

ABSTRACTS

Albert-László Barabási

■ ***What You Can Do Today, You Will Do Tomorrow, Too: Is the Dynamics of Human Behaviour Predictable?***

Keywords: *human behaviour, predictability, decision, mobile phones, viruses*

We are generally happy to accept that the orbit of a planet can be precisely predicted, or that we can have more and more accurate forecasts of the weather. But we seldom study human behaviour with a similar approach. Every day we take many decisions according to our wish and whim, which makes us think that there is no more unpredictable test subject than a human being. This paper tells us about a research project which studied the behavioural patterns of millions of anonymous mobile phone users, only to prove this concept wrong. Although our memories are dominated by diversions from our daily routine, measurements indicate that human movements can be predicted with 93% accuracy. The paper also tells us about the root of this predictability and what its practical implications are – from the estimations of the spread of viruses to understanding mobile phone viruses.

Péter Csermely

■ ***Answers for the Crisis: What Kind of Behaviours Are Spreading in a System Which Is in Major Crisis?***

Keywords: *crisis, human behaviour, group behaviour, complex systems*

It seems that the first part of the 21st century will remain in history as a period which could be characterized as ruled by disintegrated balances and unexpected events. The paper presents those behavioural forms which can be considered as answers of those members and groups which constitute different kind of complex systems.

István Krizbai – Imola Wilhelm

■ ***Intercellular Communication Pathways***

Keywords: *biology, communication, cells, neurons, signalling molecules, hormones*

Cells communicate with each other through three different pathways: direct physical contact, chemical molecules and via electrical signals. This latter is characteristic to neurons. Direct intercellular contacts are responsible not only for submitting information among the cells, but also form an interface separating them. Tight junctions are the tightest intercellular connections characteristic primarily to epithelial cells. Adherens junctions and

desmosomes also have the principal role of separating the cells, while gap junctions make possible the transfer of signalling molecules between two cells by interconnecting their cytoplasm. Communication via signalling molecules is a very effective type of intercellular information supply. In this respect cells can send signals to their own receptors (autocrine signalling), to cells coming in direct contact with them (juxtacrine signalling) and over short or large distances (paracrine and endocrine signalling, respectively). The most important endocrine signalling molecules are the hormones.

László A. Magyar

■ ***Sámuel Köleséri Jr., the Physician***

Keywords: *Sámuel Köleséri Jr., physician, Transylvania, medical oeuvre, Leopoldina Academy, British Royal Society*

Sámuel Köleséri Jr. (1663-1732) is a pivotal figure in Transylvanian cultural history. His activities covered various fields of science including theology, natural philosophy, philology, linguistics, geology, mineralogy, archaeology or medicine. Being a protestant, he took his doctor's diploma both in theology and philosophy in the Low Countries. After returning home he had a splendid career, first as the physician of Nagyszeben/Sibiu, then as the first chief medical officer of Transylvania and at last as the mighty secretary of the Transylvanian imperial government. He was elected to member of the Leopoldina Academy and the British Royal Society as well. The study analyses the medical activities of Köleséri, evaluates his medical books, articles and other writings, and concludes that although Köleséri was an eminent and renowned healer, and his public health activity proved to be up to date, he did not have any formal medical education at all. In addition Köleséri's medical oeuvre wasn't so valuable as his achievements were in other natural sciences.

Dénes Máthé

■ ***The Semiotics of Human Communication***

Keywords: *semiotics, textology, significans, significatum, S. János Petőfi*

In this interview S. J. Petőfi – a world-wide known scholar in semiotics – is asked some questions in the field of semiotic textology. In S. J. Petőfi's model text is considered to be a complex sign with two basic components: significans and significatum. Significans is structured into vehiculum (the physical component of the text), vehiculum-imago and formatio. The main parts of

significatum are: *sensus designatus*, *sensus referens*, *relatum-imago* and *relatum* (the 'object' referred by the text).

Stephen J. Rosetti

■ ***Learning from Our Mistakes: Responding Effectively to Child Sexual Abusers***

Keywords: *sexual abuse, Catholic Church, paedophilia, addiction, rehabilitation*

In his talk presented at the Bishops' symposium organised at the Pontifical Gregorian University in Rome (Feb 6-9), Monsignor Stephen J. Rosetti – who, for a decade, ran a U.S. treatment centre for abusive priests – gives a summary of common mistakes church leaders have done in responding to allegations of sexual child abuse committed by clerics, attaching constructive recommendations to each mistake. Perpetrators, just like alcohol or drug addicts, often lie about their crimes, says the author, and church leaders should cooperate with civil authorities in dealing with such crimes. Listening to the victims should be top priority for Church leaders.

Imola Wilhelm – István Krizbai

■ ***Molecular Hotlines: Intracellular Signal Transduction Pathways***

Keywords: *biology, communication, cells, receptors, ligands, signaling pathway*

The proper functioning of multicellular organisms depends on the coordinated action of individual cells. Therefore, cells need to constantly communicate without disturbing each other. This is achieved by secretion of signaling molecules, which are sensed by the target cells through specific receptors. After binding their corresponding signaling molecules (called ligands), receptors change their three-dimensional shape, i.e. get activated. In the case of intracellular receptors, the activated receptor-ligand complexes act directly in the nucleus by augmenting or suppressing transcription of particular genes. However, the majority of

signaling molecules released by signal sending cells cannot enter the target cells; therefore, most of the receptors are embedded in the cell membrane. The intracellular domains of these receptors activate the so-called second messengers, which transmit the signal inside the cell. The cellular response is usually the result of the activation of a specific intracellular signaling pathway. Here we discuss the molecular components of the most important signaling pathways emphasizing some aspects of their physiological and pathological functioning.

József Toldi

■ ***Communication Among Neurons***

Keywords: *biology, communication, cells, neurons, neural regulation, axon*

Chemical communication of cells has resulted in the development of two types of regulatory systems, the humoral and the neural regulation. Neural regulation is performed by the nervous system, and is essentially faster than humoral regulation. Neurons have long protrusions called axons, which transport the information from the cell body to the axon terminal. The high speed of this process (which can reach 100-120 m/s) is achieved by sequences of action potentials. When action potentials reach the axon, terminal neurotransmitters are released into the synaptic cleft and reach the receptors of postsynaptic cells. Although the information pathway is unidirectional (from the presynaptic to the postsynaptic cell), presynaptic cells receive feedback from postsynaptic cells, which is important for the maintenance of the synaptic connection (keep in touch). It is also important to note that synaptic transmissions are continuously changing (disappearing and reforming) depending on need and activity – this is called synaptic plasticity, which has a basic role in learning and memory.

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Támogatók



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„Miért hasznosak ezek a kutatások? Az emberi jóslhatóságnak és a mozgás megértésének számtalan alkalmazása lehetséges. Ezek közül én csak egyet mutatok be: a vírusos betegségek terjedésének problémáját. Gondoljunk a H1N1 vírusra. Tudjuk, hogy bár nagy hírverés övezte, és nagyon ijesztőnek tűnt, szerencsére végül elég gyenge vírusnak bizonyult – legalábbis abból a szempontból, hogy kevesebb haláleset tulajdonítható neki, mint egy tipikus influenzának. Kevesen tudják azonban, hogy ez volt az első olyan járvány, amelyet rendkívüli pontossággal lehetett jóslni. [...] Az ilyen előrejelzéseknek azért nagy a jelentősége, mert ha megjelenne egy olyan vírus, amely sokkal veszélyesebb, mint a H1N1, sőt akár halálos fenyegetést is jelenthet, akkor a vírusok manapság tapasztalható terjedési sebességét figyelembe véve reménytelen lenne védőoltásokkal vagy valamilyen orvossággal megállítani. Egyszerűen nem volna rá idő, hiszen egy vakcina kifejlesztése hónapokba, évekbe telhet. A társadalom egyedüli esélye az volna, ha megállítja a járványt. Ehhez pedig nagyon pontosan meg kell jóslni, hogyan fog terjedni, és ki kell találni, hogy mely intézkedések lehetnek eredményesek és melyek nem. [...] Tehát a döntéshozás szempontjából rendkívül fontos, hogy megértsük a vírusok terjedését. Ez manapság már tudományos precizitással jelezhető előre.”

(Barabási Albert-László)

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