

## A relation between $c$ -freeness and infinitesimal freeness

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### Abstract

I will consider two extensions of free probability :  $c$ -freeness and infinitesimal freeness. In both frameworks one adds to a standard non-commutative probability space  $(\mathcal{A}, \varphi)$  an additional functional. In the case of  $c$ -freeness one adds  $\chi$  such that  $\chi(1_{\mathcal{A}}) = 1$ , in the case of infinitesimal freeness one considers  $\varphi'$  with the property  $\varphi'(1_{\mathcal{A}}) = 0$ .

I will recall both notions of independence and combinatorial tools which characterize them. In the  $c$ -free case I will show a connections between cumulants defined by Bożejko, Leinert and Speicher and cumulants studied by Cabanal-Duvillard. I will recall also non-crossing partitions of type B which appear in the context of infinitesimal freeness.

The main result which I will present is a construction, which uses the functional  $\chi$  in order to define  $\varphi'$  in such a way, that structures which are  $c$ -free with respect to  $(\varphi, \chi)$  become infinitesimally free with respect to  $(\varphi, \varphi')$ . I will also discuss some difficulties related with this construction.

Based on a joint work with M. Fevrier (Paris, France), M. Mastnak (Halifax, Canada) and A. Nica (Waterloo, Canada).