

# Freeness in cognitive science

Maciej A. Nowak<sup>1,\*</sup>

<sup>1</sup> *Institute of Theoretical Physics and Mark Kac Center for Complex Systems Research,*

*Jagiellonian University, 30-348 Kraków, Poland*

\* [maciej.a.nowak@uj.edu.pl](mailto:maciej.a.nowak@uj.edu.pl)

In this lecture, we highlight, in a popular way, the power of so-called free random variables (hereafter FRV) calculus, viewed as a potential probability calculus of the XXI century, in applications to the broad area of cognitive sciences. We provide three examples:

- (i) inference of noisy signals from multivariate correlation data from the brain;
- (ii) distinguished role of non-normality in real neuronal models;
- (iii) applications to the field of deep learning in artificial neural networks.