

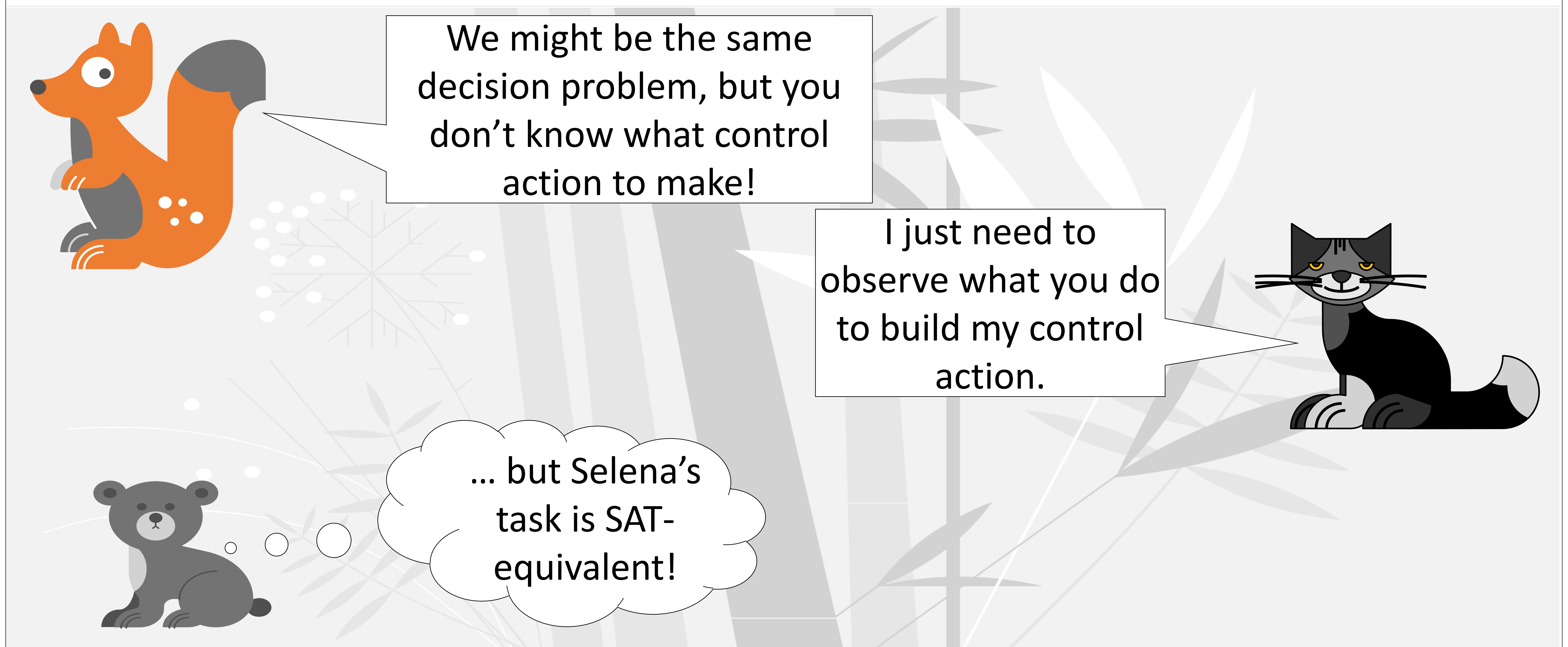
Search versus Search for Collapsing Electoral Control Types

B. Carleton, M. Chavrimootoo, L. Hemaspaandra, D. Narváez, C. Taliancich, and H. Welles

Department of Computer Science, University of Rochester

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Selena the Search Squirrel vs. Cory the Copycat: Selena (Plurality-DC-RPC-TP-NUW) is always trying to outdo Cory (Plurality-DC-PC-TP-NUW).



Why Study Search Problems?

- They better model real-world needs.
- Search and decision complexity are known to “separate” in certain settings.

What is an Electoral Control Type?

- A form of electoral attack where an election chair seeks to alter the election structure so as to modify the outcome (i.e., the set of winners).
- We are concerned with types that are about partitioning candidates and voters.
- E.g., Plurality-DC-PC-TP-NUW.
- Two control types **collapse** if they are equal when viewed as decision problems (i.e., sets).

Future Work

- Generalize methods and results, e.g., by providing dichotomy theorems.

Our Work

- Studies whether collapsing electoral control types (decision problems) share polynomially-related search complexities.
- Introduces new notions of reductions to study the complexities of such problems.
- Finds for every known pair, \mathcal{T}_1 and \mathcal{T}_2 , of collapsing electoral control types that \mathcal{T}_1 and \mathcal{T}_2 are “polynomially search-equivalent” (sometimes using the winner problem of the election system they are about).
- Pinpoints the exact search complexities of those collapsed problems as either polynomial time or SAT-equivalent.
- Provides polynomial-time search algorithms for those collapsed problems that were not known to have polynomial-time search complexity.
- Provides a bridge between search and decision complexity when the latter is NP-complete.
- Adds a new NP-completeness result to the literature (Plurality-DC-PC-TP-NUW).