

# Random mappings, urn models (and a few other things)

Jennie Hansen  
(Heriot-Watt University, Edinburgh)

Random mapping models have been studied by various authors since the 1950's and have applications in modelling epidemic processes, the analysis of cryptographic systems (e.g. DES) and of Pollard's algorithm, and random number generation. In this talk we consider random mappings from a new perspective which is inspired, in part, by results for preferential and anti-preferential attachment in other random graph models. Our work shows that both the usual uniform random mapping model and other models (e.g. random mappings with preferential and anti-preferential attachment) are special cases of random mappings with exchangeable in-degrees. It turns out that by viewing random mappings from this perspective, questions related to their asymptotic structure can be tackled by using a new calculus that is based on the moments of the joint distribution of the exchangeable in-degree sequence of the vertices in the (directed) graphical representation of the random mapping. This calculus gives us tools to tackle questions about the component structure of a random mapping which would be more difficult to attack using classical combinatorial approaches such as generating function arguments. In this talk we give an overview of the development of this calculus and of the results which can be obtained using it. In addition, we will explore some natural and attractive connections between random mappings with exchangeable in-degrees and various urn schemes.

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