



Parasites in Dynamic Social Networks

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Perspective

- The Trade-off: Benefits and Risks of Society
 - Evolutionary benefit: cooperation, distribution of tasks
 - Risk: Higher number of individuals in proximity increase likelihood of intraspecific disease spread
- Optimize



Previous Work

- Dynamic network models
 - Investigated social preferences, network structure, and disease spread
 - Assumes the disease/parasite quantity have no effect upon network (SEIS model)
 - Does not include social health benefits: social grooming



Methods

- Introducing Parasites:
 - Random initially infected individual with random parasite load
 - Transmit to all connected nodes
 - Rate of transmission vary depending upon parasite load
 - Simultaneous Grooming
 - A percentage of present parasites
 - Parasite Reproduction
 - Run until variance in parasite load stabilizes



Methods Continued

- Tests for effect on Network Structure and Population-wide parasite level (average parasite count):
 - Effect of population size
 - Effect of different parasite reproductive & transmission rates
 - Effect of dropping individuals with high parasite count
 - Effect of Different Centrality Measures



Expected Results

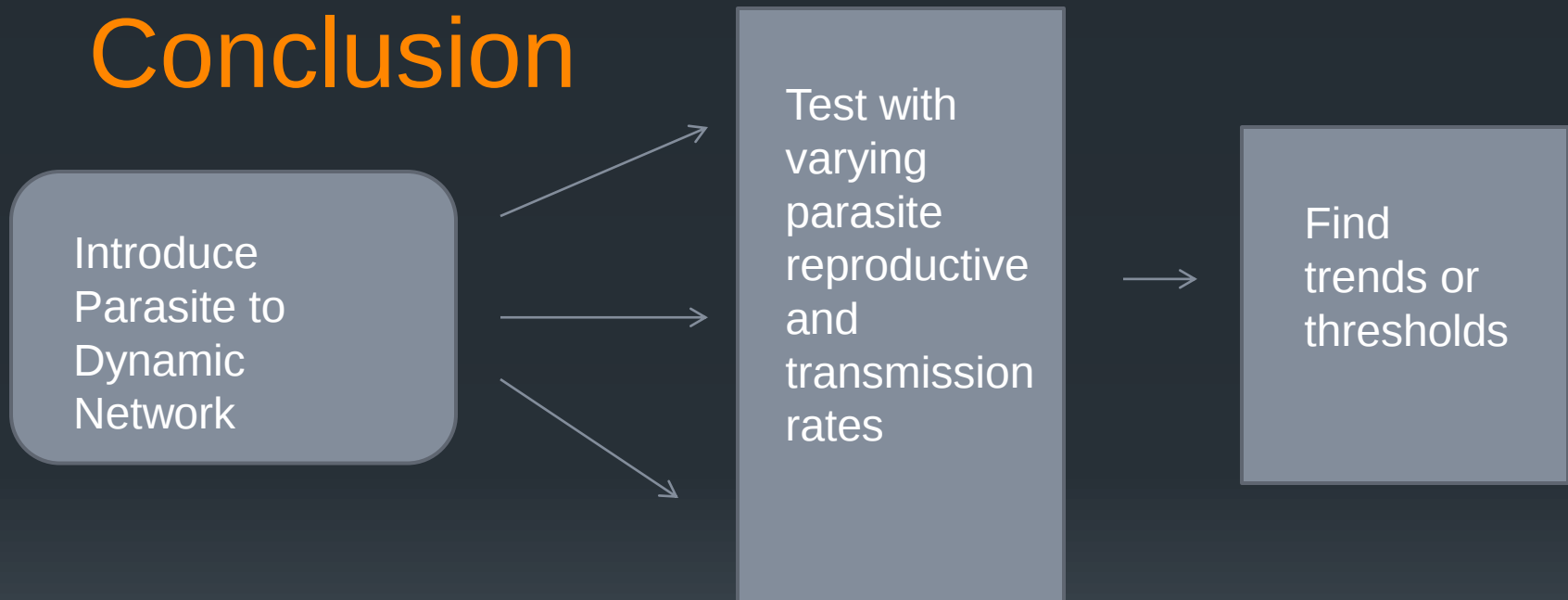
- Threshold: parasite levels in population might be very low but suddenly increase significantly with minor increases in parasite reproductive/transmission rate
- Lower average parasite count in smaller populations (trade-off between population density and disease spread)



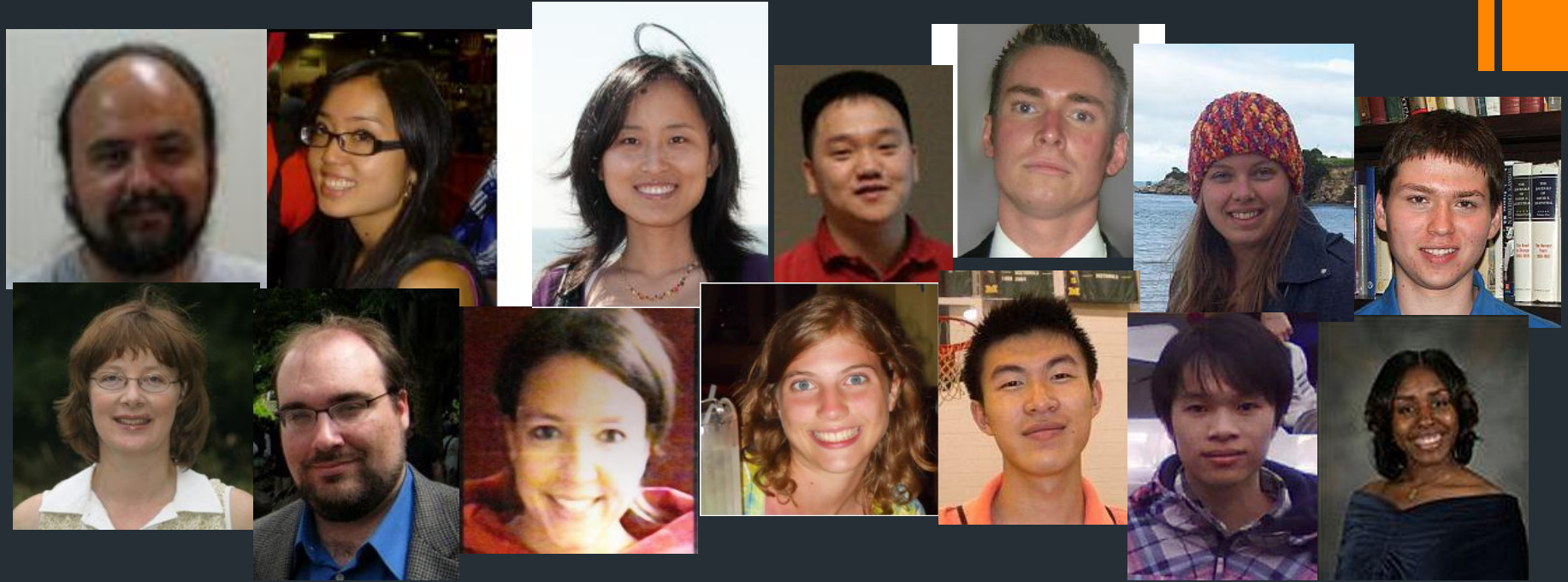
Discussion

- Key Assumptions:
 - Time of disease introduction has little effect upon results
 - Network position of first infected individual has little effect upon ultimate results
 - No death of individuals
 - No parasite population cap

Conclusion



The Fefferman Lab



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