Affective Response Patterns as Indicators of Personality in Virtual Characters

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Affective Response Patterns as Indicators of Personality in Virtual Characters

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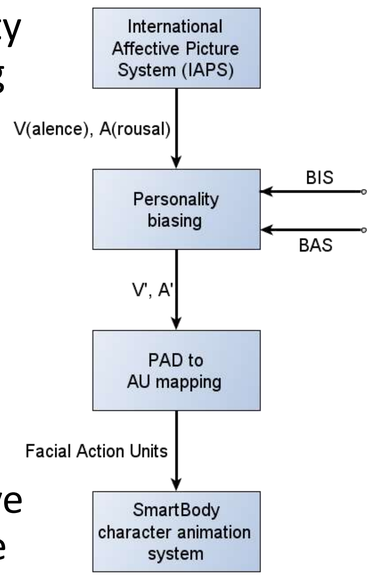
Introduction

- Inter-individual differences in cognition, emotion, and behaviour are pervasive mediators of social interaction
- Personality is revealed through motivated preferences and biases in the way people interact with their environment (Higgins & Scholer, 2008).
- BIS/BAS personality theory (Carver & White, 1994)
  - Behavioral Inhibition System (BIS): Sensitivity to punishment and avoidance behavior
  - Behavioral Approach/Activation System (BAS): Sensitivity to reward and approach behavior
- BIS/BAS suitable because of mechanistic nature, and relationship to overt behaviour

Methods

- We evoke different impressions of personality by varying the characteristics of the mapping between affective quality of the stimulus and overt behavioral response of the virtual character



- Mapping from stimulus to response (Balconi, Falbo, & Conte, 2011)
  - Valence
    - High BIS: Negative pictures more negative
    - High BAS: Positive pictures more positive
  - Arousal
    - High BIS: Negative pictures more arousing
    - High BAS: Positive (and negative) pictures more arousing

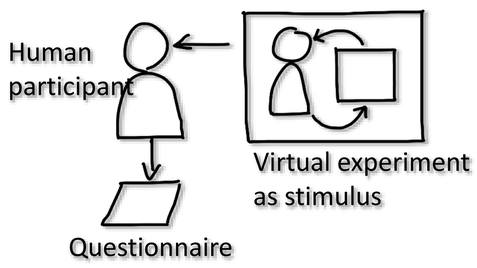
Hence we formulate our mapping hypotheses as follows:

$$V' = \begin{cases} V + V * BIS \text{ for } V < 0 \\ V + V * BAS \text{ for } V > 0 \end{cases}$$

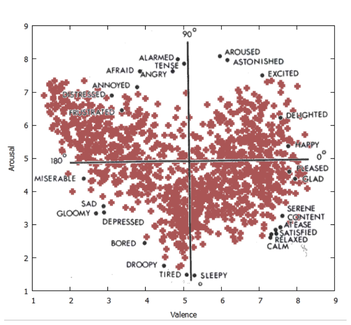
$$A' = \begin{cases} A + A * BIS \text{ for } V < 0 \\ A + A * BAS \text{ for } V > 0 \end{cases}$$

Scenario

- The basic idea of the paradigm: Experiment within an experiment
  - Human user is observing a virtual character reacting to stimuli
  - We use graphical stimuli for which we know the affective rating
  - Participants rate the personality of the virtual character



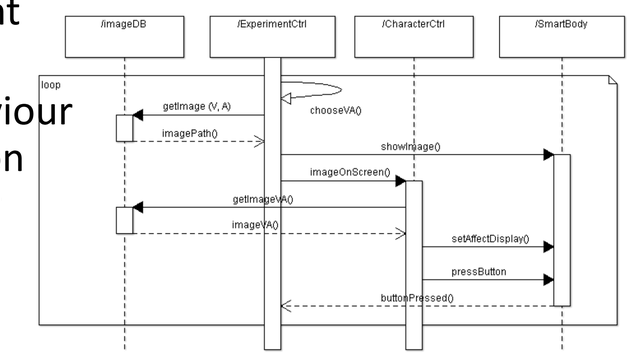
- Artificial lab scenario allows to plausibly constraint what the virtual character can do



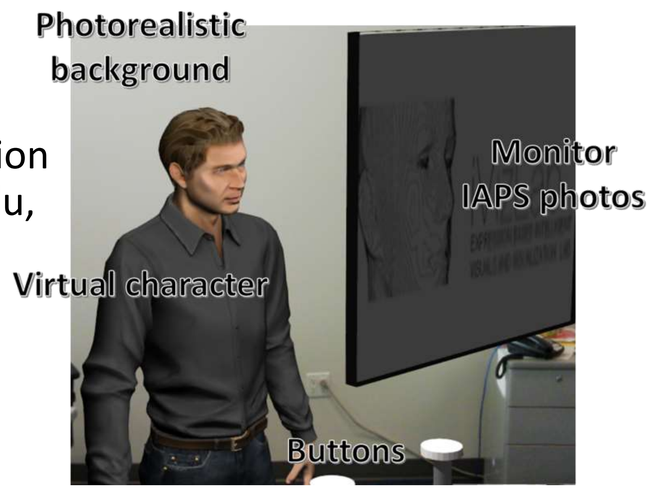
- Stimuli: International affective picture system (IAPS, Lang, Bradley, & Cuthbert, 2008)
- Images drawn from IAPS based on Valence and Arousal

Implementation

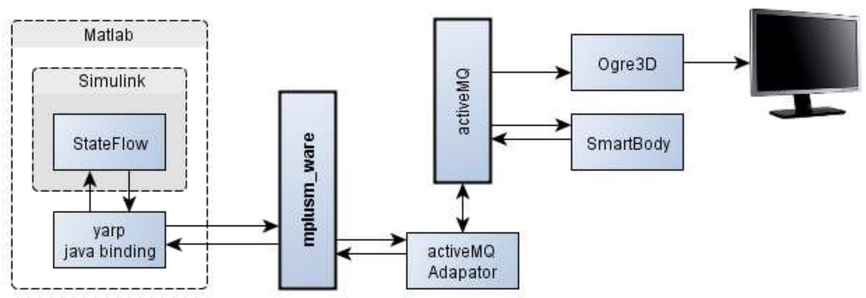
- The system as a whole implements the virtual experiment:
  - Control of virtual experiment
  - Control of character
    - Control of reaching behaviour
    - Control of facial expression
    - Control of gaze behaviour



- Hybrid continuous-discrete controller implemented in Matlab/Simulink/StateFlow
- SmartBody character animation system (smartbody.ict.usc.edu, Shapiro (2011))
  + Ogre3D renderer (www.ogre3d.org)



- Overall integration using M+M middleware (www.mplusm.ca); allows for extension to real-time interaction



Summary and Outlook

- Evoke different impressions of personality by varying mapping between affective quality of the stimulus and behavioral response
- Illustrates how autonomous virtual characters can be used as a platform to develop models of human cognition, affect, and behavior

- Facial expression: Mapping PAD to AU directly
- Empirical evaluation of personality attribution
- Spatial behaviour and posture: Approach vs avoidance (Karimaghalou, Bernardet, & DiPaola, 2014)
- Extension of paradigm:
  - Interactive experiment: Human decides which images are presented to the virtual character

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