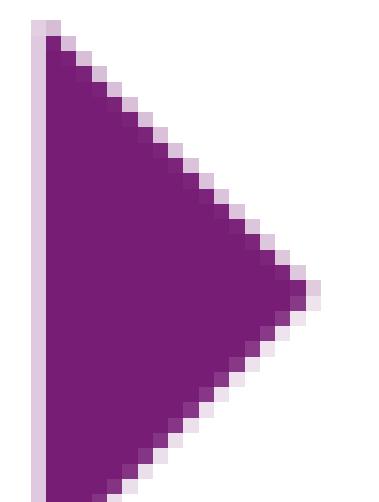
$$\gcd(t : \mathbb{P}[X_t \in A \mid X_0 \in A] > 0) = 1$$

► **Theorem:** If  $K$  is a  $\pi$ -irreducible,  $\pi$ -invariant and aperiodic, then for any  $\mu$

$$\lim_{t \rightarrow \infty} \|\mu K^t - \pi\|_{\text{TV}} = 0$$

↳ Implications of  $\pi$  when  $t$  is large enough

→ always bring your target closer, but not always quickly. It's important to be patient and let the target come to you, as this will help you to stay focused and avoid getting distracted by irrelevant stimuli. Additionally, it's important to remember that the goal is to get the target to move, so don't be afraid to use your imagination and creativity to come up with new and innovative ways to bring the target closer.

 **Big multi-modal distribution**

# CONVERGENCE OF MARKOV CHAINS

- ▶ A Markov chain is  $\mu$ -irreducible if  $\forall x \in \mathbb{X}$ , and  $\mu(A) > 0$ , there exists  $t \geq 0$  such that  $K^t(x, A) > 0$
- ▶  $\mu$ -irreducible Markov chain is **aperiodic** if for all  $\mu(A) > 0$ ,

$$\gcd(t : \mathbb{P}[X_t \in A | X_0 \in A] > 0) = 1$$

- ▶ **Theorem:** If  $K$  is a  $\pi$ -irreducible,  $\pi$ -invariant and aperiodic, then for any  $\mu$

$$\lim_{t \rightarrow \infty} \|\mu K^t - \pi\|_{\text{TV}} = 0$$

- ▶ Implies  $X_t$  is an approximate sample from  $\pi$  when  $t$  is large enough
- ▶ Irreducible chains always bring you closer to the target, but not always quickly
  - ▶ E.g. multi-modal distribution...

# ERGODIC THEOREM