

Phantoms are not *only* real



Discrete Budget Aggregation

n voters, m projects, budget b

Input

One vote $v \in \{0, b\}^m$ per voter with $\sum_{j=1}^m v_j = b$

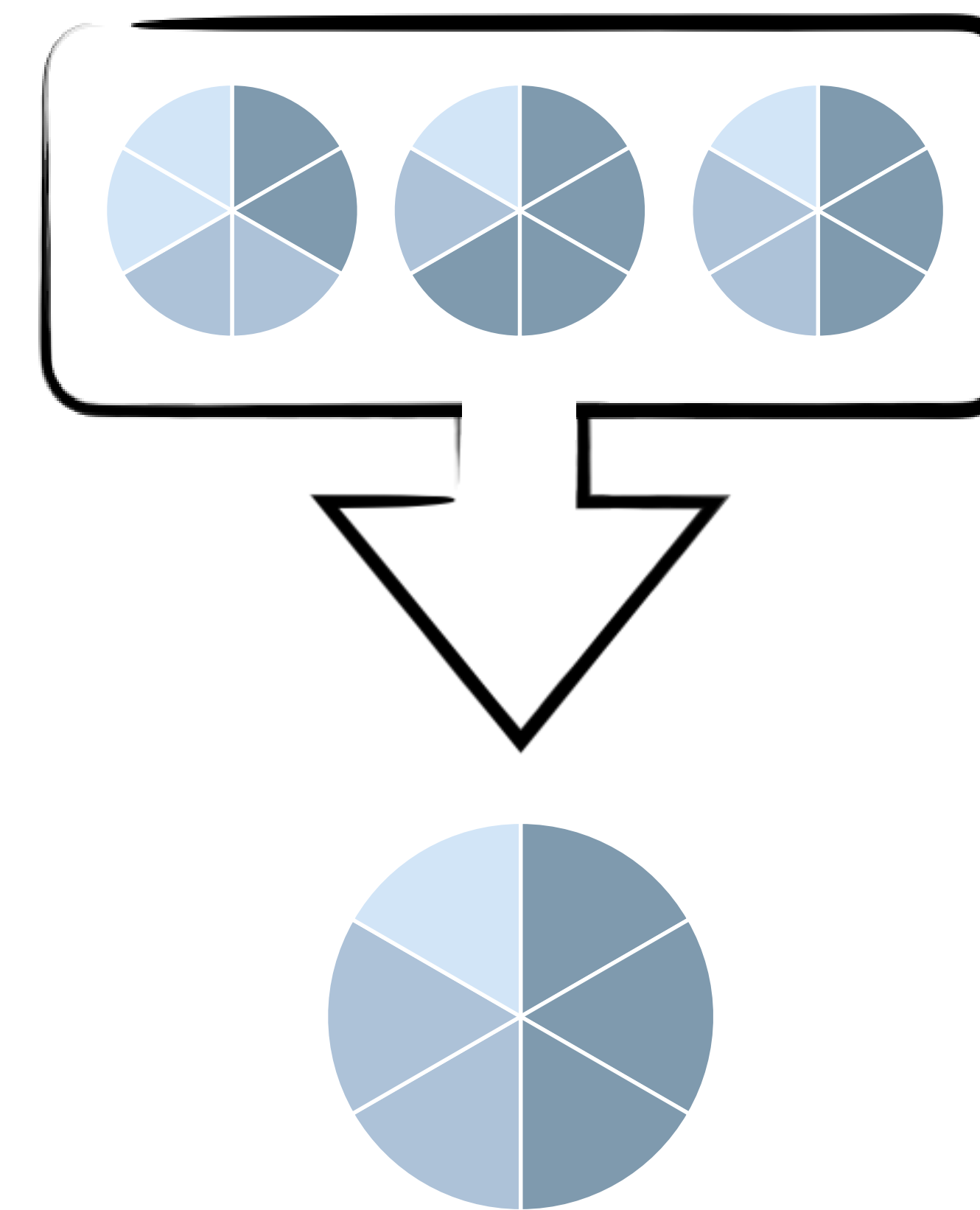
Output

Allocation $a \in \{0, b\}^m$ with $\sum_{j=1}^m a_j = b$

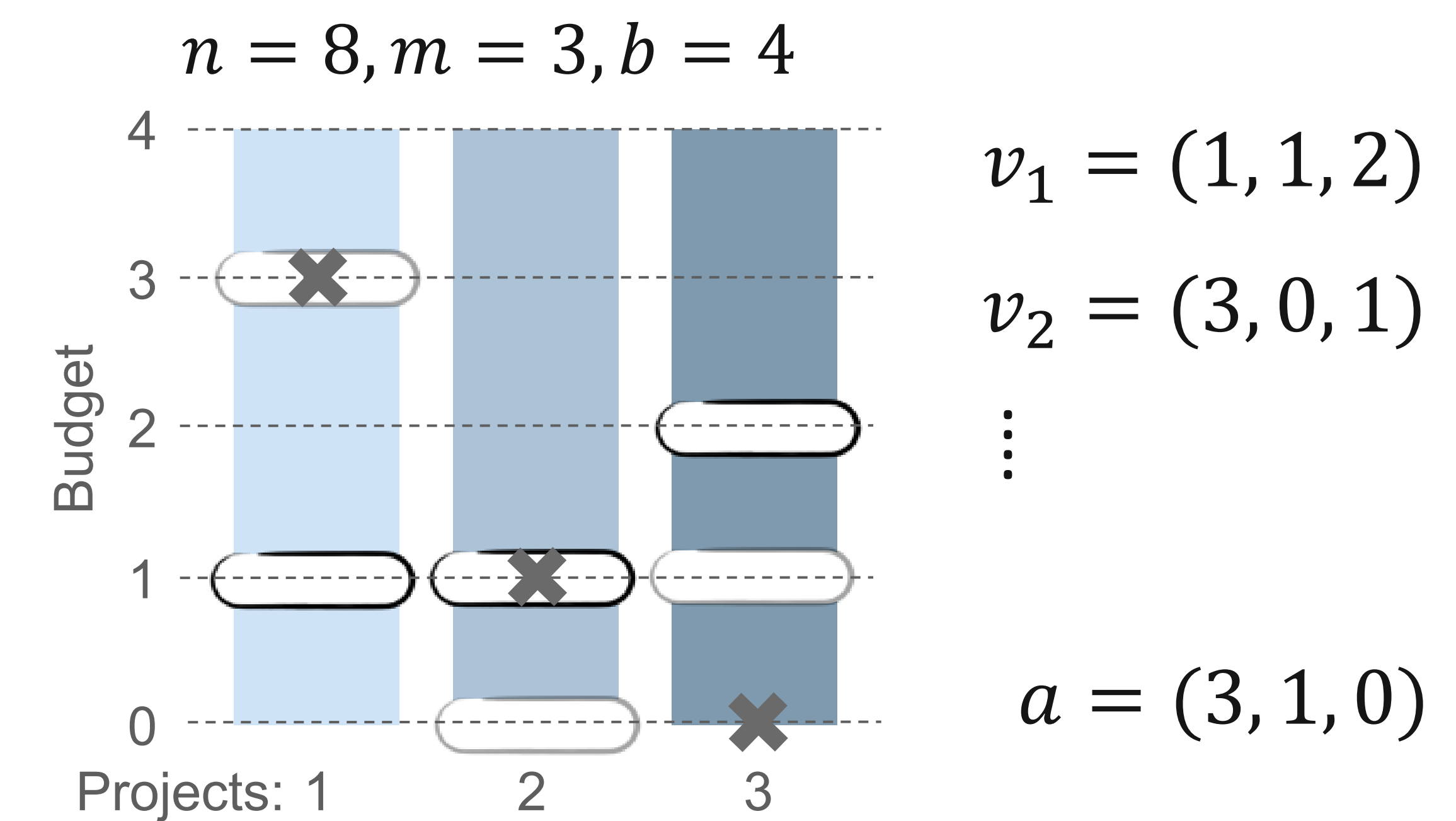
Disutility

ℓ_1 -distance of vote v to output q

Assumption: all mechanisms are *anonymous*



Example



Results

Truthfulness and Proportionality

Truthfulness and **single-minded proportionality** are compatible

→ Adapt *Moving-Phantom Mechanisms* from continuous setting

Truthfulness and **justified representation** are incompatible

→ Computer-aided proof for $n = 3, m = 4, b = 3$

Continuous preferences

Truthfulness and being **onto** are incompatible

→ Interpret as ordinal voting, use results from *dictatorial domains* literature [Aswal/Chatterji/Sen (2003)]

Axioms

Truthfulness

Voters cannot bring the aggregate closer to them by lying about their preferences

Single-minded Proportionality

If all voters are single-minded, return the rounded mean

Justified representation

If b/n voters agree that a project should get some budget, then at least one of these voters has positive satisfaction

Discrete Budget Aggregation: Truthfulness and Proportionality

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