Terrorist Networks:
Radicalization Mechanisms and Spread Control

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Radicalization Mechanisms and Spread Control

Terrorist networks:
- Social network created by contact (e.g. religious gatherings, social events, etc.)
- Radicalization dynamics is related to multiple attributes (SES, psychological & religious factors, etc.)
  - However, a lot of missing information

Controlling the spread of terrorist networks:
- Removal radical elements (by identification and monitoring)
- Restrictions on social contacts

Effective control requires:
better understanding of radicalization mechanisms and recruitment dynamics
Terrorist Networks

Terrorist network model created by socio-spatial distribution:

\[ p = \frac{n}{2\pi D^2} e^{-\frac{d^2}{2D^2}} \]

where:

- \( p \) = probability of link between two nodes
- \( n \) = average number of contact or degree
- \( D \) = distance between two agents loosely defined as affinity
Mechanism of Radicalization

\[
\frac{dG}{dt} = \gamma T - \beta_1 G \frac{C}{T} + \varepsilon \beta_1 G \frac{S}{T} - \mu G
\]

\[
\frac{dS}{dt} = \beta_1 G \frac{C}{T} - \varepsilon \beta_1 G \frac{S}{T} - \mu S - \beta_2 S \frac{l + R + R_s + R_L}{C}
\]

\[
\frac{dl}{dt} = \beta_2 S \frac{l + R + R_s + R_L}{C} - \mu l - \beta_3 l \frac{R + R_s + R_L}{C}
\]

\[
\frac{dR}{dt} = \beta_3 l \frac{R + R_s + R_L}{C} - \mu R - \alpha R
\]
Mechanism of Radicalization

\[
\frac{dR_s}{dt} = \alpha \varphi R - \mu R_s - dR_s
\]

\[
\frac{dR_L}{dt} = \alpha (1 - \varphi) R - \mu R_L - \kappa dR_L
\]
Dynamics of Radicalization

State 4.0

![Graph showing dynamics of radicalization with axes labeled ID rate and Mil. progression.](image)
Dynamics of Radicalization

State 4.1
Dynamics of Radicalization

State 4.2
Simulation and Analysis

ID 0.2

The 3D graph shows the relationship between the ID rate and military progression. The colors represent different levels, with red indicating a higher value and blue indicating a lower value.
Simulation and Analysis

ID 0.6

[3D graph showing a simulation result with axes labeled ID rate, Mil. progression, and a value range of 0 to 2.5]
Simulation and Analysis

ID 1.0

![3D graph showing the relationship between ID rate and military progression]
Summary and Discussion

Our model builds on contagious models:

- Exploit social contact networks
- Model also includes other leading key factors to changes in state

Control of Radicalization

- Via control of different variables such as targeted and random monitoring and removal

Future work

- Test robustness measure of terrorist networks to improve control strategies
- Develop coarse-grain adaptive and reactive control mechanism