

# On the complementarity of order lifting and social ranking: retrieving individual rankings from partial lifted preferences

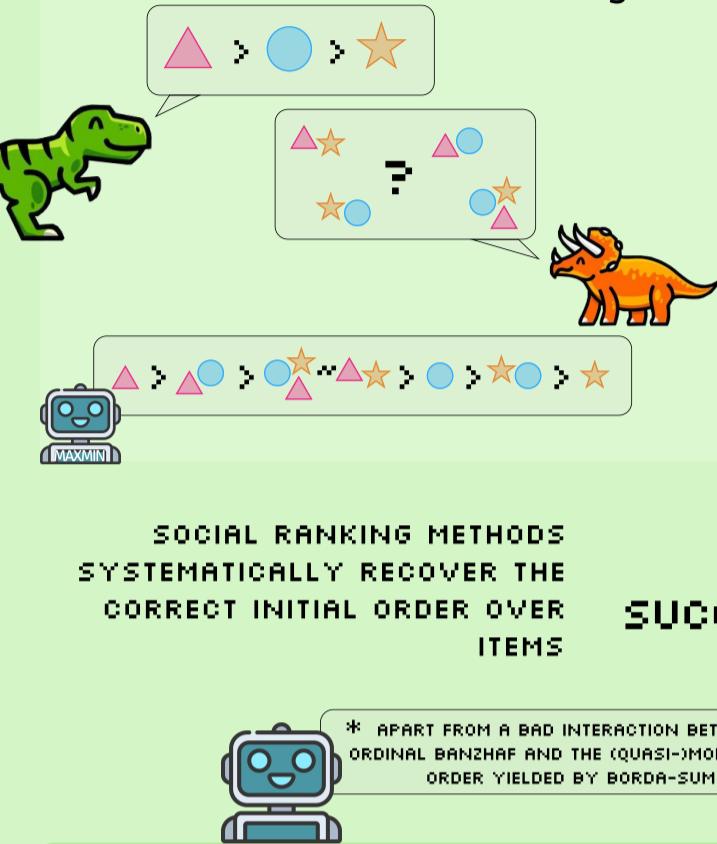
A. Ravier<sup>1</sup>, S. Konieczny<sup>2</sup>, S. Moretti<sup>1</sup> & P. Viappiani<sup>1</sup>

<sup>1</sup> LAMSADE, Université Paris-Dauphine

<sup>2</sup> CRIL, Université d'Artois

## COMPLEMENTARY PROBLEMS?

### The Order Lifting Problem



#### Some methods

Minmax-based  
two coalitions are compared using their min/max elements

Ordered lexicographical  
two coalitions are compared by ascending max/descending min elements

Borda-sum  
a coalition is evaluated using the sum of its components' Borda value

#### ERROR

NO ORDER LIFTING METHOD SYSTEMATICALLY RECOVERS THE CORRECT INITIAL ORDER OVER COALITIONS

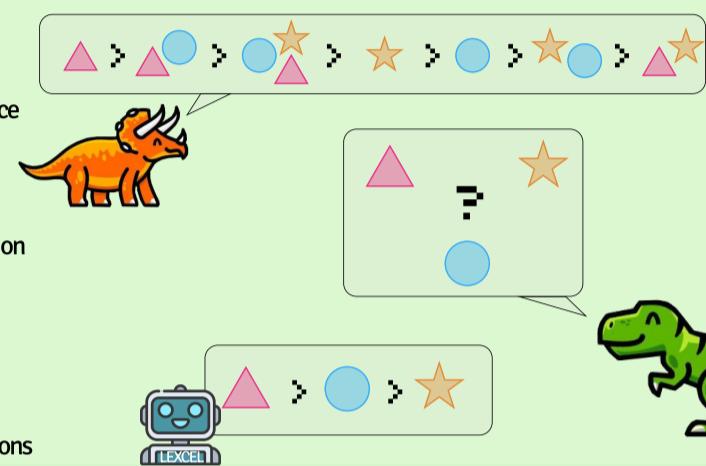
### The Social Ranking Problem

#### Some methods

Lexcel  
item is evaluated based on a lexicographical study of its presence in coalitions

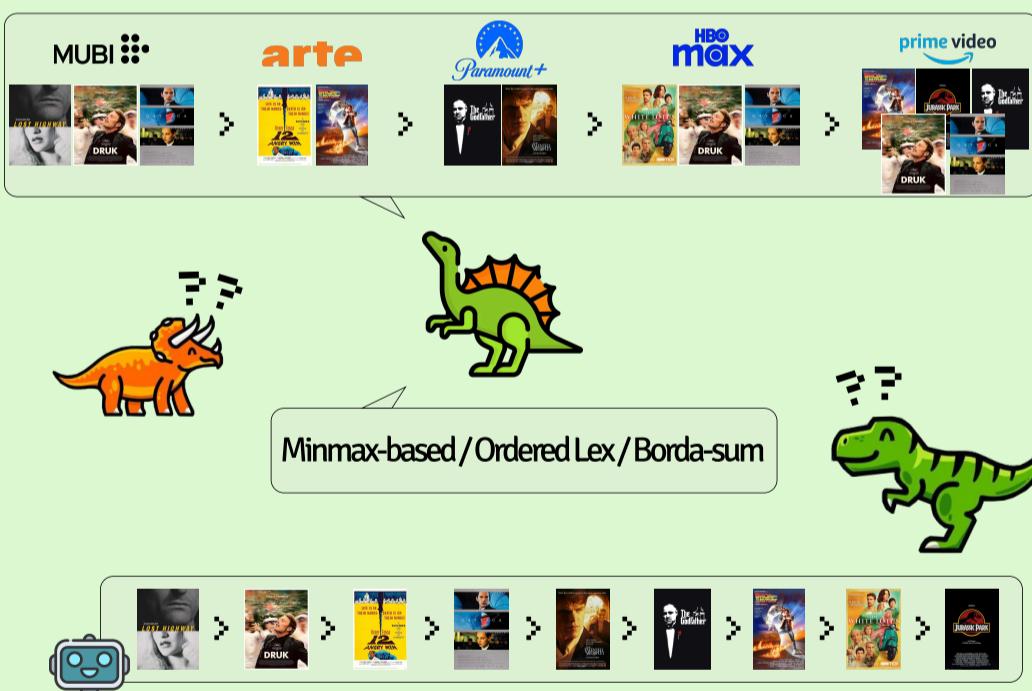
CP-majority  
pairs of items are evaluated based on the impact of their addition to the same coalition

Ordinal Banzhaf  
item is evaluated based on its marginal contribution to all coalitions



## UNDER PARTIAL INFORMATION

### PARTIAL PREFERENCES OVER COALITIONS - AN EXAMPLE: SELECTING A STREAMING PLATFORM



## PRECISION LEVELS

- 0 - POSSIBILITY OF COMPLETE PREFERENCE REVERSAL → LEXCEL
- 1 - PRESERVATION OF EXTREMES → ORDINAL BANZHAF
- 2 - IMPOSSIBILITY OF PREFERENCE REVERSAL → CP-MAJORITY

LEXCEL MAINTAINS A BETTER KENDALL-TAU DISTANCE TO THE CORRECT ORDER WITH FEW COALITIONS AVAILABLE

CP-MAJORITY CLEARLY OUTPERFORMS ALL OTHER METHODS WHEN MORE COALITIONS ARE AVAILABLE - BUT IT RETURNS A LOT OF EQUIVALENCES WHEN TOO FEW COALITIONS ARE GIVEN

## STRUCTURED PARTIAL PREFERENCES: CONSIDERING (SOME) K-SIZED COALITIONS

FIGURES OF EXPERIMENTAL RESULTS ARE AVAILABLE ON OUR WEBSITE!

### (2) WARNINGS

- » ORDINAL BANZHAF IS NO LONGER USABLE
- » UNDER MAXMIN-BASED EXTENSIONS, LEXCEL AND CP-MAJORITY CANNOT RECOVER THE CORRECT ORDER IF  $K > N/2$



NOTABLY, EVEN WITH A SMALL K AND FEW COALITIONS, SOCIAL RANKING METHODS RESPOND WELL TO BORDA-SUM RANKINGS

THE CLOSER K GETS TO N/2, THE FEWER COALITIONS ARE NECESSARY TO RECOVER THE CORRECT INITIAL ORDER

REGARDLESS OF K AND THE NUMBER OF COALITIONS, THE COMBINATION OF CP AND LEXCEL IS THE BEST PERFORMING METHOD

