COLLEGE OF BUSINESS
THE UNIVERSITY OF ALABAMA IN HUNTSVILLE

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Research Horizons Day

An Agent-Based Model of Live Escape Rooms

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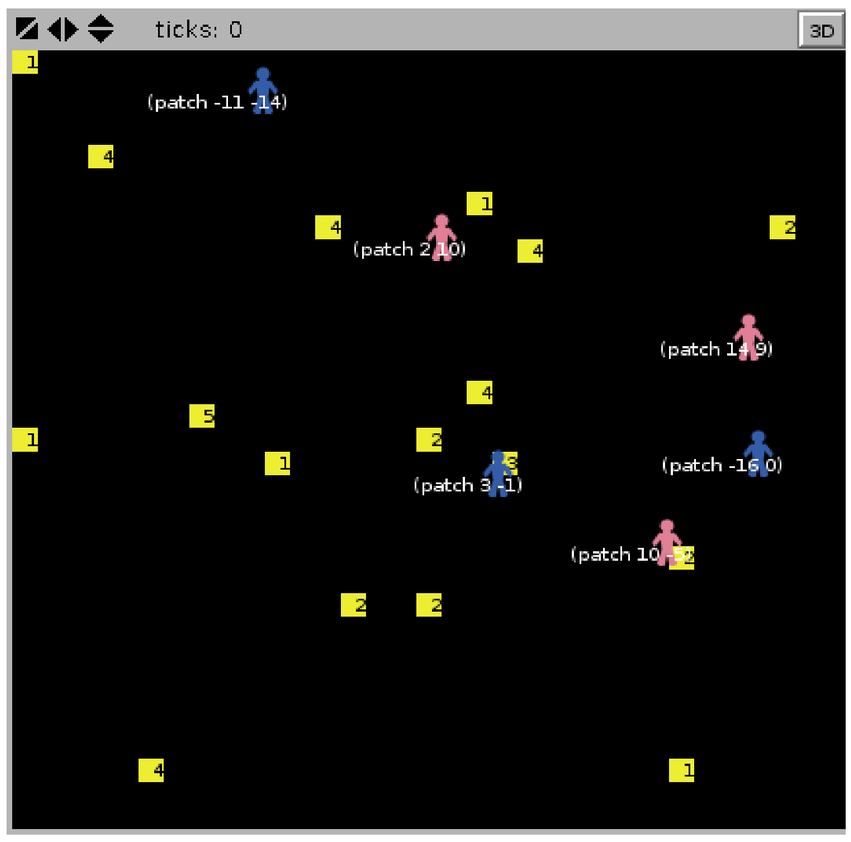
Overview

- An agent-based model is “one of a class of computational models for simulating the actions and interactions of autonomous agents (both individual or collective entities such as organizations or groups) with a view to assessing their effects on the system as a whole” (Scholarmap, FSU).
- Objective: Determine the optimal group composition for a quick solve time



Model Parameters

- Agent [6] attributes: gender, age (empirically 12 to 70), and creativity, expertise, and fatigue levels (randomly assigned)

$$P(solve)_{it} = \frac{age_i}{100} + m_i(c_i + e_i) - f_{it}$$

Where *m* is the slight male disadvantage to solving (empirical result); and *c*, *e* & *f* are the creativity, expertise & fatigue levels, respectively, for a given agent *i*.

- Puzzle attributes: difficulty (from 1 to 5), type of puzzle (expertise, creativity, or combo), and location

NOTE: Agents with a higher creativity level will do better at creativity type puzzles, while agents with a higher expertise level will do better at expertise type puzzles.

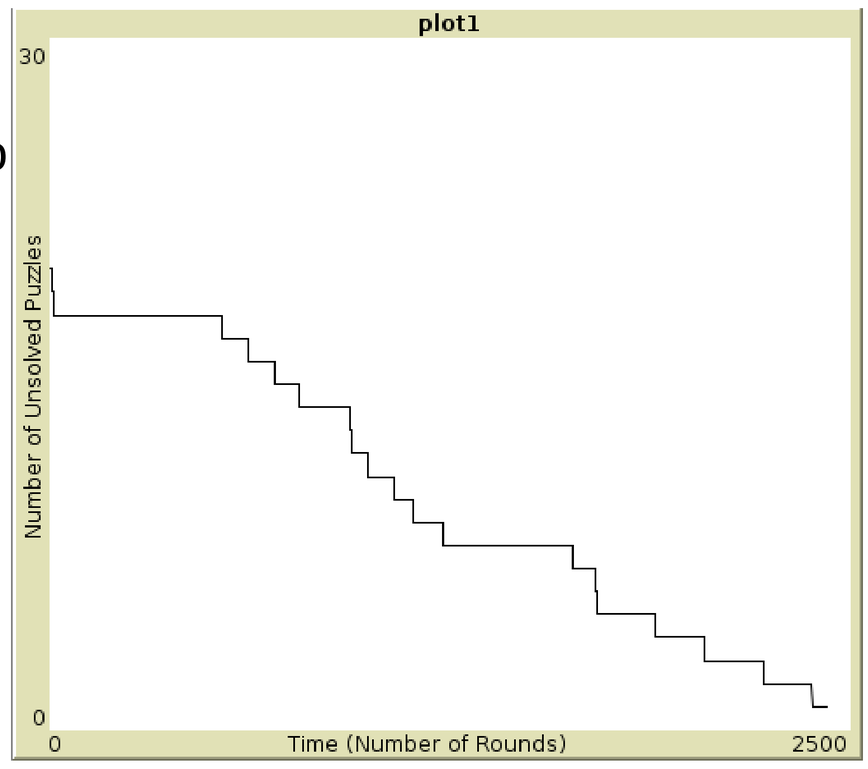
Preliminary Results

- Analytical solution: finding the optimal puzzle difficulties, types, and *P(solve)*s to minimize *t*, the number of rounds, in order to satisfy:

$$0 = \sum_{i=1}^{n_p} d_i - t \sum_{i=1}^{n_a} P(solve)_{it}$$

- After 100 runs with 6 agents & 20 puzzles:

Avg. *t* to escape the room: 2,420 (if 1 round = 1.5 secs, avg. solve time = 01:00:30)
Standard dev. = 720 (18 mins)



Impact

- Insight for escape room players and designers
- Inexpensive alternative to live experiments because parameters can be changed easily

Acknowledgements

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ESCAPE POD

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