Towards an Understanding of Shared Understanding in Military Coalition Contexts

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### Varieties of Understanding

<table>
<thead>
<tr>
<th>Sensations</th>
<th>Actions</th>
<th>Language</th>
<th>Situations</th>
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<tbody>
<tr>
<td>• Perception involves more than just an ability to detect stimuli; it also depends on an ability to make sense of stimuli.</td>
<td>• We understand a person’s actions when we are able to explain or account for them.</td>
<td>• We understand linguistic expressions when we are able to use those expressions correctly.</td>
<td>• Situational understanding involves an ability to explain the current situation and predict how it will unfold in the future.</td>
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<tr>
<td>• To perceive one must have sensory impressions that one understands.</td>
<td>• We explain actions by reference to a person’s mental states.</td>
<td>• To understand a sentence is to be able to do things that involve the sentence, e.g. to apply it correctly, to paraphrase it and to respond to it in appropriate ways.</td>
<td>• Shared understanding is an ability (or something similar to an ability) that is common to multiple agents.</td>
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<td>• Understanding is a kind of predictive ability – an ability to appreciate the sensory consequences of movement or change.</td>
<td>• Understanding is manifest as an ability to explain or predict a person’s actions in particular situations.</td>
<td>• Understanding is akin to ‘flexible performance capability’.</td>
<td>• Shared understanding improves coalition performance – it enables coalition elements to predict and anticipate one another’s behaviours and information requirements.</td>
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### Understanding

• The notion of understanding is similar to the notion of an ability.
• Typically, understanding is evidenced by our descriptive, explanatory and predictive successes regarding the object of understanding.

### Mental Models

• Mental models support the expression of particular abilities, such as those related to description, explanation and prediction.
• Mental models provide a mechanistic realization of performances that warrant the ascription of understanding to an agent.

### Situation Awareness

• SA is typically defined as “the perception of the elements in the environment within a volume of space and time, the comprehension of their meaning and the projection of their status in the near future”.
• The notion of understanding therefore seems to entail a particular kind of understanding.
• We suggest SA is best conceived of as a specific form of understanding, namely ‘dynamic situation understanding’.
• This resolves many points of confusion surrounding the SA concept. For example, SA is neither nor a state nor a process because understanding is neither state nor a process.

### Shared Understanding

• Shared understanding is an ability (or something similar to an ability) that is common to multiple agents.
• Shared understanding does not entail similarity of response output (i.e. the specific behaviours manifesting understanding may differ across agents).
• Shared understanding is commonly seen as enabling the expression of compatible or complementary behaviours – it supports ‘unity of effort’ with respect to mission objectives.
• There may be different forms of understanding: ‘identical understanding’, ‘similar understanding’ and ‘complementary understanding’.

### Coalition Operations

• Shared understanding improves coalition performance – it enables coalition elements to predict and anticipate one another’s behaviours and information requirements.
• Shared understanding promotes the efficient use of limited communication resources – it promotes efficient modes of inter-agent communication and coordination.
• Shared understanding may be important for factors such as group cohesion, group solidarity and trust. An ability to anticipate the information needs of teammates and behave in a way that accords with the expectations of others could be a key ingredient of what it means for someone to be regarded as a ‘team player’.

### Future Work

• Understand what things need to be the objects of shared understanding in coalition operational contexts, e.g. goals, tasks and situations.
• Propose assessment methods for shared understanding.
• Assess whether the notion of understanding applies to synthetic agents – is it appropriate to talk of ‘machine understanding’?
• Identify the factors that contribute to or undermine shared understanding in coalition contexts.