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Authors

Tarasenko, Sergey S.

Inui, Toshio

Abdikeev, Niyaz M.

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The Golden Ratio-based Blind Choice Performance

Sergey S. Tarasenko* (sergey@cog.ist.i.kyoto-u.ac.jp)

Toshio Inui*** (inui@i.kyoto-u.ac.jp)

Niyaz M. Abdikeev*** (nabd@rea.ru)

*Graduate School of Informatics, Kyoto University, Yoshida honmachi, Sakyo-ku, Kyoto 606-8501, Japan

**JST ERATO Asada Project

***Faculty of Informatics, Plekhanov Russian Academy of Economics, Stremyanny pereulok, 36, Moscow 115998, Russia

Until recently, human decision-making without any prior information (Blind Choice) has been merely investigated.

In our previous study (Tarasenko et al., 2006), we have illustrated non-random human performance under such conditions: identical options located in a column were selected with significantly different frequencies. This result suggests existence of an implicit pre-knowledge or Implicit Primordial Knowledge (IPK). This knowledge is used to process a new environment as a human being gets in touch with it. In the present study, we discuss a possible content of the Implicit Primordial Knowledge.

Method

The number of participants for 2, 3, 4, 5, 6 and 7-option conditions of the Blind Choice are 674, 412, 377, 560, 219 and 211 participants, respectively. All the participants had normal or corrected to normal vision. Six columns with 2, 3, 4, 5, 6 or 7 identical squares were presented as the stimuli.

No practice was provided for any of the participants. Each column appeared in a stable position: the center of the column matched with the center of the computer screen. Before starting the experiment participants performed fixation of glance at the center of the screen. Participants were instructed to choose one of identical squares presented in a column.

Results and Discussion

For the purpose of the experimental data analysis the squares in the column were enumerated with natural numbers in increasing order, starting from the top square of a column.

An analysis of the frequencies of different responses under the Blind Choice condition showed a statistically significant difference between the frequencies of the response choices and corresponding chance levels under all the experimental conditions (Binomial test: $n=674$, $p<0.001$; Chi-square tests: $\chi^2(2,412)=52.937$, $p<0.001$; $\chi^2(3,377)=$

143.350 , $p<0.001$; $\chi^2(4,560)=176.982$, $p<0.001$; $\chi^2(5,219)=108.260$, $p<0.001$ and $\chi^2(6,211)=185.947$, $p<0.001$

We provide the approximations based on the Golden Ratio (GR) and its numerical properties (1) and (2):

$$1/\phi^n = 1/\phi^{n+1} + 1/\phi^{n+2} \quad (1),$$

$$(n+\phi)/(n+1)\phi+1 = 1/\phi \quad (2)$$

where ϕ is the GR and n is natural number.

The Kolmogorov-Smirnov test revealed no significant difference between empirical distributions and approximations under all the experimental conditions (the least $p = 0.996$)(Figure 1). All the approximations are based exclusively on the properties (1) and (2) and share common features. These results suggest existence of some common mechanism employed by human beings in the case of Blind Choice. Furthermore, the approximations of empirical data characterize this mechanism to produce GR-based frequencies. Therefore, we suggest that the GR and its numerical properties are contained in IPK. This explains frequent appearance of the GR in various cognitive processes (Fechner, 1876; Lefebvre, 2006).

Furthermore, we contribute a dynamical nature of the IPK: our results have been recently developed into the model of Human Blind Choice based on numerical properties of GR mixed with Chaos (Tarasenko et al, 2007).

References

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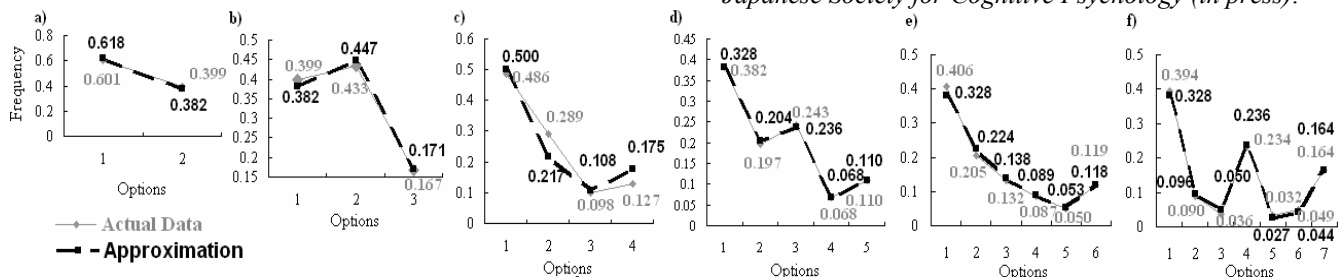


Figure 1: Empirical data and GR-based approximation