Neuroticism – a competitive advantage (also) for IVAs?

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Current situation

- Market for interactive games on PCs, game consoles, mobile phones is booming

- Semi-intelligent agents steer virtual actors

- Simple "personality structure": motivation is to win fast

- Human player only challenged with respect to rational, strategic behaviour

Hypothesis

Question:

Is it possible to increase the attractiveness of games by emotionally and/or partially "neurotically" acting agents?

Necessary condition:

Playing strength of this agent
not (much) worse than "rational" one

Procedure:

Create an emotional bot
for a real-time strategy game
that can also act "neurotically"

Menü

00:21:42 (Schwierig)

Team PsychoBot
III PsychoBot: 289

Team StandardAI

+10

Husar
· Leichte Kavallerie

Bev. in Produktionsschleife: 9

133 / 160

20 🥾 977

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6 🟡 1939

27 👤 66

Concern Debug:14 - (id:14) X

Var[00][0]: [gAppraisalMood: 1.000000] Gametime=1299993.
Var[01][0]: [cConcernKeepFromWood Weight: -0.114286 Sat: 1.000000] Gametime=1299993.
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Game: Age of Mythology

- Real-Time Strategy (RTS)

- Economic and military build-up, fighting

- Scripting system for the Game AI
  - Low-level action (unit movement) available
  - Standard AI exerts control using predefined high-level scripts
  - Sensory information: position/status of visible units, environmental features

Personality and Emotion Model

- Emotion model based on

  - Big-Five personality traits (OCEAN)

  - Emotion-Connectionist model

  - OCC model

- Influence of restrictions of scripts

- Calculated state variables:
  Pleasure / Pain, and Clarity / Confusion

- Change in emotion is the result of an environmental factor, a perception

- Strength of emotional change is influenced by the personality

Personality and Emotion Model
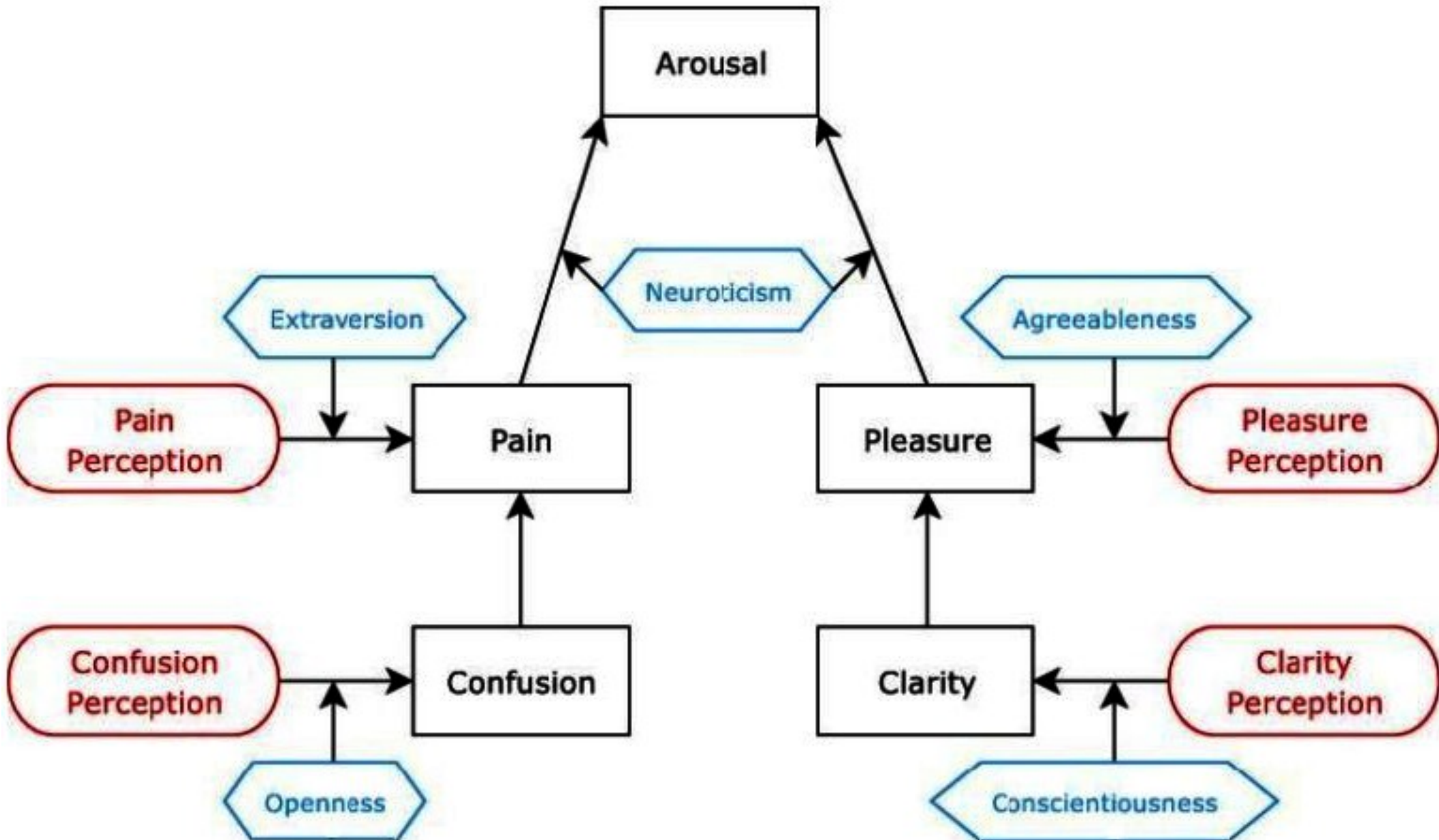
Character types

- Four bot variants with different personality parameters: defensive, aggressive, normal and neurotic

- Example: Influence of "Neuroticism"
  - High:
    - irrational assessment of resource value
      e.g. amount of available timber is overestimated
    - tendency to resort to extreme playing styles:
      aggressive vs. defensive
  - Low:
    - rational adjustment of assessed resource value
   - use game statistics unchanged

Evaluation

◆ Bot-versus-bot setup:

The four defined character types against the default Age of Mythology AI script

◆ Conditions:

- Two players
- Odin's Vikings
- Difficulty "hard"
- Strategy "normal"
- Map "Alfheim"

◆ Each character setting completed 7 test games

Test results

Each character version scored a minimum of 6 wins out of 7 matches, altogether 26 wins out of 28 games (p<0,0001) → Playing strength at least 232 Elo points higher than the default Age of Mythology AI script

Setting	Wins : Losses	Average winning time
Aggressive	7 : 0	44:35 min
Defensive	6 : 1	35:17 min
Normal	6 : 1	40:34 min
Neurotic	7 : 0	31:45 min
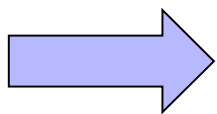
In this specific situation, neuroticism is a competitive advantage for an IVA

Further work

- Further improve playing strength

- Adapt an appraisal model of emotion for the specific environment of RTS games

- Test attractiveness of emotional, especially "neurotic" bots in games with human opponents

The End

Thank you for your attention!