We study the inference of models of the analysis by reduction that forms an important tool for parsing natural language sentences. We prove that the inference of such models from positive and negative samples is NP-hard when requiring a small model. On the other hand, if only positive samples are considered, the problem is effectively solvable. We propose a new model of the analysis by reduction (the so-called single k-reversible restarting automaton) and propose a method for inferring it from positive samples of analyses by reduction. The power of the model lies between growing context-sensitive languages and context-sensitive languages. Benchmarks using targets based on grammars have several drawbacks. Therefore we propose a benchmark working with targets based on random automata, that can be used to evaluate inference algorithms. This benchmark is then used to evaluate our inference method.