A Tale of two communities
Assessing Homophily in Node-Link Diagrams

23rd International Symposium on
Graph-Drawing and Network Visualization

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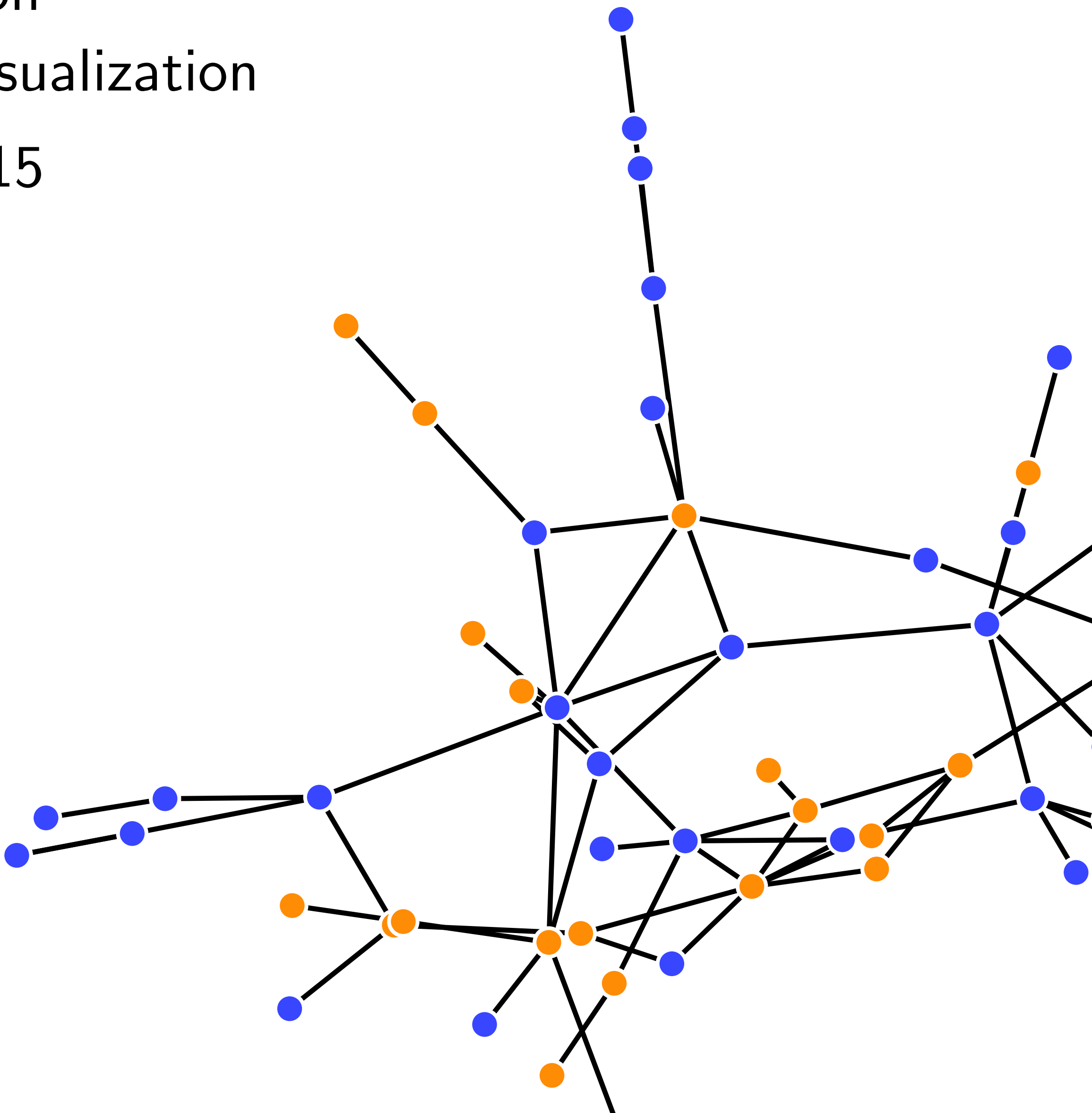

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- homophily is not restricted to *social networks*
  (Question: groups = clusters?)

Formalizing Homophily

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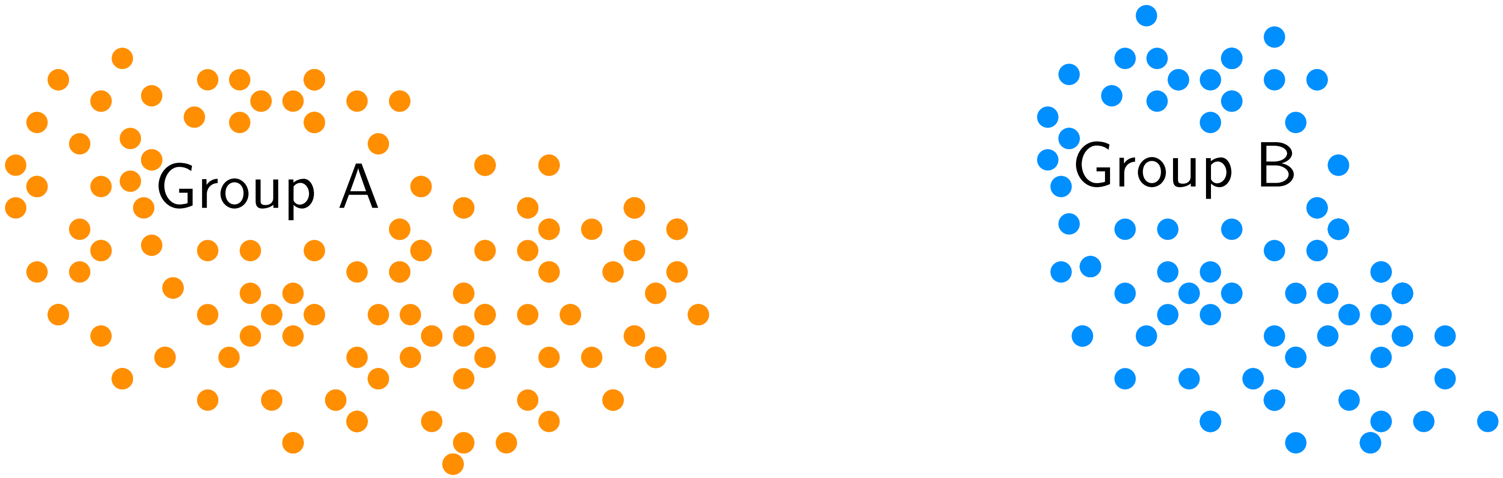

fraction p of the individuals

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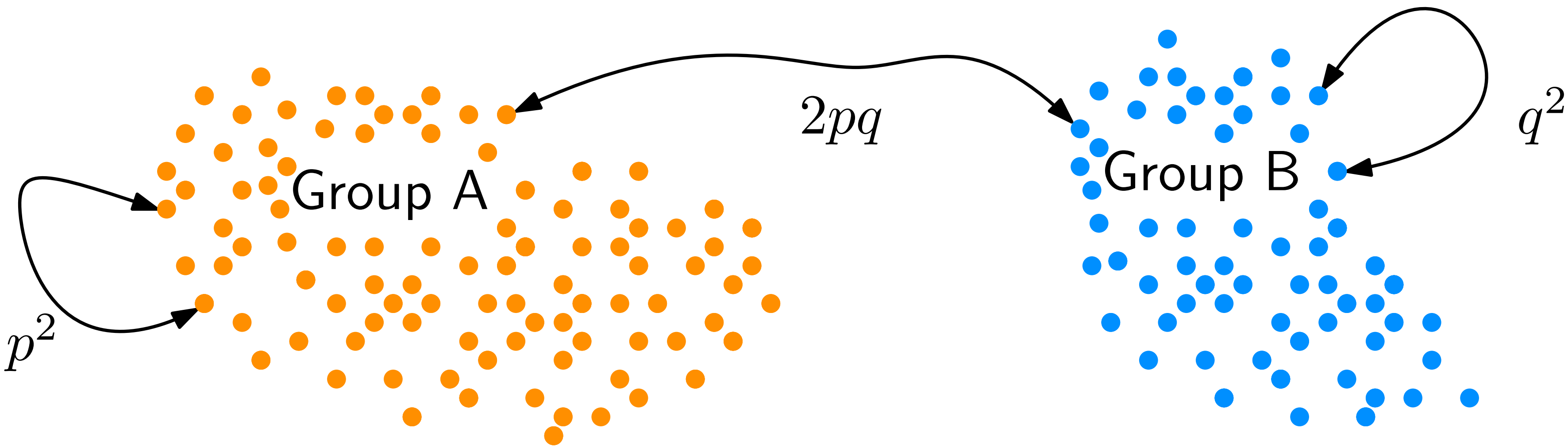

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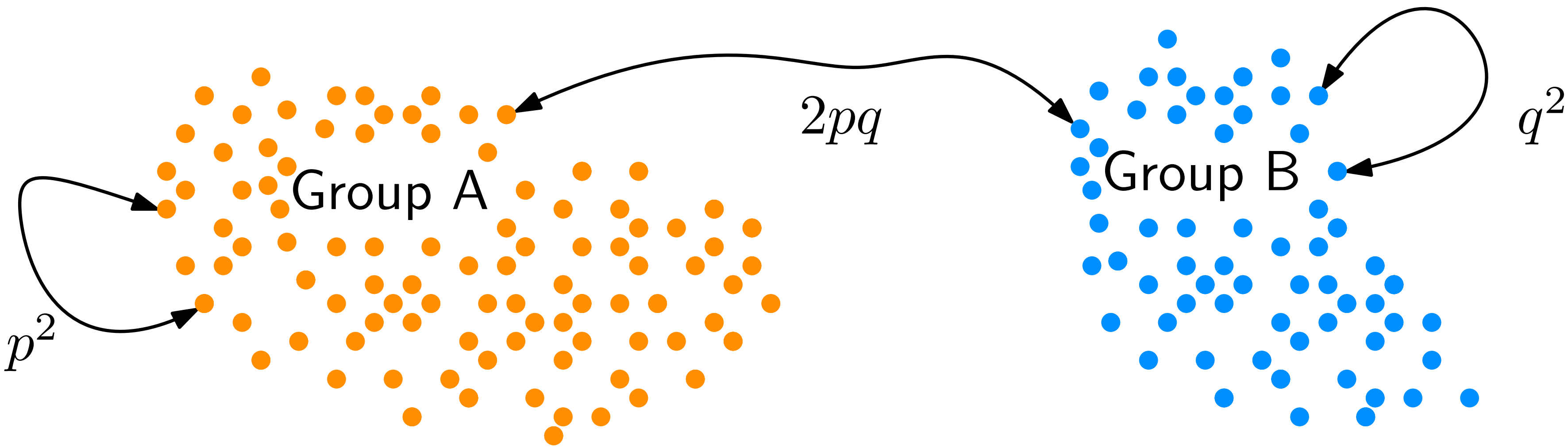

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Homophily Test

If the fraction of the between-group links is significantly smaller than $2pq$ we have homophily.

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① only cross-group links (heterophily)

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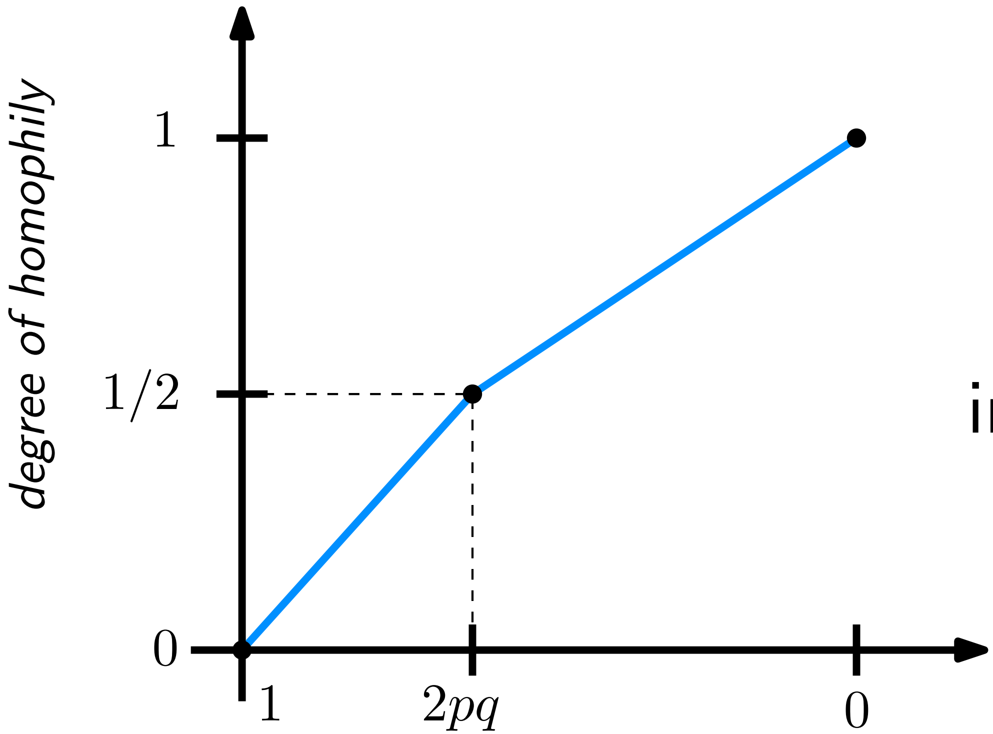

interpolate all other values linearly

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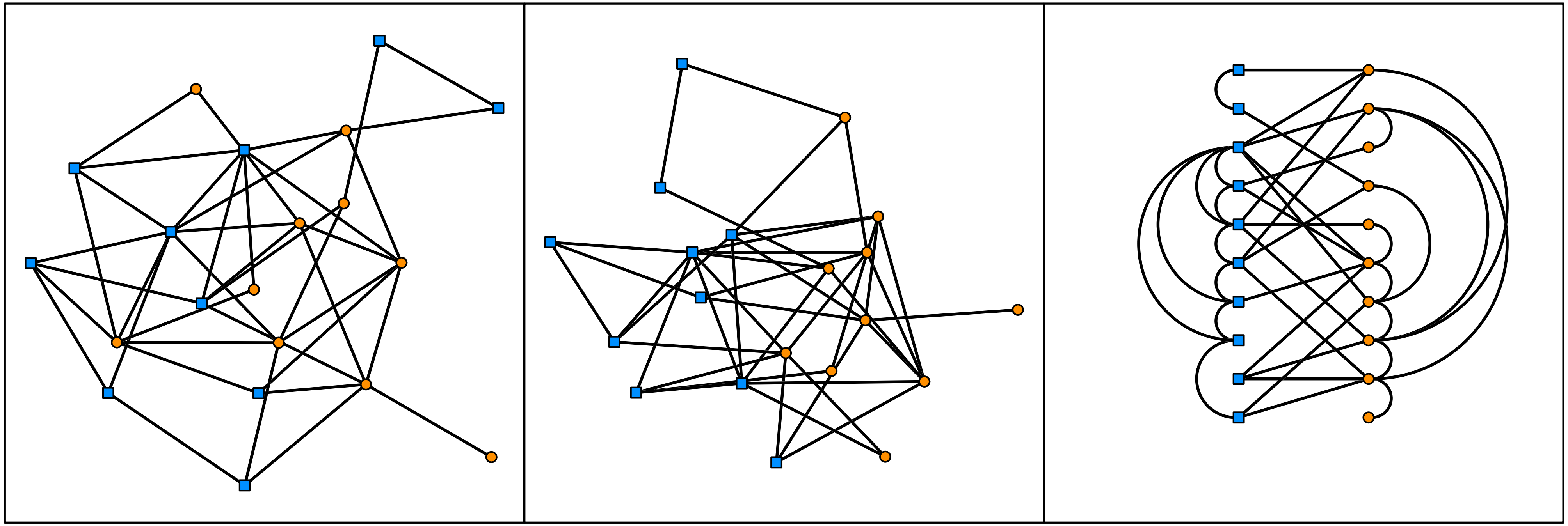
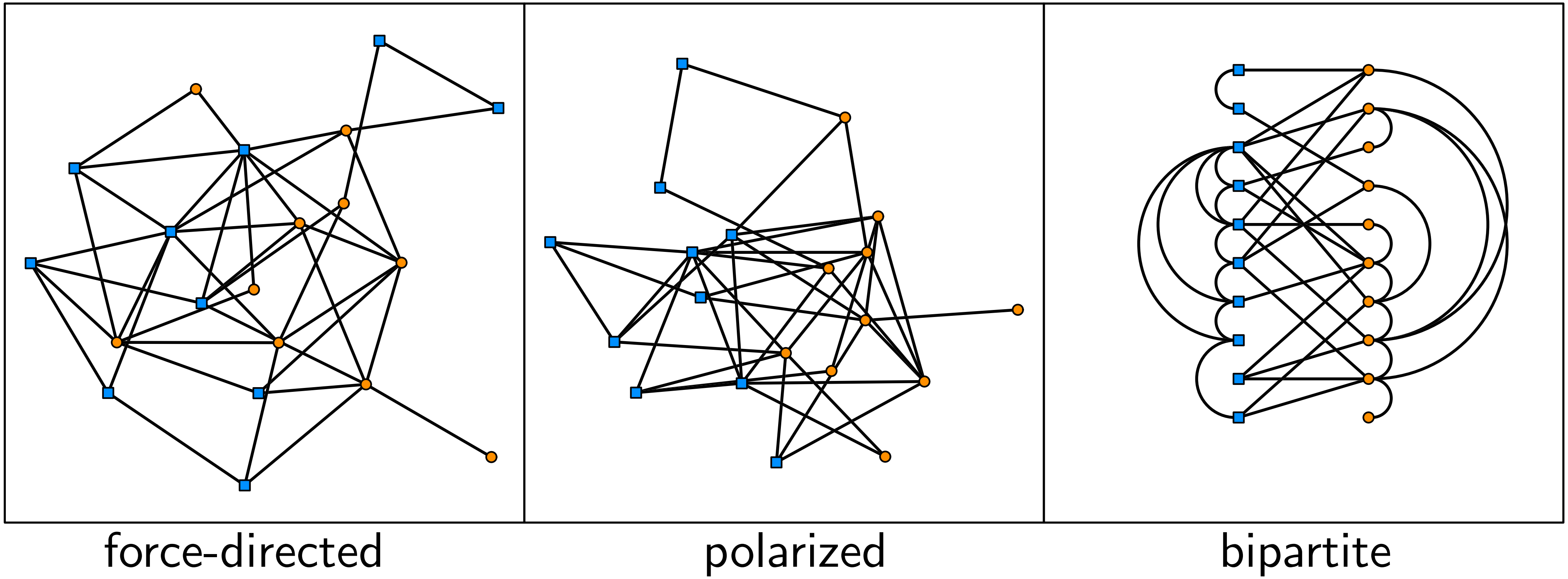
ⓘ **We only consider node-link diagrams and the "two-groups-scenario"**

Layouts



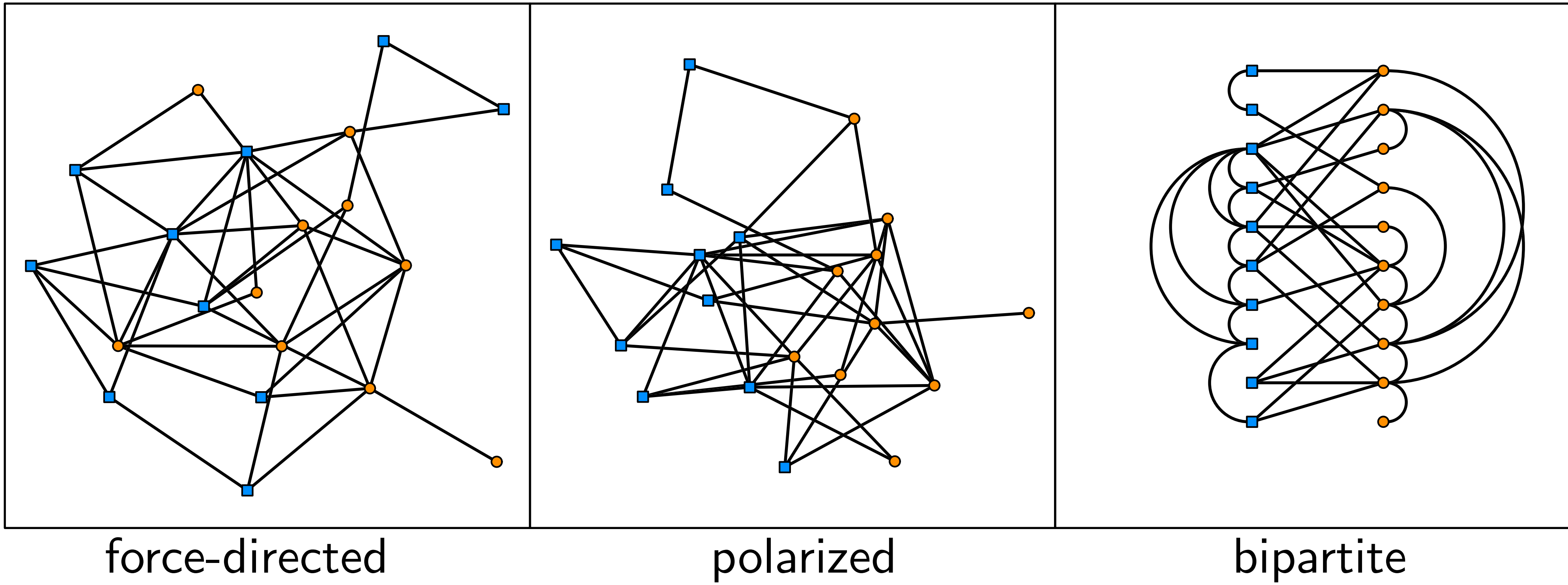
force-directed polarized bipartite

Layouts



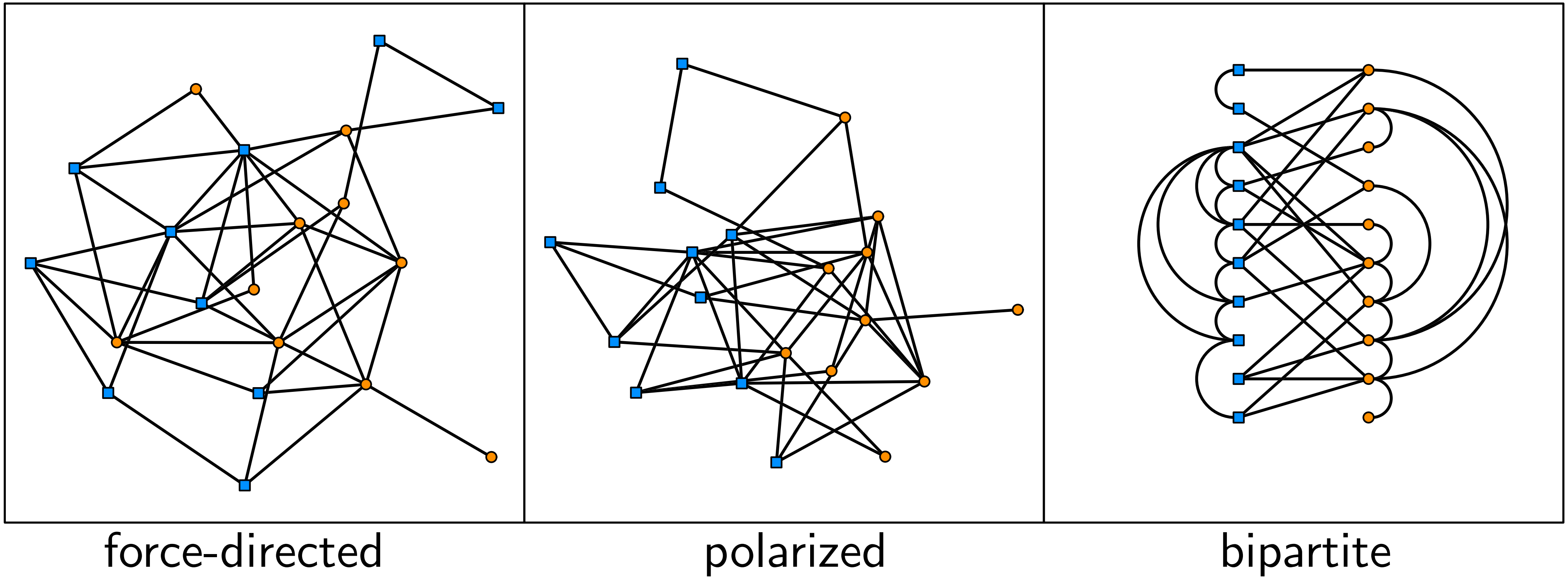
- layout based on the Fruchtermann–Reingold Algorithm
- implementation taken from the `d3.js` library

Layouts



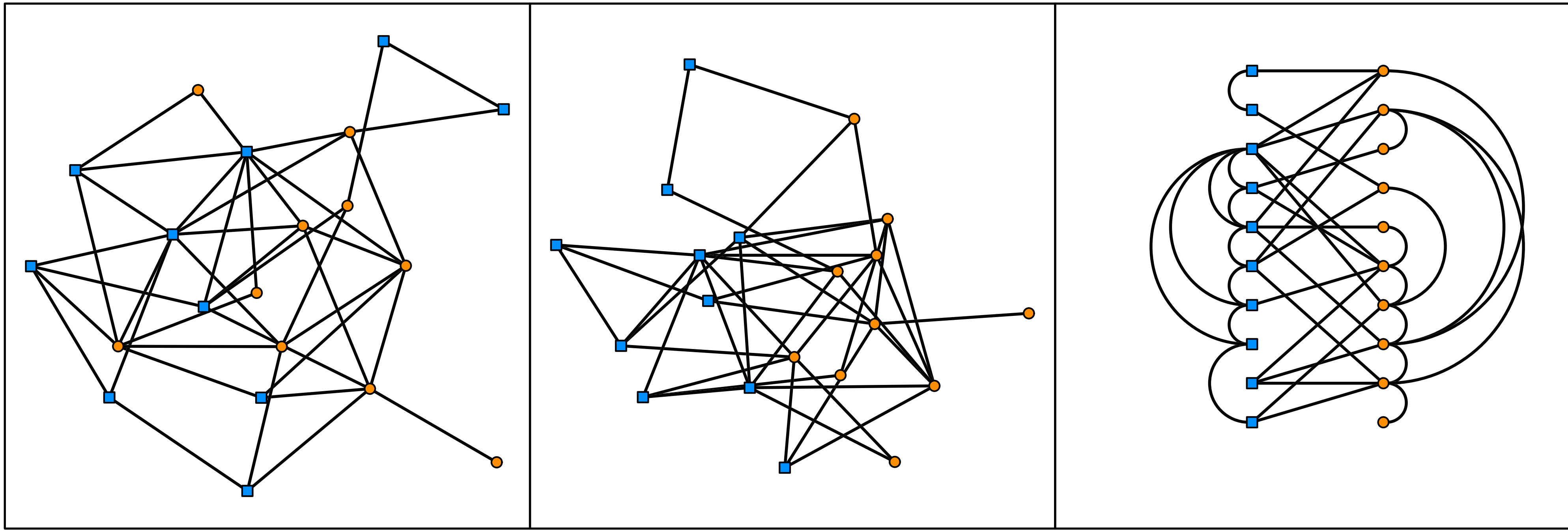
- modification of the force-directed layout
- additional forces pull blue vertices to the left and red vertices to the right

Layouts



- groups are placed on opposing vertical lines
- barycentric layout + sifting to remove crossings
- different shapes for cross-group/within-group edges

Layouts



force-directed

polarized

bipartite

group separation

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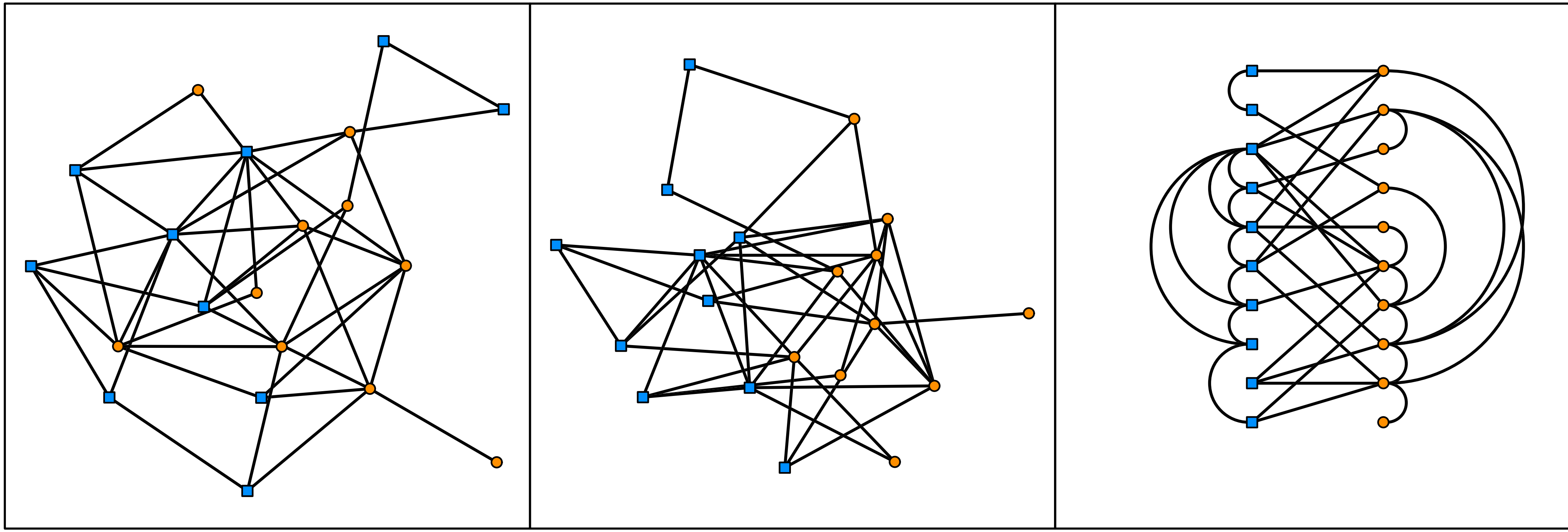

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group separation

homophily detection easier?

other tasks more difficult?

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- 3 layouts
- balanced (50:50) and unbalanced (25:75)
- 5 degree of homophily levels (only 3 for unbalanced)
- 2 tasks (homophily / length of shortest path)

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demo of the user study

`http://tutte.fernuni-hagen.de/~schulza`

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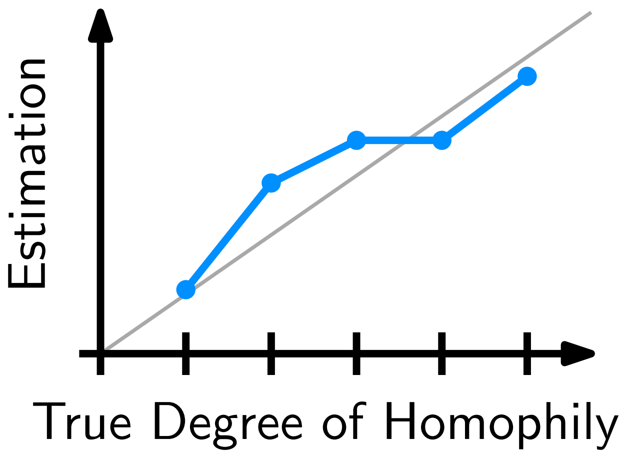
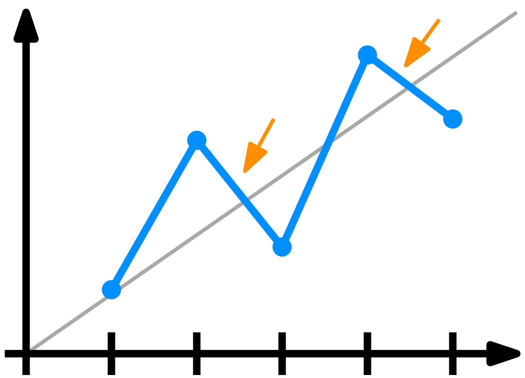
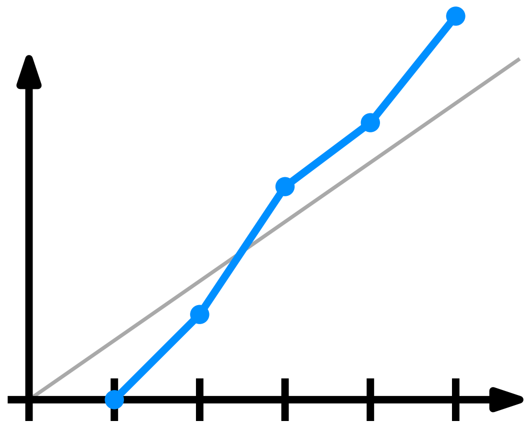


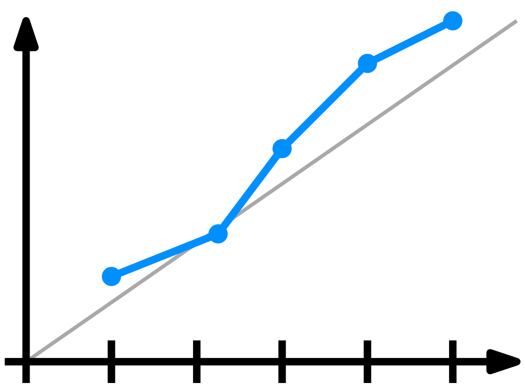
good estimation



bad estimation

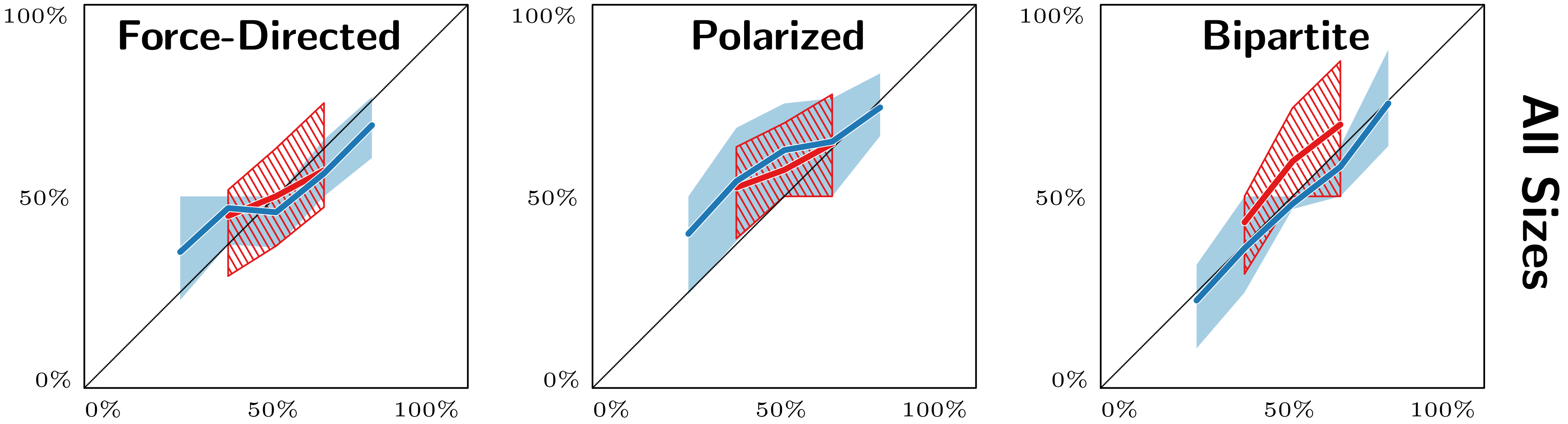


good estimation (different personal scale)



okay estimation but overestimated

Homophily Results



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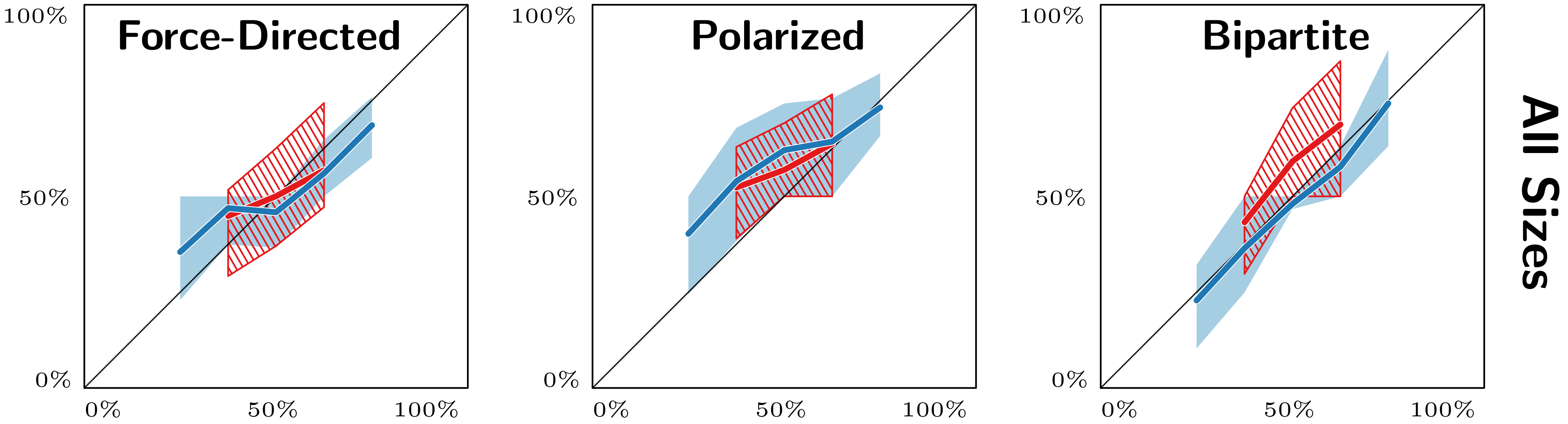

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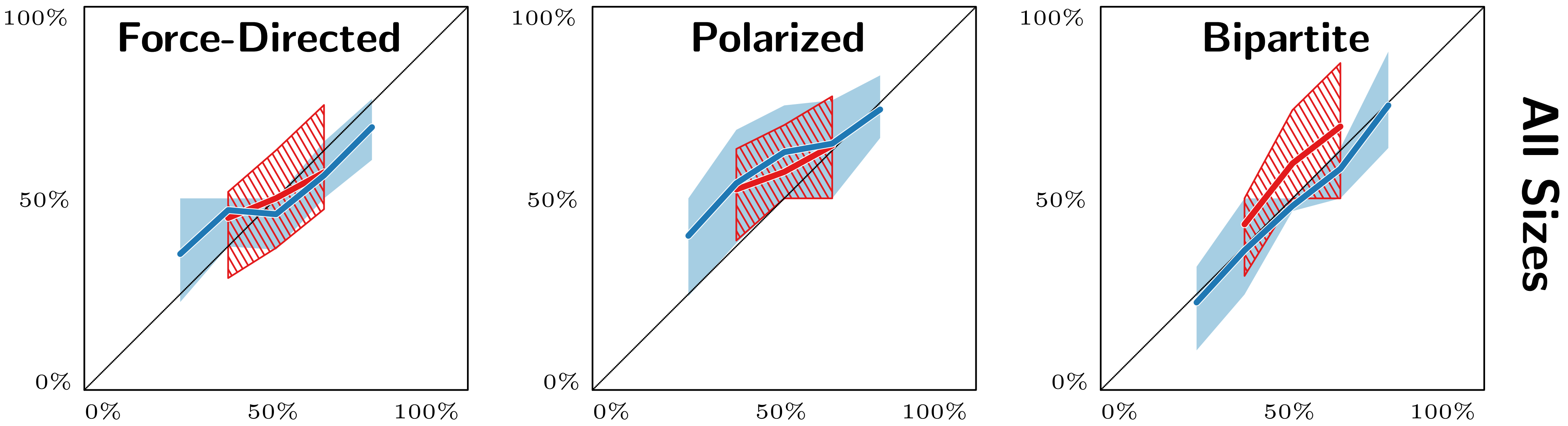

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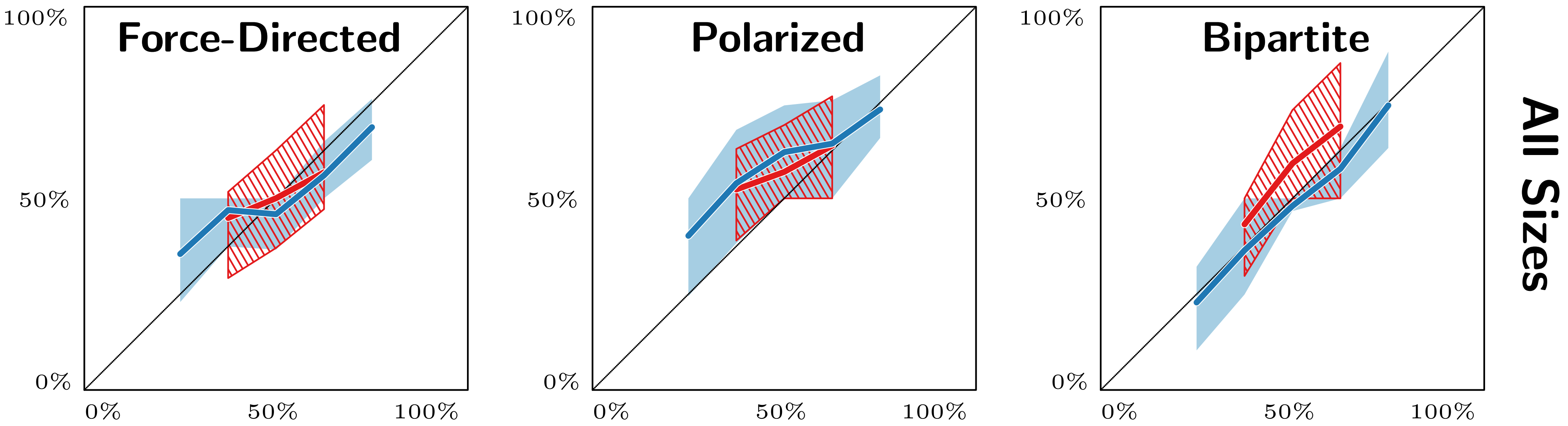

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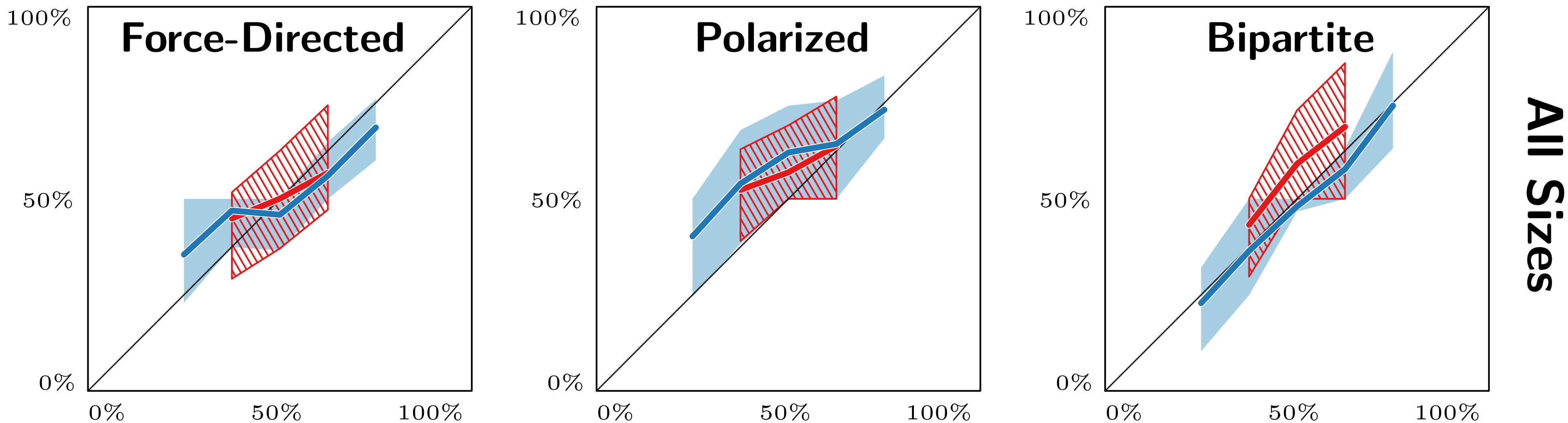

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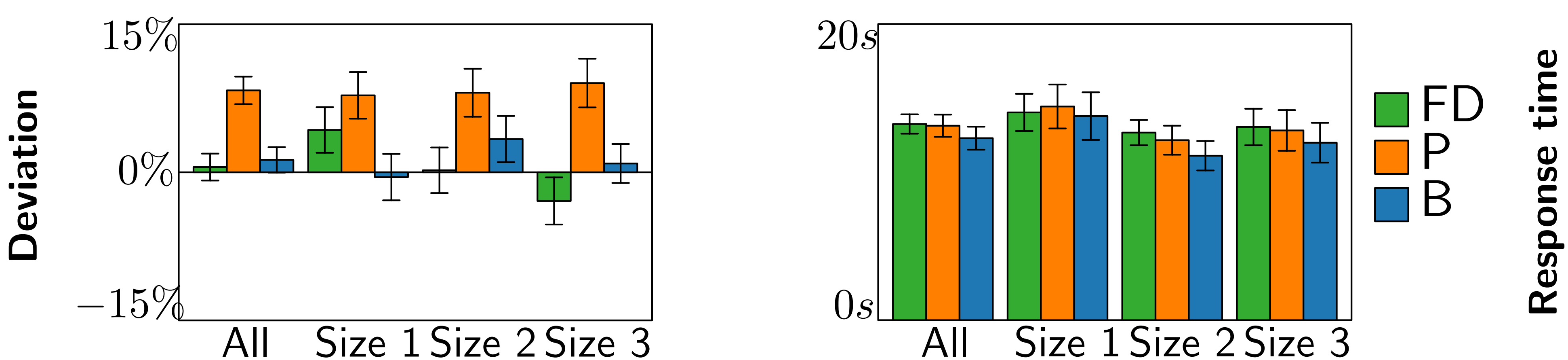
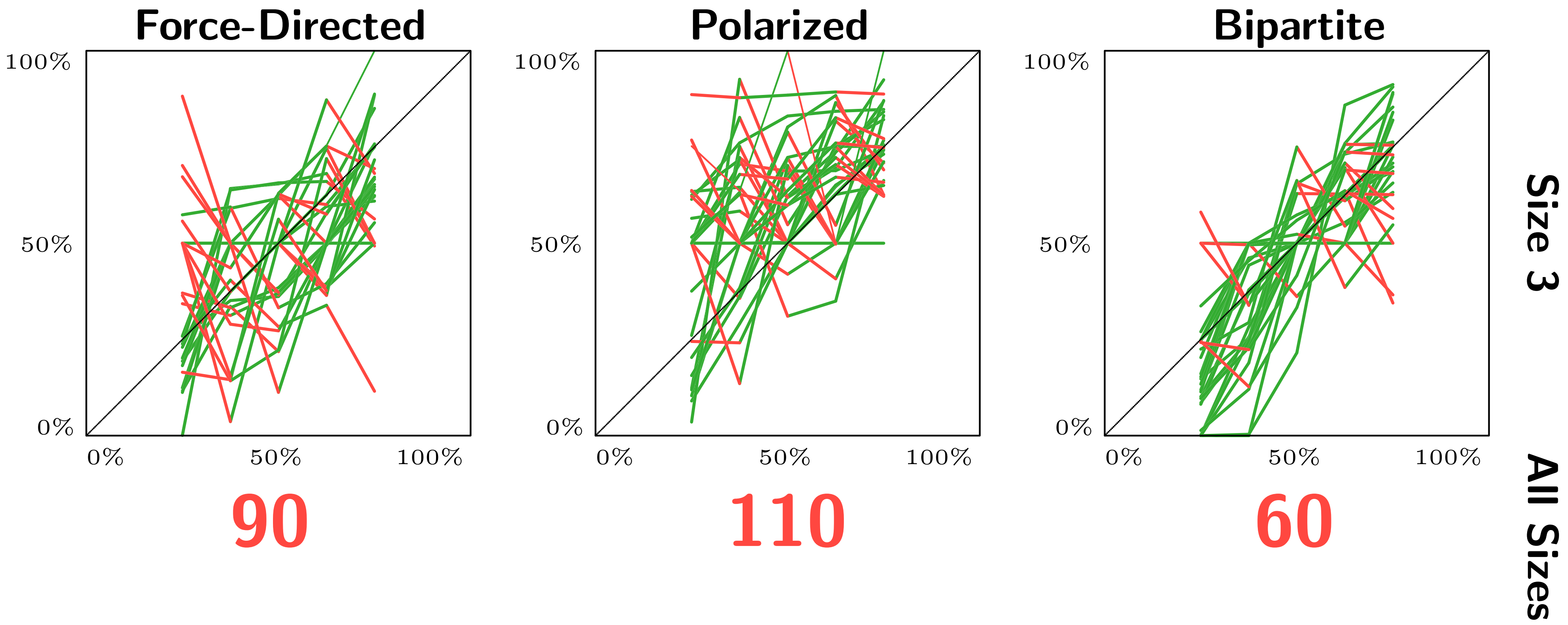


Homophily Results - Internal Consistency



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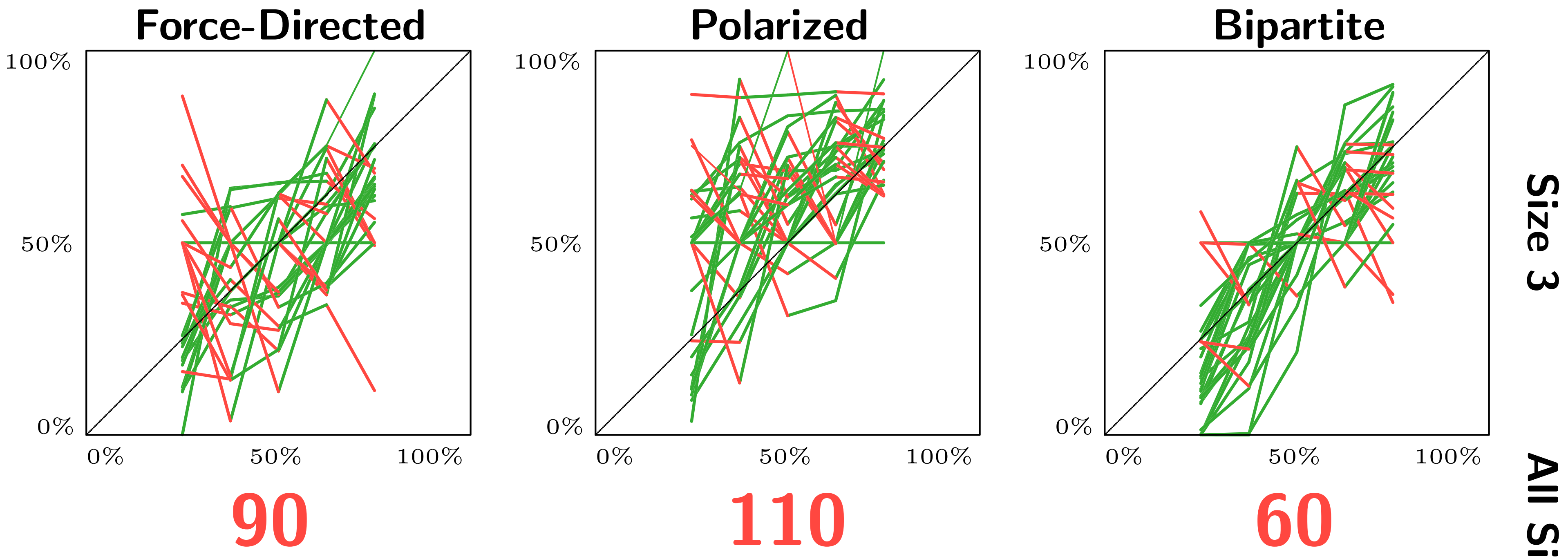

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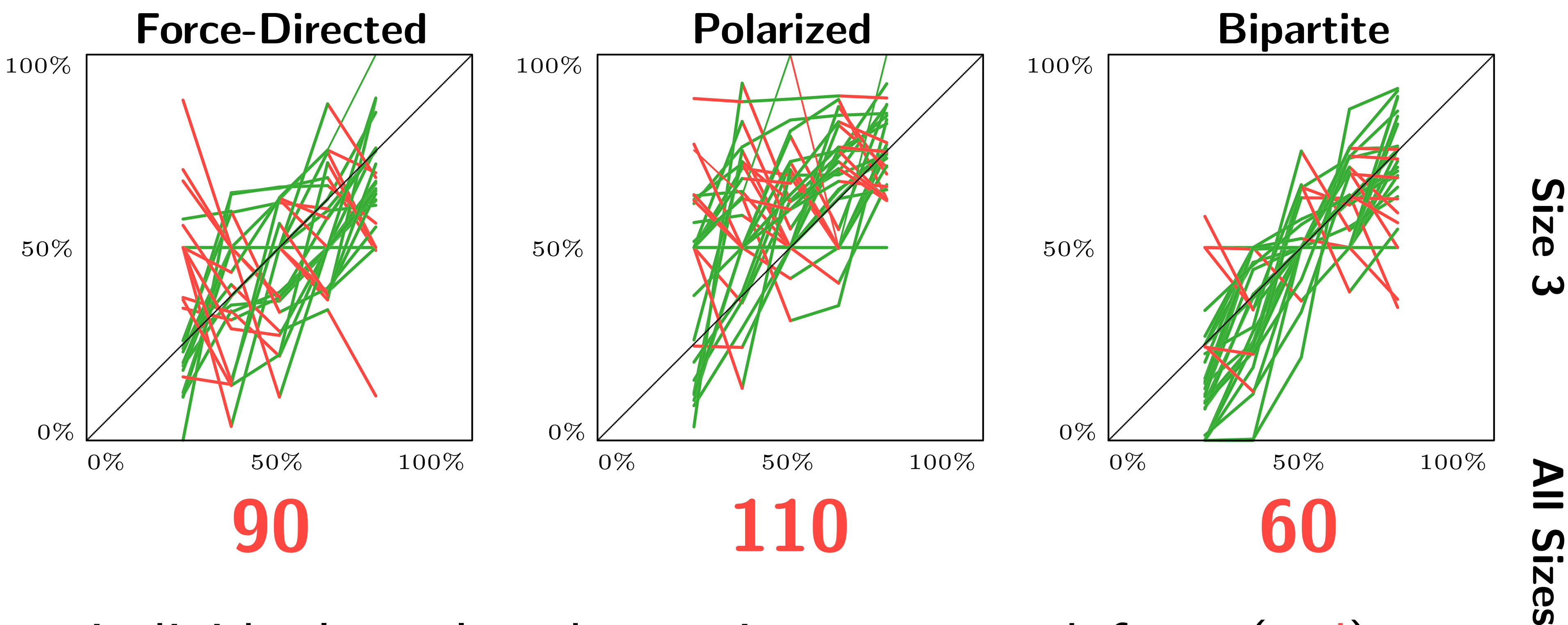

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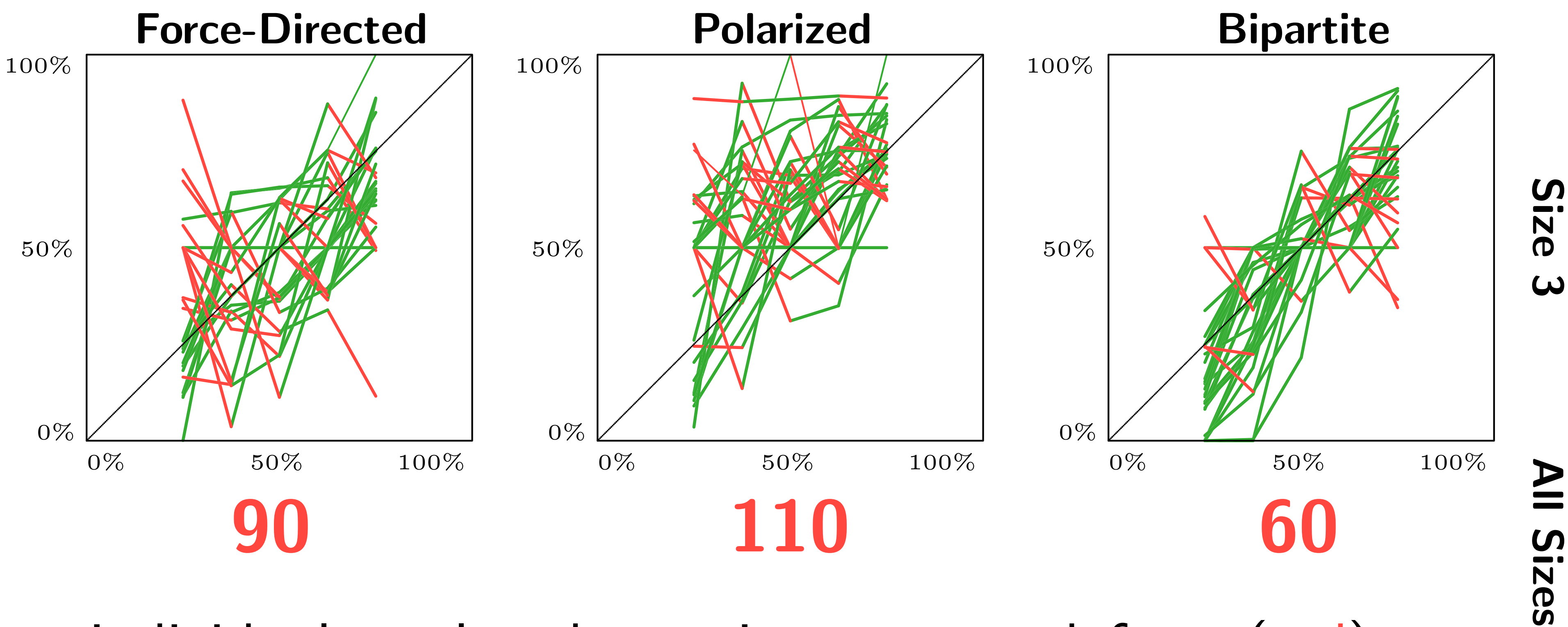

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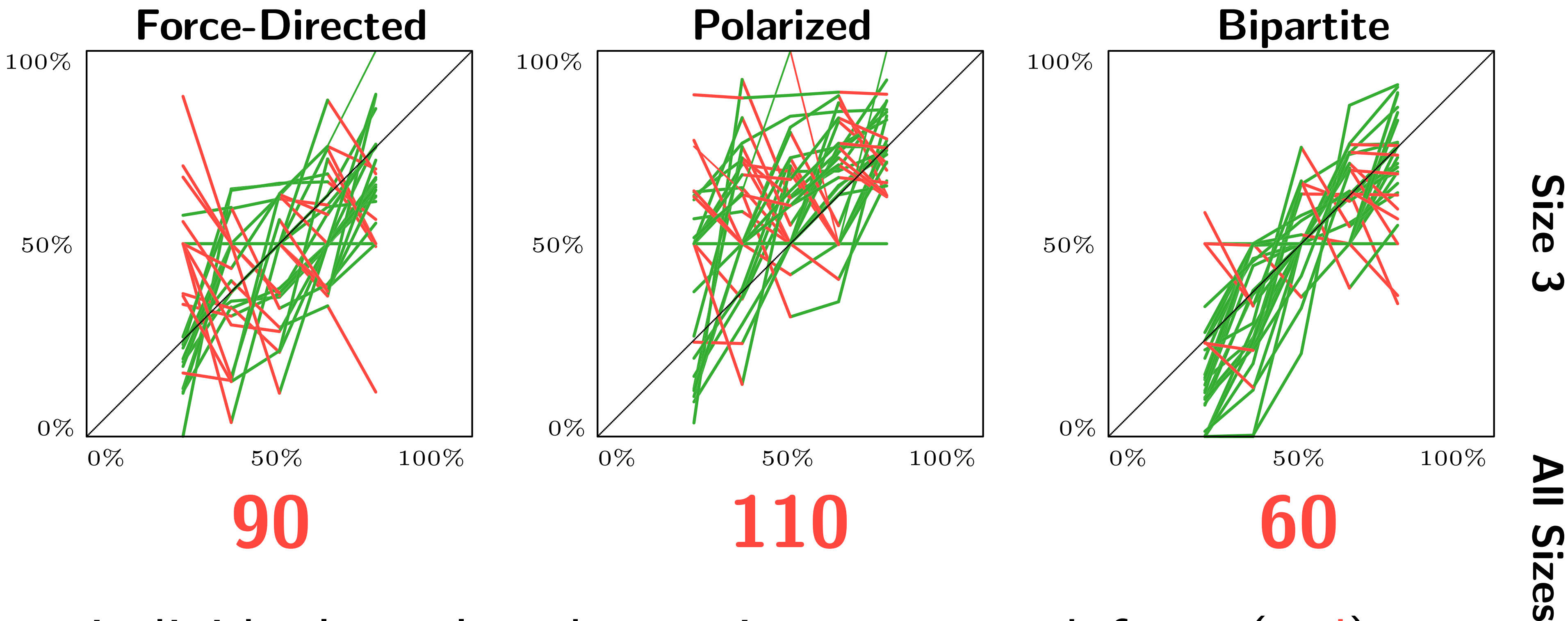

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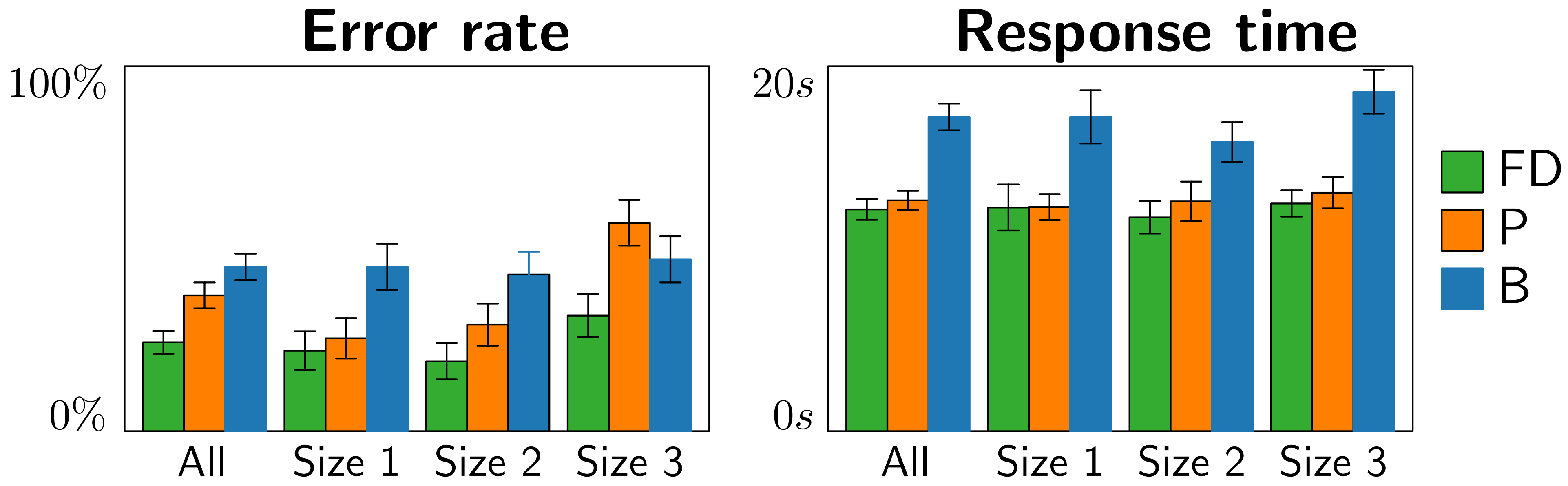

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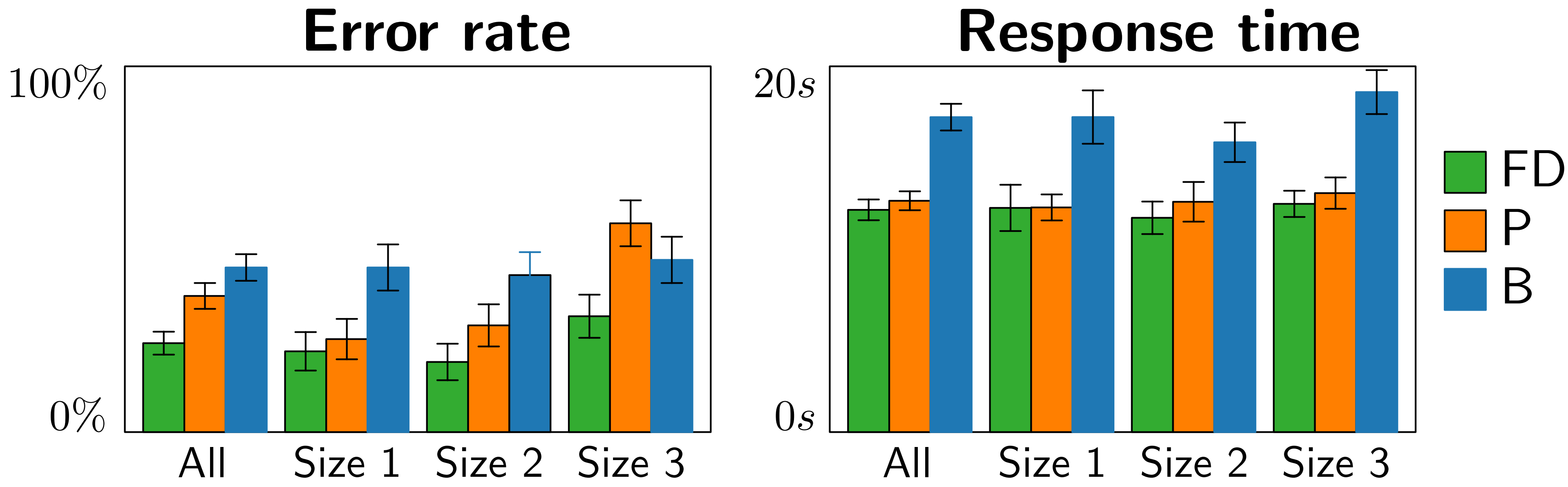

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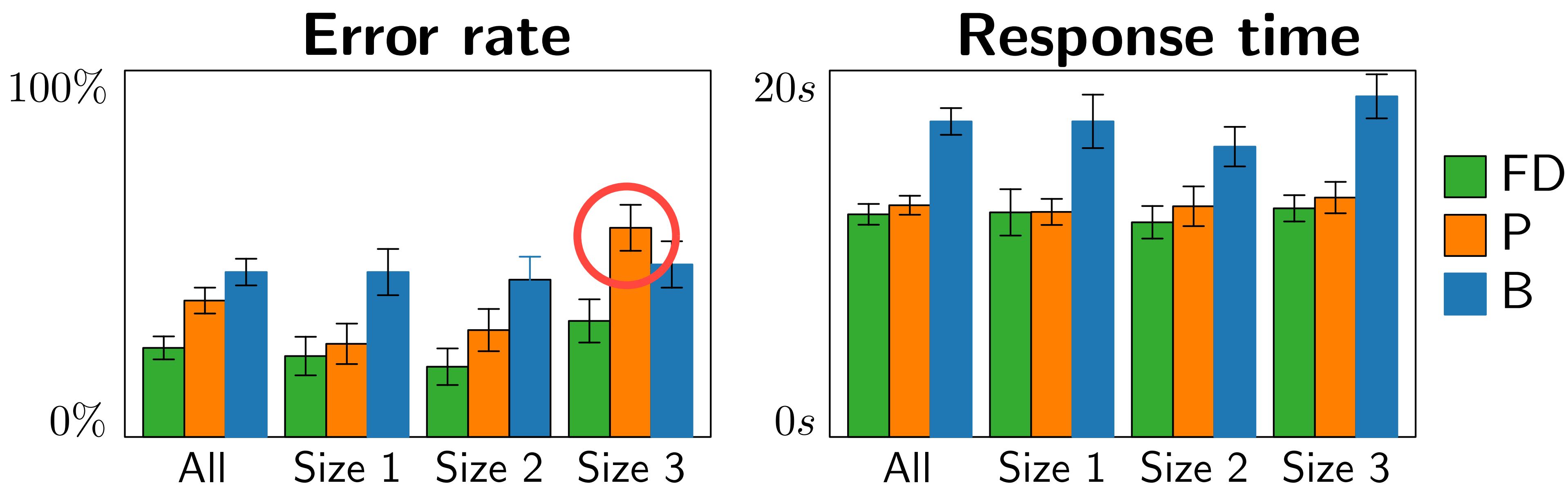

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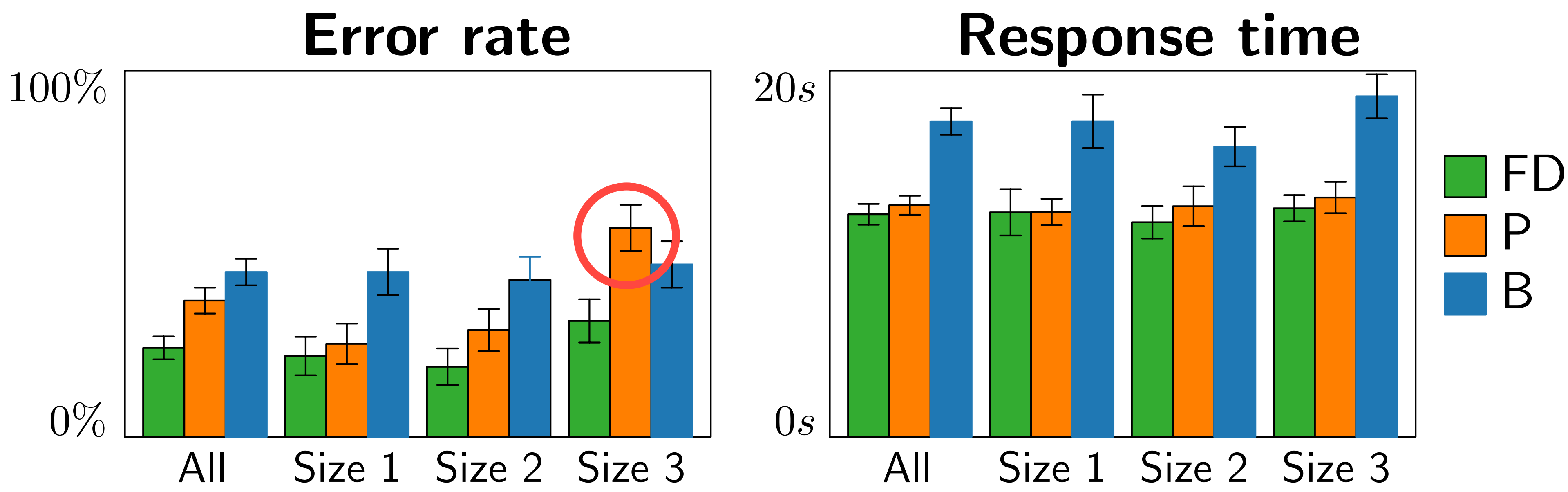

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- size was not a big influence

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- we can accept **H2** and **H3** based on our statistical analysis

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