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Complex Systems

- Behavior in aggregate differs from behavior of individual components.
- Macroscopic difference emerges from the interactions of components.

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Simple Rules

These govern the interactions between agents in the system.

- Forces that cause the system components to give rise to the macroscopic structure
- E.g., human processes such as traffic and the economy

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Digital trace data can help us to observe human systems from this macroscopic viewpoint.

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Humans in a crowd, like particles in a fluid, can create whirlpools and compression waves.

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We can use data to collapse both physical and temporal macro perspectives, allowing us to observe and analyze them more immediately.

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Indirect Coordination

- Examples:
  - Ant trails
  - Engaging online
- **Stigmergy:** a mechanism of indirect coordination between agents by way of a trace left in the environment that stimulates action
  - From Greek *stigma* (mark) and *ergon* (work)