Reverse-Engineering Censorship in China

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(Talk at the Mershon Center for International Security Studies,
Ohio State University 10/22/2015)

1Based on joint work with Jennifer Pan and Margaret Roberts
2GaryKing.org
An Observational Study:

*How Censorship in China Allows Government Criticism but Silences Collective Expression* (American Political Science Review)

Experimental and Participatory Studies:

*Reverse Engineering Chinese Censorship* (Science)

Methods:

- General Purpose Computer-Assisted Clustering and Conceptualization ([PNAS](#))
- A Method of Automated Nonparametric Content Analysis for Social Science ([AJPS](#))
- Computer-Assisted Keyword and Document Set Discovery from Unstructured Text

Copies at GaryKing.org
Chinese Censorship

The largest selective suppression of human expression in history: implemented manually (within a few hours of posting), by \( \approx 200,000 \) workers, located in government and inside social media firms. A huge censorship organization: (obviously) designed to suppress information (paradoxically) very revealing about the goals, intentions, and actions of the Chinese leadership. 3/28
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Chinese Social Media: Fractured over 1,400+ sites
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(Plus 59% from Sina Blog)
The Goals of Censorship make Social Media Actionable

What Could be the Goal?

1. Stop collective action

Implications: Social Media is Actionable!

Chinese leaders:

- measure criticism: to judge local officials
- censor: to stop events with collective action potential

Thus, we can use criticism & censorship to predict:

- Officials in trouble, likely to be replaced
- Policies that generate dissent (& interest of leaders)
- Government action outside the Internet
- Dissidents to be arrested; peace treaties to sign; emerging scandals
- Disagreements between central and local leaders

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A big prize, but payable only if we have the goals right
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Our Observational Research Design: 5 Steps

1. Monitor 85 content areas over 6 months
2. Download each social media post, the instant it appears
3. Revisit each later to check if it was censored (carefully, from computers all over the world)
4. Repeat 11,382,221 times
5. Analyze with new methods of computer-assisted text analysis
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Censorship is not Ambiguous: Example Error Page

Sorry, the host you were looking for does not exist, has been deleted, or is being investigated
Censorship is not Ambiguous: BBS Error Page

The page you requested is temporarily down. How about you go look at another page.

Jingjing, one of China's cartoon internet police
The Censors are Fast; Our Automated Methods are Faster
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Example: Shanghai Subway Crash
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Post Volume & Censorship are “Bursty”
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Collective Support for Environmental Lottery

Count Published
Count Censored

Found 87 volume bursts in our 85 topic areas
Identified real world event associated with each burst
Our hypothesis: The government censors all posts in volume bursts associated with events with collective action potential (regardless of how critical or supportive of the state)
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Observational Test 1: Post Volume

Begin with our 87 volume bursts in 85 topic areas. For each burst, calculate change in % censorship inside to outside each volume burst within topic areas – censorship magnitude. If the goal of censorship is to stop collective action, we expect:

1. On average, % censored should increase during volume bursts.
2. Some bursts (associated with politically relevant events) should have much higher censorship.
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![Censorship Magnitude vs Density graph]

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Event classification (each category can be +, −, or neutral comments about the state):

1. protest or organized crowd formation outside the Internet
   individuals who have organized or incited collective action on the
ground in the past;
   topics related to nationalism or nationalist sentiment that have incited
protest or collective action in the past.

(Inter-coder reliability: 98.9%)
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What Types of Events Are Censored?

The diagram illustrates the distribution of censorship magnitude and density across different types of events. The x-axis represents the censorship magnitude, while the y-axis shows the density of events. The categories include:

- Policy
- News
- Collective Action
- Criticism of Censors
- Pornography

Each category is represented by a different color: Policy (blue), News (purple), Collective Action (red), Criticism of Censors (orange), and Pornography (yellow). The vertical bars indicate the frequency or density of each type of event at different censorship magnitudes.
What Types of Events Are Censored?

- Protests in Inner Mongolia
- Pornography Disguised as News
- Baidu Copyright Lawsuit
- Zengcheng Protests
- Pornography Mentioning Popular Book
- Google is Hacked
- Collective Anger At Lead Poisoning in Jiangsu
- Fuzhou Bombing
- Students Throw Shoes at Fang BinXing
- Rush to Buy Salt After Earthquake
- New Laws on Fifty Cent Party
- U.S. Military Intervention in Libya
- Food Prices Rise
- Education Reform for Migrant Children
- Popular Video Game Released
- Indoor Smoking Ban Takes Effect
- News About Iran Nuclear Program
- Jon Hunstman Steps Down as Ambassador to China
- Gov't Increases Power Prices
- China Puts Nuclear Program on Hold
- Chinese Solar Company Announces Earnings
- EPA Issues New Rules on Lead
- Disney Announced Theme Park
- Disney Announced Theme Park
- Popular Book Published in Audio Format

Censorship Magnitude

-0.2 0 0.1 0.3 0.5 0.7
Censoring Collective Action: Riots in Zencheng

![Graph showing the count of published and censored riots in Zencheng from January to July. The graph indicates a spike in censored riots in June.]
Censoring Collective Action: Ai Weiwei’s Arrest

Ai Weiwei arrested

Count Published
Count Censored
Speculation of Policy Reversal at NPC

Count Published
Count Censored

Low Censorship on Policy: One Child
Low Censorship on News: Power Prices

Power shortages
Gov't raises power prices to curb demand
“ReadMe” Algorithm Validated in Chinese
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Example: Labor Strikes, 2010 (Training set: 100; Test set: 900)
“ReadMe” Algorithm Validated in Chinese

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<td>Criticize</td>
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</tr>
<tr>
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<td>Criticize</td>
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Uncensored: Non-Collective Action Posts
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Regardless of whether Supportive or Critical
Uncensored: Non-Collective Action Posts

Regardless of whether Supportive or Critical

Percent Censored

One Child Policy | Corruption Policy | Food Prices Rise

Criticize | Support | Criticize | Support | Criticize | Support
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Regardless of whether Supportive or Critical

Criticize | Support | Criticize | Support | Criticize | Support
---|---|---|---|---|---
Ai Weiwei | 0.0 | 0.2 | 0.4 | 0.6 | 0.8 | 1.0
Fuzhou Bombing | 0.0 | 0.2 | 0.4 | 0.6 | 0.8 | 1.0
Inner Mongolia | 0.0 | 0.2 | 0.4 | 0.6 | 0.8 | 1.0
Additional Research Designs

Randomized Experiment (for causal inferences)

Selected 100 top social media sites (∼87% of blogs, >500M Users, geographically diverse)
Created 2 accounts on each (from inside China all over the country)
Wrote 1,200 unique social media posts (CA/not CA, Pro/Anti)
Submitted posts randomly assigned to type
Checked on censorship (from computers in many countries)

Participatory Study (for descriptive inferences)

Current method of learning how they censor: ask (carefully!)
Our goal: change our sources' incentives
Procedure: create our own social media website in China
Bought URL; contracted with firms for servers & software; posted and censored ourselves
To learn: we tried every software option, read the documentation, and called customer support(!)
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Mechanisms of Censorship
Mechanisms of Censorship

1. Submit text for posting
   - Immediate held for review before publication

2. Publish immediately
   - Post remains online
   - Post published after review
   - Post deleted during review
   - (Post reviewed then deleted)

3. Post is removed (within 24 hours)
   - Sorry, the host you were looking for does not exist, has been deleted, or is being investigated

4. Account blocked
   - You have been silenced by the administrator, the type of silence is forever!
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Post remains online
 Publish immediately
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Immediately held for review before publication
Administrator has set up review for new topics, your post will be shown after it has passed review.

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The government goes on about anti-corruption everyday, but is it doing anything? Today, it's Guo Yongxiang from Sichuan... All officials are corrupt, it's only those who have offended someone that are investigated...

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- Censored
  - Post reviewed then deleted
  - You have been silenced by the administrator, the type of silence is forever!

- Observational study
  - 64% of websites review some content
  - 40% of all submissions reviewed
Posts For v. Against Government: Zero Causal Effect
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Censorship Difference (Pro − Anti)

Panxu
Protest
Posts For v. Against Government: Zero Causal Effect
Posts For v. Against Government: Zero Causal Effect

Censorship Difference (Pro − Anti)

Panxu Protest

Tibetan Self-Immolations
Posts For v. Against Government: Zero Causal Effect

-0.5 0.0 0.5 1.0
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Posts For v. Against Government: Zero Causal Effect

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-0.5 0.0 0.5 1.0

Panxu Protest
Tibetan Self-Immolations
Ai Weiwei Album
Protests in Xinjiang

Censorship Difference (Pro − Anti)
Posts For v. Against Government: Zero Causal Effect

Censorship Difference (Pro − Anti)

Panxu Protest
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Ai Weiwei Album
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24/28
Posts For v. Against Government: Zero Causal Effect

Panxu Protest
Ai Weiwei Album
Corruption Policy

Tibetan Self-Immolations
Protests in Xinjiang
Eliminate Golden Week

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-0.5 0.0 0.5 1.0

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Posts For v. Against Government: Zero Causal Effect
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-0.5 0.0 0.5 1.0
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Protests in Xinjiang
Eliminate Golden Week
Yellow Light Fines
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Stock Market Crash

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Tibetan Self-Immolations
Protests in Xinjiang
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Yellow Light Fines
Stock Market Crash
Investigation of Sichuan Vice Governor
Posts For v. Against Government: Zero Causal Effect
Collective Action Events: Large Causal Effect
Collective Action Events: Large Causal Effect

Censorship Difference (CA Event − Non-CA Event)
Collective Action Events: Large Causal Effect
Collective Action Events: Large Causal Effect

Panxu Protest

Censorship Difference (CA Event − Non-CA Event)
Collective Action Events: Large Causal Effect

![Graph showing the difference in censorship between CA events and non-CA events. The graph includes two events: Panxu Protest and Tibetan Self-Immolations.]
Collective Action Events: Large Causal Effect

Panxu Protest
Tibetan Self-Immolations
Ai Weiwei Album
Collective Action Events: Large Causal Effect

![Graph showing the Censorship Difference (CA Event - Non-CA Event) for various events such as Panxu Protest, Tibetan Self-Immolations, Ai Weiwei Album, and Protests in Xinjiang.](image)
Evading Automated Review

They can't follow the conversation; our new keyword methods can!

The same task:
1. the analyst's job,
2. language drift
3. People hiding in plain sight,
4. Look-alike modeling,
5. Starting point for sophisticated automated text analysis
Evading Automated Review

Example Substitution 1:
Evading Automated Review

Example Substitution 1:

自由
Example Substitution 1:

自由  “Freedom”
Evading Automated Review

Example Substitution 1:

自由 “Freedom”
Evading Automated Review

Example Substitution 1:

自由
目田
“Freedom”

Example Substitution 2:

Homophone (both sound like “hexie”)
和 谐
“Harmonious [Society]” (official slogan)
河 蟹
“River crab” (irrelevant)

They can't follow the conversation; our new keyword methods can!
Evading Automated Review

Example Substitution 1:

自由
自

“Freedom”
“Eye field”

Example Substitution 2:

河
河

“Harmonious [Society]” (official slogan)

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Evading Automated Review

Example Substitution 1:

自由  “Freedom”
目田  “Eye field” (nonsensical)
Evading Automated Review

Example Substitution 1: Homograph

自由
自由
“Freedom”
目田
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Example Substitution 1: Homograph

自由
自由
“Freedom”
目
目
“Eye field” (nonsensical)
Evading Automated Review

Example Substitution 1:  **Homograph**

自由  自由  “Freedom”  (censored)
目田 目田  “Eye field”  (nonsensical)

Example Substitution 2:
Evading Automated Review

Example Substitution 1: Homograph

自由
“Freedom”
目田
“Eye field” (nonsensical)

Example Substitution 2:

和谐
Evading Automated Review

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自由 自由
自由 “Freedom” (censored)

目田 目田
目田 “Eye field” (nonsensical)

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和谐 和谐
和谐 “Harmonious [Society]” (official slogan)
Evading Automated Review

Example Substitution 1: Homograph

自由  “Freedom”  [CENSORED]
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Evading Automated Review

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目田
目田
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Example Substitution 2:

和諧
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目田
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Example Substitution 2: **Homophone (both sound like “hexie”)**

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Evading Automated Review

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Example Substitution 2: Homophone (both sound like “hexie”)

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They can’t follow the conversation; our new keyword methods can!
Evading Automated Review

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Evading Automated Review

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Conclusions

The Chinese people: Individually free, Collectively in Chains

Social Media (analyzed the right way):
- Enables detailed, continuous, predictive monitoring of every Chinese government, leader, policy, dissident, scandal, company, etc.
- Predicts state actions when other sources are silent

Applicable to other countries:
- New statistical methods widely applicable beyond China:
  - Following conversations when people try to evade authorities, use language creatively, achieve political purposes, etc.
  - Predicting action on the ground
  - Understanding large volumes of text in any language
- Applications to brand monitoring, government analysis, sentiment analysis, investments, news, advertising, etc.
Conclusions

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For more information

GaryKing.org
Censorship to Preempt Collective Action: Ai Weiwei’s Arrest
Censorship to Preempt Collective Action: Ai Weiwei’s Arrest

Mar. 29, 5 days prior

Apr. 3, Ai Weiwei Arrested

Actual % censorship

Predicted % censorship trend based on 3/19–3/29 data
Censorship to Preempt Collective Action: Ai Weiwei’s Arrest

Mar. 29, 5 days prior

Apr. 3, Ai Weiwei Arrested

% of Posts Censored

Actual % censorship

Predicted % censorship trend based on 3/19–3/29 data

Placebo Test:
Censorship to Preempt Collective Action: Ai Weiwei’s Arrest

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Apr. 3, Ai Weiwei Arrested

Actual % censorship
Predicted % censorship trend based on 3/19–3/29 data

Placebo Test: Most extreme of all effects
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<tr>
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Predicting the South China Sea Peace Agreement

% of Posts Censored

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Jun. 25, Peace Agreement

Predicted % censor trend based on 6/10–6/20 data
Actual % censorship
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Actual % censorship

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Jan. 28, 5 days prior
Feb. 2, Wang Lijun demoted

Jan 23 Jan 30 Feb 06 Feb 13
−0.2 0.0 0.2 0.4 0.6 0.8 1.0

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Jan 23 Jan 30 Feb 06 Feb 13
−0.2 0.0 0.2 0.4 0.6 0.8 1.0

2012

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Placebo Test:

32/28
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Jan. 28, 5 days prior
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Predicted % censorship trend based on 1/18–1/28 data

Placebo Test: Most extreme of all effects
Uncensored Posts (w/o Collective Action Potential)
Critical of the State
Uncensored Posts (w/o Collective Action Potential)
Critical of the State

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<th>Collective Action</th>
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<td>Free</td>
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- State Critique
  - yes
  - no

- Collective Action
  - yes
  - no

CENSORED
Free
This is a city government [Yulin City, Shaanxi] that treats life with contempt, this is government officials run amuck, a city government without justice, a city government that delights in that which is vulgar, a place where officials all have mistresses, a city government that is shameless with greed, a government that trades dignity for power, a government without humanity, a government that has no limits on immorality, a government that goes back on its word, a government that treats kindness with ingratitude, a government that cares nothing for posterity...
Censored Post (with Collective Action Potential)
Supporting the State
Censored Post (with Collective Action Potential) Supporting the State

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Censored Post (with Collective Action Potential)
Supporting the State

The bombing led not only to the tragedy of his death but the death of many government workers. Even if we can verify what Qian Mingqi said on Weibo that the building demolition caused a great deal of personal damage, we should still condemn his extreme act of retribution. . . . The government has continually put forth measures and laws to protect the interests of citizens in building demolition. And the media has called attention to the plight of those experiencing housing demolition. The rate at which compensation for housing demolition has increased exceeds inflation. In many places, this compensation can change the fate of an entire family.