Interruption Interview:
An approach to elicit situation assessment for an ill-defined task

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An interviewing technique where participants are interrupted in a simulated environment for the purpose of understanding how one
• comprehends percepts in the environment and
• projects these percepts into the future.

Influenced by
• Klein’s approach to Naturalistic Decision-Making (cognitive dimensions)
• Endsley’s theory of Situation Awareness (projection into the future)
“故曰 知己知彼, 百战百胜, 
不知己而知彼, 一胜一负, 
不知彼不知己, 每战必败。”

~ Art of War by Sun Tsu, around 500BC

“If you know the enemy and know yourself, 
you need not fear the result of a hundred battles.”

~ Translation by Giles (1910)
**Project:** Elicit cognitive processes related to assessing an intelligent adversary
- Types of predictions & relation to performance
- Basis of judgment
- Situational considerations
- Order of recursion

**Paper:** Methodology
- Design
- Execution
- Challenges
- Demonstrate its effectiveness
## ENVIRONMENT

<table>
<thead>
<tr>
<th></th>
<th>Warfighting</th>
<th>Simulation</th>
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<tbody>
<tr>
<td>Uncertain</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Dynamic</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Time Pressure</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Limited resources</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Stake</td>
<td>High</td>
<td>Limited</td>
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Modified COTS
Microsoft Rise of Nations
- 2 sided
- Participants had limited resources.
Capture the **Enemy (Red) City** by attacking it until its health is reduced to zero and occupying it with three infantry or armour units.
Effectiveness of Tools: Does prediction performance affects task performance?

- 10 Participants x 4 Interruption Interviews
- 463 Predictions

<table>
<thead>
<tr>
<th></th>
<th>Participant level</th>
<th>Trial level</th>
</tr>
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<tbody>
<tr>
<td>Prediction frequency</td>
<td>( r(8) = .691, p=.027 )</td>
<td>( r(38) = .318, p=.045 )</td>
</tr>
<tr>
<td>Prediction accuracy</td>
<td>( r(8) = .074, p=.840 )</td>
<td>( r(38) = -.127, p=.434 )</td>
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One does not have to be accurate in his prediction but he should make as many predictions about the enemy as possible!
Step 0: Preparation
Step 1: Pre-task planning
Step 2: Simulation and freezing
Step 3: Interruption
Step 4: Post-task comprehension
STEP 0: PREPARATION

Experiment Design
Coordination
Coordination
**Participant Room**

- **Cyber Warrior** executes plan
- **Participant** interviews
- **Observer** observes both Participant (through Morae) and Gamer

**Control Room**

- **Gamer** plays
- **Observer** observes both Participant and Gamer
- **Interviewer** communicates
- **Participant Station** executes plan
- **View Game**
STEP 1: PRE-TASK PLANNING

People are not thrust into complex and ill-defined tasks without warning!

PLAN & PREDICT

Interview
STEP 2: SIMULATION & FREEZING

Participants
Semi-inform: Aware of freeze and interview but not aware of ground rules

Practice trial:
Different scenario
Semi-structured interviews

Experimenters
Semi-structured ground rules

- Calling and ending interruption
- Interval ~ 5min
- Not freezing during intense actions
- Signature question at the end of the interview
Identify the situations given questions about the situation. Attributes of these (e.g. location, direction, size) will record as they unfold.

**Interview**

Recall?
- Yes: Assessment & Decision
- No: Predictions about the enemy

Goals, Cues, Expectations

Thoughts about the enemy
STEP 4: POST-TASK COMPREHENSION

- Comprehension
- Predictions for next game
- Debrief: Summary of events
Participants felt that the interview gave them extra time to think about the problems. However, results indicate no significant difference, $t(9) = .843$.

<table>
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<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
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</thead>
<tbody>
<tr>
<td>With Interruption Interview</td>
<td>8986</td>
<td>1541</td>
</tr>
<tr>
<td>Without Interruption Interview</td>
<td>9125</td>
<td>1554</td>
</tr>
</tbody>
</table>

Even if there is an effect, we were not too concerned as the study was meant to be exploratory. There were many other confounding variables. Examples:
- Pace of the battle
- Fatigue
- Stress
Discussion

Supports in-depth analysis between psychological constructs for complex and ill-defined tasks
For exploratory studies only
Resource-intensive
Dependent on participant’s ability to verbalise their thought
Q & A

Angela Tan (tlisin@dso.org.sg)
Intelligence Preparation of the Battlefield (FM100-12): process of analyzing enemy threats

- Define the battlefield environment
- Describe the battlefield’s effects
- Evaluate the threat
- Determine threat course of actions

Similar to the idea of Sun Tzu’s foreknowledge through intelligence gathering
Computational Approach

- Model the adversarial belief
- Incorporate dynamics & effects of the environment
- Generate possible goals and intents
- Compute most probable intent

BDI model structure of KIP (Nielsen, Crossman, and Jones, 2007, p.33)
7 PRINCIPLES OF ADVERSARIAL THINKING

1. Construct a model of opponent, O, based on past behaviours
2. Include O’s model of own (proponent, P) model
3. Use O’s model to infer O’s plan and add to O’s model
4. Use this model to infer likely actions and responses to P’s actions
5. Combine P’s model, O’s model, and environment to make a decision about the best course of action
6. Use O’s model to predict what O will not expect
7. Take steps to conceal own plans.

(Thagard 1992)
Knowledge structure of enemy intent

- Principles and methods structures used to derive goals

Strategies used by commanders

- Proactive strategy
- Predictive strategy
- Reactive strategy

Components of enemy intent schema (Cohen, Thompson, Adelman, Bresnick, Shastri, & Riedel, 2000, p. 24)