

UT versus Harvard

The University of Texas at Austin might not sound like much alongside Harvard, and I don't mean *Harvard University, located at Cambridge in the American state of Massachusetts*, the way they say on the radio. I mean **Harvard**, the greatest university there ever was or ever could be, whose name is whispered in awe and envy to the four corners of the Earth. Where anything else is a jerkwater college out in the Provinces someplace, and where Steven Pinker is Johnstone Family Professor of Psychology.

MacNeilage isn't as famous as Pinker, but University-of-Texas-at-Austin professor MacNeilage is plenty influential in his way. I have been aware of him since at least 1970, when my graduate adviser mentioned something to me about errors in typing. I remembered that MacNeilage had discovered lateralization in the brains of grasshoppers, or something like that. I knew that we had mutual friends, but I never expected to have such an intimate connection to the great scientist. I bought his book through eBay at cut prices, and began reading:

MacNeilage, Peter F. 2008. *The Origin of Speech*. Oxford University Press. xi+389 pages.

MacNeilage spent a year (Acknowledgments, page ix) with Björn Lindblom and Michael Studdert-Kennedy at the Stanford Center for Advanced Study, a row of pleasant, sunlit cabins for writing, and a nearby cafeteria, where scholars can think and write and visit with their colleagues, un-interrupted. He is closer to MSK than I am. MSK was for many years the Director of the Haskins Laboratories, the world's leading phonetics laboratory, now in New Haven, Connecticut; and Lindblom is a member of the Royal Swedish Academy of Sciences, possibly the most prestigious scientific forum in the world. He is the world's most revered living phonetician. I have been aware of him, too, since at least 1970. All three of them have an intimate connection to the particulate principle. In his Acknowledgements, page x, MacNeilage mentions a "fruitful semester with Benedict de Boysson-Bardies at the Maison l'Homme in Paris". And on page xi, MacNeilage thanks "one particular reviewer for an exhaustive and extremely helpful critique" of his 2008 book. That reviewer must have seen MacNeilage's page 97, the one that reads, "Chomsky's generative grammar, of course, incorporates the particulate principle". Who was it? I have to wonder why the reviewer's identity had to remain hidden. From whom? From me? Professor MacNeilage (2008, page xi) doesn't hesitate to thank editors Kathleen Gibson and Jim Hurford by name. Why hide the name of his special helper? Anyone I know?

On his (2008) page 97, MacNeilage sets up his annihilation of the particulate principle. Quoting Michael Studdert-Kennedy 1998, he explains, "Abler (1989) has singled out the elements of chemistry, the genes, and units of language as instances of "the particulate principle of self-diversifying systems" (MSK p.67). As summarized by Studdert-Kennedy: "According to this principle, elements drawn from a finite set ... are repeatedly permuted and combined to yield larger units ... higher in a hierarchy and more diverse in structure than their constituents. The particulate units in chemical

compounding, included atoms and molecules, and in biological inheritance, genes and proteins" (1998, p. 203)." I don't know why MSK would use Pinker's page 84 in explaining my theory, but he says that the ideas are mine, not Pinker's.

Studdert-Kennedy, Michael 1998. The particulate origins of language generatively: from syllable to gesture. Pages 202-221 in: Hurford, James R., Studdert-Kennedy, Michael, and Knight, Chris 1998. *Approaches to the Evolution of Language*. Cambridge University Press. ix+442 pages.

In his Index, page 382, MacNeilage offers the quote on page 97 as the definition of the particulate principle; but it is at best a corollary, taken from the caption to Figure 1, page 2 of my 1989 paper. MSK's explanation of combinations is taken from Pinker's *TLI* page 84, as I showed earlier; and MSK should have known that I would not be happy to see Pinker's words attributed to me, while Pinker is saying that sentences are a discrete combinatorial system, an idea that I knew was wrong. MacNeilage carefully leaves out Studdert-Kennedy's next paragraph, page 203, which includes a (barely) tolerable explanation of the particulate principle: "Abler's (1989) central point was that Fisher's (1930) arguments concerning the mechanism of biological inheritance could be extended to chemistry and language," That isn't what I did, but it is a way of presenting the idea; and the repeated inclusion of chemistry should have stood as a warning that the particulate principle is more basic than anything in biology, and that the biological theory of language is untenable.

Nevertheless, having degraded a law of nature to the observation that some systems represent a discrete infinity of combinations, MacNeilage has set the stage for the final assassination of its author (bottom of page 97): "Chomsky's generative grammar, of course, incorporates the particulate principle." Of course! How easy to pretend that no one could possibly discover anything that Chomsky didn't already know. MacNeilage's word "incorporates" is vague, even cagy. Does it mean that Chomsky anticipated the particulate principle, or that he used it? Either way, the reader will jump to the conclusion that Chomsky anticipated it.

But MacNeilage isn't finished with me. In his 2008 book, he acknowledges that his (mutilated) version of the particulate principle is true, but gives it to Chomsky. The particulate principle must have gnawed at his awareness because, three years later (2011), at the Royal Swedish Academy of Sciences, with the endorsement of his old friend Björn Lindblom, he offers a disproof as astonishingly convoluted as it is dishonest, so that if I didn't see it, I would not have believed that it was possible –but this time the particulate principle belongs to me. I just don't count for anything with Professor MacNeilage.

Bill Goes to Stockholm

The Royal Swedish Academy of Sciences RSAS is the institution that awards the Nobel Prize, and anything coming out of the Royal Swedish Academy of Sciences is arguably at the Nobel Prize level. The PERILUS program, a joint effort of the RSAS and the Stockholm University Phonetics Department, holds a symposium every year. The

audience includes high-school students, and maybe the public, but the speakers are by invitation only. And for the 2011 PERILUS Symposium on Language Acquisition and Language Evolution, sponsored in part by Björn Lindblom, Peter MacNeilage was invited to be one of seven speakers, including Lindblom himself. According to its website, PERILUS is:

"**PERILUS**

PERILUS (Phonetic Experimental Research at the Institute of Linguistics University of Stockholm) is a collection of dissertations, publications and conference contributions by the staff and students at the Section for Phonetics at the Department of Linguistics and the Stockholm University Phonetics lab. PERILUS started as a publication series in 1978 - 1979.

All PERILUS publications can be found in [Stockholm University Publication Database \(DiVA\)](#).

"This volume contains articles based on the authors' contributions to the Symposium on Language Acquisition and Language Evolution which was held at The Royal Swedish Academy of Sciences in Stockholm on the 1st and 2nd of December 2011, by initiative and funding from the Department of Linguistics at Stockholm University.

"We are proud to publish in this volume these important contributions on the broad theme of Language Acquisition and Language Evolution.

Stockholm, August 2013

Francisco Lacerda

francisco.lacerda@ling.su.se"

The original title-page of the 2011 PERIUS symposium publication features a stylized logo of the human brain, with the corpus callosum figured prominently. It looked like this, followed by a kind of content page:

Department of Linguistics

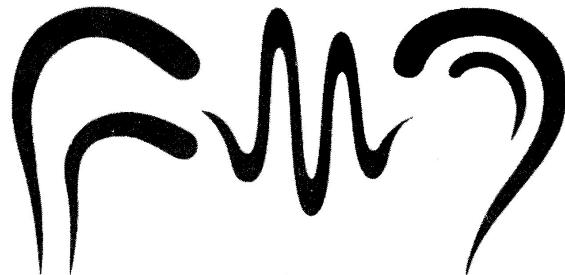


Proceedings

PERILUS 2011

Symposium on Language Acquisition
and Language Evolution

The Royal Swedish Academy of Sciences
December 1-2, 2011



Symposium on Language Acquisition and Language Evolution

Kungliga Vetenskapsakademien och Institutionen för lingvistik, Stockholms universitet
1-2 december 2011

Beijersalen, Kungliga Vetenskapsakademien, Stockholm

Symposiet hålls på engelska

<http://su.diva-portal.org/smash/get/diva2:639982/FULLTEXT02.pdf>

Öppningsanförande: Björn Lindblom
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After I wrote to Björn Lindblom, Francisco Lacerda, and to Dr. Christina Moberg, President of the RSAS, and Dr Kerstin Calissendorff, Justice of the Supreme Court and Chair of the Board of Stockholm University, advising them of Professor MacNeilage's plagiarism and bad science, the above second, content page disappeared from the PERILUS website. The place that it formerly occupied is now blank. Since no one responded to my letters, I will never know the reason for the deletion.

Professor MacNeilage's abstract begins:

The first word of Peter MacNeilage's title for his 2011 PERILUS paper, "Particulate Speech" is taken directly from the title of my 1989 paper on the particulate principle, and the first word of MacNeilage's Abstract and Introduction are my name, "William Abler". And MacNeilage sandwiches his own syllable-frame theory of speech evolution between treatments of the particulate principle –making my theory, and me, arguably the main topic of MacNeilage's article.

In spite of quoting extensively from my original article on his page 20, MacNeilage begins (page 26) not by reference to my original 1989 paper, but by misusing MSK's interpretation of it to arrive at the concept "atoms' of speech", an empty metaphor that I never suggested and now reject. Studdert-Kennedy's original quote (from Hurford, Studdert-Kennedy & Knight, eds, 1998 *Approached to the Evolution of Language*. Cambridge. Page 203) is, "The particulate units in chemical compounding include atoms and molecules, in biological inheritance genes and proteins". Studdert-Kennedy, like me [WLA], never suggests a gene-language metaphor. But MacNeilage walks the word "atoms" in a paper about language to the metaphor "atoms" of language: MacNeilage then uses the metaphor of "atoms" to create the illusion of his own path (his page 26) to a "Periodic Table" in language, as if he had arrived at it himself, when, actually, he arrived at the idea of a periodic table in language by plagiarizing Figure 3 on page 5 of my 1989 article, which shows the "Periodic properties of the phonemes" alongside the "Periodic properties of the chemical elements".

Then, having falsely used someone else's interpretation to falsely attribute to me the vacant metaphor of "atoms" of language, MacNeilage explains that "There are 118 atoms (called elements) ... which ... can be arranged consecutively in the Periodic Table according to the atomic weights indicated by their numbers (1 to 118)". Here, MacNeilage uses lining up the elements by atomic weight as if that were the periodic law. It isn't, and MacNeilage offers his readers the vaguely insulting advice to "see Wikipedia" because he doesn't want to reveal the actual concept: The periodic property refers to the repeating chemical and physical properties of the elements, not to lining them up in a row. MacNeilage leaves the reader, suggestio falsi (Fowler 1965, page 603), to jump to the conclusion that lining up the elements by atomic number is somehow the periodic property. He then disproves my supposed "atoms" by explaining that "Nothing remotely resembling the state of affairs regarding atoms and molecules [lining them up by atomic number] is true of the segmental/subsegmentsl [phoneme, or speech-sound] level of speech production."

If MacNeilage could have disproved me honestly, by demonstrating something wrong with my interpretation of the phoneme chart as a periodic table, he would have jumped at the chance. He created his compound double-reverse dishonest disproof because he couldn't find an honest one. False disproof with plagiarism isn't proof, but it is the highest possible recommendation from a distinguished scientist speaking from the highest forum in science, The Royal Swedish Academy of Sciences. I accept his praise.

Unless an old letter or diary turns up, we may never know exactly how Mendeleev discovered the periodic law. Nevertheless, he leaves clues. Page v of the Preface to the 1901 English Translation of Mendeleev's 1885 *The Principles of Chemistry* (St. Louis) tells us "... Professor Mendeléeff was led to its discovery [the periodic law] in preparing the first Russian edition of this book" [1868-170] (i, page vii). Mendeleev's descriptions of sodium and potassium are a study in parallel properties. His description of sodium (i: bottom of page 536) reads: "Pure sodium is a lustrous metal, white as silver, soft as wax ... In ordinary moist air it quickly tarnishes ..."; that of potassium, a few pages later, (i:558): "Potassium is quite as volatile as sodium, if not more so. At the ordinary temperature potassium is even softer than sodium; its freshly-cut surfaces present a whiter colour than sodium, but, like the latter, and with even greater ease, it oxidizes in moist air." ... (i:560), "The resemblance between potassium and sodium is so great that *their compounds* can only be easily distinguished in the form of certain of their salts" [Mendeleev's italics, showing that his book includes a treatment of these topics]. I would have to guess that Mendeleev noticed repeating physical and chemical properties first, and noticed relationships in atomic weight later.

MacNeilage further uses "Francis Crick's contention that that the mechanism of natural selection 'makes biology different from all the other sciences'". (Crick, Francis 1988. *What Mad Pursuit*. Basic Books, page 5). Biology, chemistry and physics are all different from one another –but none can escape the laws of physics. MacNeilge uses Crick's exuberance to support the idea that first causes in biology are a matter of natural selection, not physics, but nothing can escape the laws of physics.

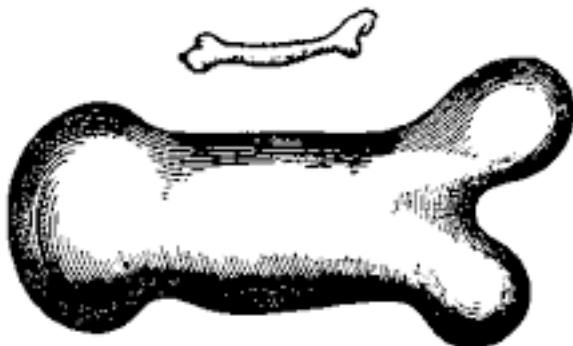
Actually the gene can't make biology different from physics. By storing discrete mutations, biology takes maximum advantage of the property that makes chemistry possible in the first place –the law of discreteness, or the particulate principle. MacNeilage confuses the phoneme with the physical events that call our attention to it – speech articulations and speech signals. No one has any idea what the phoneme itself really is.

Does Physics Matter?

MacNeilags's hyper-delicate, "It is obvious that the present perspective is somewhat different from Abler's perspective" is unconscionably supercilious. Dismissing me falsely with disdain is one thing, but presuming to correct Galileo is another. Natural selection sounds good, but nothing, not even natural selection, can over-rule the laws of physics.

Everyone has seen Galileo's drawing of the

two bones, taken from his *Opere VIII*, pages 169-170, showing the thickening required to support the weight of an animal when the length of the animal is tripled. The increase in the thickness happens because the weight of the animal, and the weight that the bone must support, increases with the cube of the length; and there is nothing that



natural selection can do about it. Innovations in the structure of bone allow partial reduction in the actual thickness. Nevertheless the bones of a large animal like an elephant are larger in proportion to the whole animal than those of, say, a mouse or a shrew. [Galileo's drawing reproduced here by kind permission of Byron E. Wall of Wall & Emerson, Inc., Toronto].

Almost as dramatic, and a little more accurate, D'Arcy Thompson's massive (779 pages of text, plus extensive notes and Index, Cambridge University Press) 1917 classic *On Growth and Form* is devoted to showing the physical and geometric laws that govern the growth of living things. Thompson shows skulls and pelvises, and the geometry of every imaginable living form, but his most famous drawing (page 751) shows the geometric relationship between an ordinary fish, *Diodon*, Figure 381, and a sunfish, *Orthagoriscus*, Figure 382, page 752 of Thompson's book. Natural selection may have stretched the dimensions of *Diodon*, but the stretching conformed to strict geometric principles.

On his page 16, Thompson shows that: "The Surface area S of a living thing is proportional to the square of its Length L^2 ; The Volume V of a living thing is proportional to the cube of its Length L^3 ; And the ratio of Volume to Surface area V/S is proportional to the Length L." Nothing in this world is free from the laws of physics. Professor MacNeilage (page 19) explicitly rejects an origin in physics, "the source of ultimate causes in biology is the theory of evolution by natural selection", yet, as part of his disproof, cites (page 26) Studdert-Kennedy 1998 and 2000, both of which reveal the particulate principle as a law in physics:

Studdert-Kennedy, M. 1998. The particulate origins of language generativity: from syllable to gesture. Pages 202-221 in: Hurford, James R., Studdert-Kennedy, Michael, and Knight, Chris 1998. *Approaches to the Evolution of Language*, Cambridge: Cambridge University Press. page 206: “The particulate Principle is a property of the physical universe”.

Studdert-Kennedy, M. 2000. Evolutionary implications of the particulate principle: imitation and the dissociation of phonetic form from semantic function. Pages 161-176 in Knight, Chris, Studdert-Kennedy, Michael, and Hurford, James R. 2000. *The Evolutionary Emergence of Language*. Cambridge: Cambridge University Press: Pages 163-164) 163: “Abler’s second insight was that von Humboldt’s (1836/1872) characterisation of language could be extended to the hierarchical structures o physics, chemistry and genetics.” [Actually, I arrived at my ideas independently, and only later cited Fisher and Humboldt to place them in historical perspective.]

Professor MacNeilage, however, is not finished with his corrections. On his (PERILUS) page 25, he tells us, “There are 118 atoms (called elements) of which 98 occur naturally, and they can be arranged consecutively in the Periodic Table according to the atomic weights indicated by their numbers (1 to 118). The individual structures are known in detail and precise rules for the way they can combine into molecules are also known (see Wikipedia—“Periodic Table” for discussion).”

What is the Periodic Law?

Apart from his vaguely insulting advice to “see Wikipedia”, Professor MacNeilage’s “There are 118 atoms … , and they can be arranged consecutively in the Periodic Table” is so misleading that if I didn’t see it, I wouldn’t think that it was possible. The periodic property resides in the repeating properties of the elements, not in the fact that they can be lined up in a row by atomic number. MacNeilage must know this, because Wikipedia gives the right answer. The question of periodicity never would have come up if the elements did nothing more than line up in serial order, and Professor MacNeilage must know that, too. If any high-school sophomore, taking first-year chemistry, or junior taking first-year physics, had turned in MacNeilage’s PERILUS contribution as a term-paper, it not only would have flunked, it might even have prompted a discussion with the principal about mis-representation of basic science. Nevertheless, Professor MacNeilage has used the highest scientific forum in the world to present his false concept of the periodic law to a room-full of high-school students. The PERILUS introduction reads: “They [the published papers] also fall short from conveying the glowing engagement of the class of interested and ambitious high-school students from Kungsholmens Gymnasium in Stockholm, who participated in the closing session of the symposium.” MacNeilage introduces the periodic law as if he had somehow glimpsed it by scanning the vast horizon of nature, and focussing his profound understanding upon it. His supercilious, “Nothing remotely resembling the state of affairs regarding atoms and molecules is true of the subsegmental/segmental level of speech production” is again unconscionable. The phrase “state of affairs” is maddeningly vague. Here, Professor MacNeilage presents himself in the light of pure

genius, perceiving, un-prompted, the periodic property that should have been there, but wasn't.

Dismissing me falsely with disdain is one thing, but presuming to correct Dmitrii Mendeleev is entirely another. The stated reason for the Royal Swedish Academy of Sciences denying Mendeleev the Nobel Prize in 1906 was his failure to predict the inert gases (Gordin 2004, page 211). For Professor MacNeilage to offer an even better reason –refusal to get the periodic law right– in a publication by the same Academy is unimaginable.

MacNeilage makes a second use of the same “state of affairs”, using one of my ideas –a comparison between combinations of atoms and combinations of phonemes– as if he had thought of it himself. And, again, he misrepresents the basic science to create a false disproof of the particulate principle:

“Nothing remotely resembling the state of affairs regarding atoms and molecules is true of the subsegmental/segmental level of speech production. ... the soft palate ... makes a single binary contribution to speech (nasal, non-nasal) in a manner similar to the way that an element might participate or not participate in a molecule. But it clearly is different from the elements of chemistry because it retains its quality when combined, in a way that elements (e.g. oxygen in water) do not.”

Here, MacNeilage deliberately misrepresents the particulate principle, whose point is new properties generated by new combinations. But MacNeilage deliberately substitutes the idea of new properties, part of the particulate principle, for the retrievability property, also part of the particulate principle. In other words, oxygen can be retrieved or recovered intact from water by electrolysis. By omitting to mention retrievability, Professor MacNeilage is deliberately mis-representing the particulate principle, and, in effect, correcting John Dalton, who introduced the modern concept of the atom around 1805, on the basis of volumes of gases combining in ratios of small whole numbers.

Corrections

Professor MacNeilage annihilates me by revealing my belief in essentialism: “According to Abler “the several particulate systems derive their properties by common inheritance from the particulate principle of self-diversifying systems which predates them all.” (p. 1) Abler believes that the principle itself derives from “some underlying property of material nature.” (p. 12). By material nature he means some property of the physical world. This property is considered to exist a priori, as in the “essences” of Plato. (See MacNeilage, 2008 for a discussion of essentialism with reference to language in particular.). “Particulation” is given axiomatic status as “a Euclidean principle which acts in a universe governed by classical arithmetic” (p. 12).”

MacNeilage's road to the essences of Plato is tortured and deliciously lethal. I don't want to discuss Plato's philosophy any more than I want to discuss MacNeilage's. I do point out that laws of nature reach out seemingly from nowhere to constrain what

we can and can't do, even in places that seemingly offer absolute freedom, like a blank sheet of paper, where you ought to be able to do the famous, "anything you want". But you can draw a star with an odd number of points without lifting your pen from the paper, while to draw a star with an even number of points, you must lift your pen once. If you draw a wheel with equally-spaced spokes, an even number of spokes will show a spoke opposite a spoke; while an odd number of spokes will show a spoke opposite a space. (You can try this at home.) Nothing can be done about it, yet there is no visible constraint on drawing. Numbers themselves, which appear as total abstractions, show precisely limited, fascinating properties –integer, positive, negative, odd, even, prime, square, fractional, perfect, rational, irrational, transcendental, imaginary. The probability of any number being an integer is infinity-to-one, or, for practical purposes, zero. Yet we are surrounded by the integer one. Exactly one person, one egg, one tree, one idea. In effect, the dimensional properties of matter reach out as if from nowhere to constrain what we can and can't do, even if we can't see them, even if they aren't visibly material. Nothing, not even a blank sheet of paper, or numbers, or the phonemes of language, or Peter MacNeilage himself can escape the laws of physics, which structure the properties of our world like an unseen hand.

I also point out that science works by reduction. Any generalization like $F=ma$ reduces different situations to a shared abstraction. $F=ma$ applies to stones, arrows, bullets, wagons, the waves on the ocean, the fish, and anything else that moves. Professor MacNeilage is resorting to the old rhetorical trick of tossing out a red herring, and waiting for everyone to jump to the conclusion that it is fatal. Once again, having reached the conclusion themselves, his victims will be only the more ready to believe it.

This is the letter that I sent to the Vice President for Research at the University of Texas at Austin.

"Vice President for Research
Research Integrity Office
University of Texas at Austin
P.O. Box 7996
Austin TX 78713-7996

William L. Abler
September 1, 2017

I petition the Vice President for Research to consider a possible case of scientific misconduct on the part of Dr.Peter MacNeilage. As the University of Texas at Austin has a six-year time-limit on cases of scientific misconduct, unless mitigating circumstances exist, (Handbook of Operating Procedures 7-1230, Section C, Paragraph 2) I must address this question first. I can understand not investigating cases where records have been lost, or witnesses have moved away or died. But the present case is entirely in print, where nothing grows stale.

I suggest that published misconduct is repeated and renewed every time the contaminated material is sold, or taken off the shelf in a library, or accessed through the internet. Discoveries in science do not expire after six years but, like Euclid's geometry or Newton's laws, are intended to last forever. And dishonest science, too, lasts forever –and should be exposed after six years or a thousand.

Professor MacNeilage has commented on my findings twenty years later, so my comments should be heard after six. Until a few months ago, I was occupied in developing my theory of language and mind, and could not have completed it if I had to think through comment made on my publication of almost three decades ago. I only discovered Professor MacNeilage's publications after my theory was nearly completed.

I petition the Research Integrity Office to waive its six-year time-limit in the case of professor MacNeilage's publications Of 2008 and 2011."

sincerely.

[signed]

William L. Abler

If Professor MacNeilage had really wanted to annihilate me, his best bet would have been to say nothing, and hope that my discoveries would lapse into public forgetfulness. To some extent, the encyclopedia entries, based on Michael Studdert-Kennedy's publications, not mine, made this less possible. Still, Professor MacNeilage brought the particulate principle to Oxford University Press and the Royal Swedish Academy of Sciences in a way that I never could have. One highly-placed scientist told me, "You don't have to worry about [MacNeilage]. He's eighty-three." Sure, I don't. His publications are as meaningful as ever and as available as ever and as prestigious as ever. He spent at least three years nursing his grudge. Like Pinker, turning over his plans to rescue his dead theory with false science and plagiarism.

I was not prepared for the lurid force of paragraph 2.3 of the letter from the Vice President for Research and the Vice President for Legal Affairs and the Associate Vice President for Legal Affairs at the University of Texas at Austin:

"2.3. The allegation focussed on scientific misconduct involving plagiarism. The following definition of plagiarism, utilized by the University in many scientific misconduct cases, was applied:

an author "plagiarizes" when they represent as their own work any material that was obtained from another source, including words, ideas, illustrations, structure, and other expression or media. An author represents another's material as their own work when the author uses the material without providing proper attribution. "Proper attribution" means that the author must enable the reader to clearly identify which words and ideas are the author's and which originated with other sources by (a) clearly acknowledging the sources of any borrowed passages, ideas, or other types of materials, and (b) enclosing any verbatim excerpts with quotation marks or by using block indentation for longer passages."

The letter continues, paragraph 2.4:

"Dr Abler's and Dr. MacNeilage's publications were manually reviewed in the context of this definition. Dr MacNeilage's publications were also entered into two software plagiarism detection programs. The reports from the manual and computer plagiarism detection reviews are available for your review."

No manual examination can explain away the fact that my 1989 paper introduced the idea of a periodic property in language, and the comparison between interaction of phonemes and interaction of atoms to generate new levels of organization with new properties, and that MacNeilage used these ideas as if he had thought of them himself. Citing me for discreteness isn't citing me for a periodic property or for interaction of discrete objects, or for their retrievability after combination. These quick summaries succeed because readers don't want to borrow other people's problems, and they don't want to think their way through complicated arguments, then take responsibility for something that has nothing to do with them. They want a quick resolution summed up in a single phrase. And that is all they get.

As far as I am concerned, in the day of smart plagiarism, running a text through a computer plagiarism detector is equivalent to an excuse for doing nothing. The review continues, paragraph 3.1:

3.1 "This allegation does not fit the university's definition of scientific misconduct (plagiarism). Both the manual and the computer-assisted reviews found that Dr. MacNeilage gave proper attribution to Dr Abler and other scholars. The debate between Dr. Abler and Dr. MacNeilage appears to be based on an intellectual and theoretical difference rather than a scientific misconduct violation (plagiarism, falsification, fabrication)."

Right. MacNeilage cites my 1989 paper, but does not refer to it in mentioning new properties or a periodic property, ideas that he took directly from my 1989 paper. That is plagiarism. The trusting reader would have no reason to look up my original publication, and find there the idea of a periodic law in the phoneme chart, or the comparison of phoneme combinations to atom combinations, or the antiquity and inevitability of physics. The trusting reader would have no reason –MacNeilage certainly doesn't give one– to look beyond MacNeilage's paper for information about mine. This isn't a private dispute. It is the substance of science. It is why the best ideas never come out of the University. It is a study in human nature. And late in the game, Björn Lindblom ruined his long and productive life by doing a misguided favor for a false friend. He will be remembered in history only for the MacNeilage affair. The introduction to the PERILUS 2011 volume says, "The articles in this volume represent the themes brought up by the speakers and capture the essential aspects raised by the speakers. Not surprising, however, the articles cannot do justice to the climate of spontaneous scientific debates and public involvement that the corresponding live presentations generated." Didn't anyone notice that linear ordering isn't the periodic law?. Had Björn Lindblom never seen my 1989 paper, with the periodic property of the phoneme chart? He was closer to MSK than I was. Maybe he never saw it. Maybe he didn't.

Paragraph 3.2 reads,

3.2 "The HOP 7-1230 states that allegations of misconduct may be considered if the misconduct took place longer than six years ago when there is clear and convincing

circumstances, however this allegation does not present clear and convincing circumstances.”

Right (euphemism). I maintain that published material is renewed every time it is read, that it is permanent literature, and I stand by my “six years or a thousand”. As far as “an intellectual and theoretical difference” is concerned, Professor MacNeilage is certainly entitled to think that biology can over-rule the laws of physics, and that the periodic property of the chemical elements is a matter of lining them up in serial order, and that atoms blend with their neighbors when they form chemical compounds. So far, so good. But does he teach students that the periodic law is a matter of lining up the elements in order of atomic number? Maybe it’s legal, but it isn’t good, and Professor MacNeilage must know it, because he sends his readers to the right answer. To all appearances, he is lying. He already taught that to some students at the Royal Swedish Academy of Sciences.

He cites my paper for discreteness, but even under U-Tex@Austin rules (“Proper attribution” means that the author must enable the reader to clearly identify which words and ideas are the author’s), he is not entitled to pretend that he thought of periodicity in language, and the comparison between combinations of atoms and combinations of phonemes all by himself, and, along with Steven Pinker, he has no business playing thimblerig with the concept of citation. Plagiarism is the only crime for which evidence accumulates rather than deteriorating. Placing a time-limit on plagiarism is a crime as bad as plagiarism itself.

Double Meaning

In exactly opposite ways, Pinker and MacNeilage make the same use of the double meaning of “citation”, which works like the double meaning of “sound” in the old gag, “When a tree falls in the forest and there is no one there to hear it, does it make a sound?” The word “sound” has two meanings, distinct yet related, so that they can be exploited to create confusion. One meaning is “air-pressure-disturbances that travel through the air”, and the other is “sensations that are triggered by the air-pressure disturbances that travel through the air.”. The falling tree produces sound by the first definition only –not by both. If someone hasn’t thought about it enough, and doesn’t see the difference, the gag can provoke quite an argument. And the same can be done with “reference” and “citation” and “attribution”, to insidious effect. By one definition, a “citation” can be any mention in a bibliography or in a text. By the other definition, a “citation” points unmistakably from the idea to its source. Pinker “cited” my article by the first definition, but separated it from me by bibliographic obstacle course, marathon, wild-goose chase, misdirected referencing, misleading referencing.

MacNeilage loudly proclaimed my article in his text, but meticulously avoided mentioning that he found the idea of a periodic law, or retrievability, or the inevitability of physics, or the comparison between chemical combination and linguistic combination, in my article. So, while scientists and University officials play shell-games with the scientific referencing system, science and truth can look after themselves (euphemism). The point isn’t science or truth or the secrets of nature, or even personal integrity. The

point is to win now, and let the future take care of itself. By protecting their treasured faculty, and maintaining an unruffled surface in their institutions, these non-scientists win for themselves an unenviable place in the history of science. We sometimes hear that the criminals' punishment is that they must live with themselves, and suffer the pangs of a guilty conscience. They don't suffer. Criminals tell themselves that they deserve to win because they are smarter than you. They love themselves.

When I asked to see their deliberations:

—Original Message—

From: bill abler [mailto: ehtert-abler@sbcglobal.net]

Sent: Tuesday December 26, 2017 11:38 AM

To: CFO <CFO@austin.edu>

Subject: my letter Peter MacNeilage

Mr. Bazzell,

I would be grateful if you would send me a copy of the University's deliberations concerning my letter about the MacNeilage 2011 PERILUS paper, and page 97 of the MacNeilage 2008 book.

Thank you. sincerely William L. Abler

I received this reply:

On Jan 11, 2018, at 1:31 PM, Robert S. Davis <bob.davis@austin.utexas.edu> wrote:

Mr. Abler

The University of Texas at Austin has completed its search and determined that we have no information responsive to your below request.

Thank you.

Bob Davis

Open Records Coordinator

The University of Texas at Austin \m/

(Here, I re-arranged the messages into chronological order.) So there you have it. Just say something –anything– and if you are in a position of control, you are right. I am sure that they no longer have any information, etc. If plagiarism is the highest form of flattery, and if false disproof is the highest form of endorsement, then Professor MacNeilage has blessed me with both.

Soon after the MacNeilage affair, The University of Texas at Austin changed its plagiarism policy:

U-TX@:Austin

"This year, you may notice a change in Chapter 11 – Student Discipline and Conduct. As our university aligns with comparable institutions to resolve matters involving student conduct and academic integrity." I like to think that they changed their policy because I scared the living daylights out of them, and you have to ask where students learn that it is OK to cheat, as long as you get away with it.

Uses of Google

In the age of Google, when you Google “abler particulate principle”, “MacNeilge PERILUS” comes up first, downloadable for free without copyright, while my poor 1989 article comes up second, “protected” behind Elsevier’s copyright. Does MacNeilage really think that Francis Crick can make biology supersede the laws of physics? Does he really want people to see his disgraceful paper? I will get to the causes of periodicity in the phoneme chart later. But for now, the physics-biology wrangle has reached such a comical state that a bumbling Professor puppet may appear any day in a Punch-and-Judy show.

Who's Who

I read somewhere that the development in understanding the evolution of language is so complex that “it would take a historian” to untangle the strands of progress. I have no ambition to be a historian of Pinker and MacNeilage, who have done nothing but create confusion, and perpetuate old misconceptions, but I have done as much as I could to set the science straight. Many years ago, when I was a graduate student in Linguistics, I discovered the naughty pun “cunning linguist”. But when I told it to the other grad students, they stared in blank incomprehension. Two years later when, inevitably, the same pun arrived on campus attached to the rumor “It came from MIT” the students enjoyed it immensely and repeated it endlessly. Even our reserved chairman allowed that “I enjoy a good pun”. It was as close to a controlled experiment as can happen in real life. The single variable factor: “MIT”. Edward H. Levi, former Attorney General of the United States and former Chancellor of the University of Chicago, warns us (*An Introduction to Legal Reasoning* 1949. page 9) that “the legal process does not work with the rule but on a much lower level”. The same goes for scientific reasoning, where prestige and power are often more persuasive than evidence. Irrelevant facts, consecrated by un-recognized assumptions, hold sway. Where prizes are awarded not so much to confer recognition on the recipient as for the conferring agency to borrow prestige from the recipient. Where we wait for the right discoverer to make the right discovery. The only thing wrong with the quantum-Newtonian theory is that it is thirty years ahead of its time, and came out of a street-address in extreme rural California. Fifty years from now (2020) –thirty, maybe– sophomores in high-school will complain about being asked to learn something so easy and so obvious. In whose hands will it end up?

When I was in graduate school, Zellig Harris used to stop a certain other student in the hall and say to him, “Mr [XYZ], I want to tell you the following”. My fellow student told me that his father raised bulls in his home country, and that it was fine to get a Ph.D. at the University, but then he had to come back home and raise bulls, because sooner or later, the University would bring dishonesty and suffering. I knew that his father was right, but stayed with science because it was all I wanted since before I could remember. His father was more right than I imagined –and if you have ever endorsed the theory of language evolution, dishonesty has come to visit you, too, even if you couldn’t have known.

Various efforts have been made to understand the nature of language by comparing it to something else. Most famous is the gene-language analogy, which lingers here and there even today. But there are others. Mark Baker developed “The Atoms of Language” in a book by that name (2001. New York: Basic Books) where he tried to reduce language to a single system of rules by extracting the shared elements of the world’s languages. He almost succeeded. Almost, and has now turned to other pursuits. Auletta (see above) pushes the language-element analogy (his page 58) to its limit:

“An application of the particulate principle in a prebiotic domain, according to Abler, is represented in chemistry: Here, electrons, protons and neutrons could be understood as a code whose syntactic combination (corresponding to the physical location in the nucleus and orbitals) give rise to the different sorts of elements.”

Analogy in Science

I never suggested a language-element analogy, and don’t endorse it now. I never suggested any material analogy. I proposed an abstract law of nature to which all natural systems are subject. Analogies are catchy because they are easy to understand; and part of their attraction is that they stay in the domain of the material, without forcing us to think in the abstract, where real laws reside. Different systems remain separate in spite of analogies, and if the analogies could be pushed ahead forever, the world would consist of only one system. “According to Abler”: Did I get it wrong? Did chemical combination have to wait for biology before chemical combinations could happen? Auletta continues, “All physical systems that make infinite use of finite means (according to von Humboldt) conform to the particulate principle”. This is absolutely not true. Humboldt had no concept of discreteness; and “infinite use” applies as much to the infinity of readings implicit in a thermometer (Abler 1989, page 8) as to any other kind of infinity. Humboldt introduced the concept of systems with properties “not present per se in any of the associated constituents” –but still he does not show what the nature of such constituents might be. The theory of discrete, or particulate constituents had to wait until my 1989 paper. Auletta is doing everything he can think of to push the particulate principle back before its actual discovery, and to defend the idea of an autonomous biology. But nothing in nature can escape the laws of physics.

We can break out of this confusion by looking at what might have been, “the mystery of the bee-eye/bee-comb analogy”. As I remember, this actually came up many years ago. Something like Jakobson’s explanation of the gene-language analogy might have been offered: ‘the legitimate question whether the isomorphism exhibited by these two different constructions, anatomical and architectural, results from a mere convergence induced by similar needs, or whether, perhaps, the foundations of the overt biological patterns superimposed upon geometric communication have been modeled directly upon its structural principles’. Did the hexagons in the bee’s eye somehow force the bee’s comb to have hexagonal cells? There is no “mystery of the bee-eye/bee-comb analogy” because the underlying rule is understood: Hexagons tessellate (tile a surface); pentagons don’t. The hexagon rule is an abstraction that applies separately to facets in a bee’s eye and cells in a bee’s honeycomb, because

hexagons are the most efficient way to cover a surface with units of identical shape, not because of any mutually inherited property of the bee.

The shared properties of language and chemistry are abstractions that apply to the two systems in exactly the way that the hexagon rule applies to the bee's eye and the bee's honeycomb. The difference is only that the particulate principle can't be visualized as easily as a hexagon, and so seems more abstract. The loss of identity when two particles blend together should be easy enough to imagine: Water and ink. That establishes the need for discrete particles in a system with new properties. After that, the number of different kinds of particles needed for a functioning system becomes an open question. An electronic computer can function on just two, zero (0) and one (1). Human languages have a minimum of about a dozen, and a maximum of about seventy or a hundred. Is there anything basic about that? The minimum number of phonemes in a human language corresponds roughly with the minimum number of elements needed to generate life –about a dozen. That number is approximately the same as the numerical base that we have chosen for our number system –ten. Is there anything basic about that?

The Geometry of Symbols

We sometimes hear that numerical base is completely arbitrary, and that, in principle, any base would be as good as any other because the structural properties of arithmetic would be the same. We might as well have chosen base-8 or base-12, as base-10. I suggest that base-10 is anything but arbitrary. It represents an approximate but vital universal constant of nature. Looking at the number system, we can compare adding up three whole-dollar shopping lists in base-two, base-ten, and base one-hundred. Suppose we have a \$100-bill, and can't go over. A base one-hundred counting system might look like this:

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	G	H	I	J	K	L	M	N	P	Q

26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
R	S	T	U	V	W	X	Y	Z	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p

51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
q	r	s	t	u	v	w	x	y	x	z	A	B	C	D	E	F	G	H	I	J	K	L	M	N

76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
P	Q	R	S	T	U	V	W	X	Y	Z	a	b	c	d	e	f	g	H	I	j	k	l	m	n

The shopping list might look like this:

cost, \$:	base 2	running total	base 10	running total	base 100	running total
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Shoes	1010	1010	10	10	A	A
Pants	1100	10110	12	22	C	M
Shirt	1000	11110	8	30	8	V
Hat	11	100001	3	33	3	Y
Batteries	110	100111	6	39	6	e
Coat	1111	110110	15	54	F	t
Phone	1101	1000011	13	67	D	f
Water	10	1000101	2	69	2	H
Lunch	101	1001010	5	74	5	M
Radio	10100	1011110	20	94	K	F
Map	100	1100010	4	98	4	t
Book	10	1100100	2	100	2	n

Base 2 works well enough in a machine, but not so well in nature. And base 100 is so awkward that it is almost unmanageable. Actually, it is close to the ancient Greek system. The miracle is that Pythagoras and Archimedes could work with it at all. But between those two is something very practical. The only range that is optimum for our actual use, in other words, for use in a functioning natural system (ourselves) is between base-8 and base-14. Base-10 lets us use our fingers as a portable adding machine, and so we have adopted it. But it isn't arbitrary. What's more, the minimum number of speech-sounds that is practical for a language is around ten or a dozen. Let's look at a binary system of speech-sounds, like a binary number system, in other words, a system with two speech-sounds, "A" for vowel, and "B" for consonant. In principle, such a system could generate any number of words that would look like this:

A, AB, BA, ABA, BAB, ABAB, BABA, ABABA, BABAB

This vocabulary would work in a machine, but in a naturally-occurring system like ourselves, it would soon sound like a structureless buzz. A system with a hundred speech-sounds would have such tiny distinctions between them that they would be difficult to identify. A system with a thousand speech-sounds is ridiculous. But a dozen speech-sounds would be just enough to generate a rich vocabulary without too much duplication, or homonyms.

i a u
b, d, g, m, n, ng, f, s, sh,

Words like: sun, bug, big, mind, fish, finish, sing, moon, mud, sand, fin, ...

A dozen speech-sounds would be plenty, and the same is true for the minimum number of chemical elements needed to generate life: Hydrogen, Carbon, Nitrogen, Oxygen, Na (sodium), Phosphorous, Sulfur, Cl (chlorine), K (potassium), Calcium, Fe (iron), Iodine –would be barely enough. Nature itself starts building diverse structures

with a dozen or so different discrete constituents. A dozen is a natural constant, not an arbitrary choice. Base-ten is close enough.

A Universal Constant

Since very different systems, language, life and human counting, arrive independently at the same number, we are not justified in pushing analogies to the atoms of language, or the electrons, protons and neutrons of language. Instead, the systems in nature are governed by universal principles, which each system manifests in its own way. So, the bee's eye, and the bee's honeycomb, as well as the facets in the skeleton of a diatom and the arms of a snowflake, all reach the same geometry because the law of hexagons is universal. —There is no mystery of the bee-eye, bee-comb analogy, through some un-discovered mechanism of common inheritance.

The laws of physics probably reflect dimensional properties of matter, that cause space to curve, and time to be not absolute, and hexagons rather than pentagons to tile a surface —and the particulate principle to dominate emergent systems. The necessity of maintaining discreteness, in effect, paints natural systems into a few corners: non-blending, new properties generated by new geometry, new levels of organization, vast numbers of compound objects produced, retrievability of the original constituents (because they are discrete, and retain their original identity during combination), and, last, a periodic property when more than about seven or ten different constituents are generated. These rules are not so hard to visualize, maybe, and they are simple enough, and are as universal and inevitable as the law of hexagons. Different systems arrive at them independently in exactly the way that different systems arrive at hexagons independently: The dimensional properties of matter require it. The particulate principle functions at its own level of detail, and systems like water and ink, whose organization does not meet its requirements, do not generate new or "emergent" properties. We are merely lucky that atoms are indivisible under ordinary conditions. If they weren't, we wouldn't exist. If there were an infinity of universes with an infinity of natural laws, only the one that conforms to the particulate principle would produce life and intelligent life.

The Geometry of the Roman Alphabet

When we think of the alphabet, we think of capital letters and small, and maybe italic and Roman letters, or alphabetical order —or printing and cursive. But our Roman alphabet is a work of geometric genius —a lesson in the limits of geometric uniqueness. Rather than looking at alphabetical order, we can look at the geometric order of the lines that compose the letters:

Vertical/Horizontal: E F H I L T

Diagonal: M N A K V W X Y Z

Hybrid: P B R D J G

Round: C O Q U S

Ten letters, or twenty-six, are not merely distinguishable, but easily identified by their geometry. The same goes for the acoustic signal of speech. As we get into larger

and larger numbers of letters, we resort to digraphs like ph, sh, ng. The difficulty of remembering a hundred letters would be real, but not basic. The basic problem posed by an alphabet with more than seventy or so letters is that we would run out of distinct, easily identifiable geometric shapes. Each letter would have so many lines that it would be hard to tell one letter apart from the next. Try to imagine an alphabet with a thousand letters. The creators of the roman alphabet got it right. But loss of uniqueness becomes dramatically visible in the extended version of the periodic table, where the lanthanum and actinium elements are included. Period 6 won't even fit on the page –and the lanthanide elements are so similar that they occur in the same minerals:

Cs Ba La Ce Pr Nd Pm Sm Eu Gd Tb Dy Ho Er Tm Yb Lu Hf Ta W Re Os Ir Pt Au Hg Tl
Pb Bi Po At Rn

The Rule of Seventy

There are only about 80 stable elements. After that the atoms self-destruct. And most aren't used in biology. Seventy is about the upper limit for the number of distinct constituents in a self-diversifying system. After seventy, the constituents run out of easily recognizable, distinct geometries. So, the number of constituents in a naturally-occurring self-diversifying system is between about ten and about seventy, an interval that represents a universal constant of nature.

The speech articulations are naturally-occurring physical events that the ear identifies by their geometry. And with distinctions of front, mid and back points of contact, and rapid-closure sounds like "b" and "d", nasal sounds like "m" and "n", partial-closure sounds like "w" and "l", turbulence sounds like "sh" or "f", and open sounds like "i" and "a", and the voiced-voiceless distinction that nearly doubles the number, the upper limit is still in the neighborhood of seventy sounds, imposed by limits to the easily identifiable features of their geometry. The same rule applies to the geometry of the acoustic signals of speech, which is generated by the articulations, and reflects them. In other words, the acoustic signal can be represented as a graph of frequency (on the vertical axis), versus time (on the horizontal axis) in a sound spectrogram, or what is misleadingly called a "voiceprint". Nothing, not even the seemingly infinite arbitrariness of human language, can escape the laws of physics.

In the Air

I have been told, and you may have been, too, that no one ever discovers anything, that scientific ideas are "in the air". Ideas in science are a lot like fiddle-tunes: They are easily detached from their creators. With folk-poetry names like Whiskey Before Breakfast and Bonaparte Crossing the Rhine, Temperance Reel, Swallowtail Jig and Smash the Windows, it is hard to believe that the tunes themselves were "in the air" any more than the titles. A musician friend of mine says, "I think that some poor bastard wrote every one of those tunes". He has to be right. Melodies don't write themselves any more than jet engines design themselves, or ideas in science materialize out of thin air. While simple forgetfulness may often be the culprit, the travels of the particulate principle show how the author and the idea can be forcibly separated.

When I published the particulate principle in 1989, I made the claim, first sentence in the abstract, “Several natural systems, traditionally treated as being independent, now appear to be based on common principles”. This is my claim to originality. In the next sentence, I name “chemical interaction, biological inheritance, and human language”. By leaving out chemical interaction, and making a show of biological systems only, (“It may not be a coincidence that the two systems in the universe that most impress us with their open-ended complex design—life and mind—are based on discrete combinatorial systems”), Pinker (1994, page 85) degrades the theory to the status of an explanation: “In a blending system the properties of the combination lie *between* the properties of the elements” (Pinker’s italics), and shifts the focus to the descriptive phrase, “discrete combinatorial system”. By degrading theory to the status of explanation, Pinker has bleached the value out of a law of nature, and by not claiming credit yet accepting it, and pushing knowledge of it back into a vague past, Pinker has detached the idea from its discoverer. It is now possible to find a published title like “Nordström, J. (2014). Language as a discrete combinatorial system, rather than a recursive-embedding one. *The Linguistic Review* 31(1), 151-191”, with no mention of Pinker or me. The theory of the particulate principle has disappeared entirely, and the descriptive discrete combinatorial system is truly “in the air”, with no visible means of support.

The Sentence.

The sentence is the only vehicle for making assertions, and, with them, the concept of truth-and-falsity (which Bertrand Russell charmingly called “truth and falsehood”). With its power of truth-and-falsity, the sentence is the basis of human responsibility. It is the absolute spark that makes the human being different from any other animal, and the human community unique. We simply can’t know what a human being is without knowing what a sentence is. We sometimes hear that a sentence is a string of words, or that all you need in order to generate language is the ability to put words together, or that language is a discrete combinatorial system –all of which amount to the same vacant thing. A sentence is a dynamic relationship between words. Ultimately, it is an event more than a structure. And if we are to understand what a sentence exactly is, we must find a way to isolate it, so that we can titrate out its parts. Not imperatives or irregular verbs, but the basic sentence isolated in the spirit of Francesco Redi.

ABSTRACT

At the end of this report, I will include my 2019 paper explaining the quantum-newtonian theory. But to provide a glimpse of the theory of the sentence, I offer an abstract of the theory.

If we want to know the origin of language, we must begin with a theory of what language itself exactly is. Just because language is delivered as a linear sequence, isn’t a reason to suppose that language is generated as a linear sequence.

Equations are sentences which assert that “A equals B”, and, since nature harbors no contradictions, the mechanism that generates one sentence, generates all. Since equations are simpler than everyday sentences, a theory of the sentence can start from a theory of the equation. This arrangement offers the unique advantage that equations possess a geometry that allows analysis, and can be used as a gateway to the sentences of everyday language. If the equation hadn’t been invented in 1557, an analysis of everyday language would have been impossible.

Equations solve problems in physics to an accuracy “beyond all reasonable expectation” –i.e., to “one part in ten millions” (from Eugene Wigner, *The unreasonable effectiveness of mathematics in the natural sciences. Communications on Pure and Applied Mathematics* 13(1):1-14, 1960, page 9). This degree of accuracy is so unbiological that a solution in biology is ruled out. Wigner, in 1960, is clear (page 3): “certainly it is hard to believe that our reasoning power was brought, by Darwin’s process of natural selection, to the perfection which it seems to possess”.

Equations are symmetrical, in other words, “A equals B” is the same as “B equals A”, i.e., word order is non-meaningful, that is to say that the mechanism that generates the sentence acquires structure by attaching words to the components of an underlying symmetrical event, not by generating sequences of words.

Since the A and the B of the equation are equal to one another and opposite to one another across the “equals”, that event emerges from Newton’s 3rd law, “For every reaction, there is an equal and opposite reaction”.

Here, in equal-and-opposite, is the reason that mathematics is a model of physics: Properties of both systems are generated under the same law. Shared symmetry is a by-product. Further, only Newton’s equal-and-opposite can generate the kind of accuracy that Wigner points out. Natural selection can’t.

Sentences, then, are generated not by attaching words to other words, but by attaching words to the two sides of an impulse that generates an equal-and-opposite reaction in the brain.

On two counts, then, language can not be studied in the way that we study ordinary objects in nature –by direct observation and analysis. The part of language that we see, the words, isn’t the part that includes the structure.

Next, all modern sentences possess the Subject-Object property, or are derived from it. They take advantage of word order and are asymmetrical, whereas the original sentences were symmetrical, and did not use word order in any meaningful way. Modern sentences are modified too much from the original to be a guide to a theory of language.

Second, the words of language do not, in their sequence, compose sentences. Instead, the words are attached to the components of an underlying equal-and-opposite reaction, or event, which we don’t see. Language is like a Christmas tree at night, where all we see is the decorations (the words), and are un-aware of the tree that lends organization to them.

Thus no examination of language, as found, will lead to a theory of language.

Language also generates the other basic human properties. Power-of-assertion is derived from the interaction between the symmetry of the sentence scaffold, and the symmetry (truth) or asymmetry (falsity) of the words placed upon its two sides. Human

technology, driven by the mind's eye, is generated by the geometry that is latent in the mechanism that generates the equation. Human actions are proxy sentences, whose power of assertion makes us responsible for them.

Please see the attached paper, and my 2005 book (*Structure of Matter, Structure of Mind*. Sofia: Pensoft; Philadelphia: BainBridgeBooks), listed in the bibliography.

Once an idea has been discovered, other, easier ways of finding the same thing may be found. There are, for example, well over 150 proofs of the Pythagorean theorem –one of them by Napoleon Bonaparte himself. And, ribbing the mathematicians for what he calls (page 79) “staircase wit”, Einstein’s old math teacher, Hermann Minkowski, found a more elegant path to relativity (Minkowski, H. 1908, Space and Time, pages 73-91 in: Lorentz, Einstein, Minkowski & Weil 1952. *The Principle of Relativity*. New York: Dover). *The Language Instinct* is staircase wit. MacNeilage’s PERILUS paper is staircase wit, what Minkowski (page 79) calls “wise after the event”. Having arrived at the Newtonian theory of the sentence the hard way, through false starts, logic and luck, I will try here to arrive at the same thing by Helmholtz’s cowpath.

Probably by the height of the stone age, about forty-thousand years ago, language had accumulated so many innovations that could only be generated within language, that language presented a vast, impenetrable front, an illusion of being an autonomous system, without connections outside itself. In other words, there was so much of it that you wouldn’t know where to start. Instead of endlessly increasing the scope of consideration by looking at more and more languages so that we are sure to “take everything into account” we might simplify language down to its essentials by looking at constructions in language, and asking which ones might be eliminated, while still leaving something that can legitimately be called language. Instead of scanning the vast horizon of language and languages, we will peel language down to its ultimate core, in the hope of finding something basic there, that is inherited, somehow, by all languages. Then we can re-constitute language by building it up again.

We can begin with the passive voice. Could language get along without the passive voice? Sure, it could. We can easily imagine something without the passive voice, that might still legitimately be called language. Some publications even banish the passive voice from their pages, on grounds that it is “weak” –yet their articles are still written in language. We can safely eliminate the passive voice.

Next, we might eliminate contrary-to-fact subjunctive, the kind of thing that we see in “If I were you”, or “If pigs could fly”. Chinese doesn’t have a special verb form for such ideas, yet everybody gets the point –and Chinese is a perfectly good language without contrary-to-fact subjunctives.

Next, we might eliminate optative subjunctives. “May God bless you” or “[may you] Have a nice day” could be eliminated, and still leave something that could legitimately be called language.

Next, we might eliminate verb tenses, present, past and future. Something like “I go. Tomorrow go” seems stilted by our standards, but it would still be language.

Next, we might eliminate relative clauses, like “The man (in the red hat) is a long-distance runner.” If relative clauses were eliminated, language might be crippled, but it would still be language.

Next, we might eliminate absolute constructions at the beginning of sentences. Constructions like “John lit the fire, and we settled in to tell stories”, or “The fire having been lit, we settled in to tell stories”.

Next, we might eliminate word compounds like tree-house, or waterfall, or sparrow-hawk, or watchdog, or arrowhead, or rattlesnake, or lightning bug / firefly, or seaweed or rainbow. Language would be severely crippled by this loss, but it would still be language.

Inflections and inflected languages are made of compound words. I won’t try to run through Latin grammar, but a few examples will show how changing the components of compound words is a means of modifying the meaning without eliminating it:

“video” (I see) becomes “videbo” (I will see).

“video” (I see) becomes “vides” (you see).

“nauta” (the sailor, he) becomes “nautam” (the sailor, him)

The elimination of word compounds would eliminate inflected languages, and would severely cripple others. But a language like Chinese has only a few real word compounds (mai3-mai4 –buy-sell, *business*), and is still language.

All that is left is Subject-Verb-Object. Sentences like “John found the treasure” or “John drew the picture”. A language that was limited to Subject-Verb-Object would be severely limited by modern standards. But it would still be language, especially when compared to single words, which are components of language, but lack power-of-assertion. That is to say that a word like “house”, spoken in isolation, unless it is the answer to a question, and borrows the structure of the question, isn’t a free-standing assertion in its own right. Subject-Verb-Object, S-V-O, is the minimal sentence of everyday modern language.

The Last Veil

Can we peel anything away from the S-V-O sentence, down even farther, to something even more basic than S-V-O? Subject-Verb-Object represents a dynamic relationship between words. Can we strip away the dynamic component? A Subject is a Noun; a Verb is a Verb; and an Object is a Noun. So the S-V-O sentence is an N-V-N sentence with relationship categories added. Can we strip those away, and still have a sentence – in other words, and still have language?

Sure we can, and the first clue to the kind of sentence that remains is the symmetry of N-V-N. S-V-O is asymmetrical, in other words, you can interchange Subject and Object and still have a sentence, but the meaning will be drastically changed. For instance, “The worm ate the apple” is not the same as “The apple ate the worm”, even though both are sentences. Can we find a kind of sentence that is symmetrical, in other words, where you can interchange the Nouns on the two sides of the Verb, and still have a sentence, but one with the same meaning?

Here, we must re-examine our concept of mathematics. Ordinarily, it might be logical to find an equation that would express the symmetry of N-V-N, and to calculate the properties of language according to properties of that equation. This, for example, is what Hermann Weyl does in his prophetic 1952 book *Symmetry* (Princeton University Press). On his page 66, Weyl almost predicts the 911 bombing of the Pentagon building: “Now, of course, we have the Pentagon building in Washington. By its size and distinctive shape, it provides an attractive landmark for bombers.” On page 141, Weyl offers a perfect example of how we view mathematics: We either develop it as a model for some physical system, or we develop it for its own sake and find, later, that it is the model for some physical system. So, Weyl explains (page 141), “This is the reason why the regular triangle, pentagon and 17-gon, $p = 3, 5$, and 17, may be constructed by ruler and compass; for in each of these cases the group of automorphisms is a cyclic group whose order $p - 1$ is a power of 2,

$$3 = 2^1 + 1, \quad 5 = 2^2 + 1, \quad 17 = 2^4 + 1.$$

A First Foray into Mathematics

I will limit my concept of mathematics to numbers and equations. This should be adequate, at least for a start, because mathematics is, in some sense, the study of numbers and their properties, and because the equation is the flagship structure of mathematics. In other words, mathematics without equations would be vacant; and the equation can be understood as an entry into mathematics in its other phases. We must ask where equations get their properties, and, in fact, why they have properties at all.

Equations could only exist inside the structure of mathematics, and, by now, mathematics has accumulated so many equations that it presents a solid front, with the appearance that mathematics is an autonomous system, separate from the rest of the world. In other words, there are so many of them, each with its own important message, that we don’t know where to start. Exactly like language, any attempt to analyze mathematics is thwarted by the simple vastness of the structure. Where to start? The CRC (Chemical Rubber Company) book of *Standard Mathematical Tables* (Cleveland, 1973) lists Factors and Expansions, Powers and Roots, Proportion, Quadratic Equations, Cubic Equations, Partial Fractions, Curves and Surfaces, Derivatives (51 of them), Integrals (732 of them), and that is just a tiny selection. Where to start?

We can start by doing for the equations of mathematics exactly what we did for the sentences of language –peel away the most complex structure, to see whether we are left with something underneath that can still legitimately be called mathematics. I have seen sentences and equations both defined as “a string of symbols”, so they have at least that much in common.

We might eliminate integrals,

$$\int a \cdot f(x) dx = a \int f(x) dx$$

and still be left with something that could be called mathematics –algebra. So, without integrals, equations like

$$a^2+b^2=c^2 \text{ (right triangle), or } y=ax^2+bx+c \text{ (parabola), or } x^2+y^2=a^2 \text{ (circle),}$$

could be eliminated, and still leave something that could legitimately be called mathematics. An expression like $x=y$ defines a straight line at 45 degrees, while $y=ax+b$ defines a straight line of slope a and y-intercept b. For purposes of this essay, I will define algebra as arithmetic plus the unknown x. Algebra could be eliminated and still leave arithmetic, which remains a branch of mathematics, so, $2+2=4$. While arithmetic presents a descent into simplicity, it also offers unexpected opportunities of interpretation, the first of which is the absolute paraphrase that escaped Chomsky on page 95 of *Syntactic Structures*, 1957.

Two plus two equals four
Two plus two equal four
Two and two equals four
Two and two equal four
Two and two is four
Two and two are four
The sum of two and two is four
Four is equal to the sum of two plus two
Four is equal to the sum of two and two
Four equals the sum of two and two
Four equals the sum of two plus two

Even something like “four minus two is equal to two”
or “The difference between four and two is two”
might be considered absolute paraphrases of $2+2=4$. These are all sentences of language.

Absolute Paraphrase.

The simplicity of arithmetic not only brings out the absolute paraphrase that was hard to discern in algebra –it also brings out the overlap between mathematics and language: All of the above statements in arithmetic are sentences and assertions of

language. All possess a truth-value. The crossover that was hidden behind the welter of symbols in complex equations emerges into the daylight when the simplicity of arithmetic removes the obstacle of complexity. Equations of mathematics are sentences of language. As we simplify both systems down to the minimum, they converge to the same thing.

In spite of the crossover, it is clear that equations are a very special kind of sentence: While ordinary sentences can handle ordinary topics, equations can handle only one topic, numbers. If we could peel away one more layer of complexity from $2+2=4$, the equation might yield up the secret of its ability to handle numbers in a way that other sentences can not, and at the same time show why it is limited to handling numbers only.

Before we peel away the last layer of mystery from $2+2=4$, we can squeeze the last measure of understanding from its thirteen absolute paraphrases listed above. Appealing to the reasoning that Chomsky applied to words in 1957, if sentences were built by attaching words to other words, then different words attached to different words would build different sentences. Since that absolutely isn't the case, it also isn't the case that a sentence is a string of words, or that sentences are built by attaching words or other words, or that language is a discrete combinatorial system, or that all you need in order to make language is the ability to put words together –all of which come to the same thing. This lesson can not be emphasized enough. Sentences are built by attaching words to some underlying mechanism, not by attaching words to each other. The trick is to find the underlying mechanism; and by peeling away the last layer of complexity from the sentence " $2+2=4$ ", we can peel away the last layer of mystery, and expose the mechanism.

When the last layer of complexity is peeled away from the equation, we arrive at the basic $A=B$, which is known well enough to math teachers, but we will push it in a different direction. $A=B$ can be expressed in ordinary sentences, the same as $2+2=4$:

A equals B
A is equal to B
A and B are equal
A is the same as B
A and B are the same
B equals A
B is equal to A
B and A are equal

Sentences of Language

These quotes are sentences of language, and, like the words corresponding to $2+2=4$, they are absolute paraphrases of one another. But they reveal one more property that is present in every equation –hidden behind the fascination of the

complexity –the equations express a geometry, the geometry of symmetry: $A=B$ is the same as $B=A$. So, instead of applying equations to solving problems in symmetry, as Hermann Weyl did, we now make a turn-about, and examine the symmetry of the equation itself, an exercise for which there is no precedent. But the geometry of the equation is the window that allows us to glimpse its internal structure. Language must be defined as sentences, because where there are sentences, there is language, and where there are no sentences, language is pointless. Words, by themselves, are not enough. The absolute minimum sentence of language is Noun-Verb-Noun, N-V-N. One of the questions that has plagued the idea of language evolution and language origin is the concept that, if language appeared, it had to appear suddenly and in its entirety, and that is unimaginable. Language is too vast and too complicated for that. Under the N-V-N model, language did indeed emerge suddenly, just only a minimal amount of it. Just N-V-N.

The link, then, between N-V-N and the minimum sentence of algebra, $A=B$, is its symmetry. What mechanism, then, might generate the symmetry of $A=B$? The clue lies in the mysterious relationship between mathematics and physics, brought out most dramatically by Eugene Wigner in his classic 1960 article *The Unreasonable Effectiveness of Mathematics in the Natural Sciences* (*Communications on Pure and Applied Mathematics* XIII:1-14). On his page 6, Wigner explains, “the laws of nature must be already formulated in the language of mathematics to be an object for the use of applied mathematics”. With dramatic insight, Wigner brings the mystery into focus, giving it an urgency that it never had before. Pythagoras’s, Galileo’s and Einstein’s pronouncements acquire urgency only in the hindsight of Wigner’s paper. On his pages 8-9, Wigner explains, “Certainly, the example of Newton’s law, quoted over and over again, must be mentioned first as a monumental example of a law, formulated in terms which appear simple to the mathematician, which have proved accurate beyond all reasonable expectation.” On his page 9, Wigner tells us, “the calculation of the lowest energy level of helium, ... agree[s] with the experimental data within the accuracy of the observations, which is one part in ten millions. Surely in this case we “got something out” of the equations that we did not put in.” And on his page 14, Wigner continues, “The miracle of the appropriateness of the language of mathematics for the formulation of the laws of physics is a wonderful gift which we neither understand nor deserve.” This 1960 paper is Wigner’s immortality.

The symmetry of $A=B$ and $B=A$, then, is a property in physics; and it provides the critical bridge to Wigner’s unreasonable effectiveness. The question boils down to this: What property in physics might generate the symmetry of $A=B$ and $B=A$?

The answer is Newton’s third law, “For every action there is an equal and opposite reaction”, which I will cite by its nickname, “equal and opposite”. Not only are the A and the B of $A=B$ equal to one another, and opposite to one another across the “equals”, but the momentum generated in two objects pushed apart by an impulse is equal and opposite. In effect, the basic equation is a re-enactment, in symbols, of a basic law in physics. So, a good hypothesis for the mechanism that generates the equation in the brain isn’t a swirling storm of synapse-firings, but some mechanism

that generates an equal-and-opposite relationship, in a way that can be detected by nerve-cells, and amplified to our own scale.

The Sentence

The sentence is the supreme accomplishment of language, yet the sentence has not so much resisted analysis as it has been taken for granted. We can all produce and recognize sentences, and so we never notice that we don't exactly know what a sentence is. Producing a sentence is a lot like riding a bicycle: We all know how to keep our balance, yet exactly what we know is not so obvious. (hint: Motion is involved, but not gyroscope action.) The same is true for words in their role as part-of-speech. We suppose that a word like *find* is a Verb, forgetting that we can get a lucky find, where *find* is a Noun. Or a word like *pilot* seems to be a Noun, and we forget that we can *pilot* a boat through difficult waters, using pilot as a Verb. So, part-of-speech is not part of words; it is assigned to words by the mechanism of the sentence itself. The real question, then, is, What is the mechanism of the sentence?

Our goal here isn't to describe sentences that have already been formed –but to discover the mechanism that generates sentences in the first place from something that isn't a sentence.

All languages have sentences. But there are so many forms of the sentence that we would not recognize the underlying mechanism even if we found it. The only way to solve the mystery of the sentence is to find a model –something that is a sentence, yet is simple enough so that we can deduce the mechanism that formed it. If no model can be found, no solution will be found, and we will just have to live with that. Eliminating the possibilities one by one, I considered evolutionary replacement, evolutionary spandrels, fractals, game theory, the idea that language is originating all around us all the time, until only one thing was left: Arithmetic. It took me ten years, 1989-1999. Just like the discreteness property of the phoneme, the idea sounded too ridiculous to be taken seriously. But when I forced myself to consider it, I realized that equations of arithmetic are sentences of language.

“A = B”, or “A is equal to B”, then, is a sentence of language, where “A” and “B” are Nouns, and “equals” is the Verb. With their Verb expressing a relationship between two Nouns, equations have syntax, a unique property in language. “A equals B” is also an assertion, which is also a unique property of language. And, depending on the values assigned to the A and the B, “A equals B” can be true or false, also a unique property of language. But equations are also symmetrical, and thus have properties in geometry and physics. Here, at last, was a structure in language that has a link to something that isn't language, offering a clear hope of finding a solution to the mystery of the sentence.

Equation as Sentence

Take the standard quadratic equation,

$$ax^2+bx+c=0.$$

It might not look like a sentence, yet it can be spoken out loud,
“a-x-squared, plus bx, plus c equals zero”, as a sentence of ordinary language.
Even the quadratic solution,

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

may not look like language, but it can be read out loud as an ordinary sentence of language:

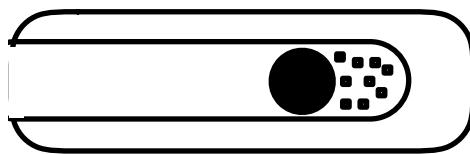
“X equals minus b, plus-or-minus b-squared minus four a-c, all over two-a”.

Any equation can be read out loud as a sentence and assertion of language with a truth-value, in exactly the same way. Equations are language, and mathematics is language, and there is no escaping it. The symbols stand for words, just like Chinese characters.

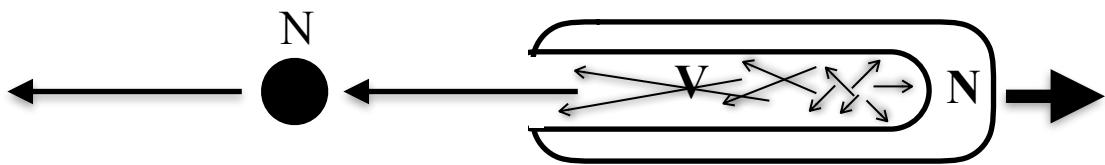
How Equal-and-Opposite Generates the Sentence

Equations are symmetrical. In other words, $A = B$ is the same as $B = A$. Equations are a kind of balance-scale, where, if you do something to one side, you have to do something equivalent to the other, to maintain symmetry. Is there, then, a law of nature that automatically generates symmetry? Such a law is the ultimate source of the equation and the sentence. That law is Newton's third law, "For every action, there is an equal and opposite reaction", equal-and-opposite.

To visualize equal-and-opposite, we might imagine a cannon, with its cannonball and its own mass –and a charge of gunpowder between them, like this.



When the cannon fires,



N: Noun; V: Verb

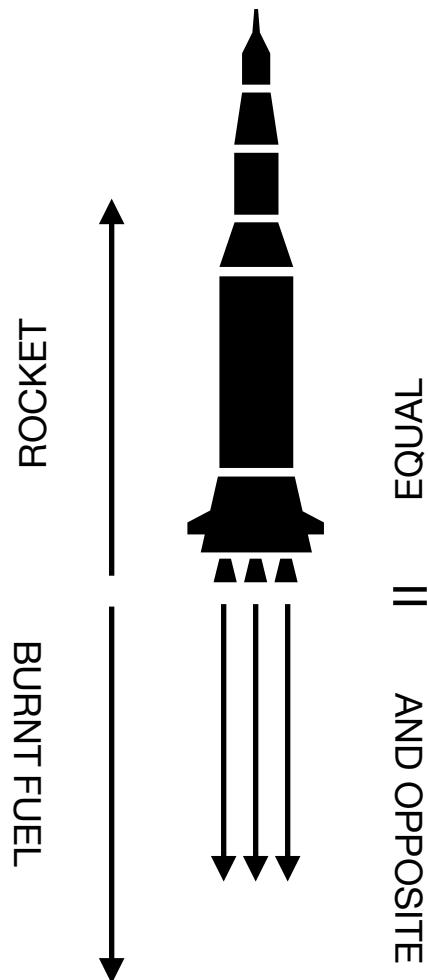
the explosion pushes the cannon and the ball in opposite directions. The ball goes faster, and farther, because it is lighter, but the momentum, the product of mass multiplied by velocity, is the same for cannon and ball. Here is dynamic symmetry, generated in physics by a basic law of nature.

The same thing happens with a rocket, which propels itself forward by propelling burnt fuel backward, as shown in the following Figure. Action and reaction are a matter of two masses responding to an impulse.

Equations, the Model of Physics

The ultimate example of Newton's 3rd law, "For every action, there is an equal and opposite reaction", the rocket propels itself forward by propelling burnt fuel backward. The two masses, the rocket and the burnt fuel, push against one another in opposite directions with equal momentum as a result of the impulse between them.

Since each side of the equation responds to changes in the other side only, the rocket and the equation, $A=B$, are alternate manifestations of Newton's "equal and opposite reaction". That is why equations are a model of physics.



Cannons and rockets don't occur spontaneously in nature, but explosions, or at least impulses, do. And when impulses happen, whether in stars or in subatomic particles, they send bits of matter flying off in opposite directions with equal momentum. This symmetry is the key to the bubble-chamber, and to the equation, and, ultimately, to the sentences of ordinary language. A sentence-equation isn't a static object waiting to be described. It is a momentary event, produced when an impulse generates a fleeting equal-and-opposite relationship between two objects. Equal-and-opposite is why equations are a model of physics: Properties of both systems are generated under the same law, equal-and-opposite, which generates not just symmetry, but the precise symmetry "one part in ten millions", as called for by Eugene Wigner, not the approximate symmetry generated in natural selection.

The word that symbolizes the impulse is called the Verb, and the words that symbolize the bits of mass are called Nouns. It is through this process that the mechanism of the sentence designates part-of-speech: Part-of-speech doesn't generate the sentence.

The cannonball model is crude but on target. It indicates that some equivalent mechanism, occurring spontaneously somewhere inside the brain, is the physiological system that has been captured or harnessed in generating the sentence. I have suggested that the symmetrically-placed points on opposite sides of the same arm of a water crystal, or snowflake, forming spontaneously on the surface of brain cells, might provide the attachment-points that would designate Nouns, while the symmetrically dynamic relationship between the two sides of the crystal might designate the Verb. Following a suggestion by Albert Szent-Gyorgy, the discoverer of vitamin C, Andrei Sommer and his colleagues have shown that such crystals are possible (2008). Crystalline water at room temperature -under water and in air. *Crystal Growth & Design*, 8(8), 2620-2622). The cell has sensors which, acting together, are capable of detecting the configuration of such crystals (Coste, B. Et al. 2010. Piezo1 and Piezo2 are essential components of distinct mechanically activated cation channels. *Science* 330:55-60, doi: 10.1126/science.1193270). The quantum-Newtonian theory is the only one that offers a clear hypothesis for the mechanism that generates sentences in the brain. If water crystals form on the surface of brain cells, the membrane can act as a transducer that will detect changes in the shape of the crystal, and will be able to transform the changes into events that the brain can use directly.

Equations are symmetrical, but sentences of everyday language are not. That is to say that where $A = B$ is the same as $B = A$, and symmetrical, an ordinary sentence like “The worm ate the apple” is not the same as “The apple ate the worm”, and asymmetrical. Even sentences like “A dollar is a dollar” or “Paris is Paris”, which are symmetrical in their words, are asymmetrical in perception: The first mention of the Noun introduces the topic, while the second mention brings out some special feature or property. What caused the sentence to become asymmetrical?

The equation, and the equals-sign (the “=”), weren’t invented until the year 1557, by Robert Recorde, in his book *The Whetstone of Witte* (see Gordon Roberts 2016, *Robert Recorde*. University of Wales Press, page 172; and Carl B. Boyer & Uta C. Merzbach 1991, *A History of Mathematics*, John Wiley, page 290). More math teacher than mathematician, Recorde surely made us his debtors, and died in debtor’s prison for his efforts. But the archaic, stone-age sentence was built on the same symmetrical infrastructure as the equation. Before 1557, there was no reason to think that mathematics and language are separate at all. So, in the first moments of language, two sentences like “John loves Mary” and “Mary loves John” would have been symmetrical and the same in exactly the way that $A = B$ and $B = A$ are symmetrical and the same today. The earliest speakers needed a way to indicate who loved whom, in other words to differentiate Subject from Object, in the sentence.

The right hand, the most skillful one in most people today, and the left side of the brain, the language side, are the Siamese twins of neuroanatomy, in other words, they are linked together physically across the corpus callosum in the brain (Crosby, E. C., Humphrey, T. & Lauer, E. W. (1962). *Correlative Anatomy of the Nervous System*. New York: Macmillan, page 516). But the Subject-Object relationship is so ubiquitous in our everyday experience that the archaic, stone-age sentence needed a semantic boost from the hands, acting as puppets. When the right hand became standard for playing the role of Subject-plus-Verb, its corresponding left side of the brain became the language side. It was the asymmetry of the modern Subject-Verb-Object sentence that introduced asymmetry, or lateralization, to the brain.

The symmetrical sentence mechanism lingered in the brain for perhaps fifty thousand years, used implicitly by Pythagoras and Archimedes, until it was put to explicit use again in 1557, in the equation as we know it. The involvement of the hands in the production of sentences initiated a process under which the sentence invaded all voluntary movements. With its power of assertion, the sentence transformed voluntary movements into proxy assertions, or intentions – transforming our primate ancestors into human beings.

Human Logic

Only sentences can be assertions, and only assertions can be true or false. And the simplest mechanism of assertion is that of the simple sentence, A equals B. In effect, the mechanism of the equation generates the basic assertion, “I am symmetrical”. The assertion may be true, as with $2 + 2 = 4$, or the assertion may be

false, as with $2 + 3 = 4$. Thus the underlying symmetrical geometry that generates the sentence is the primary mechanism that generates the logical sense of true-and-false. Anything that prompts a sensation of symmetry –even rhyme– will prompt a sensation of truth. The kind of truth that concerns detectives and scientists, an agreement between assertion and experience, is a recent invention, probably introduced around 500 BC by Aristotle and Socrates and their friends in Athens.

The Human Sense of Geometry and Physics

The human sense of geometry and physics can best be examined by comparing it to that of other animals. No person would mistake a bicycle tire or a vacuum-sweeper for a rabbit. Yet dogs who attack moving bicycles are called tire-biters, and we have all seen a dog attack a vacuum-sweeper as if it were a living animal. People and dogs interpret such objects in totally different ways. The dog interprets them in biology, while the person interprets them in geometry and physics. Where, then, did people get their unique sense of geometry and physics? With the quantum property of matter and Newton's equal-and-opposite already represented in the brain, the most reasonable hypothesis is that when the early human brain obtained control of equal-and-opposite in the production of sentences, then power-of-assertion, sense of truth-and-falsity, and sense-of-geometry-and-physics followed after. We don't think in language, exactly, but the quantum property, and equal-and-opposite mechanisms that generate sentences, also generate assertion, truth-and-falsity, and the mathematical sense and sense of geometry and physics.

How Language Developed

Once the modern Subject-Verb-Object sentence was in place, new constructions emerged as modifications of existing ones.

Independent clauses are sentences used as Direct Object:

I know that: John built the house.

Compound words are reduced sentences, with the first word functioning as the Verb:

V N	V N
waterfall	rainbow

Relative clauses are reduced sentences used as Verbs:

V	The man <i>who built the house</i> also found the waterfall
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The imperative is a modified future tense:

"Thou shalt not kill, Thou shalt not steal."

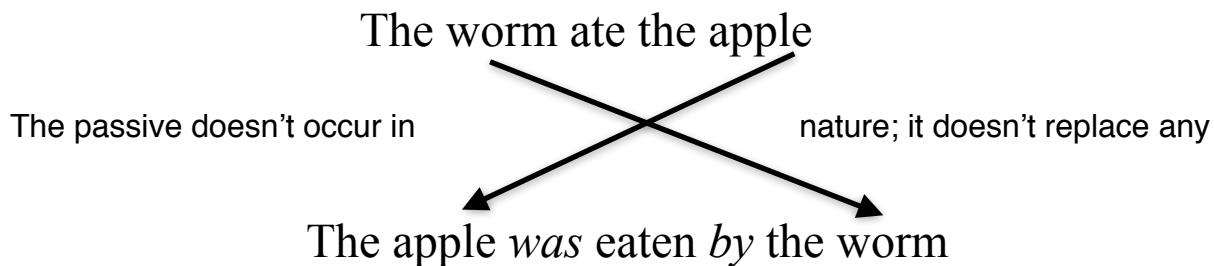
In word-ending languages like Latin, word endings have driven out word order as the indicator Subject, Verb, and Object:

V	O	S
Scripsit orationem Cicero		

The Jewel in the Crown of Language

But there is one construction that doesn't fit the pattern. Often criticized, and sometimes abolished for being "weak", the passive voice is in a class by itself. The passive is generated by reversing the order of Subject and Verb, and adding *by* and some form of the verb *to be*, to show what has been done. (This paragraph is a good example of the passive voice in action.)

The passive voice doesn't fill any visible need in the way that Subject-Object does.



construction that might have disappeared; it isn't prompted like other constructions; and there is no obvious reason for reversing Subject and Object. The passive represents a pattern that has no counterpart in nature. English, Latin and Chinese all have the passive voice, yet language could get along well enough without it, and still legitimately be called *language*. For every innovation in language, there is a first time and a first user. For the passive voice, this means an inventor.

As there is no obvious reason for it to emerge, I propose that the passive voice is the outright invention of some forgotten stone-age Shakespeare, who is the earliest individually-identifiable person, and my candidate for the most important person who ever lived. The passive voice is a kind of high-end linguistic luxury. In the months following its invention and introduction, the passive voice would have spread like a virus of prestige, with one speaker infecting the next throughout the community of speakers (Abler, W.L. 2019. *JIS Journal of Interdisciplinary Sciences* 3(1):56-77. Pages 72-73).

And it is just possible that the passive voice was the catalyst in the last major event that defined the modern human being – the death of the Neanderthals. Neanderthals and modern humans lived side-by-side for at least five-thousand years with only minimal interbreeding. Any differences between the two groups were obvious at the time, and taken seriously. Nevertheless, for some reason that is now hidden, the Neanderthals disappeared suddenly about forty-thousand years ago. What happened?

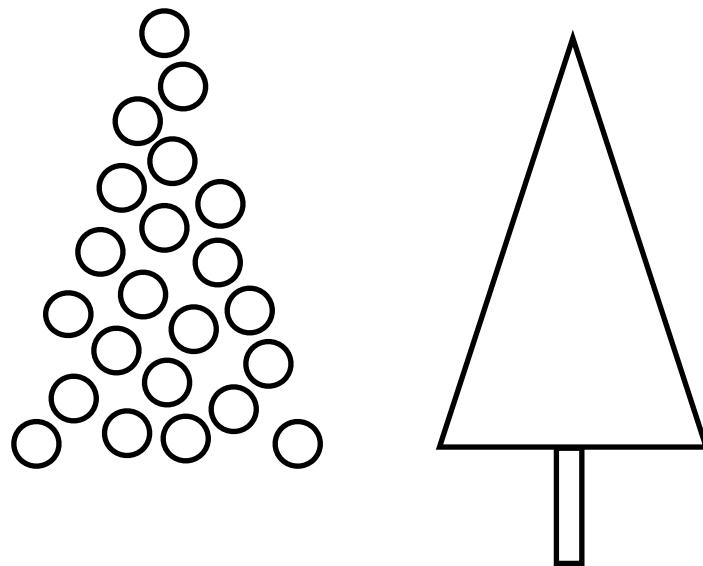
It stands to reason that some cultural event that would not have been preserved in the archeological record, precipitated murder. I suggest that the introduction of the passive voice would have been just such an event. With its reversal of Subject and Object, the passive voice can't be pantomimed with the hands, that is, you can't

pantomime the Verb-plus-Object combination. And it would have been easy to make up some shibboleth such as “The apple was eaten by the worm”. The passive voice pushed language into a purely abstract realm, and when the Neanderthals couldn’t follow, they were chased down and killed, one by one, and two by two, like the Flemings in the Peasants’ Uprising in London in 1381. If anyone said, “brot or cawse” instead of “bread and cheese”, they were hunted down and killed, even in sacred places like churches, where they had taken refuge. If the passive-voice model is true, it was through language that modern *Homo sapiens* –us– asserted itself, for better or worse, in claiming dominion over the Earth.

With the emergence of derived structures like dependent clauses and compound words, events began to happen in language that could not happen in any other system, and language assumed a life of its own, obscuring its relationship to other systems. I hope I have shown that language is special, its properties derived in physics, not biology –and that it is related to aspects of mind through a common source in the quantum property, and equal-and-opposite.

You can only recognize pattern if you already have it. The structured pattern that generates mind had to be already present, in other words, it had to be generated from something self-organized and spontaneously occurring. The structures of mind –the phoneme, the sentence, assertion, truth-and-falsity, the mind’s eye, mathematical reasoning, human technology– couldn’t “move in behind” effective behavior patterns. Such patterns were already present in the brain in some form, maybe the symmetry of the two sides of one arm of a water crystal. The property of mind drew its properties from them.

The equation-sentence shows that even the quantum property isn’t basic, despite being universal. The equation is language stripped down to its minimum, its only basics; and the origin of language does not lie in the equation itself, but in equal-and-opposite, the mechanism that generates it. In modified, asymmetrical form the same underlying mechanism generates the sentences of modern, ordinary language.



LANGUAGE is like a Christmas tree at night. All we see is the decorations, the words. While we struggle to discern the pattern in what we see, the real structure, the tree, is hidden in darkness, and we don't even realize that it is there. In a real sentence, two words become Nouns by being attached to the two sides of the equal-and-opposite reaction, while the word attached to the action is called a Verb. The fundamental mistake in the study of language has been to treat words as if they were material objects like checkers, and embodied the structure of language in themselves. That is how all grammars work. As long as we repeat this mistake, we will never find the structure of language.

Intelligent Life in the Universe

In his book *Alone in the Universe* (Wiley 2011), John Gribbin lays out his case that we, the inhabitants of planet Earth, are the only technological species in the Universe, and that we get exactly one chance to develop a scientific understanding of nature. In spite of exoplanets and thinking outside the box, I have to agree with him. Gribbin argues that the Earth's molten iron core, and oceans of water combine to give it plate tectonics and changing conditions that promote the evolution of living forms, while generating a magnetic field protecting them from charged particles coming from the Sun. The gravitation of the Moon stabilizes the Earth, while that of Jupiter stabilizes the Solar System; and such a happy combination of circumstances just wouldn't happen twice.

Animals whose entire body is dedicated to locomotion and eating just won't develop the kind of detached, contemplative mind that characterizes a human being. There won't be philosopher horses or crabs or porpoises or preying mantises.

But there is a deeper, more fundamental obstacle: Under the quantum-newtonian theory, there is exactly one solution to the question of language and mind; and that solution is found in the laws of physics and the symmetrical geometry generated under equal-and-opposite. Civilization depends on the ability to make assertions, and a concept of truth-and-falsity to evaluate them. All promises, laws, lies and rituals are sentences and assertions. These properties have their source in the symmetrical geometry of the earliest archaic sentences, not in natural selection. Laws and rituals that bind societies together depend on the ability to recite them in unison, and to duplicate them exactly –an ability guaranteed only by the discreteness property required under the particulate principle, and delivered by the quantum property of matter.

Human technology depends on pro-active use of the mind's eye, and, the ability to make these images real by asserting them through actions which are proxy sentences. Mental images themselves are a manifestation of the geometry that is latent in mathematical sentences, for which there was no call during the stone age. Further these abilities offer a selective advantages only after they have come into existence. They aren't prompted by anything in nature –and they come as a package generated under the inevitability of physics. Counting, then arithmetic, then algebra, then calculus aren't enabled by a sequence of mutations. Mathematical ability comes in its entirety along with linguistic ability –both generated under a common ancestor in physics. Language was realized first, but the symmetrical scaffolding to which the symbols of language are attached, and that makes language possible, is the same scaffolding to which the symbols of mathematics are attached, and that makes the equation possible. The symmetrical impulse that generates mathematical ability generates, as a corollary, the sense of physics and geometry that corresponds to the physical world, rather than to the biological history of this species or that. To the examples in my Quantum-Newtonian paper J/S 2019 I will add the observation that no mouse, in possession of a sense of physics and geometry, would fall for the, to us, obvious physics and geometry of a mousetrap. The central core of human abilities – words, sentences, numbers, equations, assertion, truth-and-falsity, sense of physics

and geometry, voluntary actions as proxy sentences and assertions— emerges as a coordinated package generated in Newton's third law, not as a kluge generated in biology.

While the mechanism of language and mind is ubiquitously latent in the laws of physics, harnessing it is a different story. Natural selection has to generate an animal with prehensile hands and a vocal tract, and bring the brain to the threshold of a system for which there was no call. The brain, for its part, had to possess some mechanism capable of generating, and sensing, and controlling an equal-and-opposite event that would generate language and mind to the level of perfection (read ‘accuracy’) that Wigner so admired –and could step in and take over. The chances that this kind of coincidence would actually happen are so vanishingly small that our existence verges on the miraculous.

Why Write This Book?

No one wants to write a book like this one. Readers want to learn about careers that prospered in tandem with progress in science. That is the story that Pinker and MacNeilage, and Auletta, offer. People want to read murder mysteries, and watch them on TV, but crime in science looks tawdry. We don't want to have the mirror held up to us, to see that we have been wrong. We don't want to see that the forces nurturing our career have not just been wrong, but have been propped up by theft and fake science. All theories of language evolution start with a denial of physics. A famous scientist once listened to my ideas on a basis in physics, and told me, “Language evolution is practically a growth industry in science. Too many people have looked at this. If there were anything wrong with it, someone would have noticed”. A denial of physics. The historian Paul Barrett once told me, “If history has one lesson, it is that people will think what they want, no matter what”. And when I told the late Karl Pribram, probably around 1995, that Pinker had plagiarized the particulate principle, Karl wouldn't speak to me for two years. Everything favors the plagiarist, starting from burden-of-proof to plausible deniability to people's desire to stay out of trouble. In the hands of Pinker, MacNeilage and Auletta, science is a fun-house, and truth is a reflection in the Hall of Mirrors.

The first remedy is, never buy, never sell, never read, never write, never cite, and for God's sake never publish any fact-based material –history or science– that doesn't have some kind of direct references in the text, or eyewitness report. Where the author doesn't take personal responsibility for truth, such material has to be understood as entertainment only. We need mechanical solutions to human problems, but these can only be partial. The compiler of an encyclopedia is caught between a duty to include everything, and a duty to be accurate. The two are mutually exclusive. Looking up original sources is a luxury that always pays off, but takes time. People cheat because they are human. Like the problem of bicycles and pedestrians and skateboards on city streets, the real problem is human: Education. Stop, Look and Listen. Science is supposed to deal with ultimate truth. There are no two sides to the story of $F=ma$, or $a^2+b^2=c^2$. Nature just is what it is, and our task is to find it. Scientists are expected to

speak for truth because they deal with it directly in a way that lawyers and politicians and even detectives can't.

I have lost friends over the particulate principle in science, and I suppose I will lose more by writing this book. Every friend is precious beyond calculation. Maybe I will get into trouble in ways I can, and can't, anticipate. No one wants that. I would guess that I have wasted two years becoming a historian of Pinker and MacNeilage, neither of whom deserves one minute of anyone's attention. But I have discovered two theories in physics that include naturally-occurring human language in its most basic form, as well as the basis of mind in the sense of truth-and-falsity, as well as the bridge between physics and mathematics. If the theories prove to be correct, as I expect they will, sometime about thirty years from now (2020), they will be re-discovered by someone who has some connection to my publications, especially my 2019 Quantum Words and Newtonian Sentences. It is just too much of a coincidence that both parts of language take their structure from physics in such obvious ways. The theft has already happened once. I am ten years older than Pinker, and wouldn't it just be the star at the end of his meteoric career to beat the odds, and discover, at the advanced age of eighty, that there has been a mistake. Language takes its structure from laws of physics, after all. The only thing standing between him and such a discovery is me.

If you want truth, you must demand it. I have dedicated my life to finding truth in nature, and am now forced to look for it in human commerce. Does it matter? Is it really important to know who discovered what? You will never get fine-grain truth out of plagiarists. We get the fake science we deserve, as much as the bogus politics and politicians we deserve. We need technical solutions to human problems, but only to buy time for education. Maybe I should be grateful to my plagiarists and false critics. Their falsity forces me to see my own faults and findings in perspective. At some stage, society needs actual ability. We can't plagiarize our way into the future. Sadly, Pinker and MacNeilage and Auletta have made their progress by subtracting from the store of human knowledge.

Easy Answers

Easy answers beget easy answers. Two of the most profound riddles of the third quarter of the twentieth century were the gene-language analogy, and the physics-mathematics analogy. So –why are the gene and language both strings of discrete constituents, and why is mathematics a model of physics?

The gene-language analogy first: Even when he had the right answer in hand – the particulate principle– Pinker (*TL* 1994, page 84) went for the easy, descriptive answer –the discrete combinatorial system– because a law of nature would have triggered a revolution by showing that language gets its properties from physics. That might have made my 1989 paper too obvious, and might have been asking too much of the reading public, when Pinker was already the champion of language evolution. He

degraded the law of nature to the status of an explanation: “in a blending system, the properties of the combination lie *between* those of the original constituents.” It worked.

The physics-mathematics mystery: Noticing that structures in physics and structures in mathematics are both symmetrical, Max Tegmark (*Our Mathematical Universe* 2014, Knopf, page 269), decides (page 6) “our physical world ... *is* mathematics” (Tegmark’s italics). The gene-language equivalent solution would have been, “The gene *is* language”. That is the easy answer, but in mathematics, we see a mystical, magical force that is revealed only to a privileged few –and we let them get away with murder. Tegmark has made an observation and a description, not a theory. He does not realize that a theory would have shown that a single cause generates shared properties in the two systems. Tegmark (page 271) treats symmetry in physics and mathematics as a coincidence: “A mathematical structure can have many interesting properties—for example, symmetries—even though neither its entities nor its relations have any intrinsic properties whatsoever.”

A shared property of symmetry doesn’t mean that physics *is* mathematics. A shared property could just as easily be a coincidence. If Tegmark got the right property, that doesn’t make him right, it makes him lucky. A theory showing *why* mathematics is a model of physics has to emerge from the observation that the properties of both systems are generated by the same mechanism.

What makes equations symmetrical? Under the biological theory, it is natural selection. Natural selection would have favored those individuals who possessed the most symmetrical equations, until eventually the mathematics that we know today emerged. OK, what kind of symmetry does natural selection produce? Maybe the most iconic example of symmetry in nature is seen in butterflies and moths. They exhibit symmetry, but not of an order that is accurate to Wigner’s one part in ten millions. On the other hand, Newton’s equal-and-opposite not only can cause the kind of symmetry called for by Wigner, it is the only thing that can. Other perfect symmetries, such as the symmetrical geometry of molecules in a small water crystal, must be traceable, one way or another, to Newton’s equal-and-opposite.

In spite of mathematical reasoning, the symmetry that makes equations possible would have remained hidden in the brain until 1557. Whether it would have been ‘visible’ to natural selection is an open question.

The solution to both mysteries is a deeper, more eternal law of nature. The gene and language are discrete because discreteness is a requirement for emergent properties. Physics and mathematics are both symmetrical structures because properties of both systems are generated under the same law, equal-and-opposite, a law in physics whose first consequence is symmetry. But shared symmetry in itself isn’t the answer. It is a by-product. Pinker went for the easy answer through a failure of courage, and Tegmark through a failure of insight.

In mathematics, symmetry guarantees that equations will have a right answer – the one where the two sides balance one another. Symmetry guarantees that each side of an equation is sensitive to changes in the other side only, not to changes in the environment. Thus it is symmetry that makes equations reliable. In physics, symmetry guarantees that reactions happening in one place will be compatible with reactions happening in another place. So, hydrogen generated on one side of a star will be usable by hydrogen generated on the other side of the star. And in both systems, symmetry is generated under the same law. That is why symmetry is important.

Even if they never met in person, Pinker and Tegmark are so connected through FQEB, Foundational Questions in Evolutionary Biology, for which Pinker was an adviser, and Max Tegmark's FQXi, Foundational Questions Institute, both sponsored by Templeton (who else?) that the spirit of the easy answer might have traveled between them by osmosis. How do you walk the same paths, and breathe the same air with these people without absorbing a spirit of omniscience, and why does the reading public accept it? Tegmark's unacknowledged "The theory that our external physical reality is perfectly described by a mathematical structure while still not being one is 100% unscientific" is so close in meaning to Wigner's "the laws of nature must be already formulated in the language of mathematics to be an object for the use of applied mathematics" that we might wonder whether Tegmark is flirting with plagiarism.

§ §

Part Two
Reflections
to the memory of John Milton and Niccolo Machiavelli

I have gathered these over many years, in no particular order.

Murder

Does it matter? We can read that plagiarism is the worst crime that a scientist or other author can commit, but what's so bad about it? Remember my friend who sneered, "You're still alive!" I was. So what's the harm?

Anyone who ever kept a diary or a notebook realizes, sooner or later, that your writing amounts to letters to the future. After the author's death, the diary passes into other hands. It might be read by anyone, and quoted for purposes never intended by the author. Books and articles, and any published material might be quoted at any time in the future. Toward the beginning of his *History of the Peloponnesian War* (Penguin Classics, pages 24-25), Thucydides informs us...

"It will be enough for me, however, if these words of mine are judged useful by those who want to understand clearly the events which happened in the past and which (human nature being what it is) will, at some time or other and in much the same ways,

be repeated in the future. My work is not a piece of writing designed to meet the taste of an immediate public, but was done to last for ever."

Thucydides meant what he said. Even the Greeks couldn't read him, calling him, "The Severe". Yet his long and difficult book is part of the one-percent of ancient literature that has passed through the sieve of time, being copied and recopied by hand until it survived into the age of print.

Unintentionally, the same is true of anything that has been written down. Scraps of songs and poems by medieval minstrels, written down only to help the minstrel remember them, or as an aid to composition, when found five-hundred years later represent a forbidden glimpse into a vanished world. Stacks of letters, tied up with a ribbon and hidden away in an attic, may have been written for an immediate purpose, but when they come to light decades and centuries later, may come to the attention of an eager public. This is obviously true in the case of famous people, but in the modern day, when the lives of ordinary people and their daily life is increasingly the focus of historians, the value of such personal reflections is more and more recognized. There is the little book,

WESTERN LIFE IN THE STIRRUPS
A sketch of a Journey to the West
in the Spring & Summer of 1832
By Virtulon Rich
edited with an Introduction by
Dwight L. Smith
Chicago The Caxton Club 1965
Discovered and printed for the first time.

In Washington DC, young Virtulon (page 25) "was introduced to the President by Gen. Pitcher of N. Yk.. The Old man [Andrew Jackson] received us in a polite manner keeping up a cold supremacy". In the Hall of Representatives, Rich continues (page 27), "The Old Hero [Jackson] was on several occasions held up in a pretty ridiculous light."

or:

"After a century of silence a Union Infantryman speaks from the yellowed, dusty pages of notes hastily scrawled under fire or written by the light of campfires, to give a vivid, firsthand account of our country's Civil War":

A Yankee Private's Civil War
by Robert Hale Strong
edited by
Ashley Halsey
Henry Regnery Company
Chicago

1961

In the last moments of the war, Strong reports (page 196) that, "We not only took baths ourselves, but we boiled all our clothes, blankets, tent clothes, etc., to kill the festive louse. ... we saw, way ahead of us, hats being thrown in the air" [on news of Lee's surrender]. On page 197, "we received the news of Lincoln's murder". And on page 200, Strong recounts the discovery and, on orders of General Sherman, destruction of an auctioneer's stand and whipping post. (Page 201) "Chickens would crow to the tune of Dixie, so had to be killed."

The old ostraca, the scraps of broken pottery used for voting in ancient Athens, are now valuable archeological data. An illiterate voter could ask a literate one to write out his vote for him. There is an oil lamp, found in Athens, with the name Simon scratched on it. Socrates and Pericles used to argue, and no doubt torment the cobbler Simon in his cobbler's shop –and there is no reason to doubt that the lamp, which was nothing in its day, is now precious for having been in the presence of Socrates and Pericles –and Simon. Even notices posted on walls for practical purposes in their own day, like "CAVE CANEM" (Beware of Dog) written on a wall for practical purposes in Pompeii, or tavern rooms for rent by the hour, are now archeological treasures. Libraries DISCARD out-of-date books, which are now available in thrift shops and on eBay at bargain prices. Have such books lost their value? They are an invaluable record of what people thought at the time. Even a list of musical selections to be played in the local bar next Saturday night will, 500 years from now, be a precious glimpse into the culture of a vanished past.

Plagiarism is permanent literature, too. It doesn't get stale any more than any other literature. Like Thucydides, it is intentionally or unintentionally meant to last forever. The six-year time-limit on cases of plagiarism, invented and imposed by U-TX@Austin, is indefensible and unconscionable. It is the Administration's excuse to protect their misbehaving faculty. It is their declaration that they don't give a damn about truth. And it is a slap in the face to all researchers who make honest discoveries, even if they never have anything to do with U-TX@Austin and never get plagiarized. It is an insult to the plagiarist's high ambition. Do witnesses die or move away, as they do in cases of theft and murder? Plagiarism is the quiet crime. The wise plagiarist tells no one. The more people who are in on a secret, the harder it is to keep secret. Everybody knows that. The evidence is published on paper, where it never gets stale, and can be verified. It accumulates mentions in other literature. The internet is filled with unexplored potential, and may become a kind of scientific Hall of Mirrors –fertile territory for new and more creative forms of scientific deception.

Plagiarism does not stop with the original theft. I don't know how much time I have spent reconstructing Steven Pinker's thought process, combing through his book to find the quotes, reconstructing how he scattered and hid the original source. How he directed the reader's attention to the wrong idea. He is a natural-born brute and politician and sleight-of-hand artist. I am not. I don't know how much time I have

What can be Done?

The first thing is to accept ourselves as we are. Science, the same as any other profession, is a human activity, and as long as there are people, there will be dishonesty. As with liberty, the price of good science is eternal vigilance.

Such vigilance must take many forms. We must accept that there can be no silver bullet. Armchair tests such as “Consider the source” only lead to a homogenized landscape, where, as Bertrand Russell reminds us, everything is obvious and boring. They amount to a sophisticated diversion and excuse for not thinking. Remember Bertrand Russell’s “What I think about what I think has nothing to do with what I think”. Remember that nature is unaware of our existence: Nature doesn’t know that Harvard exists, much less care. In nature, true is true no matter who says so, or who says no, or if nobody says so.

We must train ourselves to read intelligently. Since no one can read everything, this means cultivating a sense of what to read. In science there are a few classics. Everyone should read Einstein’s Electrodynamics, just to watch how he does it. He starts from a few simple assumptions –nothing can travel faster than light; there is no such thing as absolute rest; motion is relative– then he puts on his seven-league boots and strides out into the wilderness. Even if you don’t understand all of it, you can understand Einstein’s confidence and boldness.

Material analogies –the gene-language analogy, “Why is mathematics a model of physics?” “the atoms of language” are not helpful because they prompt us to look for further analogies, instead of deeper abstractions. Nothing prompts abstraction, yet abstraction is the real instinct that leads to laws of nature.

In spite of comments by Pythagoras and Galilei and Einstein on the relationship between physics and mathematics, it is Wigner’s 1960 paper that brings the math-physics mystery into focus and infuses it with an urgency that no one else grasped. Wigner’s title, “The Unreasonable Effectiveness of Mathematics in the Natural Sciences” should capture anyone’s imagination. Every educated person should recognize Wigner’s wry but spot-on genius. His closing observation (page 14) “The miracle of the appropriateness of the language of mathematics for the formulation of the laws of physics is a wonderful gift which we neither understand nor deserve” is stated in such powerful, simple and dramatic language that its message can not be missed. In his great goodness, he spells out exactly what he does not know, passing the clearly-formulated mystery along to his readers. Wigner’s paper of 1960 elevates him above the other geniuses of his century, placing him just below Einstein and Gödel. All three knew each other personally.

Galilei showed that physics should be understood in mathematical terms, and Mendel showed the same for biology. Remember what happened when I read Wegener’s *The Origin of Continents and Oceans*. If something seems fundamental, go

and read it. You will never be disappointed. History can be exploited for profit, the same as anything else. Where there is a claim that such-and-such an idea "was known" in, say, 1950, go and find out. Actual credit for a discovery hinges on showing that something was or wasn't known.

When in doubt, construct a time-line of discovery. You will be amazed to learn that some ideas were known very early, while others seem to have been known only in hindsight. The urgency of understanding the relationship between physics and mathematics only emerged with Eugene Wigner's paper of 1960.

Don't read any fact-based material –science or history– that doesn't have numbered or author+year+page-# references in the text. End-notes by themselves are a formula for deception. A very few, totally original papers have no references.

Read, as I was advised when a child, voraciously and omnivorously. You will unconsciously pick up style and phrasing that will enable you to read and write effectively. Even limericks, possibly the most densely-edited literature in existence (some of these five-line poems have been revised for decades), will give you hints for phrasing in your scientific writing. Cultivate the art of making maximum use of simple language. The impersonal style of deceptive. Nothing is impersonal. Ernest Hemingway tells us that it takes six weeks to establish a habit. So, six weeks 11 of agony will furnish you the habit of reading and writing every day. The effort that you put into your writing will give you perspective and insight into other people's writing. Every mistake that you make is a lesson for better writing next time.

Cultivate relationships. So, if the Moon is 120,000 miles away from the Earth, and light travels 186,000 miles in one second, light takes a little over one second to travel from the Earth to the Moon. The same for radio.

A poor, uninformed public is a disgrace in the eyes of the world, and a recipe for disaster. If democracy and good science depend on an informed, secure voting public, support your local community college. It employs your friends and neighbors, and delivers a better education than it gets credit for. Junior colleges educate the largest number of people who would otherwise have no access to higher learning. Junior colleges, the ones that award the Associate's degree, offer classes at a higher level than most people realize. Curriculum in professional school or trade school should include distribution requirements in art, music and literature –even just one semester combining all three will open students' eyes. Insist on health insurance for faculty at junior colleges, which now reason they get that through their spouses.

Cultivate a sense of history. Does 1795 seem like a long time ago? We should all see ourselves in some perspective. The Peloponnesian war was a long time ago (about 550 BC), and yet the Athenians' decision to attack Sicily eventually led to a Europe dominated by a Roman culture instead of a Greek one. History matters, and science is history. Memorize some dates. The Lascaux cave paintings, the pyramids of

Egypt, Socrates, Aristotle and the modern concept of truth, the fall of Rome, the distance to the Moon, the single-variable-factor experiment, the invention of the achromatic lens, upon which modern medical research still depends. Commercial radio and telephones in the home.

Read intelligently, not critically. Automatic skepticism of what we read is as pointless as automatic acceptance. Either way, we know nothing. Often, when we read something, we “get the point”, then imagine that we have got the right point. Pinker & Bloom 1990 tells us that a little bit of language is good and a little more is better – and from that we jump to two wholly unjustified conclusions. The first is that “language evolved by natural selection”, when this phrase is, dangerously ambiguous. The P&B reasoning is strictly a theory of post-origin development, not a theory of language origin, because the real mystery is the first little bit of language. The whole world fell for that. The second deception is that we now have a theory of language, and proof that language has its origin in biology, when all we have is that, once established, language might continue to grow. Another example is Max Tegmark’s (2014, page 318) “The theory that our external physical reality is perfectly described by a mathematical structure while still not being one is 100% unscientific” not only is a paraphrase of Wigner’s “the laws of nature must be already formulated in the language of mathematics to be an object for the use of applied mathematics”, (Eugene Wigner 1960, page 6), but is only a proof that physics is described by mathematics, not an understanding of *why* physics is described by mathematics. Wigner had the grace and strength to acknowledge the real state of our understanding, thus stimulating further investigation. But by prompting the assumption that the physics-mathematics mystery has been solved, Tegmark has killed the search for a real answer. Don’t let this happen to you. Think through the real meaning of what you read.

Peer review, that gold standard of science, is a certificate not of truth or quality, but of uniformity. You can be pretty sure that you aren’t getting anything too radical.

There is a real question as to the standing of faculty in a university. Gregor Mendel showed that solutions in biology are mathematical. This is what Galileo showed for physics. This is Mendel’s greatness, but his exams in zoology suggest that he never thought about zoology, or even cared about it. Who is a better candidate for a college professor, Steven Pinker, who knows a lot, and can deliver lecture after lecture out of memory –or Gregor Mendel who spent endless hours carrying out thousands of single-pollen-grain fertilization experiments, using a microscope that was second-rate even for his day, because he didn’t want to over-spend his monastery’s precious resources. Mendel is reported to have smoked up to twenty cigars in a day. If he cut back on his cigar expenses, he might have been able to afford a better microscope. There is no clear answer to this question. Mendel wanted a teacher’s certificate, but didn’t qualify. Should there be a place for someone like Mendel in the university –or should we leave such volunteer researchers to their own devices, as we have always done? Would Mendel have thrived in a modern university? Do we want Pinker’s vast knowledge, together with his thefts and bogus ideas?

The modern trend is to team research, and we can see it praised and heralded as the wave of the future. For routine research, that is undoubtedly true. But for the real discoveries that change everything, team thinking will never work. You can't get two minds to drift in the same unconventional direction, not to mention ten minds, where the ideas must drift into place like snow.

When we think of science, we think of the university. Where do new ideas come from? That's what universities are for! Maybe that's what they are for, but that isn't what they deliver. We learn about the earliest *Homo sapiens* in Europe a hundred thousand years earlier than previously thought; we learn about the role of gut bacteria in regulating health, even mood; we learn about increasing brain size in the human family tree; we learn that the control of fire and the invention of cooking provided a kind of external digestion that allowed our energy-hungry brains to grow large. It is all fascinating, and probably true, and worthwhile knowing in itself, but it still isn't a theory of the human mind and language –which is what we really want to know. Keep your eye on the rabbit (the only advice my father ever gave me). You only get threescore years and ten. The British journal *Nature* says you only deserve fifty. You must ration the years of your life against the possibility for discovery. I was seventy-five when I completed the quantum-Newtonian theory of physics, mathematics and language. How many years will the next discovery take? If the answer is more than a hundred, it won't happen. The only hope is that nature is simple, and is solvable because it is simple.

There is no such thing as a great university. There may be old ones or big ones or influential ones or rich ones or prestigious ones, even snooty ones, but no great ones. When I was an assistant professor at a university, I was resident adviser in a mens' fraternity. I had my own room in the fraternity, and lived among the people I served. I ate my meals with them and knew them personally. I was their advocate among the faculty. I am still friends with some of them. After I got married, my wife lived in the fraternity, too. At first, it was mostly OK, although one young man warned, "Ted [not his real name – the regional adviser] won't like this". The fraternity was, in its way, a barometer of the university, maybe of the country. There were smart people and dumb ones, nice ones and mean ones, strong ones and weak ones, and even two who didn't really need a college education. Both died young. And a new brother had recently joined who was quite a politician. He was enormous, and if he could do anything, he could fill a doorway.

Around the middle 1980's, after my university had dissolved its Linguistics Department and fired the faculty, I continued to live in the fraternity for several years. One day, I ran into one of my former colleagues on campus, who was on the Student Life committee –would I come to his office and share some of my observations? He mentioned that there had been some problems with cruelty in the fraternities, but students graduate after four years. He flipped his hands in the air and grinned, "Problem solved!" I said that these are not always the brightest people in the world, and that some take five and six and, in some distinguished case, seven years to graduate. And that is just the beginning. The fraternities have a big-brother/little-brother system, where a younger student understudies with an older one. The mean ones teach their

successors dirty tricks, and train them in their personality, so that when they graduate, the younger one moves into the place vacated by the older one in the system.

My former colleague asked me how he might acquire this kind of information. I said, "I can tell you what to do, but you won't do it". "Try me!", he answered in a cheery voice. "Get a position as resident adviser in a fraternity, and move in, and live there. After a couple of years, you will know". "You're right. I won't" was the answer. I said that going to the fraternities and doing on-the-spot investigation was worse than pointless –"because they will only tell you what they want you to hear", he interrupted. But it runs deeper than that. The mean ones will tell you what they want you to hear, and the rest will say only what they dare. What General Robert warns about in his famous *Robert's Rules of Order* is ruthless minorities, not competing factions. It only takes a determined, organized ten percent of any population to swing an election. A skilled leader can parcel out lines to different members of his clique. There can be tests of loyalty. The lonely, the stupid and weak want desperately to be part of something; and a leader knows how to make them feel wanted. He gives them lines to recite, like "So-and-So is disloyal", or "Such-and-Such is a troublemaker". These vacant lines are completely convincing. Most people simply want to get on with their lives. Half of them will go along with the ruthless minority, the rest resist, but the vote is split, and the ruthless ten percent win, 55%-45%.

My former colleague explained to me that when a clique forms, you get competing factions. In fact you never get competing factions. Factions require leaders, and most people don't want to lead a clique. Members of the clique can then *claim* that there are competing factions, and a site-visit won't refute that. It sounds so logical. The honest members are afraid to speak up because no one wants to believe anything bad, and they will have to live with the consequences long after the investigators are gone. It is almost impossible to convince outsiders of vicious associations, whose members claim that everyone is as bad as everyone else, and that they own the moral high-ground because, "At least we're honest about it". The result is Hell. The clique episode came to a crescendo when, one night, the leader suggested to one of the members, "If I were you, I would get that rope that is upstairs and tie XYZ to the tree outside". He did, and poured a bucket of water over him. One faculty member commented, "If a few mean people want to go off and be mean to each other, let them." What ever happened to *in loco parentis*? There were photographs. I offered to go to the police if the victim would be a witness, but he refused, and that was the end of it.

In a last-ditch effort to find a solution, some of the students went to the University Chaplain and told him their story. The clique with its leader was nicknamed the Evil Cabal, a phrase borrowed from a then-prominent politician. The Chaplain explained that "a cabal is by its nature evil, and therefore that name is redundant: 'the cabal' is what you mean", he corrected them. They had handed him exactly what makes a chaplain great, and is the purpose of a Chaplain at a university –and all they got was a vocabulary lesson. The chaplain was fired a few months later, for being redundant. My point here isn't poetic justice, but to mine the past for lessons to make a better future.

Readers may remember the early days of Bashar al-Assad in Syria. World leaders kept reassuring us with the hopeful news that “Assad is willing to negotiate”. Of course Assad was willing to negotiate. Every minute that we negotiate, he is still the President, consolidating his position. The leader of the Evil Cabal was a small-time bully, and Assad is a big-time one, but their principles were the same. If world leaders had lived in the house with a bully, they might have understood Assad –and the situation in Syria might now be very different.

I understand that research on college campuses is now starting to discover that some students take up to five, six, and even seven years to graduate. My former colleague asked me to serve on the Student Life Committee, and share my observations. I was at that time an unemployed nobody (I still am), and my former colleague was an associate professor with tenure and a salary, and health insurance and life insurance, and the social benefits of belonging to a university. I said, “Put me on the faculty, and give me tenure, and I will serve on any committee you want”. He gave me a stare as cold as ice: “I have no power” he told me in a voice that would freeze the North Pole. If all university faculty were required to live among the people they serve, and know them personally, and act as their advocate, these scenes might be avoided. Students might feel more connected to the university, knowing that their voice will be heard. The presence of a real faculty member in student society might lessen the ability of politicians to form an Evil Cabal.

Why do universities award tenure? The point is to give faculty the courage of their convictions, not to use tenure as a blind for sniping at helpless victims.

My observations go back thirty or forty years. If more University faculty had been willing to live among the people they serve, these ideas might have come out decades ago. I told them to my former colleague. As it is, even the knowledge currently being gained will be spotty and hazy because the old problem of distance between faculty and student will remain. Under these conditions, the concept of on-the-spot investigation is actually harmful. I was able to invite friends and colleagues to the fraternity without disadvantage. I suffered no adverse social or intellectual consequences for my unusual living arrangement.

Toward the beginning of section XIX, Machiavelli (*The Prince*, 1513. New York: The Modern Library edition 1940) warns, “it is very difficult to conspire against one who has a great reputation, and he will not easily be attacked”, and “hatred is gained as much by good works as by evil”. The best course is to keep quiet and let events wash over you. When 51% of other researchers have changed their mind, you can change yours, too. If I speak up, I have no popular movement to support me, just a few friends. I have already lost some of those, and fear I may lose a few more. The discoverer of a new idea is alone, totally and absolutely. It is bad form to speak up for oneself. If I speak up, I am a meany. If I don’t, I am dead, and Steven Pinker will continue to walk all over the science, and the scientists, of language and mind. I have been polite for 25+ years. When you have been plagiarized and ridiculed and falsely disproved, you tend to get an idea of what you have done. Even Pinker’s most outraged critics

(Friedersdorf, Conor July 20, 2020. *The Atlantic Monthly*. The Chilling Effect of an Attack on a Scholar. <https://www.theatlantic.com/ideas/archive/2020/07/steven-pinker-will-be-just-fine/614323/>) are not “concerned with Dr. Pinker’s academic contributions as a linguist, psychologist and cognitive scientist”, re-affirming, with all the advantages conferred by three decades of hindsight, the scientifically vacant P&B’90. They struggle to understand how Pinker got so smart, in effect doubling down on their faith in Pinker’s bankrupt science, when they should be struggling to understand how someone so wrong-headed and so vicious could rise so high, and be so revered.

What I don’t want is for some genius, thirty years from now, prompted directly or indirectly by my 2019 paper, to “discover” that equations are sentences, and that the structure of language and mind can be thought through from there. In his supercilious hyper-refinement, sniping from an almost certain position of safety, the plagiarist is as vile as the coarsest mugger who waits in the doorway at midnight.

The plagiarist has every advantage. Having stolen only the best in scientific material, the plagiarist enjoys the highest reputation. Who would believe that some obscure nobody, publishing out of a street address in Chicago, had discovered “the engineering trick behind human language” (*TLI* page 127)? Even when the quotes are there, it just doesn’t have any traction. Who are you going to believe? Even when the evidence is overwhelming and the quotes are there, what University or Research Institute wants to announce their monumental blunder in employing a thief? And the public doesn’t want to borrow other people’s troubles. Why would the ordinary reader take sides against a respected and powerful author? It is safer to just tell yourself that you don’t know enough about it, and let it go at that.

Make sure that you really believe in what you are doing. Old Nick Machiavelli (last sentence, section XXIV of *The Prince* 1513. New York: The Modern Library edition, 1940), says, “Only those defences are good, certain and durable, which depend on yourself alone and your own ability”. Do you really think that language evolved by natural selection? Every time you defend the idea of language evolution, you are taking personal responsibility for it. You can hide in the crowd –but do you really think it? How did you arrive at it? I promise you that you arrived at language evolution through group pressure, not your own logic. If the theory of language evolution is so wonderful, why do its greatest advocates have to lie, cheat and steal, and suppress critical scientific information, to support it? Maybe lying, cheating and stealing, and the suppression of critical information in the defense of language evolution is no vice. Actually, the quantum theory of word-structure, and the equal-and-opposite theory of the equation-sentence are correct. The biological theory of language and mind is dead.

Any book, like anything else that is written, is a letter to the future, in the hopeful belief that there will be a future. If eternal vigilance is the price of good science, I hope I have made some contribution to that vigilance. As long as there are people, there will be mean people, and people ready to take advantage of others in any way that they can. There will always be theft of ideas and forgery in science, in its role as a mirror of

society. And it only takes one, not some meaningful percent. Still, we can and must constantly re-examine our institutions to create conditions that will reward honesty. We must question why we have colleges in the first place. Some people go to learn; some because it is the natural thing to do, some for social advancement, some to make money, some go so that they won't have to look at poor people any more. One freezing winter night, when I was resident adviser at the fraternity, a student was looking out the window, watching a homeless man pick through the garbage, looking, perhaps, for something to wear or something to eat. The student mused out loud, "Jesus Christ, I'd love to see one of those bastards starve to death out there". Some of us go to college because the reward of success is to watch the failure of others. This has to stop. A system of dormitories, rather than fraternities at universities, with resident faculty, is one possibility. The resident adviser system has been used as a way to offer free housing to a few graduate students, but maybe a resident professor, as advocate for students and pipeline to the administration, could be made to work. The real reason for going to college is *your* reason for going to college.

When I was an assistant professor, the other faculty didn't even see my living arrangement as eccentric. I was incomprehensible beyond all meaning. A stint as resident adviser might open the eyes of even our greatest scientists. A community outreach program where gymnasiums serve as overnight shelters for the homeless, staffed by faculty and students together, might reveal our common humanity to all of us. Serving dinner from the other side of the table for an hour is good, but the real action happens at four in the morning. And the real stories. One young man in Chicago told me "I stole four-hundred dollars from a guy in Philadelphia, and came to Chicago because the guy said he would kill me. I saw him here the other day." I told him that he had to go back to Philadelphia, because that guy would find him sooner or later, and would kill him. He said, "That's what the girl at the Agency told me." A sociology professor might learn something, although, of course, it would be merely anecdotal. A no-debt tuition system would free students from what almost amounts to an indentured servitude after college, where stockholders at financial institutions profit from a college education, instead of the world's future. Universal medical care might improve not only the health of the country, it might relieve the bitterness of people who must sell their house and end up homeless, to pay for their life. The current system is open to every imaginable abuse.

We need a sense of shared treasure, as part of a sense of belonging to one another. In the United States, if you could buy, say, the Mona Lisa, you could burn it up. Some people might not think that that is the greatest idea, but it would be legal. In France or Italy, it isn't like that. You can buy and sell national treasures, or give them to charity or will them to your heirs. But you can't let them out of the country, and you can't let them get damaged. The United States has the beginnings of such a policy. Income tax is a concession to shared destiny, and Landmark Status provides that, without permission, even the owners can not modify buildings which are national treasures. Such a policy must go to everyone's soul. In France, national treasures are not just an Antiquities Act, they are the conscience of the nation. So, when a bulldozer operator in Nice was digging the foundation for an apartment building on a little alley called Terra Amata, he turned up something that looked like a skull. He switched off his bulldozer

and went to have a closer look. The skull looked ancient, so he called the Bureau of Antiquities, who sent experts. Terra Amata was the site of a stone-age camp, on what is now the French Riviera. These people were the rich ones of their day, and their camp is now a museum on the ground floor of the modified apartment building. A concession to shared destiny in the form of shared treasure, would benefit any country.

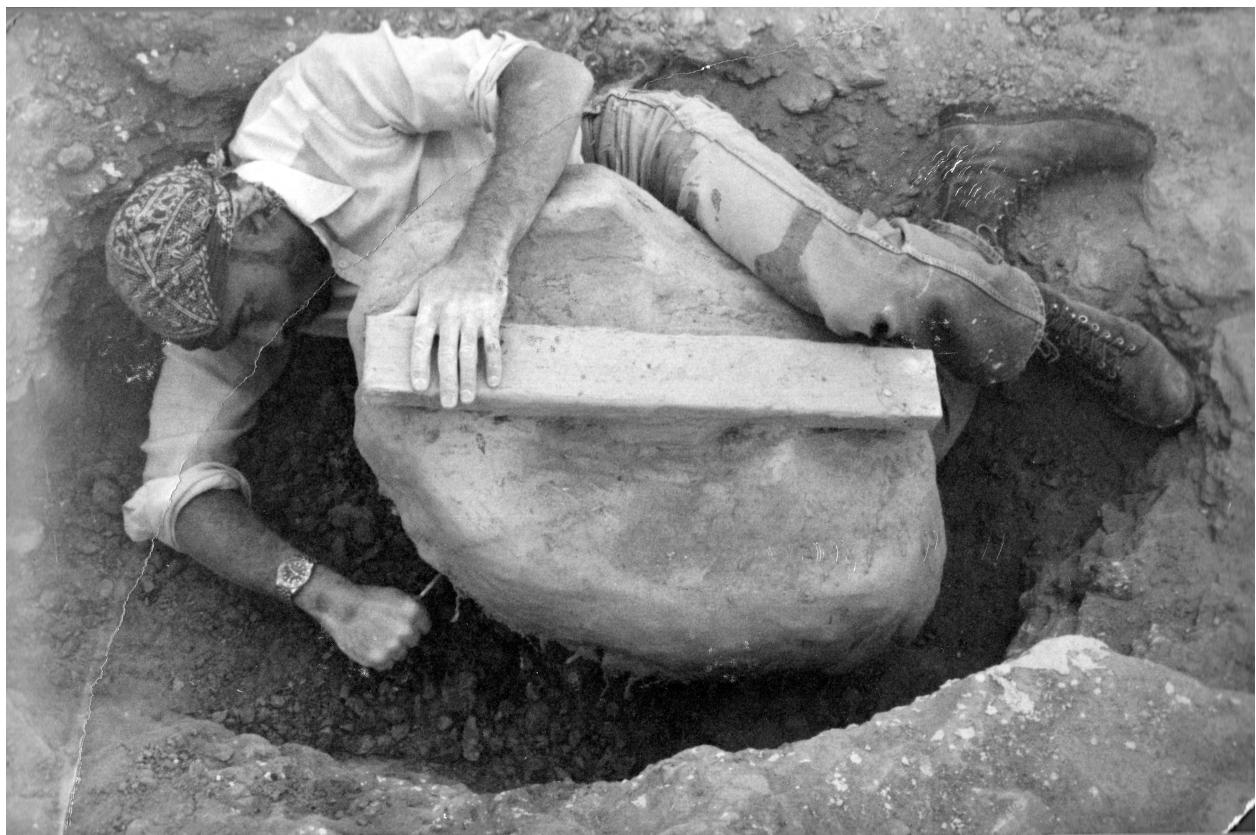
Still, no one should profit from the suffering of others. We might even consider a universal military service program, where everyone between the ages of, say, eighteen and twenty would serve in the military. No favorites and no exceptions, and two weeks every year until age seventy-five. There would be less reason for some of us to spiral down into isolated philosophies. Students confined to a wheelchair could work in the office, but they would still be part of the system. Universal military service could be used as platform, the way it was in World War II, to provide educational and cultural opportunities that many personnel might otherwise not even know exist. Yes, any system is subject to abuse and will inevitably be abused in some way or other. Nevertheless, such an arrangement might help to break down the nation-of-strangers attitude that infects us now. Young people from all social classes might discover that any social class is a prison, and might see that, sometimes, nice is better than smart.

As an appendix, please read my 2019 Quantum Newtonian paper. It can be downloaded for free by Googling “abler quantum words”. To what is in the paper I will add only that every innovation in language has a first time and a first user, and the passive voice is probably an outright invention. See Ferdinand de Saussure’s 1915, 1966 *Course in General Linguistics*, pages 98, 168; and that no mouse, in possession of a sense of geometry and physics, would be fooled by the, to us, obvious geometry and physics of a mousetrap.

We can never eliminate dishonesty, and, for a determined thief, a course in ethics is the equivalent of sending Al Capone to law school. But an educated, thinking public might stand as a deterrent to scientific criminals who might hesitate to send their larcenous material to people who will understand it.

I have shown that the science in Steven Pinker's *The Language Instinct (TLI)* is half plagiarism, half fraud. *TLI* pages 84-85: "discrete combinatorial system"; "in a blending system the properties of the combination lie *between* the properties of the elements [Pinker's italics] ... the properties of the elements are lost in the average"; "*blending systems* like geology ... weather [Pinker's italics]"; "First is the sheer vastness of language". All stolen from my 1989 paper On the particulate principle of self-diversifying systems. *Journal of Social and Biological Structures* 12(1):1-13, pages 1 and 2; "Infinity is achieved ... not by varying some signal along a continuum like the mercury in a thermometer" from my page 8. By omitting to mention that the particulate principle applies to the atoms, and is thus a theory in physics, and older than anything in biology, Pinker maintains a false impression of properties in biology. Thus when Pinker (*TLI* p. 363) explicitly rejects "an undiscovered corollary of the laws of physics", he knows that his entire concept is based on exactly such a "corollary", the particulate principle. Objects in biology evolve according to formulas in mathematics which do not, themselves, evolve. Language belongs to the formulas, not the objects, and did not evolve.

Plagiarism is the only crime for which evidence accumulates rather than deteriorating. As much as Thucydides, plagiarism is permanent literature. I don't know how many fundamental laws of nature are discovered in a century, but the theft of one of them extends deeper than the words, and even the ideas, to the life and soul of the discoverer. So much money has changed hands, so many people have been misled, so many professional careers have been affected, that *The Language Instinct* is no longer a private matter of plagiarism between individuals. *TLI* emerges as a public fraud comparable to the sale of useless medicine, or persuading people that cigarettes are good for you.



*The author undercutting the plaster jacket around the skull of a baby ceratopsian, Dinosaur Provincial Park, Alberta, 2005.
Photo by Patricia.*

The End

(book notice)

Structure of Matter, Structure of Mind: Man's Place in Nature, Reconsidered. William L. Abler.

Sofia, Bulgaria: Pensoft Publishers, 2005. pp. xi, 221. ISBN 978-1891696190, \$49.95.

Any book which claims to make great, sweeping paradigmatic changes to the way we view something as fundamental to our existence as human language, but is written by someone who has not been doing linguistics since his doctoral degree, immediately sets off warning bells in my mind. It was with this skepticism firmly engaged that I read the book. The blurb promises to deliver “a complete, clear, unified theory of the foundations of mathematics, language, and the human mind”; however, nary a mathematician, linguist, nor cognitive scientist was to be found on the jacket quotes. Abler is a staff researcher at the Field Museum in Chicago, where his key area of research has been elucidating dinosaur behavior based on their fossilized teeth; a fine area of inquiry to be sure, but certainly far from linguistics, mathematics, cognitive science, or even philosophy.

The book consists of four extremely unbalanced chapters whose structure is difficult to divine from the table of contents: “Introduction” (18 pgs.), “Character of the Mind” (126 pgs.), “Dialog” (45 pgs.) and “The Pattern Playback, Perception of the Speech Code; A Speech Synthesizer” (3 pgs.). The second chapter consists of many sub-sections, the following of which are bolded in the table of contents, and are therefore, presumably, the key points: The Non-Arbitrariness of Mathematics, Language and Mathematics Compared, The Infinitude of Language, Sets and Symbols, Blending Systems, A Genealogy of Properties, The Human Mind, The Animal Mind, The Emergence of the Human Mind and Culture, Human Logic, Logic versus Experiment in Mathematics, Lessons from History, and A possible Mechanism. The third chapter, whose full title is “Dialog between a Skeptical Reader and the medieval philosopher

Guglielmus Peritior”, is formatted much as one might guess from the title. Guglielmus appears to be the Latin version of the name William, while Peritior is a derivative of a word meaning “experience, skill”, akin to “Abler”; apparently this character is the author’s medieval alter ego.

The last chapter is a strange excursus into the details of a speech synthesizer called “the Pattern Playback”. The author was apparently much impressed by it during a visit to the Haskins Laboratories in the 1970s, considers it to be a “national treasure”, and is much distressed by the fact that the Smithsonian Institution fails to see its relevance and add the device to its collection. The author’s last paragraph, indicative of the timbre throughout his work, reads as follows:

With that last example of understanding a thing by comparing it to something else, I pray the Smithsonian to accept the Pattern Playback, and the reader to accept The Numberline Theory of arithmetic, language, and the universal human mind (2005:196).

Although the references include works by Derek Bickerton, Noam Chomsky, and Steven Pinker, as well as some of the EvoLang conference proceedings, most of his primary literature comes solely from *Science* or *Nature*. It also notably fails to include any of the recent important books on mathematical cognition and its relationship to language, such as James R. Hurford’s *Language and Number*, George Lakoff and Rafael Nuñez’s *Where Mathematics Comes From*, Brian Butterworth’s *What Counts*, or Stanislas Dehaene’s *The Number Sense*.

The key hypothesis (which, due to WA’s meandering and obfuscated writing style, is difficult to distinguish from the hypotheses he claims to refute) claims that equations are a type of sentence, and since (many) equations arise from the fundamental laws of the universe, therefore language does as well. Despite mathematics being at the core of his arguments, he makes several grievous errors, including quoting the fundamental laws of algebra incorrectly and misunderstanding the natural logarithm. The deductions he makes from this flawed base are supported not by reasoning and experiments, but by selected anecdotes, curiosities, listings of

similarities, appeals to common sense, and quotes from famous people. Rather than building a solid support for his main argument, he draws in an amalgam of other fields, each only understood at the level found in popular science literature. The result is a confusing mish-mash of already-disproven ideas, speculations, and irrelevant material. Even if the claims he makes were correct – and most aren’t – his bewildering argumentative structure undermines any hope of convincing the reader.

The motivation behind Abler’s authorship of this work seems to be his dissatisfaction with the humbling process humanity has undergone during the transition from religious to scientific thought; no longer are we ‘made in God’s image’, but ‘modified monkey’. The author professes that evolutionary psychology is the worst thing to happen to science in centuries, and that he aims to restore man to his ‘rightful place’ in the universe, presumably as more god-like than animalistic, thanks to our connection, via language, with the fundamental laws of the universe. This book is classic pseudoscience, poorly written to boot, and is worth neither the reader’s time nor their money.
