

## ON THE POWER OF P AND DP AUTOMATA

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We continue here the investigation of dP systems, recently introduced as a framework for investigating communication complexity issues in membrane computing. We compare the power of dP automata with that of usual P automata, when accepting strings (introduced symbol by symbol in the system), and with families of languages in the Chomsky hierarchy.

### 1. Introduction

In the recent paper [6], a class of P systems was introduced, under the name of dP systems, which consist of a given number of components in the form of a usual P system, of any type, which can have their separate inputs and communicate from skin to skin membrane by means of antiport rules like in tissue-like P systems. In this framework, communication complexity issues can be investigated, as in [3]. (Some previous proposals towards a communication complexity of P systems were made in [1], but mainly related to the communication effort in terms of symport/antiport rules in a usual P system, not an explicitly distributed one.) Three communication complexity measures were defined, counting the steps of computations where at least a communication rule is used, counting the used communication rules, or counting the number of communicated symbols. The case of P automata was considered in some details – a string is accepted by a symport/antiport P system if its symbols are taken from the environment during a halting computation. The possibility of accepting languages of various types in Chomsky hierarchy in a distributed way, using a bounded number of communication rules and also with some (linear) speed-up was proven.

We continue here the study of dP automata, by comparing their power with that of usual P automata and with families of languages in the Chomsky

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