Implementing personality adjectives as behavioral schemes

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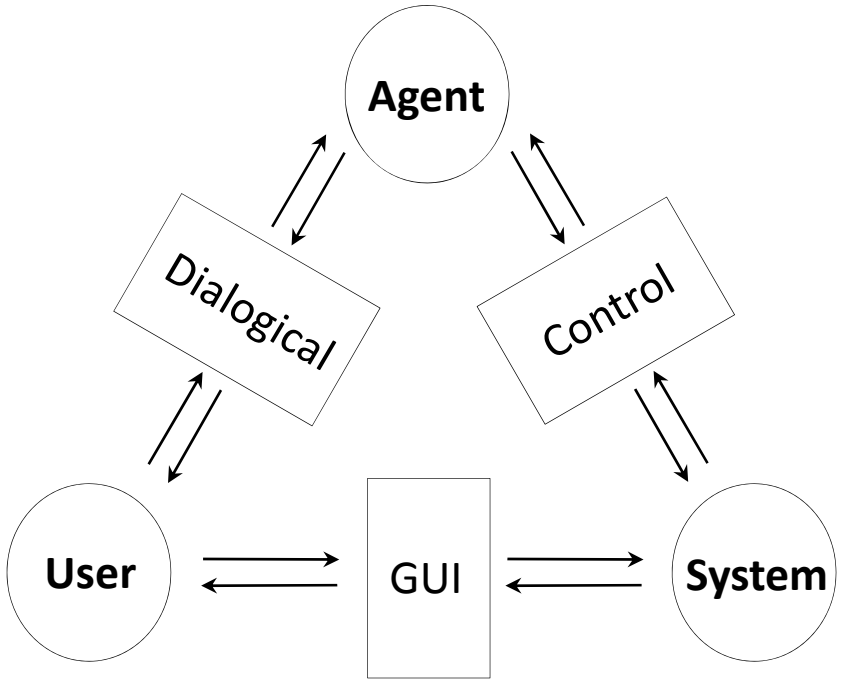
Context: assistant agents situation

- Agent-System:
  - Symbolic model of the system
  - Rational reasoning over the model [Sabouret, 2001]
- Agent-User:
  - **Multimodal conversational interface:** natural language (NL), embodiment… [Cassell, 2000]
  - **Rational agent:** reasoning over the NL requests
  - **Behavioral agent:** personality according to role: presenter, helper, companion, teacher…

➔ **What are the personality constituents?**

➔ **How to implement them?**



Related works and general approach

- Three classes of phenomena impacting behavior:
  - Task-related **roles**: social relationships and obligations
  - Low-level dynamic **emotions** [Ekman et al., 1972]
    - Multimodal expression [Cassell et al., 2000]
    - Formal model for evolution of intensity (based on OCC [Ortony et al. 1988])
  - Static personality **traits**:
    - Based on vocabulary study [Baumgarten, 1933] [Anderson, 1968]
    - Based on questionnaires [Eysenck & Eysenck, 1975] [McCrae & Costa, 1987]

  ➔ Five Factors Model (OCEAN) [Goldberg, 1981]
  … and various subsets of facets like NEO-PI-R [Costa & McCrae, 1992]

➔ **But how to link personality words to actual behaviors?**

1. Identify words actually used
2. Use electronic thesaurus definitions
3. Formally represent the associated lexical semantics

Collecting personality adjectives

- Methodology:
  - 10 lists of adjectives retrieved on the Internet
    ➔ **socially salient**
  - Extracting the relevant senses from WordNet [Fellbaum, 1998], like [Strapparava & Valitutti 2004] for WordNet Affect
  - Using WordNet synonyms to create an 11th list
    ➔ **extended coverage**

- Results:
  - 2335 words
    → **1303 unique lemmas**
  - 3000+ WordNet synsets
    → **1745 relevant senses**

We'll focus for now only on the 25 most frequent words (57 senses)

Using WordNet for personality adjectives

F	Adjective	Synset	Gloss
9	Friendly	/pally/	**characteristic of or befitting a friend**
		/allied/	*belonging to one's country forces or to an ally*
		/easy/	*easy to understand or use*
		/favorable/	**inclined to help or support**
8	Lively	/vital/	**full of spirit**
		/eventful/	*filled with events or activity*
		/frothy/	**full of life and energy**
		/springy/	*elastic; rebounds readily*
		/alert/	**quick and energetic**
		/racy/	**full of zest**
8	Ambitious	/pushy/	**having strong desire for success or achievement**
		/challenging/	*requiring full use of abilities or resources*

Behavioral schemes: definition

Glosses can be expressed as a **Behavioral Scheme** *s*, where:

$s = F(P_i(a), \ldots)$

or $s = F(P_i(P_j(a), \ldots), \ldots)$

- *F* = **performative**:
  notions about a disjunction of predicates
  `TEND/AVOID, POSSESS/LACKOF`
- *P* = **predicate**:
  attitudes of the subject about an entity *a* (possibly involving another subject)
  `INTENT(action), ADOPT(goal), SUGGEST(action)…`
- *a* = **argument**:
  any entity that can be object of a predicate
  `operation, help-action, help-info, comfort…`

Behavioral schemes: basic schemes

- **Basic schemes:** prototypical frequent behaviors, extracted from WordNet glosses

- **Examples:**
  - HELPFUL:
    ```
    TEND[INTENT[help-action],
         SUGGEST[action],
        TELL[help-info]]
    ```
  - COMFORTING:
    ```
    TEND[EXPRESS[comfort]]
    ```
  - TOLERANT:
    ```
    AVOID[REACTTO[provocation]]
    ```
  - PAIR:
    ```
    TEND[FEEL[same-authority-level]]
    ```
  - ENERGETIC:
    ```
    POSSESS[physical-energy]
    ```

From adjectives to behavioral schemes

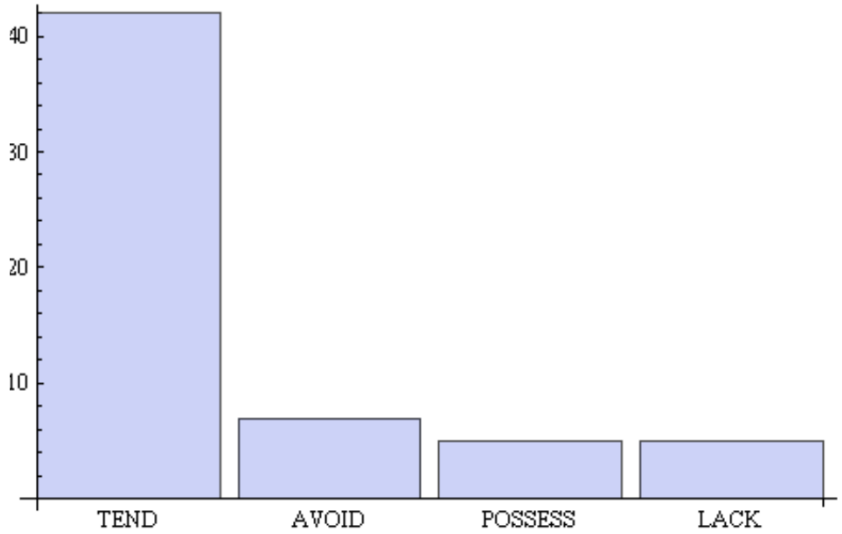
- **Methodology:** Associating adjectives to basic or specific behavioral schemes

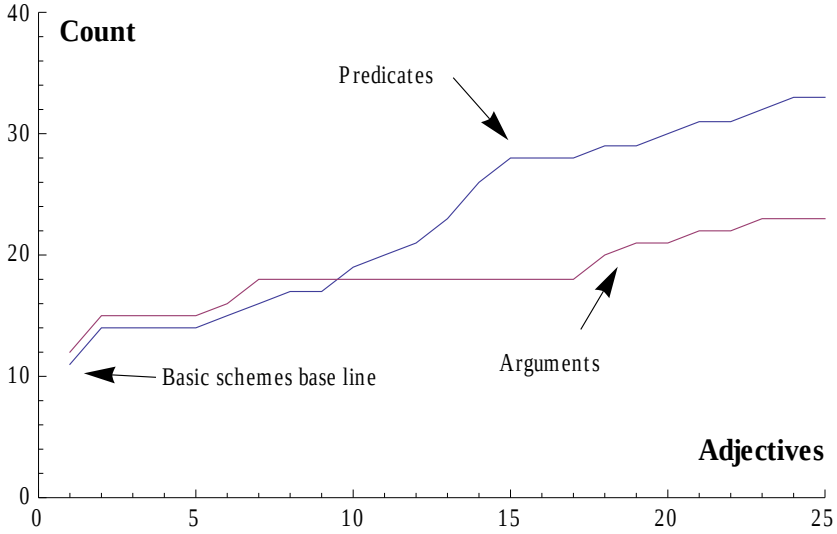
- **Examples:**
  - Friendly:
    - /pally/ = {COMFORTING, TOLERANT, PAIR}
    - /favorable/ = {HELPFUL}
  - Lively:
    - /frothy/ = {ENERGETIC}
    - /alert/ = `TEND[ISQUICK[REACTTO[event]]]`
    - /racy/ = `TEND[ISQUICK[EXECUTE[action]]]`

Behavioral schemes: statistics

- **Elements defined:**
  (for 57 senses)
  - 4 performatives
  - 33 predicates
  - 23 arguments

- **Observations:**
  - **TEND** is the most used performative to describe a personality trait
  - Predicates set not yet complete, but most used predicates are intrinsic (**INTENT**, **FEEL**, **DESIRE**) or interpersonal (**SUGGEST**, **TELL**)
  - Arguments number is more stable, and often actions or about actions





Towards integration into an existing agent framework

- In our current agent framework (R&B) [Bouchet & Sansonnet, 2009]:
  - **Plan** = a set of atomic actions
  - Psychological behaviors = **influence operators** altering rationality, using:
    - **Choices:** giving a preference order between to otherwise equal alternatives
    - **Modality:** changing the way a particular action is performed
    - **Desires:** drastically altering plans, by adding/deleting/modifying actions in them

- **Integrating a personality adjective =**
  adding to the agent's list of heuristics
  all the behavioral schemes related to
  all the senses associated to the adjective

Conclusion

- **Results:**
  - A **list** of frequently used personality adjectives
  - A **framework** to implement their lexical semantic, based on a three-level representation (performatives, predicates, arguments)
  - A **first set** of elements to represent most common behaviors as influence operators

- **Perspectives:**
  - **Annotating** more adjectives to improve behaviors coverage
  - **Evaluating** users' perception of personality traits:
    - Do they notice differences in behavior?
    - Can they acknowledge them when told?
    - Does it match the personality words originally used?