**Perceptual Cycle Model**

- Neisser’s (1976)1 view of perception
- Describes the reciprocal, cyclical relationship between an operator and their environment
- Via top-down processing knowledge (schemata) leads to the anticipation of certain types of information
- This then directs behaviour (actions) to seek out certain types of information and bottom-up processing allows information to be interpreted
- Environmental experience (world information) can modify and update cognitive schemata

**Method: Critical Decision Method**

- Knowledge elicitation tool using cognitive probes to understand expert decision making in non-routine situations2
- Retrospective semi-structured interview in which participants recall a critical incident they were previously involved with
- Four phases of the interview: 1) Incident identification 2) Timeline construction 3) Deepening probes 4) “What If” queries
- Crew members interviewed separately at their helicopter base
- Critical incident defined prior to the interviews (with the PF), other crew members not aware which incident would be discussed
- Interviews occurred 6 months after incident

**Critical Incident:**

During a routine search and rescue winch training exercise over a vessel the pilots were alerted to ‘high engine oil temperature’ (EOT) via a flashing amber caution light.

The digital scale had gone through amber readings into red, this resulted in one minute of flight time before the aircraft had to be shutdown.

**Data Analysis**

- Qualitative analysis
- Interviews transcribed
- Text chulked into meaningful segments (~1 sentence in length)
- Deductive thematic analysis: themes generated from existing theory

**Codifying schema on categories of the Perceptual Cycle Model**

<table>
<thead>
<tr>
<th>Schema</th>
<th>Code name</th>
<th>Action</th>
<th>World</th>
<th>Description for coding</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organised mental patterns (templates) held by individuals</td>
<td>Organised mental patterns</td>
<td>The process of doing something or the intention to do something</td>
<td>“Did your experience influence the decision?”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>that organise their</td>
<td>Environment</td>
<td>Externally available information in the environment</td>
<td>“Caution light came on.”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>representations of the world</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Statements relating to the use of</td>
<td>Statements relating to</td>
<td>Statements relating to</td>
<td>“I turned on the engine.”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>prior knowledge, experience, expectations</td>
<td>performing an action or</td>
<td>information existing in</td>
<td>“Caution light came on.”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>and about “knowing” things</td>
<td>discussing potential actions that</td>
<td>the world, could be physical, conditions or states of being</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>that could be taken</td>
<td></td>
<td></td>
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</tbody>
</table>

**Perceptual cycle at the team level**

**Incorporating the five factors of teamwork**

- **Schemata**
  - Compatible schemata is used to define the team schema. A compatible team schema includes the unshared elements of individual schemata that are relevant to all team members and their common goal

**Situation Awareness**

The specific knowledge and information regarding the current situation is a product of the entire perceptual cycle process. The three elements of the POM: team information in the world, compatible team schemata and coordinated actions, along with the processes of communication and cooperation combine to form team SA

**Inter- and independencies**

- Individual team members have exposure to different pieces of information = independencies
- Through communication, coordination and cooperation these independencies become part of the common goal (compatible schemata, coordinated action and team world information) = interdependence

**Conclusions**

Humans are not linear information processors. It is necessary to consider the perceptual cycle of the whole team and the individual contributions made by each team member.

**Future Work**

- Increase number of case studies to refine and validate a team PCM
- Observation of teamwork instead of retrospective accounts
- Explore different types of teams (e.g. ambiguous teams, teams with a strong authority gradient)
- Explore how schema-based processes work in teams (e.g. contention scheduling and frequency gambling)