



Understanding Deterrence and Escalation Dynamics

Role of analytical wargaming as part of a mixed-methods approach

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Ministry
of Defence

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1. What is escalation?
2. What is deterrence?
3. Role of table-top exercises
4. Role of analytical wargames
5. Case for a mixed-methods approach
6. Example: SONAC/Dstl Deterrence & Escalation Wargame Series
 - a. Historical analysis;
 - b. Wargame design;
 - c. Post-game analysis;
 - d. MINES.

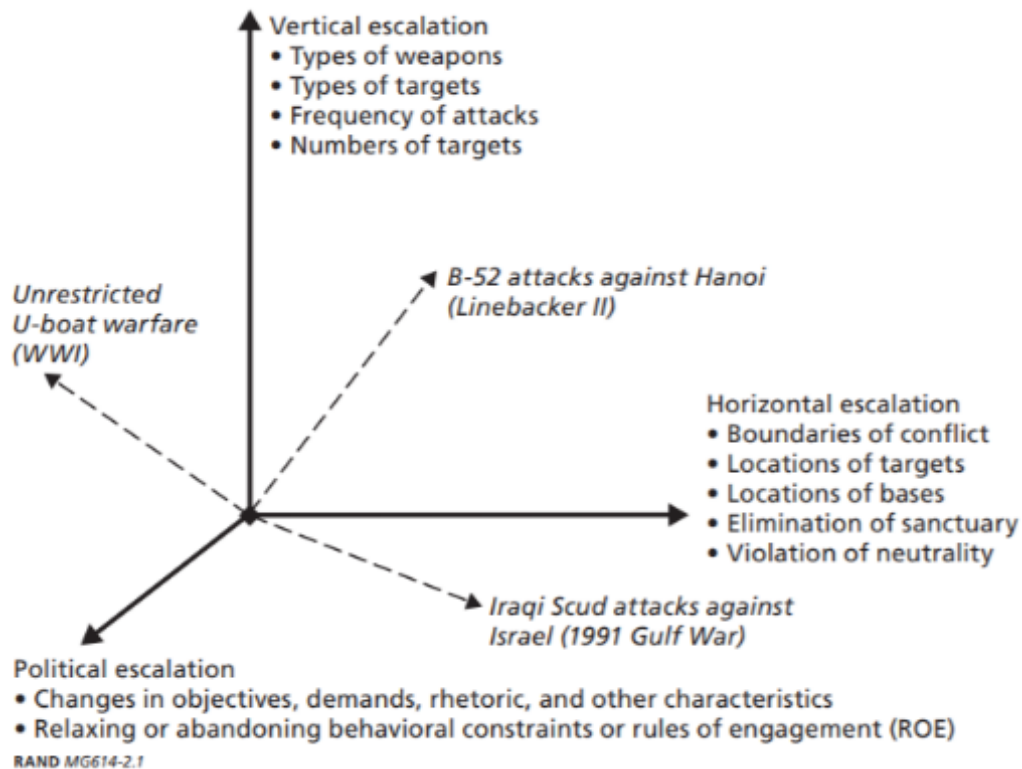
1. What is escalation?

Definition of escalation

- “An **increase in the intensity or scope of conflict** that crosses the threshold(s) considered significant by one or more of the participants.”¹
- “**Escalation is in the eye of the beholder.**”²

Dimensions of escalation

- **Vertical escalation:** an increase in the overall intensity of a crisis.
- **Horizontal escalation:** spread of crisis into new regions / domains.
- **Political escalation:** an expansion of a participant’s objectives in a crisis and/or a relaxation of their behavioural constraints.



1 Forrest Morgan et al, [Dangerous Thresholds: Managing Escalation in the 21st Century](#), RAND (2008).

2 Madison A. Estes, [Prevailing under the Nuclear Shadow: A New Framework for US Escalation Management](#), CNA (2020).

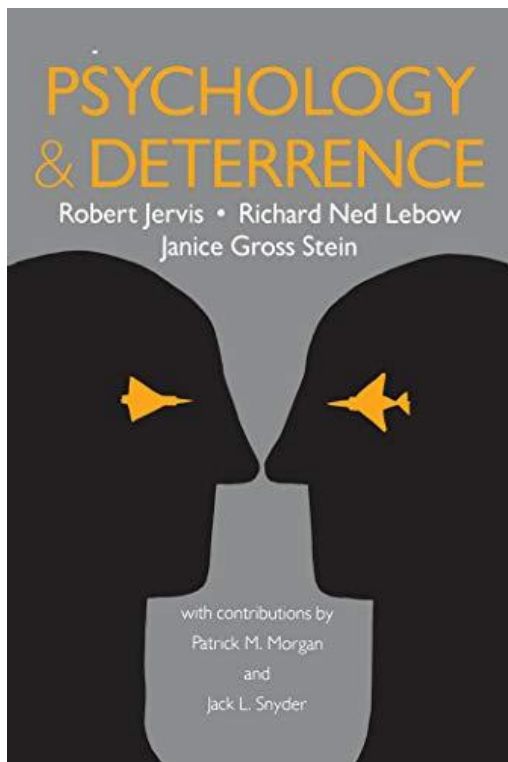
■ Aim of Deterrence

- To **persuade** an adversary to refrain from a hostile course of action.
 - By convincing the adversary that the potential costs of action would outweigh the perceived benefits;
 - And/or that the benefits of restraint would outweigh the costs.
- To **stop** an adversary from **embarking on a hostile course of action** upon which they have yet to embark.

Benefits of Action <i>E.g. Terminate conflict on acceptable terms</i>	Costs of Action <i>E.g. Nuclear retaliation</i>
Costs of Restraint <i>E.g. Probable military defeat</i>	Benefits of Restraint <i>E.g. Hypothetical off-ramps preserved</i>

Fig. 1: An illustrative adversary decision calculus

2. What is deterrence? (3)



- **Deterrence operates in the realm of perception.**
 - Deterrence involves having a **cognitive effect** using a combination of threats and incentives to shape an adversary's perceptions of risk, choices, and outcomes.
- **Deterrence is best understood as a strategy of 'second to last resort'.**
 - **Deterrence ≠ capability to defeat.**
 - If deterrence succeeds, the **adversary will still have the means to do you and your Allies harm**, but no longer the will.
 - Deterrence is a **dynamic process**.
- **Deterrence remains relevant after thresholds are crossed.**
 - Intra-war deterrence (i.e. deterrence during a conflict) is a crucial means of **managing escalation**, and restoring deterrence.

3. Table Top Exercises

- Usually involve a single player cell responding to events in a pre-scripted scenario.
- Players usually consider the implications of the scenario and discuss what options they might have to respond.

		Goal of Game		
		Creating Knowledge (Analytical Methods)	Conveying Knowledge (Teaching Methods)	Entertainment or Team Building
Problem Type	Unstructured / Wicked Problem	Discovery Games	Educational Games	Role-Playing Games
	Structured Problem	Experimental Games	Training Games	Commercial Games

- Can be used both for creating knowledge and conveying knowledge.
 - When used for conveying knowledge, or ‘experiential learning’, TTXs help bring to life issues uncovered by other forms of analysis.
 - They can sensitise participants to the dilemmas involved in managing escalation during high-end crises.
 - When used for creating knowledge, TTXs primarily focus on understanding group decision-making dynamics and clarifying roles and responsibilities, exposing assumptions, and identifying different perspectives on issues.

3. Role of table-top exercises



- **Breadth of coverage.**

- Conversely, lack of need for narrative consistency between cells and vignettes means it is possible to explore more of the problem space than the single pathway of a wargame.

Limitations:

- **Lack of dynamism can make insights very BLUE-focussed.**
- **Assumptions made in the scenario about RED and escalation dynamics may not be critically assessed.**

Benefits of deterrence TTXs:

- **Focus and immersion.**
 - Allows scenarios to be briefed and discussed in controlled, realistic and visceral ways.
- **Specificity.**
 - Use of scripted scenarios allows discussion to be focused on very specific aspects of the problem space.



4. Role of analytical wargames



- **Unintended consequences.**

- ‘Closed’ wargames can face players with the effects of fog, friction and miscommunication.

Limitations

- Abstraction can be disengaging and limit generalisability to the real-world.
- Data capture can be intrusive and can skew gameplay.
- Multi-sided wargames are usually more time-consuming and expensive to design and execute.

Benefits of analytical wargames:

- **Focus on interaction.**
 - Allows exploration of research questions where the reactions of other cells are crucial.
- **Centrality of decisions.**
 - In contrast to TTXs, players must make decisions and face the consequences of them. This forces players to engage more carefully with specific choices.



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5. Case for a mixed-methods approach

- **Mixing methods allows one to harness the strengths of each method whilst offsetting their respective weaknesses.**
 - Relevant historical case studies exist but limited in number and applicability;
 - Rich theoretical literature on deterrence and escalation exists but limited academic consensus;
 - Analytical wargames allow one to explore dynamic decision-making but are inherently speculative.
- Literature review and historical **case studies provided the empirical grounding for analytical wargaming.**
- **Analytical wargames generate pseudo-experimental data** to plug gaps in the historical examples, and to examine hypotheses derived from theory.



6. Deterrence & Escalation: Aim and Research Questions **[dstl]** The Science Inside

Aim: *“To improve our understanding of escalation dynamics across the spectrum of escalation in order to apply our deterrence approach more strategically.”*

Research questions

1. In what ways can different **factors** and **escalation types** interact dynamically in different scenarios, and with what results?
2. What **strategies** do actors adopt to manage escalation during a crisis?
3. To what extent and how do **longer-term deterrence considerations** affect the strategies that actors employ to manage escalation within a crisis, and vice versa?
4. To what extent do strategies for managing escalation and **escalation dynamics vary between different geographical regions?**

6. Deterrence & Escalation: Historical Analysis

- **Identified >50 examples of inter-state crises** since 1945 with high potential for escalation.
- **Produced 8 detailed historical case studies** based on a range of secondary sources.
- **Identified the common factors** that influenced escalation upon which to base our game design.



- Balance of power
- Correlation of forces
- Interests and objectives
- Geography
- Historical experience
- Intra-alliance relations
- Role of third-party actors

INDEPENDENT VARIABLES



- Actors' perceptions
- Negotiation positions and outcomes
- Actors' strategies
- Crisis outcomes

DEPENDENT VARIABLES

6. Deterrence & Escalation: Wargame Design

- **Turn-based structure**; each c.3 hour turn represents a week.
- Players split into **3-4 cells**.
- During each turn, players **strategise, negotiate** and submit **orders**.
 - Each phase supported by ‘handrail’ materials to support timely and comparable decision-making, without being overly prescriptive and denying players agency.

Operational Phase
Strategise Phase
Prepare for Press Conference and Negotiation
Press Conference
Free Negotiation
Negotiation Briefback
Order Submission
Adjudication
Strategic Briefback

- Operational game mechanic used to determine ‘**facts on the ground**’
 - Introduces element of chance, along with player agency and buy-in
- **Data capture prominent throughout**
 - Data Capture and Analysis Plan a key driver of game design.

- Primary purpose is to establish **what happened** during a game and **why**.
- Essential to capture the following data in a **systematic, structured, and comparable** fashion:
 - Players' **perceptions** of the situation, the stakes, the adversary, themselves, and other actors;
 - Players' objectives, strategies, options, constraints, decisions, and risk appetites;
 - Outcomes players expected, and the actions that they anticipated taking;
 - Players' contingency plans;
 - Actual outcomes and their impact on players' decision-making.

- After the game, the data capturers become analysts, and:
 - Construct a **detailed narrative** of what happened in the game, identifying turn-by-turn the critical perceptions, decisions, and outcomes that drove this narrative of events;
 - Identify the key **inflection points**, and the **alternative pathways** that the narrative could have taken;
 - Identify the **recurrent themes**, **strategies**, and **underlying escalation dynamics** that shaped the course of the game;
 - Provide **generalizable answers** to the research questions;
 - Identify any further **questions** and **scenarios** posed by the game.



Nuclear Wargaming: A Tool to Support Nuclear Effects Visualization

Mr. Steve “WEBB” Webber

DTRA RD-NTI, PMO A&AS Nuclear Weapons Effects SME

Connections UK, Sep 2024



MINES and The Need for Nuclear Discussion

- Wargames rarely examine post-nuclear use scenarios
 - In part, because adjudication of nuclear effects is difficult
 - Games either end at nuclear use, or nuclear actions are 'branch pointed'
- When we *do* consider nuclear effects, we lack the ability to represent them in detail and/or in a timely manner
 - Detailed modelling takes too long to be relevant to an ongoing wargame
 - It must either be conducted before or after the game, limiting its relevance to dynamic interactions between players
 - Rapid adjudication requires SME judgement
 - Not necessarily auditable or repeatable
 - SMEs not always available



Mission Impacts of Nuclear Events Software (MINES)

- MINES is designed for COA analysis/wargaming of the impacts of nuclear detonations to **friendly forces and missions**.
- Prioritize speed over fidelity for warfighter analysis. **Fast 70-80% solution > slow 90-95% solution**
- MINES is **designed** for:
 - Quick scenario generation and execution (< 3 min)
 - Course of action (COA) development, analysis, & revision
 - White Cell Adjudication
 - Wargames (analytic, educational, & seminar)
 - Table-top exercises (TTXs)
 - Exercises
- MINES is **not designed** for:
 - Detailed targeting solutions to include delivery system
 - Detailed full-physics analysis required for detailed system-specific and/or requirements analysis



MINES Scenario Creation Page

 Scenario: Connections UK 2024

Image is
Unclassified

HOME SETTINGS LOGOUT

1000 km
500 mi

Map of Europe and North Africa showing various countries and cities. The map is centered on the Mediterranean Sea. A scale bar indicates 1000 km and 500 mi.

Scenario Properties

Drag assets and weapons onto the map to configure a scenario

Scenario Name: Connections UK 2024

Units:
Category: Ground Units Team: Blue

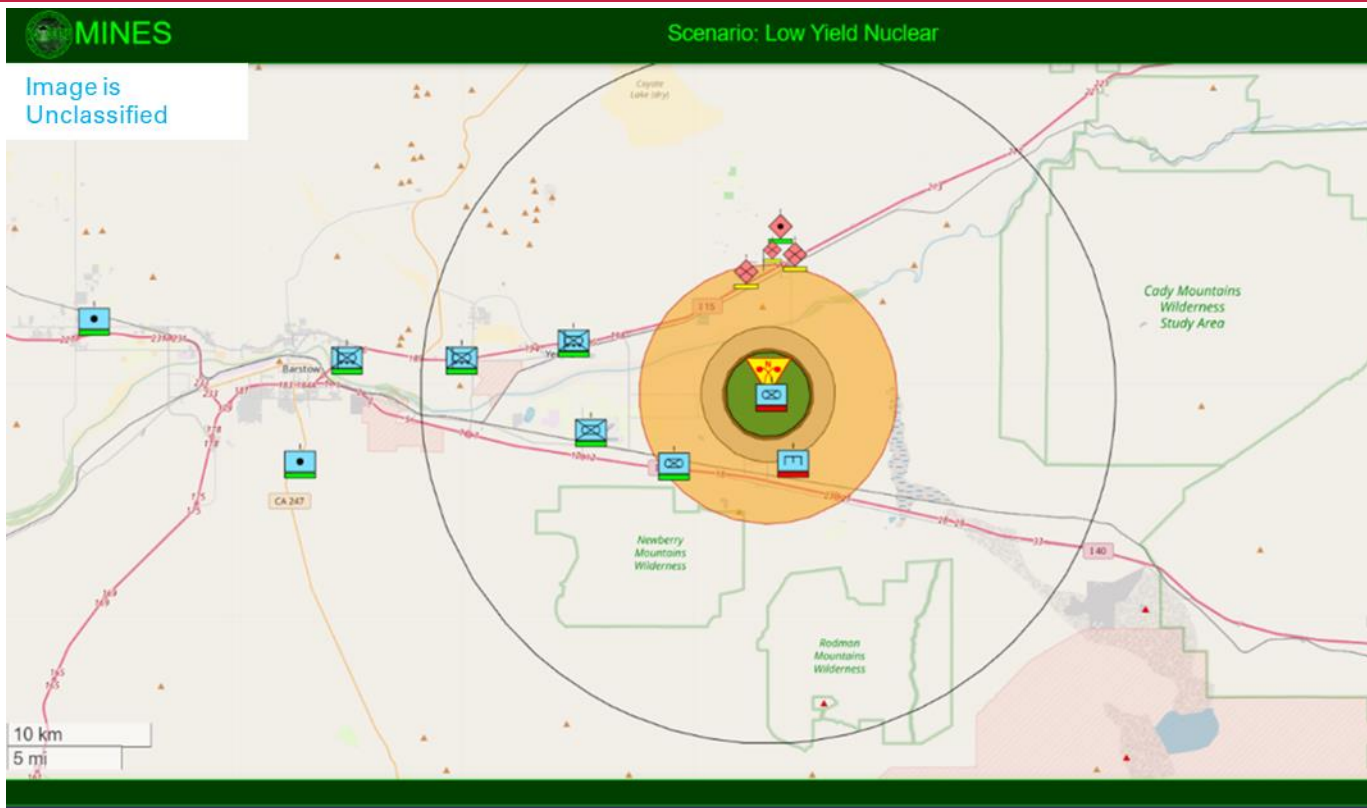
1 BDE INF
3 BDE ARM
12 BDE INF

Weapon:
Weather: January
Calculation Setup: 1 day simulation, 1 hour intervals
CALCULATE SCENARIO

Image is
Unclassified



MINES Example, 1MT





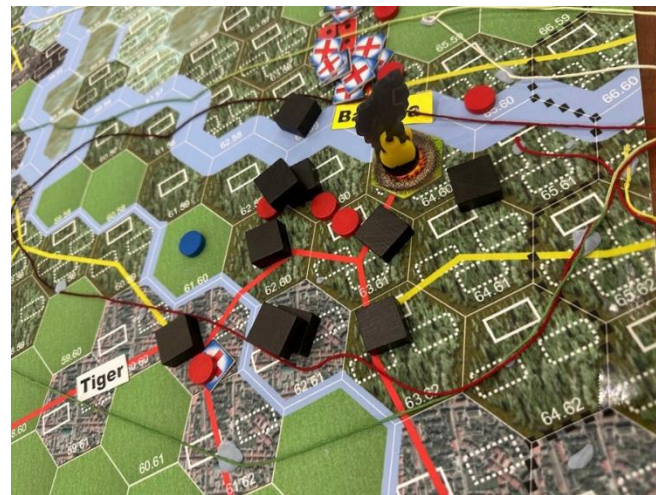
MINES Reporting Tables

Tables are
Unclassified

Name	Distance	Unit Impact	Radiation Levels	Details	Sub-unit
168 Units Hidden					
1 BDE INF	5.64 km	Vehicles: 1057/1103 Crew: 1786/1916 In Open: 2174/2395	Res-III (234463.89 cGy)	...	☒
↳ TOC 1 BDE INF, 1 BDE INF	24.95 km	Vehicles: 42/42 Crew: 52/52 In Open: 97/97	N/A	⋮	☐
↳ 1 INF BN, 1 BDE INF	5.77 km	Vehicles: 101/101 Crew: 223/223 In Open: 438/438	Res-IA (0.12 cGy)	...	☐
↳ 1 CAV SQDN, 1 BDE INF	2.46 km	Vehicles: 110/112 Crew: 255/260 In Open: 223/228	Res-III (131.91 cGy)	...	☐
↳ 1 FA BN, 1 BDE INF	4.49 km	Vehicles: 106/106 Crew: 170/170 In Open: 198/198	Res-IA (0.15 cGy)	...	☐
↳ 1 ENG BN, 1 BDE INF	4.41 km	Vehicles: 140/140 Crew: 187/187 In Open: 220/220	Res-IB (1.89 cGy)	...	☐
↳ 2 INF BN, 1 BDE INF	0.73 km	Vehicles: 57/101 Crew: 98/223 In Open: 222/438	Res-III (234463.89 cGy)	...	☐
↳ 3 INF BN, 1 BDE INF	7.39 km	Vehicles: 101/101 Crew: 223/223 In Open: 438/438	Res-0 (0 cGy)	...	☐
↳ 1 SPT BN, 1 BDE INF	6.32 km	Vehicles: 400/400 Crew: 578/578 In Open: 338/338	Res-0 (0 cGy)	...	☐

↳ 2 INF BN, 1 BDE INF	0.73 km	Vehicles: 57/101 Crew: 98/223 In Open: 222/438	Res-III (234463.89 cGy)	...	☒
↳ 2 C CO INF, 2 INF BN, 1 BDE INF	1.68 km	Vehicles: 13/20 Crew: 21/47 In Open: 65/118	Res-III (2916.27 cGy)	...	☐
↳ 2 B CO INF, 2 INF BN, 1 BDE INF	2.24 km	Vehicles: 19/20 Crew: 39/47 In Open: 104/118	Res-III (220.77 cGy)	...	☐
↳ 2 A CO INF, 2 INF BN, 1 BDE INF	0.08 km	Vehicles: 0/20 Crew: 0/47 In Open: 0/118	Res-III (234463.89 cGy)	...	☐
↳ 2 HHC INF, 2 INF BN, 1 BDE INF	2.04 km	Vehicles: 25/41 Crew: 38/82 In Open: 53/84	Res-III (1270.45 cGy)	...	☐

- Showcase event held in April 2024 to demonstrate how games like D&E could benefit from MINES-derived adjudication inputs.
- Combined MINES with a more detailed Dstl tactical wargame to provide more nuanced sense of nuclear effects.
- Players reported that the scale and longevity of the MINES outputs surprised them and changed their gameplay.
- Players also found MINES useful as a tool for comparing scenarios and informing strategising.





DTRA Support To Your Nuclear Discussions

- DTRA and MINES can support your.....
 - Wargame, TTX, Exercise, COA Development
- MINES is available to all “.mil” account holders
- Working on transferring MINES to the UK



Questions....and Contact Information

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