

# A note on Controlled Branching Processes in Varying Environment

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## Abstract

Branching processes are regarded as appropriate probability models for the description of the extinction/growth of populations (see [1]). In particular, controlled branching processes are useful to model some situations where some kind of control is required.

In order to model a control mechanism in the evolution of a population we assume a development in two phases: a reproductive phase where individuals give birth to their offspring according to a probability distribution, called reproduction law, and a control phase where some individuals are introduced or removed according to other probability distribution, called control law. In the literature on controlled branching processes the control phase is assumed to depend on the population size. On the other hand, in the vast majority of works, the reproduction law is assumed to be the same for every individual in any generation. However, it seems reasonable to think that the reproductive abilities of a population may vary from one generation to another and also that the control could change with the generation independently of the population size. These possibilities have not been considered until now, at least from a general viewpoint.

As a first approach to possible modifications for a controlled branching process, it is our purpose in this talk to introduce and research controlled branching processes that consider the reproduction law can vary. They will be called controlled branching processes in varying environment.

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## References

- [1] Haccou, P., Jagers, P., Vatutin, V. Branching processes: Variation, growth and extinction of populations. Cambridge University Press (2005).