

#### Shocking the Crowd: The Effect of Censorship Shocks on Chinese Wikipedia

Daniel M. Romero School of Information University of Michigan



In collaboration with Ark Zhang , Danielle Livneh, Ceren Budak, and Lionel Robert

## **Collaborative Crowdsourcing**

How do people self-organize **and adapt** to produce high quality output in collaborative crowdsourcing platforms such as Wikipedia and GitHub?





#### Shocks on Collaborative Crowdsourcing



## Shocks on Collaborative Crowdsourcing



### Timeline of Chinese Wikipedia



[Zhang et al., 2011]

#### **Theoretical Expectations**

- Unit of analysis: articles.
- Exogenous variation in fraction of editors blocked per article.
- How do unexpected shocks to affect collaboration dynamics?
  - Decrease in overall activity [Zhang et al., 2011].
  - Threat rigidity [*Staw 1981*]:
    - Centralization in decision making  $\rightarrow$  Skewed distribution of workload.
    - More cohesion  $\rightarrow$  Less Conflict.

### **Collaboration Dynamics**

**Volume of Activity**: Number of edits.



Zhang et al., 2011

#### Workload Centralization: Gini coefficient of the distribution of number of edits per editor.



Ortega et al., 2008

#### **Conflict**:

Fraction of reverted edits.



Viegas et al.,2007 Kittur and Kraut, 2010

# Identifying Blocked Users

Criterion 1: Not be active during blocks.

Criterion 2: Linguistic Patterns [Zhang at el., 2011]

- Simplified Chinese (mainland) vs. Traditional Chinese (outside mainland)
- Chinese characters for 'Wikipedia':





traditional

#### Use of Traditional Characters



## Identifying Blocked Users

• Criterion 3: Time of activity



# Identifying Blocked Users

- Classify user as blocked if:
  - No edits during the three blocks
  - No more than x% of traditional character usage
  - No more than y% of contributions during China's low activity.
- Using editors with IP address as ground truth, optimize x and y for F1 score.
- Precision = 0.74, Recall = 1, F1 = 0.85

#### **Collaboration and Shock Measures**



- Shock:
  - Binary: having at least one editor blocked.
  - Continuous: Fraction of edits contributed by blocked editors.
- Collaboration measures (Change: post pre block)
  - Level of activity: relative change in # of edits.
  - Centralization: change in normalized Gini-coefficient of edits.
  - **Conflict**: change in fraction of reverts among edits.

## Sample and Analysis

- Study sample
  - 49,945 articles with at least 2 editors prior to block
  - 27,856 has at least one editor blocked
- Two-step analysis:
  - How does exposure to a shock, regardless of intensity, affect articles?
  - How does the intensity of the shock matter?
    - Use linear/nonlinear models

# Activity



- 37% decrease in #edits in articles with no editors blocked.
- 40% decrease in #edits in articles with at least one editors blocked.
- Drop in activity monotonically increases with shock intensity.
- For large groups, activity initially drops slowly as shock increases.
- Large groups are more resilient to small shocks, but suffer more for large shocks.

### Centralization



- Centralization tends to increase (not significantly) in articles exposed to shocks.
- Articles become increasingly centralized with moderate shocks
- As shocks become very large, the rate of centralization decreases (why?)



- 2.5% *increase* in conflict in articles with no editors blocked.
- 2.2% decrease in conflict in articles with at least one editors blocked.
- The decrease in conflict initially increases with shock intensity.
- As shocks become very large, the change in conflict decreases (why?)

## **Crowd Compositional Effects**

- Why do changes in conflict and centralization decrease as shocks become very large?
- Articles with more blocked editors get more newcomers after the block.
- New editors were not affected by the shock, hence their behavior does not reflect a shock.



## **Crowd Compositional Effects**

- Why do changes in conflict and centralization decrease as shocks become very large?
- Articles with more blocked editors get more newcomers after the block.
- New editors were not affected by the shock, hence their behavior does not reflect a shock.



#### **Mediation Analysis**

Does shock impact conflict indirectly through centralization?

	$B^2$	В
Direct Effect	0.4222***	-0.2471***
	(0.0448)	(0.0295)
Indirect Effect	0.0012	-0.0011
	(0.0035)	(0.0035)
Total Effect	0.4234***	-0.2482***
	(0.0446)	(0.0293)



## Summary

- In Wikipedia, groups of editors become less active, more centralized, and have less conflict when they abruptly lose part of their workforce
  – consistent with theory of threat rigidity.
- **Group size matters**: Larger crowds are more resilient to small shocks, but less resilient to larger ones.
- The effect of the shock on conflict and centralization is non-linear. Moderate shocks have a larger impact than mild or severe shocks. This could be explained by compositional effects of the shock (newcomers).
- In order to **understand**, **predict**, **and manage** social and collaboration systems we have to study them, not only during times of normality, but also during times of stress and instability.