CHAIN ROCESSES IN THE INTUITIVE PROBLEM-SOLVING

Rubtsova N.A., Komissarov G.G
Semenov Institute of Chemical Physics
Russia, 11991, Moscow, ul. Kosygina,4
Tel. (495)939 72 00
E-mail: nroubtsova@yandex.ru ; gcomiss@yandex.ru

The phenomena of intuitive thinking, in particular, the insight problem-solving, are broadly known, so it is worth trying to model them with help of N. Semenov's chain chemical reaction theory [1].

Having considered the specific features of the work of mind in the process of special insight problem-solving, known from cognitive psychology, we noticed a lot of similarity between the dynamics of decision process and the kinetics of the chemical chain reactions. These are: the presence of an induction period (incubation), steep hikes in the pace of the process (e.g. anagram solving), its explosion-like acceleration by small inputs (of information), and the possibility of autonomous progress (sleep inspires insight).

In order to describe the dynamics of information circulation in the process of thinking, let us use the Minsky's Frames conception [2]. Frame is the minimal unit of information which the brain uses as part of resolving a specific problem or situation. The frames can merge, thus producing news ones. Earlier, we explored the frames' diffusion in the process of computational modeling of intuitive quest. [3].

If one considers the movement of frames as chemical chain reaction within the limited span of human attention, one can use the mathematical approach developed in N. Semenov's chain chemical reaction theory to describe intuitive problem-solving process as the proliferation of the frames' chains. Under certain conditions, an explosion-like proliferation of the number of frames may occur – the situation where one feels like it suddenly dawned upon him.

We have found that the known experimental data that suggest the facilitation of insight problem-solving by positive affect [4] agree with our conclusion regarding the possibility of multiplication of frames being triggered by broadening of the attention span, which is similar to chain ignition reaction.

So, in our opinion, the theory of chain chemical reactions can be applied to the modeling of cognitive processes.

References.

1. *Семенов Н.Н*. Избранные труды, т.1, кн.1. – М.: Наука, 2004. 393 стр.
2. *Минский М*. Фреймы для представления знаний. – М.: Энергия, 1979. 152 стр.
3. *Комиссаров Г.Г. Петренко Ю.М. Авакянц Г.С. Рубцова Н.А*. Компьютерное моделирование интуитивного поиска. Труды XX международной научной конференции «Математические методы в технике и технологиях». Ярославль, 2007. Стр. 253-256.
4. *Subramaniam K., Konios J., Parrish T.B., Jung-Beeman M.* A Brain Mechanism for Facilitation of Insight by Positive Affect//Journal of Cognitive Neuroscience, **Vol. 21**, № 3, 2009. P. 541-547.