VISUAL SCAN PATTERNS IN TOWER CONTROL:
FOUNDATIONS FOR AN INSTRUCTOR SUPPORT TOOL

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VISUAL SCAN PATTERNS
TWO QUESTIONS

1) What templates of systematic scan patterns that standardize best practices are there in tower control?

2) How can these be detected and visualized using an interactive visual sequence mining tool for exploring collected eye-tracking data?
**METHOD**

- Collect eye-tracking data
- Identify template scan patterns (workshop)
- Analyze compliance with template scan patterns

**SCENARIO**

- Single runway
- CAVOK
- Wind 180/4
- Two approaches
- Two departures
- 2 controllers

**TOBII Pro Glasses 2**
**METHOD**

- Collect eye-tracking data
- Identify template scan patterns (workshop)
- Analyze compliance with template scan patterns

**WORKSHOP**

- 3 instructors
- Goal: Identify scan patterns
- Subgoal: Define AOI
- Stimuli
  1. Printed field of view
  2. Tasks analyses (of scenarios)
  3. Demo of eye-tracking recording
METHOD

Collect eye-tracking data

Identify template scan patterns (workshop)

Analyze compliance with template scan patterns

PATTERN TREE VIEW
### RESULTS

<table>
<thead>
<tr>
<th>TEMPLATES OF VISUAL SCAN PATTERNS</th>
<th>SUPPORT IN ELOQUENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Runway scan</td>
<td>✓</td>
</tr>
<tr>
<td>Landing clearance</td>
<td>✓</td>
</tr>
<tr>
<td>Touchdown and landing roll</td>
<td>✓</td>
</tr>
<tr>
<td>Phases of visual focus</td>
<td>✓</td>
</tr>
<tr>
<td>Time glass</td>
<td>na</td>
</tr>
<tr>
<td>Wagon wheel</td>
<td>na</td>
</tr>
</tbody>
</table>
1. RUNWAY SCAN

1. AIRCRAFT
2. SCAN RUNWAY L1
3. SCAN RUNWAY L2
4. SCAN RUNWAY C
5. SCAN RUNWAY R1
6. SCAN RUNWAY R2
2. LANDING CLEARANCE

1. AIRCRAFT
2. SCAN RUNWAY
3. WIND INSTRUMENT
4. RUNWAY CONTROL PANEL
5. FLIGHT-STRIP
3. TOUCHDOWN AND LANDING ROLL

1. AIRCRAFT LANDS

- Touchdown
- Landing roll

Legend:
- Radar
- Runway Control Panel
- Strip arrivals
- AWOS Wind
- OTW approach
- OTW Runway L
- OTW Runway C
- OTW Runway R
- AWOS Clock
- OTW Taxiway
4. PHASES OF VISUAL FOCUS

1. RADAR

- AOI Phase 1
- Landing clearance
- AOI Phase 2
- Touchdown
- AOI Phase 3

- Radar
- Runway Control Panel
- Strip arrivals
- AWOS Wind
- OTW approach
- OTW Runway L
- OTW Runway C
- OTW Runway R
- AWOS Clock
- OTW Taxiway
6. WAGON WHEEL

- RUNWAY L
- RUNWAY R
- AIRCRAFT
- RADAR
- AWOS
DISCUSSION

IMPACT

- Teach novices standardized “best practice” scan patterns
- Work as anchor (checklist) for visual activity
- Insight to ATCO behavior and performance
- Main application of tool is for after-simulation review
- Self-reflection on performance

OUTLOOK

- Validate templates
- Explore tool with instructors
- Explore more complex scenarios, other aerodromes
- Automate search and detection of template scan patterns
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