

# SimbaDD (Simulation Based Agent Dresden)

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Our agent was developed as a spin-off result from a seminar at TU Dresden. The idea was to emulate the human decision making process (theory of mental simulation), since this seems to be most promising in a game where humans derive their main benefit from their ability to mentally simulate outcomes of their actions (basic human understanding of physics etc.).

The components of the agent are depicted in the Figure, each of them has its own associated view on the game world. The *reactive process* serves as an interface between the environment and the agent. It uses the agent's sensors to scan the real world and build up an internal representation of the game scene (vision etc.). In addition, it translates the strategic decisions made by the reasoning process into actions for the agent's appearance in the real world. The *reasoning process* builds up another representation of the virtual world, called the abstract world, which is used for analysis and the search for interesting and relevant features. Basically we do a static force analysis to determine weak points in the structure(s). Then, the *predictive process* uses its so called *imaginary world*, which is again derived from the virtual world, for simulation and scoring of presumably intelligent actions. More precisely, we have an internal physics/game engine that can, based on the output of the reasoning process, simulate shots and approximate reward. Based on this result, we choose randomly among the shots with equal reward (which leads to non-deterministic behavior when playing the same levels again).

## Future Improvements

The submitted agent was the most basic running version we could finish in time, as the unknown physical parameters of the angry birds game were poorly estimated by basic algorithms leading to simulation results that are only sometimes similar to the result in the actual game. The learning of those unknown parameters has to be improved and is a nice field for machine learning. Having a satisfying parameter estimation, it would then also be possible to simulate over a sequence of shots.

