

Breakfastclub

How Personality Traits effect attention and happiness in a simulated classroom

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How different personalities effect
classroom attention and happiness?

Content

- What is an Agent based model?
- How to model human personality?
- The Simulation
- Experiment & Results

Agent based models

An **agent-based model (ABM)** is 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.

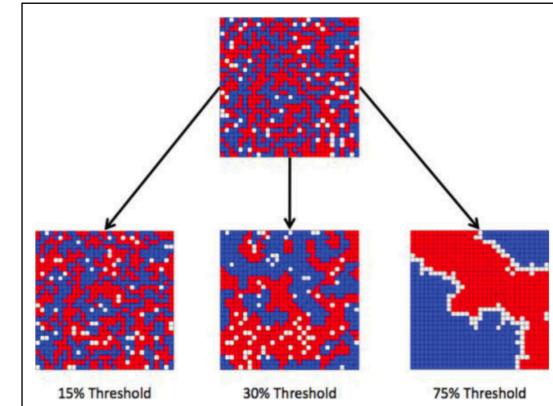
- Wikipedia

Applied in various fields

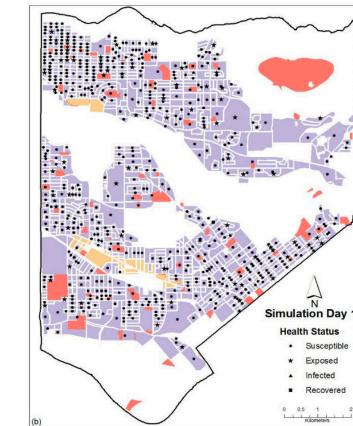
- Biology (e.g. epidemics)
- Economics (e.g. Stock Trade)
- Social Studies (e.g. Social Networks)

Agent based models - Examples

Thomas Schelling's (1971) – Social Segregation [1]



Perez (2009) – Contagious disease spread [2]

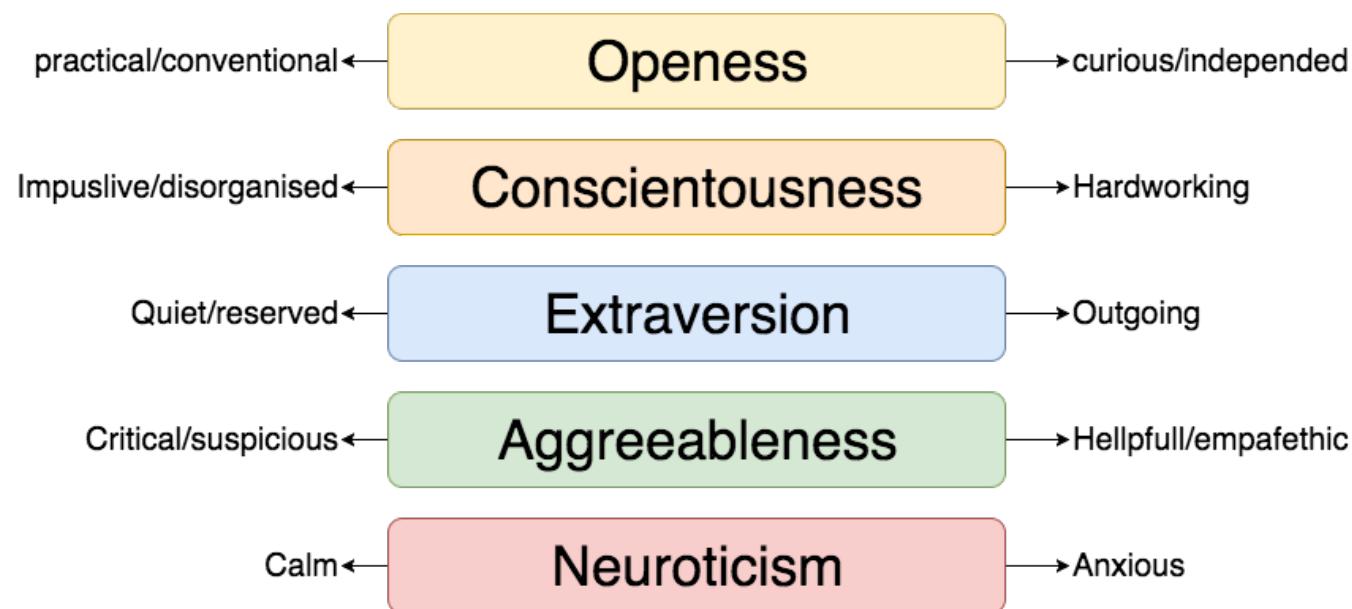


- [1] Schelling, T. C. (1971). Dynamics Model of Segregation. *Journal of Mathematical Sociology*, 1(May 1969), 143–186.
- [2] Perez, L., & Dragicevic, S. (2009). An agent-based approach for modeling dynamics of contagious disease spread. *International Journal of Health Geographics*, 8(1), 1–17. <https://doi.org/10.1186/1476-072X-8-50>

How to measure and study personality?

Big Five – Personality Trait Model

Controversial but widely applied in theoretical and practical settings is the empirical OCEAN or Big Five Personality Trait model[1].



[1] Norman, W. T. (1963). Toward an adequate taxonomy of personality attributes. *Journal of Abnormal and Social Psychology*, 66(6), 574–583. <https://doi.org/10.1037/h0040291>

Big Five in the classroom

- Empirical studies show how the big five effect the behavior or children in the classroom [1]
- On school achievements and outcome [2]
- Big Five in children with ADHD [3]

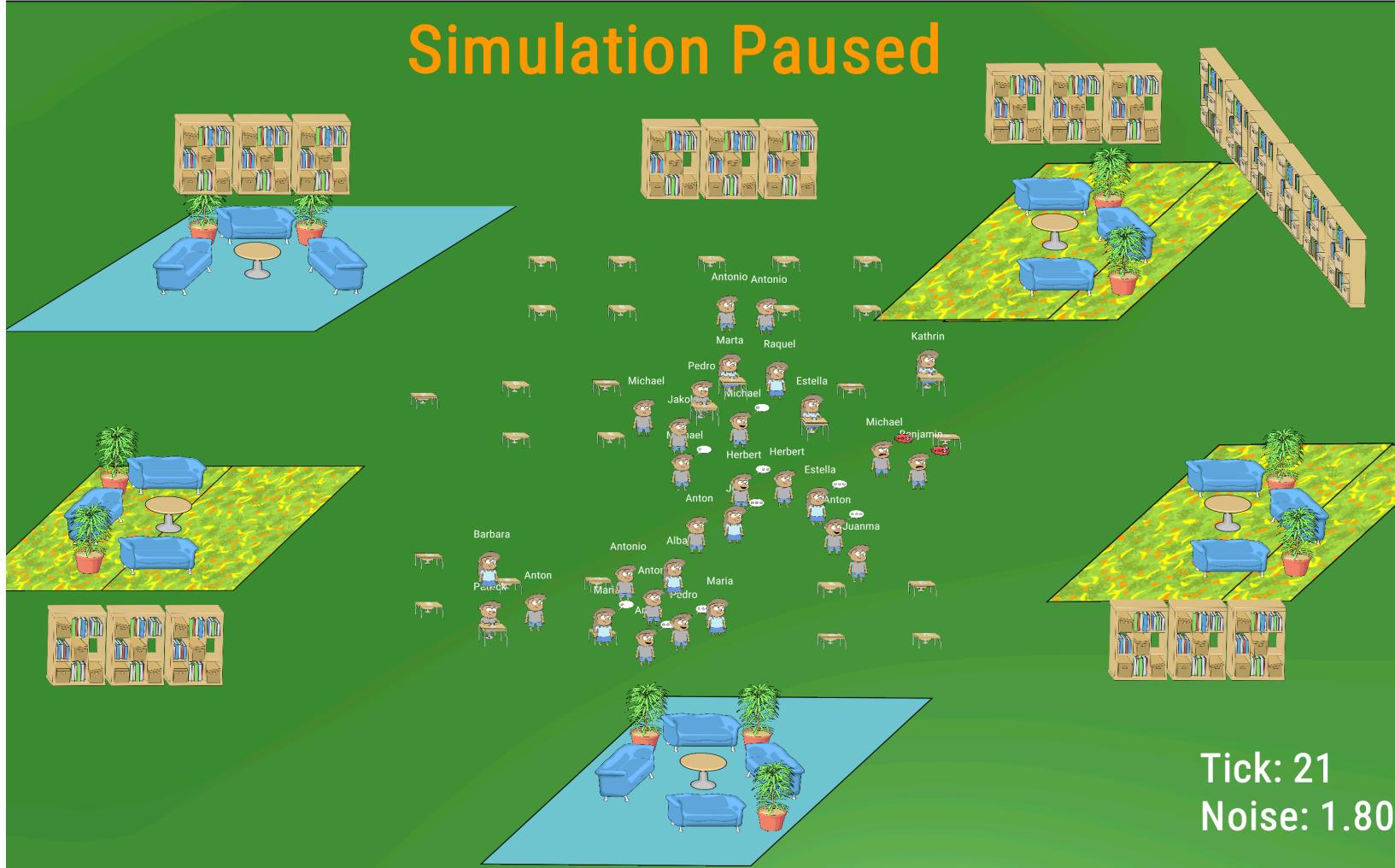
[1] Ehrler, D. J., Evans, J. G., & McGhee, R. L. (1999). Extending Big-Five theory into childhood: A preliminary investigation into the relationship between Big-Five personality traits and behavior problems in children. *Psychology in the Schools*

[2] Asendorpf, J. B., & Van Aken, M. A. G. (2003). Validity of Big Five Personality Judgments in Childhood: A 9 Year Longitudinal Study. *European Journal of Personality*, 17(1), 1–17. <https://doi.org/10.1002/per.460>

[3] Nigg, J. T., Blaskey, L. G., Huang-Pollock, C. L., Hinshaw, S. P., John, O. P., Willcutt, E. G., & Pennington, B. (2002). Big five dimensions and ADHD symptoms: Links between personality traits and clinical symptoms. *Journal of Personality and Social Psychology*, 83(2), 451–469. <https://doi.org/10.1037/0022-3514.83.2.451>

Can we build a agent based model of a virtual classroom based on the Big Five?

Breakfastclub



- Agent based model implemented in Unity3D
- Agent behavior is based on OCEAN (Big Five) Personality Trait model
- Models attention, happiness and motivation

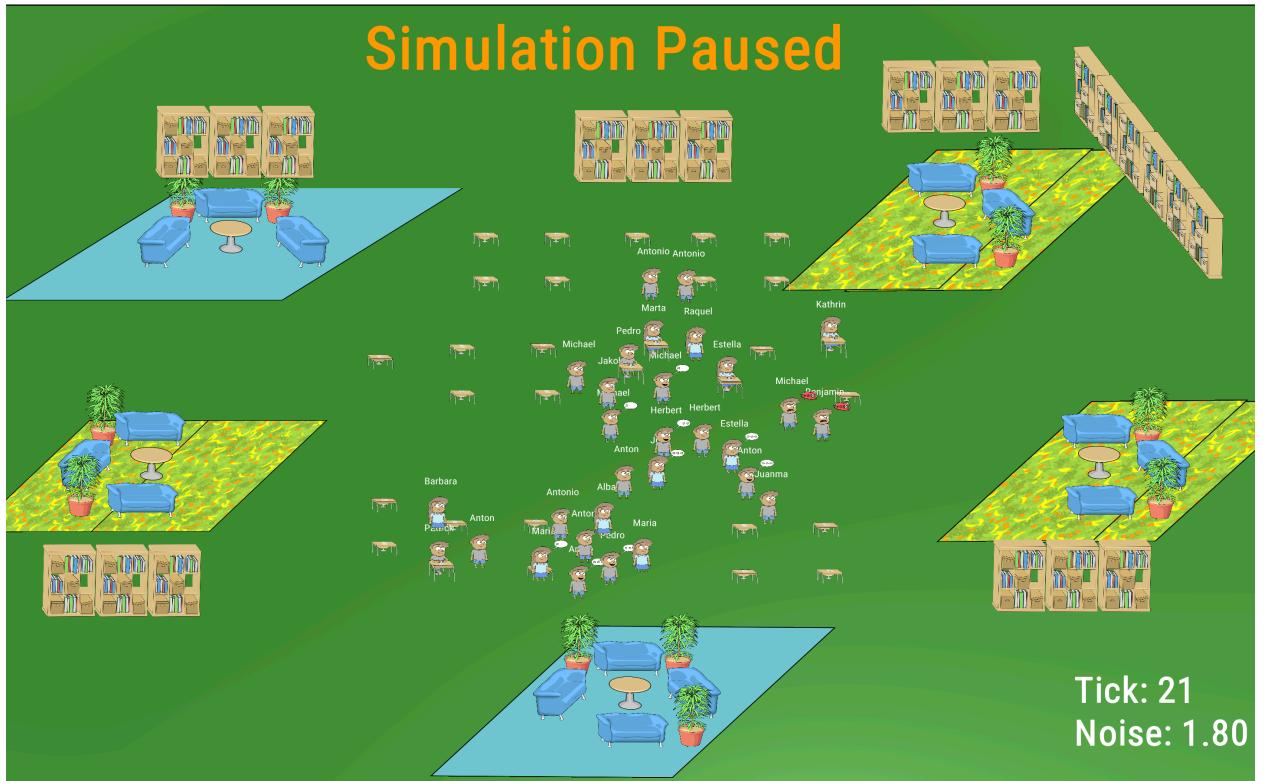
Agent based models

Main Components

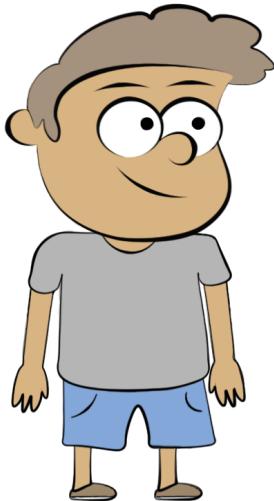
- Environment (i.e. define the classroom)
- Agents (i.e. possible behavior and characteristics)
- Logic (i.e. how to select and control behavior)

Environment

- Number of Students
- Individual/Group tables



The Agents



Personality

- Openness
- Conscientiousness
- Extraversion
- Agreeableness
- Neuroticism

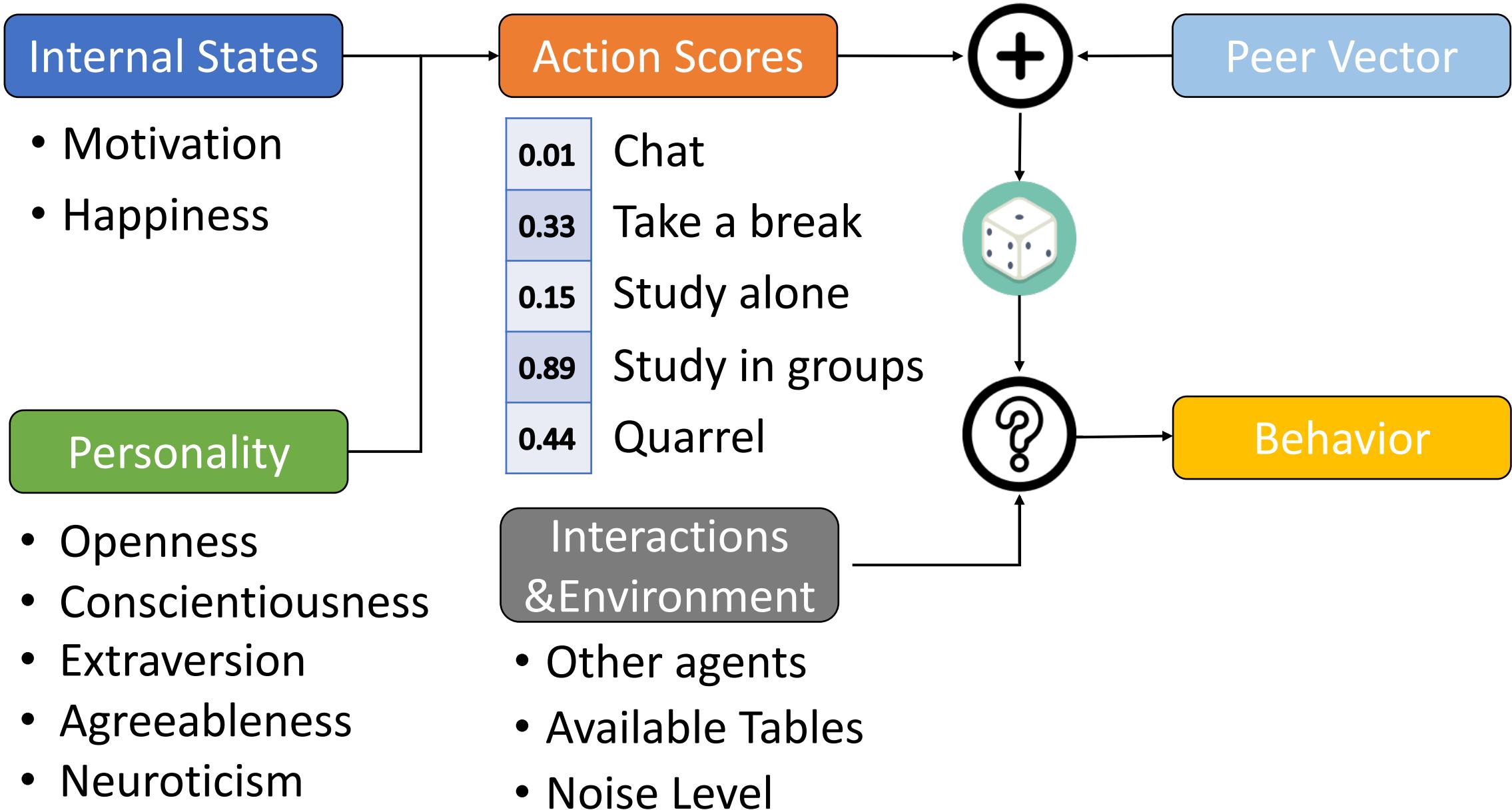
Internal States

- Motivation
- Happiness
- Attention

Behavior

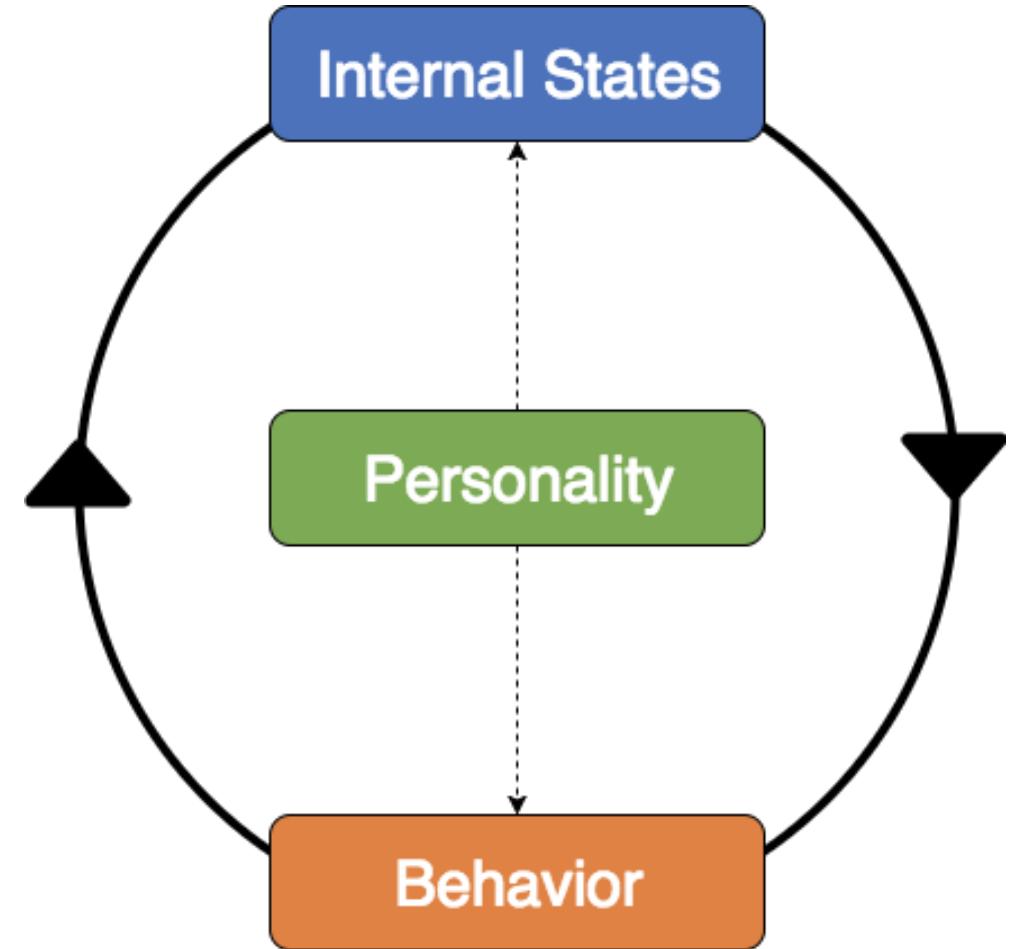
- Chat
- Take a break
- Study alone
- Study in groups
- Quarrel

Logic



Agent Dynamics

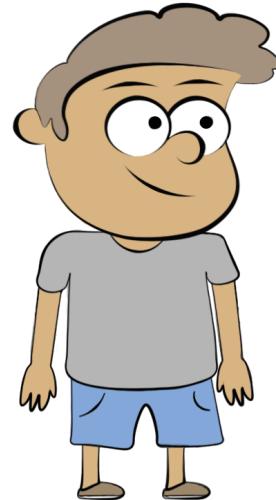
- Each Agent is a dynamic system
- Parameterized by its Personality Traits
- Internal States define and are altered by Agents Behavior



Sources of Agent Behavior

Internal States

Environment

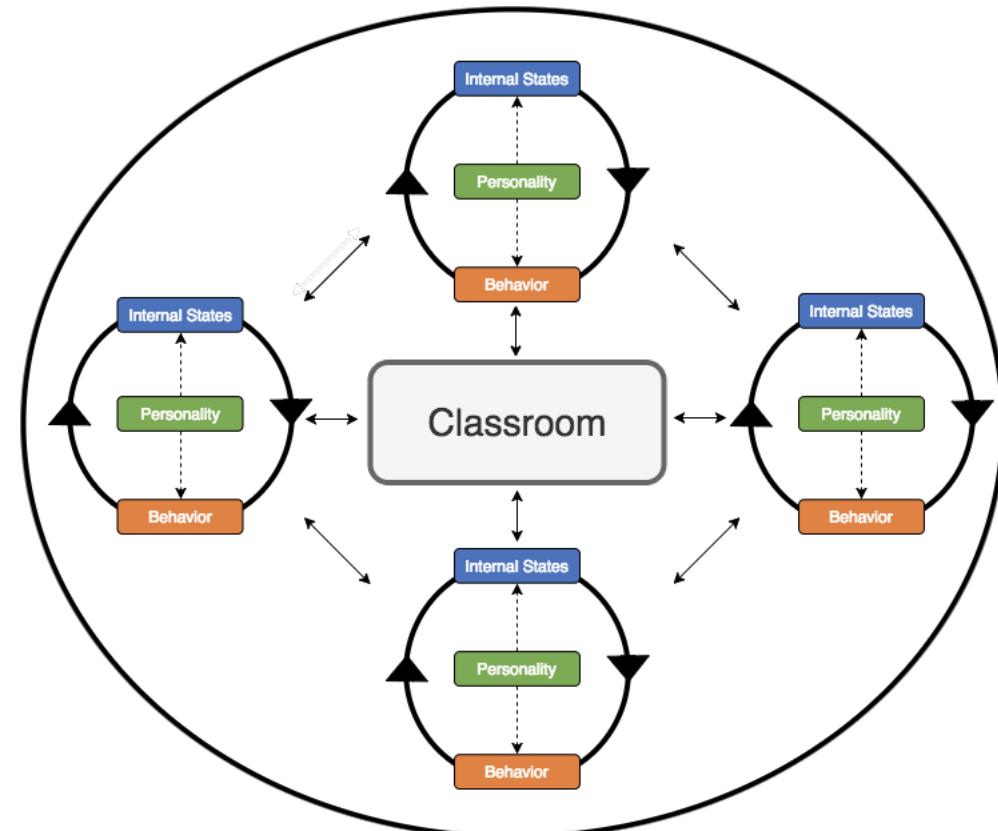


Peer Pressure

Interactions

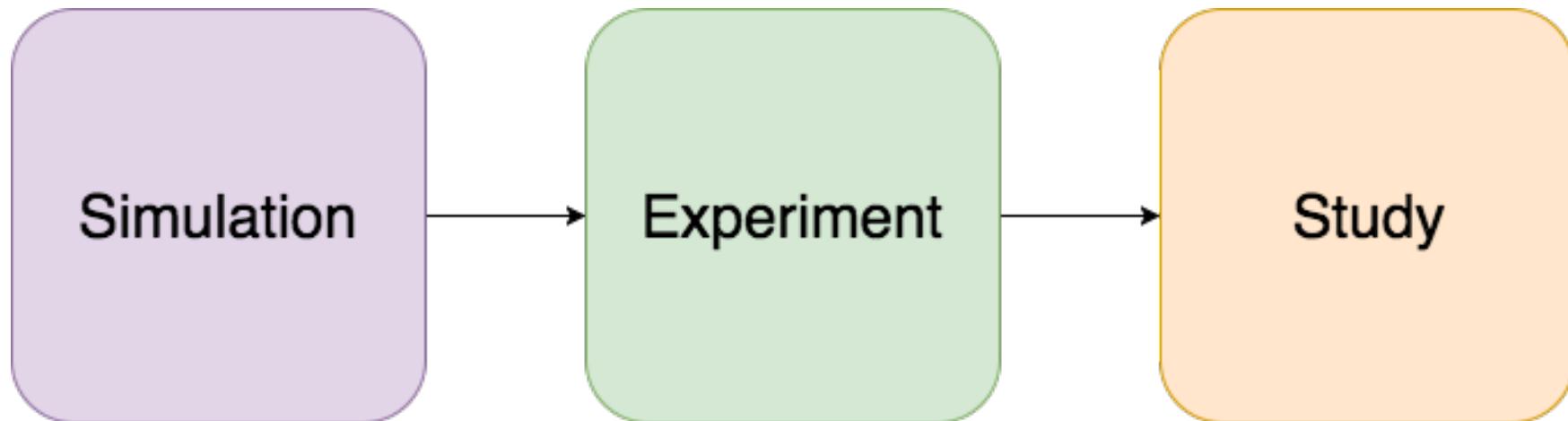
Group Dynamics

- Agents interact with each other and the environment
- Different Agent Ensembles have different Group dynamics
- The system can cause emerging behaviors



How different personalities effect
classroom attention and happiness?

Three phase Analysis



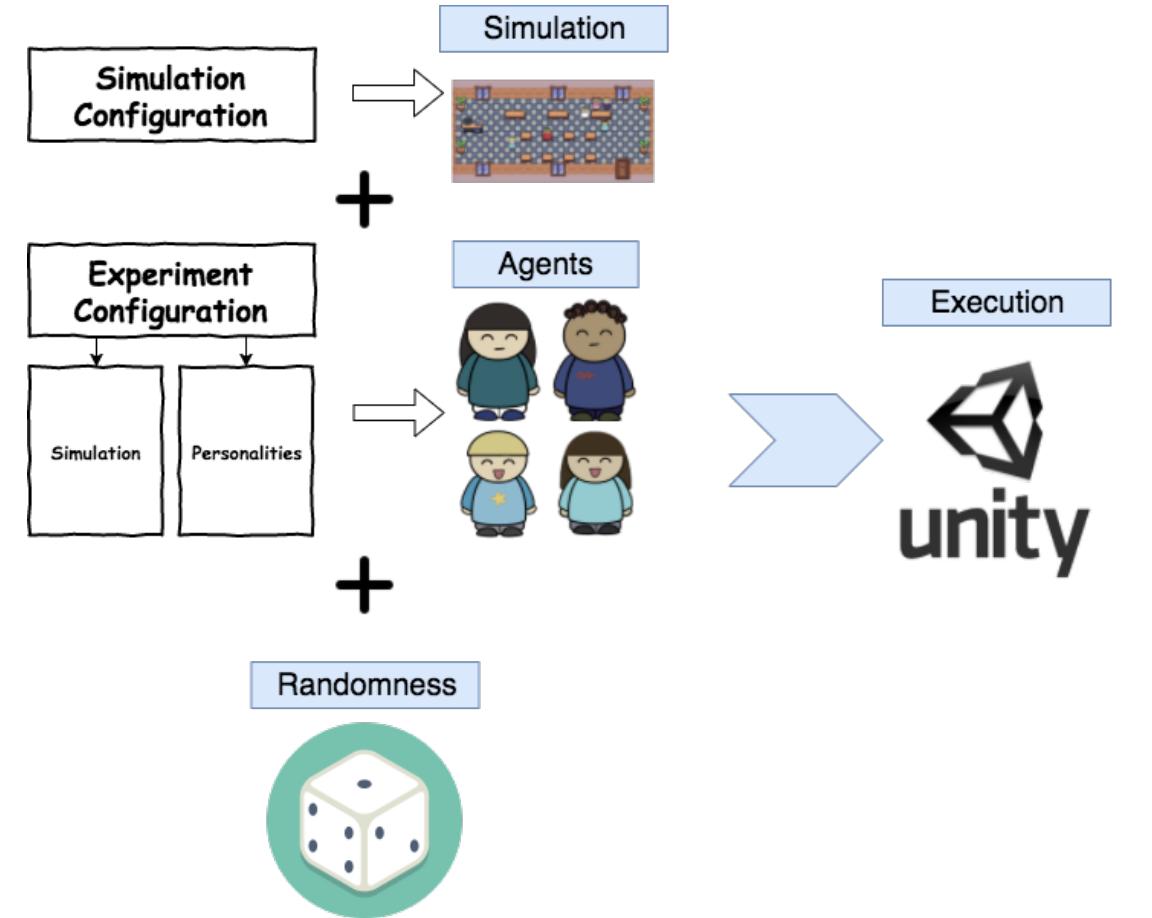
What is the behavior of one set of agents?

What is the average happiness and attention of a combination of personalities?

How do different personality combinations compare to each other?

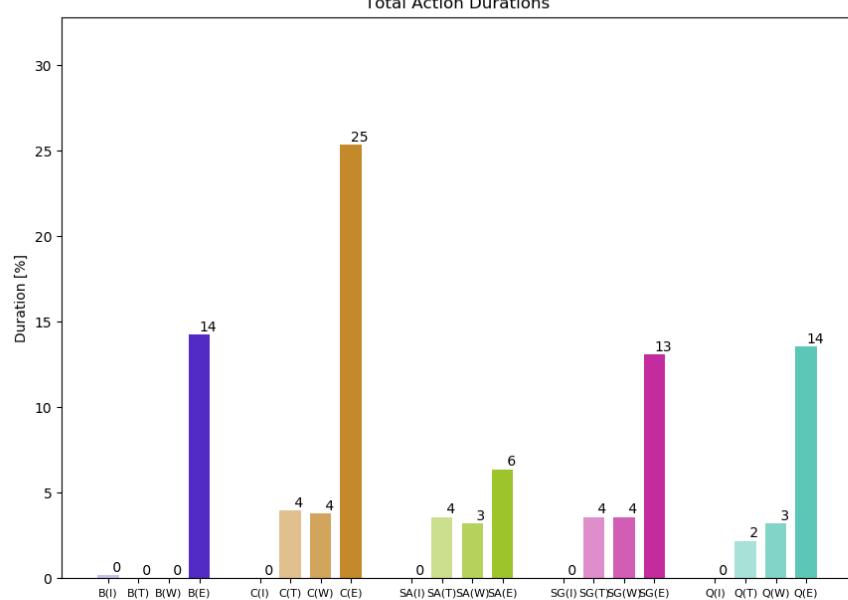
Simulation

What is the behavior of one set of agents?

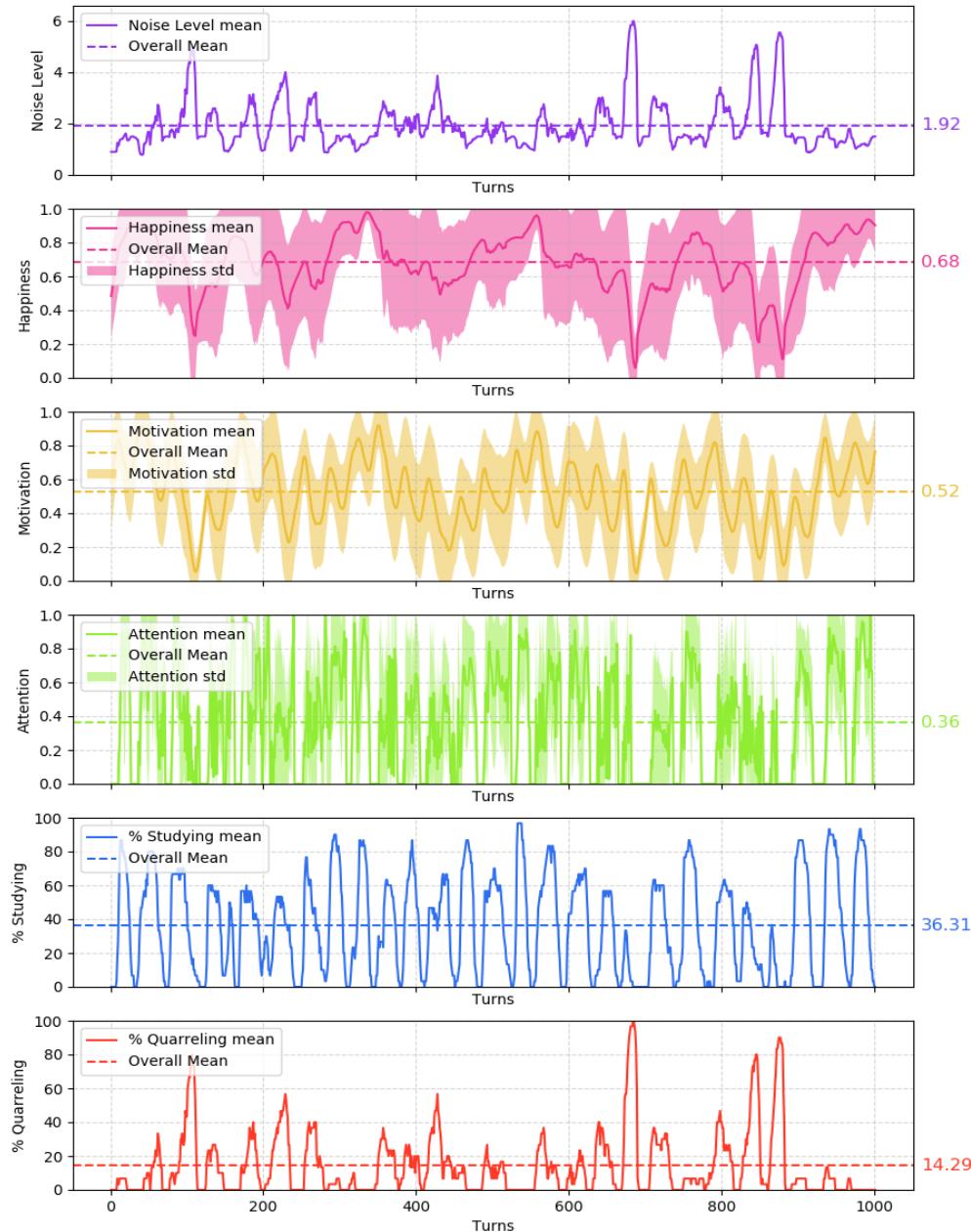


Agent Info

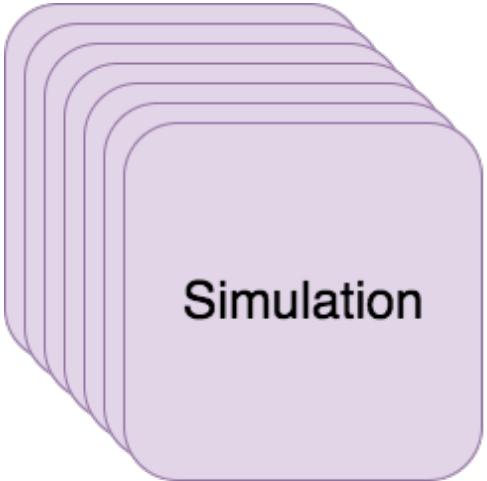
Normal: Openness: 0.75, Conscientiousness: 0.6, Extraversion: 0.55, Agreeableness: 0.65, Neuroticism: 0.55



Classroom Info

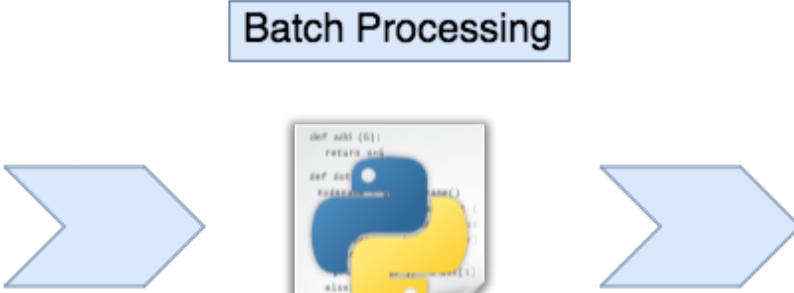


Experiment



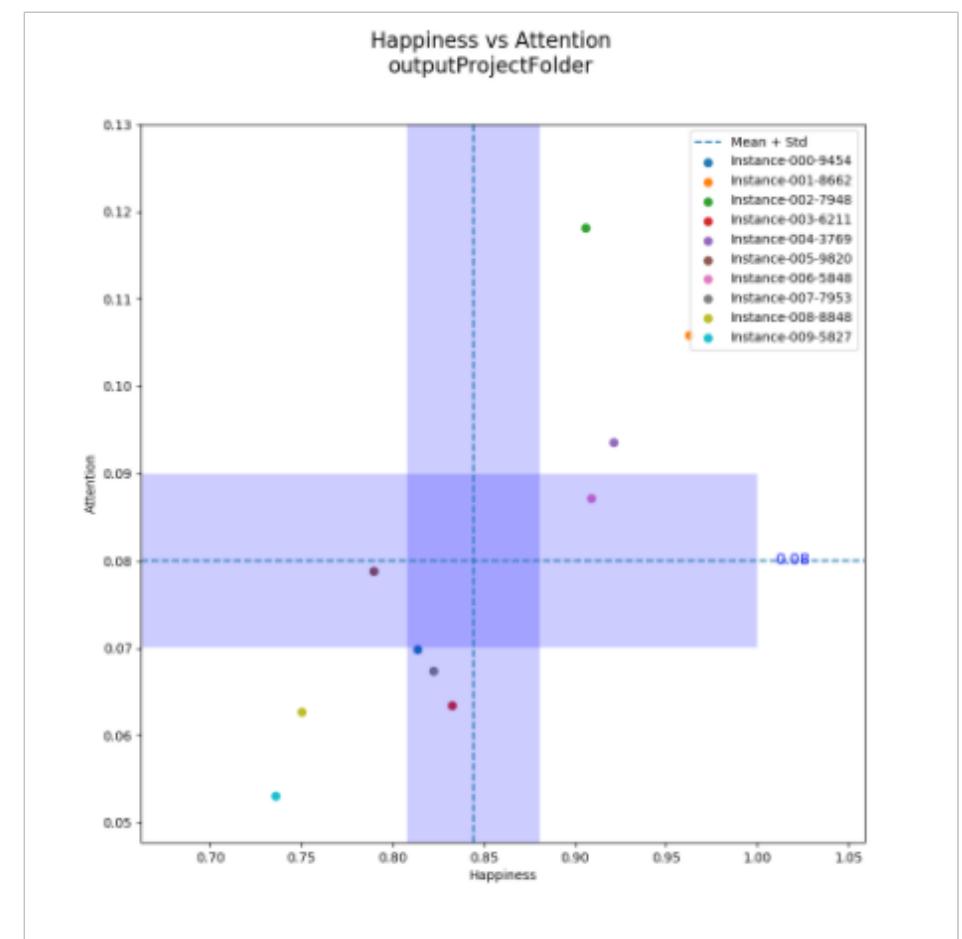
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Randomness



What is the average happiness and attention of a combination of personalities?

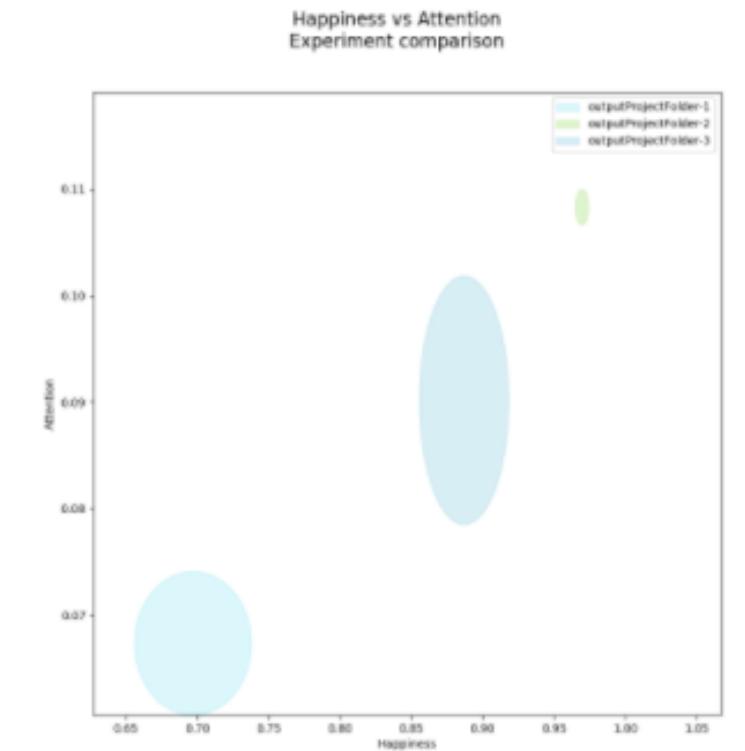
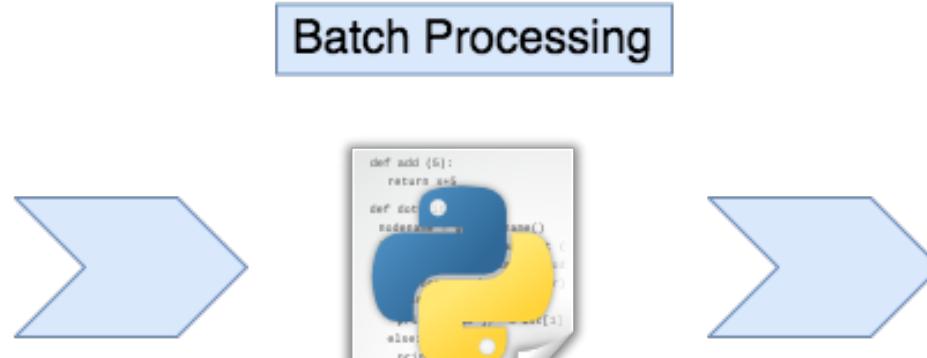
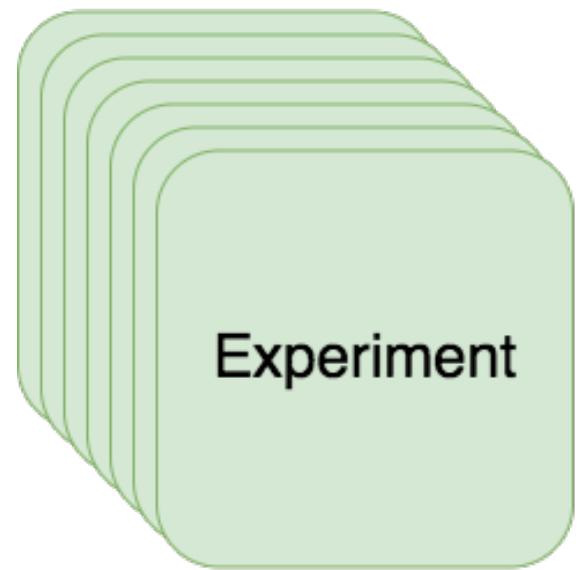
Average



Study

How do different personality combinations compare to each other?

Group comparison



Experiments & Results

Experiment - Setup

1. Define different Student Types (Personality Trait Profiles)
2. Define Classrooms with different Student Type Distributions
3. Run multiple simulations per Classroom
4. Compare groups

Experiment

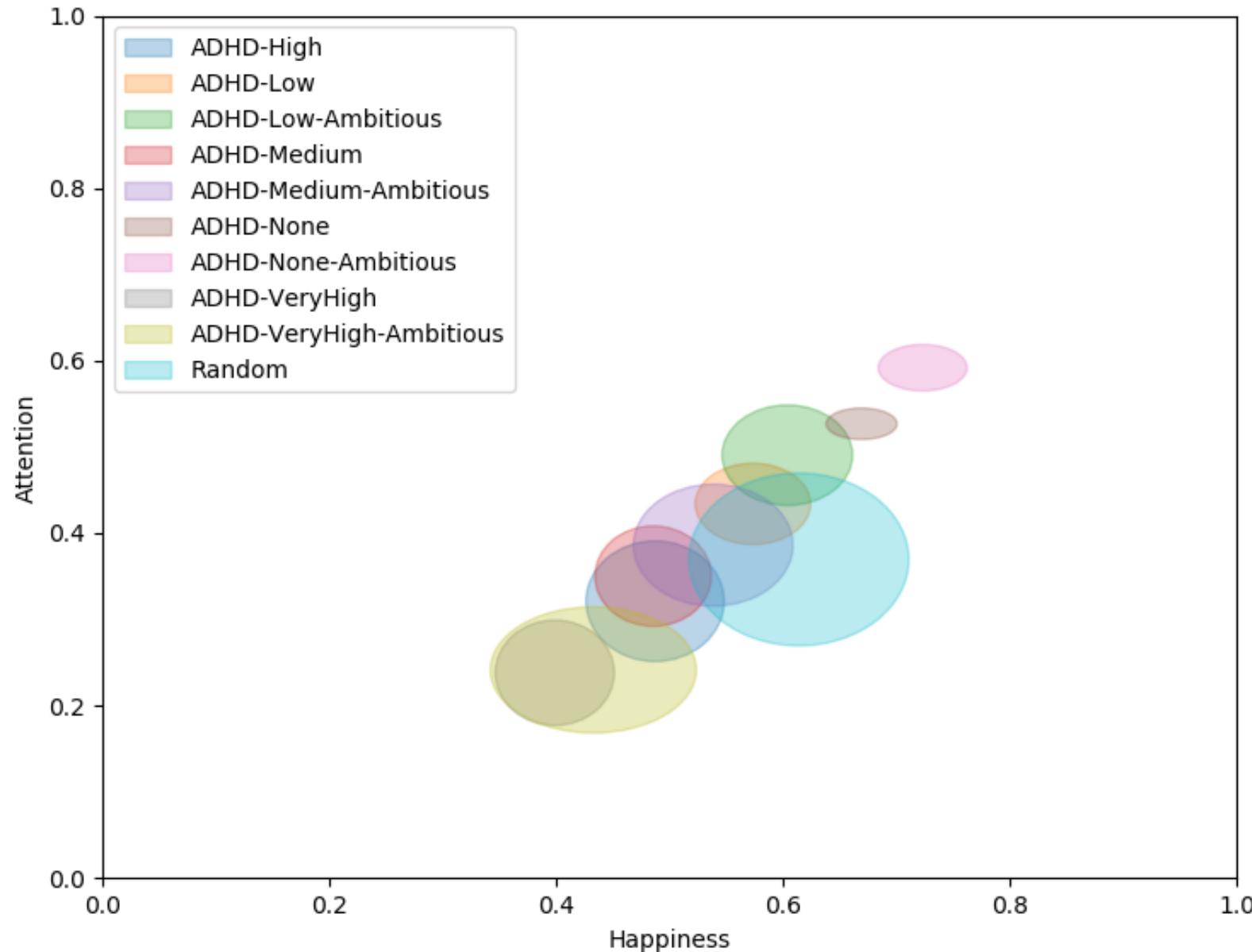
Personality Profiles

Student Type	O	C	E	A	N
ADHD	RND	0.20	RND	0.20	0.80
Normal	0.75	0.60	0.55	0.65	0.50
Ambitious	0.80	0.80	RND	0.80	0.20
Random	RND	RND	RND	RND	RND

Classroom Profiles

Group	ADHD	Normal	Ambitious	Random
ADHD-Low	7%	93%	0%	0%
ADHD-Medium	17%	83%	0%	0%
ADHD-High	33%	66%	0%	0%
ADHD-VeryHigh	50%	50%	0%	0%
ADHD-None	0%	100%	0%	0%
ADHD-None-Ambitious	0%	50%	50%	0%
ADHD-Low-Ambitious	7%	46%	46%	0%
ADHD-Medium-Ambitious	20%	40%	40%	0%
ADHD-VeryHigh-Ambitious	50%	0%	50%	0%
Random	0%	0%	0%	100%

Results



Result interpretation

1. ADHD students have a very strong effect on any group
2. ADHD students reduce group happiness and attention
3. Several ambitious students can not counter balance a single ADHD student

Conclusion

1. It is possible to build an agent based model of a virtual classroom
2. Agent behavior is strongly effected by Personality Profile
3. Predictions suggest a strong negative effect of ADHD Students on average class happiness and attention

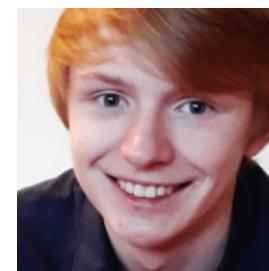
Prof. Dr. Michael Kickmeier-Rust
(Supervisor)



Prof. Elena Verdu Perez
(Supervisor)



Felix Meissl
(Art Work)

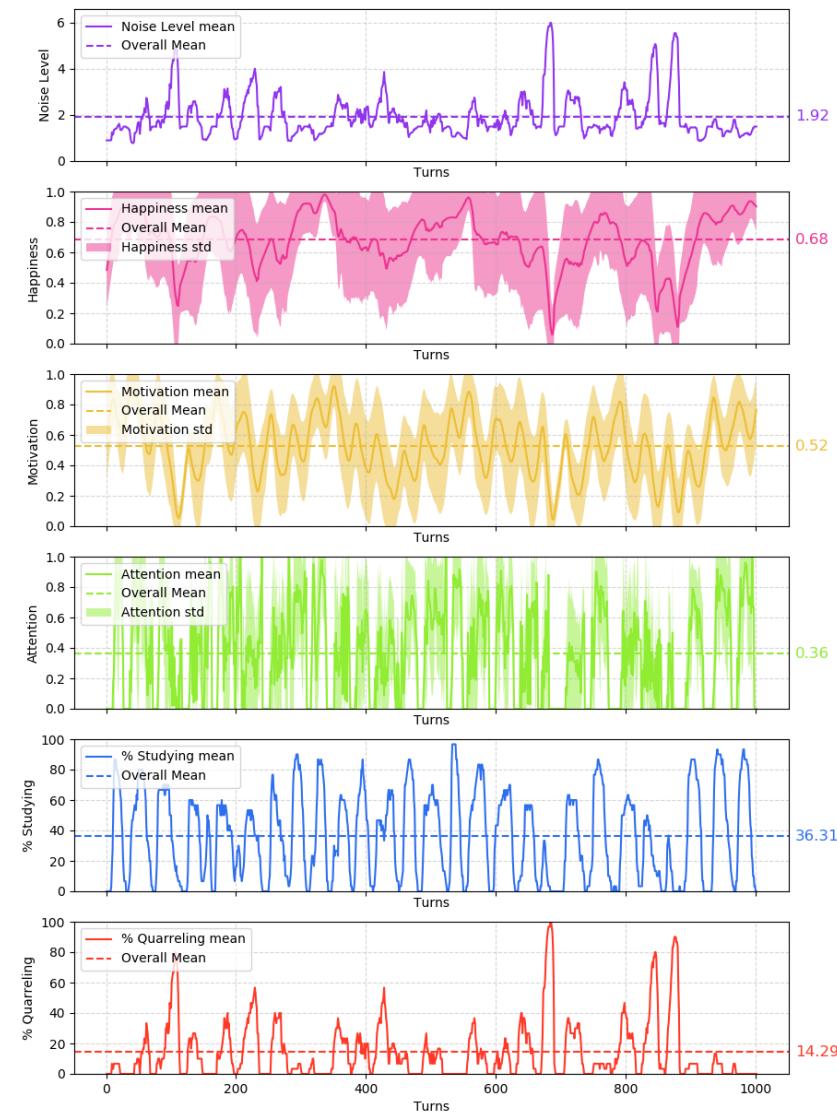


Thank you

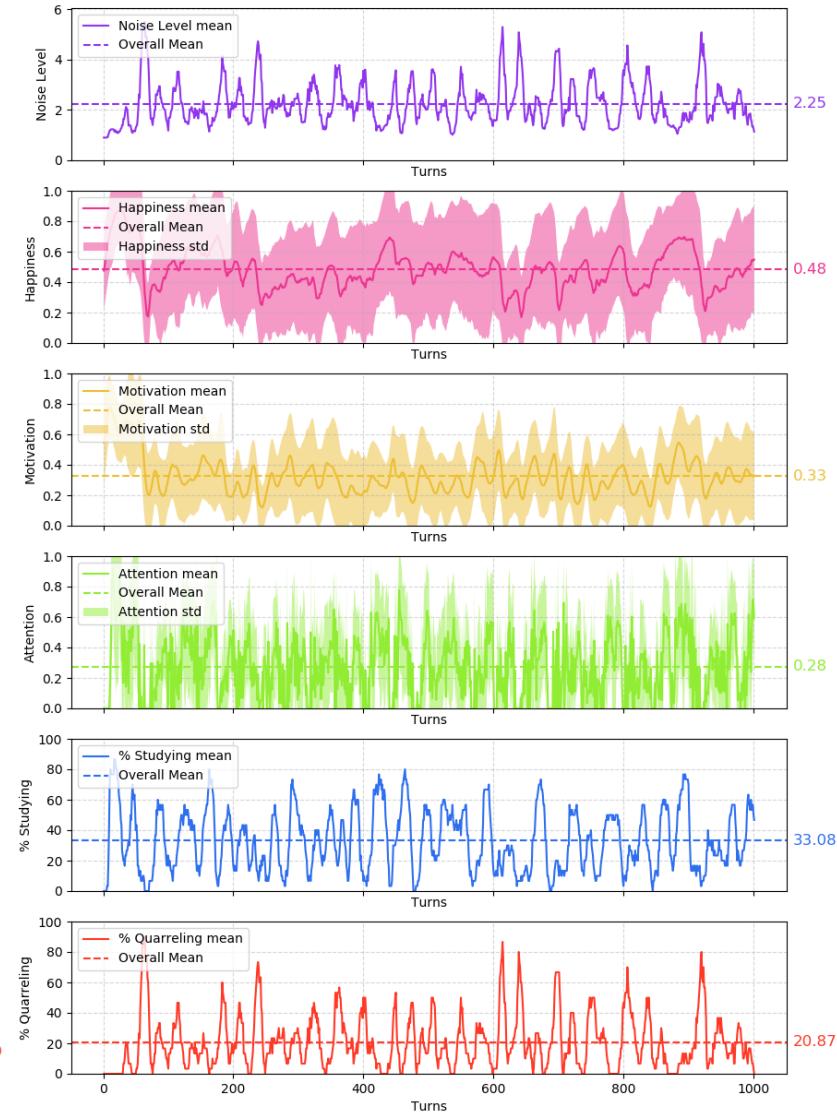
Outlook

1. Improve classroom aggregates analysis
2. Interactive Simulation
3. Include a Teacher Agent

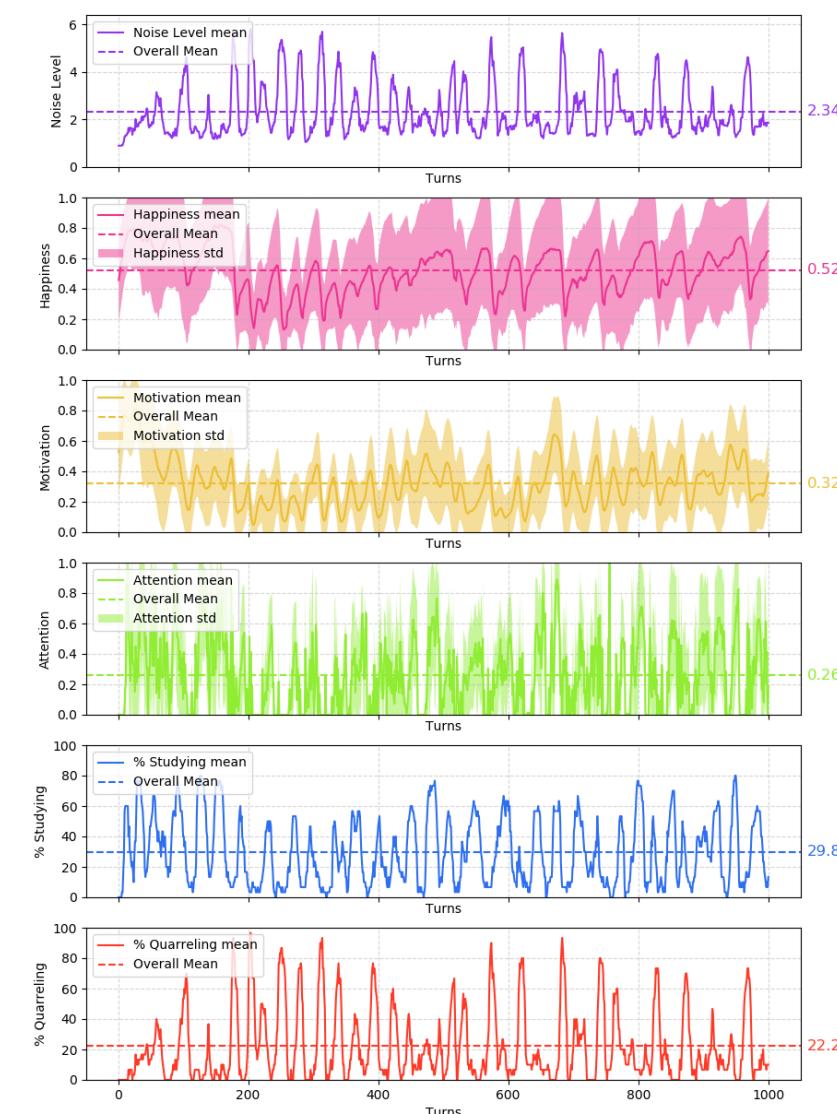
ADHD-None



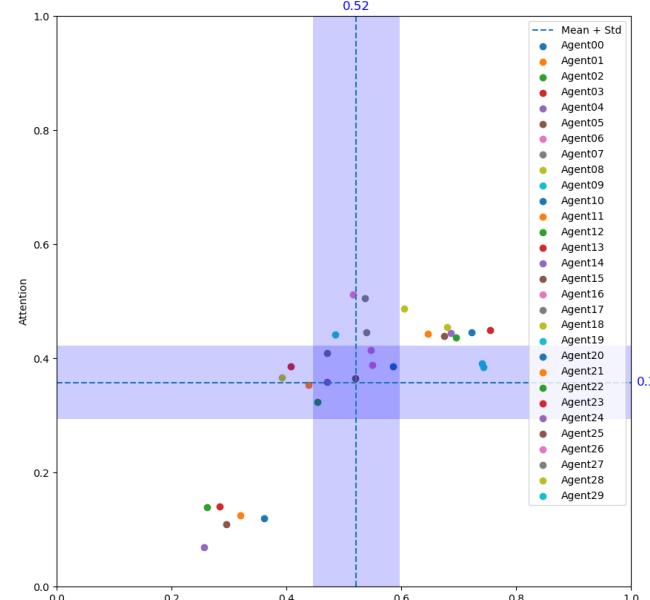
ADHD-Medium



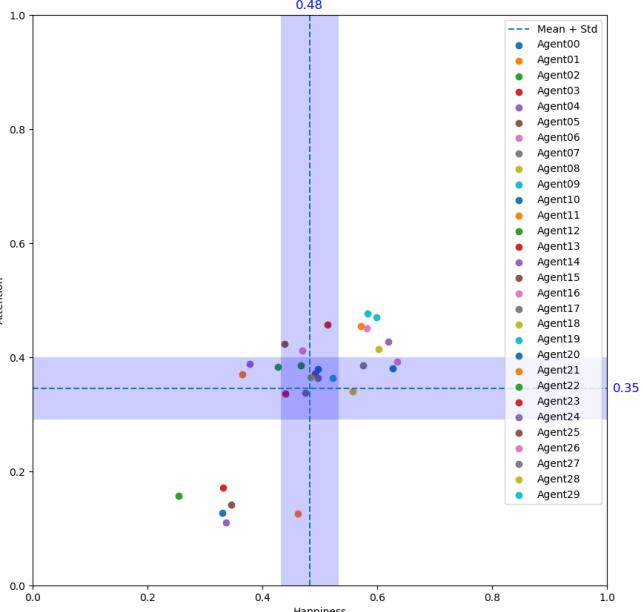
ADHD-Medium-Ambitious



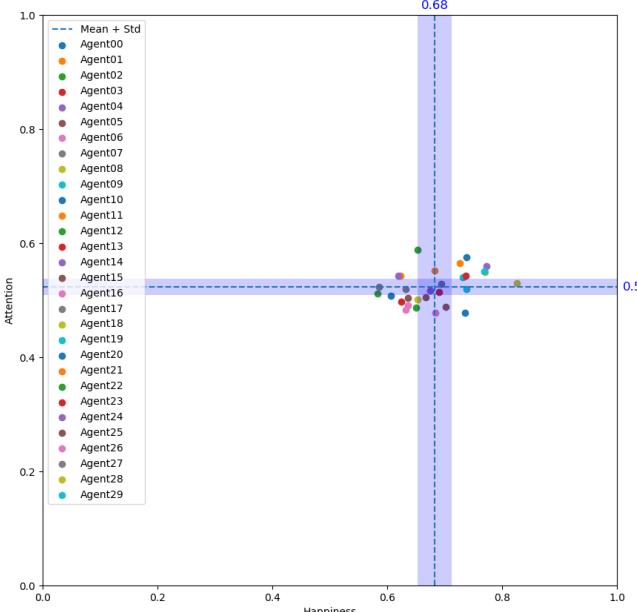
ADHD-Medium-Ambitious



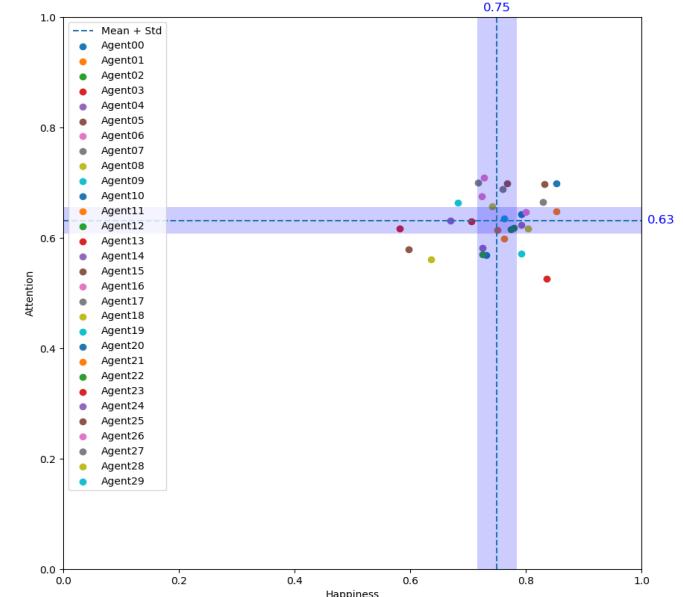
ADHD-Medium



ADHD-None



ADHD-None-Ambitious



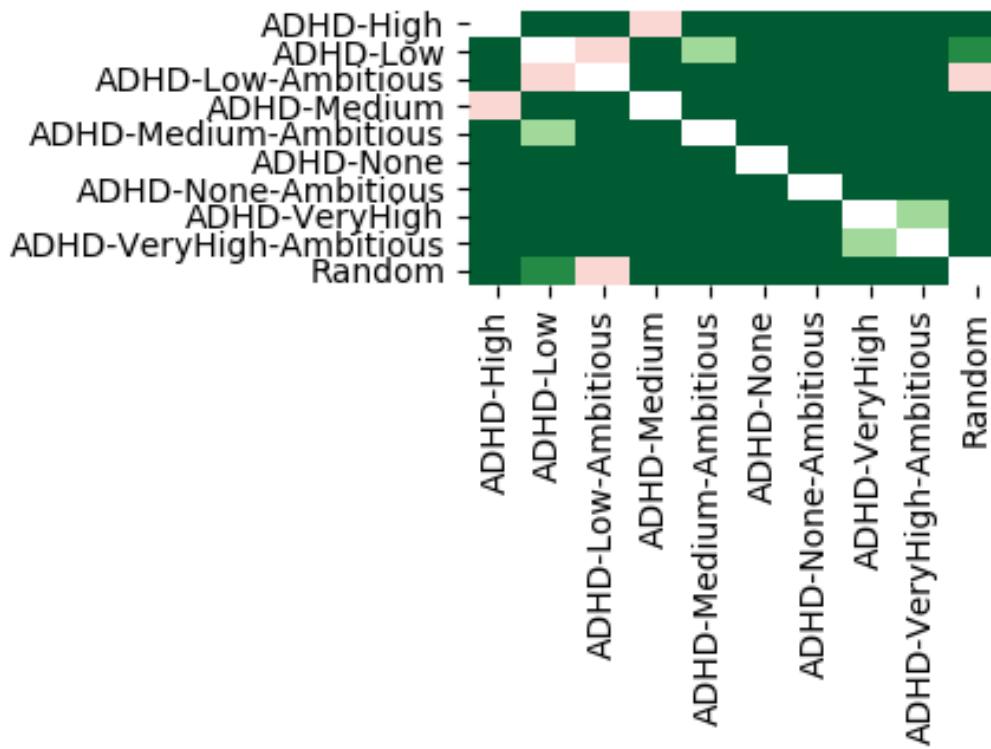
Spearman Rank-Order correlation

	Happiness	Attention
conformity	0.66	0.60
Openness	0.29	0.32
Conscientiousness	0.53	0.71
Extraversion	-0.09	0.05
Agreeableness	0.61	0.53
Neuroticism	-0.70	-0.54
Attention	0.66	1.00
Happiness	1.00	0.66

MANOV Significance ($p < 0.05$)
 Happiness: True
 Attention: True



Happiness



Attention

