007
TM

Violence in Africa

Han Swee Yee (1000995)
Yeow Lih Wei (1000974)
Wang Yiran (1000906)

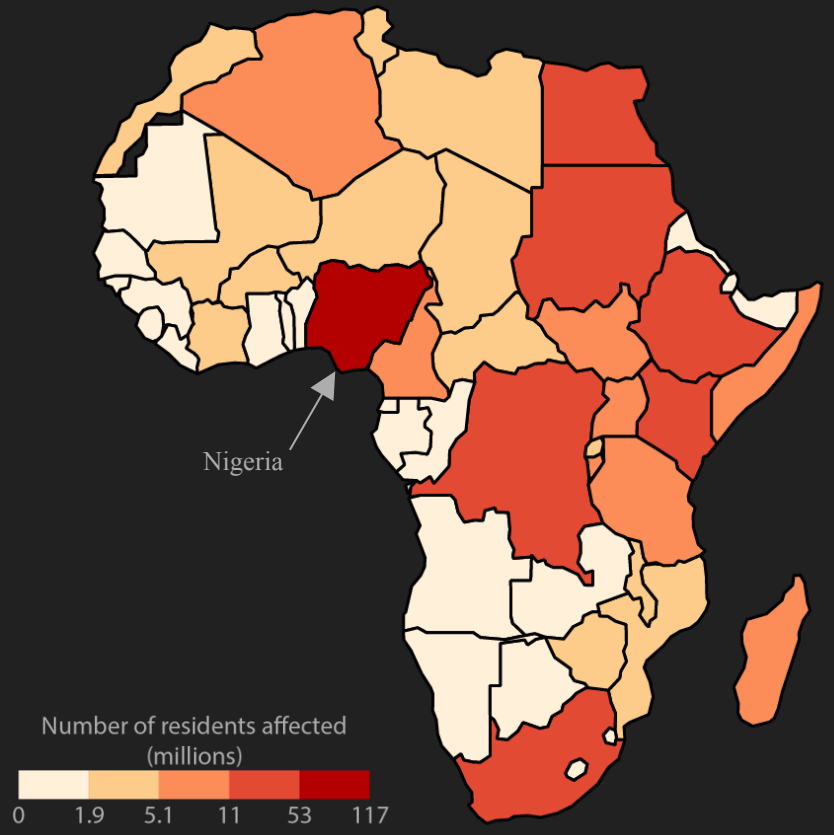
Content

- (1 min) Background to source of data
- (2 mins) Map class!!!
- (1 min) How our graphs are generated (events vs fatalities)
- (8 mins) Discussion of network measures
  - (3 mins) Degree & Eigenvector Centrality
  - (2 mins) Size of largest component, randomness of graph?
  - (2 mins) Modularity
  - (1 min) Degree Distribution
- (3 mins) Q&A Session

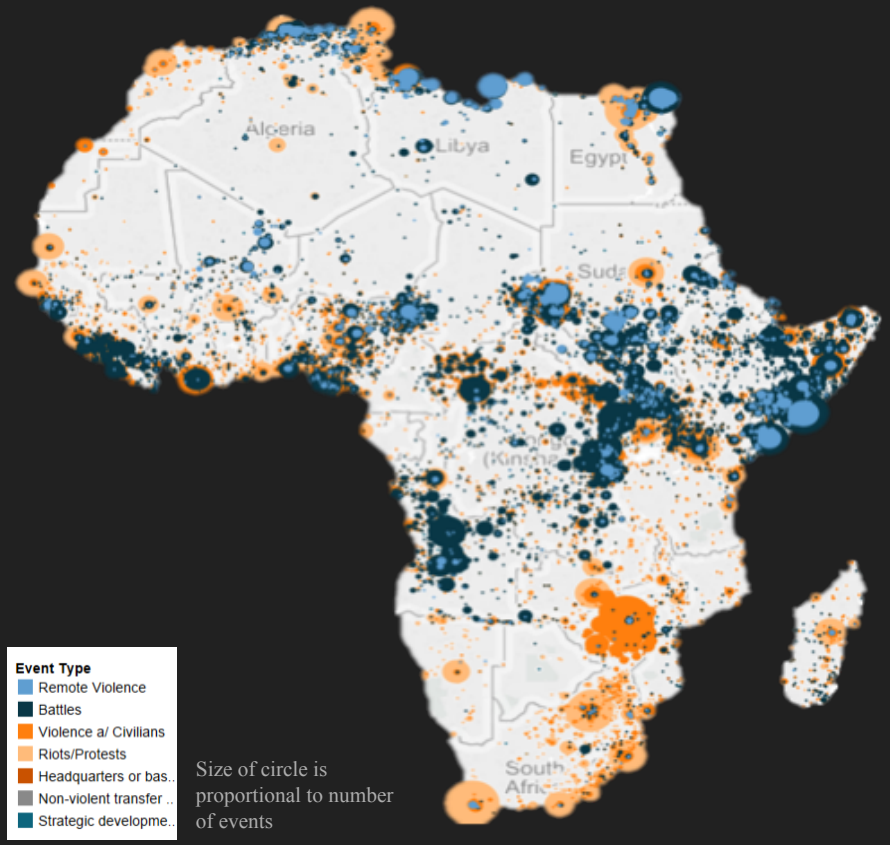
Armed Conflict Location & Event Data (ACLED) Project

- Public collection of political violence and protest data for developing countries (mainly in Africa and Asia)
- The dataset encodes the dates and locations of all reported political violence and protest events, the parties involved and number of fatalities

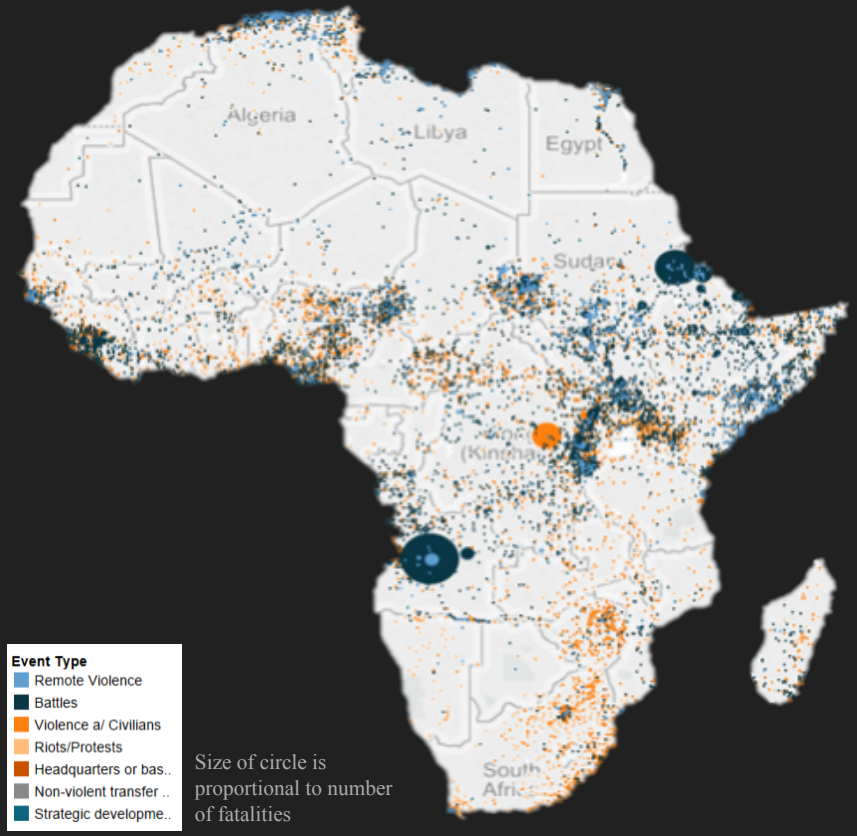
Where are the people that are most affected by violence in Africa?



Spatial Distribution of Events



Spatial Distribution of Fatalities



Size of circle is proportional to number of fatalities

Process of graph generation

1. Each actor (person/organization) forms a node
2. Link a pair of node if they are involved in the same event
3. Two choices of weight assigned:
    a. By event count (Weight represents number of events that they co-appear in)
    b. By fatality count (Weight represents number of people that died due to the events that they co-appear in)

By Count of Events

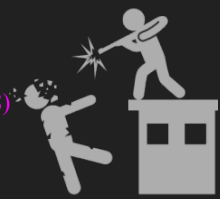
Al-Shabaab (Somalia)

Degree Centrality (14-15):

1. Al Shabaab (2446.0000)
2. Military Forces of Somalia (2012-) (1561.0000)
3. Civilians (Sudan) (1463.0000)
4. Unidentified Armed Group (Somalia) (1385.0000)
5. Civilians (Somalia) (1339.0000)
6. Civilians (Nigeria) (1156.0000)
7. Military Forces of South Sudan (2011-) (946.0000)
8. Boko Haram - Jamaatu Ahli is-Sunnah lid-Dawatai wal-Jihad (764.0000)
9. Police Forces of Egypt (2014-) (753.0000)
10. Unidentified Armed Group (Egypt) (711.0000)
11. SPLA/M-In Opposition: Sudanese People's Liberation Army/Movement-In Opposition (684.0000)
12. Civilians (Central African Republic) (663.0000)
13. Civilians (Democratic Republic of Congo) (653.0000)
14. AMISOM: African Union Mission in Somalia (2007-) (631.0000)
15. Unidentified Armed Group (Libya) (628.0000)
16. Military Forces of Democratic Republic of Congo (2001-) (578.0000)
17. Military Forces of Sudan (1989-) (547.0000)
18. Rioters (South Africa) (526.0000)
19. Civilians (South Sudan) (524.0000)
20. Police Forces of South Africa (1994-) (519.0000)

Eigenvector Centrality (14-15):

1. Al Shabaab (0.2315)
2. Military Forces of Somalia (2012-) (0.2198)
3. Unidentified Armed Group (Somalia) (0.1382)
4. Civilians (Somalia) (0.1329)
5. AMISOM: African Union Mission in Somalia (2007-) (0.0956)
6. Police Forces of Somalia (2012-) (0.0235)
7. AMISOM: African Union Mission in Somalia (2007-) (Ethiopia) (0.0228)
8. Military Forces of Jubaland (2013-) (0.0171)
9. AMISOM: African Union Mission in Somalia (2007-) (Kenya) (0.0124)
10. Military Forces of Puntland (1998-) (0.0093)
11. Civilians (Kenya) (0.0079)
12. Police Forces of Kenya (2013-) (0.0067)
13. Military Forces of Kenya (2013-) (0.0063)
14. Military Forces of Ethiopia (1991-) (0.0062)
15. Militia (Pro-Government) (0.0054)
16. Biyamal Clan Militia (Somalia) (0.0035)
17. Police Forces of Puntland (1998-) (0.0033)
18. ASWJ: Ahlu Sunna Wal Jamaa (0.0027)
19. Military Forces of United States (0.0024)
20. Habar Gedir-Sa'ad Sub-Clan Militia (Somalia) (0.0018)



By Fatalities

Nigeria

Boko Haram

Degree Centrality (14-15):

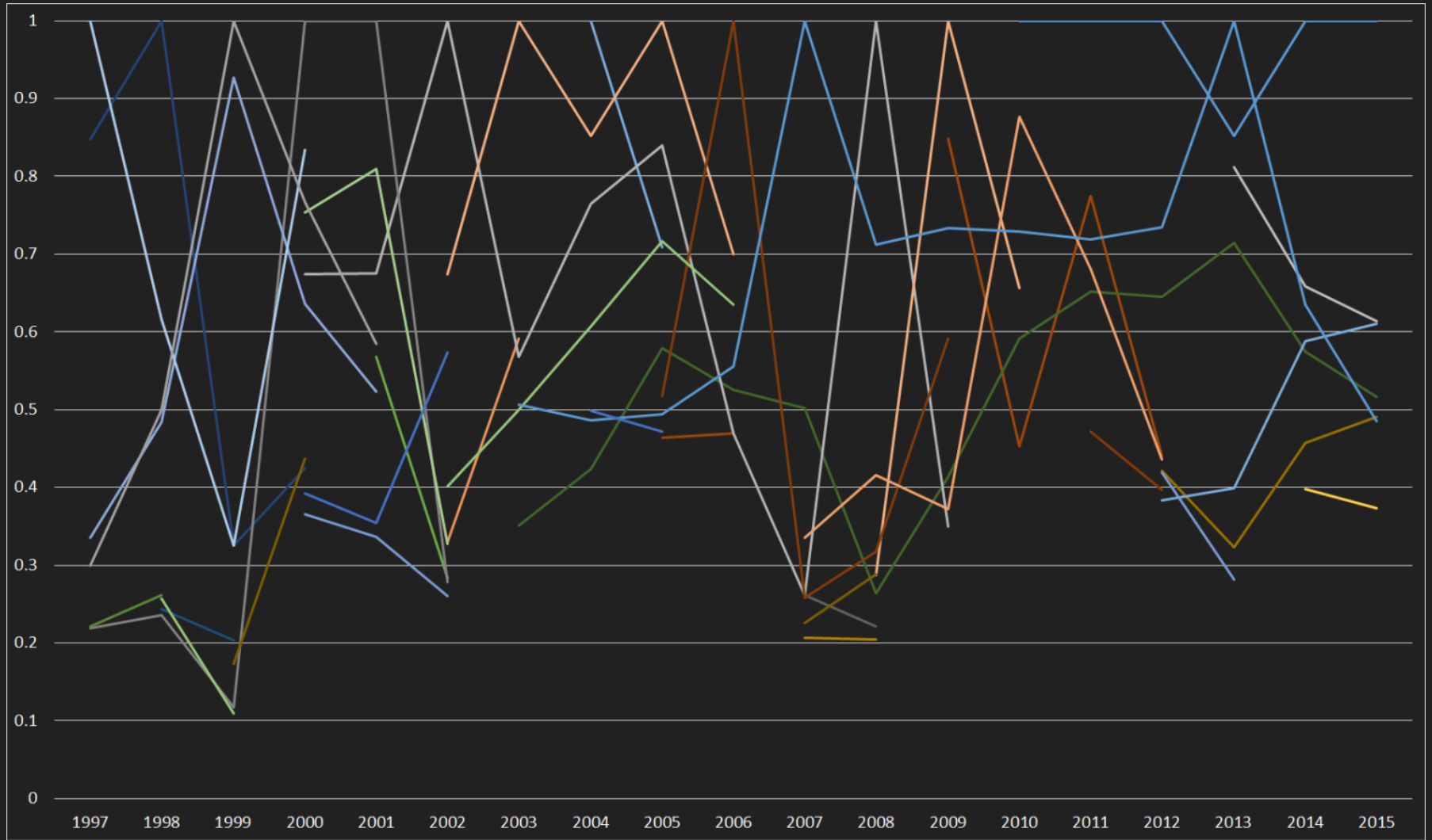
1. Boko Haram - Jamaatu Ahli is-Sunnah lid-Dawatai wal-Jihad (16228.0000)
2. Civilians (Nigeria) (14006.0000)
3. Al Shabaab (6322.0000)
4. Military Forces of South Sudan (2011-) (6075.0000)
5. Military Forces of Nigeria (2010-2015) (5844.0000)
6. SPLA/M-In Opposition: Sudanese People's Liberation Army/Movement-In Opposition (4645.0000)
7. Boko Haram - Wilayat Gharb Ifriqiyyah (4326.0000)
8. Military Forces of Sudan (1989-) (3400.0000)
9. Civilians (South Sudan) (2744.0000)
10. Military Forces of Egypt (2014-) (2731.0000)
11. Civilians (Central African Republic) (2355.0000)
12. Military Forces of Somalia (2012-) (2270.0000)
13. Fulani Ethnic Militia (Nigeria) (2218.0000)
14. Unidentified Armed Group (Nigeria) (1888.0000)
15. Military Forces of Cameroon (1982-) (1832.0000)
16. Anti-Balaka (1784.0000)
17. Civilians (Sudan) (1758.0000)
18. Slka Militia (1704.0000)
19. Civilians (Democratic Republic of Congo) (1566.0000)
20. State of Sinai (1544.0000)

Eigenvector Centrality (14-15):

1. Boko Haram - Jamaatu Ahli is-Sunnah lid-Dawatai wal-Jihad (0.2800)
2. Civilians (Nigeria) (0.2523)
3. Military Forces of Nigeria (2010-2015) (0.1597)
4. Boko Haram - Wilayat Gharb Ifriqiyyah (0.0620)
5. Fulani Ethnic Militia (Nigeria) (0.0514)
6. Military Forces of Cameroon (1982-) (0.0480)
7. Unidentified Armed Group (Nigeria) (0.0461)
8. Military Forces of Chad (1990-) (0.0208)
9. Military Forces of Niger (2011-) (0.0160)
10. Vigilante Militia (Nigeria) (0.0158)
11. Civilians (Cameroon) (0.0098)
12. Military Forces of Nigeria (2015-) (0.0074)
13. Police Forces of Nigeria (2010-2015) (0.0052)
14. BVYG: Borno Vigilance Youths Group (0.0048)
15. Military Forces of Cameroon (1982-) Rapid Intervention Battalion (0.0045)
16. Militia (Pro-Government) (0.0029)
17. Unidentified Ethnic Militia (Nigeria) (0.0022)
18. Civilians (Niger) (0.0014)
19. Eggon Ethnic Militia (Nigeria) (0.0013)
20. Civilians (Chad) (0.0011)

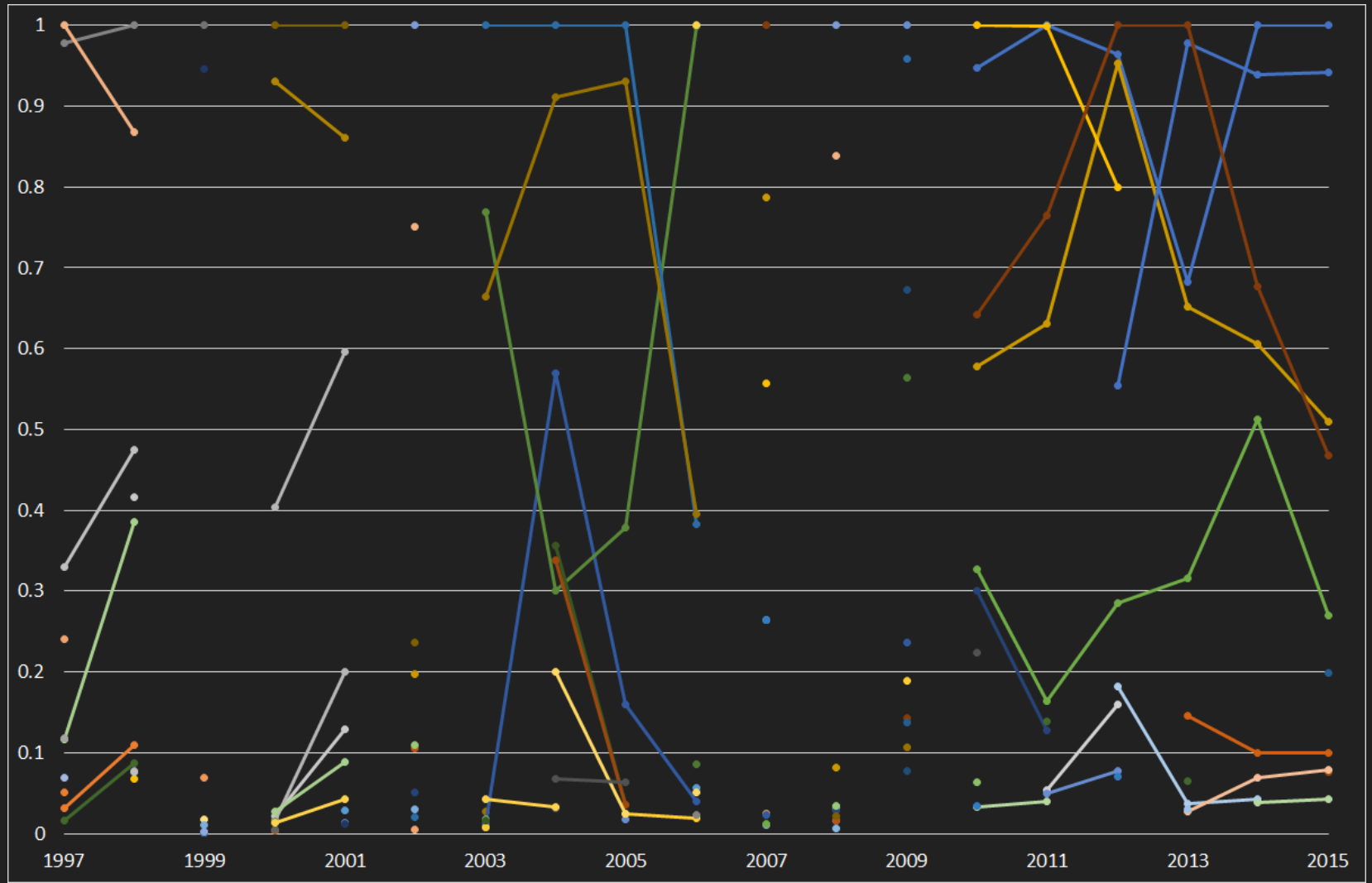
Centrality Trends (by Number of Events)

What if we tracked the values of degree centrality of each party in the top 10?


1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015

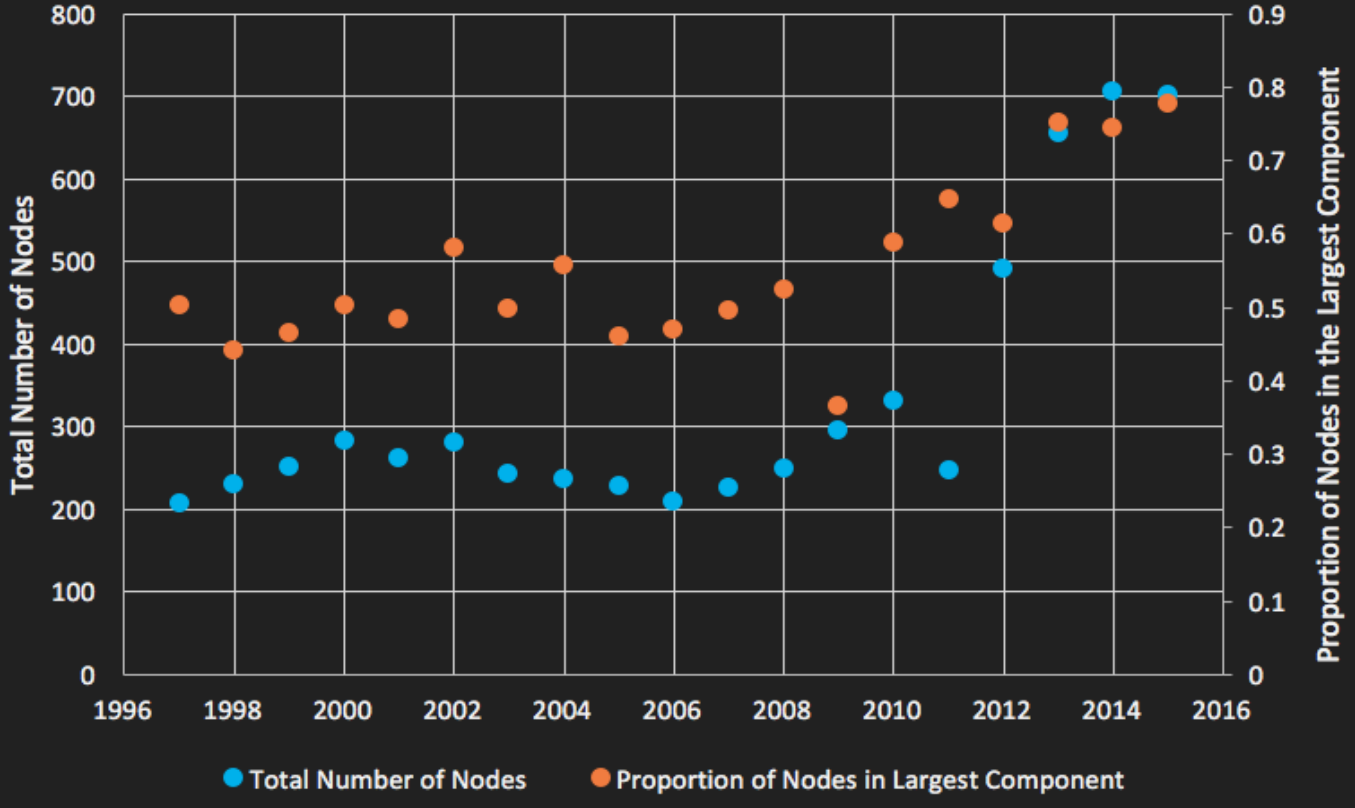
Centrality Trends (by Number of Events)

What if we tracked the values of eigenvector centrality of each party in the top 10?


1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1997
1999
2001
2003
2005
2007
2009
2011
2013
2015

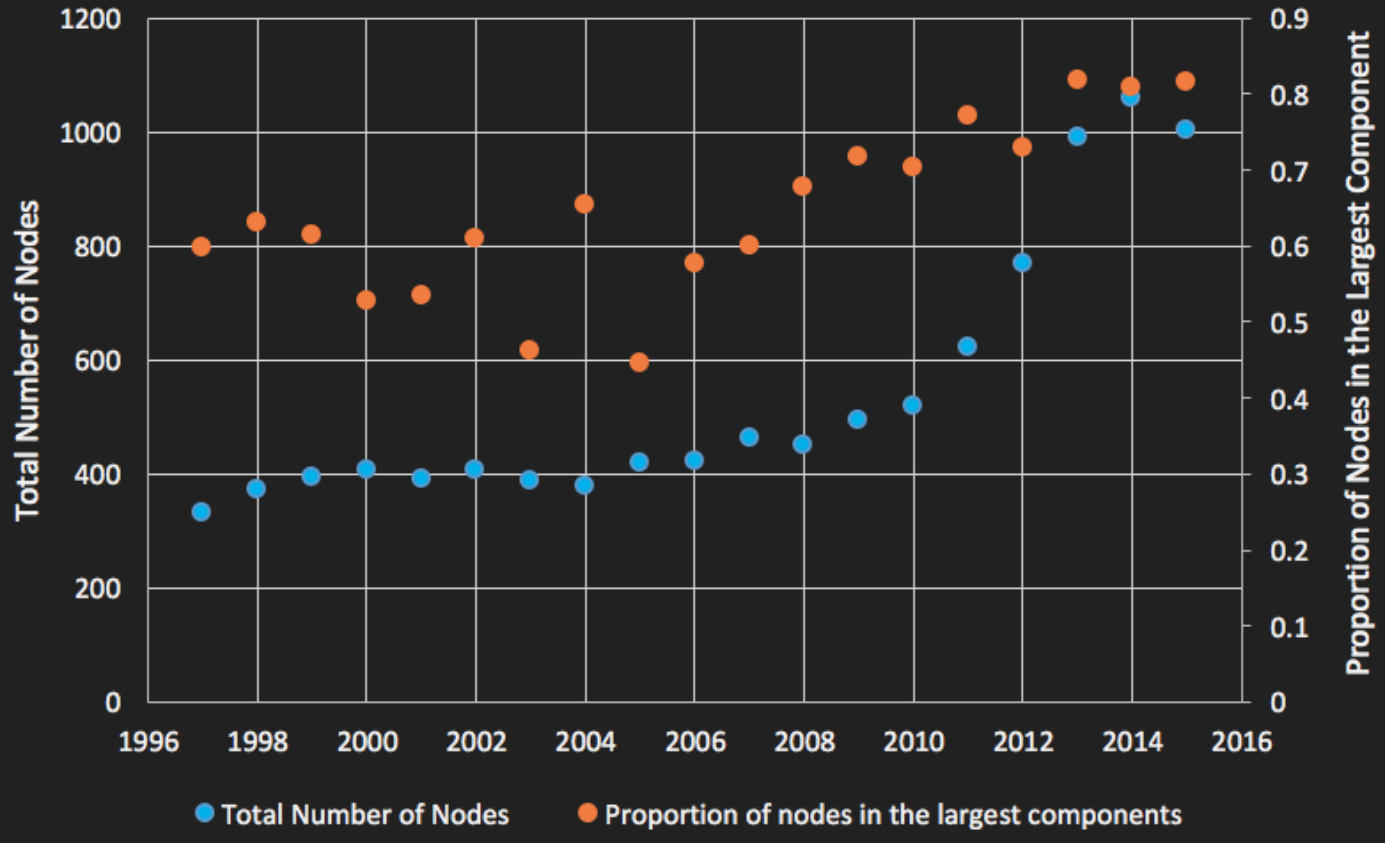
Proportion of Nodes in the Largest Component

By # of Fatalities

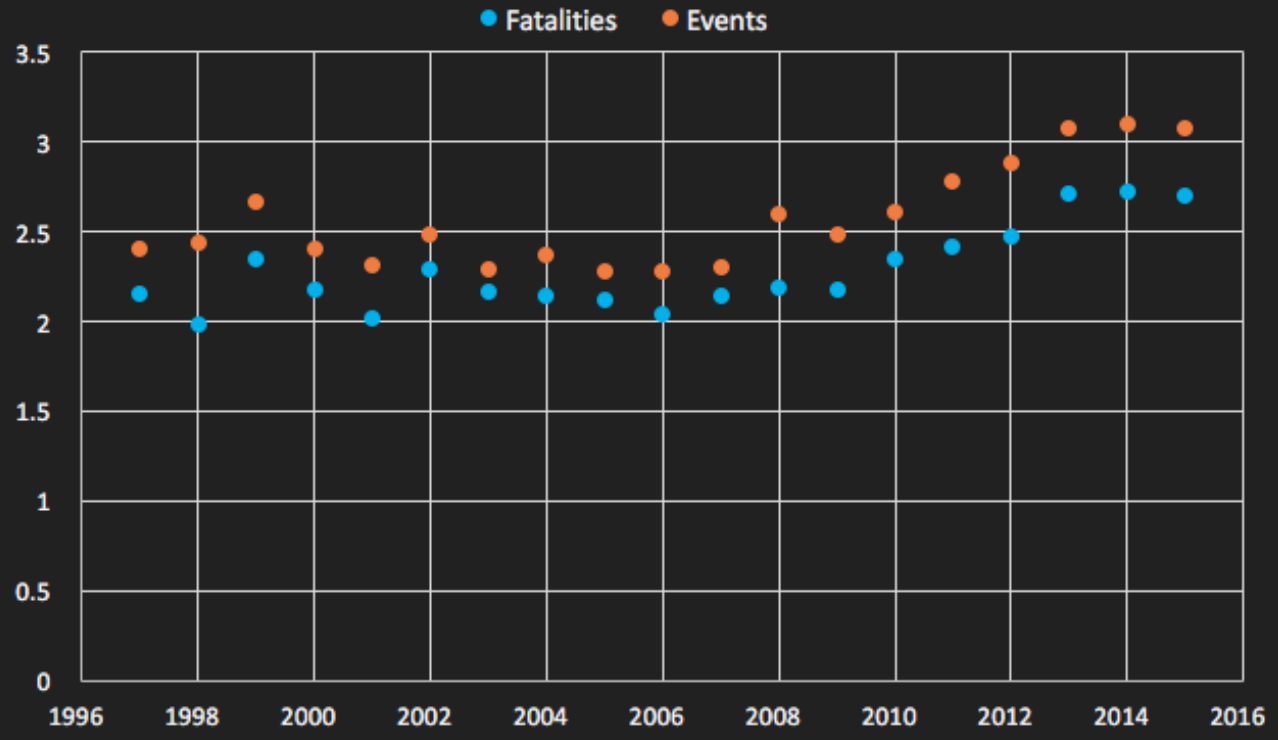


Proportion of Nodes in the Largest Component

By # of Events

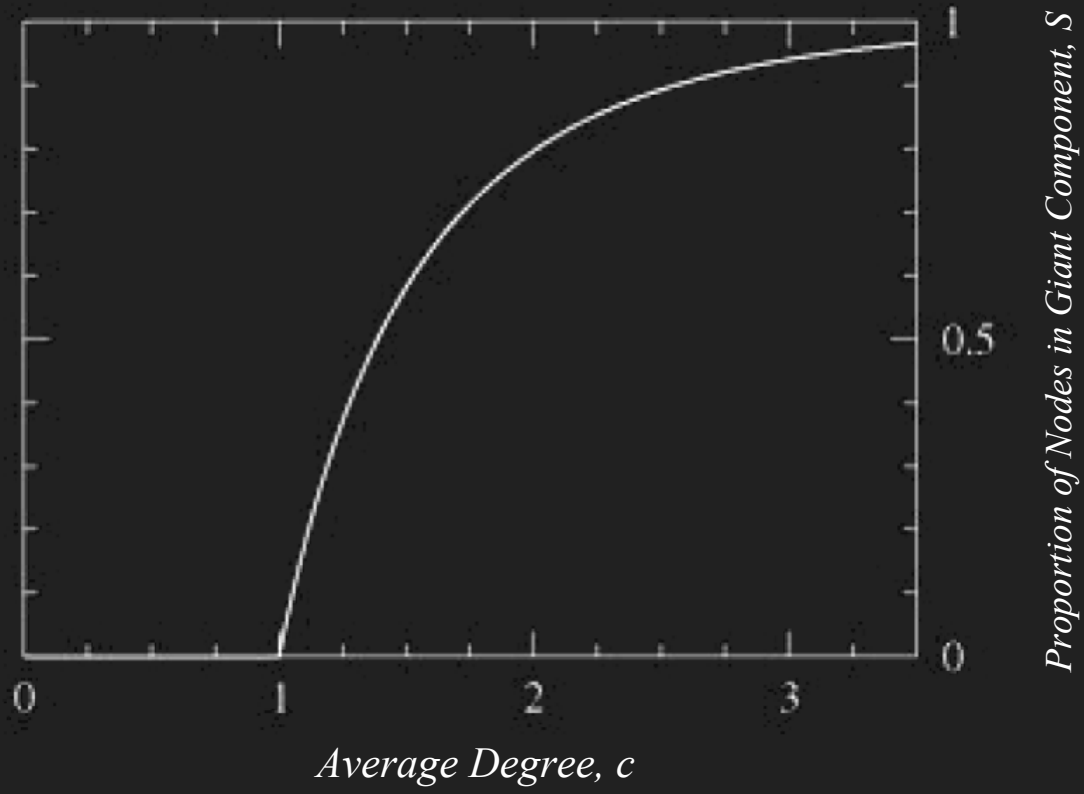


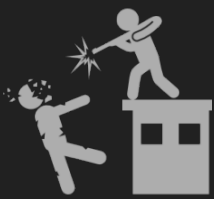
Average Degree



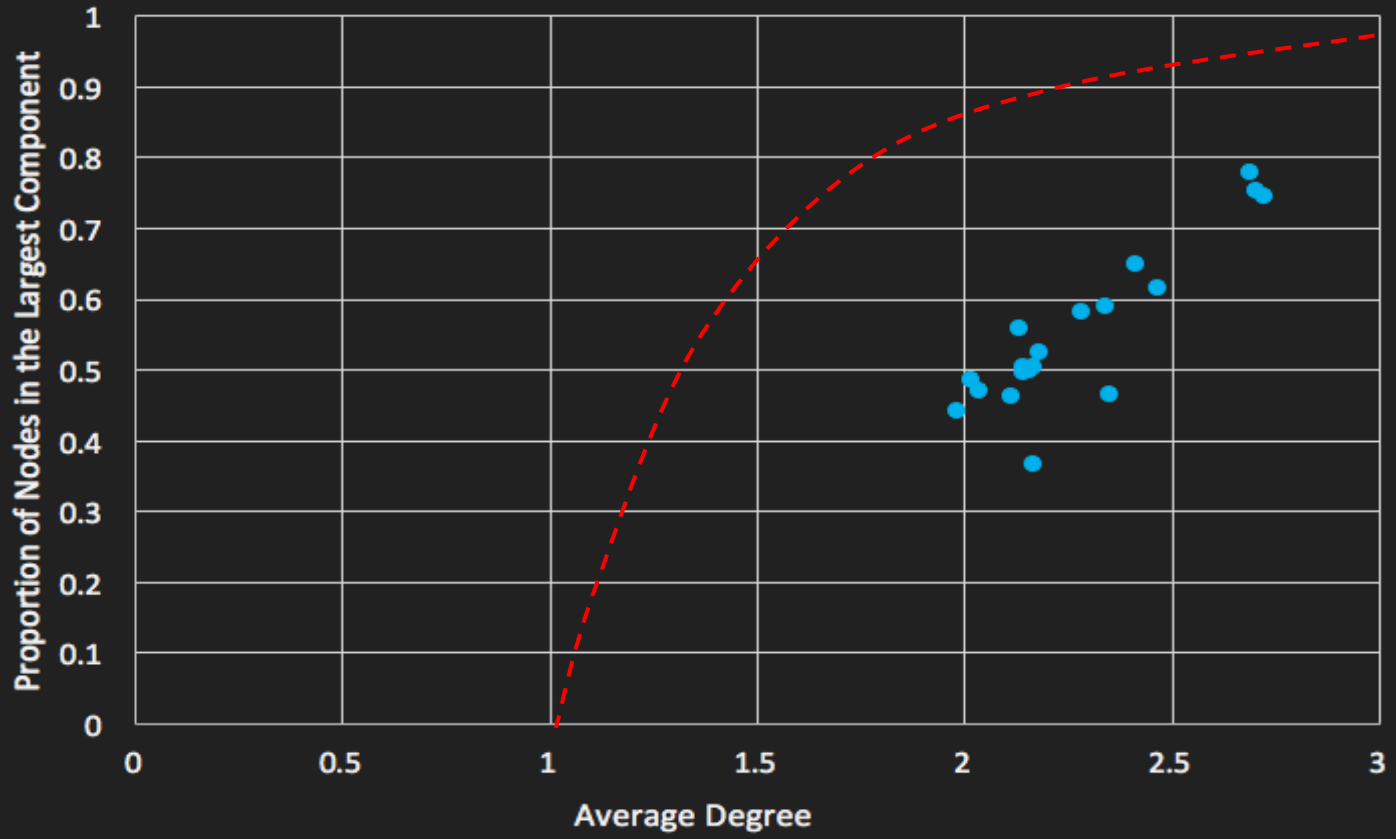
Proportion of Nodes in Giant Component vs. Average Degree in Random Graphs

$$S = 1 - e^{cS}$$

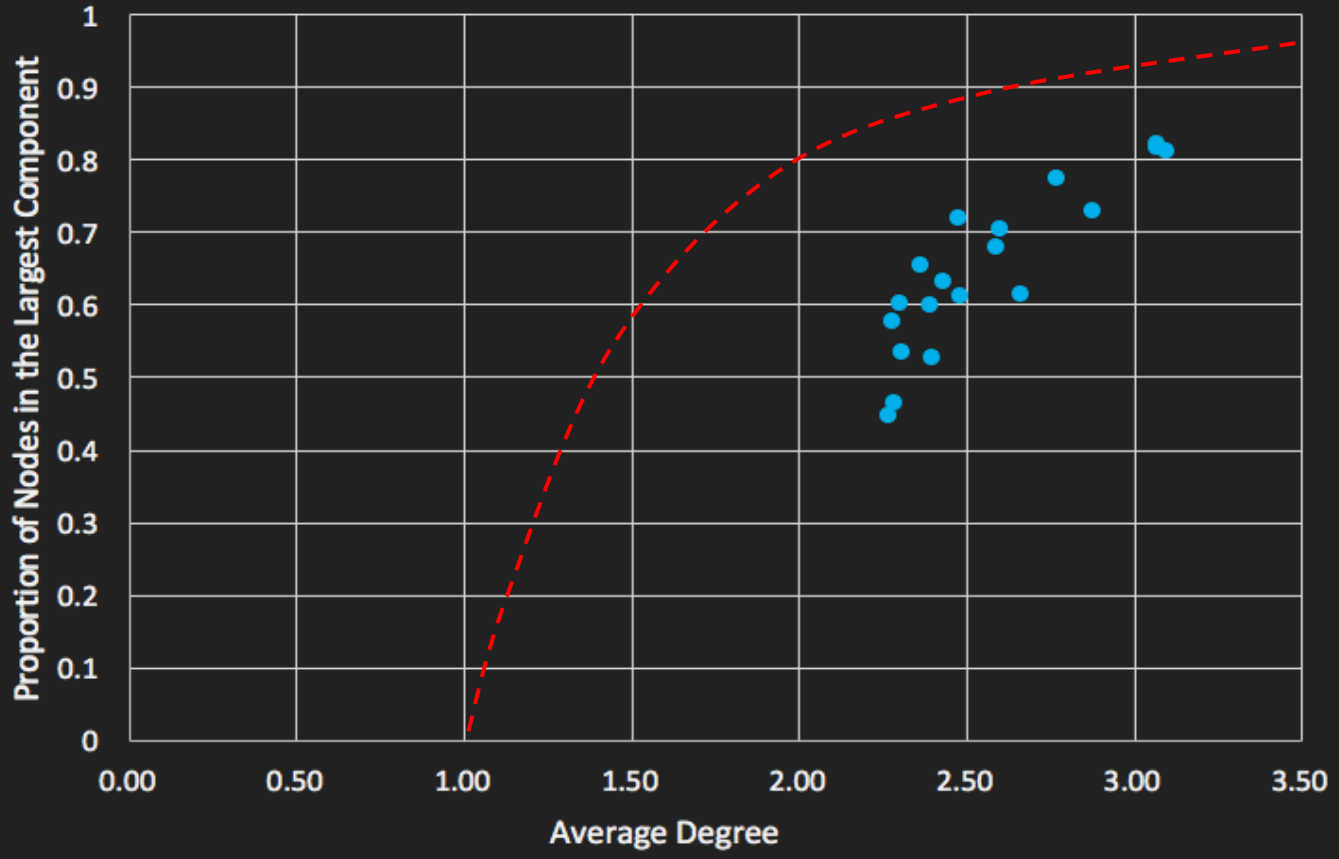




Proportion of Nodes in Giant Component vs. Average Degree by Fatalities



Proportion of Nodes in Giant Component vs. Average Degree by Events



Modularity (considering all events)

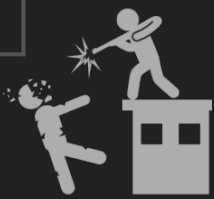
By Count of Events (all years)

- Modularity (Countries): 0.0538 / 0.8299
- Normalised Modularity: 0.0649

By Count of Fatalities (all years)

- Modularity (Countries): 0.0470 / 0.8229
- Normalised Modularity: 0.0571

Code	Categories
1	Government or mutinous force
2	Rebel force
3	Political militia
4	Ethnic militia
5	Rioters
6	Protesters
7	Civilians
8	Outside/external force (e.g. UN)



Modularity (all battles only)

By Count of Events (all years)

- Modularity (Countries): 0.1798 / 0.7016
- Normalised Modularity: 0.2563

By Count of Fatalities (all years)

- Modularity (Countries): 0.1670 / 0.7002
- Normalised Modularity: 0.2386

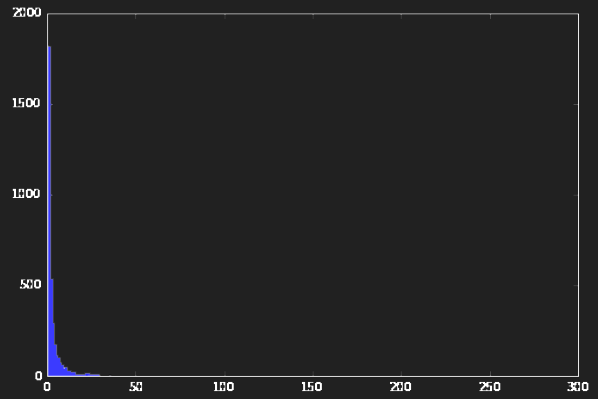
Code	Categories
1	Government or mutinous force
2	Rebel force
3	Political militia
4	Ethnic militia
5	Rioters
6	Protesters
7	Civilians
8	Outside/external force (e.g. UN)

These groups of people do not take part in battles!

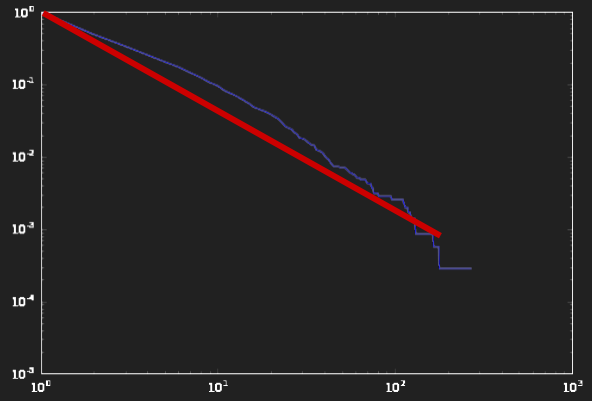
(Disregarding battles by outside forces as well)

Degree Distribution - Plots

By Number of Events



Degree Distribution



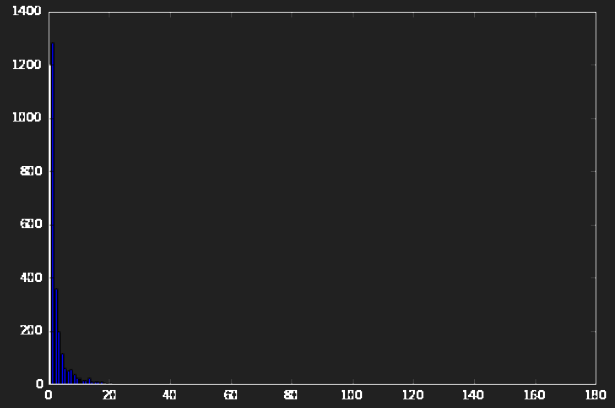
Cumulative Degree Distribution

Almost follows a power law

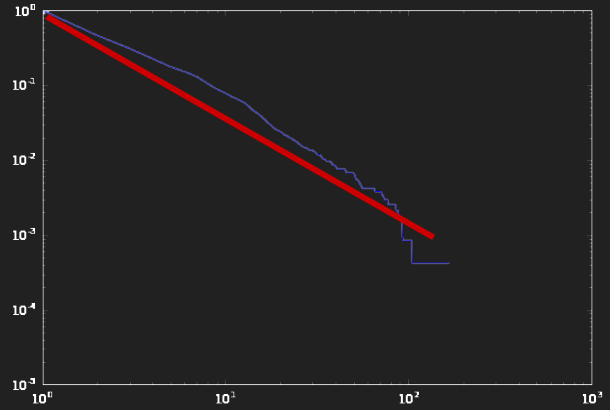
With $k_{min} = 1$, $\alpha = 1.69 +/- 0.01$

Degree Distribution - Plots

By Number of Fatalities



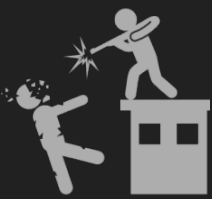
Degree Distribution



Cumulative Degree Distribution

Almost follows a power law

With $k_{min} = 1$, $\alpha = 1.73 +/- 0.01$



END

Q&A