Sensitivity Analysis of Linear Structural Causal Models

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UCLA

Joint work with Daniel Kumor, Bryant Chen, Judea Pearl and Elias Bareinboim

ICML, Long Beach, June 2019

Motivating example: smoking and cancer

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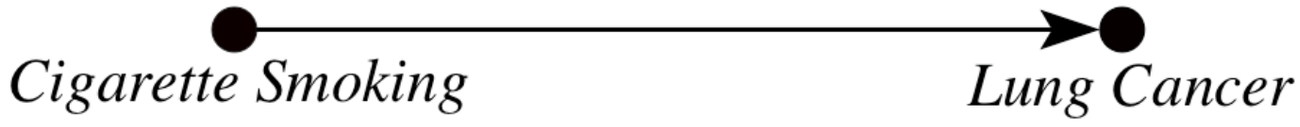

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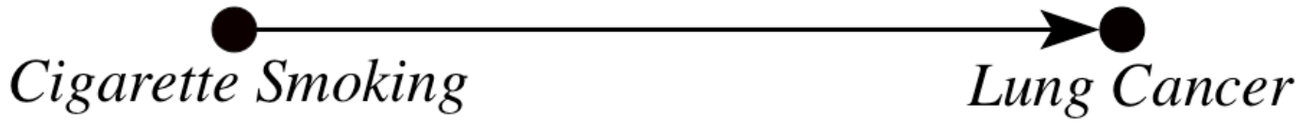

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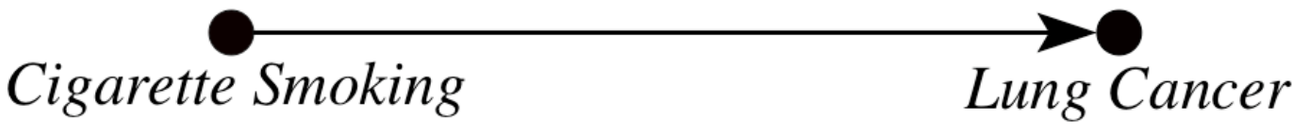

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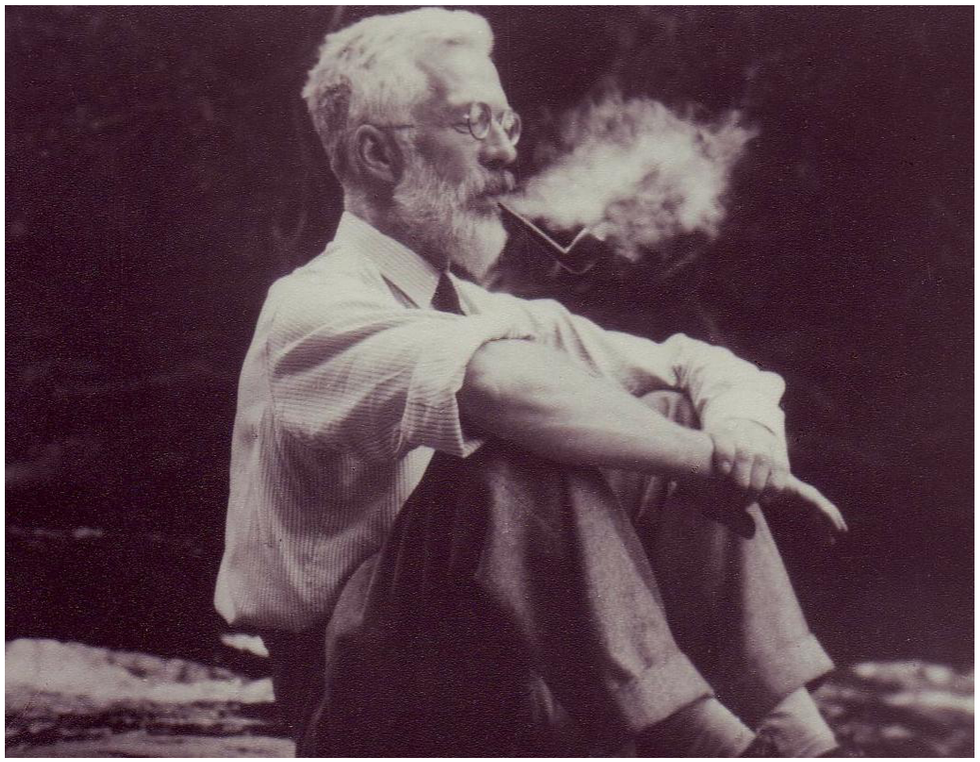

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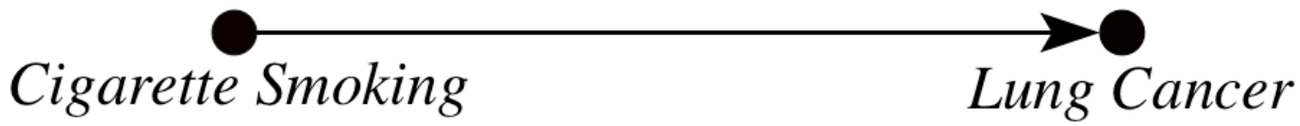

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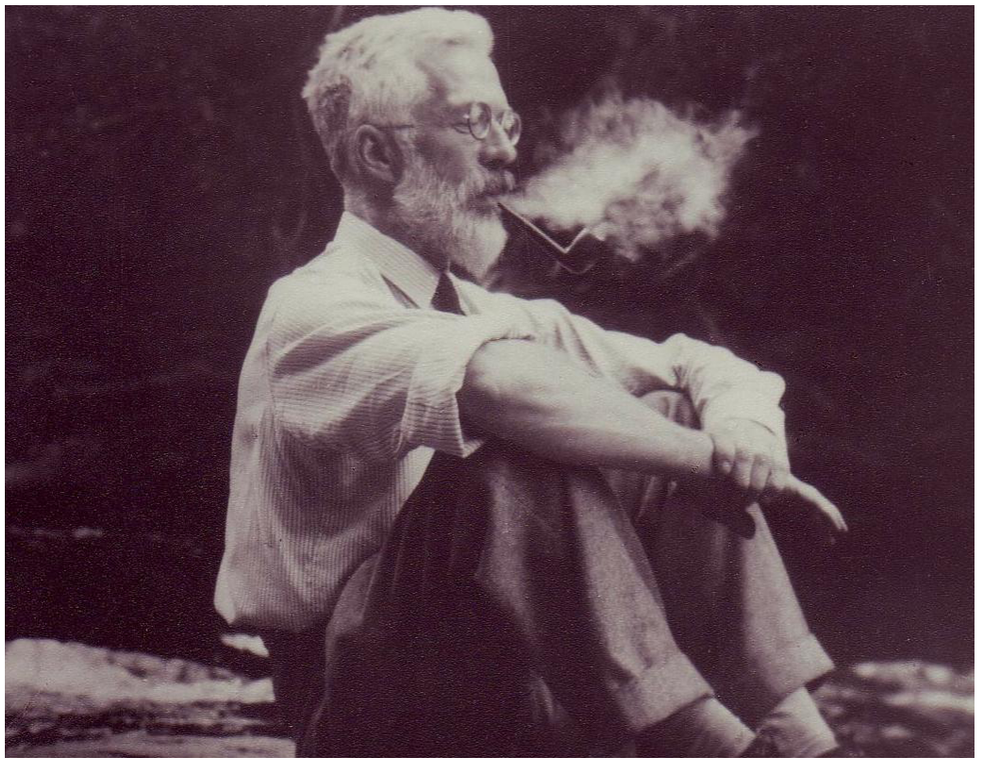

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Observational data alone cannot distinguish both models.

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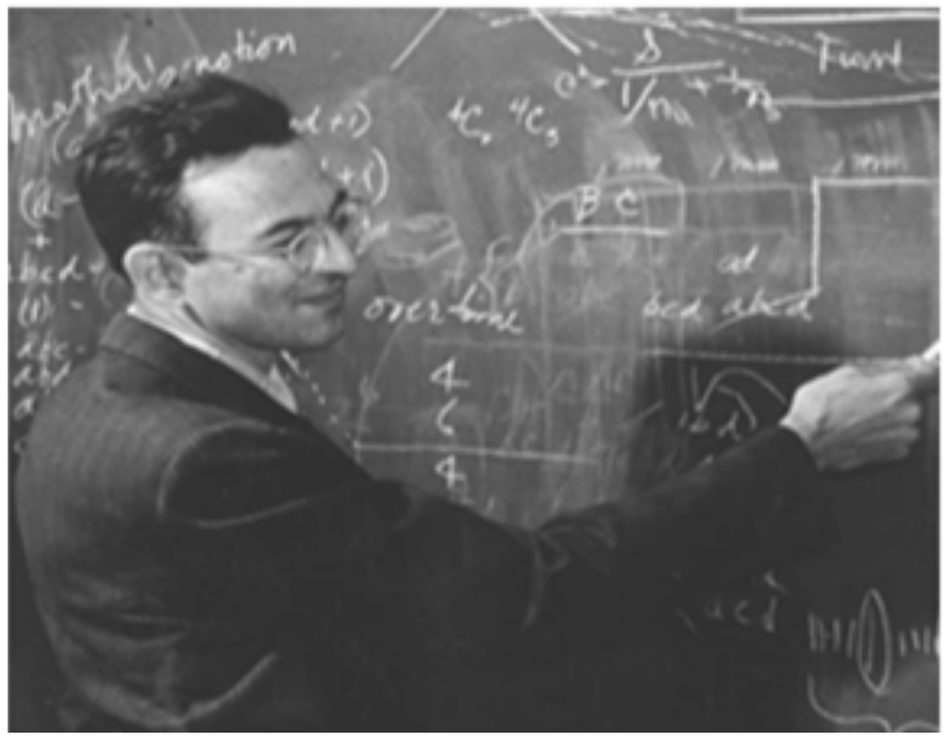

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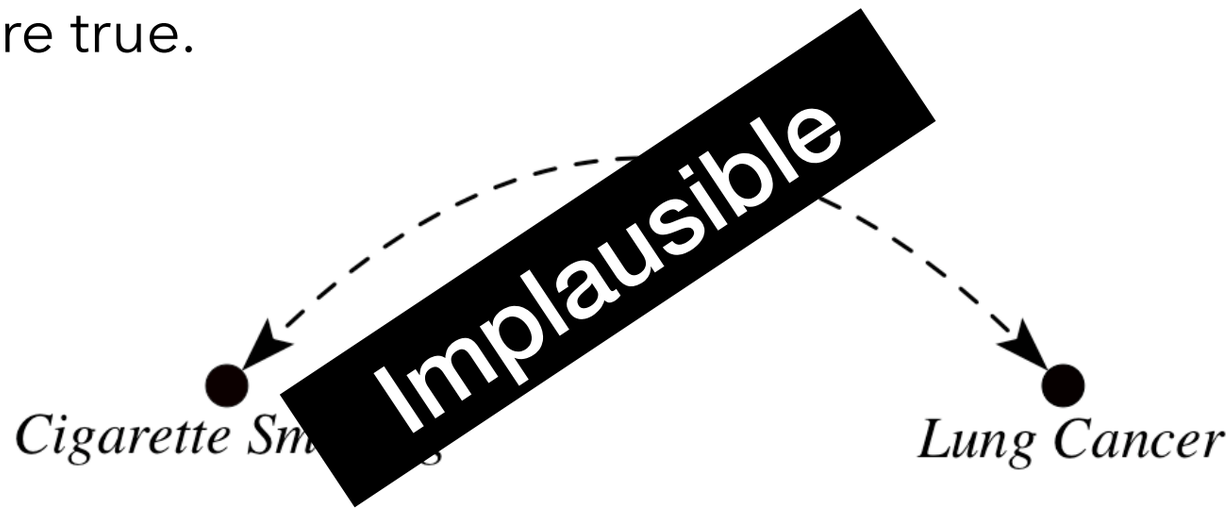

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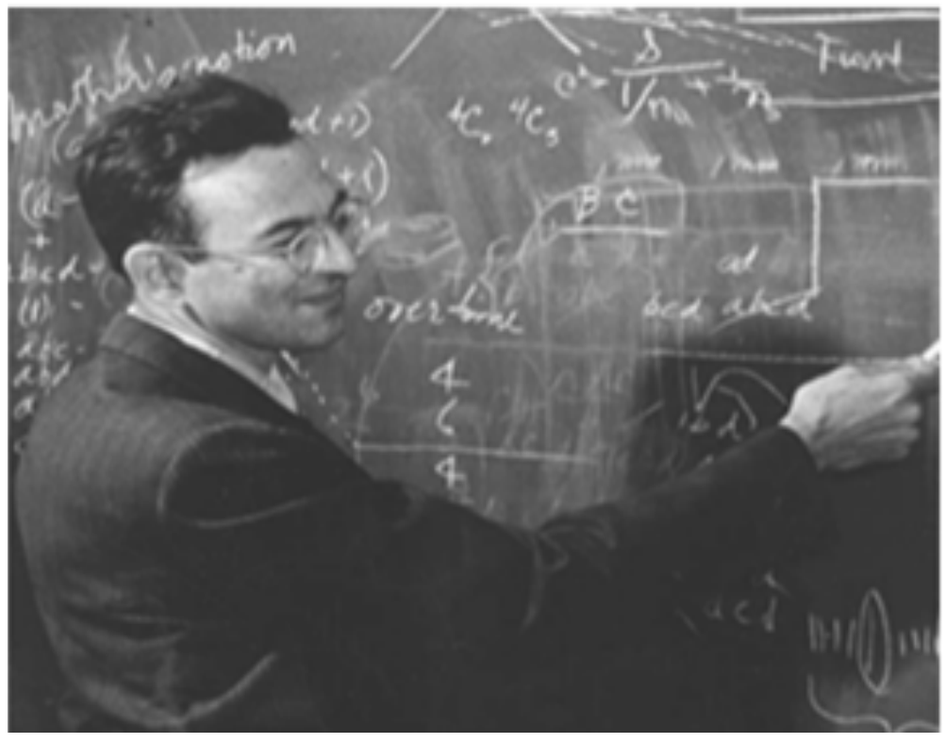

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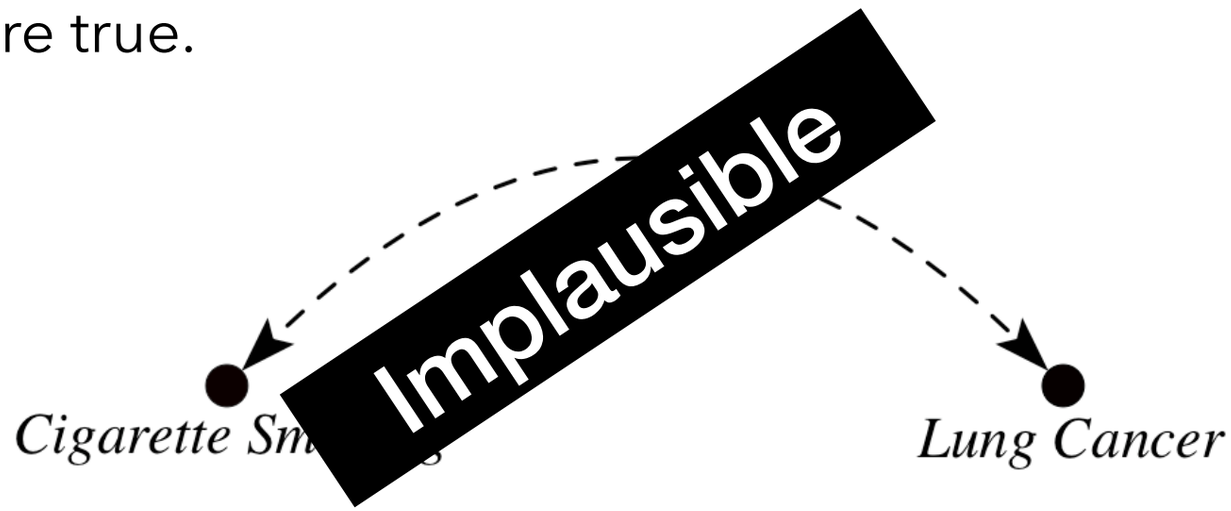

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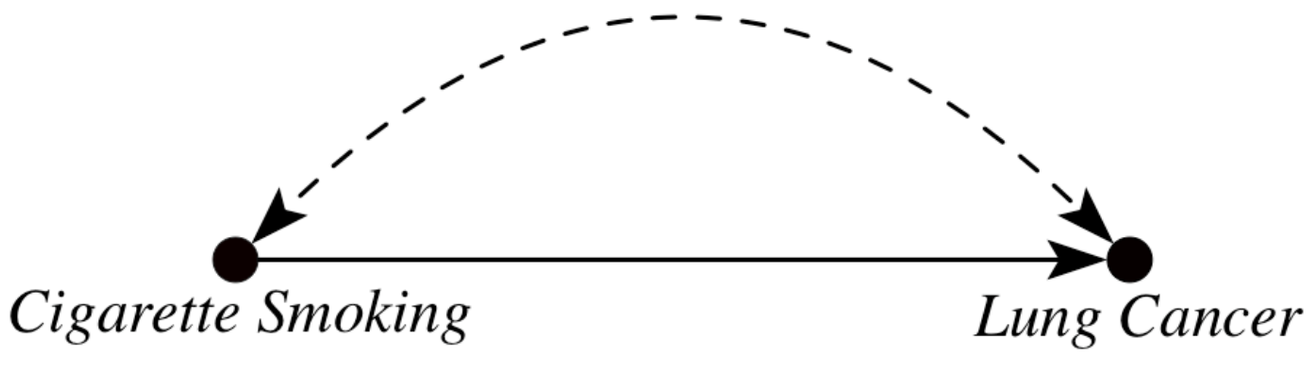
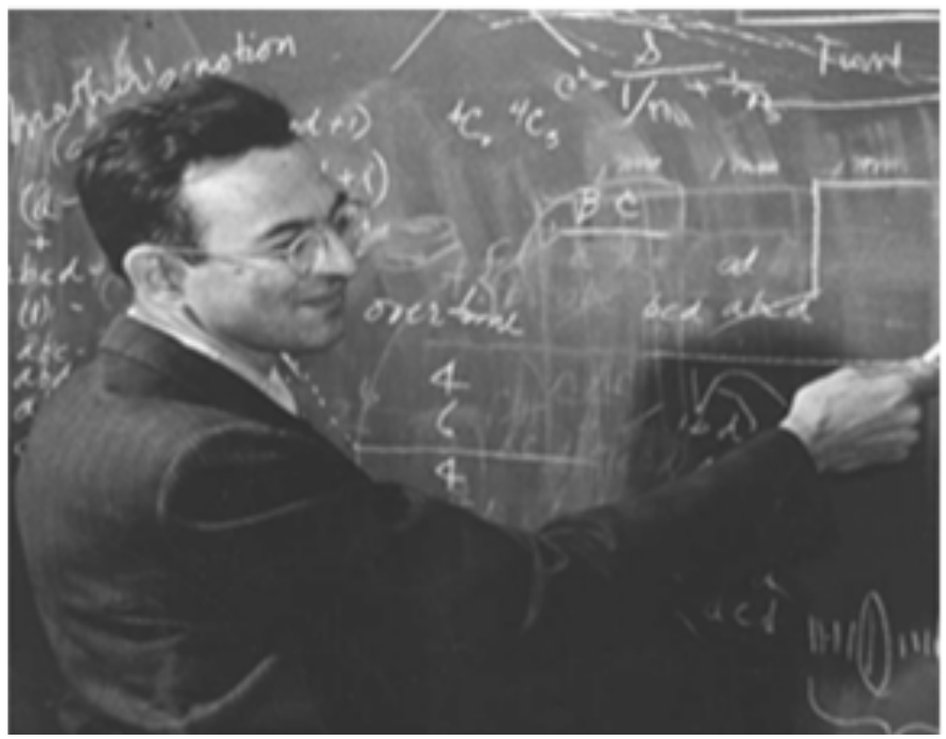


Sensitivity analysis + plausibility judgments = there must be a causal path between cigarette smoking and lung cancer.



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Sensitivity analysis allows us to ***quantify how the violations of assumptions affect our conclusions.***

These results can then be ***submitted to expert judgment***, to decide whether problematic degrees of violation are plausible.

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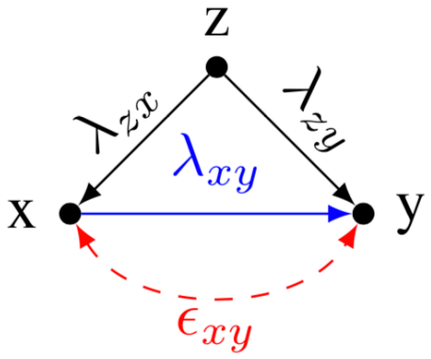

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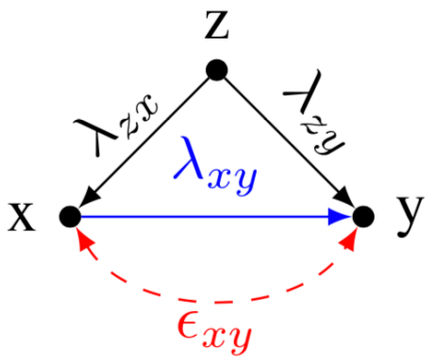

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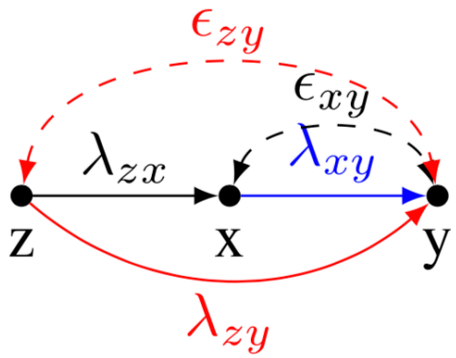

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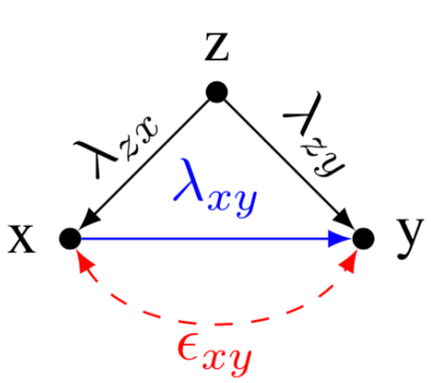

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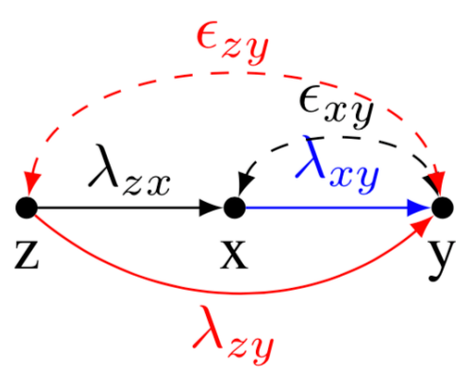

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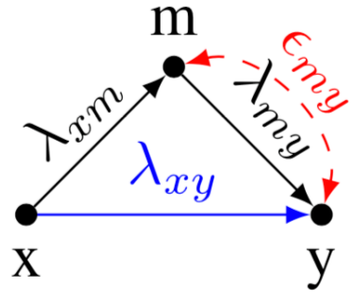

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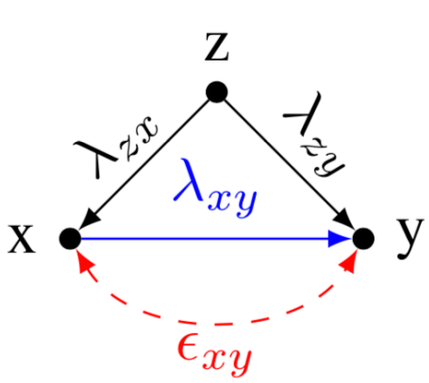

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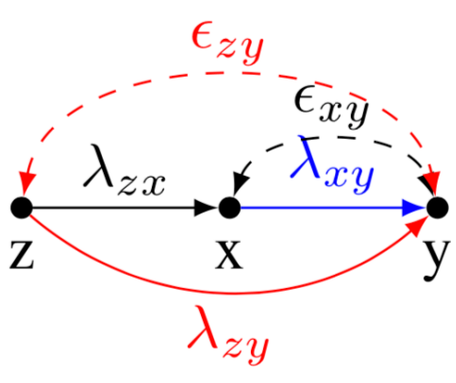

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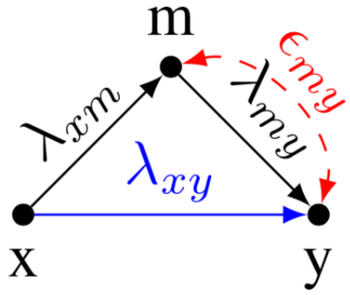

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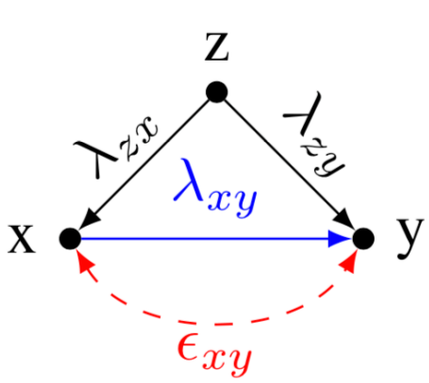

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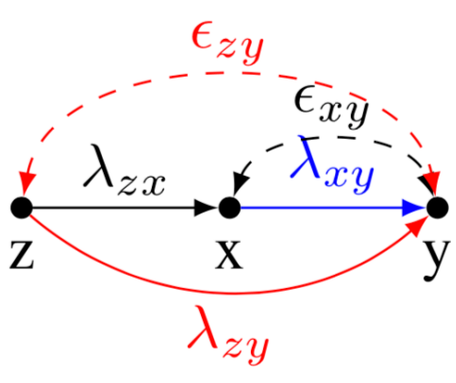

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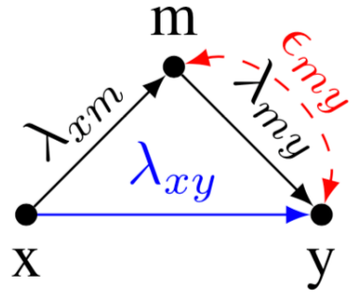

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Can we have a ***general-purpose, algorithmic framework*** that captures all these canonical cases – and many more?

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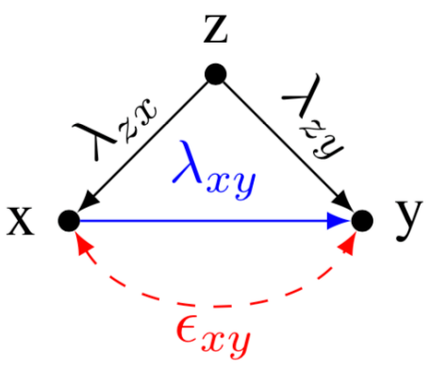

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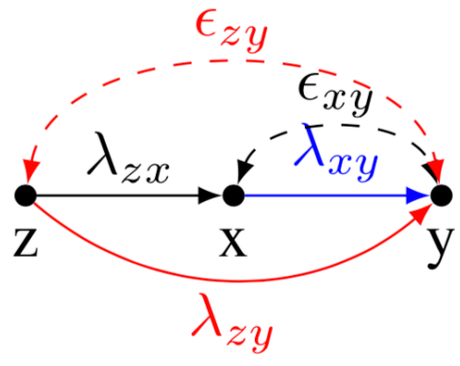

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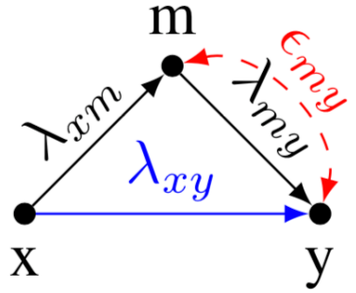

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…canonical cases are a small subset of all possible sensitivity analyses covered by our framework.

For details, come to our poster session:

Wed, Jun 12th
6:30pm–9:00pm
@ Pacific Ballroom #78

Or see paper: https://tinyurl.com/y5urlwqs

Thank you!

Contact
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twitter: @analisereal