Relation between Motivations and Personality Traits for Autonomous Virtual Humans (Extended Abstract)

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ABSTRACT
By modifying the intensity of the motivations to test the adaptability of our model of action selection in real-time, we provide evidence of a relationship between motivations and personality traits. These modifications imply a tendency to satisfy more or less some motivations and give to the virtual human distinctiveness in its behaviors. By defining specific set of motivation intensity, we can give to the virtual human some corresponding personality traits such as greediness, laziness or uncleanness in order to obtain more distinct and believable virtual humans.

Categories and Subject Descriptors
I.2.11 [**Distributed Artificial Intelligence**]: Intelligent agents.

General Terms
Algorithms, Experimentation, Human Factors.

Keywords
Description: Application, Inspiration: Artificial intelligence, Focus Keyword: (Virtual) Agents (any subarea), Motivations, personality traits, real-time decision making.

1. INTRODUCTION
The term *motivation* is used to describe "drives that constitute urges to action based on internal needs related with survival and self-sufficiency" [1]. Motivations can be seen as homeostatic processes which maintain controlled physiological variables within a certain range. We define *personality* as a dynamic and organized set of characteristics possessed by a person that uniquely influences his or her thoughts, motivations, and behaviors in various situations [2]. Another definition is the superset of traits that are peculiar to a specific person.

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Modifications of the motivational intensity influence the decision-making of the virtual human and induce it to act in a specific way. We can then define specific set of motivation intensity to match with some traits of personalities such as *lazy, tidy, social* or *greedy* (see section 2.1 and 2.2).

In this paper, we test some of the personality traits of the virtual human in a simulated environment in real-time [3] by modifying some motivational intensity (by the user). Finally, we provide evidence to support a relationship between motivation intensity and personality traits.

2. RELATION BETWEEN MOTIVATIONS AND PERSONALITY TRAITS
To test the robustness and adaptability of our action selection model [4], the motivational intensities can be modified depending on how the user wants the virtual human to behave. They can be set randomly at the beginning (default), predefined or changed in real-time thanks to the graphical interface.

The personality traits in these tests correspond to a specific set of motivation intensities. By modifying intensity percentage of motivations, the user can then define certain personality traits such as lazy, greedy, tidy, dirty, etc… for the virtual human.

2.1 Test 1: the virtual human is greedy, lazy and dirty

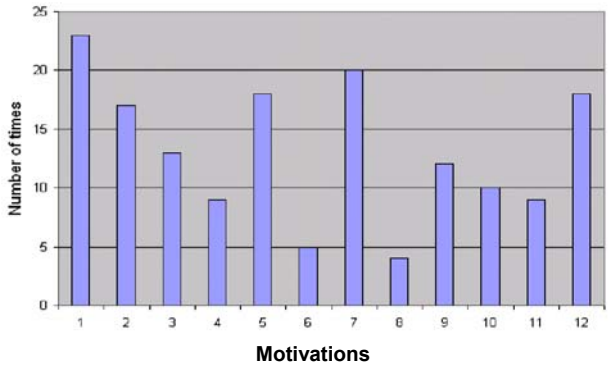

Figure 1: Number of times the motivations are satisfied by the action selection model during the 65000 iterations (see table 1 for the correspondence between numbers and motivations).

Table 1: intensity percentage of motivations.

1 hunger	98%	7 cooking	80%
2 thirst	63%	8 cleaning	10%
3 resting	42%	9 reading	43%
4 toilet	36%	10 communicating	40%
5 sleeping	59%	11 exercise	31%
6 washing	21%	12 watering	75%

Figure 1 shows an example of tuning the motivational intensities to give some personality traits to the virtual human so that it acts in a specific way during the simulation. In this case, the virtual human behaves with greedy, lazy and dirty tendencies in its behaviors. Thirst, hunger, cooking (greedy) and sleeping (lazy) are high whereas doing exercise (lazy), washing and cleaning (dirty) are low. The action selection model satisfies the motivations accordingly and does not neglect any of them.

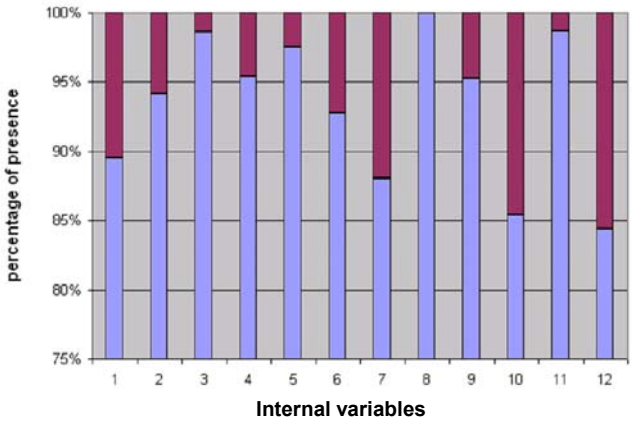

Figure 2: Percentage of internal variable presence according to the threshold system: comfort zone (blue), tolerance zone (red) during the 65000 iterations

However, the internal variables stay most of the time (around 90 %) inside their comfort zone [3] (see fig. 2) which is the most important role of an action selection mechanism.

2.2 Test 2: the virtual human is tidy, social and sporty

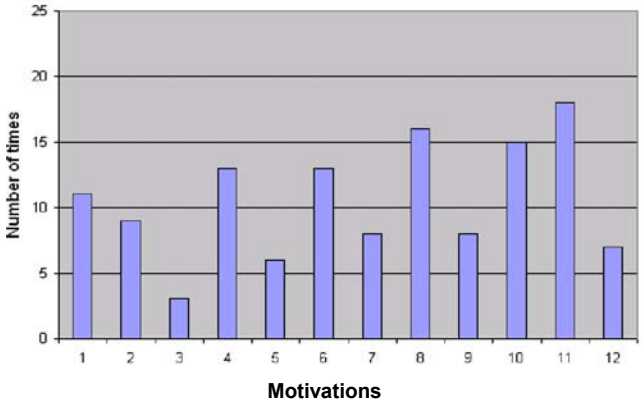

Figure 3: Number of times the motivations are satisfied by the action selection model during the 65000 iterations (see table 2 for the correspondence between numbers and motivations).

Table 2: intensity percentage of motivations.

1 hunger	51%	7 cooking	39%
2 thirst	41%	8 cleaning	75%
3 resting	9%	9 reading	33%
4 toilet	55%	10 communicating	80%
5 sleeping	25%	11 exercise	93%
6 washing	62%	12 watering	32%

In this case, the virtual human behaves with tidy, social, and sporty tendencies in its behaviors. The corresponding results show that the virtual human chooses more often to do exercise, communicate or wash and clean and less often resting, sleeping, reading or watering the plant (see fig. 3). However, the internal variables usually remain (around 90 % of the time) inside their comfort zone.

3. CONCLUSION

We provide some evidence to support a relationship between motivation intensity and personality traits. The action selection model is still coherent and adapts well to cope with these modifications which imply a tendency to satisfy more or less some motivations and have a direct influence on behaviors.

These variations in the motivations provide the virtual human with distinctiveness in its behaviors since it does not always react in the same way to the same situation. Finally we can deduce that defining a certain set of motivation intensity implies some personality traits. It could be an easy way to test personality traits by tweaking the motivational intensities in order to obtain more distinct and believable virtual humans.

As the model can be reused easily, we plan to study in more detail the links between motivation intensity and personality traits with Embodied Conversational Agents (ECAs) [5] by testing it with users. The model can also be applied in video games to give personality traits to non-player characters.

4. ACKNOWLEDGMENTS

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