Opinion Dynamics in Gendered Social Networks: An Analysis of Female Engagement Teams in Afghanistan

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Opinion Dynamics

- Family of related techniques for modeling information flow through a group of individuals
  - Derived from statistical physics models
  - Opinions represented by numerical value
- Grounded in structural balance theory
- Individual opinions approach consensus values with neighbors
- Bounded confidence component can prevent consensus, create clusters
Opinion Dynamics in Action

\[
\{k \in S_i: |x_i(t) - x_k(t)| \leq \varepsilon_i \}
\]

\[
x_i(t + 1) = x_i(t) + \frac{1}{|S_i|} \sum_{k \in S_i} \mu_{ik} [x_k(t) - x_i(t)]
\]

\[
x_i(t + 1) = 0.41
\]

\[
\begin{align*}
x &= 0.4, \\
\varepsilon &= 0.3
\end{align*}
\]

\[
\begin{align*}
\mu_{i1} &= 0.1, \\
\mu_{i2} &= 0.1, \\
\mu_{i3} &= 0.1
\end{align*}
\]

\[
\begin{align*}
x &= 0.3, \\
\mu_{i1} &= 0.1
\end{align*}
\]

\[
\begin{align*}
x &= 0.7, \\
\mu_{i3} &= 0.1
\end{align*}
\]

\[
\begin{align*}
x &= 0.8
\end{align*}
\]

\[
S_i: \text{ Set of out-degree neighbors} \\
\varepsilon: \text{ Tolerance} \\
\mu: \text{ Plasticity}
\]
Female Engagement Teams

- Began in Afghanistan in 2009 as outgrowth of Lioness Program
- Engage with women and men in Afghan communities
- Ad-hoc engineering for people, capabilities
- Primarily USMC initially, now multi-service and multi-national
- Multidimensional engagement
  - Information dissemination
  - Medical support
  - Passive information collection
  - Security support
Female Engagement Teams

- Supports UNSC Resolution 1325
- FETs demonstrated high degree of success on the ground
- Could FET success be due in part to topological characteristics of social networks in Afghan communities?
Gendered Social Networks

- Cross-cultural phenomenon
  - Gender assortativity shown in many different kinds of social networks (elementary and secondary schools, entrepreneurs, illicit activities)
  - Also shown in primate studies
- Subnetwork topologies and characteristics can be distinct
  - Increased transitivity
  - More emotional support, less instrumental support
Gendered Networks in Afghan Communities

- *Purdah* constrains interactions between sexes for non-family members
- Solidarity among women can offset otherwise strongly patriarchal society
- *Pashtunwali* describes code of freedom, honor, revenge, and chivalry - individualistic
- Multi-level conflict resolution: familial, tribal, national
- Idealized egalitarian community structure
Gendered Networks in Afghan Communities

- Female networks characterized by higher edge densities
- Male networks characterized by lower edge densities, distinct components
- More within group links than between group links
Notional Network Illustration
Model Results

• Greater edge density in female network component can lead to greater solidarity, larger percentage of population in consensus

• Engaging with both females and males in community can permit international forces to efficiently effect changes in population opinions

• Opposition forces, when constrained to engaging only males in the community, can exert strong influence if unopposed

• FETs can counteract opposition influence, shift opinions favorably
Effect of Message Content: Influencing tolerance with culturally sensitive humanitarian interventions

Female Edge Density

Male Edge Density

FET Edge Permeability

Community Tolerance

- Push Opinion and Tolerance
- Push Opinion Only
Who Should FETs Communicate With?

Communicate Only with Female Network

Communicate with Female and Male Network

Mean Opinion vs. Male Connection Probability

- Female Network
- Male Network
Male Opinions: Female vs. Female and Male Engagement

Female Only

Mixed Engagement
Future Directions

- Additional network topologies
  - Richer community structure
  - Alternative degree distributions
- Multi-valued opinions
- Opinion-behavior mapping
- Generalize model with application to other kinds of interventions
  - WHO interventions
  - Microcredit-style economic dynamics
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