All Games Bright and Beautiful

What is a combinatorial game? The usual definition is a game in which

(i) there are two players moving alternately;
(ii) there are no chance devices and both players have perfect information;
(iii) the rules are such that the game must eventually end; and
(iv) there are no draws, and the winner is determined by who moves last.

In this section, two master expositors lead us through many examples of such games, and introduce the theory that has been developed to deal with them (pages 13–78). As an appetizer, you may prefer to read first J. H. Conway's charming study (pages 3–12) of a game that does not satisfy this definition, because it may well be endless. Or, if you already know the basic theory and are dying for action, turn to the reports of the Workshop tournament finals, on pages 79–89; or download the Gamesman's Toolkit, described on pages 93–98. Have fun!

Strides on Classical Ground

The origins of chess and related games are lost in time; yet, in spite of hundreds of years of analysis, they remain as interesting as ever, because of their fantastically large configuration space. The articles presented here are steps in the continuing endeavor to master these games, an endeavor in which the computer nowadays is often a valuable tool. In fact, the "simpler" board game Nine Men's Morris has succumbed to computer analysis, as reported by R. Gasser. Checkers may well be on its way: J. Schaeffer tells of the development of the program Chinook, and pays a tribute to the extraordinary (human!) player M. Tinsley. N. Elkies and L. Stiller write articles about chess, computerless in one case and computer-heavy in the other. Shogi, also called Japanese chess, is Y. Kawano's subject.

The last four articles of this section deal with Go, a game that has come under intense scrutiny recently. Although it is a territorial game and not, strictly speaking, a combinatorial game according to the definition on page 1, the board breaks up toward the end into a sum of smaller independent games, a situation that the theory of combinatorial games handles well. Other aspects of Go, such as ko, require extensions of the traditional theory, as explained in two of these articles.

Taming the Menagerie

This section collects seven analyses of "simple" games in their dizzying variety: from the hitherto ignored *sowing games* (where counters are distributed from one pile to others, without ever being removed from the game) to *take-away games* (where there is only one pile, but the rule specifying how many counters can be removed may be fiendishly complicated). Not surprisingly, complete analyses are hard to come by, but several interesting general results are proved. There is also a description of a computer interface for Domineering, that archetype of partizan board games, amazing in its economy and elegance.

New Theoretical Vistas

Many authors have examined games that do not satisfy one or more of the conditions on page 1, or have otherwise extended the framework of combinatorial games. No rule is sacred. In this section, Berlekamp introduces a methodology, based on the notion of auctions, to analyze a position in a possibly loopy game, in which play might continue forever. Blackwell relaxes the perfect-information condition. Loeb considers many-player games. Lazarus, Loeb, Propp, and Ullman replace the rule that players have alternate turns by an "auction-based" approach not unlike Berlekamp's. The remaining articles represent significant theoretical advances, while remaining within the traditional framework.

Coda