Game-based Assessment of Dynamic Personality

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Background

Our understanding of the human mind is limited by the methods we use. It is critical that these methods capture the essential aspects of personality and thinking.

There is ample evidence to support the use of the “Big Five” (B5) traits to depict personality. The traits are Openness, Conscientiousness, Extraversion, Agreeableness and Neuroticism (see B5-section).

However, the trait approach has severe limitations. The traits have a relatively poor capacity to predict actual behaviors (4-10%; Soto, 2019). Additionally, the trait approach often neglects the role of situations. It is unrealistic to assume that the traits are expressed similary across different situations.

The project aims to develop a new game-based method to assess dynamic personality (GADP). It aims to overcome the limitations of previous research by utilizing new technological and theoretical innovations. GADP is based on the following four tenets:

Tenet I: Situation x Personality

Expressions of personality depend on situations. Thus, the essential element of personality is a collection of *If ..Then ..* -rules. These mental rules form one’s ”personality signature” (Mischel & Shoda, 1995).

Tenet II: B5 as a universal language

The B5 model is successfull in depicting the basic dimensions of behavior. Therefore, it is applicable to characterize the expressions of personality, i.e., *states*, in different situations (Sosnowska et al., 2020).

Tenet III: Evolution and predictive brain

Neuroscience suggests that the brain has evolved to predict *future events* (Pezzulo et al., 2021). Thus, it is essential to assess behavior in contexts that require future-oriented thinking and mental simulation.

Tenet IV: Personality ♥ Intelligence

The B5 traits have likely emerged in evolution to foster responding to threats and opportunities typical for the human species (deYoung, 2015). Therefore, they should be assessed in contexts that allow quantification of their outcomes, that is, adaptive intelligence.

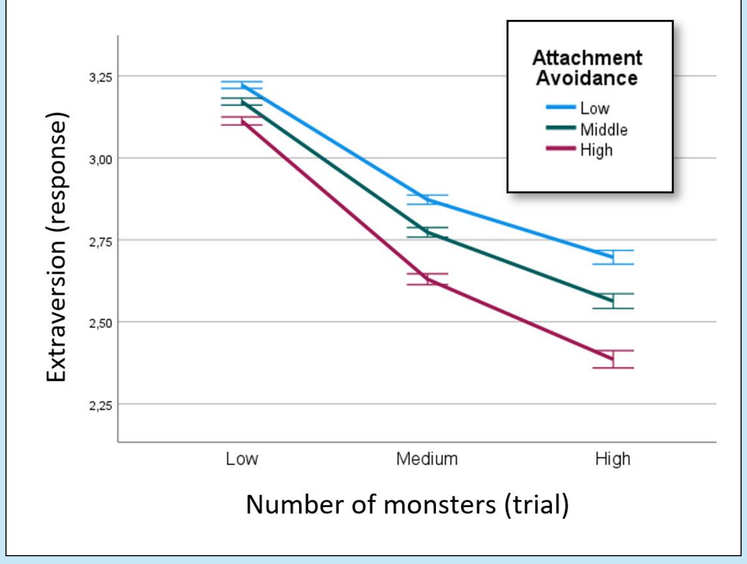
Proof-of-concept pilot

Some evidence is already available from a pilot study (n = 169 students; 104 trials, 17576 datapoints). The first part involved filling out personality questionnaires, the second part playing GADP using web-browser.

Preliminary findings:

- **Adult attachment:** As shown in Figure 1, participants with high attachment avoidance avert *Extraversion* especially in the presence of high threat (i.e., monsters). In addition, those with high attachment anxiety avert *Neuroticism* especially if there are only a few humans and energy in the situation.
- **Adverse Childhood Experiences (ACE)**: Participants with high ACEs avert *Neuroticism* until the presence of threat is very high.
- **Mental health:** Participants with high depression favor *Openness* even in highly threatening situations.
- **Adaptive intelligence:** Participants with high ACEs and with high attachment avoidance fared *better* in the game (i.e., fewer deaths).

Figure 1. Number of monsters (Situation) and attachment avoidance (Personality) interact to predict Extraversion (response in the game)



Breakthrough potential

- **New method, new thinking.** GADP is a unique and novel framework to assess personality. It can renew how we think about personality systems, dynamics, functions and relations with situations. Application of B5 makes it highly adaptitable.
- **New perspective on intelligence.** Personality and intelligence paradigms have been overly segregated. In GADP, they can be integrated and studied as joint parts of evolution-based, future-oriented, socio-emotional problem solving.
- **Clinical implications.** GADP asessess mental beliefs from behaviors (e.g., ”When can I trust on the help from others?”). It can provice novel information to guide therapeutic interventions and increase understanding of psychopathology.
- **Next steps?** GADP needs iterative development; validation using experimental and diary merhods; and analysis of its predictive power against the more traditional trait-questionnaire approaches.

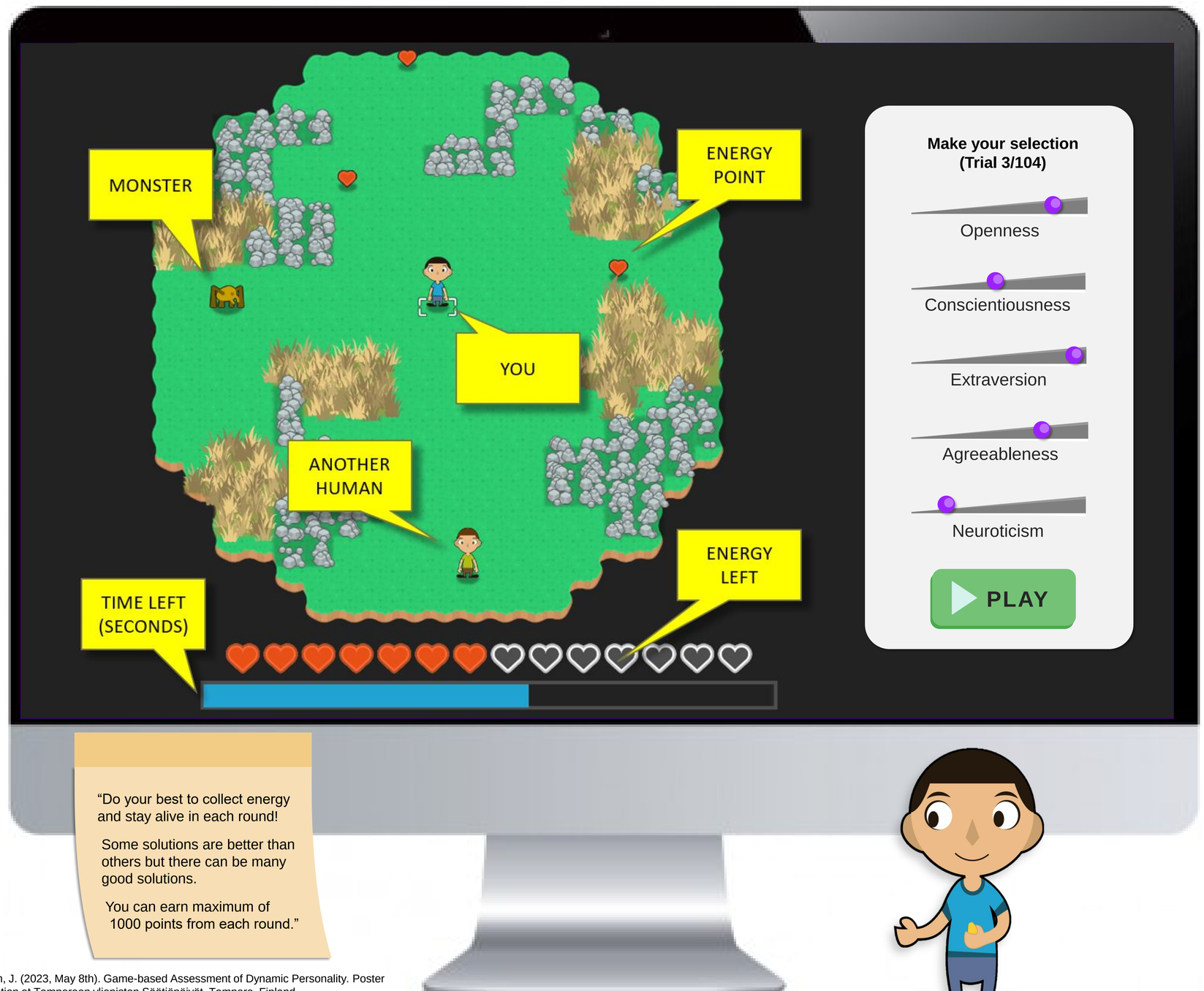
GADP game logic

GADP is currently in the beta-development phase. In the game, the participant is instructed *to survive for as long as possible while collecting energy*. The game protocol involves 104 trials. The number of monsters, energy points and other humans is balance randomized in the trials.

Unlike in typical computer games, the participant does not have real-time control of the game character. Instead, the participant is asked to response with Likert-scales to indicate what kind of B5 personality would fit best the given situation.

After the participant has provided the responses, the game runs automatically for 15-20s. To save time, approximately 70% of the trials are shown “blinded” without animations.

Probability of different actions of the game character are influenced by the given personality attributes. These are exemplified in the B5-section below.



The B5 dimensions

Openness

Cognitive exploration and engagement with information, e.g., ”Comes up with ideas”

→ The game character sees large area and has a tendency to walk around the map.

Conscientiousness

Protection of non-immediate goals and strategies from disruption, e.g., ”Does a thorough job”

→ The game character is slow to stop ongoing actions and to update set goals.

Extraversion

Behavioral engagement with specific rewards (i.e., goals to approach), e.g., ”Is outgoing, sociable”

→ The game character has a tendency to approach anything that can gain energy.

Agreeableness

Altruism and cooperation; coordination of goals with those of others. E.g., ”Is considerate and kind”

→ The game character does not attack other humans and is cooperative in trading interactions.

Neuroticism

Defensive responses to uncertainty, threat, and punishment. E.g., ”Worries a lot”

→ The game character avoids monsters (flight) but if they come close will attack (fight).

(Definitions from deYoung, 2015; Examples from Nandi & Nicolette, 2009)

Lindblom, J. (2023, May 8th). Game-based Assessment of Dynamic Personality. Poster presentation at Tampereen yliopiston Säätiöpäivät, Tampere, Finland.