Serious Games for Decision Making

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outline

• Decision making
• Elements in decision making
• Practicing decision making with games
• Designing games for decision making
General deliberation cycle for decisions
Types of decisions

- Time pressure
- Changing environment and/or goals
- Routine decision or one-off decision
- High or low stakes
- Affects own actions or other’s actions
- Individual or joint decision
- Known alternatives or not
- ...

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Natural Decision Making (Gary Klein)

1. Ill-defined goals and ill-structured tasks
2. Uncertainty, ambiguity, and missing data
3. Shifting and competing goals
4. Dynamic and continually changing conditions
5. Action-feedback loops (real-time reactions to changed conditions)
6. Time stress
7. High stakes
8. Multiple players
9. Organizational goals and norms
10. Experienced decision makers
From Novice to Expert

• Novice:
  • Does not know which elements in the environment are salient for the decision
  • Finds a procedure to make a decision after having all the facts
  • The deliberation is mainly using superficial features of the situation
  • Works from the unknown to the known
  • Will typically mentally check several possible solutions before choosing one

• Expert:
  • Knows which information to look for in the environment
  • Has a solution procedure attached to the problem
  • The deliberation uses higher-order thinking and schema’s
  • Works from the known to the unknown
  • Typically only tries the first possible solution
Experts in Recognition Primed Decision-making

A. Simple Match

Experience the Situation
- Recognize Typicality
  - Goals
  - Critical Cues
  - Expectancies
  - Typical Action

B. Developing a Course of Action

Experience the Situation
- Recognize Typicality
  - Goals
  - Critical Cues
  - Expectancies
  - Typical Action
- Evaluation via Mental Simulation
- Modify
  - Will it work?
  - Yes
    - Implement
  - No
    - Modify
- No
  - Will it work?
  - Yes
    - Implement
  - No

C. Complex RPD Strategy

Experience the Situation in a Changing Context
- Is the situation familiar?
  - Yes
    - Reassess Situation
    - Seek More Information
  - No
    - Are expectancies violated?
      - Yes
        - Activation of information from memory
          - Plausible Goals
          - Expectancies
          - Relevant Cues
          - Actions 1...n
      - No
    - Modify
      - Will it work?
      - Yes
        - Implement
      - No

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**Key features**

1. First option is usually workable NOT random generation and selective retention

2. Serial generation/evaluation of options NOT concurrent evaluation

3. Satisficing NOT optimizing

4. Evaluation through mental simulation NOT MAUA, Decision Analysis, or Bayesian statistics

5. Focus on elaborating and improving options NOT choosing between options

6. Focus on situation assessment NOT decision events

7. Decision Maker primed to act NOT waiting for complete analyses
Components to encourage higher-order thinking

• Assume a role (roles focus attention)
• Meaningful dialogue (realistic, supportive)
• Complex storyline (experiencing consequences of choices)
• Challenge the learner
• Immediate immersion (helps motivation)
• Manipulating variables (teaches cause and effect)
• Third person perspective can help
• Interaction with the environment
• Synthesize knowledge (use tasks that need to combine previous results)
• Authentic environment
• Replayable with different results
Possible learning goals for games for decision making under stress

- Norms and rules
  - Structure the course of actions and interactions
- Role responsibilities
  - What is important for me and what can I influence
- Patterns of input variables
  - What is salient and what can be ignored
- Optimal vs. Satisficing
  - Which options give most chance of a good outcome (that can be improved)?
One off decisions with high stakes

• How much do I offer for this house?
• Do I buy solar panels?
• Do I change my job?
• …
Elements to consider

• There are no experts, but usually third parties with more knowledge
  • (real estate agents, ...)
• Utilities of effects of decision not all quantified, objective, unknown
  • Comfort of house, stress of new job, colleagues, future price of energy,...
Learning goals of games for one-off decisions

• Experience consequences of decision
• Develop long term perspective
• Change perspective
  • What does this move mean for my children? ...
Joint decision making

• Not all information is available for all participants

• Different preferences have to be combined

• All participants are involved in executing the decision
Elements to consider

• Truthfulness or completeness of information provided

• Mechanism design

• Coalition formation

• Who “wins”?
Learning goals for games for joint decision making

• Get all relevant information
• Satisfy all participants
• Time efficiency
Shared problem solving using games

• Create a shared purpose
• Celebrate accomplishments
• Allow individual and team efforts
• Carefully consider the scoring system
• Use a variable interface (allowing for expert players to have more options)
• Shortcomings should be acknowledged
• Create a community
Conclusions

• Many types of decisions that involve different aspects of the environment and also involve different types of deliberation processes
• When designing a serious game for decision making:
  • Decide what aspect should be practiced
  • See what are the most salient components to include to practice this aspect
• Games for experts should be different from games for novices (not just more difficult!)