Universität Zürich[UZH]

**Computational Psycholinguistics Seminar**
Department of Computational Linguistics, Spring term 2023

# Session 4.2: Entropy reduction

📖 Hale, J. (2006). Uncertainty about the rest of the sentence. Cognitive science, 30(4), 643-672.

📖 Linzen, T., & Jaeger, T. F. (2016). Uncertainty and expectation in sentence processing: Evidence from subcategorization distributions. Cognitive science, 40(6), 1382-1411.

## 1 Understanding entropy

1. Does the entropy a random variable depend on the number of different values that the variable can take? Explain your answer using the formula that defines entropy.
2. Does the entropy of a random variable depend on the distribution of the different values that the variable can take?
3. Is the random variable of a uniformly distributed random variable high or low?
4. Why is it a bit tricky to apply the original formula for entropy to language (i.e., to the rules of a PCFG)?
5. What is the difference between entropy and surprisal?
6. Give a linguistic example to illustrate the difference between entropy and surprisal.

## 2 Surprisal, entropy, or both?

The following questions refer to Linzen & Jaeger (2016).

1. What was the goal of Linzen  Jaeger (2016)'s study?
2. Describe the experimental design of their experiment (i.e., what did the stimuli look like and why?).
3. How did the authors calculate entropy and surprisal?
4. Summarize the results of the study.