Card games have long been enjoyed by children and adults of all ages, with several companies producing cards for centuries. However, some card games are more popular than others. Our research goal is to computationally simulate various card games and quantify their quality automatically (Browne, 2012). We have thus far developed two components: a card game description language (Font et al., 2013), and an interpreter for this language. Using these components, we can generate sample run transcripts and analyze their game flow.

First, we created a language, titled RECYCLE, in which turn-based games can be represented. We restrict ourselves to games which use only cards and numeric tokens and where all card locations are spatially independent. Second, we implemented a library, written in C#, called Card Stock, which contains the functions and mechanisms necessary to run RECYCLE programs and executes the basic operations performed in these card games. The games written in RECYCLE are simulated with random players to collect statistics, such as player branching factor, average game length, game complexity, etc.

We have demonstrated that RECYCLE can capture the mechanics of several traditional card games including Spades, Hearts, Whist, Game of Pure Strategy, Crazy Eights, and Cribbage, plus a number of commercial games with custom decks of cards, such as Lost Cities, Pairs, and Sushi Go! Using RECYCLE and Card Stock, we can run each of these games thousands of times, allowing us to understand the strategic and tactical implications of the rules in action through statistics and graphical analysis.

Of the four graphs above, Spades, Whist, and Hearts are trick-taking games. We can see that the rule of following suit constrains the branching factor for the followers. Spades and Hearts have a restriction on when trump can be led, thus limiting the branching factor for the leader, whereas in Whist, there is no such restriction. In Lost Cities, we can observe how play choices are limited as the game progresses while draw choices increase.

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Visual Studio Code
Chart JS
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