

Mitigating Non-Strategic Coalitions

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A common problem with three-player games is ‘kingmaking’, in which a player with no hope of winning is able to determine the eventual winner. I describe a known method for mitigating this problem and its modification for games that include final ranks. I also introduce the related term ‘princemaking’ to describe cases in which the leading player is able to determine the second place-getter, and strategies for mitigating this problem as well.

1 Introduction

COMBINATORIAL games are two-player games with no hidden information and no chance elements [1]. Games involving more than two players are susceptible to *non-strategic coalitions* [2] in which players may pursue personal agendas rather than playing strictly to win. A well-known example is the *kingmaking* problem, in which a player with no hope of winning is able to determine the eventual winner [3, 4], which can ruin a game for many players [5].

A lesser known type of non-strategic coalition problem is what I call *princemaking*, which occurs when the *leading* player is able to determine who comes second. This article explores the issues of kingmaking and princemaking and presents ways to mitigate these effects. Future references to ‘game’ in this article refer to combinatorial games.

2 The Kingmaking Problem

An interesting feature of three-player games is emergent temporary strategic alliances between two players, typically to thwart the current leader. Algorithms have been developed in an attempt to understand these social dynamics, but formal studies of these, such as [6], remain inconclusive, making it hard to say at a formal level what is ‘rational’ play in such games.

However, the intriguing social features of three-player games also create the potential for kingmaking. This is a problem for many players, as the chosen winner may consider the victory to be hollow, and the remaining player may resent having the chance of victory snatched away by the kingmaker rather than through their own strategic errors.

The very features of abstract strategy games that appeal to their devotees, namely the significant player control due to no hidden information or randomness, also exacerbate kingmaking in three-player games. A kingmaker has full knowledge of the game state (no hidden information)

and more ability to manipulate the game (no randomness).

3 The Stop-Next Rule

One way to mitigate kingmaking is the Stop-Next (SN) rule:

Players may not let the next player win on the next turn, unless there is no other choice.

This rule was developed in 2002 to specifically address the problem of kingmaking in three-player games [7, pp. 161–165].

3.1 Yavalath

A well-known game featuring SN is Yavalath from 2007 [8, pp. 75–86].

Yavalath is played on a hexagonal grid of hexagons with five cells per side.

The board starts empty. Players take turns adding a piece of their colour to an empty cell.

Players win by making a line of four (or more) of their pieces, but lose by making a line of exactly three beforehand.

The game is tied if the board fills up before any player wins.

Yavalath was originally designed for two players, but later extended to three players by adding the following rules [8, pp. 75–86]:

A player must block the next player’s win if possible. Losing players leave the game but their pieces remain on the board. The winner is either the last surviving player or the first player to form a line of four (or more) of their pieces.