

Consilience: The Unity of Knowledge Study Guide

Consilience: The Unity of Knowledge by E. O. Wilson

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Plot Summary

Wilson develops the idea of unified learning when gaining insight into nature during his science studies. His view of the classification of species as connected with evolution is influenced by Linnaeus, who classifies animals and species into groups, families, orders and kingdoms. This ordering reminds one of the way armies are organized with platoons, armed services heading armies, and with chiefs of staff at the top.

Wilson analyzes various branches of learning, where the unification can be proved as justified and needed. The idea stems from early scientific ideas that are part of the philosophy of the Enchantment, a belief that science follows certain order while its laws are applicable in other branches. Thales of Miletus regards water as part of all matter, representing in this way a symbol of unity.

The unification of knowledge is confirmed by the material world while it is also the only choice to overcome problems that the industrialized world faces as it struggles with poverty. The unity of knowledge is the basis for learning as well as making government decisions.

Sparked by the Enlightenment, the unity of knowledge emerges as part of philosophical thought that is to foster human rights through knowledge. The knowledge that is united through rules applicable to more than just one area is based on the idea that physical laws can be applicable to other areas as well. Science and analysis leads to reasoning and seeking objective truth. Condorcet, Descartes, and Bacon develop philosophical thinking, where empirical evidence gains importance as part of discovery. Descartes uses deduction and analysis when examining each phenomenon. For him knowledge is a system of truths applicable also in mathematics. Another way to obtain knowledge is through systematic doubts. He proposes reductionism, where concepts are analyzed through separating elements that are then further analyzed in the same way. This concept stimulates the future direction of scientific research.

Scientific pursuit is based on principles of objective truth, experiments, and evidence. It consists of patches of experiments that fit hypotheses. It should be based on real truth, using various methods of research as well as various hypotheses. Science uses fundamentals that are substantial and a variety of research methods that can benefit the future. Biological sciences especially offer discoveries that expose the power of human intellect.

The complexity of the human brain represents the most challenging scientific endeavor. Its evolutionary nature involving consciousness and subconsciousness surpasses animal abilities in its propensity to analyze and use free will. It is the most complex system known in the universe which humans have failed to reproduce so far.

Genes play an important role in our evolution. They determine our behavior and the way we develop along with our culture, including our avoidance of incest.

Although artistic abilities fail to be identified by scientists, they stem from our natural environment. At first they manage to create certain order in the chaotic world. Later, common elements evolve along with our natural selection, such as myths.

One of the most important branches of learning is ethics that incorporate biology, culture, and instincts. Although a more objective analysis is needed in this area it determines the way we approach our world and the environment, deciding, ultimately, our future. All areas of learning benefit through consilience. Human evolution changes the world allowing for the volitional evolution to the detriment of our environment. Despite these advances the destruction on the earth that threatens our survival calls for urgent actions in the area of the environment that also involves ethics.

The Ionian Enchantment

The Ionian Enchantment Summary and Analysis

Wilson develops the idea of unified learning when gaining insight into nature during his science studies. His view of the classification of species as connected with evolution is influenced by Linnaeus, who classifies animals and species into groups, families, orders and kingdoms. This ordering reminds one of the way armies are organized with platoons, armed services heading armies, and with chiefs of staff at the top.

Evolution allows for perceiving the world in a new way, and changes the classification of animals. Biological classification is based on Systematics and the Origin of Species. Belief in the unity of species that follows certain order along with a few simple laws is in accordance with the speculations of Thales of Miletus in Ionia, who thought that the world has a material basis, wherein all matter consists of water that unifies in this way by nature. The Ionian Enchantment signifies the belief in the unity of species. Such thought subsequently becomes dominant in science. This unification can also span to other sciences and humanities.

Einstein recognizes the unity of complex phenomena in his discoveries, where he tries to unify space with time and motion, and gravity with electromagnetism and cosmology. Other scientists follow. Even though Wilson is born a Southern Baptist, he rejects the literal interpretation of Bible, where he also finds no mention of evolution. He choose to search for objective reality rather than revelation although he does not discard the existence of God. The unification of knowledge may lead to a better understanding of ourselves. This challenge may only be a failed ambition expressed by the ancient Greeks in the myth of Icarus who falls down when flying towards the sun on wings made from feathers and wax that melts in the heat. One of the interpretations of this myth implies that such endeavor represents the daring of human nature, where we are compelled to try how far we can reach.



The Great Branches of Learning

The Great Branches of Learning Summary and Analysis

The evidence from the natural sciences shows that Enlightenment thinkers made correct assumptions about the material world as well as the unity of knowledge. They attempted to link sciences and humanities, but despite their efforts the current state of knowledge is fragmented.

Consilience, a term revitalized by Edward Wilson, implies an agreed approach to different subjects, and linking facts and theory to provide a unified justification. Through consilience theories and facts can be tested. One way of testing its effectiveness is employing it in social sciences and humanities. When linking environmental policy, ethics, social science, and biology, we discover that inquiries in one area can lead to reasoning in other areas. Some areas have little analysis. Subsequently, no sufficient knowledge of ecology exists to formulate ethical guidelines to achieve agreement. There is also no scientific knowledge of the long-term valuation of forests.

Government policies stem from the way politicians think. They have little to do with the way intellectuals think. With consilience this situation can improve when all disciplines are employed—not just abstract principles. The material world confirms unity, where consilience is implicit. Not all philosophers would agree that philosophy is vital in intellectual unification. Its importance lies in its ability to reach into the future. Some philosophers claim that it can answer issues that some sciences, including physics, biology or sociology, are unable to provide. Hence scientists and philosophers should collaborate in the areas of biology, social sciences, and humanities. In this way philosophy can become science. The world implies consilience of knowledge. In the twenty-first century some areas such as natural sciences, humanities, and creative arts will be linked with science and become large areas of learning.

The ability of science to provide rational answers manages to enter the communal mind. People are able now to see reality in a way that exceeds the ability of a single mind to see. In the same way science provides greater opportunities for the arts, giving it a wider range of narratives and images. Consilience can be employed in education facing a decreasing number of mandatory courses and an increasing number of undergraduate courses. Currently, science is the least mandatory subject but vital for understanding the relation between science and humanities as well as their importance for human welfare.

Most issues that vex politicians and come before the US Congress such as ethnic conflict, escalation of arms, environment or poverty require that knowledge from natural science is integrated with social sciences and humanities so that these problems can be solved. Only in this way a clear picture of the real world can be achieved. The training that politicians receive is limited to social sciences and humanities, with little knowledge

of natural sciences. Although professionals, including public intellectuals or media interrogators can make correct analyses, the basis of their wisdom is fragmented. Consilience can produce order, and that is why it is necessary in the increasing diversity of knowledge.



The Enlightenment

The Enlightenment Summary and Analysis

The idea of intellectual unity emerges as a way to foster human rights and progress through knowledge during the Enlightenment. This concept instigates the modern era, but later its ideas cease to dominate. The end of the Enlightenment is marked by the death of the Marquis de Condorcet in March 1794, who dies during the Revolution after being jailed. The French Revolution incorporates intellectual ideas such as that of Condorcet. Its strength is in its attempt to improve educational opportunities as part of human rights. The revolutionary slogan "Liberty, Equality, Fraternity" is inspired by the ideas formulated by Jean-Jacques Rousseau in "The Social Contract". Robespierre uses his idea of general will during the Revolution, where those who want to improve their welfare can execute those who oppose it, killing 17,000 people. In his view he serves eternal justice when freeing slaves from tyrants and giving them the opportunity to enjoy liberty and equality. The movement fails, creating doubt in the supremacy of reason. In the end, the Enlightenment fails not because of its potential, but because of the intellectual opposition to the tyranny of the revolution.

Marie-Jean-Antoine-Nicolas Caritat, Marquis de Condorcet is born in 1743 in Picardy, north of France. He is the last of the philosophers concerned about political and social issues. He studies mathematics but pioneers its application in the social sciences in the same way that Laplace invents and uses the calculus of probabilities in physics. He opposes French colonial aspirations, inspiring the abolition of slavery by the National Convention. He is the follower of the English philosopher John Locke in his belief in the natural rights of men as well as following reason rather than passion. He believes in knowledge and the nurturing force of the environment through which society can be molded and become whatever it pleases. With the outbreak of the Revolution he turns to politics, with friends both among Girondists and the leftists. He is identified with the Girondists and becomes a criminal suspect. Despite his earlier involvement in the revolution, the National Convention orders his arrest.

He thinks that culture is ruled by laws similar to those of physics while history is an evolving process. The idea of the inevitable progress to which he adheres survives the Enlightenment. In the higher level of civilization, all nations along with its citizens are to be equal, science is to lead the way, and art is to grow. With a longer human life span, crime, poverty, sexual discrimination, and racism are to decline. The Enlightenment declines, but it is the only movement that results in the highest advancement, contributes to the dominant ethics, and is the greatest inspiration not just to the Western culture but the entire world.

The Enlightenment is led by science and analysis. This idea is inspired by Francis Bacon who thinks that the understanding of nature can lead to self-improvement even when mistakes which should be left uncorrected are made. He strives for objectivity through observing patterns and avoiding preconceptions. His achievements are greatest



in psychology and the nature of creativity. His attempt to reform reasoning involves inductive inquiry in all learning. His visions remain part of scientific ethics.

Rene Descartes, who founds algebraic geometry and modern philosophy, uses deduction, analysis, and skeletonizing of each phenomenon. He views knowledge as a system of truths that can be used in mathematics. His universe is both rational and linked through causes and effects, while concepts can be applied in physics, medicine, and moral reasoning. He believes that systematic doubts inspire learning, inventing the phrase "Cogito ergo sumo," meaning I think therefore I am. He argues for the separation of mind and matter and proposed reductionism, where parts of the world can be separated and analyzed. His follower, Isaac Newton, invents calculus, and also believes in experiment. Reductionism proves to be the best way to formulate the knowledge of the physical world. Despite similar abilities as those of the Western scientists, Arab and Chinese scholars fail to achieve the concept of reductionism. They focus instead on holistic properties and relationships between entities, never arriving at the point of abstraction or analytic research.

Postmodernist fragmentation has not been useful to scientists. Their one positive contribution is that it enriches culture despite disintegrating intelligentsia, while still attempting to arrive at the truth. Its rebellious nature leads to the investigation of both views, where one is to create order out of disorder, and the other, disorder out of order. As long as such arguments remain, learning can continue forward.

The Natural Sciences

The Natural Sciences Summary and Analysis

The Enlightenment rightfully believed that science allows for understanding physical reality. Humans know that their vision is incapable of seeing the world in its true state, as human retina registers only 400-700 nanometres. Animals perceive the world outside of our spectrum. Our limitations can be conquered by science that can expand our senses, giving us greater auditory range, where we can communicate even with electric fish through generators and detectors.

All signals in the environment can be picked up by some species. Human physical capability is limited to the most necessary devices to survive, filling the appropriate niche, and maximizing only its fitness, but nothing beyond. Some questions such as the capabilities of mind remain unanswered. It is through these mind qualities, such as curiosity and creative drive that humans attain the techno-scientific age in three centuries between 1600 and 1900. The laws of physics can transcend cultures and other civilizations. Science achieves the ability to measure the ultimate smallness such as the size of electrons, and such trend drives the Western natural science. Another scientific quest involves visual observations through telescopes and microscopes. These trends result in nanotechnology as well as other inventions, such as data storage, timing of charged reagent molecules, and assembling of molecule-sized machines.

Our brain is designed to multiply our genes, delve into theories, and apply them in context. Scientific theories are constructed in such a way that they can be discarded if proven wrong. Science gathers knowledge in an organized and systematic ways, using repeated experiments as proofs, abstracting information in the simplest and aesthetically pleasing form, generalizing if something can be measured, stimulating further research, and using phenomena in one area to provide explanations in other areas. Unlike astrology, ufology, and Christian Science, natural sciences can be locked in theory and evidence that forges the base of modern civilizations.

Science delves into complexity through reductionism, where elements are separated and analyzed further. If it leads to chaos, search points entries can be identified. Science questions elements of systems while attempting to integrate them. Laws and principles can be transferred to various levels through consilience. Even though there are different levels of laws, they can be reduced to the laws of physics. Science also poses questions that pertain to religion and philosophy. Scientists use various methods of research, but what matters most is the final result. Some scientists are driven by ambition while others have utilitarian aims. Ideally they think like poets while working like bookkeepers. It is best when one uses everything in the subject including procedures that can be duplicated, observing events with attention to detail, under different circumstances, styles, causes, effects, statistical arguments, and logical arguments. The audience should be also kept in mind.



Scientific evidence consists of blocks, where some claims are accepted as final. When evidence is gathered and confirmed by interlocking theories, some knowledge is accepted universally. No external objective truth can measure the extent to which the evidence will be accepted. According to Mark Kac, proof can convince a reasonable man, while a rigorous proof can convince an unreasonable man. If many hypotheses are used, a method of science is satisfying. Science seeks objective truth based on hypothesis. The fifth International Congress for the Unity of Science in 1939 agreed that the best knowledge for humanity is rationally recognized.

The standards that measure scientific knowledge should be based on something real. Even mathematics is unable to inform us of the world in which we live, only directing us towards the objective truth. Logical positivism fails due to its inability to distinguish between concept and fact, as well as generalization and mathematical truth. It also lacks research on how the brain works. When the biological process of concept formation is defined, both the world and the brain can be researched through superior investigative methods.

Ariadne's Thread

Ariadne's Thread Summary and Analysis

The natural sciences stimulate the development of other sciences. Their complexities can be unraveled through consilience that works through breaking down components and then putting them back together. It is easier to dissect each element rather than analyzing in the opposite direction when investigating general phenomena. Consilience allows for understanding organisms through the examination of their organization. Through the analysis of elements we arrive at researching molecules. The way ants communicate is investigated through researching their organization, environment, and evolutionary history. Each colony is a superorganism made of members whose reactions affect other members. The communication systems of ants can be identified as released pheromones.

Dreams seem to be important in cultures that frequently represent serpents as part of trances and hallucinations. Freud investigates dreams, focusing on the role of unconsciousness as part of the hidden processes of the brain. As Freud fails to test his influential hypotheses, he also fails to realize that his assumptions are wrong. Dreams turn out to originate differently than Freud thinks. Science find that dreams involve the rush of visions charged by emotion due to the reorganization of information in memory. They are a fantasy that conscious brain activates during sleep without the involvement of senses. In molecular terms sleep occurs when certain chemical nerve cell transmitters decrease in number while other transmitters increase. Dreams begin when acetylcholine nerve cells fire, initiating PGO (ponto-geniculo-occipital) waves. When the pons pass signals through the PGO system they indicate that the body is in motion and the brain reacts creating images from memories. Dreams are to consolidate information upon awakening and improve responses relevant to survival. There is no information on the mechanism that produces specific memories in dreams such as serpents, but fear of snakes is shared by humans and other Old World primates. Such fear may be triggered by their dangerous presence on most continents. Gnostics and alchemists view snakes as a symbol of destruction and re-creation. The serpent transcends the snake in mind and culture.

Complexity theory was formed in 1970s and its theorists, such as Stuart Kaufman, claim that they involve deep laws such as that of deep chaos, self-criticality, and adaptive landscapes. According to Kaufman, living on the edge of chaos fosters evolution. Chaos theory itself proposes that complicated and indecipherable patterns can be detected through changes in the system. Complexity theory can benefit from biological research. The investigation into a living cell, the way it is composed and operates unveils its level complexity. It involves, for example, the rules of folding amino acid strings into the shapes of protein molecules. After molecular biologists discover fully the way a human cell operates and its composition, mind and behavior can also be researched. Other organisms can be examined, and reproduced through simulation. It can lead to the discovery of other life forms. Research questions involve organizing principles of

organisms, the way it applies to mind, behavior and ecosystems, the way mathematics can assist biology, and the level of detail required to produce models.



The Mind

The Mind Summary and Analysis

Conscience is especially important in researching the mind that is also the root of knowledge and creation. Various models that attempt to outline the way the brain operates fail as evolution laws make the brain able to survive but not to understand itself. Living and reproducing do not require knowing the way the brain works. The brain is the most complex system known in the universe, consisting of 3,195 genes, which is twice as much as any other organ or tissue. Its surface is wrinkled, weighing on average three pounds. It increases four times during evolution. Ultimately it allows for taking over the earth. The concept of the evolutionary progress is not easily defined as evolution has no preset goals. If evolution would aim at producing increasingly complex systems, its goals and progress may be established. The beginning of life on earth starts with simple organisms, such as bacteria, eukaryotic cells, and then their building blocks allow for the emergence of crustaceans and mollusks that use their central nervous system. The last and most threatening to other forms of life is humanity.

Contemporary science rejects previous philosophical mind concepts involving dualism that are proposed by Rene Descartes. The mind is considered to be the working brain. The research into the working of the brain is taken up by cognitive neuroscience. Any injuries to the brain, including physical traumas, infections, strokes, and poisoning have effects on behavior and thought. When thalamus is destroyed as happened when Karen Ann Quinlan took painkillers and tranquilizers when drinking alcohol in 1975, it can result in death. Scientists strive to monitor the working brain, but only its snapshots so far ARE possible.

The brain from the engineering point of view is composed of wide circuitry and wiring elements contained in a sphere. Nerve cells are called neurons and send signals along axons. The speed is assured by electric discharge through depolarization of the cell membrane while accuracy is assured through the insulation of axons with sheaths. The brain contains one hundred billion nerve cells. Cells connect through synapses that are their points of connection. Electric discharge stimulates synapses and neurotransmitters are released. The connections made by neurons are programmed with precision forming systems of systems during their contacts and forming circuits. Neurons are touched by other neurons and decide whether certain cells are to be active, establishing patterns and roles the cells play in the brain activity.

The size of the human brain is the largest of all animal species, sized just to pass through the birth canal while it is also quite vulnerable to physical contact as humans chose intelligence rather than strength in their evolution. The brain structure evolves during 400 million years, preserving both the ancient parts while adding new to assure survival. Both passion and emotion are linked to reason. The brain has three primitive divisions, such as hindbrain, midbrain (that controls sleep and arousal), and forebrain (that regulates emotional responses and contains the cerebral cortex). There is no seat



of consciousness, but certain centers can be active as part of free will. The inside of the cerebral cortex is responsible for one's own concern and welfare. Temporal lobe epilepsy can cause hyper-religiosity or assigning cosmic significance to various events.

The mind is capable of conscious and unconscious experiences, including taste for around 1000 substances. The nervous system has to control hundreds of organs precisely and simultaneously. The lower brain responses and reflexes are primal and genuine, as opposed to contrived and conscious. Emotions stimulate rational thought. Consciousness that satisfies emotion is incapable of command, acting and reacting to retain a stable system. Primary emotions are inborn and instinctive, while secondary emotions are personal. Both are expressed by the same channel.



From Genes to Culture

From Genes to Culture Summary and Analysis

All human behavior is influenced by culture that reflects the genetic history of the species. Psychological concept of gene-culture co-evolution involves cultural evolution with both evolutions being linked. The mind absorbs parts of the existing culture during its growth. Culture uses various elements, such as fear of snakes to create narratives and metaphors. Shamans enrich cultures through their experience of serpents in their dreams.

Evolution by natural selection creates new mixes of alleles which are changes in DNA sequences that improve survival. Genes assuring higher survival increase in populations that prevail over those with lower survival rates. Societies are created by culture while culture creates societies. Culture can be defined as behavior constructed by a specific language with language instincts and large vocabulary. It is difficult to determine when symbolic language evolves to create culture, but natural elements of culture, such units of culture emerge with concepts as part of complex behaviors or ideas. Culture evolves when different parts of the brain become responsible for meaning and perception along with semantic and episodic memory.

There are competing perceptions on the way cultures evolve. Nurturists stress the impact of the environment while hereditarians consider heritability of intelligence and personality as critical. Nurturists and hereditarians think that differences between cultures are due to history and environment. Human genetics responsible for behavior is one of the links between genes and culture. There are 1200 disorders caused by genes. Mutation in single genes causes changes in traits. Both environment and hereditary conditions are responsible for disorders.

Cultures evolve from a similar basis. Later differences are the products of genes, senses, learning, and social behavior. Inherited neurobiological traits allow for certain perceptions of the world. Both animals and humans are innately prepared to learn certain behaviors. While senses impose epigenetic rules that are "regularities of sensory perception and mental development that animate and channel the acquisition of culture" (Wilson, p. 157), sensations are broken into units. The structuralist approach proposes that oppositions in concepts such as life and death create myths and symbols. Such oppositions are linked into compositions that create cultures.

Only one gene mutation that causes dyslexia has been identified so far. Genes determine epigenetic rules that allow the acquisition of culture that determines in the end which genes survive. Linguistic complexities are critical to the way cultures develop. Color vocabulary has been much quicker adopted in cultures where such vocabulary was limited when the principal color terms were grouped with the terms they knew. The way cultures recognize colors differ.



The Fitness of Human Nature

The Fitness of Human Nature Summary and Analysis

Human nature involves patterns in mental development while connecting genes to culture. It can be viewed as the evolution of the epigenetic rules. Culture determines genes that underlie human nature. The brain decides what happens to the genes that prescribed it. Some brains make better choices and are more fit for survival. Culture as part of human existence is influenced by human action and genes, while it also influences such actions as well.

The epigenetic rules can be cross-cultural and predispose to invent cultural conventions, such councils or ceremonies. Genetic evolution prepares the brain to respond equally to all experiences through biased mental development. Behavioral genes produce behaviors that assure Darwinian fitness, such as kin selection, where relatives care most deeply for their closest relatives, parental investment, where parents invest in their offspring to increase their fitness, mating strategy, where women are made available to men competing for female egg in most societies to assure offspring.

Status connotes significance through rank, class or wealth so that men with higher significance can produce more offspring. Territorial expansion assures that limited resources are under control. Those who can control territory in such circumstances can pass more genes to future generations. If resource control is not required, territorial control is not necessary. Wars are the products of genes and culture and can be avoided if their interaction with contexts in which they evolve are understood.

The genetic fitness mean that widely distributive cultural traits produce advantage to the genes that predisposed them. In this way traits that are widely distributed are adaptive. Despite various weaknesses in this hypothesis the natural consilience signifies the connection between heredity and culture.

Genetic fitness is tested through incest avoidance tendencies. Societies avoid sex between siblings and between parents and children due to the genetic defects that such practices produce. The human brain evolves to defy incest. The lethal genes of chromosomes may cause the death of an infant if both chromosomes have a lethal gene at a site. Similar situations exist in plants and animals. Even when children are adopted and raised as siblings, they retain their relations as that of brothers and sisters. Social taboos render incest punishable by law. Only some societies such as Egypt and Rome supported incest. Beliefs that incest causes adverse effects on children is shared by the Lapps in Scandinavia, The Tikopian Polynesians, the Kapuku in New Guinea, and the Toradja of Sulawesi in Indonesia. Some evidence by Durham purports that most motifs and myths in societies convey that incest has beneficial effects because it produces giants and heroes, but also views these offspring as abnormal.



The Social Sciences

The Social Sciences Summary and Analysis

Social sciences are to deliver knowledge about lives and the way to control future. Social scientists lack unity and vision, and instead rely on precision in words. The complexity of social science exceeds that of physics or chemistry despite apparent familiarity. Due to errors of social scientists, Muslim fundamentalists are misjudged, there is a failure to foresee the collapse of the welfare state in America, while paying little attention to the foundation of human nature. They isolate social sciences from other sciences such as biology or psychology, denying evolution and hereditary differences. Cultures are claimed to be equal with equal rights in a society. Cultural relativism gains support, opposing unified human nature, biology creating a question on what really unites humanity.

There are two branches of anthropology that explain culture either as having a genetic background, a view held by biological anthropologists, or as a higher order phenomenon that has no genetic influence and evolves without limit from one society to the next, held by cultural anthropologists. Their views conflict and both fail to answer the question of diversity. Even the analysis of various cultures as unique entities failed to resolve these conflicting views.

Contemporary sociology can be called the anthropology of complex societies while anthropology the sociology of simpler, remote societies. Modern sociology involves measurement and statistical analysis. It avoids an analysis used in biology that traces causations across many levels of organization and is removed from natural sciences. According to the Standard Social Science Model, human minds are the product of culture, a view that denies the existence of the biological aspect of human nature.

Social sciences can benefit from other disciplines, such as natural sciences, anthropology, primatology, and sociobiology. The patterns established through natural selection are the same for animals and humans, such as that families are unstable unless they control high-quality resources, or the higher cooperation between certain relatives, such as father and son rather than uncle and nephew. Such instincts are part of instinctive responses assure survival.

Economics is best equipped to bridge the gap between social and natural sciences. There have been three periods in economics. The first is the Classical Era in the eighteenth and nineteenth century, where economy controls the resources through supply and demand. Then the Marginalist Era, around 1830, involves the breaking down of the inner working of the economy into individual decisions by examining activities through mathematical models of persons, firms, and governments. Economy could be treated as a virtual world with shifts either towards or away from steady states of supply and demand through rises and falls in prices of various units of production, such as gold, oil, or housing. In this way, microeconomics was founded. Economic change would



involve marginal cost, total cost increase through additional units of production, marginal product, and the growth in output. Marginalist economic models change variables, keeping the remainder constant.

When the Classical Era is macro-analyzed and combined with the micro-analysis of the Marginalist Era, neoclassical economics emerge, called the Era of Model Building. The new era features linear programming, game theory, and mathematical techniques to stimulate economy through detail, equilibria, and impulses in supply and demand. The weaknesses of these systems involve inability to predict all human behavior through simple principles. Hermetic sealing off from the environment that imposes constraints on human behavior also renders economic theories to fail in predicting the economic future. Some of their successes involve partially stabilized economies, regulation of the flow of money, and preventing from inflation and depressions. The key questions remain unanswered. Mathematical models that work need to have parsimony, few units, and processes that account for phenomenon, generality or a wide range of phenomena covered by the model, as well as consilience, where processes conform with other disciplines. No account of biological evolution is investigated, where needs and opportunities in one category strengthen the needs in other categories. There is a wide number of psychological models that fail to be applied in modern economics.



The Arts and their Interpretation

The Arts and their Interpretation Summary and Analysis

The arts are often considered as encompassing all humanities, such as history, philosophy, languages, literature, and religions. The arts have different goals than science. They need science to stimulate interpretation in the same way that science needs arts. Such interpretation is the logic behind consilience between science and arts. The arts express human condition through mood and feeling with both order and disorder. Brain imaging fails to identify neuro-biological traits responsible for art. Those more gifted engage a broader area of the brain than those less gifted. Famous artists are capable of selecting important thoughts and producing creations that impress with quality.

The arts is humanistic but lacks consilience. The postmodernist influence views existence as individual rather than universal while deconstruction analyzes missing elements where truth is relative and personal. The postmodernist view that applauds chaos fails to conform to scientific evidence concerning mind. Natural sciences can strengthen the interpretation of arts through the investigation of the creative process of the mind. Through the co-evolution of genes and culture as part of the way the brain evolved, the arts originate as part of natural selection. Different individual learning abilities, incest avoidance, effective emotional thoughts and behavior, as well as focus on certain forms influence the way the arts evolve through natural selection.

The gene-culture evolution unveils a process through which genes that evolve can be traced. The traditional view of arts states that arts evolved as part of the genetic origins of human brain. The arts communicate from mind to mind without explaining its impact. Science creates principles and uses them to define qualities while the arts use details to implicate qualities. They both start in imagination but remain part of human origins. Arts generate metaphors in contexts striving for elegance. The art begins in reality transgressing then to other worlds. Art is universal and intuitive.

Creative powers of the human mind are driven by natural selection and environment. A specific climate and set of resources foster culture. The epigenetic rules of human nature that are regularities in mental development that propel culture involve innovation, learning, and choice. Myths evolve through sources of great power, such as apocalypse, migration, evil, and the beginning.

The arts are to exert order upon chaos, as the procession of information becomes high, creating various mental scenarios that could be filled with arts. Natural selection is unable to substitute old genes with new to cope with various possibilities that intelligence encounters. The arts create rituals and consistency through words, images, and rhythms. Visual images thirty thousand years ago are to evoke real events through

the depiction of hunted animals. These beliefs are sparked by sympathetic magic wherein people believe that symbols can influence real objects.

The epigenetic rules generate universal archetypes, hence art is universal. The working of epigenetic rules is apparent when the synchronization of alpha waves of 20 per cent arouses the brain. High arousal figures involve patterns present in symbols, flags or logos. Regularities in faces attract. Beauty, however, is associated with elements that represent exaggerated models. It is the expression of certain stimuli that attracts even though it may not represent the strongest survival elements. Fashion and beauty works along the similar lines.

The arts attract because they uses mystics towards which we are predisposed. The primitive mind is also tuned to mystery as equally as contemporary societies. Both perceive only a fraction of the world that is gradually discovered through science. Through consilience, where arts and science are combined, the evolution of the brain can be achieved.



Ethics and Religion

Ethics and Religion Summary and Analysis

Ethics has been constructed around the notion that justice is independent of human existence or that it has been invented by humans. These choices unveil the way we view ourselves although it cannot be determined by pure logic. Moral reasoning, however, is connected with the natural sciences. Natural law inspired natural rights. The power of these transcendental statements is used by Thomas Jefferson who, following John Locke, uses secular and religious presumptions in his Declaration of Independence. Transcendentalism is used to validate ethics, as theologians ascribed natural law to God's will. Natural law theory is compelling, although transcendentalism is used to fight wars, where each side regards their causes as sacred.

Ethics can be viewed as a code of principles. Their grounds are established by philosophers but they determine cultures that flourish. Effective ethical codes are based on objective knowledge. Consequences of actions render them ethical or unethical. Moral reasoning can be based on the current transcendental view, i.e. theological or philosophical or an empirical view. According to Wilson and his empirical principles, ethics are inspired by evolution and material origin. He considers such a view as more stable. Two viewpoints, transcendentalist and empirical, will be argued.

The transcendental view has its origins in the long history of Judaism, Christianity, and Islam. Its strength is apparent in statistics showing that nine in ten American believe in God. As scientists deal only with partial reality, they are unable to research our mental experiences. Religion can explain everything, including measurable and unmeasurable phenomena. God opens our mind to what lies outside of our world. According to Dostoyevsky's Grand Inquisitor, if the ruling hand of God is not present all things are permitted, where freedom becomes misery. All thinkers of the Enlightenment believe in God. The reduction of creation to the product of evolution seems appalling to authors such as George Bernard Shaw, who regards such view as leading to the annihilation of honor, aspiration, and beauty. In the end, human mind and immortal soul are notions that science is unable to explain. Whether science has been pushed too far can be debatable, but a quarter of Americans reject evolution.

Empiricist views are not as attractive as religious views that incorporate notions of love, human spirit, and most of all hope. Religious doctrine of sacrifice is inspiring despite the destructive potential of religions to cause wars. All three major religions are expanded via territorial conquests. Great civilizations rose through conquest while their religions condoned and validated it. Exclusion, however, is part of tribalism, where belief in superiority inspires totalitarian thoughts. Religious beliefs lead to sacrifice in the name of the needs of the group that is to be rewarded in the afterlife, hence sacrifices can be made even environmental. There is no scientific proof that prayer cures or after life exists. Faith may be insufficient to assure character that arises from within. Statistics prove that work and ethics can exist without religious doctrines. Integrity can be attained



through decisions that are internally good and true. Science benefits humanity and eventually may be able to explain the mind. Empirical evidence is objective, bloodless and lacks poetry. Hence sacral traditions should remain but humility should be shown to other living creatures rather than condoning their destruction in the name of false ideals.

Philosophers that express influential views on ethics, such as Kant or Rawls make their statements without the knowledge of science and deal with ideals rather than reality. The consilient perspective regards principles as behavioral codes that society wishes to follow to attain common good. Some religious ethical principles can be controversial. The empiricist view searches for the origins of ethical reasoning, viewing an individual as prone to various choices.

Ethics deals with principles as part of biology, culture, and instincts. Certain behaviors such as cooperation that is always rewarded or xenophobia that is to protect from strangers evolve as part of survival. The rules made later evolve to protect the ruling class. Later, rules are made into laws to protect the ruling class. There has been very little objective analysis in the subject of ethics, hence little progress has been made in this area. Religions are instinctive but are well suited to the inborn subordination in humans. They also suit human mind that evolve in need of god and belief. Hence both transcendental and empiricist views continue to be important, although blind faith is no longer accepted.



To What End?

To What End? Summary and Analysis

The concept of consilience is beneficial in all areas of learning. Consilience implies that tangible phenomena evolve from material processes that can be reduced to the laws of physics. It shows that culture can only be explained when linked with natural sciences. In the twenty-first century when the information will be readily available there will be a need for the synthesis of information to make wise decisions.

Liberal arts should address issues of human existence to link science and humanities on all levels. Human progress stimulated technological advancement necessary for survival but damaging to the environment. Now the biological nature of humans can be altered at will. Genetic changes show tendencies towards rounder heads, skin protective proteins in some desert populations, erasing racial features through mixing, although individual variants increase. Humanity can choose a new direction of evolution or continue along with its own heritage. With the knowledge of heredity it can alter anatomy, intelligence, emotions, and creative drive.

Volitional evolution can alter defects through gene therapy. Genes can be eradicated and improved, creating specialized communities or greater longevity, although such changes can make people less human. The project called Biosphere 2, where a miniature Earth was built in Oracle, Arizona, showed that we are unable to sustain artificially created environments when species became eradicated after oxygen levels drop and carbon dioxide rises. As human population is growing such environments are needed. Human population can reach 7.7 billion in 2050 with 2.1 per each parent or 12.5 billion with 2.2 children per parents and the human biomass will be the same as the weight of the world.

Experts think that the Earth can sustain only up to 16 billion people for an indefinite period of time. The ecological footprint of productive land that can support people has to be lowered to assure the sufficient standard of living in all population. Currently more than 1 billion of people live in absolute poverty, and 13 to 18 billion people a year die of starvation. Due to the declining supply of grain carryover stocks, the wider area of land is needed. Only the Indian Ocean has rises in yields while other oceans are used beyond its capacities. The accelerating climate change leads to higher temperatures that are to rise by 3.5 degrees by 2100 causing thermal expansion of marine waters. The Antarctic and Greenland ice shelves will break, raising sea levels by 30 centimeters. There will be more heat-waves and cyclones. Tundra ecosystems will shrink, and many species will be extinguished. Shortage of food along with environmental changes will cause an environmental bottleneck. Civilizations will cease to exist unless every possible technological fix is implemented, resources expanded through sustainable development, and quality of life improved. Nuclear fusion or solar energy can reduce energy consumed.



Conservation experts consider the current situation to be a crisis. Such events may lead to the end of Mesozoic Era that requires 10 million years to reach previous diversity levels. The higher level of species increases the ecosystem productivity and the ability to withstand environmental stress while more than 40 per cent of medicines use plant, animal, or fungi extracts. The current knowledge is insufficient to preserve ecosystems artificially and return them to the environment that needs to be somehow saved to assure the survival of life. Existentialism assuring autonomy needs to be replaced by the ability to have accurate foresight through unified learning that is universally shared. Human existence depends on ethics as evolution shows that contract formation assures survival along with genes that prescribe it. Banishing the rest of life as well human heritage by making selfish decisions may lead to our own extinction.



Characters

Condorcet

Marquis de Condorcet was born in 1743 in Picardy, north of France. His family originated in Dauphine, and he was among the last of the French philosophers who dealt with social and political issues. Rather than pursuing a career in the army, Condorcet decided to become a mathematician. His mathematical abilities turned out to be not as outstanding as those of his contemporaries, such as Pierre Simon de Laplace and Leonard Euler. He was elected to the Academie des Sciences at the age of twenty-five. He became its secretary at the age of thirty-two. When he was thirty-eight, in 1780 he became a member of the August Academie Francais. His main achievement was using mathematics in social sciences, where mathematical achievements can be applied to human actions. In 1785 he wrote the Essay on the Application of Analysis to the Probability of Majority Decisions. He made some advances in mathematics although he used his achievements in the study of political behavior. Condorcet recognized that social action can be predicted and quantitatively analyzed. His work inspired future sociologists, such as August Comte and Adolphe Quetelet. He was regarded as noble because of his personality and demeanor. Called by his friends Condorcet the Good, he presented himself as sweet and calm while relating with simplicity and negligence. Even to those who were jealous of his achievements, such as Jean-Paul Marat, he was kind and generous. He passionately advocated social justice and welfare of others on both individual and collective levels. Even at a considerable political risk he made his convictions known to the public, opposing French colonial politics. He founded an anti-slavery organization called Society of the Friends of the Blacks. While in hiding, his arguments found their way to the members of the National Convention who ultimately abolished slavery. In his views he followed John Locke, sharing with him his liberal convictions. He supported the natural rights of men like Locke. He also thought that moral imperatives should lead rather than follow passions just as Immanuel Kant. Along with Tom Paine he created Le Republicain, a revolutionary journal for inspiring a progressive, egalitarian state. He hoped that there would come a time when men would only follow reason. He shared the accomplishment of the unification of science with Laplace. His extraordinary abilities included near-photographic memory and a wide ranging knowledge that he regarded as a much needed resource that should be available to everyone. Others considered him as knowledgeable in all subjects, be it science, the arts, government, law, or fashion. Due to his talent and personality he reached the highest ranks of his society as the youngest of the philosophers. He viewed the human soul as molded entirely by the environment. Consequently, humans can make of themselves what they wish, while he also adhered to the idea of perfectibility, where the quality of life can be indefinitely improved and perfected. In political terms he was a revolutionist, standing up against clerics and republicans. He was historicist in social science because of his conviction that history can unveil the presence as well as the future. He thought that in ethical terms the human race should be unified. Even though he was egalitarian he thought that societies would become part of the high civilization of Europe. Due to his humanitarian ideals he viewed politics more as the



source of moral principles rather than power. He died on 29 March, 1794. He was named the prophet of the Laws of Progress. He possessed intellect and political leadership. In 1794 he composed Sketch for a Historical Picture of the Progress of the Human Mind, but had to hide after being sentenced to death by the National Convention during the French Revolution. He was viewed as a Girondist and expressed criticism of the constitution drawn by the National Convention. He died in Bourg-le-Reine jail.

Francis Bacon

Francis Bacon was born in 1551 and was the younger son of Sir Nicholas and Lady Ann Bacon. He regarded English as parochial and preferred to write in Latin, yet he became famous for its mastery. He was educated at Trinity College at Cambridge, and was called to the bar in 1582. Two years later he was appointed to the Parliament. His father was Lord Keeper of the Seal that used to signify the highest judicial officer. He was knighted in 1603 and named Attorney General, Lord Keeper. Later in 1618 he was called Lord Chancellor. At the end he was named the first Baron of Verulam while soon later Viscount St Alban. Ultimately he faced the challenge of being accused of bribery. Fined and imprisoned, he pleaded guilty and was released after three days. After leaving jail he devoted himself entirely to scholarship.

Francis Bacon was the first who thought that political sciences should be guided by analysis. His spirit is the most enduring spirit of the Enlightenment era. He cautioned that we have to understand the nature that surrounds us as well as within us so that humanity can continually self-improve. Destiny can belong to humanity, but if it abandons the dream we would go back to barbarism. Bacon criticized classical learning based on medieval conventions, ancient texts, and lengthy logical detailing. He thought nature should be studied as well as the human condition. He was an astute observer of mental processes, thinking that the mind's ability to notice things sparks further actions. Hence mistakes will always be present and as such should remain uncorrected. In this way knowledge has no foundation as it also lacks construction. Sciences, arts, and all human knowledge should be hence rebuilt.

He considered induction as the best method of investigation, where a high number of facts can be gathered to detect patterns. We should strive for maximum objectivity achieved with a minimum of preconceptions. He viewed natural history as the basis of disciplines, where metaphysics is at the peak while it can shed the light on everything that is below.

He was a better thinker than he was a scientist or mathematician, and founded philosophy of science. Adhering to Renaissance principles he regarded all knowledge to be his province. He also became the first master of scientific method as part of the Enlightenment. Bacon advocated peace and turning against the nature of things.

Bacon died in 1626 on April 9 following one of his experiments, catching pneumonia after testing the effect of the snow on chicken flesh. His life was the contest between his two great ambitions, to the detriment of his foremost ambition that was science.



He was compared to Shakespeare in his literary mastery, apparent in *The Advancement of Learning*. Passionate about synthesis he became a prominent futurist. In his view, learning should be concentrated on the world where science is the future of civilization. Science was to be a knowledge tested through experiments not as a controlled manipulation but as part of modern science through information, agriculture, and industry. He believed in the unity of knowledge. He was named the Father of Induction, where he advised to collect most common traits as part of generality and proceed towards generality. He wanted to improve traditional description and classification methods of concept formulation, competing hypotheses, and theory that underly science.

His greatest achievements are, however, in psychology, where he advised the use of aphorisms, fables, and analogies to portray truth as reality needs to be delivered with vividness so that the play of emotions can stimulate a clear picture. He wanted to enhance reasoning in all learning. One should stay away from so called idols of the mind that represent various fallacies and their acceptance by being only a spectator. Instead the world should be observed and reflected upon.

Rene Descartes

Rene Descartes believed in the system of knowledge that could be viewed through mathematics. He thought that the universe is both rational and united due to cause and effect. The same concept can be used in physics, medicine, biology, and moral reasoning. In this way, he greatly influenced the Enlightenment. In his view, systematic doubt is the way to learn. All knowledge should be analyzed through logic. He is also famous for his premise *cogito ergo sum*—I think therefore I am. Science continues to recognize the Cartesian system of doubt, where assumptions are made and rejected until one logical axiom is devised that is used to conduct experiments. He believed in God, a perfect being who has the power to empower his mind with the idea of such a being. According to him, mind and matter were separate. He concentrated on matter that was to be pure mechanism. He argued that the world consists of physical parts that can be separated and analyzed as part of reductionism theory. The concepts of reductionism and analytic mathematical modeling became one of the most significant devices in modern science.

Descartes considered artificial human intelligence impossible. There would be always two criteria that would distinguish machine from a mind. Machine would not be able to modify phrases in response to make sense and behave according to reason.

Isaac Newton

Isaac Newton invented calculus although it was Gottfried Leibniz who devised the clearer calculus used today. He was inspired by possibilities and was resourceful, and inventive. He believed in experiments, recognized physical processes that could lead to the discovery of the laws of science, and discovered the origin of rainbows. He found



that prisms are formed through the refraction of light and constructed the first reflecting telescope that was then improved by William Herschel. He formulated the three laws of motion in 1687, achieving the first significant breakthrough in the modern science. Newton proved that the planetary orbits are part of the first principles of mechanics. The laws he invented could be applied to all inanimate matter in the solar system. According to him, the universe is both orderly and comprehensible. The laws of gravity and motion proved to be significant as part of the Enlightenment.

William Durham

William Durham searched for the consequences of incest through ethnographic records of sixty random societies. He discovered that twenty were aware of these consequences. Among them were the Tlingit Amerindians, the Lapps of Scandinavia, the Tikopians from Polynesia, the Kapauku from New Guinea, and the Toradja of Sulawesi. He found that sixty societies used incest motifs in their myths but only five admitted to evil effects. A larger amount admitted to beneficial effects, such as resulting giants and heroes.

John Locke

John Locke advocated that those who fail to believe in God should not be tolerated. He himself was a believer and thought that atheists were incapable of being part of human society. He believed in God as only belief in god could inspire men to follow obligations.

Antonio Damasio

Antonio Damasio was a famous neurologist who described the role emotions play in our consciousness. He described the mind in a holistic way, depicting the existence of two emotions: primary, that is instinctive, where little conscious activity is needed; and secondary emotions, that are part of personalized experience, such as friendship or success at work. Damasio thought that nature allows secondary emotions to be expressed by the same channels as primary emotions.

Darwin

Darwin wrote *The Origin of the Species* that depicted natural selection as part of the evolution of species. The diversity of life was self-assembling, created through random variation and survival of the fittest.

George Bernard Shaw

George Bernard Shaw, who called himself an atheist, viewed Darwinism with repugnance as reducing creation to matter and random circumstances. For him such

perception was fatal, depriving life of beauty, sentiment, intelligence and assigning such ideals to matter.

Freud

Freud proposed a hypothesis that mysticism and science connect in dreams. As our dreams disguise our unconscious wishes we release our most primitive fears and desires that can then be transferred to our conscious mind. They can only be played as characters or symbols so that our sleep is not disrupted and it is difficult for an ordinary person to know their meaning upon awakening. He focused on the hidden irrational processes in our brain that inspired psychology in the future. His error was, however, in lack of testing of his theories. He also failed to correctly guess the nature of the roles and transference that is based on the reorganization of information rather than hidden memories and emotions.



Objects/Places

Tuscalosa

Wilson studied at the University of Alabama in Tuscaloosa.

Ionia

Thales of Miletus, considered to be the founder of the physical sciences, lived in Ionia in the sixth century B.C.

Derrida Paradox

The Derrida paradox is similar to the Cretan paradox: a Cretan says "all Cretans are liars".

Western Europe

Science has various questions and procedures that are not easy to master and hence it takes a long time to start it mostly in Western Europe.

Vienna Circle

Vienna Circle was a group formed by Moritz Schlick and made of Austrian intellectuals to foster a logical positivism that was to define the essence of scientific statements. Later, they emigrated to the US to escape from the Nazi regime.

Cretan Labyrinth

The Cretan labyrinth has corridors with twists and turns through which Theseus walked. During his walk he unraveled a ball of thread that he received from Ariadne to find the Minotaur that devoured seven people each year as part of a sacrifice. Theseus returned from the labyrinth following the thread that symbolizes consilience; the labyrinth is the unknown world that humanity traverses through, struggling to understand it.

Western Amazonia

The rain forests of Western Amazonia have a large volume and diversity of snakes.



Amazonian Peru

Amazonian Peru is a place where Pablo Meringo, a shaman and artist depicts his visions in paintings based upon traditions of Amerindians.

Church of the New Jerusalem

Church of the New Jerusalem was founded by Emanuel Swedenborg who believed that dreams have secrets of the divine.

Gatun Lake

The creation of Gatun Lake during the construction of Panama Canal in 1912 created an isolated land covered with forest named Barro Colorado Island that became a biological research station prey to cats. Due to the lack of natural predators, the system became out of balance, where some animals multiplied beyond control leading to the sudden rise in some species, such as bacteria and fungi, to the detriment of others, affecting the entire ecosystem.

Themes

The Unification of Knowledge

The central theme of the book is the unification of knowledge. Each branch of learning can enhance the understanding of other branches of learning. The Unification of knowledge is necessary for humans to know and understand who they are and why they exist. The unification of knowledge can also liberate the mind. Such attempts can end in failure but it is human to endeavor even if there is lack of success as long as it is honorable and memorable. The myth of Icarus, who tried but failed when flying towards the Sun on wings from wax and feather can be viewed as the punishment of foolishness or defeat of pride. It can also be viewed as the daring of human endeavor. It is also an attempt to test how far can humans go.

The unification of knowledge is part of the Ionian Enchantment that signifies a belief that the world is orderly and guided through few simple rules. Such unification expressed by Thales of Miletus incorporated the belief that all matter consists of water. This view, although not entirely right, contains a perception of the unifying nature of the world and sciences. The Enchantment became dominant in scientific thought. In physics it signified the unity of forces of nature to the extent that it was also to become a perfect system of thought.

The unification of sciences is still a valid notion supported by perceptions that complex phenomena are united, despite appearing to be separate events as Marcel Grossman proposed. The unification of knowledge allows the release from dogma towards an attempt to venture.

Empirical versus transcendental views

The clash between empirical and transcendental views involves the recognition that the Darwinian theory has relevance, as evolution represents an important element in natural history as part of biological organization. The unity of knowledge is a concept that sparked scientific thought and the concept of the perfect system of thought, along with significant developments in physics and other sciences. The unification of knowledge releases while at the same time clashes with religious views that contain hope, faith, charity, and heritage. Religions represented by great ideals, however, led to wars.

Religion that inspires is also part of belonging, reminding that life is larger than humanity while steering to rise above instincts, giving explanations for our origins and continuation. Revelation provides certain satisfaction that our existence is justified. Religion also provides a sense of significance but is unable to deliver the explanation of the complexity of life on earth. The attractive aspects of religion involve its inspiration of love and hope. The fundamental clash between religion and science is its basic assumption of the origin of human beings. While religion claims that we belong to a



different world, science certifies the origins of human evolution across hundred of thousands of years. Our immaterial state that is to manifest itself after our death may fail to eventuate the way we hope. Even then, sacral traditions provide believers with hope in times of turmoil, with prayer delivering relief. Despite convincing arguments, religion proves that it is needed and beneficial. The clash between religion and science may remain unresolved, but it can be reconciled.

Biology as the unification tool

Biology can enhance our view of the world that gains a different perspective when we unveil the manner in which it classifies life on earth, gaining a theoretical structure through the Darwinian theory of evolution. The same pattern that exists in biology involves causal events that are part of biological organization that are also applicable to life. Species not only exist in real life. They are also part of real science.

Biology also invites the view that the world proceeds according to a certain order and is orderly. Biology is connected with other branches, such as environmental policy, ethics, and social science. Each area can stand apart with specific language, standards, and language. Concepts serve to guide us. Biology is closely related both to environmental policies and ethics. Few policies can be identified that deal effectively with environmental threats. Only when other scientific domains are identified, where the focus of research can be determined, can a proper line of action can be established.

Human actions involve events of physical causation. Biology is linked to natural sciences that unveil the causation of historical events. Collaboration between various sciences represents also the recognition of borderlines where consilience can be tested. Biology as well as other sciences need to be recognized in devising solutions to the most common problems facing humanity, such as ethnic conflict, arms escalation, overpopulation, environment, and poverty.

Style

Perspective

Wilson has made contributions in such areas as population genetics, evolutionary biology, entomology, and ethology. Consilience is a study of sciences that should have a common goal to provide understanding, purpose, and solutions. Through the synthesis he raises issues of scientific purpose, human nature, religion, and rectifies confusion that has entered these areas when wrong premises are adopted or wrong questions are asked. His work inspires with thought-provoking case studies, indicating that science can be better studied when a meaning is adopted. He considers the Enlightenment as the most vital period that delivered important philosophical and scientific concepts that drove civilization to where it is today.

The author argues that social and natural sciences should work together towards solving the most urgent needs of humanity. Wilson raises issues present in all areas of humanity. He considers biology as capable of linking other sciences and phenomena. All subjects that involve economics, art, religion, ethics, and human mind are analyzed. The most urgent issue involves the environment and is considered as most vital to the survival of humanity. Only when all branches of learning work together can solutions be designed as we approach the critical moment for human development hindered by the imminent environmental disaster.

His central argument concerns sociobiology and the genetic evolution. His arguments provide a convincing case for a more knowledgeable approach to sciences that need more awareness of their purpose. Both empirical and transcendental views are present when attempting to decipher the meaning of our existence. Through epigenetic rules that evolved along with our brain development as part of our survival, we are prone to certain behaviors most prominent in our family relations that discourage incest while striving for support between the closest relations.

Tone

Wilson provides cases, metaphors, and explanation that lead to conclusions some may consider radical. His style of writing is gentle, respectful, and well argued.

Wilson uses elegant prose that also moves while using comparisons. His optimistic views are interwoven with insights, information, facts, and thoughts. At times a conversational style incorporates questions. He has the ability to provide clear and thought provoking arguments while being economical and meaningful.

His analysis is provocative, while his assertions are meaningful and informative. The tone changes as it delves into historical events to ensure that while arguing for the objective world view, he maintains objective perspective.



Both transcendental and empirical arguments unveil arguments from all areas of life. Statements are also considered with reflection. His views may be controversial, but his tone is also quite reserved. There is nothing that can be considered as redundant, and his changing methods of argument make reading engaging. He traverses across many topics with ease, raising points that touch real life, knowledge, and assumptions. His colorful examples are derived even from movies as ways of illustrating arguments. Nothing seems to be abandoned in the pursuit to find the truth amidst chaos and confusion. His writing contains also a tone of discovery, where we delve into various areas, time, space, and places.

Structure

The book is divided into twelve chapters. Each deals with a different scientific area, such as physics, chemistry, biology, economics, social sciences, the arts, humanities, philosophy, religion and ethics, and environment. Each chapter begins with a certain historical perspective. Each chapter leads to the following chapter with implications for other chapters. He carries his investigation into each chapter with a similar methodology.

He often resorts to myths, metaphors, and history. In all chapters the themes of ethics and religion also emerge, as ethics is what is most important to human survival.

The entire book progresses from the beginning, where Wilson's arguments originate during his studies through the historical account of the origin of his inspiration until the last most urgent issue that deals with current human survival on the planet.

All other areas that are analyzed pertain to human life and are essential to its evolution. Science is as necessary as ethic and arts. Two arguments apparent throughout involve science and religion. As a scientist he presents mostly empirical arguments, although conclusions are drawn based on cultural, anthropological, and historical accounts.

All arguments are presented in such a way that they represent a synthesis of statements leading to the final ultimate conclusion. It is no coincidence that ethics and religion are raised just before the last chapter that deals mostly with human current survival and the environment. As the final conclusion states, it is ethics that is a tool to survival, but needs to include other life on earth.



Quotes

"Whether that metaphor is accepted or not, the undeniable truth is that each society creates culture and is created by it," p. 131.

"When we have unified enough knowledge, we will understand who we are and why we are here," p. 7.

"And so the great astrophysicist Subrahmanyan Chandrasekhar could pay tribute to the spirit of his mentor, Sir Arthur Eddington, by saying: 'Let us see how high we can fly before the sun melts the wax in our wings,'" p. 7.

"The more forbidding the task, the greater the prize for those who dare to undertake it," p. 209.

"Both the known and the unknown, the two worlds of our ancestors, nourish the human spirit," p. 233.

"No barrier stands between the material world of science and the sensibilities of the hunter and the poet," p. 237.

"Now, with science and the arts combined, we have it all," p. 237.

"We are better off if the economists speak than if they remain silent," p. 197.

"The world economy is a ship speeding through uncharted waters with dangerous shoals," p. 198.

"God may exist, He may be delighted with what we are up to on this minor planet, but His fine hand is not needed to explain the biosphere," p. 198.

"'Oh how we hate one another,' observed Cardinal Newman, 'for the love of God,'" p. 239.

"The choice between transcendentalism and empiricism will be the coming century's version of the struggle for men's souls," p. 240.

Topics for Discussion

Compare and contrast empirical and transcendental views of scientific method.

Can all knowledge be objective?

How can science be analyzed and/or improved?

Discuss the ways science may have contributed to the environmental problems.

Can art be scientific?

What is the connection between ethics and the environment?

Discuss how consilience can benefit the environment and other sciences.