Maury Seldin's notes for Consilience, Part I

Consilience Presentation at Books and Ideas, November 19, 2002

The Author: Edward O. Wilson

Edward O. Wilson is, according to *Time* magazine, one of America's twenty-five most influential people of the 20th century. He won the Pulitzer Prize twice: once for *On Human Nature.*, then for *The Ants.* Some colleagues consider him the most important biologist since Charles Darwin. He is a pioneer in sociobiology and diversity and argues for the fundamental unity of knowledge, which is what the book, *Concilience* is about.

Some addition background is as follows: His doctorate is in biology from Harvard where he taught for four decades. His rank was Pellegrino University Research Professor. Also, at Harvard, he was Curator in Entomology of the Museum of Comparative Zoology. And, he has received numerous honors and awards in addition to the two Pulitzer Prizes mentioned.

The Book

The book, *Consilience: The Unity of Knowledge,* argues for the fundamental unity of all knowledge. The idea is that, "everything in our world is organized in terms of a small number of fundamental natural laws that comprise the principles underlying every branch of learning."

The word, "Concilience" goes back to the 19th century. It was used by philosophers of science. It refers to the connection of different disciplines through shared basic laws. Thus, the concept is uniting knowledge at a fundamental level. A wide range of disciplines are discussed in the book; including biology, anthropology, psychology, religion, philosophy and the arts. The key, as I see it, is that the commonality of natural laws extends from the physical and natural sciences to the humanities and the social sciences.

The Ionian Enchantment

The title of the opening chapter, "The Ionian Enchantment," refers to a belief in the unity of the sciences. That is, a conviction, "that the world is orderly and can be explained by a small number of natural laws." [pp.4-5]

It is an expression coined by the physicist and historian Gerald Holton. The roots of the belief go back to a philosopher of the sixth century B.C.E., Thales of Milietus, in Ionia. Thales' belief that all matter ultimately consists of water is "often cited as an example of how far astray early Greek speculation could wander, [however the real significance of his thought] is the metaphysics it expressed about the material basis of the world and the unity of nature."

Wilson's "Ionian Enchantment" began with a reading of *Systematics and the Origin of the Species* by Ernst Mayr, published in 1942. {read text, p. 4}The book united the 19th century Darwinian theory of evolution with modern genetics. It gave a theoretical structure to natural history.

"Einstein, the architect of grand unification of physics, was Ionian to the core. That vision was his greatest strength." So writes Wilson in his development of the explanation that modern physics has focused on the unification of the forces of nature. He also writes, "But the spell of the Enchantment extends to other fields of science as well, and in the minds of a few it reaches beyond into the social sciences, and still further, as I will explain later, to touch the humanities."

Thus, the opening chapter, among other things, serves as a preface introducing the series of chapters that ranges from the natural sciences to the arts, with chapters on the mind, social sciences, and ethics and religion. {see table of contents}

However, the opening chapter concludes with a sharing of some personal philosophy. He writes,

> "…people must belong to a tribe; they yearn to have a purpose larger than themselves. We are obliged by the deepest drives of the human spirit to make ourselves more than animated dust, and we must have a story to tell about where we came from, and why we are here." When I read that, Tolstoy's *The Death of Ivan Ilyich* came to mind.

<u>The Great Branches of Learning</u>

The second chapter is titled, "The Great Branches of Learning." It, along with the first chapter, and perhaps the third, provides the introduction to the chapters that discuss consilience with a focus on disciplines or areas of knowledge.

The chapter opens as follows: "You will see at once why I believe that the Enlightenment thinkers of the seventeenth and eighteenth centuries got it mostly right the first time." [p8] {Read the paragraph- ending with natural sciences}

The thrust is in the sentence, "The greatest enterprise of the mind has always been and will always be the attempted linkage of the sciences and the humanities." The diagnosis is, "The ongoing fragmentation of knowledge and resulting chaos in philosophy are not reflections of the real world but artifacts of scholarship."

The chapter is brief. The point is made that, "The belief in the possibility of consilience beyond science and across the great branches of learning is not yet science.
It is a metaphysical world view, and a minority one at that, shared by only a few scientists and philosophers." [p.9] {Possibly read paragraph.}

Although he is not prepared to attempt a proof of the interdisciplinary application across the social sciences and humanities, most of the chapter develops an example dealing with environmental policy, ethics, social science, and biology.

> [Interestingly enough this is relevant to Tom Pickard's Books and Ideas discussion of *the Skeptical Environmentalist* by Bjorn Lomberg on October 8.]

Wilson makes the point that most real world problems are at the point where the disciples involved are most closely intertwined. And, that this is where we are least equipped to deal with them. He points out that there is an increase in shifting domains to hybrids. Concilience is implicit in this melding of disciplines.

Wilson doesn't say so, not as far as I can see, but it is my professional opinion that the progress that is made may well comes from a top down rather than a bottom up method. That means that as we get more interdisciplinary studies we reconcile the disciplines and identify commonality in principles and build toward consilience from the top down. There may be progress from the bottom up, but that requires the identification of principles and the exploration of wider application. That is tougher, but Newton did it when the apple fell on his head. Perhaps we will have more on this later, especially in chapter 4.

Wilson sees the unification agenda as important for improving decisions. He advocates curriculum reform in colleges and universities so that, "Every college student should be able to answer the following question: What is the relation between science and humanities, and how is that important for human welfare?" [p.13]

The importance is summarized as follows: "Most of the issues that vex humanity daily – ethnic conflict, arms escalation, over population, abortion, environment, endemic poverty, to cite several most persistently before us–cannot be solved without integrating knowledge from the natural sciences with that of the social sciences and humanities." [p. 13]

The criticism is,"…the vast majority of our political leaders are trained exclusively in the social sciences and humanities, and have little knowledge of the natural sciences. The same is true of the public intellectuals, the columnists , the media interrogators, and think tank gurus. The best of their analyses are careful and responsible, and sometimes correct, but the substantive base of their wisdom is fragmented and lopsided."

His conclusion is "A balanced perspective cannot be acquired by studying disciplines in pieces but through pursuit of the Concilience among them." [p.14] He continues, "Such unification will come hard. But I think it is inevitable." The great progress on the road seems to be with the Enlightenment. The third chapter is titled, "The Enlightenment."

<u>The Enlightenment</u>

The Enlightenment of the 17th century was focused on making progress by the use of reason. That use of reason came through the advancements in the natural, physical, and social sciences.

The scientific revolution that started in the century preceding the Enlightenment brought dramatic progress to the quality of life in Western civilization. More important than the technology, at least in my view, is the freedom brought about by the Enlightenment. People, today, think about things differently than did people of a few centuries ago. This thought is grounded in the scientific revolution. It has migrated from the physical sciences to the social sciences.

This migration is noted in Wilson's opening to the third chapter, to wit,

> "The dream of intellectual unity first came to full flower in the original Enlightenment, an Icarian flight of the mind that spanned the seventeenth and eighteenth centuries. A vision of secular knowledge in the service of human rights and human progress, it was the West's greatest contribution to civilization. It launched the modern era for the whole world: we are all its legatees. Then it failed."

The start of the second paragraph asserts failure of the Enlightenment when its ideas no longer dominate. Wilson writes that the essential nature of the Enlightenment and that the weakness that brought it down can be said to be wrapped up in the life of the Marquis de Condorcet "Science was the engine of the Enlightenment..." It provided an organization of the body of knowledge utilizing laws that dealt "..with entities that can be measured and arranged in hierarchies…"

Among the scientific achievements that were the precursors to the Enlightenment were the pioneer applications of mathematics to the social sciences. Condorocet's work in this area was a distant forerunner to current decision theory. It was not only the scientific developments that made progress possible, it was the applications to social change.

Although Condorcet's major scientific work was his "Essay on the Application of the Probability of Major Decisions (1785)," his most relevant work for our discussion is his philosophical work, "Sketch for a Historical Picture of the Progress of the Human Mind (1795)." He wrote that while in hiding since he was extending the world of reason to social affairs and that ran up against some intolerant leadership.

To quote Wilson, "The French Revolution drew its intellectual strength from men and women like Condorcet. It was readied by growth of educational opportunity and then fired by the idea of universal rights of man. Yet as the Enlightenment seemed about to achieve this by means of political fruition in Europe, something went terribly wrong." [p.16]

Wilson goes on the explain that Rousseau's "Social Contract" of thirty years earlier while inspiring the later slogan of "Liberty, Equality, Fraternity," also "invented the abstraction of 'general will' to achieve these goals. …Those who do not conform to the general will, Rousseau continued, are deviants subject to necessary force by the assembly. There is no other way to achieve a truly egalitarian democracy and thus break humanity out of the chains that everywhere bind it." [p.16]

Wilson continues,

> "Robespierre, leader of the Reign of Terror that overtook the Revolution in 1793, grasped this logic all too well. He and his fellow Jacobins across France implemented Rousseau's necessary force to include summary condemnations and executions for all those who opposed the new order….
> "…Thus took form the easy cohabitation of egalitarian ideology and savage coercion that was to plague the next two centuries…"
> "…The decline of the Enlightenment was hastened not by just tyrants who used it for justification but by rising and often valid intellectual opposition. Its dream of a world made orderly and fulfilling by free intellect had seemed at first indestructible, the instinctive goal of all men. Its creators, among the greatest scholars since Plato and Aristotle, showed what the human mind can accomplish. Isaiah Berlin, one of the most perceptive historians, praised them justly as follows, 'The intellectual power, honesty, lucidity courage, and disinterested love of the truth of the most gifted thinkers of the eighteenth century remain to this day without parallel. Their age is one of the best and most hopeful episodes in the life of mankind.' But they reached too far, and their best efforts were not enough to create the sustained effort their vision foretold." [pp 16-.17]

Had Rousseau spoken of general reason rather than general will, events may have unfolded differently. Wilson puts the end of the Enlightenment as March 29, 1794, the date of the death of the Marquis de Condorcet. The imposition of "the general will" had left no room for reasonable differences.

These thoughts bring to mind *The Hedgehog and the Fox* as well as *The Crooked Timber of Humanity,* both by Isaiah Berlin. Knowing the one big thing as a utopian view is not a reasoned justification for an imposition on others who see things differently. The issue is how to co-exist with different views, and that is what Isaiah Berlin speaks of with his concept of plurality.

The relevance in all of this is in dealing with major issues of today. If we define the issues restricting ourselves to one discipline, then the outcome is in that context. However, if the problem is an interdisciplinary problem, then the analytical system needs cognizance of the different perspectives.

The Wilson plea for Concilience is for a unification of disciplines, looking for the principles common to all the disciplines The relevance here is that the scientific method breakthrough of Francis Bacon, in the preceding century, set the stage for the Enlightenment from the perspective of science. Bacon rejected the sharp separation of disciplines prevailing since Aristotle and visualized a pyramid of knowledge, "with natural history forming the base, physics above, and subsuming it, and metaphysics at the peak.." [p.25]

Condorcet picked up on the idea of the cosmos being a combination of "entities that can be measured and arranged in hierarchies." And, he furthermore "…called for the illumination of the moral and political sciences by the 'torch of analysis." [p. 24]

As noted, Condorcet applied the math of the physical sciences to the social sciences. He thus led the way to the present day social science obsession with rigor. As I have noted elsewhere, academics worship at the alter of rigor. Relevance takes second place because the incentive system focuses on peer reviewed research in prestigious learned journals. These journals are typically focused on discipline rather than issues. The issues may be inter-disciplinary, but the academic structures are typically departmentalized by discipline. Or, using the words of Edward O. Wilson from his Consilience: The Unity of Knowledge, "Grants and honors are given in science for discoveries, not for scholarship and wisdom….The same professionalism atomization afflicts the social sciences and humanities." [p.42] { I did adlib some discussion of these issues in Schools of Business.]

This organization of knowledge has afflicted us in the way we organize our programs and pursue our discussions. The roots of change may be found in the Enlightenment that started in the seventeenth century. As previously noted, it was then that Francis Bacon "rejected the sharp divisions among disciplines prevailing since Aristotle." [p.28]

It is time for a New Enlightenment, one in which relevance and rigor are teamed in the analysis of issues using interdisciplinary techniques. Concilience would reveal the principles common to the various disciplines. In the meantime, the paradigms need to be blended. The ensuing chapters focus on specific areas of knowledge.

The Natural Sciences

Chapter 4 is titled, "The Natural Sciences." It starts off by saying that, "… the faith of the Enlightenment thinkers in science was justified." He defines science as follows:

> "Science is neither philosophy nor a belief system, it is a combination of mental operations that has become increasingly the habit of educated peoples, a culture of illuminations hit upon by a fortunate turn of history that yielded the most effective way of learning about the real world ever conceived."

Using the examples of visible light and the human auditory range, Wilson makes the point that the pre-scientific people had no basis of knowing reality beyond that which they could experience by their senses. Science, with appropriate instruments, has enabled us to better understand the system and know about light that we cannot see and sound that we cannot hear.

Wilson explains that natural selection has given us the senses that we need and given other creatures the senses that they need. We don't have the same senses. It takes science to understand theirs as well as ours.

He explains that natural science emerged as a product of history out of three conditions: "The first was the boundless curiosity and creative drive of the best minds. The second was the inborn power to abstract the essential qualities of the universe. [The third was] '…the unreasonable effectiveness of mathematics in the natural sciences" [pp. 52-53]

The evolutionary explanation is summarized as follows:

> "In the ultimate sense our brain and sensory system evolved as a biological apparatus to preserve and multiply human genes. But they enable us to navigate only through the tiny segment of the physical world whose mastery serves that primal need. Instrumental science has removed the handicap. Still, science in its fullness is much more than just the haphazard expansion of sensory capacity by instruments. The other elements in its creative mix are classification of data and their interpretation by theory. Together they compose the rational processing of sensory experience enhanced by instrumentation." [p 56]

Wilson continues with a discussion of the concept of theories noting that scientific theories are the product of informed imagination that reaches out "…to predict the existence of previously unsuspected phenomena. They generate hypotheses…" [p57]

He leads to the following: "Science…is the organized systematic enterprise that gathers knowledge about the world and condenses knowledge into testable laws and principles.." [p.58]

Ariadne's Thread

Chapter 5, "Ariadne's Thread," starts with a metaphor that gives the chapter its name. Ariadne, the love struck daughter of Crete's King Midos, gave Theseus, whom she loves, a ball of thread. Theseus unravels the thread as he makes his way through a labyrinth. He is then able to retrace his steps. [Read from page 72.]

The point of the chapter is that in exploring the tree of knowledge, it is less difficult to go from the branches back to the base than it is to go forward from the base to the branches. This metaphor relates to the point that it is less difficult to go from biology back to chemistry and physics than it is to go forward from physics and chemistry to biology.

The 32 page chapter has some really interesting examples from ants and dreams of serpents. As you may recall from my introductory remarks, Wilson won Pulitzer Prizes for two books. One was *The Ants.* The other, *On Human Nature*, is especial relevant in the next chapter, "The Mind." But, the thread of his work, from what I have been able to discern, is to move our understanding of the world we live in, by the use of science, through linking the understanding of the physical sciences to understanding the cognitive science. He does not use the phrase "cognitive science." Rather he refers to the mind. [Read the first paragraph on page 103.]

The Mind

Chapter 6, "The Mind," starts off as follows: "Belief in the intrinsic unity of knowledge – the reality of the labyrinth – rides ultimately on the hypothesis is that every mental process has a physical grounding and is consistent with the natural sciences. The mind is extremely important to the consilience program for a reason both elementary and disturbingly profound: Everything that we know and can ever know about existence is

created there." That was the first paragraph. I'll now read the next two paragraphs, perhaps with some adlibs. [p105.]

The key points are: Understanding the brain requires science. Philosophy is knowledge challenged in this matter. There has been a biological evolution of the brain. That evolution focused on survival. In order to see more than survival, it takes knowledge applied in a holistic paradigm. The best quality of knowledge is from science. Other options included myth, self-deception, and ritual. I would add superstition and dogma as lesser qualities of knowledge.

The human brain is the most complex object known in the universe. Of course it takes the brain to know the brain. But, it was not designed or that purpose. As noted survival was the purpose.

Over the last 200,000 years the average brain size quadrupled. It has the volume of about two quarts. It weighs about three pounds. It was the seat of the higher functions that grew most. So now we have taken control of the planet, more or less, be that desirable or not. We are not doing very well with it, some might say.

[THIS IS WHERE THE PRESENTATION ENDED.
You may want to read the essay referred to, so I am including the notes from the rest of the chapter.]

The concept of progress may mean moving toward a goal. It may also mean growth and development, as in evolution. When I first read the following two sentences a couple or few years ago, they inspired an essay. The sentences are from page 107. [READ]

The essay is entitled "Making Progress." It speaks to fostering an interdisciplinary approach, applications of knowledge, as in engineering, and making a difference, professionally. If interested the web site is hoyt.org. Click on Advanced Studies Institute, then on the side bar scroll to ASI Newsletter inserts. It is from the Fall 2000 issue.

Wilson develops the point the mind is the brain at work. He writes that, "The brain and its satellite glands have been probed to the point where no particular site remains that can reasonably be supposed to harbor a nonphysical mind." [p108]

He continues with his consilience theme, writing as follows: "As late as 1970 most scientists thought the concept of mind a topic best left to philosophers. Now the issue has been joined where it belongs, at the juncture of biology and psychology."

This is a great segue to the next chapter, "From Genes to Culture." But there is some really interesting stuff in the rest of its chapter. Some of it relates to his earlier work, *On Human Nature*, 1978, two decades earlier. Some of it relates to later chapters in the *Consilience* book. He writes, [pages 125-126]

> "What we call *meaning* is the linkage among neural networks created by the spreading excitation that enlarges imagery and engages emotion. The competitive selection among scenarios is what we call *decision making*. The outcome, in

> terms of the match of the winning scenario to instinctive or learned favorable states, sets the kind and intensity of subsequent emotion. The persistent form and intensity of emotions is called *mood.*

The relevance of all of this, in my view, is that societal progress is a function of the decisions we make. So we look to philosophy and science (natural science and social science) to help us understand the system so as to be able to make better decisions.

A paragraph from Wilson's earlier work, *On Human Nature,* sheds a lot of light. It is [p75] "…A schema is a configuration within the brain, either inborn or learned, against which the input of nerve cells is compared. The matching of the real and expected patterns can have one or the other of several effects. The schema can contribute to a person's mental "set," the screening out of certain details in favor of others, so that the conscious mind perceives a certain part of the environment more vividly than others and is likely to favor one kind of decision over another. It can fill in details that are missing from the actual sensory input and create a pattern in the mind that is not entirely present in reality. In this way the gestalt of objects – the impression they give of being a square, a face, a tree, or whatever – is aided by the taxonomic powers of the schemata."

Elsewhere in the same book, page 55, Wilson writes,

> "We have at last come to the key phrase: genetic determinism. On this interpretation depends the entire relation between biology and the social sciences."

Then, later in the same book, page 199,

> The search for values will then go beyond the utilitarian calculus of genetic fitness. Although natural selection has been the prime mover, it works through a cascade of decisions based on secondary values that have historically served as the enabling mechanism for survival and reproductive success. These values are defined to a large extent by our most intense emotions: enthusiasm and a sharpening of the senses from exploration; exaltation from discovery; triumph in battle and competitive sports; the restful satisfaction from an altruistic act well and truly placed; the stirring of ethnic and national pride; the strength of family ties; and the secure biophilic pleasure from the nearness of animals and growing plants."

Thus, as I see it, making progress is predicated on instilling values into the schema such that the frame work of decision making has the suitable foundation. That is philosophy and whatever else you want in the value system. Furthermore, we need better understanding through the sciences, natural and social, in order to be able to forecast the outcome of courses of action. The blending of disciplines is what consilience is about.

Others have approached it in different ways. Einstein attempted to "establish a unified theory of the classical fields of gravitation and electromagnetism." A description from the web is as follows:

Unified Field Theory, in physics, a theory that proposes to unify the four known interactions, or forces—the strong, electromagnetic, weak, and gravitational forces—by a simple set of general laws. Four distinct forces are known to control all the observed interactions in matter: gravitation, electromagnetism, the strong force (a short-range force that holds atomic nuclei together), and the weak force (the force responsible for slow nuclear processes, such as beta decay). The attempts to develop a unified field theory are grounded in the belief that all physical phenomena should ultimately be explainable by some underlying unity.

The unified theory approach has now been extended to the social sciences. description from the web is as follows:

Information Interaction Design: A Unified Field Theory of Design by Nathan Shedroff

One of the most important skills for almost everyone to have in the next decade and beyond will be those that allow us to create valuable, compelling, and empowering information and experiences for others. To do this, we must learn existing ways of organizing and presenting data and information and develop new ones. Whether our communication tools are traditional print products, electronic products, broadcast programming, interactive experiences, or live performances makes little difference. Nor does it matter if we are employing physical or electronic devices or our own bodies and voices. The process of creating is roughly the same in any medium. The processes involved in solving problems, responding to audiences, and communicating to others are similar enough to consider them identical for the purposes of this paper. These issues apply across all types of media and experiences, because they directly address the phenomena of information overload, information anxiety, media literacy, media immersion, and technological overload--all which need better solutions.

These approaches, as well as that of consilience are based on a bottom up approach of seeking principles that apply to the different disciplines.

An alternative approach is to go top down. That is to blend disciplines. Among these interdisciplinary approaches is that of cognitive science, which has been referred to as a "gigantic melting pot where disciplinary boundaries no longer hold." [p196, *The Science of the Mind.*]

[This concludes my notes from the first six chapters.]