

“There is no practical value in learning biology in my life.” _____
 _____ do you _____ statement? You _____
 _____ the _____ this _____ that
 _____ biology with history, philosophy, _____, and so on. _____
 arts, such as social science and _____ science, may seem to lack
 _____ and nothing _____.
 You might rather want to learn _____ for climbing up the _____
 or visualizing your way to being rich. _____
 _____ than books of the _____ - _____, learning liberal arts
 can actually provide profound insights into humans and society that will
 support _____ life. For example, the knowledge of life
 science _____ insights into human nature and society,
 _____ you challenge the traditional idea about organizational management,
 and _____ and _____. What kind of
 lessons can we _____ from life science?

“There is no practical value in learning biology in my life.” To what extent do you
agree with this statement? You might have heard the slightly different versions of
this assertion that replace biology with history, philosophy, classics, and so on.
Liberal arts, such as social science and natural science, may seem to lack pragmatic
utility and nothing more than intellectual entertainment. You might rather want to
 learn tips for climbing up the career ladder or visualizing your way to being rich.
Although it may seem less straightforward than books of the self-help genre,
 learning liberal arts can actually provide profound insights into humans and society
 that will support and enrich your life. For example, the knowledge of life science
will deepen our insights into human nature and society, help you challenge the
 traditional idea about organizational management, and bring about essential
humility and maturity. What kind of lessons can we draw from life science?

profound	深い	organizational	組織に関する
insight	洞察	humility	謙虚
liberal arts	人文科学	maturity	成熟
pragmatic	実用的な	self-help	自助
intellectual	知的な		

The _____ of organizational management is probably _____ and control. It is a _____ system _____ upper managers are _____ making decisions and taking responsibility for their decisions, and _____ follow these commands and _____. Today, many companies _____ this concept, but they don't necessarily have to work this way. Learning life science _____ another possibility of how organizations function. In fact, some of the _____ business leaders use the _____ of a living organism or an _____ talk about their organization. For example, our bodies _____ 40 trillion cells that are working _____ but _____. The Human brain has 100 billion neurons, but there is no "president" neuron that directs and controls the function of other neurons. When we _____ someone speak, neurons of the _____ cortex _____ start working. It doesn't receive a _____ the _____ cortex _____ have a discussion with the _____ to _____ a consensus. Likewise, some companies thrive without top-down management. Any member in these organizations, regardless of their position, is _____ to make decisions by themselves _____ it's necessary, as long as they _____ people _____ and people who will be _____ by the decision. Companies like Buurtzorg and Morning Star have successfully operated this way _____ their _____ more than a thousand employees.

The common typical image of organizational management is probably command and control. It is a hierarchical system where upper managers are in charge of making decisions and taking responsibility for their decisions, and subordinates follow these commands and execute them. Today, many companies adopt this concept, but they don't necessarily have to work this way. Learning life science suggests another possibility of how organizations function. In fact, some of the innovative business leaders use the metaphor of a living organism or an ecosystem when they talk about their organization. For example, our bodies consist of about 40 trillion cells that are working collaboratively but autonomously without any central command. The Human brain has 100 billion neurons, but there is no "president" neuron that directs and controls the function of other neurons. When we hear someone speak, neurons of the auditory cortex automatically start working. It doesn't receive a command from the prefrontal cortex nor have a discussion with the amygdala to form a consensus. Likewise, some companies thrive without top-down management. Any member in these organizations, regardless of their position, is empowered to make decisions by themselves when they feel it's necessary, as long as they seek advice from people with expertise and people who will be impacted by the decision. Companies like Buurtzorg and Morning Star have successfully operated this way despite their scale of more than a thousand employees.

hierarchical	階層的な	autonomously	自律的に
subordinate	部下	neuron	ニューロン、神経細胞
metaphor	隠喩	cortex	皮質
ecosystem	生態系	consensus	合意
collaborative	協力的な	empower	権限を与える

There is an _____ famous book called “The Selfish Gene” _____ by the biologist Richard Dawkins in 1976. The title of the book is _____, _____ an impression that living organisms are _____ selfish and egoistic. But we often _____. He _____ genes that are selfish, not individual creatures. If we take a closer look, _____ that acts of _____ altruism of the individuals are actually selfishness of the gene _____. In other words, altruistic behavior by an individual for the benefit of the community sometimes _____ the interests of genes. _____ example of the _____ behavior of worker bees. This is an effective defense against _____, but they are like kamikaze fighters. They _____ the act of stinging. This suicide act _____ altruistic on an individual level, _____ actually beneficial for the genes. A social insect colony is a huge family, usually all _____ the same mother, and all bees in the same colony _____ a similar _____ genes. If the act of self-sacrifice benefits the other members of the colony, it makes sense _____ and _____ of the genes. Altruism within a group often _____ selfishness between groups. Genes might be _____ selfish, but _____, individuals can _____ altruism because of the selfishness of genes.

There is an exceptionally famous book called “The Selfish Gene” written by the biologist Richard Dawkins in 1976. The title of the book is somewhat misleading, giving us an impression that living organisms are inevitably selfish and egoistic. But we often get him wrong. He meant that it is genes that are selfish, not individual creatures. If we take a closer look, it often turns out that acts of apparent altruism of the individuals are actually selfishness of the gene in disguise. In other words, altruistic behavior by an individual for the benefit of the community sometimes coincides with the interests of genes. Take an example of the stinging behavior of worker bees. This is an effective defense against honey robbers, but they are like kamikaze fighters. They die soon after the act of stinging. This suicide act appears altruistic on an individual level, but it is actually beneficial for the genes. A social insect colony is a huge family, usually all descended from the same mother, and all bees in the same colony share a similar set of genes. If the act of self-sacrifice benefits the other members of the colony, it makes sense in terms of survival and propagation of the genes. Altruism within a group often goes with selfishness between groups. Genes might be inherently selfish, but paradoxically, individuals can exhibit altruism because of the selfishness of genes.

misleading	誤解を招く	stinging	刺す
egoistic	利己的な	altruistic	利他的な
altruism	利他主義	propagation	繁殖
disguise	変装	paradoxically	逆説的に
coincide	一致する		

Pragmatic Life Science #4

We Homo sapiens are quite interesting animals _____ altruism. A number of studies on psychology and _____ economics have demonstrated that we often _____ personal economic rationality and _____ other's interests. This is probably because humankind is a species _____ survived and _____ by trusting and cooperating with each other. Biologically speaking, there is nothing particularly special about our bodies and brains. We are genetically very similar to our _____ relatives, chimpanzees and bonobos. _____ larger brains and bodies than Homo sapiens, and _____ speculate that they were _____ to us in both physical and _____ abilities. However, chimpanzees are _____ in zoos and _____ became _____ while Homo sapiens _____ prosperity. This is because of the simple fact that we can cooperate more effectively than other species. Our ancestors effectively cooperated to hunt large _____ that any individual hunter could never _____. _____ everyone making both _____ and _____ only for themselves, people _____ in making either bows or spears and exchanged them, _____ each of them saved time. The same is true today. We are all _____ the _____ network of _____, and nobody can _____. _____ Homo sapiens is trust and cooperation. We _____ and _____ by trusting each other, sharing skills and knowledge with each other, and contributing to each other. Thus, it is no wonder that we are genetically _____. We feel happy _____ others. We get motivated and _____ our job when we _____ for society. We become even physically _____ good relationships. You will _____ come to realize that only _____ your own success or well-being never brings about happiness in the _____. This is not _____, but biological reality.

We Homo sapiens are quite interesting animals in terms of altruism. A number of studies on psychology and behavioral economics have demonstrated that we often disregard our personal economic rationality and behave in favor of other's interests. This is probably because humankind is a species that have survived and thrived by trusting and cooperating with each other. Biologically speaking, there is nothing particularly special about our bodies and brains. We are genetically very similar to our closest relatives, chimpanzees and bonobos. Neanderthals possessed larger brains and bodies than Homo sapiens, and researchers speculate that they were superior to us in both physical and cognitive abilities. However, chimpanzees are locked up in zoos and Neanderthals became extinct while Homo sapiens enjoy unprecedented prosperity. This is because of the simple fact that we can cooperate more effectively than other species. Our ancestors effectively cooperated to hunt large mammals that any individual hunter could never bring down. Instead of everyone making both bows and spears only for themselves, people specialized in making either bows or spears and exchanged them, thereby each of them saved time. The same is true today. We are all dependent on the enormous network of cooperation, and nobody can live alone. What defines Homo sapiens is trust and cooperation. We have survived and thrived by trusting each other, sharing skills and knowledge with each other, and contributing to each other. Thus, it is no wonder that we are genetically hardwired to be social. We feel happy when we receive gratitude from others. We get motivated and engaged in our job when we find its significance for society. We become even physically healthier when we have good relationships. You will inevitably come to realize that only caring about your own success or well-being never brings about happiness in the truest sense. This is not sentimental idealism, but biological reality.

behavioral economics	行動経済学	unprecedented	前例のない
rationality	合理性	specialize	専門化する
thrive	繁栄する	cooperation	協力
genetically	遺伝的に	sentimental	感傷的な
Neanderthal	ネアンデルタール人	idealism	理想主義
cognitive	認知の		

Pragmatic Life Science #5

There is a famous phrase that says, “nice guys finish last,” which means that those who behave _____ and _____ will _____. _____? We can _____ this proposition from a biological perspective. An American political scientist Robert Axelrod used the famous “Prisoner’s _____” as a _____, and he simulated on computers the _____ of individuals taking various _____ behaviors. In his simulation, when two individuals cooperate with each other, the both can benefit _____ well. When one intends to cooperate but the other betrays, the betrayer enormously benefits and the other loses out. When the two betray each other, both of them _____. Each individual _____ a number of _____ in the next generation _____ to the size of the _____ benefits. After a thousand generations of reproductive competitions, what type of behavior thrives and becomes _____ within the group? He _____ the simulation several times, and in most cases, _____ succeeded the most was the strategy named “Tit for Tat,” in which individuals generally behave _____ but can betray in _____ only _____ betrayed. As the generation _____, nasty betrayers disappeared from the group and nice cooperative individuals became _____. Some of the nasty strategies _____ for a _____. When the group was already dominated by selfish individuals, other strategies were exploited and struggled to _____. But their prosperity was usually _____ - _____. In evolutionary _____, a successful strategy is one that has become the majority in the _____, and for a strategy to _____ successful, it has to do well _____ the majority. Selfish strategies _____ be the dominant one, but they often _____ because they cannot benefit _____ gathering and cooperating. _____ in this simulation, nice guys finish first.

There is a famous phrase that says, “nice guys finish last,” which means that those who behave kindly and trustfully will lose out in the end. But will they really? We can examine this proposition from a biological perspective. An American political scientist Robert Axelrod used the famous “Prisoner’s Dilemma” as a basis with some modifications, and he simulated on computers the reproductive competition of individuals taking various cooperative behaviors. In his simulation, when two individuals cooperate with each other, the both can benefit pretty well. When one intends to cooperate but the other betrays, the betrayer enormously benefits and the other loses out. When the two betray each other, both of them lose out a little. Each individual leaves a number of offspring in the next generation that is proportional to the size of the acquired benefits. After a thousand generations of reproductive competitions, what type of behavior thrives and becomes dominant within the group? He ran the simulation several times, and in most cases, what succeeded the most was the strategy named “Tit for Tat,” in which individuals generally behave cooperatively but can betray in retaliation only when they are betrayed. As the generation proceeded, nasty betrayers disappeared from the group and nice cooperative individuals became dominant. Some of the nasty strategies thrived for a while. When the group was already dominated by selfish individuals, other strategies were exploited and struggled to flourish. But their prosperity was usually short-lived. In evolutionary terms, a successful strategy is one that has become the majority in the cluster, and for a strategy to remain successful, it has to do well specifically when it is the majority. Selfish strategies can occasionally be the dominant one, but they often fail to persist because they cannot benefit from gathering and cooperating. At least in this simulation, nice guys finish first.

proposition	提案	dominant	支配的な
reproductive	生殖の	exploit	利用する
simulation	シミュレーション	flourish	栄える
betray	裏切る	evolutionary	進化の
retaliation	報復	persist	持続する