Machine Translation

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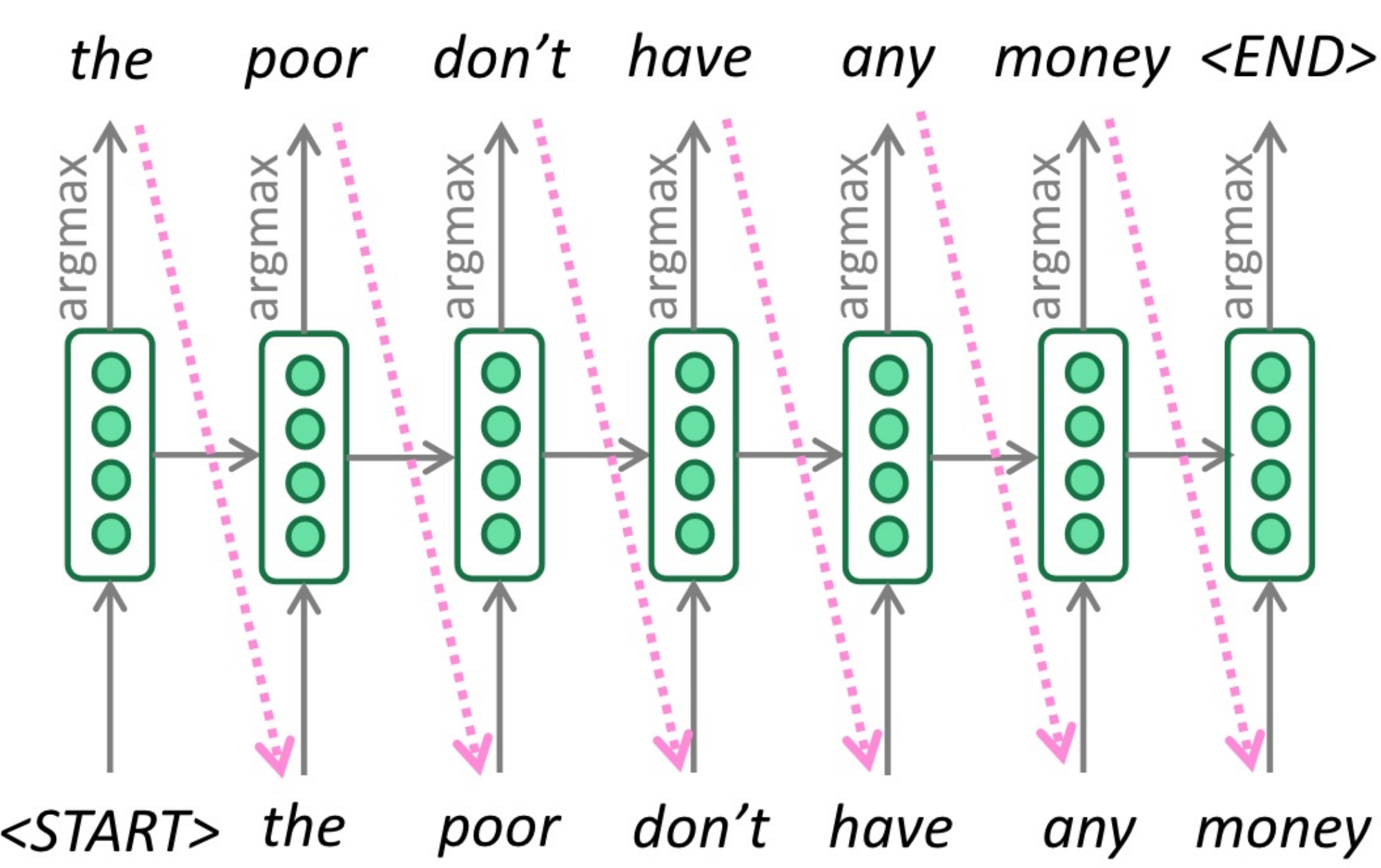
Decoding

Adapted from material by Mohit Iyyer, Luke Zettlemoyer, Kalpesh Krishna, Karthik Narasimhan, Greg Durrett, Chris Manning, Dan Jurafsky



Argmax at every time step

Sampling Methods

Softmax distribution

$$p(w) = \frac{\exp\left\{\beta \cdot \vec{f}(w)\right\}}{\sum_{w'} \exp\left\{\beta \cdot \vec{f}(w')\right\}} \tag{1}$$

- top-k
- Nucleus / top-p
- Temperature

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$$p(w) = \frac{\exp\left\{\frac{\beta \cdot \vec{f}(w)}{T}\right\}}{\sum_{w'} \exp\left\{\frac{\beta \cdot \vec{f}(w')}{T}\right\}} \tag{2}$$

Josiah Willard Gibbs, From Wikipedia

From Wikipedia

Sampling Methods

Softmax distribution

$$p(w) = \frac{\exp\left\{\beta \cdot \vec{f}(w)\right\}}{\sum_{w'} \exp\left\{\beta \cdot \vec{f}(w')\right\}} \tag{3}$$

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Sampling Methods

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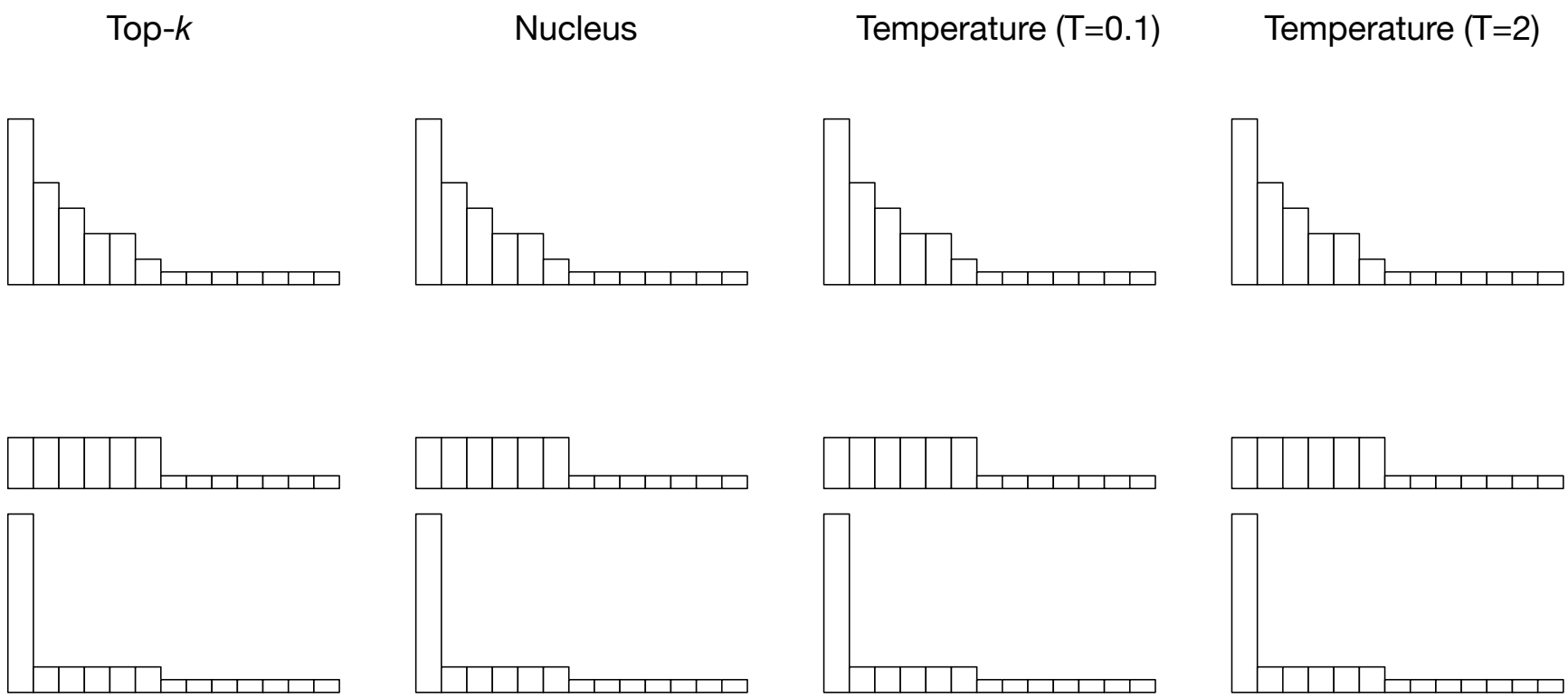
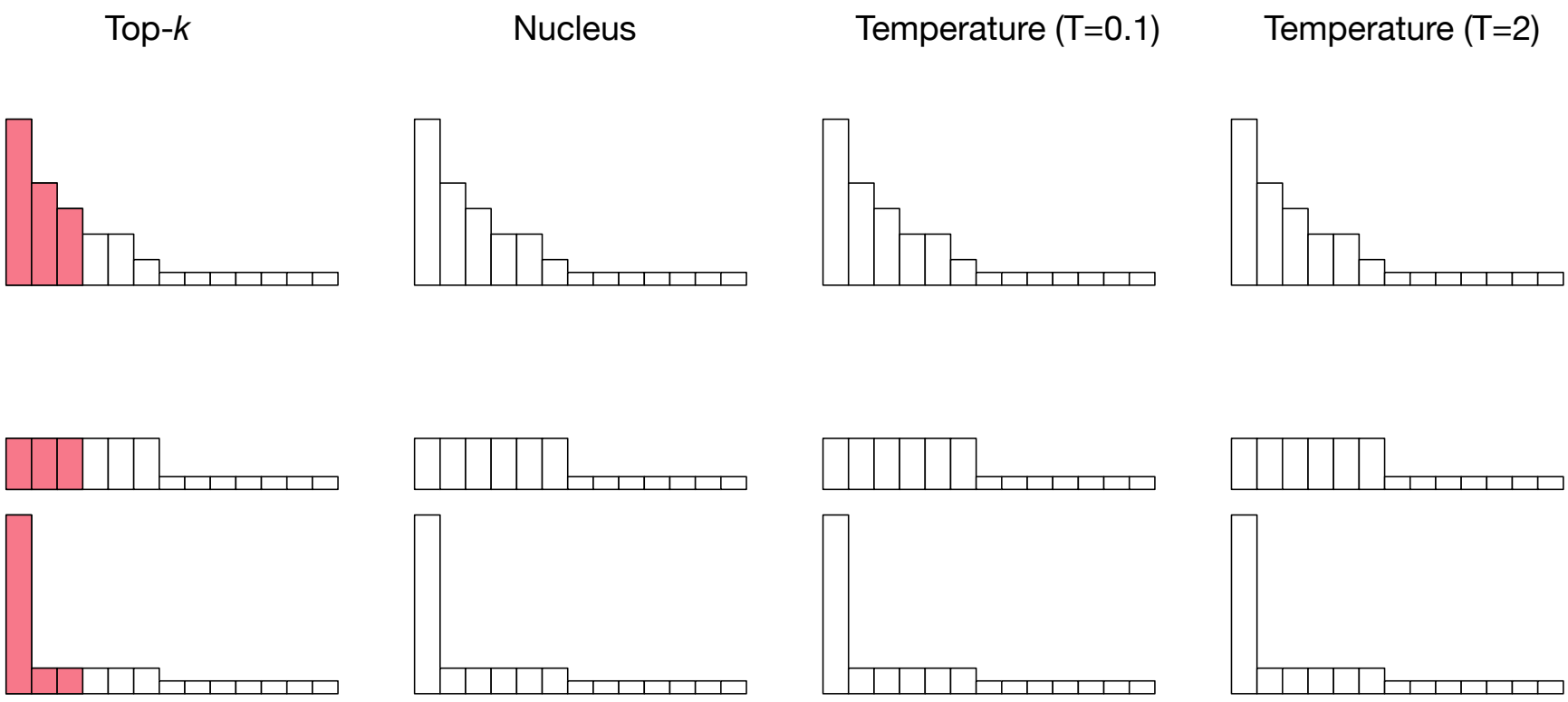
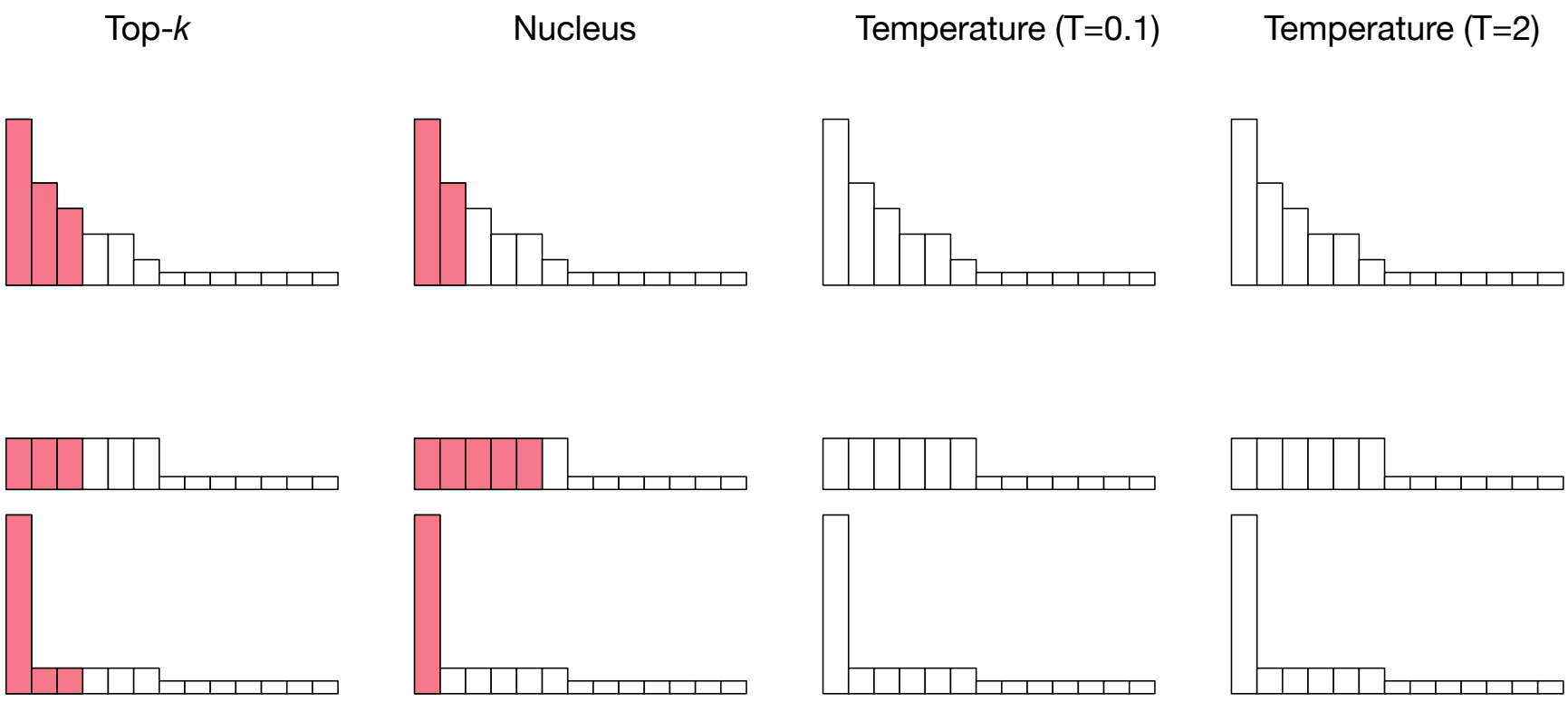
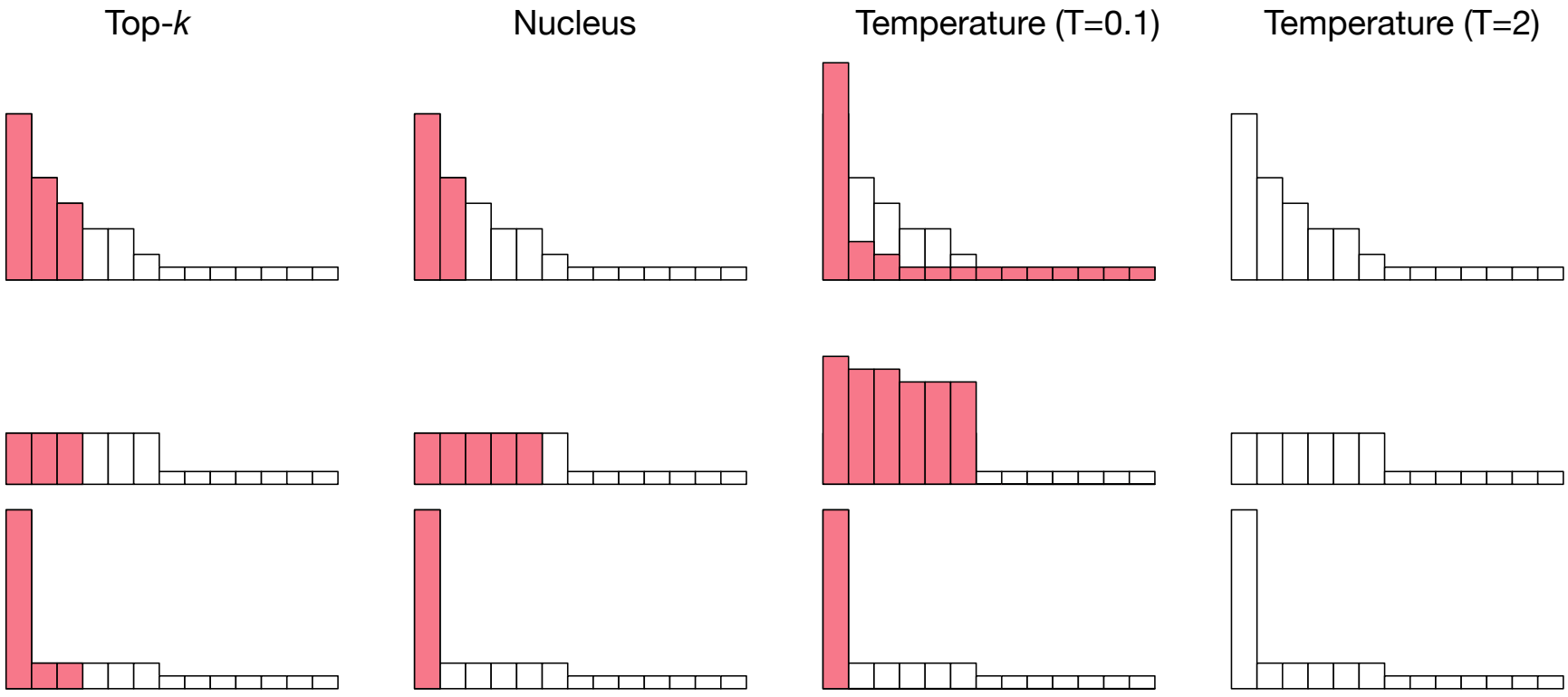
Top-*k* Nucleus Temperature (T=0.1) Temperature (T=2)


Top-*k*
Nucleus
Temperature (T=0.1)
Temperature (T=2)


Top-*k*
Nucleus
Temperature (T=0.1)
Temperature (T=2)


Top-*k*
Nucleus
Temperature (T=0.1)
Temperature (T=2)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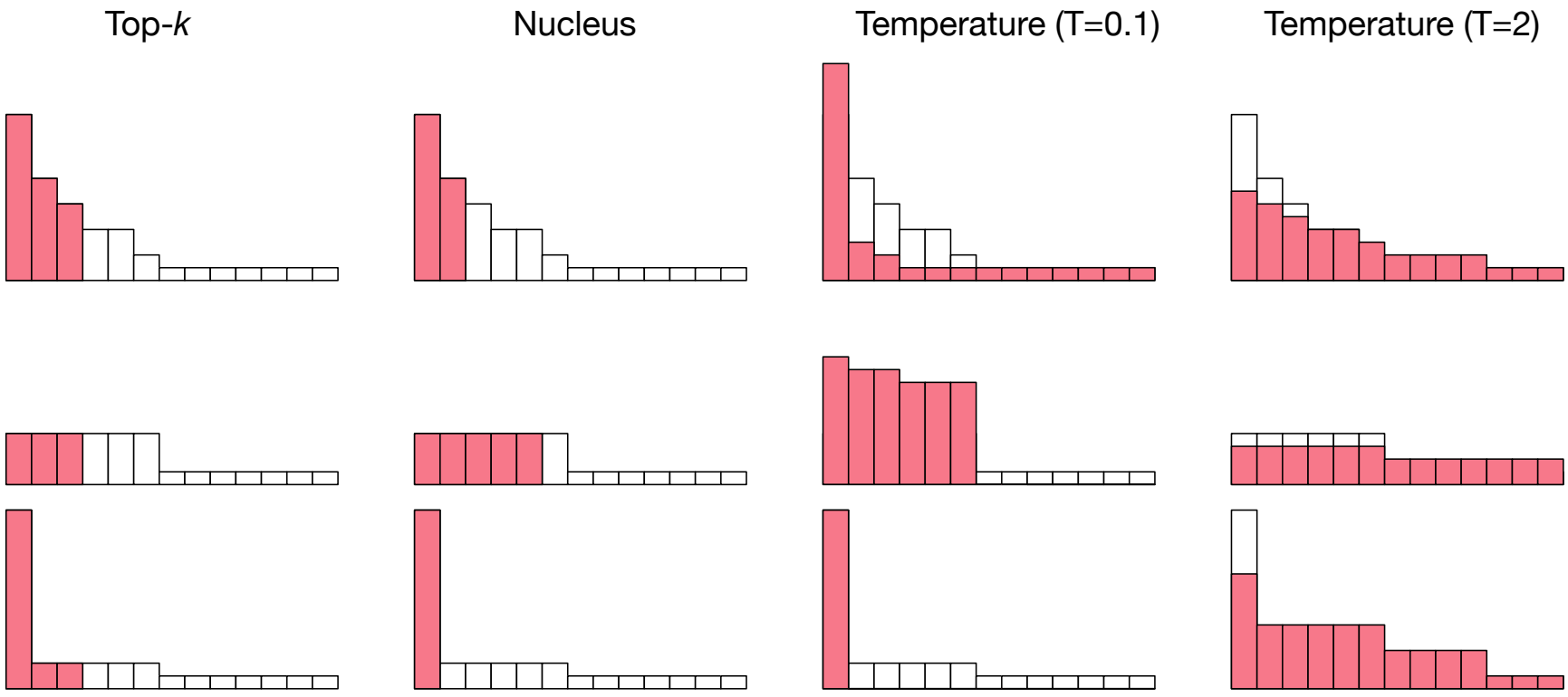
Nucleus
Temperature (T=0.1)
Temperature (T=2)


Top-*k*
Nucleus
Temperature (T=0.1)
Temperature (T=2)

What do you do with samples?

- Getting out of being stuck in a garden path
- Getting diverse outputs
- Combining multiple models together
- Rescoring by a non-probability metric

From Zhang et al. (Dive into Deep Learning)

Beam Search Decoding for: Die Arme haben kein Geld

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Using multiple sources

- Generate from multiple models
- Generate from multiple directions
- Generate from multiple data
- Generate from multiple temperatures

How to pick?

- Show to a user

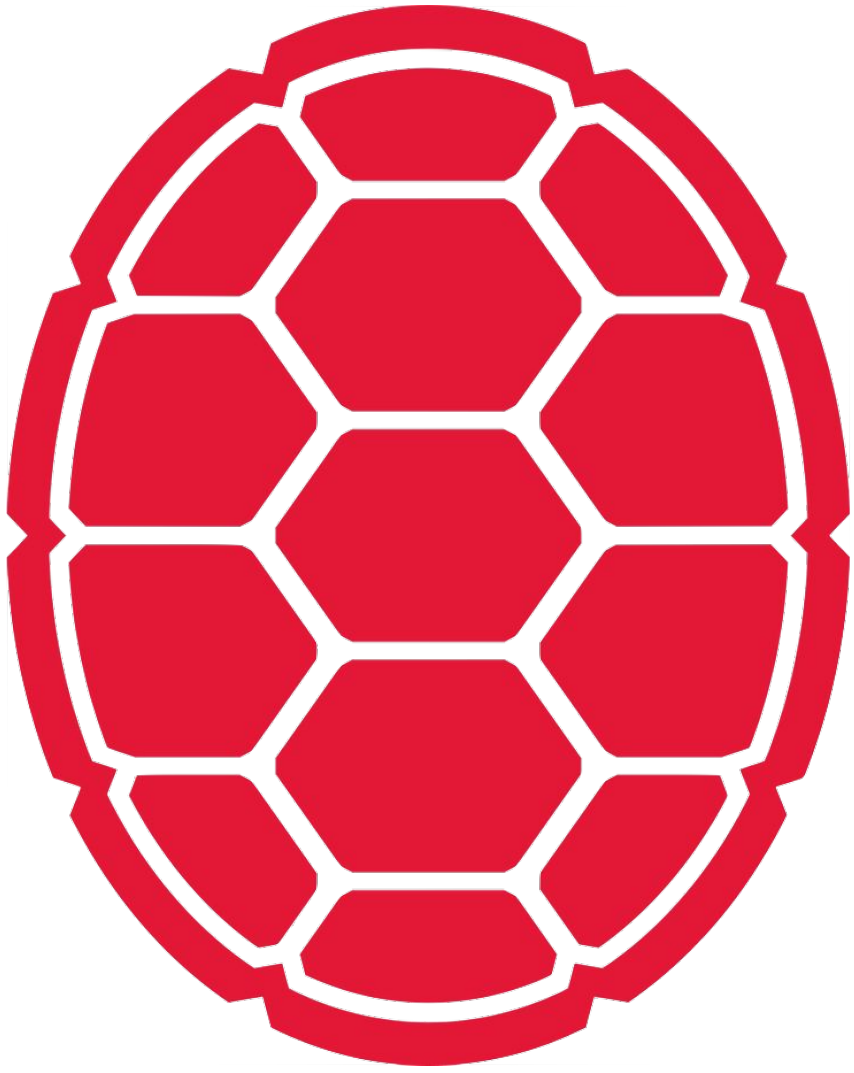
How to pick?

- Show to a user
- Take highest probability

How to pick?

- Show to a user
- Take highest probability
- Rerank

Tones in Chinese (for “shu”, not “ma” like I said)

Misheard lyrics when the tones are wrong

Decoding song translations with tones in decoder