On the Cybernetics of Artificial Personality: Correlating with Human Traits

Faisal Kadri

Artificialpsychology.com, Montreal, Canada

Abstract. George and Mary (G&M) is a US patented cybernetics application of two talking heads which uses a repertoire of sentences to generate artificial conversation with no linguistic analysis or parsing. The underlying design assumption of G&M is age dependence: The artificial personality follows Age Trend Classification (ATC) model with four complex dimensions. The idea of adult age dependence contrasts with main currents in academic psychology, which assume a substantially constant personality in adulthood. The Big 5 personality traits are widely used as a psychological personality model, part of their popularity is the free availability of evaluation questionnaires. This work is a correlation study between four ATC and five Big 5 traits, taking into account age dependence, so that correlation is represented graphically as profiles rather than single values of correlation coefficients. The practical consequences of validated artificial personality include customized man-machine interaction to the age and personality of the users and targeted internet marketing.

1 Introduction

Second Order Cybernetics (SOC) is known as the cybernetics of observing systems, or observing the observer [1]. George and Mary (G&M) is a US patented cybernetics application modeling the observer [2], where the artificial personalities of George and Mary generate artificial conversation based on motivational rather than cognitive rules. At any point in time, each of the two personalities has a motivational state which decays to a resting state on four complex motivational dimensions.

The dimensions contain repertoires of random sentences on scales reflecting states of extreme insecurity (fight-or-flight) activation and extreme security self-assurance state. Fight-or-flight in extreme states is extended as expressions of either externalizing or internalizing sentences, effectively constructing two sub-scales in each of the four motivational dimensions.

The design of the artificial personalities is built on projection of a dynamic animal motivation model [3], the model is a mathematical representation of priming and homeostatic motivations with four main animal motivations: self-preservation in the immediate sense, feeding, sociosexual and rearing motivations. Their projection on human behaviour has a slightly different nomenclature in G&M: The emotions, feeding, sociosexual and parenting.
Anecdotal observations suggested that motivations may have age dependence in adult humans; feeding motivation, including aggression in the context of securing and defending resources, desire for growth and perhaps extremism, is predominant in young adults but gradually falls with age. Parenting motivation is the opposite; humans care for their offspring more and for themselves less as they age. Sociosexual desires peak around the time of maximum fertility and virility, while the emotions are equally likely to occur at any age, therefore the emotions are likely to be constant over adult age. Hence the four dimensions of G&M, the emotions, feeding, sociosexual and parenting, were designed in G&M to be constant, falling, peaking and rising respectively with adult age. The categorization is called Age Trend Classification (ATC) [4, 5]. So, G&M personalities have programmable age, where the probabilistic rule of selection depends on fuzzy logic rule of selection from the distribution of the four dimensions.

Age dependence contrasts with main currents of psychological research which assume age constancy or insignificant change of personality in adulthood cf. [6]. The Big Five personality traits or dimensions are widely used as a psychometric personality model, different questionnaires for their assays are freely available online [7]. The dimensions are Extroversion, Agreeableness, Conscientiousness, Neuroticism and Openness. When comparing the interpretations, four of the five parallel the four ATC dimensions to some extent. The exception, Neuroticism in Big 5, projects over ATC as distributed over the other four, so that each ATC dimension has its own scale of dynamic stability, an abstract concept which parallels neuroticism in humans.

G&M exploits the parallelism in interpretation and designs a conversion, or compatibility table, between ATC and Big 5 as well as 8 additional personality models whose assays are proprietary. However, the basis of compatibility is interpretation, which leads to descriptive subjective evaluations not very reliable in practice, therefore the need for ATC-psychometric statistical cross-validation.

The purpose of this work is to seek cross-validation between funniness scores of random sentences and Big 5 trait scores.

2 Method

Online Big 5 funniness questionnaires were published by the author and promoted by Google search in 2009-2012, the questionnaire which resulted in the most coherent profiles was the one with the highest count of sentences. The questionnaire was in English, had 100 items Big 5 assay and 96 random humorous sentences to be scored for funniness, i.e. the participants were asked to give a 1 to 5 mark to each sentence, a score of 1 if not funny and up to 5 if found very funny. The questionnaire attracted 276 English language participants from around the world, six age groups in 10-year steps, age distribution of participants: 14/82/44/36/52/47. Female/male participation: 135/141.

The 96 humorous lines are classified according to their age trend, jokes found funny by the young and gradually declined with age are classified in the falling trend category. Jokes whose funniness scores increased on average with age are classified in the rising category, the third category of jokes peaked at around 33 years and the fourth remained somewhat constant with age. Notice ATC is computed from only empirical score data and does not depend on subjective interpretation of the researchers or a priori appraisal of sentences. The distribution of 96 sentences between the four categories are 25/30/13/28 in constant/falling/peaking/rising categories respectively.

The score data provided research material for earlier works [4, 5, 8]. Previous work included signature analysis of funniness scores [8]. Some questionnaires used different languages, including Chinese, with fewer sentences and/or participants, leading to jagged, incoherent profiles indicating inadequate data to show trends.
A comparison of coherent sentence profiles with signatures typically looked like the graphics in figure 1. The y axis indicate standard deviations from average, x axis indicate age groups: 15 years and below (15), 16-25 (16), 26-35 (26), 36-45 (36), 46-55 (46) and over 55 (55) years old. Notice the prevalence of smooth, coherent profiles across age groups, a clear indication that the analysis is meaningful and the samples are adequate in numbers. Such results built the expectation for similar profiles of correlation curves.

3 Procedure

In earlier unpublished investigations, single sentence ATC correlation with Big 5 traits did not lead to significant values of correlation according to statistical standards [9]. When comparing single sentence funniness score data and Big 5 trait scores, Big 5 values are keyed aggregates of ten scores, it became clear that single sentence scores needed to be keyed and aggregated to the same standard as Big 5 before correlation. This is a correlation investigation of keyed aggregates of sentence funniness scores with Big 5 traits.

The procedure was implemented in R statistical programming language. First, quantile selection of Big 5 scores applied in order to remove out-layer participants with non-serious scores, then age trends were computed for all humorous sentences, and sentences were classified in one of the four categories: constant, falling, peaking or rising.

Sentence correlations were calculated and used for aggregating negative and positive values. It was found that positively correlated sentences were in externalizing context while
negatives were internalizing [5, 8]. Top and bottom 5 sentences were keyed, added and correlated with Big 5 trait scores, leading to 10 keyed aggregates of ATC scores. The correlations is presented below as profile curves of 6 age groups.

**Figure 2.** Correlation of four ATC categories with five Big 5 traits for six age groups.

## 4 Results

Figure 2 shows the correlation of five Big 5 traits by four ATC categories, the y axis indicate correlation coefficient, x axis indicate age groups as in figure 1. Notice the profiles contain many points at or above correlation coefficient of 0.4, considered a significant value for determining score links [9].

The profiles in figure 2 are among the most coherent in ATC categories, some indicate constant or age dependent trend. Yet most points are less than 0.4, the profiles are mostly jagged and do not indicate trend. On comparing figures 1 and 2, figure 2 seems to show less coherence in general.

## 5 Conclusions

Estimating six correlation values from 276 participant may not lead to coherent profiles. Other configurations were tried, with different quantile values and different count of top/bottom sentence aggregation, none contradicts the conclusion that the total number of participants may be inadequate to estimate the correlation profiles. The inadequacy of participant totals is particularly noticeable for the 15 and below year olds age group, where the original total is only 14 participants.
While it is clear that aggregation can lead to higher correlation of ATC/Big 5 scores, higher participation is necessary to determine systematic link.

The author is willing to collaborate with academic and/or commercial organizations in order to validate the artificial personality model and to realize its practical benefits.

References

1. R. Glanville, Second order cybernetics. In F. Parra-Luna (Ed.), *Systems science and cybernetics*. In *Encyclopaedia of life support systems* (EOLSS). Oxford: EoLSS (2002).

2. F.L. Kadri, "Artificial Psychology Dialog Player with Aging Simulation", United States Patent number 7644060. http://www.google.com/patents/US20080177685 (2010).

3. F.L. Kadri and I.J. Duncan, A New Nonlinear Model of Mechanisms of Motivation, Behavioural Processes 33, pp. 273-288 (1995).

4. F.L. Kadri, The design and validation of an artificial personality", Kybernetes 40(7/8), 1078-1089 (2011).

5. F.L. Kadri, Towards compatibility between artificial and psychometric personality models", Kybernetes 42(3), 497-505 (2013).

6. G. Matthews, I.J. Deary and M.C. Whiteman *Personality Traits* (2nd Edition), Cambridge University Press, U.K. (2003).

7. L.R. Goldberg, J.A. Johnson, H.W. Eber, R. Hogan, M.C. Ashton, C.R. Cloninger & H.C. Gough, The International Personality Item Pool and the future of public-domain personality measures. J of Res in Personality, 40, 84-96 (2006).

8. F.L. Kadri, The cybernetics of humour: introducing signature analysis to humour research", Kybernetes, Vol. 44 No. 8/9, pp. 1274-1283 (2015).

9. J. Cohen, *Statistical Power Analysis for the Behavioural Science* (2nd edition), Lawrence Erlbaum Publishers, New York (1988).