Emerging Technology + International Security

17.449

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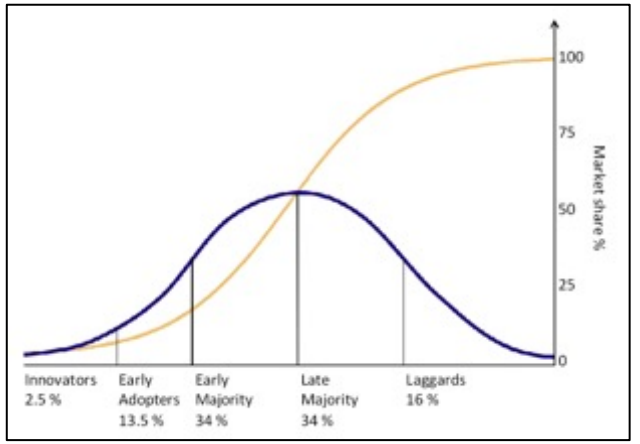
Recap

- Diffusion of innovations
  - Innovation
  - Communication channels
  - Time
  - Social System



- Innovation-decision process
  - Knowledge → persuasion → decision → implementation →confirmation

- Consequences of diffusion

- Parallels between diffusion + innovator's dilemma
  - Barriers to adoption (e.g., norms, resources, bureaucracy)

- Adoption-Capacity Theory (system + state level effects)
  - Financial intensity
  - Organizational capital
  - First mover vs. late mover advantages

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Innovations

Independent Variable

Dependent Variable

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"war is permeated by technology to the point that *every* single element is either governed by or at least linked to it. The **causes** that lead to wars and the **goals** for which they are fought; the blows with which campaigns open and the **victories** with which they (sometimes) end; the **relationship between the armed forces and the societies** that they serve; planning and preparation and execution and evaluation; operations and intelligence and organization and supply; **objectives** and **methods** and capabilities and missions; command and leadership and strategy and tactics; and even the very **conceptual framework** adopted by our brains in order to think about war and its conduct—all are and will be affected by technology."

Martin van Creveld , *Technology and War*

Innovation as a IV

- Effects on conflict/crisis initiation
- Effects on organizations
- Effects on doctrine/tactics
- Effects on effectiveness and outcomes

Revolutions and Innovations

Military Innovation

- Major military innovations (MMI): Major changes in the conduct of warfare, relevant to leading military organizations, *designed* to increase the efficiency with which capabilities are converted to *power*.

- Conduct of warfare: How great powers organize their militaries and plan to fight wars. *Character (not nature) of war.*

Revolutions

- Four elements:
  - Technological change
  - Systems development
  - Operational innovation
  - Organizational adaptation
- Each is necessary, but not sufficient
- Shapes military effectiveness

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Revolutions

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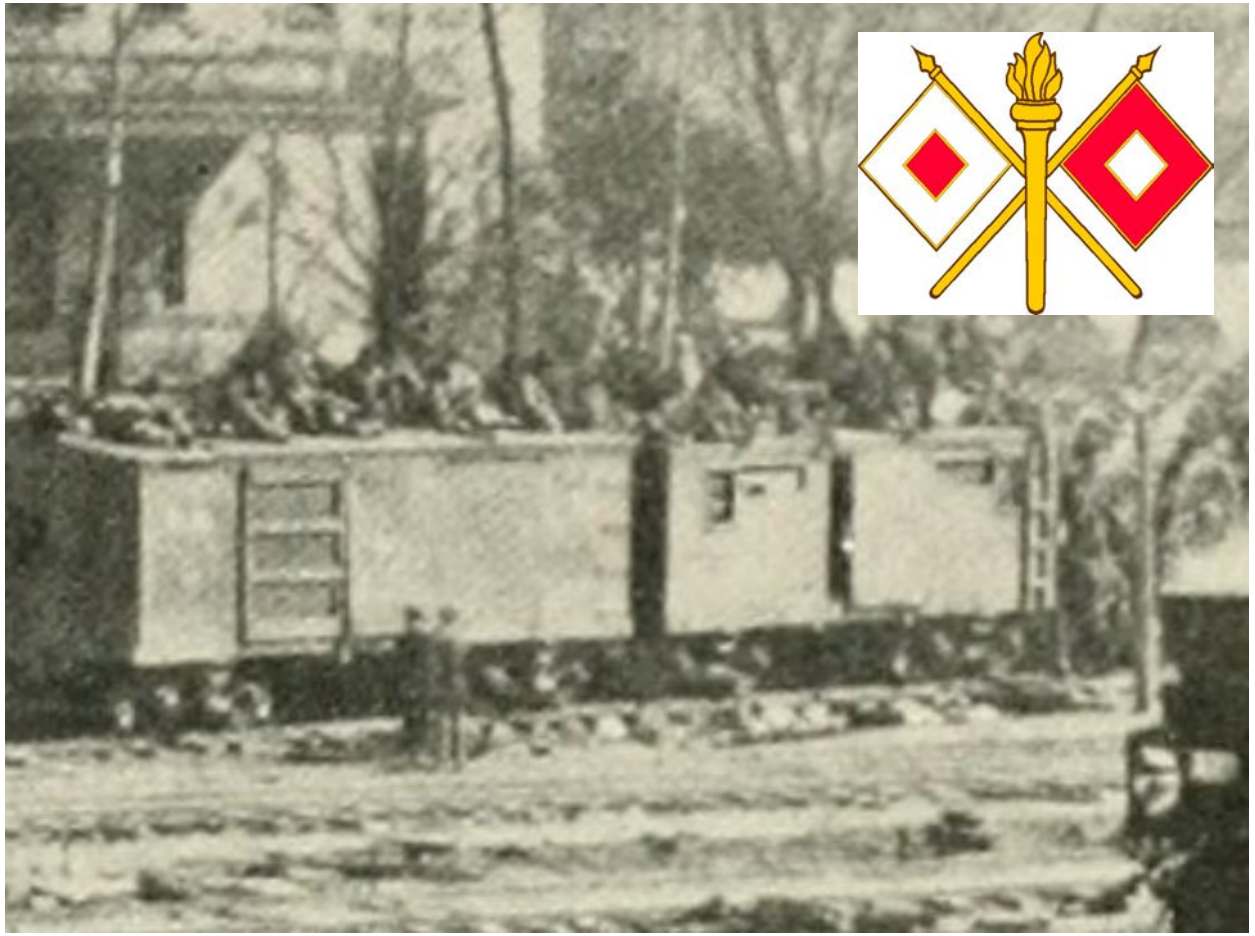

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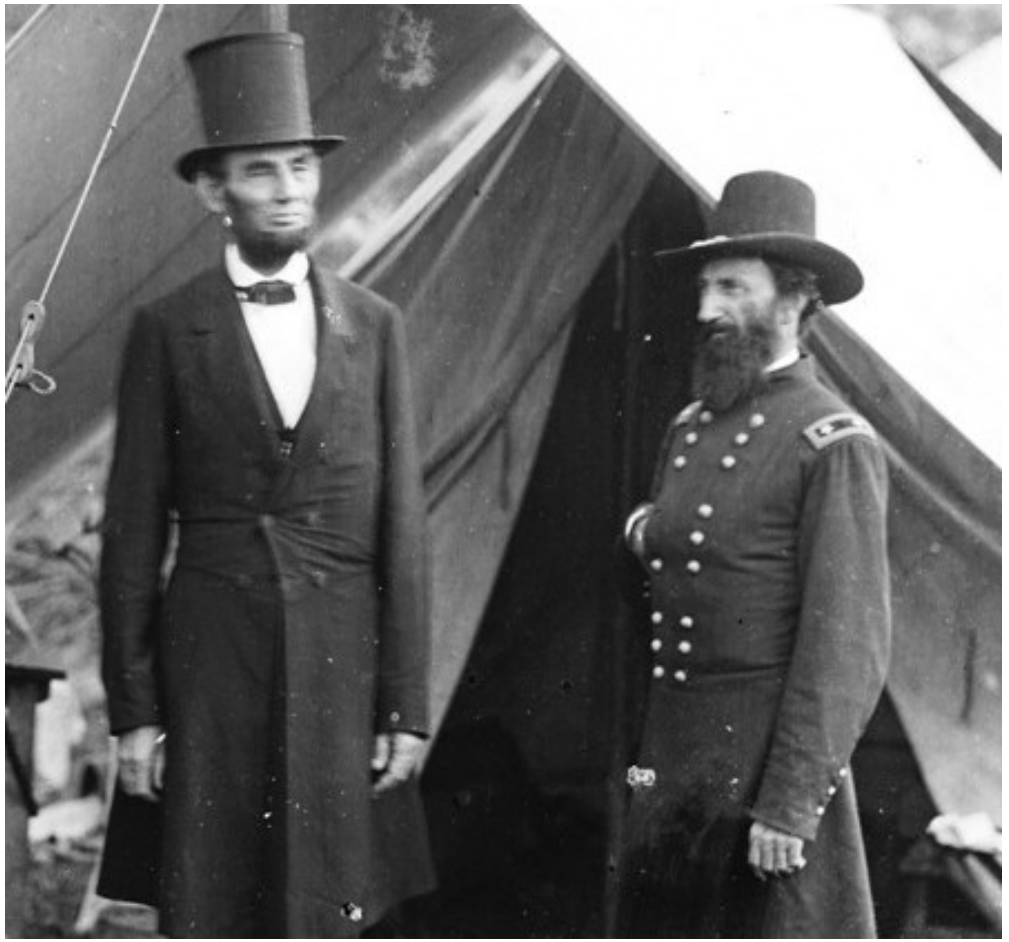

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Revolutions

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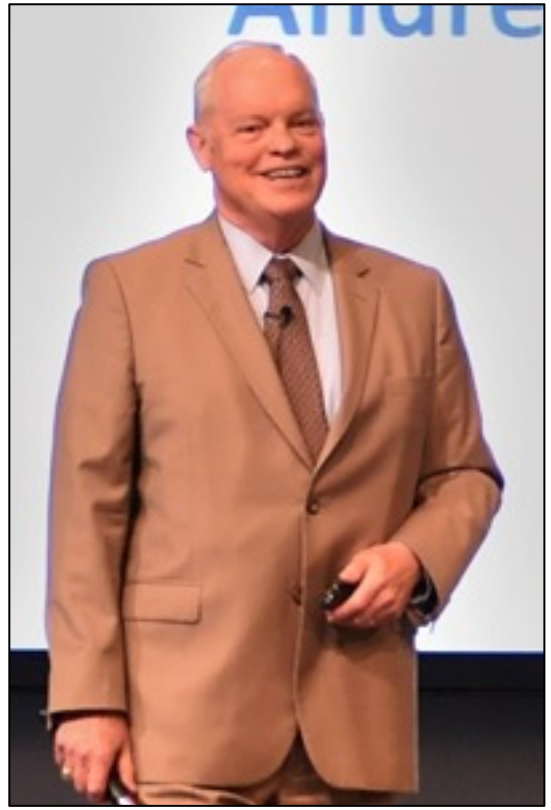
Revolutions: How fast?

- "relatively brief period" (Krepinevich 1994)
  - But time matters less than change itself
- Compares to water to ice state change
- At some point invalidates older concepts



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Revolutions: Seven Lessons

- 1. Emerging technologies only make revolutions possible

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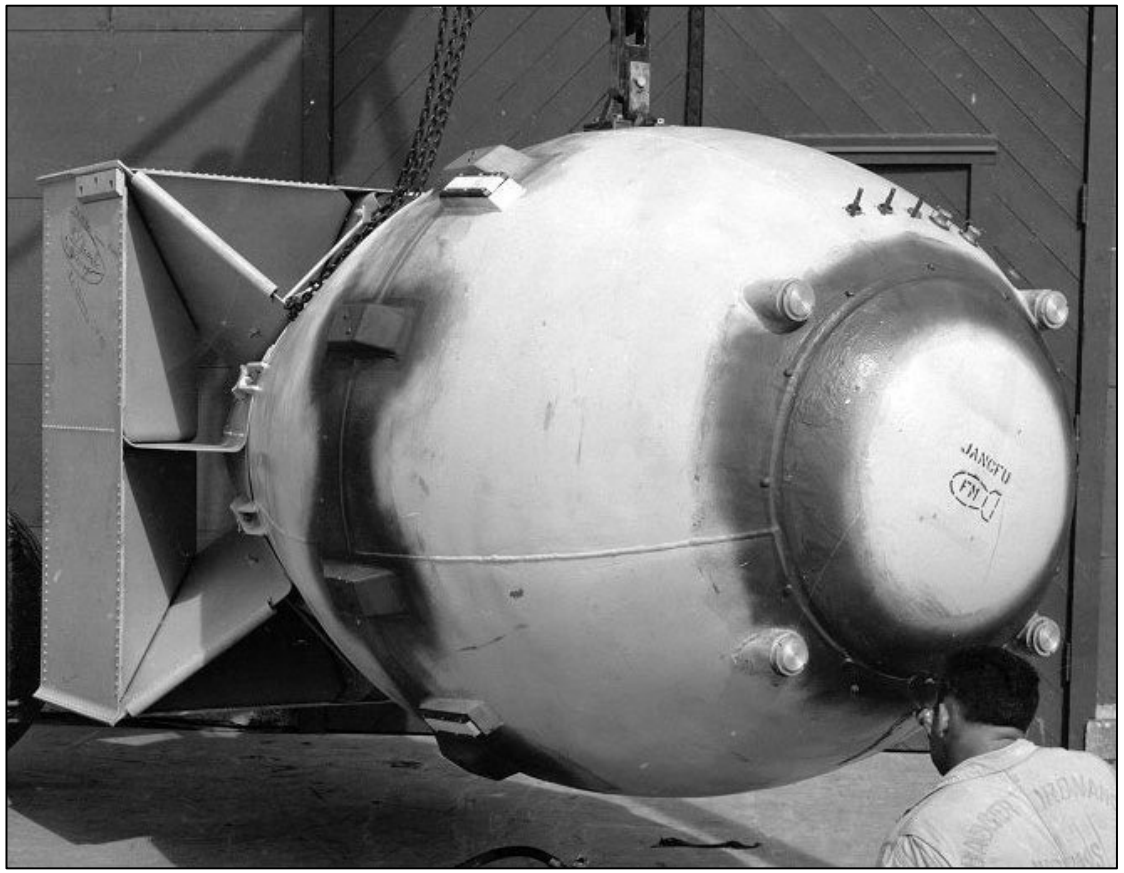
Revolutions: Seven Lessons

- 2. Competitive advantages are increasingly short lived
  - Ties back to Horowitz Adoption-Capacity Theory



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Revolutions: Seven Lessons

- 3. Cross-national variation leads to niche competitors
  - Objectives, strategic culture, resource limitations, threats

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Revolutions: Seven Lessons

- 4. War and revolutions in warfare are separate entities

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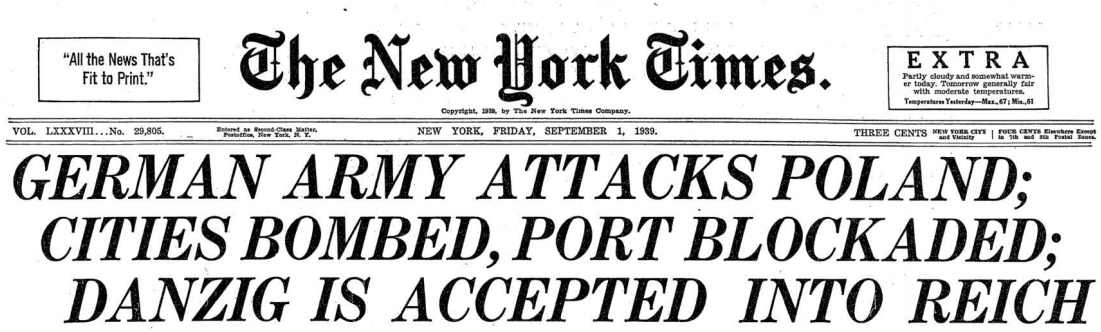
Revolutions: Seven Lessons

- 5. Militaries may not recognize and exploit revolutions



"All the News That's Fit to Print."

The New York Times.

EXTRA

Partly cloudy and somewhat warmer today. Tomorrow generally fair with moderate temperatures.

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VOL. LXXXVIII...No. 29,805. NEW YORK, FRIDAY, SEPTEMBER 1, 1939. THREE CENTS

GERMAN ARMY ATTACKS POLAND; CITIES BOMBED, PORT BLOCKADED; DANZIG IS ACCEPTED INTO REICH

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Revolutions: Seven Lessons

- 6. Technologies often "imported" from non-military domain
  - Doesn't mean that weaker economies can't partake in revolutions

Revolutions: Seven Lessons

- 7. Revolutions need not increase costs
  - Might even reduce costs

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RMAs: A Brief History

- Starts with Soviet analysis of U.S. posture in Europe
  - AirLand Battle (1982-late 1990s)
  - Close coordination between ground + air forces
    - Air forces locate and strike rear echelon
    - USSR: Reconnaissance Strike Complex

- Military Technical Revolution

RMAs: A Brief History

- Andy Marshall (Office of Net Assessment) sees Soviet writing about Military Technical Revolution

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RMAs: A Brief History

- Admiral William Owens
  - Vice Chairman of the Joint Chiefs of Staff (1994-1996)
  - Formalizes RMA thinking into U.S. doctrine
  - "System of Systems" → *generate defined effects vs. attrite forces*

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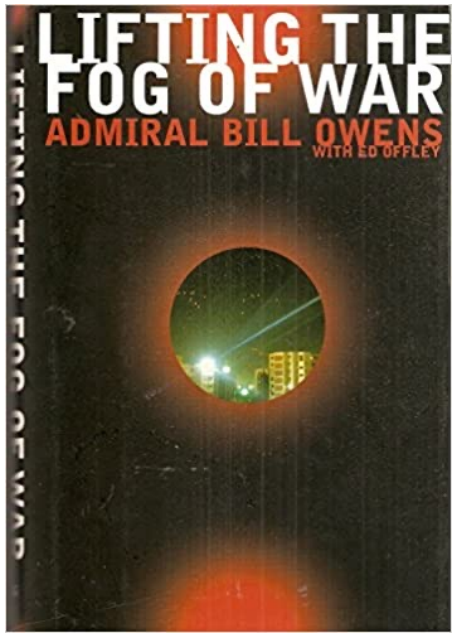


Owens, Admiral Bill, with Edward Offley. *Lifting the Fog of War*. Farrar, Straus & Giroux, 2000.© Farrar, Straus & Giroux. All rights reserved. This content is excluded from our Creative Commons license. For more information, see https://ocw.mit.edu/help/faq-fair-use/.

RMAs: Academic Studies

- Subject of much debate
  - Do RMAs exist?

- Eliot Cohen is a leading proponent
  - Harvard undergrad, PhD
  - MIT Army ROTC grad
  - OSD, Gulf War Air Power Study
  - Counselor to Sec State Rice
  - Dean, Johns Hopkins

Image courtesy of Eric Gibson / New America. Source: Wikimedia Commons. License CC BY.

U.S. Air Force, the Department of Defense, and the U.S. Government. *Gulf War Air Power Survey: Summary Report*. alc Books, 2015. This material is in the public domain.

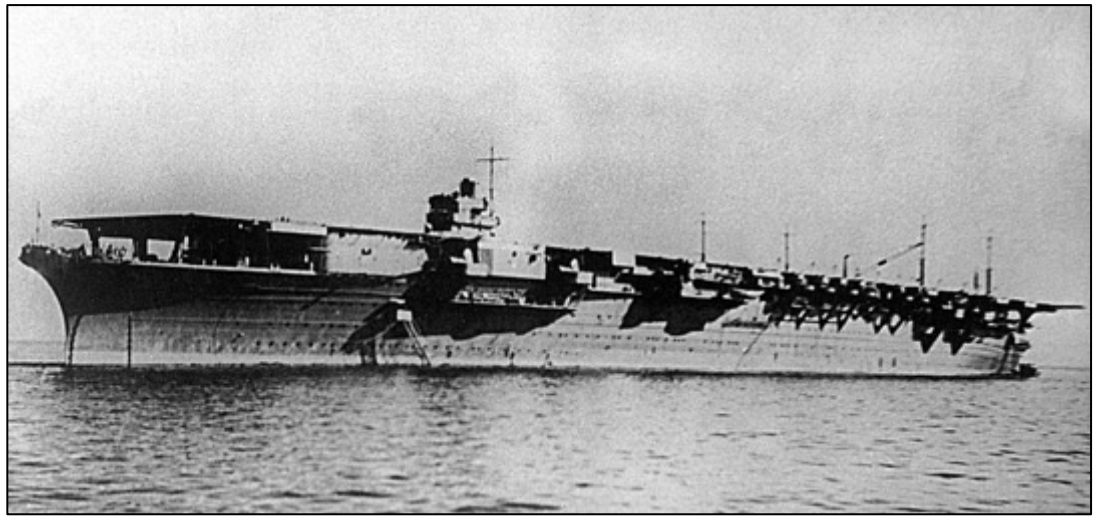
RMAs: Academic Studies

- Four problems with much RMA research (Cohen 2004):

1. Abstraction of RMA from geopolitics
2. Focus on tech at the expense of organization, doctrine, and manpower
3. View of transformation as top-down vs. bottom-up
4. How do weaker opponents respond

RMAs: Academic Studies

- Abstraction of RMA from geopolitics
  - Need to consider threats, objectives, resources, etc.



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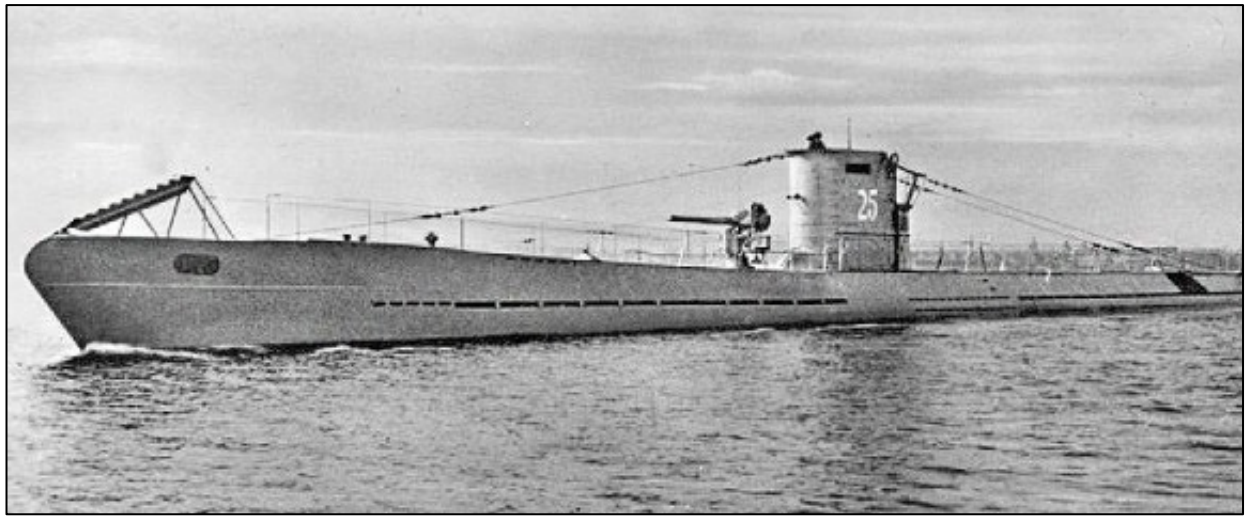

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RMAs: Academic Studies

- Tech at the expense of orgs, doctrine, and manpower
  - Tech efficiency can be at odds with mil effectiveness (vC)
  - Some militaries can do old things for longer
  - More operational militaries tend to innovate more

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RMAs: Academic Studies

- View of transformation as top-down vs. bottom-up
  - How effective is top-down change? (Posen vs. Rosen)
  - How do actors learn from bottom-up innovation?

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RMAs: Academic Studies

- How do weaker opponents respond (per Cohen)?
  1. Selective transformation (negate advantages)
  2. WMD development
  3. Asymmetric terrorism

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The Gulf War: An RMA?

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The Gulf War: An RMA?

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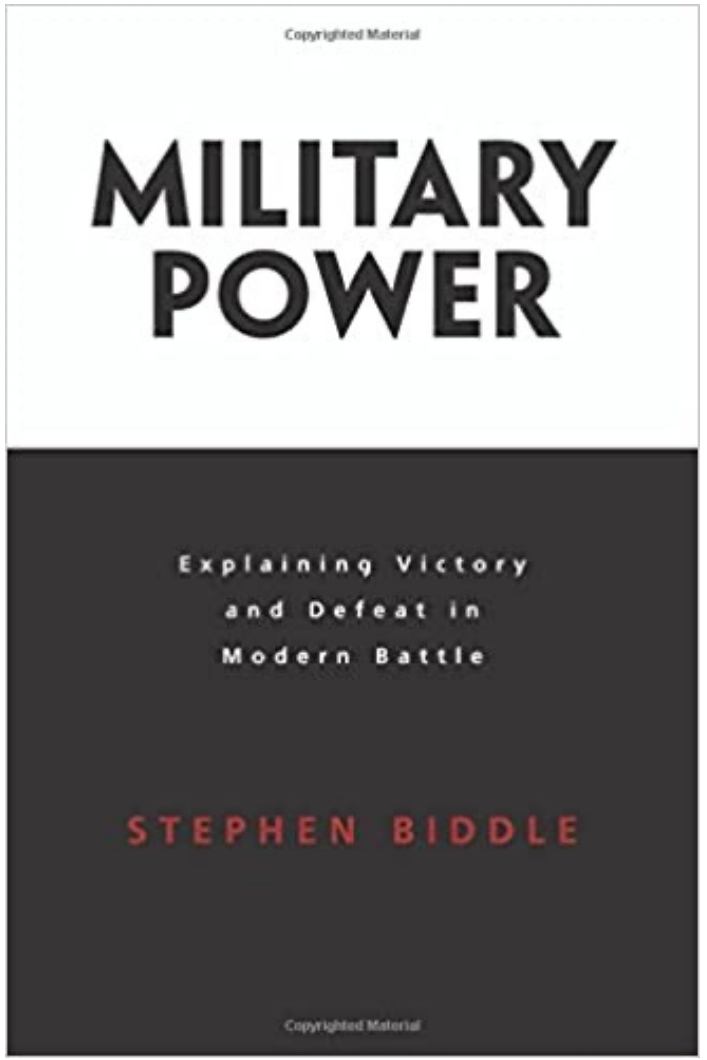
The Gulf War: An RMA?

- Stephen Biddle
  - Not tech, but "modern system" tactics
    - Cover/Concealment
    - Dispersed forces
    - Combined arms operations
- But what drives modern system?
- How might we test Biddle's claims?



Biddle, Stephen. *Military Power: Explaining Victory and Defeat in Modern Battle*. Princeton University Press, 2006. © Princeton University Press. All rights reserved. This content is excluded from our Creative Commons license. For more information, see https://ocw.mit.edu/help/faq-fair-use/.

The Gulf War: An RMA?

- Battle of 73 Easting (26-27 Feb 91, SE Iraq)
  - Allies: ~6 KIA, 19 WIA, 1 M3 lost
  - Iraq: 600-1K KIA/WIA, 1300+ POW, 340 tanks/APCs lost

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Cohen's Tests: An RMA?

1. Do forces today's force look different than past forces?

2. Are the processes of battle different?

3. Are the outcomes different?

Revolutions or Evolutions?

Van Creveld and Cohen ask:

What changes and what remains the same?

Revolution or Evolution

- Psychology of war
- War with/without standard fronts
- Who fights?
- What is purpose of military?
- What is the theory of victory?

Discussed cultural factors

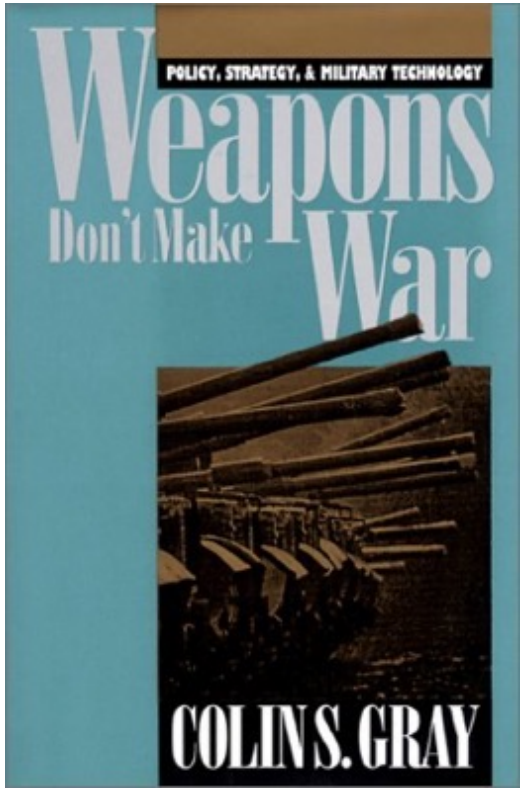
Defined Revolutions in Military Affairs

Assessed RMA and its Challengers

Looking Ahead

- Continue discussion of tech as an independent variable
- Key themes and theories:
  - Offense-Defense Balance
  - Technological determinism
- Start thinking about topics

Ellis, John. *The Social History of the Machine Gun*. Arno Press, 1981. © Arno Press. All rights reserved. This content is excluded from our Creative Commons license. For more information, see https://ocw.mit.edu/help/faq-fair-use/.



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