



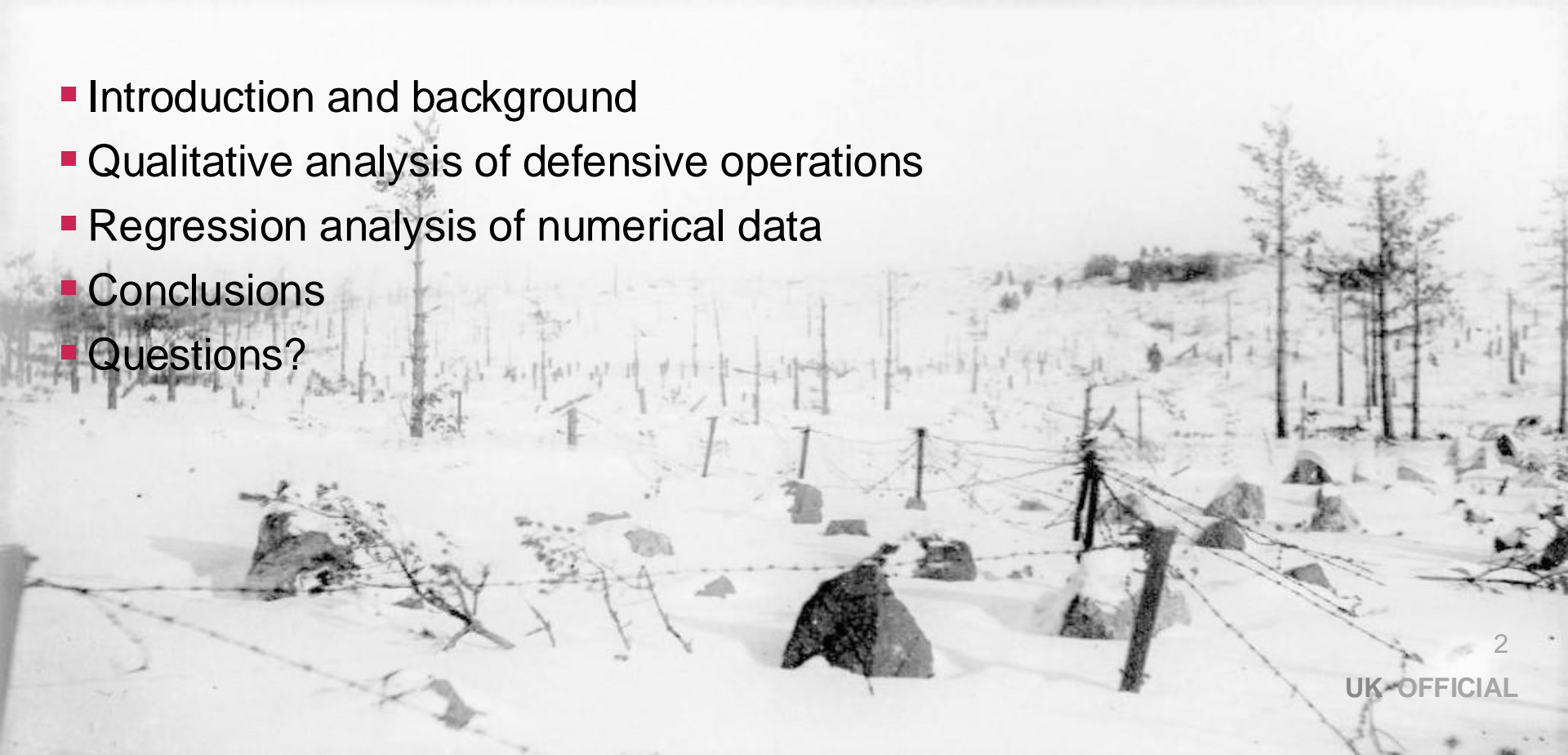
Juxtaposing Numbers and Narrative: Combining Methodologies in Historical Analysis

Rebecca Brown, Arnie Delstanche, Colin Irwin, Ahmad I. Villasenor, Elliot Cook,
and Paul R. Syms, Dstl Platform Systems Division

rbrown2@dstl.gov.uk

40th International Symposium on Military Operational Research

- Introduction and background
- Qualitative analysis of defensive operations
- Regression analysis of numerical data
- Conclusions
- Questions?



Carl von Clausewitz



Friction is the only concept that more or less corresponds to the factors that distinguish real war from war on paper.

AZ QUOTES



- <https://www.atlanticcouncil.org/blogs/ukrainealert/ukraine-is-the-front-line-of-the-free-world/>





AUSTRALIAN WAR MEMORIAL

P03998.002

- Leadership, morale, and will to fight are the 'holy trinity'
- Fortifications and outposts slow the attacker
- Counter-attack is key
- 'Citadelization' useful in urban defence
- Assimilating terrain obstacles
- Air superiority is important
- Maintain ISTAR superiority
- Artillery, armour, logistics and C3 are all important



Mit den siegreichen verbündeten Armeen vom Donajec bis Lemberg IX: Generalfeldmarschall v. Madenjian besichtigt am 3. Juni 1915 ein von den Verbündeten gestürmtes Außenfort von Przemysl.
Nach einer Zeichnung des Generalstabes der „Alliierten Zeitung“ „Wolfs“ in Wien, bei den großen Zweibrüderfeldern in Italien zum Wafung am begründet ist.



The Utility of Numbers in Historical Analysis: Regression Analysis of Defensive Operations

- Selected 470 historical battles from the revised Helmbold database
 - from 1914 to 1999
 - including examples of five different defensive postures
- Agreed a list of 14 factors to analyse with our customers
 - covering physical, moral, conceptual, and environmental factors
- Ran full-factor regression analyses using R
- What are the key contributors to defender victory in each posture?

- **DELAY (DL):** Prevent the enemy from arriving at a specified location, either for a specified length of time, or until a force has withdrawn
 - may or may not use the natural defensive strength of the terrain, e.g. shell scrapes, and improvised obstacles.
- **HASTY DEFENCE (HD):** Normally organised while in contact with the enemy or when contact is imminent
 - characterised by improvement of natural defensive features, e.g. shell scrapes, foxholes, and improvised obstacles.
- **PREPARED DEFENCE (PD):** Bulk of the defending force is disposed in pre-selected positions
 - non-permanent structures such as trenches and emplacements, and controlling the terrain between them using mines, wire, ditches, and other engineered obstacles.
- **FORTIFIED DEFENCE (FD):** Built when out of contact with the enemy, and when contact is not imminent
 - permanent fortified zones incorporating pillboxes, forts, mines, wire, ditches, and protected communication systems.
- **MOBILE DEFENCE (MD):** Non-fixed tactical defence that concentrates on blocking and dislocating the enemy, as a prelude to counter-attacking.

Defence postures

1. Delay (DL)
2. Fortified Defence (FD)
3. Hasty Defence (HD)
4. Mobile Defence (MD)
5. Prepared Defence (PD)



Factors to analyse

- | | |
|------------------------------------|------------------------|
| 1. Force Ratio | 8. Relative Technology |
| 2. Artillery Ratio | 9. Morale |
| 3. Artillery Guns per 1K Defenders | 10. Leadership |
| 4. Tank Ratio | 11. Surprise |
| 5. Air Superiority | 12. Training |
| 6. ISTAR | 13. Cover |
| 7. Logistics | 14. Relief |

Regression Analysis: Statistical technique used to establish relationships between variables, and to calculate the contribution of each to the probability of outcome

Factors		Hasty Defence (HD)	Mobile Defence (MD)	Prepared Defence (PD)	Fortified Defence (FD)	Delay (DL)	Comments
Material	Force Ratio	22-31%	30-41%	32-42%	29-39%	39-50%	Ratio from 0.1-3
	Artillery Ratio	37-44%	32-37%	23-29%	22-27%	7-9%	Ratio from 0-5
	Arty. Guns per 1000	38-44%	32-40%	23-28%	21-26%	6-8%	Ratio from 0-20
	Tank Ratio	43-37%	35-29%	26-21%	24-20%	7-5%	Ratio from 0-1.5
	Air Superiority	14-74%	14-62%	9-61%	12-64%	2-18%	Relative Air Superiority (-2 to 2)
	ISTAR	3-93%	3-79%	1-84%	1-4%	0-40%	Inferior to superior ISTAR (-2 to 2)
	Logistics	4-86%	6-70%	2-75%	2-69%	0-32%	Inferior to superior Logistics (-2 to 2)
	Relative Technology	10-82%	6-69%	5-70%	6-73%	1-25%	Inferior to superior Technology (-2 to 2)
Moral	Morale	4-93%	4-85%	2-87%	2-84%	0-53%	Inferior to superior Morale (-2 to 2)
	Leadership	5-88%	5-72%	2-76%	2-71%	0-33%	Inferior to superior Leadership (-2 to 2)
Conceptual	Surprise	19-79%	14-63%	9-61%	9-57%	2-22%	Relative Surprise (-2 to 2)
	Training	15-74%	13-54%	7-54%	6-48%	1-17%	Inferior to superior Training (-2 to 2)

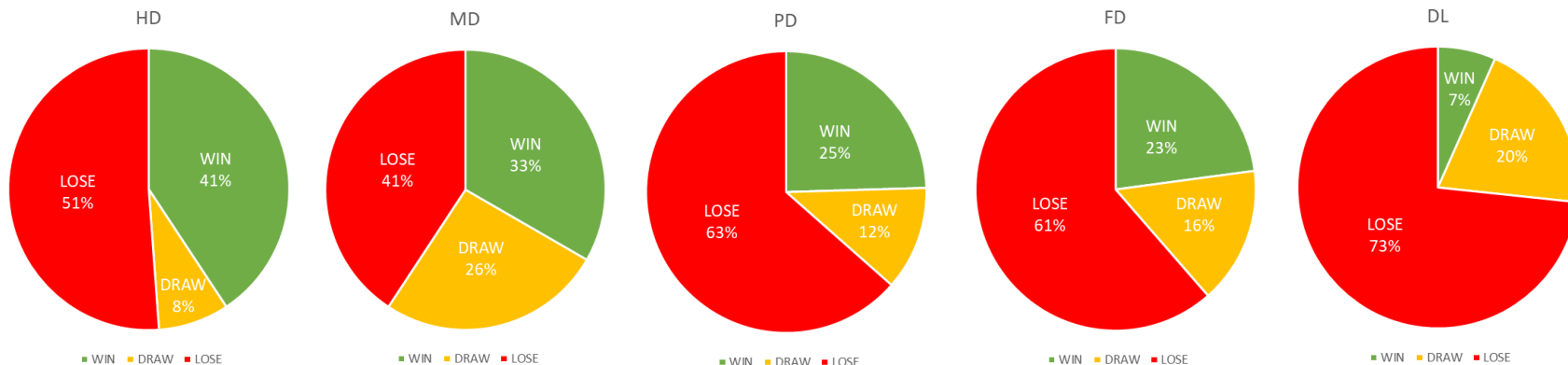
Key observations

- **Morale** makes the largest contribution to defender victory across all defence postures
- **ISTAR** makes the second largest contribution to defender victory in 3 of 5 defence postures
- Greater variation in those factors that make smaller contributions to defender victory

Terrain		Hasty Defence (HD)	Mobile Defence (MD)	Prepared Defence (PD)	Fortified Defence (FD)	Delay (DL)
Cover	Farmland	44%	34%	27%	23%	7%
	Forest	48%	37%	31%	26%	8%
	Mixed	34%	28%	20%	17%	5%
	Open	36%	33%	23%	19%	6%
	Scrub	54%	46%	37%	32%	11%
	Urban	26%	22%	15%	12%	4%
Relief	Flat	42%	34%	24%	23%	7%
	Hilly	39%	33%	22%	21%	6%
	Rolling	41%	33%	23%	22%	7%
	Mountain	61%	45%	41%	37%	12%

Key observations

- **Mountainous terrain** makes the largest contribution to defender victory in 4 of 5 postures
- **Urban** makes the smallest contribution to defender victory across all postures



Key observations

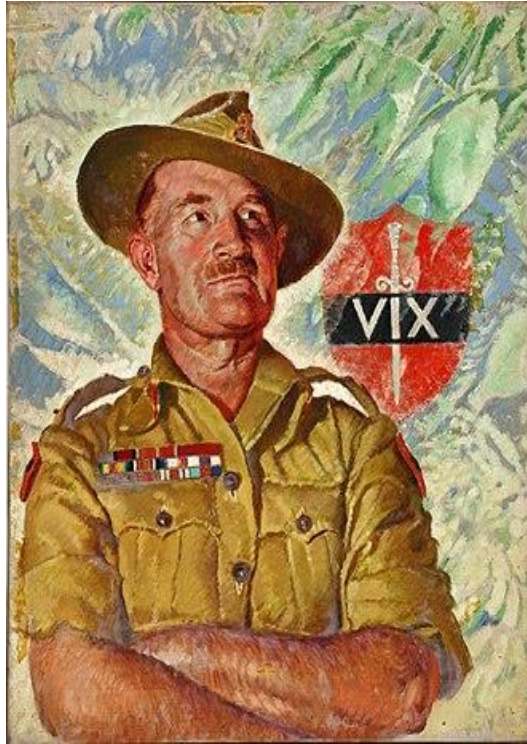
- **Hasty Defence** has the most wins (41%), but fewest draws; it is 'brittle'
- **Mobile Defence** has the fewest losses (41%), but the most draws
- **Prepared** and **Fortified Defences** have higher probabilities of loss (63% and 61% respectively)
- **Delay** has the worst outcomes of all ... known to be the hardest mission

- Hasty Defence is not the posture of choice ...
 - but a defender must expect it, and thus prepare for it the most
 - in leadership and flexibility ...
 - the attacker is having a hard time as well!
- Must address ‘operational porosity’ challenge
 - there *will be* local setbacks and penetrations
 - counterattacking can manage them
- Hasty Defence destroys attacker momentum
 - reducing their ‘first-mover advantage’



- 1) Be diverse in strengths and skills
 - don't focus all energy on improving just one or two areas
 - 2) Don't let the attackers dominate in these key areas:
 - air superiority, morale, ground force technology, logistics
 - 3) Defenders benefit from advantage in these key areas:
 - leadership, ISTAR, training, and logistics
- Don't need to be the best at everything to win!

Closing Thoughts: Can Numbers Enhance the Narrative?





[dstl] The Science Inside

Discover more

