

Popular science summary of the PhD thesis

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Title of the PhD thesis	Origins of structure in social networks
PhD school/Department	DTU Compute

Science summary

For over a century, social scientists have documented recurring patterns in human relations: people cluster in close groups, short acquaintance chains span society, and ties form disproportionately among similar individuals. These insights are foundational, yet explanations have often remained descriptive or limited in scope.

The rise of large-scale digital data has transformed the study of social structure, with online traces and national registries offering new ways to connect individual behavior with collective outcomes. But abundant data is not universal—some domains remain data-scarce, requiring model-centric reasoning rather than direct measurement.

This thesis combines both regimes. Using population-complete family registries from Denmark, I show that family-network structure is shaped mainly by partner-change dynamics, while partner-choice homophily plays a secondary role. In opinion dynamics, where influence is rarely observed directly, I analyze a weighted-median model that links network topology to consensus or persistent disagreement, supported by a mean-field approximation for short-run forecasting. Finally, with 4.3 million marriages, I examine partner choice as a high-dimensional process: intersections of age, education, occupation, industry, and income segregate the partner market in ways invisible to single-trait analyses.

Together, these studies advance a mechanistic understanding of how tie formation, dissolution, and influence generate recurrent social patterns. They underscore the need to adapt explanatory strategies to data abundance or scarcity, and to account for tie semantics when explaining the patterned social fabric we inhabit.

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