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Annals of Psychiatry and Mental Health

Review Article

Psychology in Practice

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Submitted: 16 November 2018

Accepted: 11 December 2018

Published: 12 December 2018

ISSN: 2374-0124

OPEN ACCESS

Keywords
- Psychology
- Fatty acids
- Cell membranes
- Phenotype

Abstract

Fatty acids have this characteristic that they carry chemical and physical information. The former has received most if not all the scientific attention so far, most probably because the chemical part is tangible. The hydrocarbon moiety of fatty acids is hydrophobic by nature, therefore insoluble in water. When attached to a phosphate group though, they produce phospholipids which have a natural tendency to self-assemble into cell membranes, the substrate of all biological life on Earth. When in cell membranes, they are involved in all kinds of chemical reactions which transform them into as many intra- and extra-cellular communicators, mediators and regulators. Those "body" metabolic aspects of fatty acids have been reviewed extensively and intensively over the past 10-15 years. Eventually, business vehicles such as the Columbus Concept were developed and established to take Science to Market.

No matter how important fatty acids chemistry is though, it goes without saying that their origin, ie their natural selection, has to do with physics and their inherent ability to capture time/space-related information (chronomes) from the cosmos. The allylic double bond of evolutionary selected unsaturated fatty acids has indeed all that it takes to record time-structure cyclicity of each and all relevant events biological life is submitted to on Earth, all the way up from the inception of RNA, DNA, protein, lipids and carbohydrates, to their assemblage into complex life system as we know today.

But, just as it wasn't enough, fatty acids in cell membranes appear as the ideal candidate for the long looked-for substrate of the "mind", ie the yet un-encoded physical information which, as a matter of fact, determine Behavior.

INTRODUCTION

If practical psychologists were in search of a tangible substrate, well here they are. Red blood cells (RBCs) account for some 25% of all body cells, they constantly commute between heart and brain, head to and retrieve from lungs and peripheral tissues for oxygen/carbon dioxide exchange. They carry no genetic information yet they carry environmental ones and it is the latter which in fine determine genetic expression and behavior, *ie* the phenotype. The environmental information is by definition variable and is constantly captured by body sensors. Capturing is one thing. Processing in another. One may well hear, see, smell, taste, feel something without paying attention to the meaning of – not even mentioning analyzing – the captured information. Processing information is a conscious, cognitive, energy-demanding action on its own. For such process to happen, the information must be first translated/sequenced into manageable inform ions (tytes) at molecular level which then can be transported to the brain and back to the heart and peripheral tissues. The allylic double bond of cell membrane fatty acids is an ideal vector for carrying informs ions because it allows for discrete units of electronic information to be stored transiently, retrieved and processed within cell membranes [1].

Cell membranes are double leaflet layers of lecithin (phospholipids, cholesterol, xanthophylls) which may eventually accommodate species specific biologically relevant proteins, the latter accounting for the antigens which may also exhibit some degree of variance within species. The lecithin part on the other hand is very constant within and across species of the same phyla. It is like the environmental information has a unique carrier (cell membrane fatty acids) in very much the same way as the genetic information uses a unique strand of DNA (deoxyribonucleic acids). Say otherwise, cell membranes are to the mind what DNA is to the body and the two interact to create, organize and manage life as a biological process. In that sense, the term bIT (biological information technology) applies fully to life species (Figure 1).

Cell membrane (http://cellbiology.med.unsw.edu.au/units/images/Cell_membrane.png). Deoxyribonucleic acid (http://library.thinkquest.org/C004535/cell_membranes.html).

Mind building

The first mind component to be built is the random access memory (RAM). It lies within the heart, imprinted in special frozen lipid networks or rafts, and accounts for the black box of the mind. The information there is simple and referred to as Boolean gates, *ie* type of yes/no rules, which the mind is submitted to for

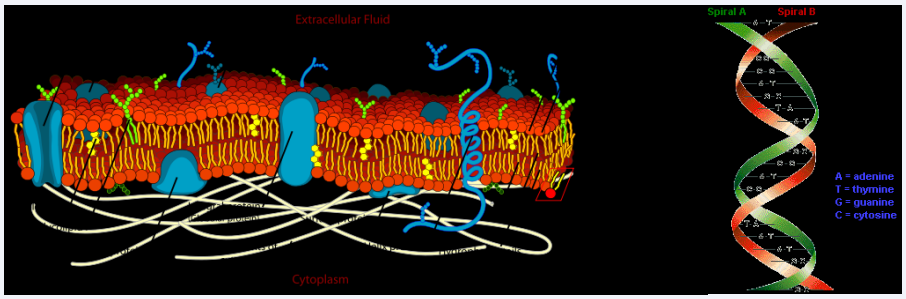

Figure 1 Memes and genes shown here as their evolved repeatable and rhythmical basic elements, ie cell membranes and deoxyribonucleic acid. An illustration of the memes/genes interaction is provided by the visible light-sensitive retino-hypothalamic tract to the suprachiasmatic nuclei, allowing for synchronization of circadian rhythms in cells of complex organisms.

an entire lifetime. These are deeply imprinted during the early stages of life development, mainly as emotional instruction or, better say, in association with deep/strong emotions: They shape the *forgotten* memory, a kind of filter which all new information will be submitted to over the entire life time. It is the critical brainwash, part of each and all educational environment. Time has come to address and perhaps to better control it for the sake of Humanity. A Code of Conduct may need to be developed to the attention of pretending parents/educators.

The second mind component is cognitive and comes with the brain, mainly astrocytes as microprocessors or CPUs and the random operating memory (ROM) carried out by circulating/commuting RBCs. The ROM is then eventually processed within the brain while systematically being sieved throughout the heart. Behavior – the expression of the circulating ROM/RBCs – represents a balancing act between brain (cognition) and heart (emotion) related information. The capacity of each and all individual to control one's behavior is related to one's brain capacity (cognition) to take control of one's heart (emotion). Cartesian decision *vs* gut feeling as it usually is referred to, Homo *modestis vs* Homo *sapiens*. Hero *vs* Evil, potentially (Figure 2).

Red blood cells (RBCs) sweeping along the internal surface of the blood brain barrier (BBB) micro-vessels exchange oxygen/carbon dioxide and environmental/cognitive inform ions with brain cells (astrocytes) receptors lining their external surface. Heading to the heart, brain concepts will be submitted to a sieving process ruled by an established/imprinted Boolean gates network before being distributed all over peripheral tissues. Post-delivery, RBCs will return peripheral tissue inform ions back to the heart and brain and the process will repeat itself again and again in a kind of cardio/cerebro-vascular loop very similar to that undertaken by serum lipoproteins: the mind vs the body. The ARA.EPA~1:1 ratio (Columbus Concept) is a critical condition to maintain tissue homeostatis thereby avoiding chronic inflammation and chronic degenerative diseases, incl atherosclerosis (blood micro-vessels constriction). DHA-PS/PL: sn-2 docosahexaenoic acid bearing phosphatidyl serine/phospholipids (phosphatidyl choline & ethanolamine); UA: uric acid; LA-CL: linoleic acid bearing cardiolipids; BG: Boolean gates. Uric acid is used as a spin trap to allow for inform ions (i) to translocate from external DHA-PL to internal DHA-PS and vice versa for cellular processing and exchange, respectively.

Mind → Body Instruction

In tissues, cell membranes extend as organelles from the outside to the inside of the cells. In particular, the endoplasmic reticulum is a large double leaflet membrane scaffolding that surrounds the cell nucleus in an antenna-like manner allowing for physical information (mind/electron spins) to interact directly/closely with the chemical information (body/genes) and thereby influencing gene transcription/translation and in fine behavior. The detailed mechanism of this mind → body communication is yet to be discovered, but one cannot miss the parallel between the possible electronic spin configurations of the allylic double bond in cell membrane fatty acids (-1,0-+1) and the electronic pairing of nucleic acids in DNA (A-T & G-C). In both cases, the electronic environment allows for both data processing and reproduction/re-editing on the one hand, for environment/mind–genes/body interaction. In contrast, non-reproducing robots are binary (0,1) instructed and are entirely faithful to their program, no matter the environment. A robot is by definition mindless or, better say, fixed mind-wise, *ie* predictable behavior (Figure 3).

bIT or biological Information Technology

In animal species, allylic double bond-containing cell membrane fatty acids are mainly four, ie linoleic (LA; C18:2w6), arachidonic (AA; C20:4w6), eicosapentaenoic (EPA; 20:5w3) and docosahexaenoic (DHA; C22:6w3) acids. For bIT, LA is used for Boolean gates, AA and EPA are used in inter-personal communications, and DHA is used in conceptualization.

AA has 40 possible spin configurations, in close agreement with the number of basic one-phoneme sounds languages are made of. EPA has 121 possible spin configurations, again in close agreement with the number of written characters languages are made of. DHA has 365 possible spin configurations, allowing for pretty much all possible combinations of two-phoneme basic sounds (syllables) to be assembled; those basic sounds can then be further assembled in meaningful words, phrases and concepts, in the brain prior to be sieved off through imprinted Boolean gates in the heart. The brain-heart connection through circulating red blood cells, *ie* the mind, determines the phenotype, *ie* behavior, in animal species, more so in humans. And just as genes are made of four nucleic acids, memes are made of four fatty acids, *ie* the four chemical imprinted information (A,T,C,G) have their four corresponding physical environmental information (LA,AA,

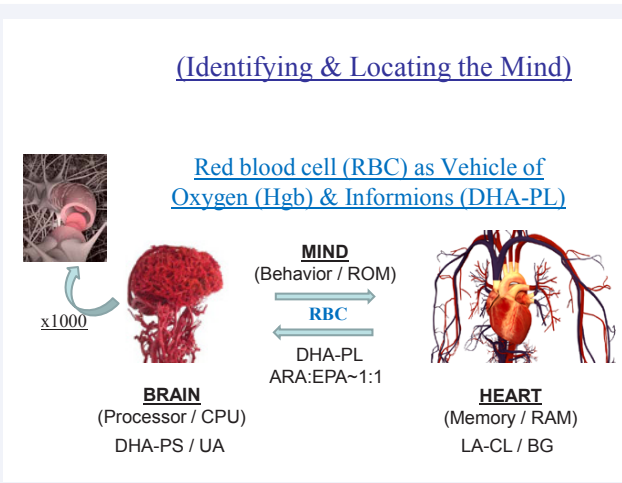

Figure 2 From body(Columbus) to Mind(Copernicus) Concepts.

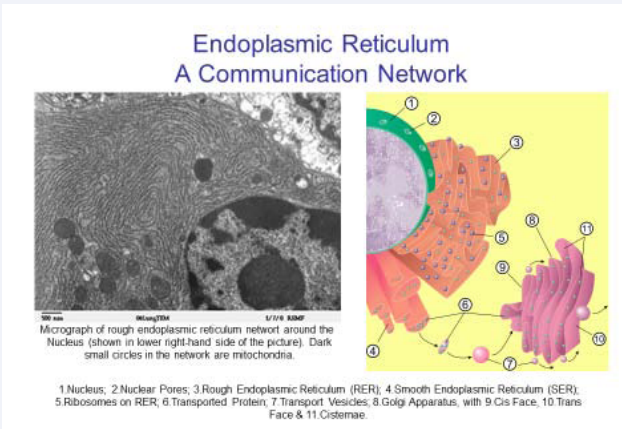

Figure 3 Endoplasmic Reticulum A communication network.

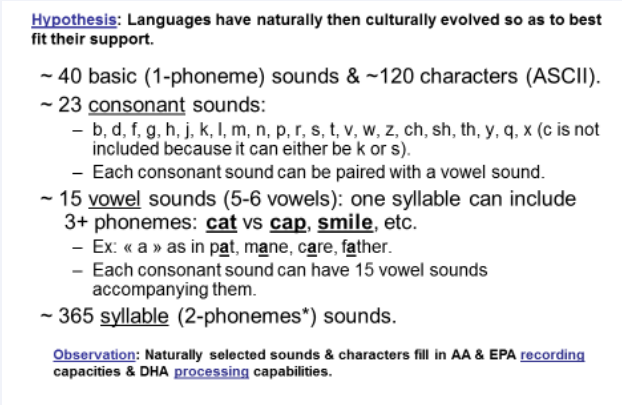

Figure 4 English as a modern language.

EPA,DHA) in animal species, at the nucleus and cell membrane levels, respectively (Figure 4).

Psychological meaning

The earliest stage of life development of the child – most probably starting in the womb – sets the Boolean gates in heart lipid rafts, *ie* the imprinted rules which will serve as information sieve for a lifetime. Later developing brain cognition will have the capacity to alter the sieving process result, but such correction will always require energy, effort, will and, inevitably, search for compensation, *eg* wolfing on food, sex, narcotics, and the like. There must be a way to standardize those rules at large – a sort of Code of Conduct for pretending parents – to avoid too much suffering later in life. At the end of the day, if the rule of law applies to all and all-doings in life, then why it would not apply to life reproduction and education/instruction in the first place?

In the meantime, understanding how memes dialog with genes and vice versa in determining the phenotype, *ie* behavior at cellular level, will probably help a long way at addressing, understanding and acting on psychological disorders (Figure 5).

- It is the phenotype, expression vector or individual, which is submitted to selection, ie natural (time-space) and cultural (society).
- Biological information technology refers to data processing (capture, storage, retrieval, assembling) at mind (memes / psychophysics) and body (genes / biochemistry) levels of the phenotype.
- Fatty acids in cell membranes are to memes what nucleic acids in cell nuclei are to genes, ie biological sets of information.

Medical ethic

Blood transfusions save life, body-wise. One cannot ignore though that they blindly transfer mind/memes from one subject (or multiple subjects) to another. Blood transfusion = mind transfer. It is no surprise that transfused subjects lose their mind for some time, the extent of which depending on the cognitive capacity/ status of the subject. Changing mind is a cognitive process. It is transient, by definition. It stands as long as cognition proceeds/controls. As a corollary, dreams and nightmares are instructive of what a person' state of mind is at rest, when unconscious, and as such are harbingers of psycho-somatic disturbances and diseases.

Scanning and reading inform ions in someone's blood and heart is reading someone's state of mind at a point in time (ROM)

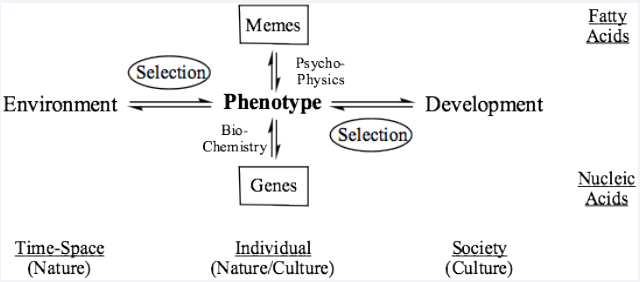

Figure 5 Genes / Memes type phenotype: Individual phenotype (behavior) reflects the expression of memes and genes, which themselves influence each other. Cultural selection squeezes out the winning pattern.

on the one hand, black box deep imprinted memory (RAM) on the other hand. It might contribute improvements to security screenings, coaching, and therapies.

ACKNOWLEDGMENT

Love does not know sex. Perhaps a better understanding/imprinting of such basic rule is at reach. Psychologists could make it happen. It is a tangible substrate away, *ie* red blood cells (RBCs). With this, I wish to thank Dr Agnieszka Wilczynska for her company over the past years, helping me sorting out body-type chemistry from mind-type physics. I have not become a psychologist – by no means – but I think I have become a better physico-chemist.

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1. De Meester F. From Columbus to TsimTsoum Concepts: A Kyoto-Type Approach. In: Omega-6/3 Fatty Acids: Functions, Sustainable Strategies and Perspectives (Meester F, Watson RR, Zibadi S, eds) Humana Press, Springer Science+Business Media New York. 2013; 397-416.

Cite this article

De Meester F (2018) Psychology in Practice. Ann Psychiatry Ment Health 6(3): 1135.