Shadow Force Experimental Design

**Required changes/actions:**

* Make chat and spot reports separate windows
* Allow players to add their own map icons (**X**, **O**, and **?**) to represent their teammates’ reports
* Each player should be able to input their own independent solution to where the targets are (i.e. no single team solution)
* Derive metrics for efficiency of resource allocationy (capability overlap or redundancy).

**Summary:**

Three manipulations of interest are: (1) single- vs. multi-player, (2) time pressure, and (3) task difficulty.

Dependent Variables

* + Number of targets correctly located
  + Communications between players
  + Efficiency of resource allocation
  + Time taken to complete each resource allocation trial

Independent Variables

* + Number of Players
    - One
    - Two
    - Four
  + Time Pressure
    - No time pressure (TBD by piloting)
    - Time pressure (TBD by piloting)
  + Task Difficulty (detailed below)
    - Easy
    - Medium (multi-player only)
    - Hard (multi-player only)

**Difficulty Conditions:**

Task difficulty is conceptualized as to whether or not explicit group communications are required for resource allocation and/or information fusion.

* In the EASY condition, all players’ assets will appear automatically on the map. Each player will see the reports from their own assets (**X**, **O**, and **?**) appear automatically on the map, but the reports from the teammates’ assets will only appear in the text-based spot reports. In this case, communication might improve task performance, but it’s not required for resource allocation or for information fusion. This will (obviously) be the condition for the single player condition.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| EASY | Automatic Map Population | | Text-Based Spot Reports | |
|  | Player’s | Teammates’ | Player’s | Teammates’ |
| Asset Locations | YES | YES |  |  |
| Asset Reports  (**X**, **O**, **?**) | YES | **NO** | YES | YES |

* In the MEDIUM condition, only the individual player’s own assets appear on the map, not those of his/her teammate(s). As in the easy condition, each player will see the reports from their own assets (**X**, **O**, and **?**) appear automatically on the map, but the reports from the teammates’ assets will only appear in the text-based spot reports. Players must communicate to plan where their respective assets will be placed if they want to effectively sample the grid.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| MEDIUM | Automatic Map Population | | Text-Based Spot Reports | |
|  | Player’s | Teammates’ | Player’s | Teammates’ |
| Asset Locations | YES | **NO** |  |  |
| Asset Reports  (**X**, **O**, **?**) | YES | **NO** | YES | YES |

* In the HARD condition, only the individual player’s own assets appear on the map, not those of his/her teammate(s). Each player will see the reports from their own assets (**X**, **O**, and **?**) appear automatically on the map. Reports from the teammates’ assets will not appear in the text-based spot reports in this condition. Players must communicate to plan where their respective assets will be placed, and they also must communicate to share what their assets find. In this case, analysis of the communications data is essential to identify and understand the effectiveness of various information sharing strategies.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| HARD | Automatic Map Population | | Text-Based Spot Reports | |
|  | Player’s | Teammates’ | Player’s | Teammates’ |
| Asset Locations | YES | **NO** |  |  |
| Asset Reports  (**X**, **O**, **?**) | YES | **NO** | YES | **NO** |

**Sample Data Analysis:**

General analysis:

We hypothesize that there will be a difficulty by time interaction.

For the medium condition, we hypothesize that communicating resource allocation will result in better efficiency scores. We need to derive a measure of efficiency in resource allocation, perhaps in relation to an optimized algorithm. I don’t have a graph here.

Looking at communications volume (or perhaps number of grid locations reported):  
Hypothesize that communicating the right information, that is not too little and not too much (data dump), results in the best collaborative performance.