Hemanta K. Maji

Cryptography and Security

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- Science of providing Controlled Access to Information
  - "Who learns what," and
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- Goal: Discover Laws of Nature through the Lens of Security & Privacy using Mathematical Tools

Laws of Nature: Examples

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- Channel Capacity: Law of Information Throughput

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- Circuit Complexity: Cost of Computation

My Perspective & Goal

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- Law of "Privacy Throughput"
  - Transmuting various forms of Atomic Components of Privacy at Optimal Rate

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- Cryptography is founded upon Atomic Components
- Law of "Privacy Throughput"
  - Transmuting various forms of Atomic Components of Privacy at Optimal Rate
- Cost of "Privacy-preserving Computation"
  - Securely Computing using Minimal Atomic Components

Applications: Secure Computation

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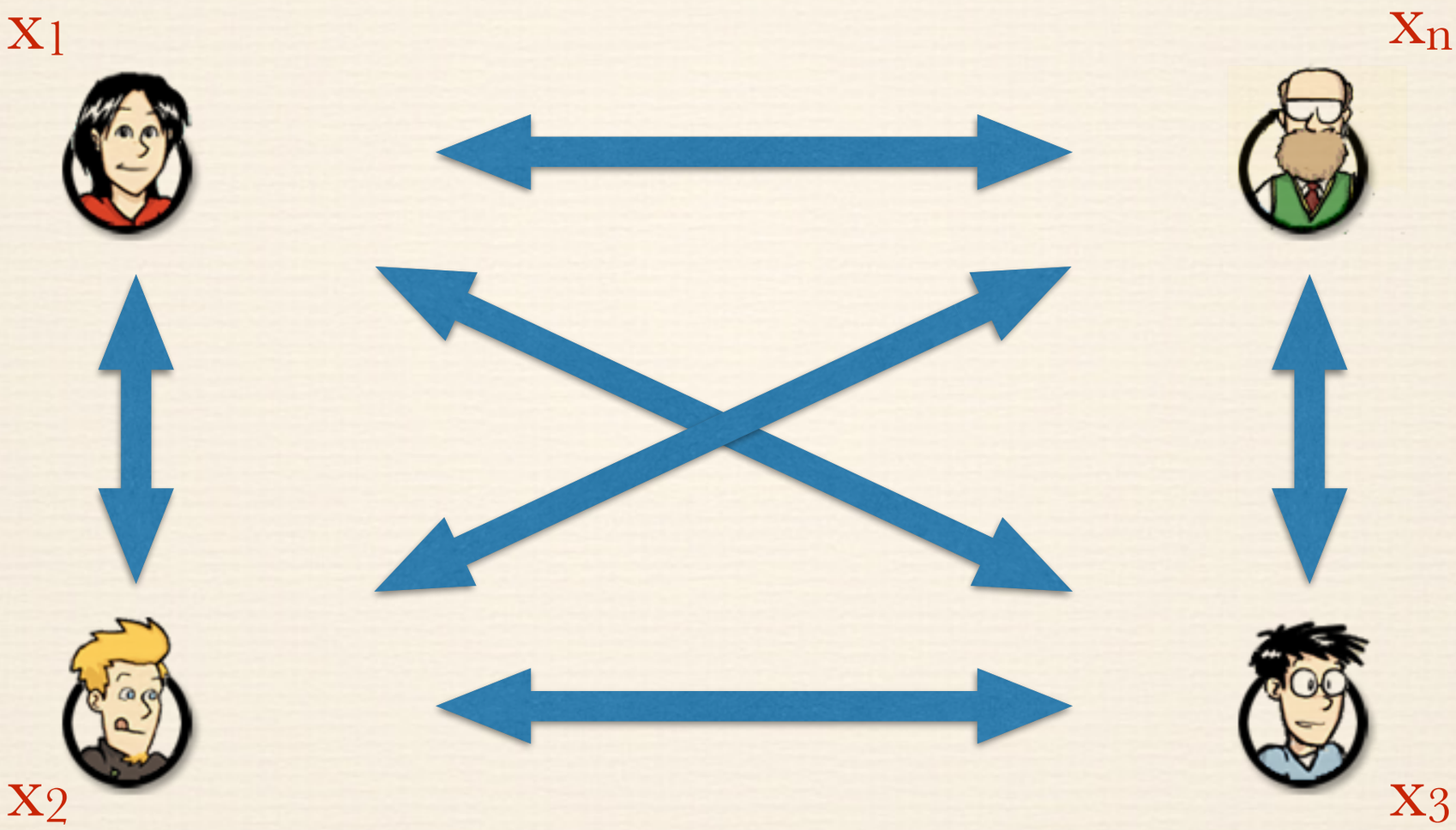
x_1

x_n

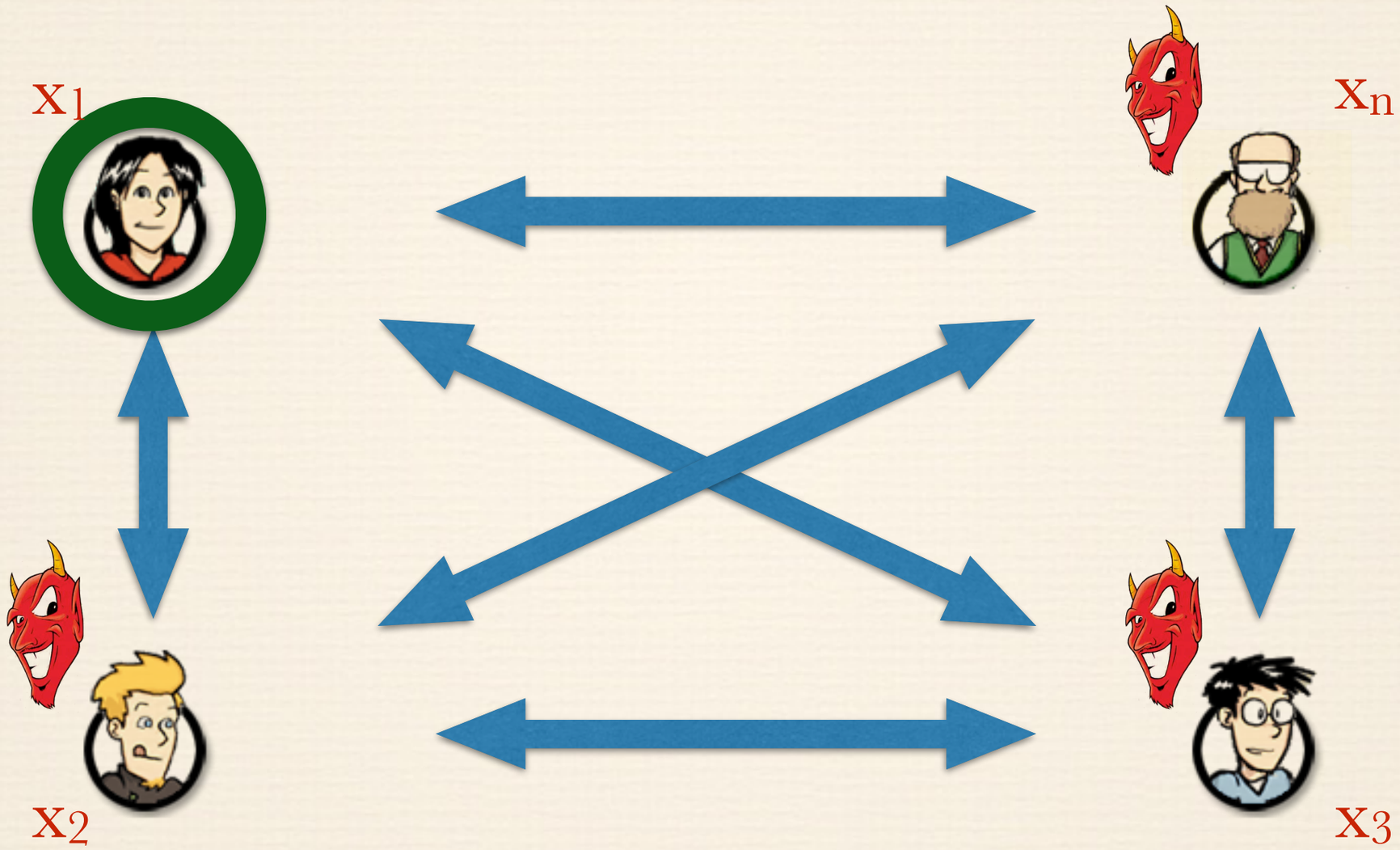
x_2

x_3

Applications: Secure Computation



Applications: Secure Computation



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- With: Maximum Resource Efficiency

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- Using: Noisy Channels, Secure Hardware, Hardware Tokens, Conservative Computational Assumptions

Applications: Secure Computation

- With: Maximum Resource Efficiency
- Using: Noisy Channels, Secure Hardware, Hardware Tokens, Conservative Computational Assumptions
- Despite: Sophisticated Adversarial Attacks, like Leakage and Tampering

Summary

- Understand: Law of "Privacy Cost"
- Closely Correlated with the Practice of Cryptography
  - For example: Secure Computation

Thanks