$$\frac{G_{\mu_1,\sigma_1^2}([S = x])}{G_{\mu_1,\sigma_1^2}([S = x]) + G_{\mu_2,\sigma_2^2}([S = x])}$$

Proportion of /p/ responses

$G_{\mu_1,\sigma_1^2}([S = x])$ $G_{\mu_2,\sigma_2^2}([S = x])$

/p/–/b/ acoustic continuum

Workshop on Bayesian models of cognition, language and speech

Laboratoire Parole et Langage, 9 July 2021

Organized by Noël Nguyen, Nicolas Claidière, Elliot Huggett, Lena Huttner, & Leonardo Lancia

With the support of the LPL and the Institute of Language, Communication and the Brain

09:45-10:00: Welcome and general presentation

10:00-11:00: *Prior distributions in Bayesian cognitive modeling: From priors as informed bets, to their use in models of phonetic category learning*

Julien Diard, LPNC, Université Grenoble Alpes & CNRS

In this talk, I propose a tutorial presentation addressing some recurrent issues and questions about Bayesian models in cognitive science. First, I will recall their mathematical basis, some of the associated terminology, and a rapid panorama of their different flavors found in the literature. Second, I will discuss various uses of prior distributions and their properties, both in the context of parameter identification procedures and in cognitive models. In particular, I will present a classical experiment (Tenenbaum et al. (2011) How to Grow a Mind: Statistics, Structure, and Abstraction. *Science*, 331, 1279) where sophisticated priors help accounting for ultra-rapid concept learning. Third and finally, I will present a classical model of phonetic category learning, in which both prior distributions about category frequency and category stability are expressed. This model is extended towards taking into account characteristics of a communication scenario to drive category adaptation.

11:00-12:00: *Bayesian models of cognition: From individual biases to emergent cultural phenomena*

Jon Carr, Scuola Internazionale Superiore di Studi Avanzati, Trieste, Italy

Probabilistic generative modeling provides a useful framework in which theories of cognitive phenomena, such as learning and decision making, can be formally posed and experimentally evaluated. Within this framework, it is often useful to model individuals as rational Bayesian agents that make optimal choices in response to evidence. In this talk, I will give a brief introduction to why Bayesian models of cognition are useful in theory and then set out the key ingredients required to formulate such models in practice. I shall do this through the lens of two quite different projects, both using artificial languages as experimental test cases. The first project explores how perceptual biases and the structure of the lexicon contribute to visual word identification and reading behavior, while in the second project, we will scale up to multi-agent systems to explore how weak cognitive biases at the level of the individual can ultimately shape emergent cultural products at the level of the population.

12:00-13:30: Buffet in the garden of the LPL

13:30-15:00: *Presentations on ongoing studies* by PhD students **Mamady Nabé** (LPNC), **Lena Huttner** (LPL/COBRA), and **Elliot Huggett** (LPL/LPC/ILCB)

15:00-16:00: General discussion and perspectives for future work and collaborations

Location: The workshop will be held in a hybrid mode, both in person (Room B011, LPL, 5 av Pasteur, Aix-en-Provence), and on Zoom.

Registration is free but mandatory: https://bit.ly/3gbeJqk

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