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# Dealing with Battlefield Complexity: A Decision Maker's Perspective

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# Overview

- Complexity of Modern Warfare
- Decision Making Research
- Conclusions & Links
- Implications
- Summary
- Questions..



# ‘Fourth-generation Warfare’

- Information age forces are characterised by:
  - Decentralised control
  - Self-organisation
  - Adaptation
  - Feedback loops
- Contributing to the following demands:
  - Time pressure
  - High stakes and risk
  - Multiple, incomplete, and conflicting information sources
  - Ill-defined and conflicting goals
  - Rapidly changing situations
  - High work and data loads

# Prescriptive Rationality



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- ‘Good’ decision making = ‘Rational’ decision making
- Assumes an ordered and exhaustive process
- Not realistic and/or used in many real-world settings
- Humans’ cognitive capacity can’t cope in these terms



# Non-rational $\neq$ Irrational

- Herbert Simon suggested that thorough insight into possible decision alternatives not possible
- Our cognitive limitations constrict us in making ‘optimal’ decisions
- Shift to field research using real-world environments and participants
- Grand Master chess..

# Naturalistic Decision Making



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- Focus on expert decision makers' strategies, context, and environment
- Concerted focus on military DM
- Expert military decision makers use their experience and recognition to make decisions in complex situations
  - Refined mental models
  - Recognise situations and make instant assessments
  - Results in key expectations, goals, and cues
  - Evaluated by projecting events in the future (if time permits)



# If I Ruled the World....

- Dörner's (1996) work on policy decision making
- Simulated micro-worlds rather than real-life cases and/or environments
- 'Poor' decision makers would fall into certain traps
- 'Good' decision makers would project, anticipate, and evaluate





# Dörner's Decision Tactics

- 'Good' decision makers:
  - Monitored their decision performance
  - Adapted by changing contextual assessments if required
  - Focused on information depending on the situation, not their beliefs
  - Projected events in the future to test hypotheses
  - Developed measurable expectations on which to assess the evolving situation
  - Developed specific goals

# Dörner & NDM



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- Both CS and NDM fields present similar conclusions regarding cognitive functions of proficient DMs
- In particular:
  - Projection
  - Refinement/Adaptation
  - Awareness/Understanding
  - Anticipating
  - Evaluation
  - Monitoring



# Military Implications

- Training
  - Apply tried & tested NDM training programs which focus on:
    - Domain relevant, low fidelity tactical simulations
    - Building mental models and situational understanding
    - Support pattern recognition & evaluation
  - Adapt CS methods and findings to training
    - Provide computer simulated practice (micro-worlds)
    - Focus on learning to anticipate and project
    - Look at monitoring own performance (Metacognition)
- Metrics
  - Dörner's decision tactics
  - Develop and improve NDM measures



# Summary

- Battlefield DM will remain complex and cognitively taxing
- Significant links between CS and NDM theory exist in decision making research
- Both NDM and CS methods, metrics, and findings can be adapted for military use
- Helping novice and expert military decision makers deal with complexity has been achieved, and can be progressed with CS research

# Questions?



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