

Common Sense – Its Development and Disorders¹

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Introduction

The term *common sense* appears in virtually all languages and cultures, and throughout all time periods (Table 1). Based on ancient languages and scripts, the term can be traced back at least 3,000 years. Notions of common sense are found in jokes and humor (Borey, 2002), arts and design (Landre, 2004; Smith and Shadel, 2008), politics (Paine, 1776), ancient Sanskrit literature (e.g., “Aprikshitakaraka” is the fifth of five principles in the Panchatantra, and, roughly translated, means “knowledge is not enough, application is essential”; see <http://www.samasya.com/stories/panchatantra/panchatantra.html>), as “local knowledge” in anthropology (Geertz, 1975/1992; Geertz, 1983), in discussions on medicine and religion during the Middle Ages (i.e., *sensus communis* [Latin]; cf. Mullooly, 2003; Mullooly, 2006), in the “Scottish school” in moral philosophy (Reid, 1764; Reid, 1819), and in artificial intelligence and computer sciences (McCarthy, 1959; Minsky, 2006). In short, the notion of common sense is ubiquitous throughout culture, language and history.

<Insert Table 1 about here>

What is common sense? For our purposes, *common sense* is defined as *core nurturance within a group, herd, culture, and/or organization or institution* (Smith, 2007). In regard to nurturance, most, if not all, decision-making processes within the context of the group, herd, culture and/or organization must be *appropriate* (i.e., well-circumscribed), and *no* decision-making processes within the context of that group, herd, culture and/or organization should be blatantly or flagrantly *inappropriate* (i.e., represent aberrant thinking and/or outlying behavior). Emphasis on appropriateness and inappropriateness in actual decision-making is deemed to be essential in thinking and “sense-making.” The notions of appropriateness and inappropriateness also are central to the commonality in real and expected behaviors. *Importantly, the term common sense applies to the group, collectively, and its members.*

Use of terms such as groups, herd, culture and organization is deliberate. These terms connote possibilities that common sense may not be limited to human behavior. A widely viewed *YouTube* video clip of “The Battle of Kruger (Schlosberg and Budzinski, 2004; see <http://www.youtube.com/watch?v=LU8DDYz68kM>) is instructive in this regard. This naturalistic existential documentation of a battle between a herd of water buffaloes and pride of lions reveals evidence that both biological (i.e., nature) and herd / cultural (i.e., nurturance, development and adaptation) components are important in common sense. One only needs to ponder how the lead water buffalo communicated with the herd in order to effectively summon the herd to attack the pride of lions and

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rescue the calf.² In the absence of any known water buffalo “language,” a presumption of body language must be inferred. How such languages are acquired must not be overlooked. One can speculate that some neurological mechanism – possibly involving mirror neurons (cf. Ramachandran, 2000; Ramachandran, 2006; Iacoboni, 2008) – may play an essential role. If mirror neurons are a significant factor in the acquisition of language and/or behavior, this will have extraordinary implications for Darwinian evolution and Lamarckian adaptation – particularly in regard to a novel “tripartite” model of evolution (Smith, 2006a; 2006b; 2006c).

The Battle of Kruger videoclip intrinsically raises several additional questions. First, do fundamental features of common sense differ in predator animals (e.g., lions and wolves) and prey animals (e.g., water buffaloes or horses)? This question has particular medical, philosophical and evolutionary relevance for humans. If the autism spectrum is taken as a model of one form of aberrant common sense, then one may be able to explicate and elucidate gender issues, sympathetic nervous system versus parasympathetic nervous system issues, and, belief, awareness and consciousness issues. For example, Malcolm Gladwell (2005), in arguing for a notion of ‘temporary autism’ surrounding police behavior, implicitly poses an intriguing possibility that many presentations of autism represent ‘fight’ (in contrast to flight or fright) physiological behavior. Gladwell’s notion of temporary autism was introduced to explain police behavior underlying the killing of Amadou Diallo by four male New York City plain-clothed police officers on February 4th, 1999 (see Wikipedia entry <http://en.wikipedia.org/wiki/Amadou_Diallo> for a succinct summary of the events). Diallo, at the time, was unarmed. Was it common sense to kill Diallo with 41 bullets fired at him (and 19 of those bullets actually hitting him)? Would female police officers have fired the 41 shots? In other words, would one expect gender differences involving common sense in police behavior – perhaps akin to differences in hunters and gatherers? Alternatively, do police training academies ablate gender differences in policing behavior? In the Diallo case, was the police behavior more akin to predator behavior (e.g., “going for the jugular”) and Diallo’s response akin to prey behavior? How are both types of behaviors acquired within the context of a group, herd or culture? Did the police exhibit common sense and did Diallo exhibit common sense? How did common sense go awry?

Insofar as autism is a spectrum of disorders, it may be overly simplistic to focus on “fight” analogies. One is reminded that Asperger syndrome occasionally is characterized by savant-like behaviors. Although savant behavior and common sense differ, an understanding of features in each condition could contribute greatly to the explication of underlying physiological and molecular mechanisms in memory, consciousness and their roles in decision processes – particularly involving creativity and ingenuity.

A second concern is whether some animals fundamentally lack common sense. That is, are there any animal models of possessing *no* common sense in contrast to possessing aberrant common sense? If so, then which are those animals and why did they evolve to have no common sense? Alternatively, when and how did common sense evolve? This challenge could clarify what may be unique biological processes associated with

² This videoclip also is useful for conveying the important distinction between common sense and heroism (cf. Zimbardo, 2006).

long-term memory, brain information processing and social behavior. For starters, I propose the crab – a crustacean – as an animal lacking a general notion of common sense because I know of no evidence of *cooperation* being exhibited among members of this species. How important is cooperation in common sense ... and why? Much more research is required to affirm and assess this hypothesis about crabs.

Regarding cooperation *per se* and its role in common sense, it should not be too surprising that the term “common” in common sense directly implies some degree of social interaction. This could have particular importance in any exploration of the economics of common sense and its disorders. Perhaps more important, an explication of the acquisition and development of social and economic behavior may have profound pedagogical implications and consequences, as well as implications in the nature versus nurture debate. Finally, because game theory often is associated with mathematical models in economics and military sciences (cf. von Neumann and Morgenstern, 1944; Nash, 1950; Luce and Raiffa, 1957/1989) and especially cooperative game theory (cf. Nash, 1950), one wonders whether a concern for common sense could give rise to novel approaches and models in economics, military science and peace studies.

The Japanese *SHOGAKU DŌU TŌKU* / どうとく (*Morality / The way of virtue*) for 1st, 2nd, and 3rd grades (Umiuchi et al, circa 1967; loosely translated as “Elementary Morality Education”) textbooks reveal two excellent illustrations of roles of education, nurturance and cooperation in the acquisition of common sense in Japan (Exhibit 1).³ In the first display a bear, pig and rabbit engaged in a foot race were used to illustrate how the elimination of an obstacle could contribute to an “n-sum” cooperative finding (i.e., wherein each animal simultaneously crosses finishing line) in contrast to a “0-sum” competitive finding (i.e., wherein there is a winner and two losers). Insofar as virtually all contemporary students in Japan (and their parents) were exposed to the same standardized textbooks, some uniformity in common sense could be expected. This example would rarely (if ever) occur in the USA because the wholly free-market textbook economy would not favor a common lesson in either homes or schools.

<Insert Exhibit 1 about here>

The second display from the *SHOGAKU DŌU TŌKU* in Exhibit 1 is even more prescient. The characters in the pedagogical scenario are a fox, rabbit, badger, monkey and bear (reading top to bottom right panels first and then left panels second). The important and insightful illustration regarding common sense occurs in the last panel on the left side; to wit, the fox teaches the rabbit, badger and monkey what it has learned from the bear. Again, one rarely would find a similar example of the last (teaching) step in early childhood education in the USA. Perhaps most important, these two examples lend support for cultural and linguistic differences in common sense implicit in Table 1. Synchronic and diachronic changes in common sense are illustrated nicely in Exhibit 2. This display is taken from a parallel lesson in a later version of the *SHOGAKU DŌU*

³ Use of cartoon-like characters is typical in Japanese early childhood education textbooks. It also should not escape one’s attention that there is sparse use of traditional and Kanji characters because of their intricacies.

TŌKU (Yamamoto et al., circa 1980). It remains unclear why the Japanese curriculum designers eliminated the teaching step in the subsequent version of the textbook.

<Insert Exhibit 2 about here>

Are there Aberrations and Disorders in Common Sense?

Just as the notion of common sense is ubiquitous and may extend across a broad array of animals, aberrations and disorders in common sense are equally ubiquitous. Most persons know of or have encountered someone said to ‘lack’ common sense. Those specific persons often are described using unflattering terms even when a general notion of aberrant common sense may be more toned down (Table 2). Substantively and as mentioned above, derangements and disorders in common sense generally involve highly *inappropriate* or *outlying* decisions and decision-making processes as defined within the context of the group, herd, culture or organization. Thus, common sense has ‘kinetic’ meaning – generally applying to manifest actions, rather than ‘potential’ behaviors. A central challenge is to assess inappropriateness by means of some valid and reliable assessment tool or scheme.

<Insert Table 2 about here>

Why Study Common Sense?

There are many reasons for studying common sense. For brevity and to avoid being discursive, some of those many reasons are categorized in Table 3. This list is by no means exhaustive. Its purpose is to cite the richness underlying issues involving common sense and support the earlier claim that a broad range in commonsense issues merit intense scholarly, humanitarian and philanthropic inquiry.

<Insert Table 3 about here>

The remainder of this article is devoted to making a compelling case for studying common sense as a subject with profound scientific, scholarly, social, clinical and intellectual significance. One can envision future studies in common sense garnering recognition and prestige in: *chemistry* ~ for explicating the molecular basis of long-term memory and common sense; *physiology or medicine* ~ for elucidating and explicating the development of common sense and its clinical disorders (e.g., associated with infections, genetic and genomic variations, and, most importantly, epigenetics); *physics* ~ for articulating and demonstrating a novel thermodynamic principle associated with the development of syntropy in biological and evolutionary systems (i.e., syntropy is a mathematical tendency toward order out of “un-order”); *economics* ~ for disambiguating the economics of “stupidity” (cf. Schwartz, 2008) and poor common sense (cf. Smith, 2008a); and, not least, *peace* ~ for discerning the importance of common sense as a mechanism, marker and/or indicator pursuant to understanding and mathematical, heuristic and game modeling in peace studies in contrast to game theory applications generally being limited to economics and military sciences.

Common Sense as an Essential Element in Models of Long-Term Memory

Our interest in common sense derives, primarily, as a matter of logic, logistic intelligence and logistic reasoning⁴ about findings in studies on the molecular biology of long-term memories in living systems (LTM; Smith, 1979), and, secondarily, from a fortuitous observation in 1985 of several elementary school students with aberrant common sense (Smith, 1988; Smith, 1986; Smith, 1987). Logistic intelligence and logistic reasoning comprise elements of ‘scientific common sense’ (Smith, 2006c). This overall interest began in the late-1970s after discovering that all ‘slow viruses’, without exception, are associated with dementia (in brain) and ‘immune dementia’ (Smith, 1979). A second finding was that DNA *must be* a repository of LTM, hereafter referred to as the ‘DNA as LTM’ theory. When combined with the dementia findings, the 1979 ‘DNA as LTM’ theory accurately anticipated HIV and AIDS in the 1980s, and ‘mad cow’ disease in the 1990s. A third finding was that Francis Crick’s revised “central dogma” (i.e., that “DNA ↔ RNA → proteins”; Crick, 1970) was the principal impediment to the ‘DNA as LTM’ theory, even though Crick (1970), in an important footnote citing reports by Gibbons and Hunter (1967) and by Jones (1967), recognized possibilities that the scrapie agent possibly could give rise to “DNA ↔ RNA ↔ proteins.”

Smith (1979) reported a fourth significant finding. It already was known that McClintock discovered transposons (McClintock, 1950); Sharp and Robert independently discovered introns, exons, “split genes” and splicing (Berget et al., 1977; Chow et al., 1977); and, Tonegawa discovered DNA rearrangements associated with immunoglobulin hypervariability (Tonegawa et al., 1978; Sakano et al., 1979). Using logistic reasoning, the DNA repository for LTM must be associated with non-protein encoding regions of the DNA genome which, at the time, were labeled “junk” DNA (Smith, 1983). Affirmative empirical evidence supporting this reasoning became available in 2001 upon the publication of two human genome project reports⁵. Those two human genome projects reports independently revealed that the proteome (i.e., protein-encoding region of the genome) comprises approximately 1.2% of the *human* genome, with perhaps another 22.3% of the genome having some regulatory interaction with the 1.2%.

A generous interpretation of these findings is that Darwinian evolution can explain *at most 25%* of the *human* genome. An equally generous interpretation is that *nature*

⁴ Logistic intelligence refers to the ability to see connections using logic and logistic reasoning (Smith, 1983). Logistic reasoning is a quasi-goal-oriented process involving asking “good” questions (i.e., question-asking involving ‘why’, ‘why not’, ‘what if’, ‘what is taught/learned’ and ‘what is anticipated/next’) and ‘question-answering’/problem-solving, ‘look-ahead’, fault and error analysis (including expectations of Murphy’s Law; to wit, ‘when something can go wrong, it may occur’), and erotetics. These processes are analogous to strategies used by systems designers, computer programmers, chess and “Go” masters, and going beyond classic *gedanken studies* (Smith, 1979; Smith, 1983; Smith, 2006c; cf. Platt, 1964). In general, Logistic reasoning is concerned with how ‘things’ and systems work together (including broad concerns about ‘common sense’; Smith, 2007), how they fail to work together, and discerning if and when they cannot work together. An ultimate goal in logistic reasoning is to see the ‘big picture’ first, and then focus on the minutiae (i.e. to paraphrase an old saw, ‘one should see the forest first, especially if that forest exists, and then its trees’). Finally, logistic reasoning should reveal an appreciation for the retrospective (both synchronic and diachronic issues), prospective and anticipatory. These often prove to be essential in characterizing feed-forward, feedback and skip-ahead processes often associated with systems and processes.

⁵ See February 2001 issues of *Nature* (Volume 409, 15 February 2001) and *Science* [Volume 291 (5507), 16 February 2001]. For a historical perspective, also see Berg (2006).

comprises approximately 25% of the human genome. What could account for the remaining ~75% of *human* evolution? Is *nurturance* a factor? Are *nurturance* and *adaptation* similar? How might *nurture* overlap and/or complement *nature*? What comprises early LTM information being entered into the DNA repository? Could LTM associated with commonsense reasoning be reflected in these *a priori* DNA repositories and/or their *a posteriori* neural networks? If one controls for genetics, culture, language and other environmental factors, would molecular mechanisms associated with LTM allocate DNA changes in some reliable and consistent manner, and especially if commonsense knowledge and commonsense behaviors are commonplace? These are questions driving this inquiry into the molecular basis of common sense.

Insofar as Crick's central dogma frequently is cited as evidence that DNA must be the same in all cells in an organism (thereby arguing against the 'DNA as LTM' thesis), and in view of Smith's third and fourth findings, a novel **protonic-electronic-ionic-photonic molecular calculator** (i.e., **preliophic moleculator**) "commonsense" device and *preliophic* processes were conceptualized, schematized and invented (i.e., "reduced to practice") in order to specifically refute the central dogma (Exhibit 3; Smith, 1983). A prototype was constructed in November 1996. Additional refinements designed to dissipate heat were made in 1999 (Exhibits 4 and 5). Those refinements also enabled the device to find applications in variable temperature *preliophic* processes, including modeling of cold-blooded and warm-blooded molecular chemistry. A US Patent has been announced by the US Patent Office and its publication is pending – including the schematics citing several of *preliophic* applications (Exhibit 5; Smith and Shadel, 2008)

<Insert Exhibit 3, Exhibit 4 and Exhibit 5 about here>

The theoretical framework for the DNA as LTM and the conceptualization of a molecular basis for common sense cannot be complete without an appreciation of proteomic and non-proteomic regions of the genome. The proteome comprises that portion of the genome (i.e., the non-mitochondrial DNA in most cells) that accounts for genes and their gene products which usually are proteins. "Junk DNA" is a term often used to describe complementary regions of the genome (i.e., non-proteomic regions). The 'DNA as LTM' model suggests otherwise; to wit, that significant portions of non-proteomic regions are highly relevant and may find use as sites for *a priori* changes in DNA. Available clinical, laboratory and theoretical evidence suggest that, in brain, those DNA changes are from adenine-thymine (A*T)-rich base-pairs to guanine-cytosine (G*C)-richer base-pairs, with those changes often occurring during sleep and dreaming (cf. Roffwarg et al., 1966; Karni et al., 1994; Benington and Heller, 1995; McGuire et al., 2001; Pascual and Preat, 2001; Dunwiddie and Masino, 2001; Siegel, 2003; Walker and Stickgold, 2004; Joiner et al., 2006; Keisler et al., 2007; Savage and West, 2007). Significantly, adenine may be metabolized to adenosine which, in turn, autoregulates sleep (cf. Benington and Heller, 1995). *A posteriori* consequences of those *a priori* changes in DNA appear to give rise to axon-dendrite networks (i.e., neural networks).

Insofar as two human genome projects provided evidence that a ~1.2% of the genome accounts of genes, and, conservatively, ~23% may be regulatory, it is necessary to have a theory of junctions between proteomic and non-proteomic regions. Moreover, insofar as trinucleotide codons determine the genetic code for proteomic regions, it should not be surprising that trinucleotide repeats (TNRs) are associated with

neurological diseases having both neuromuscular and cognitive components (e.g., Huntington's disease, fragile X syndromes, et al.; Cleary and Pearson, 2003). Indeed, logistic reasoning about TNR diseases suggests that the phenomenon of repeats is consistent with the 'DNA as LTM' thesis and may be central to some code associated with DNA changes. This thesis further is supported by the high prevalence rates of cytosine (C) and guanine (G) in TNR diseases, and that adenosine autoregulates sleep (Benington and Heller, 1995).

Graphic artist Chris Finnie illustrated some of these issues in Exhibits 6 through 10. She used Colleen W. Platt's *Rivers and Currents* vase (Exhibit 6; see C W Platt Gourds <http://www.cwplattgourds.com/nature_Rivers_and_Currents.htm>) as a metaphoric and analogical model of the brain and its genomes. The plural term "genomes" is deliberate insofar as the 'DNA as LTM' thesis implies multiple genomes with seemingly minor variations in proteomic regions, though with greater variation in non-proteomic regions of those genomes. The smooth (lighter colored) swirling areas on the vase connote proteomic regions, and stippled (darker colored) swirling areas on the vase connote non-proteomic regions. The smooth areas deliberately are chosen to reflect the orderliness of genes and gene products. The stippling representing the non-proteomic regions connote the seeming disorderliness associated with perceptions of nurturance and individual differences

<Insert Exhibit 6, Exhibit 7, Exhibit 8, Exhibit 9 and Exhibits 10 about here.>

Exhibits 7 and 9 are cross-sections from the *Rivers and Currents* vase. Exhibit 7 represents normal genomic (smooth and stippled) material, whereas for the same cross-section, Exhibit 9 portrays contributions to proteomic and non-proteomic diseases (associated with Finnie's use of multiple distortions in smooth and stippled regions). To add a bit of realism to the graphics, Exhibits 8 and 10 are subdivided into three strips labeled A, B and C to signify chromosome A, chromosome B and chromosome C. In other words, Exhibits 8a, 8b and 8c connote normal chromosomes A, B and C, respectively. Likewise, Exhibits 10a, 10b and 10c connote abnormal chromosomes A', B' and C', respectively.

Close scrutiny reveals defects in both proteomic and non-proteomic regions on chromosome A' (Exhibit 10a). Encroachments from smooth proteomic regions into non-proteomic stippled regions, at the simplest level, would contribute to cognitive and/or behavioral challenges. Encroachments from stippled non-proteomic regions into smooth proteomic regions, at the simplest level, would likely contribute to sensorimotor symptoms. TNR diseases would be an example of an encroachment into a non-proteomic region. Not to be overlooked the gene reflected in the encroachment could produce distorted protein products.

Chromosome B' (Exhibit 10b) reveals defects mostly in proteomic regions. Encroachments from smooth proteomic regions into non-proteomic stippled regions, at the simplest level, would contribute to cognitive and/or behavioral challenges. Encroachments entirely within the stippled non-proteomic regions, at the simplest level, would likely contribute to cognitive and/or behavioral symptoms, although sensorimotor symptoms would not occur. Schizophrenia might be an example of *de novo* or other mutations occurring entirely within non-proteomic regions in brain.

Chromosome C' (Exhibit 10c) reveals defects mostly in non-proteomic regions. Encroachments from stippled non-proteomic regions into smooth proteomic regions, at the simplest level, would present as neuromuscular or other physical findings. Encroachments entirely within the stippled non-proteomic regions, at the simplest level, would likely contribute to cognitive and/or behavioral symptoms, although sensorimotor symptoms would not occur.

Although chromosomes A, B and C, and chromosomes A', B' and C', represent symbolic structures, they do present a case for distinguishing LTM structures from applications of LTM as processes which might be used in normal and aberrant common sense processes. These depictions also illustrate the importance in distinguishing between common sense knowledge (LTM) and common sense *per se*.

One cautionary note: Finnie's graphics do not capture the importance of distinguishing *a priori* events (i.e., associated with DNA changes) from *a posteriori* events (associated with the formation of axons, dendrites and axon-dendrite connectivity as in neural networks). Her graphics also do not reveal the fundamentally important evolutionary event; to wit, DNA changes in brain are not accompanied by cell division and replication, whereas DNA changes in most cells are accompanied by cell division and replication. This could be the seminal importance of the evolution of the bony cranium insofar as it allows DNA changes to occur, though without cell division. The opposite is the case in the immune system. DNA changes are associated with clonal expansion in order to increase immunoglobulin surveillance. By way of contrast, cell division associated with DNA changes in brain would be contraindicated because the redundancy in information mathematically and logically would be unmanageable.

Where are the Clinicians?

Just as common sense is ubiquitous and not well understood, molecular mechanisms underlying long-term memory are equally ubiquitous and not well understood. Ubiquity presents other challenges. Disambiguating and distinguishing normal from aberrant LTM events and normal from aberrant common sense pose special challenges – especially in brain if the 'DNA as LTM' thesis is affirmed. In regard to LTM, its implications for brain processes (e.g., some common sense actions) and disorders in brain require a fundamental understanding of non-proteomic genomics. This presently is beyond the state of the genetics and genomics art as well as the scope of scholarly inquiry in neurosciences. This shall remain this way until the 'DNA as LTM' is fully embraced. Equally important, the 'DNA as LTM' thesis and logistic reasoning may be central to resolving perceived challenges in resolving genes associated with mental illnesses and poor definitions in psychiatric disorders (cf. Editorial, 2008; Abbott, 2008).

Interestingly and despite the universality of the term common sense (Table 1) and notions of aberrant common sense (Table 2), there are *no* clinical, educational or other practical discussions of common sense, its development or its disorders in any professional textbook or diagnostic manual – regardless of language, culture or time period (Smith, 2007; also see point-counterpoint discussion associated with Target Article 100 at <www.kjf.ca>). Moreover, insofar as autism and schizophrenia are characterized by aberrations and derangements in reality, beliefs, and other indicators of sensibilities and common sense, it is surprising that common sense is not considered

a clinical entity in *Diagnostic and Statistical Manuals of Mental Disorders* (cf. American Psychiatric Association, 2000).

Less well known, many persons diagnosed with general anxiety disorders (GAD) exhibit disorders in common sense and vice versa. This would indicate that GAD and some disorders in common sense may require medical or pharmacologic interventions. It also is an indication that a thoroughgoing review of medical and psychiatric diagnoses, and pharmacologic treatments, could have merit vis-à-vis studies and reports on common sense.

There is a third indication for regarding common sense as a clinical entity. Young children whose parents are “negative” may develop disorders in common sense (Smith, 1986; Smith, 1987; Smith, 1988). The terms “transmissible negativism” (TN) and “psychoviruses” were coined to capture these transmissible and infectious processes (Smith, 1986; Smith, 1987; Smith, 1988). The transmissibility and infectiousness of these processes reveal novel opportunities for exploring broad clinical implications of psychoviruses. Evidence of “psychoviruses” (cf. Verny and Kelly, 1981/1983; Smith, 1987; Smith, 1988; Sabatier, 1988; Reuters, 2006; Christakis and Fowler, 2007) and life-long consequences of traumatic events also support infectious cognitive snippets leading to DNA changes consistent with the ‘DNA as LTM’ thesis (Smith, 2006a; Smith, 2006b). Thus, infectiousness and transmissibility of psychoviruses, and disorders of DNA changes, could represent groundbreaking approaches for clinical diagnoses and treatments.

There are three frequently overlooked situations possibly having profound clinical and social significance. Persons, even with excellent common sense, occasionally become mired in bureaucratic nightmares – chaocracies! – if or when systems or cultures are dysfunctional, disorganized or poorly crafted. Globalization and privatization occasionally produce these outcomes (cf. Zwerdling, 2008, Taleb, 2004; Taleb, 2008). An interesting case in point is the USA grants processing systems. In order to apply for a grant from the National Institutes of Health, there are at least five government and privatized agencies which may be involved in the grants process (e.g., Grants.gov, Dun and Bradstreet, the US Internal Revenue Service, Central Contractor Registration System, eRA Commons, and the National Institutes of Health). When these systems and subsystems do not operate seamlessly (as often is the case), chaocracies and nightmares ensue. In the NIH grants process, distinctions between individual contractors, sole proprietors, and independent scholars cause major SNAFUs. Whether one uses a taxpayer identification number (TIN/TPN) or an IRS supplied Employer Identification Number (EIN) also can trigger chaocratic consequences.

A second situation is the 2008 “financial meltdown” in the USA economy. This meltdown is being compared to chaotic and catastrophic events surrounding the 1929 crash in the Stock Market, the Depression, the September 11, 2001 attack on the World Trade Center in New York City, and an ill-advised and poorly executed war against Iraq in 2003. Numerous well-meaning persons with excellent common sense experienced foreclosures on their homes and personal properties. Fannie Mae and Freddie Mac were taken over by the US government. Lehman Brothers went bankrupt. AIG, the international insurance giant corporation, was bailed out by the Department of the Treasury and the Federal Reserve Bank. Giant banks – IndyMac and Washington

Mutual – were taken over by the Federal Deposit Insurance Corporation. An ill-conceived and poorly-regulated \$700 billion bailout proposal was presented to the US Congress, with \$700 billion being more money than the first few years of the poorly-planned and poorly executed war against Iraq – all deceptively and falsely presented in the name of a “war on terrorism” and pursuit of “weapons of mass destruction.” These chaocratic situations contributed to individuals possessing normal common sense being met by an absence in adequate governmental and institutional regulations. Perhaps most important, any economics of aberrant common sense must address the economics of stupidity, inappropriateness and chaocracy! An economics of common sense and aberrant common sense also must address economic issues pertaining to the proper balance between regulation, outlier behavior, and *appropriate* limitations on freedoms (e.g., free will, free markets, free trade, free speech, and, unfettered and unrestrained privatization, globalization and outsourcing). In short, economics and system sciences may be appropriate disciplines for assessing common sense and its disorders in groups, herds, and institutions/organizations. The clinical professions may be appropriate venues for assessing common sense and its disorders in individuals.

The third situation is associated with wars, traumas and other disasters. Following stressful events, common sense often is distorted or changed, or becomes aberrant. A few examples currently under investigation are cited in Table 4. A special case study involves common sense in post-World War II Germans residing in Germany, Jewish Holocaust survivors residing in the USA, and Jewish Holocaust survivors residing in Israel.⁶ These groups were selected because much of World War II history and its consequences are amply documented and archived. Even if common sense in Germans and Jewish persons differed before World War II, one hypothetically⁷ should not expect statistically significant differences among early generations of Jewish Holocaust survivors living in Israel and Jewish Holocaust survivors living in the USA. Thus, the underlying experimental design provides important controls in these exploratory studies. To date, preliminary evidence suggests three divergent strands of common sense are associated with these three subpopulations (Smith, 2007).

<Insert Table 4 about here>

The study of common sense in post-World War II Germans had an unanticipated consequence. An *in situ*, phenomenological study of aberrant common sense revealed a confluence in emerging concerns for “illness,” “aberrancy,” “health,” “wellness” and “helping” (Smith, 2007). The study was unique insofar as some familial and transmissibility issues were documented which otherwise would be impossible to discern (see Table 5). The study also revealed many difficult and near-intractable challenges in providing assistance for unknowingly needy persons with aberrant common sense. This finding could have profound implication for child development, early childhood education and the clinical professions.

⁶ Although Holocaust victims included many persons and groups other than Jewish persons, the decision to focus only on Jewish persons is based on practical considerations (e.g., availability of archives and documents, identifiable survivors and their offspring, access, etc.).

⁷ This is a “null” hypothesis. In actual fact, one should not be too surprised if there are significant divergences in common sense in Jewish Holocaust survivors in Israel and the USA. Environment, culture, government and other factors may contribute to those divergences.

Succinctly, the study took place during a two month period in 2007. Its propositi (i.e., individual participants) included a divorced middle-aged mother (Proposita “A”) and her two young adult, interracial⁸ daughters Propositi “B” and “C”. Other propositi include two somewhat elderly next door neighbors (Proposita “Y” and Proposita “Z”). Propositi “Y” and “Z” are unrelated.

Propositi “A,” “B,” “C,” “Y,” and “Z” are German citizens residing in a large urban city in Germany. Of these propositi, it immediately was apparent that Proposita “C” lacked common sense. Aberrant common sense in Propositi “Y” and “Z” was somewhat peripheral, except insofar as their behaviors initially sparked concerns about potentially high prevalence rates of aberrant common sense in post-World War II Germany. *Significantly, Proposita “A” was diagnosed with aberrant common sense midway through the in situ study.* There was no evidence that Proposita “B” had any aberration in common sense, although indirect evidence suggests that her father Propositus “X” lacked common sense.

Proposita “D” is a divorced middle-aged mother known to the investigator since 1972. Her aberrant common sense was diagnosed in 1985 shortly after transmissible negativism and aberrant common sense were reported to represent important clinical entities (Smith, 1988). Prior to 1985, Proposita “D” was considered to be “strange,” challenging, difficult, passive-aggressive, moody, emotionally labile, “worried well,” anxiety-laden, frequently prone to errors and misunderstandings, unreliable, and self-absorbed. In the 2007 study, Proposita “D” is one case control for Proposita “A” insofar as her age is the same age as Proposita “A,” she and Proposita “A” are second generation survivors of World War II, and Proposita “D” has members of her family who were displaced by World War II. Proposita “D” has a teenage, interfaith/interethnic son (Propositus “E”) who is approximately five years younger than Proposita “C.” Propositus “E” is selected as a case control for Proposita “C” particularly in view of findings on psychoviruses (Smith, 1987; Smith, 1988; Smith, 1992; Smith, 2004b) and higher prevalence rates associated with anxiety disorders in families. The significance of the latter will become apparent later in this report.

Both Propositi “D” and “E” are cited in earlier studies (Smith, 1988; Smith, 2004a; Smith, 2004b; Smith, 2006a; Smith, 2006c; Smith, 2007a; Smith, 2007b). Proposita “D” is Jewish and, as noted, a second generation survivor of World War II. Her father’s family is Sephardic Jewish, although he was born in Poland and migrated to Canada before the Holocaust. Her mother is Ashkenazi Jewish who, along with her (mother’s) sister, was hidden by French Catholic families on farms in France. They were raised as Catholics. Propositi “A” is a non-Jewish second generation World War II survivor, and Propositi “Z” and “Y” are first generation World War II survivors whose religious heritages are unknown.

⁸ Interracial, interfaith and interethnic relationships are cited because of past findings associated with propositi who lack common sense (Smith, 1992; Smith, 2004b). Of 37 propositi marriages and divorces, 24 of those marriages were interracial and 1 was an interfaith marriage (67.6%). Also, of those 37 propositi marriages, 16 involved 2nd marriages (43.2%), and 1 involved a 3rd marriages (2.7%). Twelve of these multiple marriages were to interracial partners. Thus, the significance of the high prevalence rates of interracial, interfaith, and interethnic relationships among persons with aberrant common sense remains to be explored beyond being a mere caveat emptor. More than 70% of Proposita “A’s” partners are interracial.

By any description, Propositi “C” and “E” would be regarded as non-autistic savants insofar as each excels in some personal passion (i.e., Proposita “C” is a child actress of considerable acclaim, and Propositus “E” is an expert on Civil War history). Propositus “E” alleges pass-life experiences and past-life regressions, although his pass-life experiences and past-life regressions have never been assessed.

Proposita “F” is a second case control for Propositi “A” and “D.” She is a divorced Japanese-American who lived her formative years in internment centers in California (i.e., from months shortly after her birth until the closure of the internment centers). Thus, Proposita “F” may provide another perspective on the impact and consequences of World War II on the development of common sense and its aberrations.

Of all propositi, only Proposita “D” actively discussed World War II – a common finding in Jewish Holocaust survivors and their offspring. Germans and Japanese-American survivors of World War II and their offspring are less likely to openly discuss war-time experiences.⁹ Indeed, it is somewhat difficult to document *Trümmerfrauen* (i.e., “rubble women”)¹⁰ activities in Germany, even though they played a significant role in the reconstruction of select regions in Germany (because of the scarcity of males due to deaths and infirmity caused by World War II). The investigator knows relatively little about Propositi “Y” and “Z,” however they may be significant in future studies because they are first generation survivors of WWII.

Of more than 50 adult propositi in a database of aberrant common sense (Smith, 1987; Smith, 1992; Smith, 2004b), there is very little evidence of significant religious or spiritual practices among the propositi. None of the *in situ* propositi revealed any spiritual practice, even though Propositi “A,” “B” and “C” are Roman Catholic. Propositi “A” refused to pray in two situations where prayer may have been appropriate or indicated. This general observation could provide an opportunity for further investigation, particularly in the context of resistance, intransigence and “my way or the highway” responses exhibited in most persons lacking common sense. Faith in higher powers, in contrast to hope from the occult, lies at the core of this concern.

The *in situ*, phenomenological study revealed the profound importance of extreme *outlier behavior*, *misunderstanding* and *misinterpretation* in aberrant common sense. The terms misunderstanding and misinterpretation are unrelated to one’s native (first) language. In other words, the fact that German was the spoken language, and the investigator’s first language is English, is not relevant.¹¹ Rather, propositi with aberrant

⁹ Different groups respond differently to war and trauma. Armenians are increasingly vocal about their 1915 experiences. Cambodians are relatively mute regarding the “killing fields” and displacements. Chinese only recently have begun to discuss the Cultural Revolution. Thus, an analysis of rhetoric (including prose, poetry, art, film and music) and divergences in common sense may have value if divergences in common sense in responses to war and trauma are affirmed (cf. Cocks, 1989; Lakoff, 2002).

¹⁰ Because their activities generally were not organized or coordinated, *Trümmerfrauen* could be extremely important in one’s quest to understand the evolution and development of common sense and aberrant common sense in post-World War II Germans. However, there is no evidence that Propositi “A,” “B” and “C” are progeny of *Trümmerfrauen*.

¹¹ Proposita A” is reasonably fluent in the English language and Propositi “B” and “C” are fluent in English and are American citizens.

common sense often state or do things which are outrageously preposterous and/or unbelievably thoughtless and inappropriate.^{12,13} The term “chaos” is too kind a term to describe consequences of these phenomena. Indeed, any underlying chaos serves to underscore the challenges regarding whether the classification of aberrant common sense is a psychopathological or a sociopathological disorder. It is both! Persons with aberrant common sense are both psychopaths and sociopaths.¹⁴

The collection of these clinical vignettes should provide a compelling case for clinical studies of common sense. The discovery of psychoviruses also merits further investigation particularly regarding issues of transmissibility, infectiousness and disease. Unlike “memes” (Dawkins, 1976), psychoviruses behave akin to slow viruses and comport with numerous transmissible and infectious (often lentivirus) epidemiologic findings (Smith, 2006c). Whereas “memes” are thought to mimic genes, psychoviruses mimic non-proteomic processes.

Basic Research Opportunities

Table 3 cited a variety of reasons for studying common sense. The remainder of this report highlights a few basic science and basic research issues which illustrate the richness of underlying issues and the importance of interdisciplinary inquiry in explicating issues of common sense. Hopefully, one or more topics will motivate readers to contribute meaningfully to the explication of the entire list of topics and reasons cited in Table 3.

¹² The terms ‘thoughtless’ and ‘inappropriate’ are relatively neutral terms used in lieu of ‘stupid’ and ‘stupidity’ – even though the latter are more accurate in some instances. The latter are harsh and likely to be too “charged.” The challenge was to find terms which *do not* imply that one innately is incompetent, unable, or has an inability or mental deficiency. Persons with aberrant common sense generally are neither dull, incompetent, unable, nor mentally deficient. Rather, their momentary responses and mental lapses in challenging situations reveal a quality of thoughtlessness, inappropriateness, lacking judgment and/or being unaware, unthinking and transfixed. These transfixed behaviors may lead to psychopathology – including passive-aggression, cynicism, frustration, stress, anxiety, resistance, intransigence and “my way or the highway” responses. Although somewhat counterintuitive, the insensitivities and lack of judgment and awareness may be sources of underlying sociopathy. More important, ‘believable’ is used to describe certain types of circumscribable mistakes and errors (as in mathematics; cf. Smith, 1987; Smith, 1988; Smith, 2004c). ‘Unbelievable’ is used to describe outliers which challenge one’s credulity. In aberrant common sense, errors, mistakes, misunderstandings, and breakages often are of the unbelievable sort.

¹³ As noted above, the terms ‘thoughtless’ and ‘inappropriate’ often do not capture underlying ‘stupidity’. Despite her healthcare profession background, Proposita “A” on several occasions used a table knife to obtain and spread jelly and/or quark on bread, and then licked the knife before sticking it back into the jelly jar. At a later time, she was surprised that the jam was moldy. When this behavior was pointed out to Proposita “A” immediately after it occurred, she vehemently denied her behavior. Another Swedish propositus in the larger aberrant common sense database also seeded bacteria in jellies using the same mechanism (Smith, 1992; Smith, 2004c). Proposita “C” often would hoard bread, jellies and other products passive-aggressively, and then express surprise when products became moldy and/or rancid.

¹⁴ ‘Sociopaths’ are antisocial-personality disorders or dissocial personality disorders (ICD-9 301.7; ICD-10 F60.2). Several propositi (with aberrant common sense) show a disregard for social norms, are impulsive and non-strategic thinkers, unwittingly cause harm to themselves and others, and, disregard others’ feelings and rights. Insofar as Germans are highly law-abiding persons, disregard for rights in the present context refers to non-codified rights and laws though which are social norms. Proposita “C” did not understand why it was inappropriate to ‘crash’ a neighbor’s dinner party, and Proposita “A” justified her daughter’s behavior on the grounds that the neighbor had enough food to accommodate extra guests. This example is particularly salient insofar as cultural norms in Germany may differ from cultural norms in Armenia or Bulgaria – two cultures in which dinner guests may be openly embraced.

Common Sense and Development

My interest in common sense arose from fortuitous observations in 1985 (Smith, 1986; Smith, 1987; Smith, 1988). I volunteered to manage a Mathematics Laboratory for grade 3 to grade 6 students in a Sunnyvale, CA (public) elementary school. The objective in the mathematics laboratory was to provide remedial support for students who performed poorly on mathematics tasks and to provide enrichment activities for exceptional students.

Answers to mathematics problems generally can be “correct” or “incorrect.” In most instances, incorrect errors can be circumscribed based on discernible faulty applications of mathematics rules, operations and processes. Thus, it was somewhat baffling when several (approximately nine) students occasionally responded with answers that defied any logic of error processes.

Because the Mathematics Laboratory was housed in the school Library, a passing remark about the baffling responses was made to the school Librarian. She knew the particular students whose answers were aberrant and outliers. She then mentioned that those same students also had difficulties in completing reading tasks. When asked to describe examples of some reading difficulties, the Librarian cited examples taken from an elementary morality and ethics textbook used in Japan (Exhibit 1; Umiuchi et al., circa 1967). She then mentioned that the students were likely to invent their own interpretations of the cartoons, and, if the lesson were presented in prose, the students were unlikely to understand the lesson

This situation (i.e., the outlier math responses and difficulties on reading tasks) was discussed with the school Principal. His advice was to present our findings in Parent-Teacher conferences. At those conferences, the parents who were present were uniformly and singularly “negative.”

These observations led to the formulation of the notions of transmissible negativism and psychoviruses. In theory, psychoviruses which are present during early childhood development possibly disrupt the normal development of logical, moral and/or emotional skills (Smith, 1988). Available evidence suggests that common sense in humans may develop following birth and up to six years of age (cf. Fulghum, 1986/2004). This is a reason for focusing on the acquisition and development of common sense and the molecular basis for LTM in non-proteomic regions of brain genomes.

Assessment of Outliers

Aberrant common sense often is characterized by responses and behaviors that are inappropriate and/or extreme outliers - both in individuals within the herd and as thinking and problem-solving behaviors not shared by most members of the herd. For example, the 9 Mathematics Laboratory students' responses cited in Smith (1988) were outliers when compared to reasonable circumscribed error responses (cf. Coben, 1998). Their responses had a quality of being unbelievable and outrageous. Misunderstandings, misinterpretations and inability to understand also characterize aberrant common sense (Smith, 2007).

Detection, assessment, processing and understanding underlying inappropriate and outlying responses pose several challenges for the herd and for science. At the highest level, this challenge involves pattern recognition. What constitutes the “norm,” if it indeed is measurable, and when are responses deemed acceptable and unacceptable? How do members of the herd acquire an understanding of boundaries on their behaviors? Even for a highly circumscribed discipline such as mathematics, is there a manageable system of error analysis that may find application in curriculum design, and in testing and measurement? After all, if clinical studies have merit (see above), then a meaningful goal in studies on common sense is the development of pedagogical and clinical materials for clinicians, parents, and educators.

The assessment of errors has utility beyond clinical applications. If a notion of ‘scientific common sense’ has merit, then the meaningful assessment of common sense in question-asking and question-answering must become a component in scientific inquiry. Verisimilitude simply is not enough (cf. Popper, 1934/1959; Popper, 1963; Platt, 1964; Kuhn, 1970; Hutcheon, 1995)! A central goal must be to flesh-out aberrant ‘scientific common sense’. One example pertains to the ongoing pursuit of HIV vaccines without recognizing that vaccines against HIV may be mathematically impossible based on important characteristics of HIV and its microheterogeneity, and microheterogeneity in other lentiviruses (cf. Smith, 2001; Smith, 2007). There is an element of not knowing when or how to stop pursuing failing strategies. This failure to appreciate ‘when and how to stop’ has the unfortunate consequence that the process of erring obscures an obvious alternative approach to vaccines against AIDS (i.e., vaccines crafted against nascent pathogens as opposed to vaccines against HIV, *per se*; Smith, 2001; Smith, 2006c; Smith, 2007). Failures to stanch HIV vaccine studies and then to shift the paradigm to the indirect vaccine approach can be attributable, in part, to ethnomethodological factors; to wit, not properly assessing taken-for-granted assumptions.

A second example is even more troubling. Gene therapy studies have contributed to two avoidable deaths (i.e., Jesse Gelsinger and Jolee Mohr; Smith, 2007). Although ethnomethodological considerations were factors, the real failure can be attributed to poor scholarship. Many approaches to gene therapy employ adenovirus-associated vectors, though with little appreciation for the phenomenon of autovirulence. Proper scholarly inquiry would have ruled out autotoxicity, autovirulence and context-specificity (Smith, 1983; Smith, 1984; Smith, 2001; Smith, 2007).

‘Scientific Common Sense’

Research on common sense provides novel opportunities for revisiting a number of issues in philosophy of science. An emphasis on ‘scientific method’ often obscures common sense issues such as logistic reasoning and logistic intelligence (Smith, 1983; Smith, 2006c; Smith, 2007). An increased emphasis on commonsense issues also could contribute to new discoveries, novel inventions, and meaningful applications of “native” insights.

Several recent issues serve to underscore the importance of ‘scientific common sense’. The emergence of HIV and AIDS in 1981 provides an excellent and instructive example. First, it HIV and AIDS could be anticipated based on studies of ‘slow viruses’ (Smith, 1979). Second, HIV and AIDS both proceed with underlying logics which readily are

apparent if one looks beyond ethnomethodological barriers associated with disciplined inquiry and taken-for-granted assumptions (Smith, 1983; Smith, 1984; Smith, 2001; Smith, 2007). Third, a cherished goal – vaccine development – could be anticipated from knowledge of slow viruses and lentivirology (Smith, 2001; Smith, 2007). Fourth, many mistakes, errors, misunderstandings, misinterpretations and inappropriate behaviors could be anticipated and well-circumscribed (Smith, 1983; Smith, 2001; Smith, 2007). Fifth, logistic reasoning and intelligence provide novel perspectives on logic, proofs, axiomatics and *in virtualis* studies¹⁵ – even in experimental situations and all claims to the contrary notwithstanding (Smith, 1994). Perhaps most important, ‘scientific common sense’ contributes unique insights regarding etiology, causality, association, relevance, irrelevance, mimicry and biohazards – as cited below regarding research on autotoxicity, autovirulence, context-specificity and epigenetics in diseases of brain and mental health. For illustrative purposes, autovirulence is discussed below, particularly in regard to epigenetics and a putative etiology for the autism spectrum.

Another example of “scientific common sense” is even more instructive. Following early reports of HIV and AIDS in 1981, many investigators began to report the detection of acid-labile α -interferon in many persons with HIV and AIDS. Insofar as α -interferon is a natural antiviral agent, what was the basis for the production and detection of a non-functional, acid-labile moiety of α -interferon? Could HIV generate viral countermeasures? A discovery that Epstein-Barr virus-associated molecular mimicry could explain these findings (see below; Smith, 1983; Smith, 1984) proved to be a seminal finding – particularly in view of findings that gamma-herpesviruses *cis*-activate lentiviruses. The term autovirulence was coined to explain these findings (Smith, 1983; Smith, 1984). Even more important EBV was associated with more than 92 other diseases and syndromes (Table 6; Smith, 2003b), even though EBV is ubiquitous – and found to infect more than 95% of persons throughout the world. Why would a ubiquitous virus cause so many different diseases ... and not in the same persons? Why had not clinicians and scholars made the connection between ubiquity (i.e., common occurrences) and outlier diseases and syndromes? Could some notion of ‘scientific common sense’ contribute to the explication of this conundrum?

<Insert Table 6 about here>

The following discussions of epigenetics and autovirulence provide some insight into skeletal elements of ‘scientific common sense’. Logistic reasoning and logistic intelligence skills must be essential components in ‘scientific common sense’. A particularly exciting finding is that stress-activated EBV can release transmissible and infectious *secondary* particles – especially in the pregnant female – which contribute to the etiology of the autism spectrum. Autovirulence also can explain the etiology of schizophrenia. EBV-associated secondary particles and secondary particles associated with some adenoviruses are dubbed autovirions. Their mechanisms of action contribute to novel perspectives on epigenetics. Equally important, the absence of logistic reasoning and ‘scientific common sense’ may stymie scientific progress (e.g., HIV/AIDS

¹⁵ The term *in virtualis* was coined to represent the *process-oriented* intermediate between *in vivo* and *in vitro* now represented by *preliophics*. Insofar as “virtual” is a word taken directly from Medieval Latin term “virtualis” (W. Cawley, personal communication), this can be schematized as: ‘*In Vitro* ↔ *In Virtualis* ↔ *In Vivo*’. *In virtualis* emphasizes underlying notions of the ‘virtual’ and ‘verity’ (Smith, 2006c).

being converted from an emerging infectious disease to a chronic disease; failures in attempts at producing vaccines against HIV *per se*; failure to recognize biohazardous aspects of autovirions). Overall, the revised notion of epigenetics can give rise to distortions in “signals” (e.g., aberrant translation products) and warrant new sciences of discovering and discerning “noises” – as in the debate about genetics versus psychiatry and mental health sciences (Editorial, 2008; Abbott, 2008).

An Epigenetic Etiology for the Autism Spectrum and Schizophrenia

Epigenetics is a term first introduced by Conrad Hal Waddington in the 1940s (Waddington, 1942; cf. Waddington, 1940; Waddington, 1941; Waddington, 1946; Lederberg, 2001). It now is often defined as heritable changes in gene expression that do not change gene or proteome sequence. This definition is adequate for usual genetics and molecular biology studies of methylation, “imprinting,” selective silencing and other heritable changes (cf. Bird, 2002; Bird, 2007; Gerstein et al., 2007; McGowan et al., 2008; Gluckman et al., 2008). More broadly defined, epigenetic phenomena are heritable (*or propagated*) alternative states of gene expression, molecular function, or organization *specified by the same genetic instructions* (i.e., DNA sequence). Conformational changes associated with Kuru, scrapie, Creutzfeldt-Jakob disease and other prion diseases are subsumed within this definition, but the definition is not limited to genetics and molecular biology perspectives (cf. Mead et al., 2007). Still other scholars emphasize that epigenetics refers to gene-regulating activities that *do not change the genome*. The subtle difference in these definitions is that the former refers to the proteome (i.e., that portion of the total genome focused on genes and proteins), whereas the latter refers to the total genome and its many undiscovered functions. The latter definition also can accommodate DNA dynamics associated with transpositions (i.e., transposons; McClintock, 1950), DNA rearrangements associated with immunoglobulin hypervariable regions (Tonegawa et al., 1978; Sakano et al., 1979), and a hypothesis that DNA *must be* the repository of long-term memories in brain and the immune system (LTM and the ‘DNA as LTM’ hypothesis; Smith, 1979; Smith, 2003a; Smith, 2007).

The latter definition is important for another reason. As noted above, relatively recent findings from two independent human genome projects reveal that the proteome comprises approximately 1.2% of the *human* genome, with perhaps another 22.3% of the genome having some regulatory interaction with the 1.2% (*Nature* [Volume 409, 15 February 2001] and *Science* [Volume 291 (5507), 16 February 2001]).¹⁶ A generous (albeit debatable) interpretation of this finding is that Darwinian evolution can explain *at most 25%* of the *human* genome.¹⁷ An equally generous interpretation is that *nature* comprises approximately 25% of the human genome, with *nurture / nurturance*

¹⁶ None of the proffered definitions takes up a fundamental need to challenge underlying ethnomethodological assumptions about the sanctity of definitions of ‘genes’ and ‘genetics’ *per se* (cf. Pearson, 2006; Gerstein et al., 2007; Ji, 2008), even though findings and mechanisms cited in this report provide an appropriate occasion to revisit this matter.

¹⁷ In fairness, neither Charles Robert Darwin nor Jean-Baptiste Lamarck had any knowledge of genomes. Nor were they in any significant position to argue the merits of nature versus nurture. Arguments supporting a ‘tripartite’ theory of evolution (Smith, 2006a; Smith, 2006c) establish the nature / nurture claims, as well as the unique roles of the womb, mirror neurons and ‘DNA as LTM’ as a broader basis for viewing evolution. Perhaps more important, the tripartite model will be useful in explicating the third (i.e., etiology and pathogenicity) objective in this report.

comprising a larger fraction of the genome (Smith, 2003a; Smith, 2006a; Smith, 2006c; Smith, 2007). In regard to the discipline of genetics, a generous interpretation is that epigenetic events may be far more prevalent than previously suspected. Thus, past definitions most certainly ignore the vast genomic territory beyond the paltry ~25% ($\geq 1.2\% + 22.3\%$) comprising all manner of genetic processes. A range for epigenetic options surely can accommodate a significant portion of the remaining ~75% of the human genome – pseudogenes notwithstanding!

In the end, few definitions focus on the typical meaning of the prefix “epi-,” ‘that which is on, beyond, at, after, beside, or akin to ...’ Emphasis on an even more general definition of epigenetics may be especially important in view of recent discoveries of RNA interference, a multitude of potentially transmissible and infectious microRNAs, new and unusual epigenetic mechanisms discussed in this commentary, and the potential for actions associated with non-protein encoding DNA likely to emerge from even newer and unanticipated discoveries (cf. Footnote 16). Because of subtle underlying issues of transmissibility, infectiousness and replicability, this more general definition has important implications for evolution. Hence, the prefix “epi-” in epigenetics may best capture being ‘beyond the genome’ with little emphasis on genetics notions of methylation/imprinting, silencing and heritability (i.e., the proportion of a trait attributable to genetics) given rapid changes in our knowledge of genomics (Smith, 2003a; Smith, 2003b) and evolution (Smith, 2006a; Smith, 2006c).

Some epigenetic phenomena involve the viral hijacking of host genetic machinery to effectively “sabotage” immune and other organ systems (including brain!) in an unusually stealthy manner (Smith, 1984) – especially in view of the ubiquity of EBV and other viruses which release autovirions. The phenomena should not be surprising in view of discoveries of post-transcriptional events and alternative splicing of RNA associated with some adenoviruses (Berget et al., 1977; Gelinas and Roberts, 1977; Chow et al., 1977). The net effect is to change the “code,” even though the host “genetic code” remains intact (Smith, 1983).¹⁸ Dubbed “aberrant translation products” for lack of any additional specificity (Exhibit 10), EBV and selected other viruses effectively hijack the genetic code through viral countermeasures aimed at turning ‘self’ into ‘other’. This mechanism also calls into question traditional notions of autoimmune disease in terms of underlying immune mechanisms and semantics (Smith, 1983; Smith, 2004). Overall, when stress-activated aberrant gene expression patterns simultaneously involve multiple genes (because the changes to the code may involve multiple genes), one encounters vexatious situations and conundrums wherein only logistic reasoning can be used to disambiguate the myriad of presentations mimicking multifactorial traits (cf. Chapters 7 and 8 in Lewis, 2008). Those stress-activated aberrant gene expression patterns should be viewed as noise patterns when contrasted to multifactorial traits (i.e., signal patterns). With noise patterns, the challenge goes beyond not seeing forests for the trees. Presentations of both the forests and trees become distorted when autovirions contribute grossly to epigenetic code changes. This precisely is the situation

¹⁸ Emphasis on the more general notion of “code” is not without foundation. For logistic reasons, one can anticipate that there will be one or more ‘codes’ associated with the ‘DNA as LTM’ hypothesis (Smith, 1979; Smith, 1983; Smith, 2003a; Smith, 2006a; Smith, 2006c; Smith, 2007). Those codes are likely to focus on non-proteomic regions of the genome. They also could be targets of autovirulent epigenetic actions and could have cognitive and/or behavioral consequences.

wherein geneticists and molecular biologists have been unable to assess systematic and scientific signals among noises and psychiatrists have not been able to assess noises among quite concrete clinical signals (cf. Editorial, 2008; Abbott, 2008).

<Insert Exhibit 10 about here>

Although precise mechanisms underlying the production of aberrant translation products remain elusive (though with aberrant splicing being one suspected mechanism [cf. Lerner, Boyle, Mount et al., 1980; Mathews, 1980; Akusjärvi et al., 1980; Hinterberger et al., 1983], aberrant translation being another mechanism [cf. Thimmappaya et al., 1982; Bhat and Thimmappaya, 1983; Bhat, Metz and Thimmappaya, 1983], and aberrant transcription being a third mechanism [Exhibit 10]), molecular *mimicry* is the usual outcome and autoimmune diseases are occasional clinical presentations (cf. Ehrlich's notion of "horror autotoxicus"; cf. Silverstein, 2005). These code altering viral products include (though may not be limited to) EBER 1 and EBER 2 small RNAs encoded by EBV (Lerner, Boyle, Mount et al., 1980; Mathews, 1980; Akusjärvi et al., 1980; Hinterberger et al., 1983), and VAI and VAII small RNAs encoded by some adenoviruses (Akusjärvi et al., 1980; Thimmappaya et al., 1982; Bhat and Thimmappaya, 1983; Bhat, Metz and Thimmappaya, 1983). That these small RNAs may be interchangeable should not be lost to one's attention. That they differ from host tRNA, mRNA and other small RNAs also should not be overlooked. Finally, autovirulent small RNAs need not be replicatable; their increased production may derive from the replication of the host virus (e.g., EBV, adenoviruses, etc.) and/or biological fission (Smith, 1984). Non-replicatability of the autovirulent secondary particles could explain their "hit-and-run" and "beneath-the-radar" traits.

Although not "denatured," 'other' molecules generally lack the usual biological (specificity and functional) properties, even if they retain many conformational properties *possibly*¹⁹ giving rise to immune recognition. In this sense, particular care must be used when referring to "autoimmune" processes and autoimmunity. The immune system could be fully intact, yet molecular mimicry could render an appearance that it is dysfunctional – a semantic distinction possibly having crucial importance in clinical settings and laboratory studies (Smith, 1983; Smith, 1984; Smith, 2006c). Equally important, molecular mimicry may render some aberrant molecular products to be immunogenic whereas other aberrant molecular products may be non-immunogenic. This observation could explain the variable presentation wherein approximately 12% of mothers with autistic offspring have autoantibody responses (Paul Ashwood, 2008 personal communication).

Autotoxicity, Autovirulence and Context-Specificity

A theory of autotoxicity, autovirulence and context-specificity (Smith, 1983; Smith, 1984) was crafted as a *parsimonious* explanation for transmissible and infectious *secondary*

¹⁹ Immunogenic response is not a foregone consequence. Acid-labile α -interferon often elicits no immune response. Perhaps more important, the Singer et al (2008) findings provide clues that some (*though not necessarily all*) targets of autovirulent acts may produce immune responses. Further investigation is required to determine whether important byproducts of autovirulence in brain elicit no immune responses, titers of autovirions and/or aberrant translation products are factors, and/or location on the autism spectrum is a factor. Clinically, these may prove to be crucial considerations if the Singer et al. findings logistically are a 'tip of an iceberg'.

particles contributing to epigenetic and epigenomic diseases. Those diseases often present as slowly progressive, “hit-and-run” and/or “beneath-the-radar” disorders (Smith, 1983; Smith, 1984; Smith, 2003b). Insofar as herpesviruses were known to *cis*-activate lentiviruses such as HIV (cf. Rosadio, 1983) and other pathogens *trans*-activate HIV, autovirulence first was proposed as a parsimonious explanation for the titer-dependent role of EBV in the production of *both* α -interferon and acid-labile α -interferon²⁰ – especially in HIV/AIDS (cf. Kikuta et al., 1984; Smith, 1984). The mechanism also explained the association of EBV with hairy leukoplakia, the presence of EBV antigens in classic and AIDS-related Kaposi’s sarcoma tissue (KS tissue; Smith et al., 1984a; Smith et al., 1984b; Smith, 1984), and the crucial distinction between the evolution of HIV and the evolution of AIDS (Smith, 1989). Using ‘logistic reasoning’, one was able to *anticipate* that several EBV “antigens” would represent aberrant translation products (of early “diffuse” [EA-D] and “restricted” [EA-R], and “membrane” [MA] products) in KS tissue and possibly tissues from other tumors (e.g., renal carcinoma and squamous carcinoma; Smith et al., 1984a; Smith et al., 1984b; Smith, 1984). Monoclonal antibodies directed at EBV EA-D, EA-R and MA antigens affirmed this *anticipated* finding (see Table 2 in Smith, 1984; Smith et al., 1984a; Smith et al., 1984b). Chang et al. (1994) subsequently reported a ~39% overlap in the EBV and Kaposi’s Sarcoma herpes virus (KSHV) genomes. [NB: HHV8 (= Castleman’s Disease) also has a significant genome overlap with EBV. Moreover, HHV-6 (associated with roseola) may have a significant genome overlap with EBV autovirions in addition to its intriguing capability of congenital transmission (Hall et al., 2008).] Available evidence suggests that the offending autovirions are encoded in the overlapping genomic intersections of EBV, KSHV, HHV6 and HHV8. Indeed, this overlapping intersection may be a central feature of *all* gamma herpesviruses. More important, any associations among virus and disease (e.g., KSHV and KS, HHV-6 and roseola, HHV8 and Castleman’s disease) must carefully disambiguate among virus and its autovirions as etiologic factors. Hence, the Henle-Koch postulates (Henle, 1846-1853; Henle, 1955-1871; Koch, 1866; Koch, 1876) may not be an adequate methodological procedure for establishing causality in regard to gamma herpesviruses, their autovirions and diseases.

In general, EBV and gamma herpesviruses are not the only viruses producing autovirions. Autovirions also are produced by some adenoviruses (cf. Akusjärvi et al., 1980; Lerner, Andrews et al., 1981; Lerner, Boyle et al., 1980; Lerner, Boyle et al., 1981; Thimmappaya et al., 1982; Bhat, Metz and Thimmappaya, 1983; Bhat and Thimmappaya, 1983), vesicular stomatitis virus, Ebola virus (Lee et al., 2008), and may underlie mechanisms of many epigenetic disorders – *and especially many alleged autoimmune disorders*. Just as the classification of herpesviruses distinguishes among alpha-, beta- and gamma-herpesviruses, the classification of adenoviruses may benefit from distinguishing among those variants which may or may not encode for VA1 and VAII (*or other*) small RNAs particularly in view of findings by Bhat and Thimmappaya (1983). In regard to the Ebola virus, a preliminary clue to an epigenetic mechanism is

²⁰ Significantly, the Kikuta et al (1984) conference presentation did not cite finding titer-dependent increased production of acid-labile α -interferon. Those authors considered titer-dependent increased production of acid-labile α -interferon to be a negative finding which might besmirch their report. The finding only was revealed after this author cited *logistic* reasons for suspecting the finding (Kikuta et al., 1984 personal communication).

that the virus can produce two different forms of a glycoprotein from one gene (Lee et al., 2008).

It is important to emphasize that autovirions need not be replicatable (i.e., self-replicating, just as the hepatitis delta antigen may not be self-replicating; Smith, 1984). This may be the basis of their hit-and-run and beneath-the-radar profiles. Once aberrant translation products are produced, the immune system (reacting to the molecular mimicry) may contribute to the slowly progressive disorders. This may be the basis of antibodies to myelin basic protein being a finding in multiple sclerosis and autism (Singh et al. 1993). It also could be the basis for other variable autoantibody and antibody findings in autism (Todd and Ciaranello, 1985; Warren et al., 1990; Singh et al., 1993; Singh et al., 1997; Singh et al., 2002; Vojdani et al., 2002; Dalton et al., 2003; Singh and Jensen, 2003; Singh and Rivas, 2004; Ashwood et al., 2004; Ashwood and Wakefield, 2006; Singer et al., 2008; Kirkman et al., 2008; Libbey et al. 2008; Braunschweig et al., 2008), schizophrenia (DeLisi et al., 2008) and other disorders (Kieśliling et al., 2003; Kirkman et al., 2008). Equally important, the immune system need not be involved in responding to aberrant translation products (see Footnote 19). This could be the basis of the differential expression of apolipoproteins and complement proteins associated with children with autism (Corbett et al., 2007). If there is any lesson learned from HIV/AIDS, the production of acid-labile α -interferon served to militate against antiviral properties of α -interferon thereby providing EBV and other potential pathogens free passage – both in the host and evolutionarily! Acid-labile α -interferon merely competed with α -interferon ... a process analogous to radioimmunoassay analysis, though using non-functional (and not radio-labeled) molecules.

Autotoxins subsume all prions, which, as noted above, are epigenetic *conformational* byproducts (Exhibit 11; Smith, 1983,²¹ Smith, 1984; Smith, 2003b). *Naegleria amoeba*

²¹ It is no coincidence that the theory of autotoxicity, autovirulence and context-specificity was formulated at the same time that the prion hypothesis was reported (Prusiner, 1982). Logistic reasoning in 1981 revealed parsimony underlying research by Stanley Prusiner, Thelma Dunnebacke, Joan Steitz, Thomas Okarma and Gary Pearson (Smith, 1979; Smith, 1983; Smith et al., 1984a; Smith et al., 1984b; Smith, 1984). Indeed, the pun on Immanuel Kant's, *The Critique of Pure Reason* (Kant, 1781/1929/1985) in the title in Smith (1983), was a direct reference to logistic reasoning about uncanny coincidences in reports by Prusiner, Dunnebacke, Steitz and Okarma (cf. Smith, 1983; see Table 1 in Smith, 1984). Moreover, in 1981 Okarma's laboratory at the Palo Alto Veteran's Hospital provided an opportunity for this author to gain 'wet'-laboratory experience thereby providing the impetus for formulating the preliophic molecularator (i.e., *protonic-electronic-ionic-photonic molecular calculator*, Smith and Shadel, 2003/2008). This device and its processes were schematized as Figure 1 in Smith (1983). Conceptually, cells and preliophic devices are electrofocusing (i.e., *vectorial*) devices though not electrophoresis devices (i.e., the latter devices are used to elucidate structure, not function). That was the basis for the title question: "Does Purification of Molecular Function Differ from Purification of Molecular Structure? ..." (Smith, 1983). Because the "central dogma" often was cited as an impediment to the 'DNA as LTM' hypothesis, and because Crick (1970) had doubts about the dogma as evidenced in a footnote citing articles by Gibbons and Hunter (1967) and Griffith (1967), the preliophic molecularator device specifically was conceived and designed to *disprove* the "central dogma" in a simple, straightforward, elegant, and generalizable (utilitarian) manner. The invention provided an additional salient (thermodynamic) discovery. The chemiosmotic hypothesis concerned with coupling in oxidative and photosynthetic phosphorylation (Mitchell, 1966) posits that protons are byproducts of mitochondrial processes. Preliophic processes revealed an *in virtualis* observation (see Footnote 15 for an explanation of *in virtualis*) that, in theory, those protons support intracellular, cell surface and preliophic pH-gradients thereby facilitating bi-directional vectorial movements with minimal Brownian motion. Naturally occurring microtubulin-associated proteins, phosphatidyl-proteins and other phosphatidyl-moieties (e.g., phosphatidylserine,

cytopathogenic material [NACM] may be another autotoxin (Dunnebacke and Schuster, 1985; Dunnebacke and Dixon, 1989), thus initially establishing the generalizability of the process (Smith, 1984). Whether NACM represents an epigenetic byproduct remains to be fully explicated, although its resistance to some proteases suggests some unconventional conformational properties. Autovirions subsume small ribonucleoproteins (snRNPs; Lerner and Steitz, 1979; Akusjärvi et al., 1980; Lerner, Andrews et al., 1981; Lerner, Boyle et al., 1980; Lerner, Boyle et al., 1981; Hinterberger et al., 1983; Smith, 1984; Thimmappaya et al., 1982; Bhat, Metz and Thimmappaya, 1983; Bhat and Thimmappaya, 1983), the hepatitis ‘delta’ agent (Smith, 1984), other transmissible and infectious smallRNAs or microRNAs (cf. Zhai et al., 2008), and other yet-to-be-identified viral-associated *secondary* pathogens (e.g., the hepatitis delta antigen; Smith, 1984) as depicted in Exhibit 12.

<Insert Exhibits 11 and Exhibit 12 about here>

As noted above, many autoimmune diseases are associated with autovirions (Lerner and Steitz, 1979; Smith, 1984; Smith, 2003b) and many rheumatologists have speculated that autoimmune diseases may comport with slowly progressive transmissible agents (Halstead Holman, 1981 personal communication). Context-specificity merely indicates that diseases are associated with specific aberrant or dysfunctional byproducts being produced and occurring in cells during unspecified cell or developmental cycles. In practical and philosophical terms, context has both existential and phenomenological meaning. For the broad array of autovirulent epigenetic byproducts, one should not be surprised that these virus secondary products are associated with a spectrum in presentations – whether in the plethora of EBV-associated disorders (Smith, 2003b), the autism spectrum, hemoglobinopathies, lymphomas, carcinomas et al., and despite the underlying *ubiquity* of the parent viruses. Indeed, these findings teach that ubiquity appears to confer an evolutionary advantage on select viruses (e.g., herpesviruses and adenoviruses).

These findings also teach an important lesson about context-specificity. A mother’s womb may be a veritable cauldron for context-specific changes (Smith, 2006a; Smith, 2006c; Hall et al., 2008). The fetus, *in utero*, represents a rapidly developing entity. It should be no surprise that titer-dependent production and release of autovirions could give rise to a range in slowly progressive developmental outcomes, responses and disorders depending on which ‘context-specific’ cells during the fetal developmental cycle become infected with those secondary products. Outcomes also could depend on titers of aberrant translation products (cf. Corbett et al., 2007). Both possibilities (i.e., autovirions and aberrant translation products) thereby may explain the autism spectrum. This may be the real lesson in Singer et al. (2008; also see Footnote 19). The Singer findings also teach that time is of the essence; a high priority should be directed at the early identification and detection of real or aberrant antigens to which the antibodies are directed (cf. Okarma et al., 1982). Among other lessons, Daniels et al. (2008) teach that parents (*and especially mothers*) of autistic children may be candidates for excess production of autovirulent products (cf. autism odds-ratios for mothers in Table 1 in

phosphatidylinositol, phosphatidylinositol, phosphatidylglycerol, phosphatidylethanolamine, and phosphatidylethylamine), along with commercial ampholytes (i.e., molecular substrates used for producing pH-gradients during isoelectrofocusing) provided further support for the utility of this device.

Daniels et al., 2008; cf. Smith, 2007). The Daniels finding also comports with emerging data on mothers with disorders in common sense who often exhibit high anxiety and general anxiety disorder (Smith, 2007). Some of their offspring occasionally reveal autistic tendencies (Smith, 2004; Smith, 2006a; Smith, 2006c; Smith, 2007). Because disorders in common sense remain a beneath-the-radar phenomenon not being investigated in any clinical profession, much more can be learned as clinicians become more cognizant of these extremely challenging medical, psychological and social disorders.

Three other recent reports, when combined with the reports by Daniels et al (2008) and Singer et al (2008), now provide compelling evidence that much of the autism spectrum *and schizophrenia* may derive from autovirulent processes. [NB: Fragile X syndrome is not considered a part of the autism spectrum for reasons cited below.] Reports of *de novo* germline mutations associated with autism (Sebat et al., 2007) and *de novo* mutations in genes critical to brain development in schizophrenia (Walsh et al., 2008) are consistent with the autovirulence hypothesis. When sampling families in which parents were cousins, Morrow et al. (2008) report mutations, deletions and other anomalies in 88 families in Turkey, Pakistan and other Middle East regions. These findings are particularly significant because many autovirulent factors are hyperendemic in an Equatorial region roughly bounded by the Tropic of Cancer on the north (say, below ~23.5° latitude) and the Tropic of Capricorn on the south (say, above ~23.5° latitude). In other words the higher prevalence rates in families caused by germline mutations and aneuploidies in this hyperendemic region, when coupled with rare mutations in at least 10% of sporadic cases of autism (Sebat et al., 2007), provide compelling evidence that no theory of autism now can be complete without ruling out autovirulent etiologic factors. Not to be overlooked are the anomalous mutations in 15% of adult-onset schizophrenia and 20% of child- and adolescent-onset schizophrenia (when compared to 5% in healthy controls; Walsh et al., 2008). Indeed, *as matters of logic and logistic reasoning*, autovirulence *must* be suspected whenever *de novo* mutations or *idiopathic* processes are observed or reported²² (cf. Smith, 1983; Smith, 2006c). This accounted for the logistically important 'Eureka!' moment which occurred when this author received the Singer et al. and Walsh et al. reports on the same day in late-March, 2008. Had each paper been perused in a separate manner which could not be co-cited, this report never would have gained any grounding or traction.

A possible future finding of *de novo* mutations in postmortem brain tissue of persons with autism, schizophrenia or other cognitive disorder would be particularly significant and could provide indirect support for the 'DNA as LTM' hypothesis particularly in regard to possible discoveries of inverse encoding schemes implicated in LTM (Smith, 1979; cf. Smith, 2003a; Smith, 2006a; Smith, 2006c; Smith, 2007; also see Footnote 18). In schizophrenia and other cognitive disorders, the targets of autovirulent actions could be transposon-like, endogenous retrovirus-like and other molecules implicated in changing DNA. Those aberrant products then might produce *epigenomic* consequences, *de novo* mutations and *idiopathic* disorders. This could comport with a recent report of some

²² 'Idiopathic' and '*de novo*' are catchall terms describing actions and processes of unknown origin. The terms are promulgated by investigators who are quick to invoke Ockham's razor without using logistic reasoning to explore inter- and meta-disciplinary implications or underlying ethnomethodological assumptions that might explain the 'unknown origin'.

statistically significant findings related to six genes involved in the control of maternal and affiliative behaviors in the autism spectrum (e.g., OXT=oxytocin, OXTR=oxytocin receptor, PRL=prolactin, PRLR=prolactin receptor, D β H=dopamine beta-hydroxylase, and FOSB=Fos family transcription factor complexes; cf. Yrigollen et al., 2008). This could be in contrast to recently reported epigenetic hypermethylation (largely in hippocampus) in postmortem brain tissue associated with suicide and child abuse (McGowan et al., 2008). Significantly, because the McGowan et al. research team revealed no knowledge of the ‘DNA as LTM’ hypothesis, their study failed to rule out hypermethylation as an *anticipated* LTM response.

Insofar as the ‘DNA as LTM’ theory was derived from a comprehensive analysis of ‘slow viruses’ (i.e., prions and lentiviruses) and their potential and putative roles in the evolution of the molecular basis for LTM, trinucleotide repeat diseases (TNR diseases; e.g., Huntington’s disease; Fragile X syndrome; X-linked spinal and bulbar muscular atrophy; myotonic dystrophy type 1; Cleary and Pearson, 2003) may be evolutionary consequences of autovirulence.²³ This may be the real significance of some reported familial epidemiologic findings (Daniels et al., 2008) and *de novo* germline mutations (Sebat et al., 2007). However, the specific mechanism of autovirulence proposed for the autism spectrum differs from any autovirulence associated with TNR diseases. Thus, Fragile X disease should not be considered among the autism spectrum. Finally, a report by Campbell et al. (2006) of putative genetic variants in autism associated with disruptions in MET transcription also comports with the autovirulence theory.

In a final analysis, transposon-like and endogenous retrovirus-like molecules could be significant targets of autovirulent actions. This presents an epigenetic and epigenomic conundrum: If the targets of autovirulence are host molecular translation products involved in generating *natural* changes to the genome (as would occur in the ‘DNA as LTM’ hypothesis, transpositions, immunoglobulin gene rearrangements, and other natural DNA dynamics processes), what is the source of the epigenetic/epigenomic malfeasance ... the virus or the evolutionary consequences of the virus? This may be the real significance of TNR diseases. During past evolutionary time periods, autovirions gave rise to changes in molecules implicated in changing trinucleotides and TNRs (as in LTM).²³ Those aberrant translation products produced TNR sequences and subsequent repeats in gene products (as in *huntingtin* in Huntington disease). This is a logistically important reason for understanding boundaries between proteomic and non-proteomic regions of genomes²⁴ (Smith, 2003a; Smith, 2006a; Smith, 2006c; Smith, 2007). For logistic reasons, if the ‘DNA as LTM’ hypothesis is true, then one can anticipate the need to change and/or move *trinucleotides*. It also is an important reason to be on the lookout for *de novo* or other changes in the genome as in progeria (cf. Eriksson et al.,

²³ Trinucleotides are important in the ‘DNA as LTM’ hypothesis because there must be parsimony and internal consistency between direct (DNA \rightarrow RNA \rightarrow proteins) and inverse (DNA \leftarrow RNA \leftarrow protein; or, stated differently, proteins \rightarrow RNA \rightarrow DNA) pathways. Insofar as trinucleotides are essential to the genetic code, inverse pathway encoding schemes also must account for trinucleotides. However, this does not mean that inverse encoding schemes must be limited to trinucleotides sequences.

²⁴ Logistic reasoning anticipates high cytosine (C) and guanine (G) content in TNRs for syntropic and thermodynamic reasons, in addition to substantive aspects of the ‘DNA as LTM’ hypothesis (Smith, 2003a; Smith, 2006a; Smith, 2006c; Smith, 2007). Adenine (A) * thymine (T) base pairings have other equally important roles in the ‘DNA as LTM’ hypothesis (Smith, 2003a; Smith, 2006a; Smith, 2006c; Smith, 2007).

2003; Goldman et al., 2004). Perhaps most important, transpositions, gene rearrangements, and changes in DNA associated with LTM (as would occur in the ‘DNA as LTM’ hypothesis) most likely will occur after birth, and not *in utero*. This could explain the functional phenotypic differences associated with the autism spectrum.

Autovirulence Can Explain the Autism Spectrum and Schizophrenia

Succinctly, it is proposed that (*for the autism spectrum*) EBV, some adenovirus or other stress- (or trauma-) activated infectious autovirulent pathogens (i.e., autovirions) *in a pregnant female* may be transmitted to her yet unborn offspring *in utero* (i.e., a congenital process; cf. DiPietro, 2004; DiPietro et al., 2006; Gallagher et al., 2008; Laplante et al., 2008). The thesis also comports with several other recent findings such as autoantibodies against serotonin receptors (Todd and Ciaranello, 1985), autoantibodies against myelin basic protein (Singh et al., 1993; Libbey et al., 2008), autoantibodies against neuron axon and glial filament protein (Singh et al., 1997), neuron-specific antibodies (Vojdani et al., 2002), serum antibodies to caudate nucleus (Singh and Rivas, 2004), aneuploidies and chromosomal rearrangements (The Autism Genome Project Consortium, 2007), maternal antibodies against neuronal tissue (Dalton et al., 2003), maternal antibodies against fetal brain proteins (Singer et al., 2008; Braunschweig et al., 2008), transmissibility of maternal IgG from mothers of autistic children to rhesus monkeys (Martin et al. 2008), findings (including stress) associated with mast-cell activation (Theoharides et al., 2008), and, other aneuploidies, microduplications, microdeletions and other copy number variations (Exhibit 13; Weiss et al. 2008; Marshall et al., 2008). Although it is likely that autovirions are transmitted via the umbilical cord, this is not essential. Indeed, it is of interest to determine if autovirions and/or antibodies are detected in amniotic fluid.

<Insert Exhibit 13 about here>

Overall, the hypothesis is consistent with a neo-Darwinian and neo-Lamarckian “tripartite theory of evolution” (Smith, 2006a; Smith, 2006c; Smith, 2007). It also is consistent with the Barker Hypothesis concerning long-term consequences of *in utero* fetal experiences (cf. Barker et al., 1989; Barker, 2001; Barker, 2002; Gluckman et al., 2008), recent findings on allergies and asthma risks may be set in the womb (Huebner et al., 2008), stress during pregnancy (DiPietro, 2004; DiPietro et al., 2006; Laplante et al., 2008), and a four-component model of evolution (Jablonka, Lamb and Avital, 1998; Jablonka and Lamb, 2005). Distinguishing among intrauterine umbilical and amniotic possibilities and perinatal experiences (e.g., breastfeeding) also are important.

In the etiology of schizophrenia, the host is older and already may be infected with the offending virus though *not necessarily* from an *in utero* source or transfer.²⁵ That potentially stress- (or trauma-) activated virus, in turn, may release autovirulent pathogens. These auto-transmissions and auto-infections of autovirions then can contribute to the panoply of epigenetic byproducts in brain mimicking natural biological products including *de novo* mutations (Stark et al., 2008; Xu et al., 2008; Walsh et al., 2008), microdeletions associated with chromosome 22q11.2 deletion syndrome (Simon

²⁵ A recent report by Xu et al. (2008) implicating *de novo* mutations in sporadic schizophrenia could contradict, or more likely, add clarity to this matter if those *de novo* mutations arose *in utero* (during pregnancy).

et al., 2008; Stark et al., 2008), “rare” (The International Schizophrenia Consortium, 2008) and “recurrent” deletions (Stefansson et al. 2008), and loci association studies (O'Donovan et al., 2008) associated with schizophrenia, and abnormal miRNA processing in brain (Stark et al., 2008). Indeed, a significant feature of the autovirulence hypothesis is its association with mutations, deletions, rearrangements, copy number variation, transpositions, etc.

Heretofore (and with the exception of autotoxins such as prions), there are few convincing examples revealing the fate of autovirions crossing placental and/or blood-brain barriers – whether in fetal, post-natal or adult brains. It also is a significant feature because one now can envision and anticipate a broad spectrum of outcomes including the autism spectrum *and other undiagnosed, misdiagnosed or unexplained disorders* (e.g., ALS, Guillain-Barre syndrome, post-polio syndrome [PPS] and Tourette's syndrome; cf. Kiessling et al., 1993; Petek et al., 2001; Muhle et al., 2004; Claessen, 2005; Kirkman et al., 2008; Fields, 2008). PPS particularly is interesting because polio virus has not been isolated during this late-stage in disease. Hence, the identification of possible sources of autovirulent cofactors, *if any*, may present significant challenges. *In retrospect, this finding should not be surprising because of the autotoxic examples provided by prions and the broad spectrum of EBV-related disorders* (Table 1; cf. Smith, 2003b).

The emphasis on stress and trauma as activators of EBV or other viruses is not without cause. This investigator finds stress and trauma to be significant contributors to anxiety in disorders of common sense (Smith, 2007). Smith (2007) reports Proposita “D” exhibits extreme forms of generalized anxiety disorder and Propositus “E” reveals evidence of mild, clinically diagnosed autism. DiPietro et al. (2006) report a number of physical and psychological correlates and associations relating maternal psychological stress during pregnancy to child development at age 2, although there is no evidence that the effects could be attributable to an infectious etiology. Other persons cite stress being among the potential cofactors in chronic fatigue syndrome (cf. Hillenbrand, 2003). Still others cite anecdotal evidence that stress was associated with cold-induced urticaria, thyroiditis (both Hashimoto's and Kawasaki's thyroiditis)²⁶, fibromyalgia, Hodgkin disease, schizophrenia, breast cancer (Peled et al., 2008), et al. (anonymous personal communications). Furthermore, Gallagher et al. (2008) report that stress is a factor in parental caregivers of children with developmental disabilities mounting a poor antibody response to pneumococcal vaccination. The Gallagher study did not consider roles of stress in concert with predispositions to stress-activated viruses prior and during pregnancy.

PTSD in returning male and female battleground veterans should merit special attention because of implications for battlefield medicine and childrearing (Smith, 2007). Indeed, an epidemiologic study of autism associated with maternal PTSD may be informative, as would a separate study of schizophrenia associated with maternal PTSD.

²⁶ It may not be entirely coincidental that both forms of thyroiditis were discovered in Japan – in EBV-hyperendemic regions bounded by the Tropic of Cancer on the north and Tropic of Capricorn on the south.

Regarding schizophrenia, it remains to be determined if this paradigm fundamentally is inconsistent with reports that individuals with 22q11.2 microdeletions show behavioral and cognitive deficits and are at high risk of developing schizophrenia (Stark et al., 2008). As noted, *de novo* mutations could affect the germline at some particular point in the past. One example might be the increased polymorphisms in myelin genes associated with white matter lesions and disorders (Fields, 2008). It also remains to be determined if the unknown alteration in the biogenesis of microRNAs (siRNAs and miRNAs) is associated with epigenetic mechanisms (cf. Stark et al., 2008). Finally, it should not escape one's attention that loci on 22q rarely are implicated in autism or only recently were discovered (cf. Auranen et al., 2000; Muhle, 2004).

It should not escape one's notice that epigenetic mechanisms can mimic hereditary processes and obscure genetic versus infectious findings in twin studies involving autistic and schizophrenic persons. In monozygotic twins, a crucial clue is whether exposed twins behave in identical ways – and not whether those twins are autistic *per se*. Mere autism without identical behavior could be an important clue supporting autovirulence in contrast to monozygosity. Moreover, *maternal* exposure to mercury could mimic *unfounded* and *unsupported* claims of toxic aspects of thiomersal in MMR vaccines administered to persons who later are identified as being autistic (cf. Palmer, Blanchard and Wood, 2008; Tarbouriech et al., 2005; Tarbouriech et al., 2006). Indeed, an association between autism and maternal exposure to mercury (e.g., in dental amalgams, fish products and the environment) should be investigated further (cf. Palmer, Blanchard and Wood, 2008), and claims of associations between MMR vaccines and autism should be dismissed categorically. *This report suggests that autism already exists by the time a child is exposed to MMR vaccines.*

Regarding thiomersal specifically, it usually presents as ethyl mercury, whereas methyl mercury may be a far more significant toxic factor because it binds to monomeric EBV dUTPases (cf. Tarbouriech et al., 2005; Tarbouriech et al., 2006). It remains to be determined if the concentration of mercury is a *cis*-activating or *trans*-activating factor, or another form of cofactor in EBV-related autovirulent processes.

Divergences in Common Sense Associated with War and Trauma

Table 4 points to a variety of stressful and challenging situations associated with war and trauma. Our research on common sense in Germany highlights and underscores the seminal importance of epidemiologic and phenomenological studies of both common sense and disorders in common sense. One now hopes to enlist a broad range in social science professionals (including psychologists, historians, political scientists, anthropologists, economists and philosophers) to flesh out the impact of war and trauma on peace.

Assessment of Syntropy in Species, Groups and Individuals

Syntropy comprises mathematical, chemical and physical measures of tendencies toward organization and order in information (as contrasted to entropy²⁷; cf. Fantappiè,

²⁷ Although syntropy, as a concept, arose from notions of negative entropy (Fantappiè, 1942/1993; Szent-Gyorgyi, 1977), our view is that syntropy and negative entropy are quite distinct. Syntropy represents an *inverse* (albeit *parallel*) process. At present, syntropy is best reflected in un-ordered atoms and molecules

1942; Fuller, 1975/1979; Szent-Gyorgyi, 1977; Fuller, 1992; Fantappiè, 1993; Cook and Daniels, 1994; Adleman et al., 2001; Morin, 2006; Vannini, 2004/2005; Vannini, 2006; Wikipedia; 2006; Arcidiacono, 2006). An obvious example of syntropy occurs when single strands of DNA are deposited in an aqueous solution, with their complementary base-pairing occurring after relatively short order in time. For practical considerations, 'time' is not a variable in the calculation of syntropy; rather, syntropy merely is a measure of increased order/organization. For DNA in brain and if G*C connotes Guanine*Cytosine base-pairs and A*T connotes Adenine*Thymine base-pairs, then $(G^*C :: A^*T)_{\text{changing LTM}} / (G^*C :: A^*T)_{\text{baseline}}$ are crude measures of 'syntropy' – with $(G^*C :: A^*T)_{\text{baseline}}$ being determined for tissue not undergoing changes in DNA (e.g., DNA from a hair follicle).

In regard to syntropy, nurturance and any underlying thermodynamic considerations, it should not escape one's attention that increasing G*C :: A*T ratios reflect increasing molecular avidity insofar as G*C-bonds energetically are stronger than A*T-bonds (Exhibit 14). Whether this may have evolutionary significance beyond concerns for long-term memories (LTM) remains to be explicated more fully.²⁸ Extant evidence suggests that adenine (from A*T base-pairs) is metabolized, and, among other functions, may play a role (through adenosine, a metabolic intermediary) in the autoregulation of sleep (Smith, 2003b; Roffwarg et al., 1966; Bennington and Heller, 1995; Dunwiddie and Masino, 2001; cf. Savage and West, 2007). This possibility provides indirect evidence of linkages among sleep, dreaming (in function, form and content) and LTM (McGuire et al., 2001; Pascual and Preat, 2001; Walker and Stickgold, 2004; Joiner et al., 2006).

<Insert Exhibit 14 about here>

Although entropy is a thermodynamic principle often cited as a measure of the dispersion of order and information, biological (evolutionary) information possesses a capability of syntropy – a measure of order from "un-order" in species, groups and individuals. We propose $(G^*C :: A^*T)_{\text{changing LTM}} / (G^*C :: A^*T)_{\text{baseline}}$ as crude measures of *syntropy* (i.e., mathematical, chemical and physical measures of tendencies toward organization and order in information; cf. Demetrius, 2000)²⁹ in different regions of brain (e.g., in forebrain, midbrain and cerebellum. In the latter formulation, $(G^*C :: A^*T)_{\text{baseline}}$

giving rise to higher-order forms of biological molecules such as nucleotides, amino acids and other organic molecules (cf. Johnson et al., 2008).

²⁸ There are at least two issues of possible evolutionary significance. First, one must assess whether there is something truly unique about LTM which would lead to increasing G*C :: A*T ratios (in, say, forebrain, midbrain and cerebellum) over time. In this regard, one must ask whether there may be other (non-LTM) evolutionary byproducts – possibly associated with non-proteomic regions of genomes – which scholars have yet to consider. Second, as more becomes known of genomes for different species, an assessment of G*C :: A*T ratios for proteomic and non-proteomic regions may be instructive.

²⁹ Although syntropy and entropy have thermodynamic implications in general systems and the physical sciences (e.g., energies involved in changing chemical bonds from A*T-rich to G*C-richer regions and increased avidity), the proposed (crude) measure of syntropy associated with LTM probably has a miniscule effect on overall thermodynamic values associated with life and the living. Perhaps more important, syntropy may not be the opposite of entropy because syntropy can reflect changing order, and/or increasing order and complexity – not decreasing or decreased disorder (cf. Lieb and Yngvason, 1998). Another perspective emphasizes uni-directionality associated with adaptation (Demetrius, 2000). This perspective is only marginally related to syntropy.

represents a baseline ratio for tissue *presumably* not undergoing changes in DNA (e.g., DNA from skin or a hair follicle).

As noted, increasing G*C :: A*T base-pair ratios reflect increasing molecular avidity insofar as G*C-bonds energetically are stronger than A*T-bonds (Exhibit 14). It should not escape one's notice that our specific formulation of syntropy has meaning only when there is a nucleic acid backbone. This poses an intriguing astrobiological question for astrophysics, astrochemistry, and astrobiology; to wit, in terms of astronomical time and the expansion of matter and information, did syntropy and entropy co-evolve simultaneously?

Second and perhaps more important for studies of evolution and the substantive professionalization of general education, *changing* G*C :: A*T ratios provide crude, though meaningful *quantitative and qualitative* measures of *nurture* and *nurturance*. The relatively stable G*C :: A*T ratios associated with non-developmental proteomic regions of a genome provide quantitative measures of *nature*. Discussions and debates about nature versus nurture thereby become more real, even though *in virtualis* because of their crudeness of those measures. Equally important, one can *anticipate* that demarcations among scientific and philosophical disciplines will become softened as protagonists for the various disciplines begin to appreciate the novel opportunities for cross-disciplinary inquiry and scholarship. As was noted earlier, a remaining challenge will be to discover and/or invent technologies to provide concrete meaning to our crude or others' more sophisticated quantitative and qualitative measures of nature and nurture.

In the preceding discussion, one could presume that different forms of nurturance (and, implicitly, primitive notions of common sense) are unique properties of mammals, or that crude measures of nurturance may be reflected only in changing G*C :: A*T ratios in brain. Other sophisticated (albeit primitive) forms of nurturance have been observed associated with interspecific communicative and coordinated hunting in Grouper *Epinephelus fasciatus* and Moray Eel *Gymnothorax griseus* (cf. Karplus, 1978; Bshary et al., 2006; Cutraro, 2006) and swarm behavior in harvester ants (cf. Gordon, 1999; Leslie, 2002). We anticipate changing G*C :: A*T ratios in these animals, and possibly in oxytricha (Hopkin, 2006), although we know of no extant clinical or laboratory evidence favoring these anticipated theoretical findings. We also know of no evidence supporting DNA changes in "the muscle spindles in the muscle tissue.... called nuclear bag and nuclear chain.... essentially large, stretch sensitive multinucleate cells with an apparent excess of RNA" (UCLA Neuroanatomy Professor Arnold Scheibel, personal communication [October 8, 2004]) or neurons and interneurons associated with muscles (cf. Berkowitz, 2005).

Non-Invasive Imaging of Guanine*Cytosine Base-Pairs :: Adenine*Thymine Base-Pairs

One frequently encounters markings or notches on vertical measurement devices or doorposts being used to indicate a child's growth. By analogy, a proposed invention comprises a magnetic imaging device designed to calculate Guanine*Cytosine :: Adenine*Thymine (i.e., G*C :: A*T) base-pair ratios for different regions in brain (e.g., forebrain, cerebellum, amygdala; Smith, 2003a; Smith, 2008b). Smith (1979) first posited that DNA is the repository of LTM in brain. As mentioned above, anticipated

changes in DNA take place in non-proteomic regions of the genome. Clinical, laboratory and theoretical evidence implicates changes from A*T-rich regions to G*C-richer base-pair regions. In cerebellum, those ratios are likely to be asymptotic over time. In forebrain, the ratios are likely to be monotonically increasing over the life of the organism. Available evidence implicates changes in forebrain being made during sleep and dreaming (Smith, 2003a). Significantly, the underlying theory implicates a novel thermodynamic principle herein referred to as 'syntropy' indicating changes from 'un-order' to 'order' in contrast to entropy (Smith, 2003a).

In addition to the invention having value in affirming or refuting the underlying 'DNA as LTM' theory, it should find use in psychiatry and neurosciences. For example, trinucleotide repeat (TNR) diseases implicate neuromuscular and cognitive symptoms at proteomic and non-proteomic boundaries (say, for Huntington's disease and Fragile X disease; Smith, 2007). The invention may have diagnostic value in detecting and disambiguating TNR diseases. Longer term applications may obtain in studies of the formation of beliefs, reality, awareness, common sense, consciousness, mindfulness, meditation, autism, schizophrenia post-traumatic stress and peace (Smith, 2007; Smith, 2008a; Smith, 2008b).

The major challenges in reducing the proposed invention to practice pertain to issues of resolution involving high- (i.e., ≥ 4) Tesla magnetic spin-resonance devices (cf. Mazerolle et al., 2008). Because the non-invasive imaging would involve G*C :: A*T base-pair ratios in brain, it is most likely that standard MRI devices would need to be suitably re-engineered to respond to spin resonance properties of phosphorus or phosphate moieties, carbon and/or nitrogen in view of the double bonding properties of A*T and triple bonding properties of G*C (Exhibit 14).

Expected forebrain and cerebellum G*C :: A*T base-pair ratios for a typical human are depicted in Exhibit 15. For identical twins raised together, Exhibit 16 portrays anticipated forebrain and cerebellum G*C :: A*T base-pair ratios, and Exhibit 17 shows anticipated G*C :: A*T base-pair ratios for identical twins raised apart. Greater divergences in base-pair ratios would be expected for twins raised apart because of environmental factors and different sources of nurturance. An intriguing special case of identical twins raised apart occurred when, during the 1990s, one twin was produced in the United Kingdom using *in vitro* fertilization at time "x" and the identical sibling was produced approximately 3 years later by the same *in vitro* fertilization process (citation missing).

<Insert Exhibit 15, Exhibit 16 and Exhibit 17 about here>

The Economics of Stupidity and Aberrant Common Sense

Chaos and aberrant common sense pose significant challenges for economics. An underlying assumption is that economic behavior is rational behavior. Many instances of aberrant common sense represent irrational and unpredictable behavior. Because aberrations in common sense are associated with outliers, misunderstandings, misinterpretations and inability to understand, there is a real need to circumscribe a range of economic possibilities to the extent this may be possible. Examples include economic aspects of chaos and aberrant common sense in:

- **personal lives** (e.g., associated with psychoviruses, trauma, addictions, failed relationships, sociopathy, insurance, clinical costs and opportunities, medications

providing symptomatic relief, etc.);

- **nationally** (e.g., politics, election laws and procedures, associated with poor leadership and leaders with aberrant common sense, crime, civil strife and riots, war, catastrophes, national caveats emptor, etc.);
- **globally** (e.g., global warming, inequities between those who have and those who do not have, displacements and diasporas, human rights, divergences in common sense, etc.); and,
- **aberrant 'scientific common sense'** (e.g., poor experimental designs; failures in vaccine trials; confusion regarding causality, correlations and associations, consequences, and irrelevancies; not knowing when or how to stop; ethical lapses; open and anonymous peer review; mistakes and misunderstandings; internecine behaviors, etc.)
- **chaocracies associated with institutions and organizations** (e.g., dysfunctional institutions and organizations)

In addition, insofar as conditional and Bayesian probabilities may represent subconscious dynamic and fluid boundary conditions on reality, then beneficial and detrimental (economic) implications for chaos, health, wellness and sanity must be considered.

Although economics traditionally is viewed in terms of micro- and macro-economic perspectives, commonsense issues speak to the intersection in both perspectives insofar as common sense is concerned with micro-economic (e.g., in individuals) and macro-economic (e.g., within and across group) issues. That intersection is even more important because of a need for an economics of aberrant intersecting issues ... such as aberrant common sense and disorders in common sense.

Gaming and Peace

Perhaps the most challenging opportunity for research on common sense pertains to consequences of war, trauma and catastrophes. Preliminary findings (Table 4) suggest that divergences in common sense often are consequences of these challenges. Hence, just as game theory is applied in economics and military sciences, there now is a need for novel game-theoretic constructs directed at stabilizing common sense and, in turn, peace. One is reminded of John Nash's (1950) seminal finding about economic equilibrium being applied to groups of size n . Common sense intrinsically is about groups of size n , though with minimal disequilibrium caused by aberrations in common sense. Rather than modeling wars and costs of wars, one now is challenged to model peace and long-term benefits and consequences of peace.

Conclusions

This report paints a complex, colorful and richly textured picture of the ubiquitous term "common sense." One goal is to inspire scientists, scholars, clinicians and laypersons to explore and embrace its many nuances and implications, particularly in regard to one's interests and perspectives. Another goal is to encourage readers to grapple and wrestle with definitions, ethical and moral issues, and technological challenges. A third goal is to reveal ways in which commonsense issues are pervasive throughout disciplines and potentially rewarding at all levels.

A number of novel findings are cited. These findings cover a broad expanse in intellectual territory – including new discoveries (e.g., the 'DNA as LTM' thesis brings

clarity to the molecular basis of common sense; and, autovirulence provides a novel perspective on epigenetics, molecular mimicry and generalizes the prion hypothesis), clinical opportunities and perspectives (e.g., stress-induced EBV secondary particles in the pregnant female may contribute to the etiology of the autism spectrum), inventions (e.g., preliophics, preliophic molculators, and non-invasive imaging of G*C :: A*T base-pair ratios), evolutionary precepts (e.g., syntropy), and even cherished notions of peace and tranquility. Sadly and most surprising, the singular failure in the professions to appreciate the serious nature of disorders in common sense and attendant economic implications leaves much to be desired.

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Table 1 – Examples of the Term “Common Sense” in Different Languages

- common sense (American English – what people in common would agree; that which they "sense" in common as their common natural understanding)
- horse sense (informal American English and other cultures – common sense; gumption; sound practical judgment)
- gumption (informal American English – common sense)
- nous (chiefly British – common sense; alertness; street smart; savvy; "she has great social nous")
- chomin bwyll (Welsh – common sense)
- sensus communis (Latin; originated in medicine during Middle Ages; cf. Mullooly, 2003; Mullooly, 2006)
- sentido común (Portuguese)
- senso comum (Brazilian Portuguese – “Opinion of most of the people on one subject”)
- sentido común (Spanish)
- buonsenso (Italian – good sense)
- senso comune (Italian – common sense)
- senso comune delle cose (Italian – common sense of the causes)
- bon sens (French – good sense)
- sens commun (French – usual sense / knowledge / understanding; common understanding; more erudite expression of common sense)
- sens pratique (French – practical sense, though involves more thought or thinking than ‘bon sens’)
- ca tombe sous le sens (French – "falling under the meaning;" "obvious;" "evident;" "it goes without saying;" "living up to its definition" [Nota bene: This is the more frequently used expression])
- ca tombe sous les sens (French – "apparent to the senses;" "a priori" [Nota bene: This is a more "old fashioned" and less frequently used expression])
- gesunder Menschenverstand (German; Swiss German – common sense; well-balanced, sound or healthy peoples' understanding)³⁰
- gesunder Hausverstand (German – common sense; healthy house training/understanding)
- Menschenverstand (German – shortened form of common sense)
- Allgemeingut (German – general good)
- gemeinsinn (German – mean sense / public spirit / collective spirit)
- vernunft (German – reason, understanding, good or common sense)
- volksweisheit (German – folk wisdom)
- gesunder Komputerverstand (German – computer common sense)
- gezond verstaand (Dutch – healthy understanding)
- felles meining (Norwegian – common / mutual understanding)
- sund fornufft (Danish – sound sense)
- sunt förnuft (Swedish – sound sense)

³⁰ Zimmerli AG Zürich (December 7th, 1995) puts forth an intriguing possibility of Gesunder Boden-Gesunde Pflanze-Gesunder Mensch (i.e., healthy soil-healthy plants-healthy people). A natural extension would be Gesunder Bodenverstand-Gesunde Pflanzenverstand-Gesunder Menschenverstand (i.e., healthy soilunderstanding-healthy plantunderstanding-healthy peopleunderstanding).

- självklart (Swedish – of course / it is clear)
- förnuftig (Swedish – common sense)
- heilbrigd skynsemi (Iceland – healthy sensibility)
- heilbrigðskynsemi (Iceland – healthy sensibility)
- liggur í augum uppi (Iceland – "lies up within open eyes")
- terve järki (Finnish – healthy / sound sense/mind)
- talonpoikaisjärki (Finnish – peasant / commoner sense)
- здравыйна смисл (Russian; zdrabyi smysl – healthy/sober/robust sense/raison d'etre)
- здоровий глузд ("zdorovyy hluzd"; Ukrainian)
- zdrowy rozsadek (Polish)
- zdravý rozum (Slovak – healthy mind)
- prostý rozum (Czech – common sense; healthy mind)
- zdrav razum (Croatian – common sense)
- zdrava pamet (Slovenian – common sense)
- józan ész (Hungarian – common sense)
- ésszerű (Hungarian – by your brain; common sense)
- общ чувство – (Bulgarian – common sense)
- sveikas Protanimas (Lithuanian – healthy thinking)
- dramapanagan (Armenian – think with logic)
- שכל ישר, שכל בריא, היגיון פשוט, – (Babylon Hebrew Dictionary – common sense and simple logic)
- שכל בריא (sechel barie)– (Babylon Hebrew Dictionary – common sense; healthy brain)
- היגיון פשוט (hegayon pashut) – (Babylon Hebrew Dictionary – simple logic)
- שכל ישר (sechel yashar) – (Babylon Hebrew Dictionary – common sense; straight brain; straight head; straight sense; sound judgment)
- היגיון (hegayon) – (Hebrew – logic; reasoning; sense)
- חכמה (hachmut / hachma / huchmut (Hebrew – wisdom, inclusive of common sense)
- mitkabel la da'at (Hebrew – "acceptable to knowing capacity"; English: "to make sense")
- mitkabel at hada'at (Hebrew – reasonable, as in "That's a reasonable solution to the problem."; "It would be reasonable to look for my keys in the kitchen drawer."; "It makes sense to take a bath after gardening, not before.")
- طبترم تاملک (Farsi from Babylon online dictionary – common sense; intellect; nous; hale; robust; reasoning; savvy; know what's what)
- maloom (Farsi – obvious)
- marteghi (Farsi – logical)
- mosaleur (Farsi – given)
- 常識 traditional³¹ or 常识 simplified ("chang shi"; Chinese – normal or conventional knowledge)
- 常識 (jyoshiki; Japanese – common sense)

³¹ There is some evidence that these ideographic Chinese characters may date back several thousand years.

- 良識 (ryoshiki; Japanese – good sense)
- 상식 (sang shik; Korean – common sense)
- trí-thức phổ-thông (Vietnamese – pronounced “tree tuck foe tom”)
- สามัญสำนึก (Thai – pronounced “saa^R man^M” or “sahm^R neuk^H,” common sense)³²
- กึ๋น (Thai – pronounced “geun^R,” slang for intelligence, smarts; common sense; brains)³²
- sağduyu or aklıselim (Turkish, with first word being the preferred; sağduyu refers to right / healthy sense / sensation)
- κοινή αίσθηση (Greek = pronounced ‘koine aisthese’ – ‘common sense’ in modern Greek, and ‘common perception’ in ancient Greek)³³
- Lakali (Songhai ethnic group in Niger, in West Africa)
- Lakari (Bariba ethnic group in Benin – West Africa)
- Aprikshitakaraka³⁴ (Sanskrit – common sense)
- samaj (Urdu – understanding, common sense, intelligence)
- sehaj buddhi (Hindi – common sense)
- sehajabuddhi (Hindi – common sense)
- saamaanya buddhi (Hindi / Sanskrit – ‘common-to-all’ intelligence)
- vyavaharika buddhi (Hindi / Sanskrit – intelligence in everyday dealings)
- sadharan budhi (Bengali-India – common sense)
- sadharan gane (Bengali-Bangladesh – common sense)
- saamaanya jnana (Kannada/India – common sense)
- samanya gyan (Nepalese – common sense)
- pahuth arivu (Tamil – common sense)
- حِس سَلِيم (Hiss Saliim) Modern standard Arabic – common sense
- البِدِيهَة (Al Badiha) (Arabic – common sense, used in laypersons’ opinions) – “what you know without any need of thinking”
- العُرْفُ (Al Uorf) (Arabic – common sense, used for practical things such as kinds of behavior and traditions) – “what you know about how to behave because everyone in the society behaves that way”
- مَنْطِق (Lebanese colloquial Arabic – People generally refer to Common Sense using the word ‘reason’)
- pangkaraniwan madama – Philippines Filipino Tagalog – common sense
- Ipapahiwatig ng pag iisip – Philippines Filipino Tagalog – thinking; common sense

³² Every syllable in Thai is pronounced in one of five tones: low, mid, high, falling, or rising. The transliteration shown in the dictionary indicates the required tone with a superscripted capital letter after the syllable; L, M, H, F, or R, respectively.

³³ “There is no phrase in Plato that expresses what we mean nowadays by common sense. There may be a phrase in Aristotle equivalent to our meaning of common sense, although we are unable to identify that term in his writings. This may be due to limitations on available search engines. Nor does an equivalent expression for common sense appear in the Septuagint, the Greek translation of the bible. The term does appear in the Latin of Cicero who uses the phrase in the modern meaning of the phrase” (Michael Eisenstadt, personal communications).

³⁴ It is possible that this term may date back thousands of years (circa Manu’s formulation of the caste system in India), although we are not able to confirm this hypothesis. The term “Aprikshitakaraka” certainly is known to exist in the Panchatantra – the “five principles.” It is the fifth of the five principles, and, roughly translated, means “knowledge is not enough, application is essential.”

Table 2 – Examples of the Term “Lacking Common Sense” in Different Languages

Terms for “common sense”	Terms for “lacking common sense” et al.
German – <i>gesunder Menschenverstand</i>	<i>ein Mangel an gesundem Menschenverstand</i> – lack of healthy human understanding; ‘one in want of common sense’; ‘one deficient in common sense’
German – <i>gesunder Menschenverstand</i>	<i>gestört gesunder Menschenverstand</i> – distorted or faulty common sense
German – <i>gesunder Menschenverstand</i>	<i>aberrierend gesunder Menschenverstand</i> – aberrant common sense
German – <i>gesunder Menschenverstand</i>	<i>unausgeglichene Wahrnehmung</i> ("unbalanced perspective" may be the most suitable translation). However, this expression is rather artificial and abstract.
German – <i>ein guter Hausvorstand</i> (a well functioning community, a helpful neighborhood) ³⁵	<i>der Hausvorstand ist uneins</i> (there is trouble in the community)
German – <i>gesunder Menschenverstand</i>	<i>einer Sache weder sprachlich noch sachlich gewachsen sein</i> (being unable to express a sound opinion, neither verbally nor objectively). This expression is popular among teachers, if a student appears unwilling to learn or is generally ignorant.
German – <i>gesunder Menschenverstand</i>	<i>Dummkopf</i> – stupid; foolish; blockhead; saphead (colloquial curse)
German – <i>gesunder Menschenverstand</i>	<i>Verrückt</i> – crazy; out of place
German – <i>gesunder Menschenverstand</i>	<i>Unsensibel</i> – insensitive to needs of other people
Dutch – <i>gezond verstaand</i>	<i>Hij heeft er niets van begrepen</i> – He has no understanding
French – <i>bon sens</i>	<i>Ca n’a pas de sens</i> – It does not make sense.
French – <i>bon sens</i>	<i>N’pas avoir du bon sens</i> – not have common sense
French – <i>bon sens</i>	<i>Manquer de sens</i> – missing sense
French – <i>bon sens</i>	<i>Denuee de bon sens</i> – without common sense
	<i>Denuee de sens pratique</i> – without practical sense; silly; crazy
American English – <i>common sense / gumption</i>	Lacks gumption; foolish; unaware; unacceptable
American English – <i>common sense</i>	Lacks common sense
American informal English – <i>horse</i>	Common sense is not so common

³⁵ The German term *gut Hausverstand* was used at the turn of the 20th century (1900-1960). It means that at least two tenets "share" a house (or more tenets in an apartment house) and that this small community is functioning well.

<i>sense</i>	
American informal English – <i>horse sense</i>	he hasn't got the sense God gave little green apples
Australian English – <i>common sense</i>	One who does not <i>use his noggin</i>
Australian English – <i>common sense</i>	<i>Don't be a silly galah</i> (lame brain, <i>wally</i> , <i>drongo</i> , not being very bright and not using common sense); <i>use your loaf</i>
Swedish – <i>sunt förnuft</i>	<i>saknar vanligt folkvett</i> - lacking common sense (“folk-sense”)
Swedish – <i>sunt förnuft</i>	<i>saknar vett</i> - lacking sense
Swedish – <i>sunt förnuft</i>	<i>vettlös</i> – crazy; sense-less
Swedish – <i>sunt förnuft</i>	<i>han saknar sund förnuft</i> – he lacks sound reasoning
Hungarian – <i>ésszerű</i>	<i>Hüe</i> – real dumb (curse)
Hungarian – <i>józan ész</i>	<i>Nem józanul gondolkodik</i> – is not thinking sanely; is not thinking with common sense
Hungarian – <i>józan ész</i>	<i>Nincs észze</i> – not sensible (a curse)
Hebrew – שכל ישר (<i>sechel yashar</i>)	<i>sechel akum</i> – wrongheaded; someone whose reasoning process does not work as it should
Hebrew – היגיון (<i>hegayon; higayon</i>)	<i>zeh lo higyoni</i> – this does not make sense; not logical
Spanish (Mexican) - <i>sentido común</i>	<i>Creo que te falta informacion</i> – I think you are lacking information <i>Creo que te falta un poco de cerebro</i> – small brain
Spanish (Puerto Rico) - <i>sentido común</i>	Shit for brain... shit for brains... s/he has shit for brains (curses)
Philippine Tagalog – <i>pag iisip</i>	<i>Wala kang isip</i> – you do not think; you do not use common sense <i>Utak naman</i> – use your brain
Modern standard Arabic – حِسْ سَلِيم (<i>Hiss Saliim</i>)	زائغ – ضال – (<i>Dhal –Za”gh</i>) Aberrant common sense
Arabic – البِدِيهَة (<i>Al Badiha</i>) Arabic – العُرْفُ (<i>Al Uorf</i>)	تَعَقَّلَ (<i>Ta~akal</i>) – (verb) “use your brain;” Although this verb is derived from “mind”, the root of this verb means “bridle”
Arabic – البِدِيهَة (<i>Al Badiha</i>) Arabic – العُرْفُ (<i>Al Uorf</i>)	تَدَبَّرَ (<i>Tadabbar</i>) – (verb) “think before you talk;” In the Arabic Dictionary, this verb mainly means “reflection around things and their consequences”
Arabic – البِدِيهَة (<i>Al Badiha</i>) Arabic – العُرْفُ (<i>Al Uorf</i>)	غَيْرُ بَدِيهِي (<i>Ghiro badihi</i>) – (adjective) “lacks common sense;” It means something is not consistent with common sense
Arabic – البِدِيهَة (<i>Al Badiha</i>) Arabic – العُرْفُ (<i>Al Uorf</i>)	(<i>Anta gabe</i>) – “your intelligence is less than ...” (curse)
Farsi - طبترم تا ملک (common sense)	(<i>shoma hichi sareton nemishett</i>) – your head doesn't work (<i>shoma hichi nemidanid</i>) – you don't know

	anything
Japanese – 常識 (<i>kyoshiki</i>)	非常識 (<i>hijoshiki</i>) – missing common sense
Japanese – 常識 (<i>kyoshiki</i>)	<i>kyoshiki nai</i> – lacks common sense
Chinese – 常識 traditional or 常识 simplified <i>chang shi</i>	常识: 普通知识 (<i>pu tong zhi shi</i>) – having no common sense
Chinese – 常識 traditional or 常识 simplified	(<i>mei you chang shi</i>) – short on common sense
Chinese – 常識 traditional or 常识 simplified	不知 (<i>bu zhi</i>) – no knowing
Chinese – 常識 traditional or 常识 simplified	不觉 (<i>bu jue</i>) – no awareness
Chinese – 常識 traditional or 常识 simplified	不知不觉 (<i>bu zhi bu zhi</i>) - no knowing, no awareness (i.e., someone lacking common sense)
Chinese – 常識 traditional or 常识 simplified	白痴 (<i>bai chi</i>) or 弱智 (<i>ruo zhi</i>) – It means someone's intelligence quotient doesn't reach the normal standard. In Chinese they have a metaphorical meaning that is someone having no common sense.
Chinese – 常識 traditional or 常识 simplified	无知 (<i>wu zhi</i>) – lacking common sense
Chinese – 常識 traditional or 常识 simplified	不正确的普通知识、有缺陷的普通知识 – having faulty common sense
Oromo -	<i>Beekumsa Hubanara argamuu hin Q'abuu</i> – you lack common sense
Amharic -	<i>Ke limmdina ke menoree yemigegnee Iwuqeet yellehim</i> – you lack common sense
Ibo -	<i>O nwero uche</i> – this situation lacks common sense <i>I nwero uche</i> (confrontational) – you lack common sense (a curse)
Nepalese – <i>samanya gyan</i>	<i>pagal</i> – crazy
Tamil – <i>pahuth arivu</i>	<i>arive illaya</i> – (you) don't have it; mentally lacking
Kannada/India - <i>saamaanya jnana</i> (common sense)	<i>Buddi Maandya</i> – one who does not use his brain
Bengali-India – <i>sadharan budhi</i> (common sense)	<i>sadharan boka</i> (Bengali-India) – lacks common sense; stupid
Songhai ethnic group in Niger, in West Africa – <i>Lakali</i>	<i>A bon'o si cube</i> – the person's head/thought is not together <i>A sin'da yassi</i> – the person doesn't make good sense <i>A sin'da lakal</i> – the person doesn't have common sense

<p>Bariba ethnic group in Benin in West Africa – <i>Lakari</i></p>	<p><i>Um lakari mon</i> – <i>The person doesn't have common sense</i> <i>We wira kun'meme</i> – The person cannot get his/her head/thought straight</p>
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Table 3 – Important Reasons for Studying Common Sense

- **Molecular models of long-term memory, initially derived from studies of slow viruses, reveal that common sense may be an essential form of long-term memory**
 - Molecular basis for common sense
 - Proteomic versus non-proteomic issues
 - Memory, ‘storage’ and representation issues
- **Developmental issues**
- **An examination of dogmas and ethnomethodological³⁶ assumptions** – The ‘DNA is repository of LTM’ hypothesis contradicts the central dogma of Francis H. C. Crick and calls into question logics underlying other dogma
 - Portends the invention of a **PRotonic-ELectronic-IOnic-PHotonIC MOLECULAR calcuLATOR** (i.e., *preliophic moleculator*) device and *preliophic* processes
 - Anticipates HIV / AIDS (i.e., an “immune dementia”) and ‘mad cow’ disease
 - Learning from HIV / AIDS
 - Posits novel circumventive approaches to vaccines against lentiviruses
 - Autotoxicity, autovirulence and context-specificity (e.g., acid-labile α -interferon and Kaposi’s)
 - Anticipated small proteome and large non-proteome regions of genome
 - Anticipated diseases along psychoimmunoneurological axis
 - Posits a need to distinguish among descriptive-structuralism (in biological sciences), heuristic-functionalism (in computer and information sciences), and logistic intelligence and reasoning (as an alternative to Ockham’s Razor)
 - *in vitro* → *in virtualis* → *in vivo*
 - Anticipates *syntropy* – a novel thermodynamic principle / law involving increasing G*C :: AT ratios within biological species / organisms / organs (e.g., brain and immune system)
- **Issues of logic, methodology, ethnomethodological, ethics and philosophy of science**
 - Causality, consequences and associations
 - *A priori* and *a posteriori* issues
 - Philosophical, existential and phenomenological issues
 - Detection, assessment and diagnoses
 - Testing, measurement, diagnosis and assessment
 - Novel peer-based theories of testing
 - Epigenetics
 - Disambiguating genetics and genomics (e.g., twin studies) from epigenetics and epigenomics (e.g., molecular mimicry in twin studies)
 - A signal-to-noise conundrum (disciplinary versus epi-disciplinary challenges)
 - Transmissible and infectious ‘hit-and-run’ and beneath-the-radar’ issues
 - Rethinking sciences – particularly regarding roles of dogma, experiments and biohazards
 - “Scientific common sense” versus common sense in science

³⁶ Ethnomethodology is concerned with “how we know what we know, and what are any ‘taken-for-granted’ assumptions.”

- **Issues of Evolution** – What can be learned about the evolution of common sense (especially in birds, reptiles, and mammals)? Can platypus and echidna contribute to one's understanding of the evolution of common sense?
- **Nature versus Nurture issues**
- **Opportunities for investigating belief, reality, awareness, behavior, unknowing neediness, worried wellness**
- **Diseases, disorders and aberrations in common sense**
 - Aberrant common sense secondary to 'transmissible negativism' (TN)
 - Anxiety and stress disorders, and disorders in common sense
 - Molecular disorders of common sense – the autism spectrum, schizophrenia,
- **Fundamental and basic science issues**
 - Syntropy – A thermodynamic principle of increasing order derived from 'un-order' in memory and evolution (though associated with biological systems)
 - Tripartite model of evolution
 - Darwinian, Lamarckian and neo-Darwinian-Lamarckian issues
 - *in utero* issues (e.g., congenital, epigenetic and evolutionary issues)
 - DNA is the repository of LTM in brain and the immune system
 - developmental and nurturance issues (e.g., roles of mirror neurons)
 - Ubiquity and evolution – the role of the womb
 - Generalization of the 'prion' hypothesis – Autotoxicity, Autovirulence and Context-Specificity reveal novel epigenetic mechanisms
 - Transmissibility and infectiousness of secondary particles
 - Epigenetics and molecular mimicry
 - Semantics and semiotics of autoimmunity and autoimmune diseases
 - Idiopathic and *de novo* lesions
- **Meta-issues**
 - It should not be surprising that common sense is an interdisciplinary issue cutting across at least several disciplines
 - Molecular biology and evolution – Common sense and long-term memories
 - Physics and chemistry – Common sense represents the accumulation of group, herd, cultural and evolutionary *syntropic* information
 - Physiology, medicine and/or education (i.e., clinical issues)
 - Physiology of fight, flight and fright (predator and prey) behaviors – common sense and sympathetic versus parasympathetic mechanisms
 - Obstetrics – common sense and pregnancy
 - Pediatrics – common sense and early childhood development
 - Psychiatry – common sense and its disorders (e.g., anxiety, transmissible negativism, passive-aggression, anti-social and spiritual emergency diagnoses)
 - Military and battlefield medicine (including stress and post-traumatic stress disorders)
 - Education and special education
 - Psychology, sociology, anthropology, political and other social sciences
 - Economics of discrepancies and abnormalities
 - Economics of stupidity and aberrant common sense
 - Economics of chaocracies
 - Economics of privatization, globalization and outsourcing
 - Transpersonal, transcendental and spiritual

- Peace and Conflict
- Peace and common sense
 - Using common sense as a concrete marker of peace
- Common sense in systems, bureaucracies and ‘chaocracies’
 - Aberrant common sense and ‘institutional cancers’ associated with systems attributable to privatization and globalization
 - Aberrant common sense associated with government regulation / de-regulation and free-market economies
 - Ponzi schemes
 - Sub-prime mortgage crisis and domino effects
- The economics of common sense and its disorders
- Common sense, logistic intelligence and logistic reasoning
- Rethinking and anticipating evolution
- New approaches to obstetrics, gynecology, public health, military science and health policy
- Help for the Unknowing Needy and the Worried Well³⁷
- A paradigm and model for social design and engineering
- Intersection between common sense associated with systems and social constructs, and biological / natural common sense
- Common Sense and Society – Example of Large Hadron Collider versus Autovirulence (i.e., Peter Higgs’ eponymous “Higgs Boson” in sub-particle physics versus autotoxins and autovirions in sub-particle biology)
- **Products, inventions and anticipated futures**
 - Non-invasive imaging of common sense in brain and diseases of common sense in brain
 - Non-invasive assessment and measurement of syntropy and other G*C :: A*T ratios
 - Preliophic molculator and preliophic processes
 - Detection of autotoxins and autovirions
 - Vaccines against autotoxins and autovirions
 - Anticipating biohazards, bioterrorism and malfeasance
 - Anticipating ‘hit-and-run’ and ‘beneath-the-radar’ possibilities
 - Novel approaches to diagnostics and ‘debugging’

³⁷ Our notion of ‘unknowing neediness’ and ‘worried wellness’ is derived from the ‘commonsense’ application of a paradigm and model for social design and engineering

It is said that ... “Mankind may be divided into four classes:

- (1) Those who *KNOW* and know that they *KNOW* – of them seek knowledge;
- (2) Those who *KNOW* but do not know that they *KNOW* – awaken them;
- (3) Those that do not *KNOW* and know that they do not *KNOW* – instruct them;
- (4) Those who do not *KNOW* but think that they *KNOW* – they are fools, dismiss them.”

Salomon Ibn Gabirol (also known as Avicbron)
 In *Mibhar Hu-Peninim* [*Choice of Pearls*]
 No. 60 (circa 1050 AD)

An analysis of this adage reveals that those with and without knowledge may be partitioned, albeit somewhat simplistically, according to their education, alertness, motivation and ability to educate. The range of possibilities is even more instructive if the words “*NEED*” and/or “*HELP*” are substituted for the capitalized and italicized word “*KNOW*.”

Table 4 – Effects of War, Trauma and Catastrophe on Common Sense

War and other trauma appear to contribute generally to divergences in common sense elsewhere³⁸ – resulting from genocide, ethnic-cleansing, other crimes against humanity, and other specific traumatic events. A few examples include:

- Black Deaths in Europe produced different behavioral responses and changes in Italy and other European countries (cf. Tuchman, 1978; Boccaccio, 2000)³⁹;
- Situations contributing to various diasporas and internally displaced persons;
- Estimates of 4700 or more lynchings of African-Americans and others in the USA from the late-1800s to the early-1960s (cf. Potok et al., 2007; Moyers, 2007);
- The killing of large numbers of Armenians and other persons in 1915 which began during the reign of Abdülhamid II – the last Ottoman emperor;
- Traumatic aspects of World War I (particularly in terms of social and military consequences) memorialized in many of Wilfred Owen’s war poems⁴⁰ (Owen, 1965);
- The Holocaust during World War II;
- Relocation of Japanese-Americans to internment sites during World War II (cf. The Kitchen Sisters, 2007);
- The Chinese Cultural Revolution between 1966 and 1976;
- Sectarian violence and ethno-political conflict largely between Nationalists-Catholics and Unionists-Anglicans/Protestants in Northern Ireland from the late-1960s to the late-1990s;
- The traumatic four year reign of the Khmer Rouge in Cambodia (from 1975 to 1979) and its “killing fields” (cf. Cheam and Gordon, 2007);
- Forced disappearances (i.e., “disappeared people” also called *desaparecidos*) and state terrorism in Chile and Argentina during the 1970s and 1980s [also known as Operation *Condor* (Spanish: *Operación Cóndor*, Portuguese: *Operação Condor*)];
- The abduction, kidnapping and subsequent criminal activities of Patricia (“Patty”) C. Hearst (granddaughter of publishing magnate William Randolph Hearst) in 1974 by the Symbionese Liberation Army (SLA);
- The war in Iraq (where Sunni, Shia and Kurdish common senses are diverging);
- War veterans (returning from the Vietnam war, the Gulf war, and the war in Iraq) suffering from post-traumatic stress disorders (PTSD; cf. Milliken, Auchterlonie and Hoge, 2007);
- Genocide in Rwanda involving massacres of Tutsi and Hutu subpopulations;
- Ethnic-cleansing in Bosnia-Herzegovina (among Serbs, Croats and Muslims);
- Internal Palestinian strife in Israeli-occupied Palestinian territories (among Fatah and Hamas factions);
- Trauma, rape and other sexual violence in the Congo (cf. Gettleman, 2007);
- Strife, dislocation and genocide in the Darfur region of Sudan;

³⁸ In all instances of divergences in common sense cited in this report, attributions of responsibilities or “blame” are avoided, even though blame and causality may have relevance. Rather, the sole focus is on phenomena underlying common sense, aberrant common sense, and changes in common sense. A goal is to understand how evolutionary, molecular, developmental, situational *and clinical* events may contribute to the explication of common sense and changes in common sense.

³⁹ Whereas Boccaccio’s writings were diachronic, Tuchman’s approach was more synchronic.

⁴⁰ Examples include: “Parable of the Old Men and the Young”; “The Dead-Beat”; “Mental Cases”; “Arms and the Boy”; and “Conscious.”

- “Terrorist” events surrounding September 11th, 2001 in the USA;
- “Terrorist” school hostage events in September 2004 in Beslan, North Ossetia-Alania (Russian Federation);
- Natural disasters in southeast Asia after a large December 2004 tsunami;
- Flooding, dislocations and property losses associated with Hurricane Katrina in August 2005;
- Homelessness;
- School massacres at Bath Consolidated School in 1927, Virginia Tech University in 2007, University of Texas (Austin) in 1966, Columbine High School in 1999, and Jokela High School (Tuusula, Finland) in 2007.

Table 5 – Psychological and Physical Symptoms in the Propositi in this Study

Propositi	“A”	“B”	“C”	“D”	“E”	“F”	“X”	“Y”	“Z”
Psychological									
<i>Gender</i>	F	F	F	F	M	F	M	F	F
<i>Aberrant common sense</i>	xxx		xxxx	xxxxx	xx	x	x	xx	x
<i>Impaired reasoning, anticipatory & problem-solving skills</i>	xxx		xx	xxxx	xxx	x		xx	x
<i>Negativism</i>	xxx		xx	xxx##			x	x	unk
<i>Selfish</i>	xxx		xxxx	xxxx	unk	X	x+	unk	unk
<i>Witty & humorous “zingers”</i>	xx		xx	x		xx	unk	unk	unk
<i>Unconditional love for offspring</i>	xxx	N/A	N/A	xxx	N/A	x	unk	unk	unk
<i>Poor parenting skills</i>	xxxx x	N/A	N/A	xxxxx# #	N/A		xxx	unk	unk
<i>Blames others</i>	xxx		xx	xx##	unk	x	x	x	unk
<i>Mood swings</i>	xxxx		xx	xxx#	x		unk	unk	unk
<i>Obsessive-Compulsive</i>		xx		#####	#		unk	X	unk
<i>Passive-aggressive, tardy & procrastinates</i>	xxx		xxxxx x	xxxxx# #	?		xxxx	unk	unk
<i>Internecline behavior</i>	x		xxx	#			unk	unk	unk
<i>Suicidal ideation</i>	x		unk	xxx	unk		unk	unk	unk
<i>‘My way or the highway’</i>	xxxx		xxx	xxxx##	unk	x	x	xx	x
<i>Exhibitionist</i>	x		x				unk	unk	unk
<i>High risk sexual behavior</i>	xx	x	x	x		x	x	unk	unk
<i>Constantly seeking love</i>	xx	?	xxxx	xxxx#	N/A	x	x		
<i>Interracial, interfaith, interethnic relationships</i>	xxx		x	xxxx	N/A	x	xxx	unk	unk
<i>High failure rate in relationships</i>	xxx	x	xxxx	xxxxxx	?	x	x	unk	unk
<i>Addiction</i>	x				N/A		xx	unk	unk
<i>Teetotaler</i>			x	x	N/A			unk	unk
<i>Aberrant distillation skills</i>	xxx		xx	xxxx##	?		x	x	x
• <i>Impractical concerns and/or poor knowledge</i>	xxx		xx	xxxx##			x+	x	x
• <i>Insensitivities</i>	xx		x	xxx##			xx	x	x
• <i>Poor introspection</i>	xxx		xxx	xxx##	xxx	xx	xxx		
• <i>Poor discernment</i>	xxx			xxx##			unk	unk	unk
• <i>Poor mindfulness</i>	xxx		x	xxx#			x	x	x
<i>Breaks agreements</i>	xx		xxx	xxx		x	xx	unk	unk
<i>Prone to mistakes, breakages & errors</i>	xxx		x	xx##		x	unk	unk	unk
<i>Misunderstandings</i>	xxx		x	xxx##		x	unk	unk	unk
<i>Does not accept responsibility</i>	xxx		xxx	xxxxx			unk	unk	unk
<i>Difficulties in understanding</i>	xxxx x			xxxxx# #			unk	unk	unk
<i>Chaos & unbelievably</i>	xxxx		x	xxx##			xx	unk	unk

<i>thoughtless (Footnote 12)</i>									
Confuses reasons & excuses	xxx		x	xx##			x	unk	unk
Inappropriate body language	xx		x				unk	unk	unk
Narcissistic and single-minded	x		xx	xx			x	unk	unk
Savant-like behavior			x		x###		unk	unk	unk
Irrational actions, fears, worries & risks	xxxx		xx	xxxxx##			unk	unk	unk
Interest in occult and mystical	xx			xxxx		x	unk	unk	x
Physical and Somatic									
Anxiety > 6 months & generalized anxieties	xxxx		xx	xxxxxx###	x		unk	unk	unk
Medicated for anxiety	Yes			No			unk	unk	unk
Rapid heart beat	xx			xxx			x	unk	unk
Sweating	x			xx			unk	unk	unk
Difficulty breathing	x			xxx			unk	unk	unk
Feeling tense	xx		x	xx			unk	unk	unk
Muscle tension	xxx		xx	xxx			unk	unk	unk
Neck and back pains	xxx		X	xxx			unk	unk	unk
Headaches	xxx		X	xxx			unk	unk	unk
Trembling	x			xx			unk	unk	unk
Irritability	xx		x	x			x	unk	unk
Fatigue	x		x	xx			unk	unk	unk
Easily “stressed out”	xxx		xx	xxx##	unk		unk	unk	unk
Stress-induced (EBV-related) epigenetic disorders	x		?	xx			unk	unk	unk
Psychosomatic disorders	xxx		x	xxxx#			unk	unk	unk

- x = one unit in the investigator’s subjective measure of profoundness. These units are open-ended and do not represent closed Likert scales. Some subjective measures represent actual events.
- # = one unit in the investigator’s subjective measure of profoundness during an overnight (*in situ*) visit as a house guest on December 15, 2007. These units are open-ended and do not represent closed Likert scales. Some subjective measures represent actual events.
- **unk** = unknown to the investigator because these propositi did not reside in the household, could not be observed directly or indirectly, and/or second-hand information was deemed unreliable or lacking validity.
- Gender = **F** – female; **M** – male.
- **N/A** – Not applicable.
- ? – Insufficient information to reach a conclusion.

Bulleted points associated with “**Aberrant distillation skills**” represent negatives.

Table 6
Stress-Activated Autovirulence and Common Sense
[Diseases, Symptoms, Conditions and Syndromes Associated with EBV]

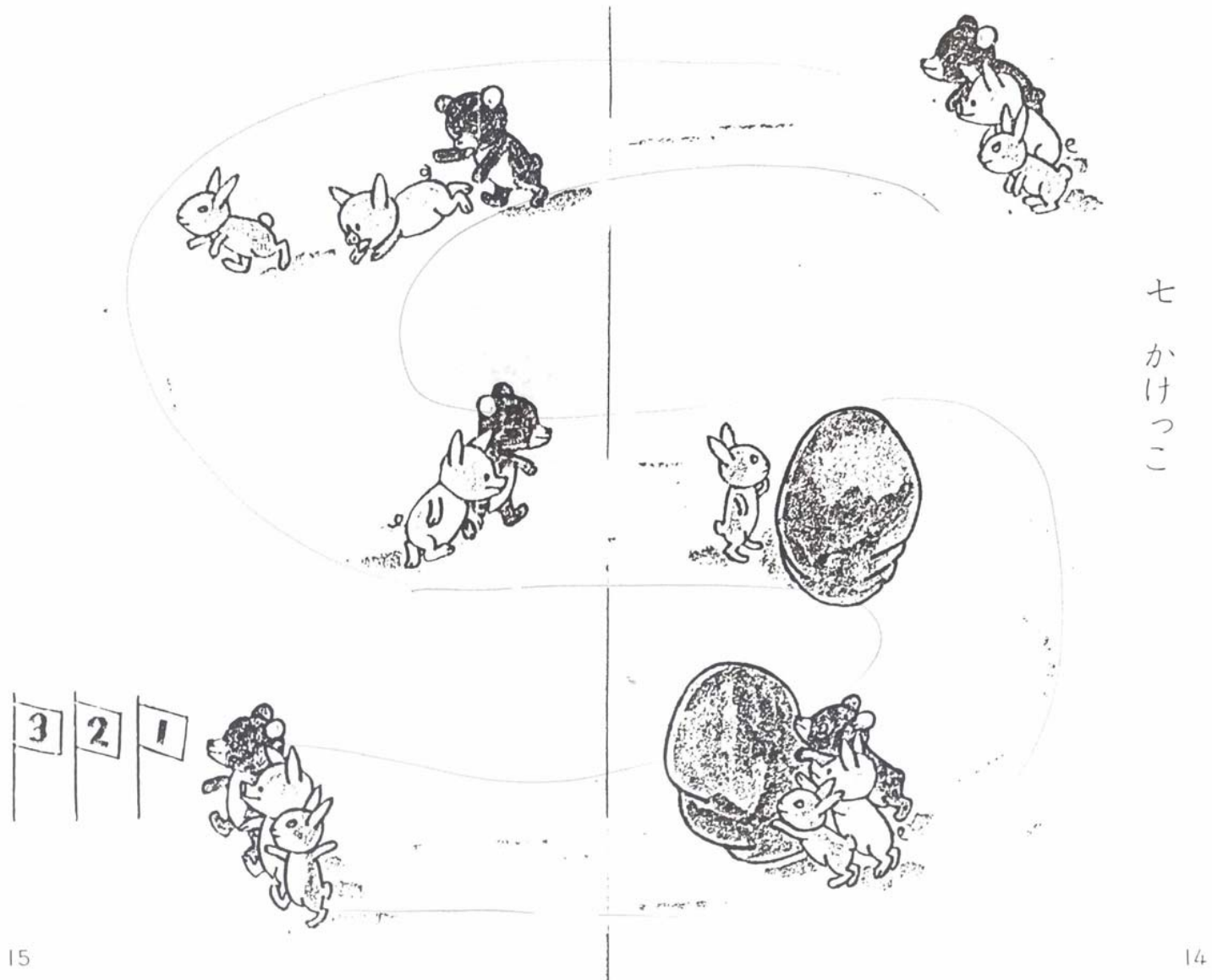
1. Aberrations in membrane and nuclear proteins
2. Aberrations in teleomeric protein complexes (Wistar study – Molecular Cell, March 29, 2002)
3. Acid-labile α -interferon (Kikuta, Mizuno and Osato study)
4. Acute cerebellar ataxia
5. Antiphospholipid Antibody Syndrome – Cervera, R. and Asherson. R. A. Antiphospholipid syndrome associated with infection: clinical and microbiological characteristics, Immunobiology 2005; 210:735-741.
6. Antiphospholipid Antibody Syndrome and Pregnancy
7. Aplastic Anemia
8. Autoimmune Hepatitis
9. Autonomic neuropathy
10. Babesiosis; Mycoplasma Infections (also see Rasmussen's encephalitis/disease); Hepatitis A; Coxsackieviruses; Herpes Zoster; HIV-1 Associated CNS Complications (Overview); HIV-1 Associated Opportunistic Neoplasms: CNS Lymphoma; Cytomegalovirus
11. Bell's palsy
12. Bone Marrow Transplantation, Long-Term Effects (Two cases of chronic active Epstein-Barr virus infection in which EBV-specific cytotoxic T lymphocyte was induced after allogeneic bone marrow transplantation. Pediatr Transplant. 2008 Feb 6)
13. Brachial plexus neuropathy; Brachial Neuritis; Neonatal Brachial Plexus Palsies
14. Breast Carcinoma [Detection of Epstein-Barr virus in breast carcinoma in Egyptian women, Clin Biochem. 2008 May; 41(7-8):486-92; Detection of Epstein-Barr virus in breast cancers with lymphoid stroma, Ann Biol Clin (Paris). 2008 Jan-Feb; 66(1):59-62]
15. Burkitt's Lymphoma
16. Castleman's disease (HHV8)
17. Childhood Cancer, Epidemiology
18. Chorioretinitis
19. Chronic Fatigue Syndrome; Chronic Fatigue Syndrome
20. Chronic Obstructive Pulmonary Disease (COPD) - High levels of Epstein-Barr virus in COPD. Eur Respir J. 2008 Jun; 31(6):1221-6
21. Cold Agglutinin Disease; Cold Agglutinin Disease
22. Cold-induced urticaria [Ann Allergy 1983 Apr; 50(4):271-274]
23. Coma
24. Common Variable Immunodeficiency
25. Complement Receptor Deficiency
26. Cryoglobulinemia
27. Cutaneous Manifestations of HIV Disease
28. Ear, Inner and External Ear, Inflammatory Diseases –
29. Early Symptomatic HIV Infection
30. Eczema and itchiness
31. Encephalitis
32. Epiglottitis

33. Erythema Annulare Centrifugum
34. Esophageal Lymphoma
35. Esophagitis
36. Fever of Unknown Origin
37. Fibromyalgia
38. Gastric carcinoma [Cancer Res. 2008 Mar 1;68(5):1427-35; Epstein-Barr virus associated gastric carcinoma: epidemiological and clinicopathological features, Cancer Sci. 2008 Feb;99(2):195-201; A case of Epstein-Barr virus (EBV) associated remnant gastric carcinoma arising 7 years after distal gastrectomy for EBV associated gastric carcinoma, Nippon Shokakibyō Gakkai Zasshi. 2007 Dec; 104(12):1728-32]
39. GI dysfunction secondary to selective cholinergic dysautonomia
40. Gianotti-Crosti Syndrome (Papular Acrodermatitis of Childhood)
41. Granuloma Annulare
42. Guillain-Barre Syndrome
43. Hairy Leukoplakia
44. Hashimoto's thyroiditis
45. Head and Neck Cancer: Squamous Cell Carcinoma
46. Hearing loss
47. Heart Transplantation; Heart Transplantation; Heart-Lung Transplantation
48. Hemophagocytic syndromes
49. Hodgkin Disease; Hodgkin Disease; Hodgkin Disease, Thoracic
50. Human Herpesvirus Type 6
51. Hypoglossal nerve palsy
52. Infantile Polyarteritis Nodosa
53. Interstitial Lung Disease in Children
54. Intestinal and Multivisceral Transplantation
55. Kaposi Sarcoma
56. Leukemias
57. Liver Transplantation; History of Pediatric Liver Transplantation
58. Lung Transplantation; Lung Transplantation; Heart-Lung Transplantation
59. Lupus Erythematosus, Acute
60. Lymphoma, Diffuse Large Cell; Lymphoma, Malignant Small Noncleaved; Lymphoma, Mantle Cell
61. Lyomyosarcoma (#####)
62. Lymphoma, Non-Hodgkin
63. Lymphomatoid Granulomatosis
64. Lymphoproliferative Disorders; Lymphadenopathy
65. Lymphoproliferative Syndrome, X-linked
66. Malignant Tumors of the Nasal Cavity
67. Meningoencephalopathy
68. Mesenteric Lymphadenitis
69. Metamorphopsia (Alice in Wonderland Syndrome – Metamorphopsia is a visual illusion that distorts the size, shape, or inclination of objects)
70. Mitochondria-related – Epstein-Barr virus immediate-early protein Zta co-opts mitochondrial single-stranded DNA binding protein to promote viral and inhibit mitochondrial DNA replication (J Virol. 2008 May; 82(9):4647-55)
71. Mononucleosis and Epstein-Barr Virus Infection; Mononucleosis; Infectious Mononucleosis, Infectious mononucleosis due to Epstein-Barr virus with

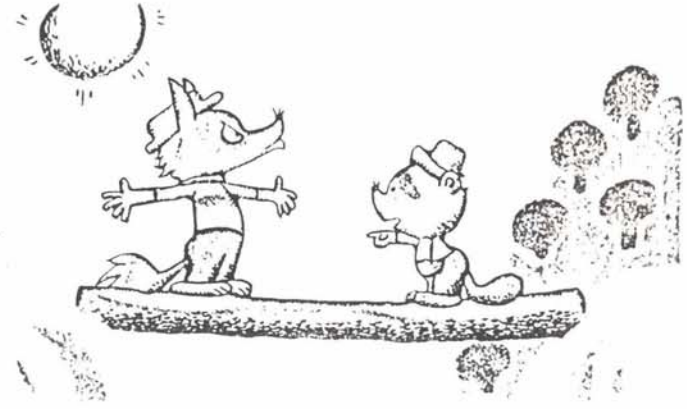
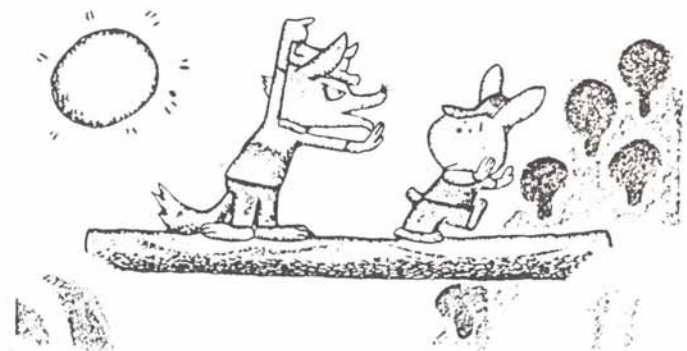
- suspected reactivation of human herpesvirus 6 (Kansenshogaku Zasshi. 2008 Jan; 82(1):47-50)
72. Mucocele and Ranula
 73. Multiple cranial nerve palsies
 74. Multiple Sclerosis; Multiple Sclerosis; Integrating risk factors: HLA-DRB1*1501 and Epstein-Barr virus in multiple sclerosis, Neurology 2008 Mar 25; 70(13 Pt 2):1113-8; Epstein-Barr virus genotypes in multiple sclerosis, Acta Neurol Scand. 2008 Feb; 117(2):141-4]
 75. Myelodysplasia
 76. Myelodysplastic Syndrome
 77. Myogenic Tumors – Posttransplant Epstein-Barr virus-associated myogenic tumors: case report and review of the literature, Am J Transplant. 2008 Jan; 8(1):253-8
 78. Myopericytoma – Multifocal Epstein Barr virus (EBV)-associated myopericytoma in a patient with AIDS, Neuropathol Appl Neurobiol. 2008 Feb; 34(1):115-7
 79. Nasopharyngeal Cancer [Expression of Epstein-Barr-virus-encoded small nuclear RNA in nasopharyngeal carcinomas of Aegean Turkish patients, Virchows Arch. 2008 Apr; 452(4):411-4]
 80. Neuroendocrine Carcinoma – Small-Cell Neuroendocrine Carcinoma of the Nasopharynx: Report of a Rare Case Lacking Association With Epstein-Barr Virus, Int J Surg Pathol. 2008 May 28
 81. Nonrhabdomyosarcoma Soft Tissue Sarcomas
 82. Oculoglandular syndrome associated with reactivated Epstein-Barr-virus infection, British Journal of Ophthalmology 2008; 92(6):740.
 83. Normal-tension glaucoma - Anti-Ro/SS-A positivity and heat shock protein antibodies in patients with normal-pressure glaucoma, American journal of ophthalmology 1998; 125(2):145-157; Antiphosphatidylserine antibodies are elevated in normal tension glaucoma, Clinical and Experimental Immunology. 2001; 125(2):211–215.
 84. Oral Manifestations of Systemic Diseases; Some Crohn's Disease
 85. Periodontitis (Patient with severe periodontitis and subgingival Epstein-Barr virus treated with antiviral therapy, J Clin Virol. 2008 Jun; 42(2):176-8)
 86. Periorbital Infections
 87. Pharyngitis
 88. Pharyngitis, Viral; Pharyngitis
 89. Pityriasis Lichenoides
 90. Pneumonia, Viral; Lymphocytic Interstitial Pneumonia
 91. Posttransplant Lymphoproliferative Disease
 92. Pregnancy- and Fetus-related disorders – Fetal exposure to herpesviruses may be associated with pregnancy-induced hypertensive disorders and preterm birth in a Caucasian population, BJOG. 2008 Mar; 115(4):492-500
 93. Rasmussen's encephalitis
 94. Reye's syndrome
 95. Severe Combined Immunodeficiency
 96. Sjögren Syndrome; Sjögren Syndrome; Sjögren Syndrome; Sjögren Syndrome
 97. Some sarcoidoses
 98. Splenomegaly
 99. T-Cell Disorders; Some B-cell lymphomas and other disorders; Non-functional antibodies

100. Tonsillitis and Peritonsillar Abscess
101. Transplants, Renal
102. Transverse myelitis
103. Unilateral laterothoracic exanthem with coincident evidence of Epstein-Barr virus reactivation: exploration of a possible link., Dermatol Online Journal 2008 Jan 15; 14(1):24
104. Unusual neurologic findings in childhood (Journal of Child Neurology 2000; 15:791-796)
105. Upper Respiratory Infection
106. Viral Infections of the Mouth
107. Viral Meningitis; Meningitis; Meningitis, Aseptic
108. Vulvar Ulcerations – Picture of the month quiz case. Vulvar ulcerations resulting from acute Epstein-Barr virus infection, Arch Pediatr Adolesc Med. 2008 Jan;162(1):86-7.

Exhibit 1 – Two Examples of Elementary Moral and Common Sense Education from a Japanese Textbook



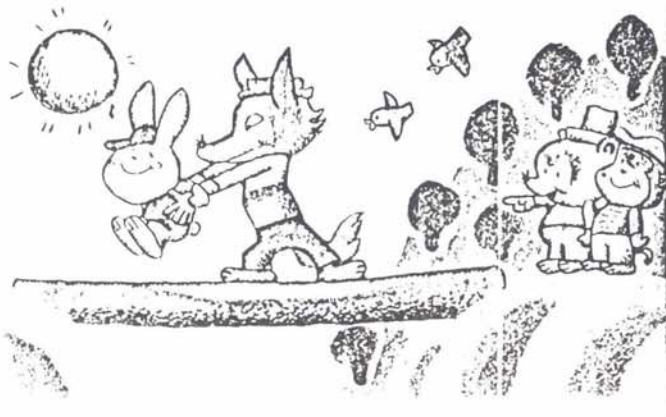
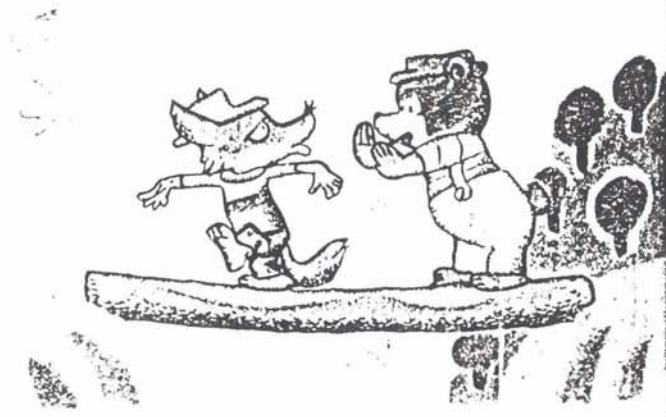
十三 はしの うえの おおかみ



おれさまの おとおりだ。 もとれ、もとれ。

どうぞ おとしください。 いそいで いるのです。

どうぞ おさまに わたっ



しつれいしました。 どうぞ おさまに

もどらなくても いいよ。

えへん、へん。 これに かまひな

Exhibit 2 - Examples of Elementary Moral and Common Sense Education from a Revised Japanese Textbook



13

はしの
うえの
おおかみ



「おれさまの おとおりだ。
もどれ、もどれ。」



「どうぞ、とおして ください。
いそいで いるのです。」



26



「しつれいしました。
どうぞ、おさきに。」



「もどらなくても
いいよ。」



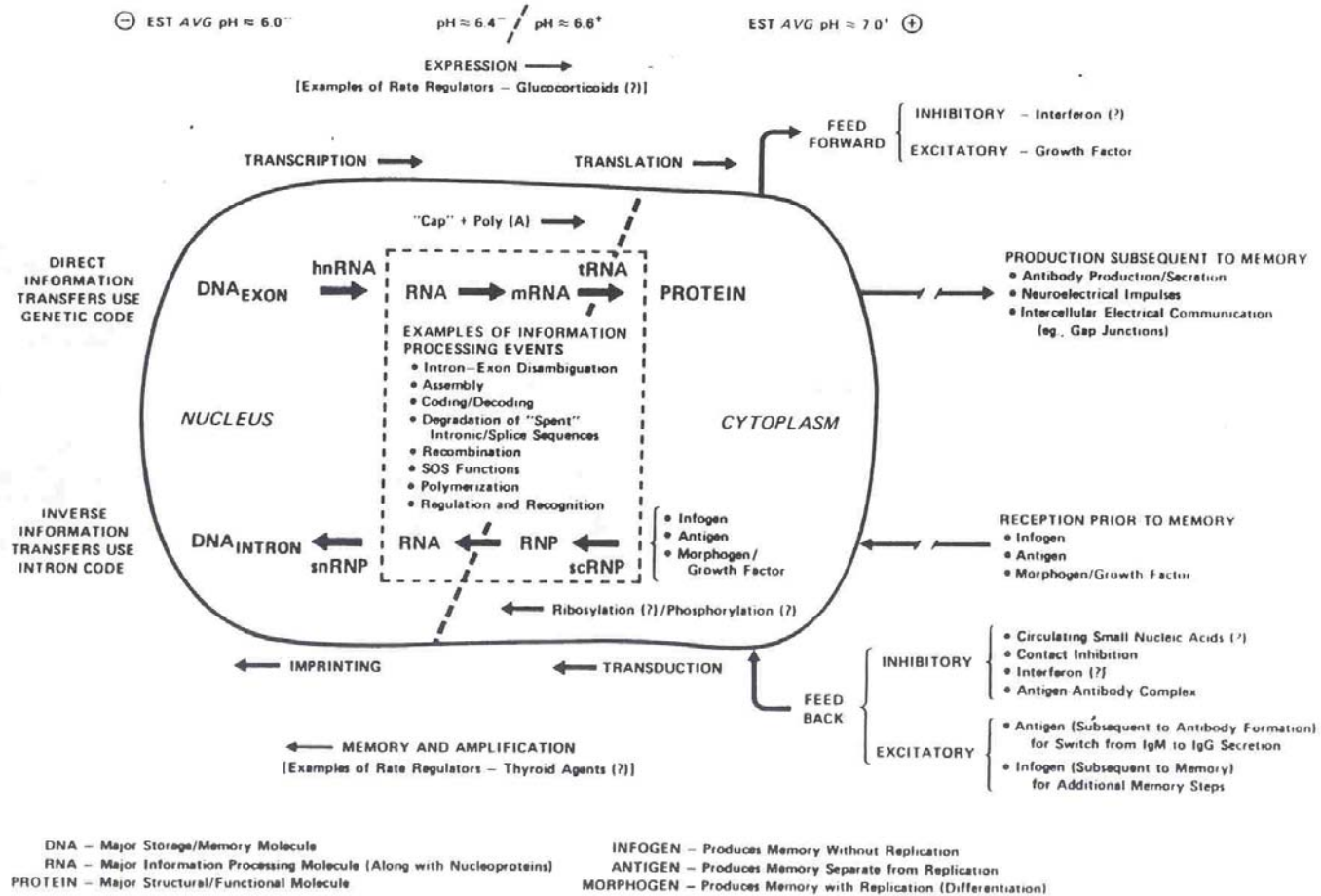
「おおかみは、くまの
うしろすがたを じっと
みおくらって いました。」

(奈街三郎の作品による)



Exhibit 3 – Schematic Depicting Bi-Directional Flow of Molecular Information Designed to Refutes the Central Dogma

SCHEMATIC REPRESENTATION OF NORMAL INFORMATION TRANSFERS IN SELECTED EUKARYOTIC CELLS



Notes:

- Transmissible infectious agents can emulate or subvert any type (direct/inverse) information processing event or structure
- Viral early events often are analogous to inverse information processes, while viral late events may mimic direct or inverse information processes.
- Genetic diseases can cause aberrations in most structures and processes.
- Tumor initiators and promoters may have separate actions along the inverse information pathway.
- Radiation may preferentially damage intronic sites.
- Molecular information proceeds, in part, along 3 dimensional micro-pH gradients.

Exhibit 4 – Photos of the Preliophic Molecularator















Exhibit 5 – Schematic and Prototypic Preliophic Molculator Applications

1/5

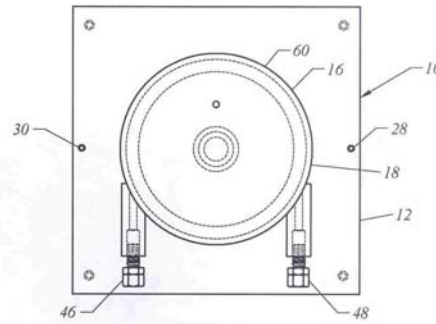


FIG. 1

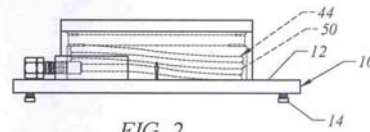


FIG. 2

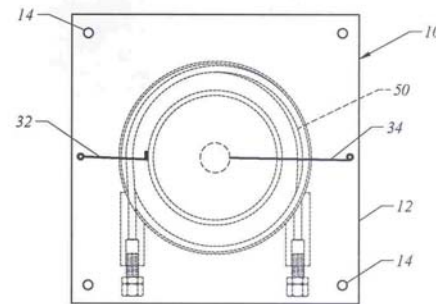


FIG. 3

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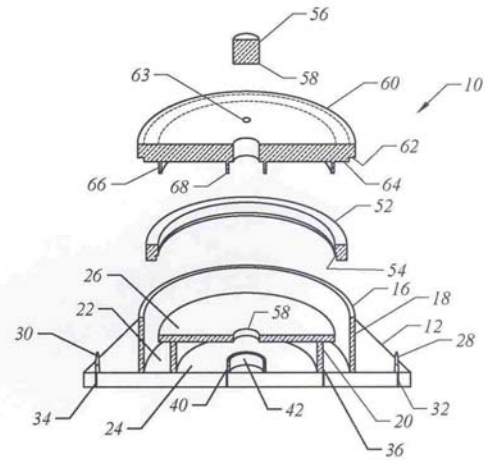


FIG. 4

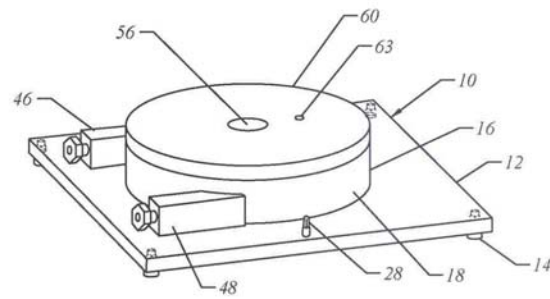


FIG. 5

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PRELIOPHIC MOLECULATION PROCESSES

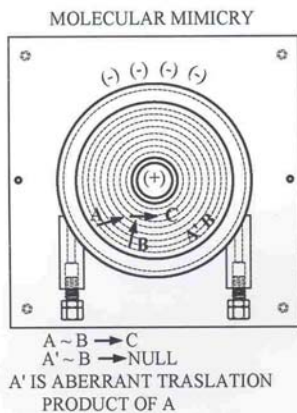


FIG. X1

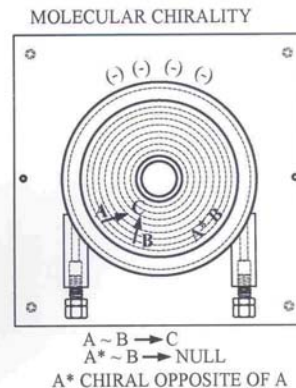


FIG. X2

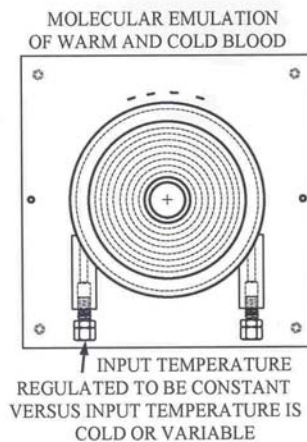


FIG. X7

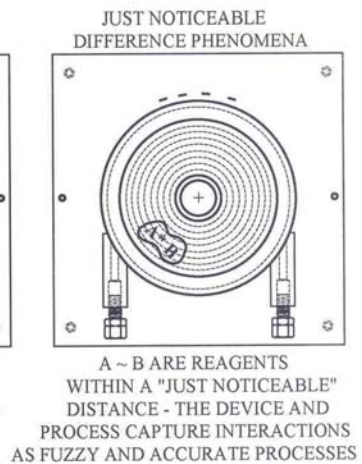


FIG. X8

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PRELIOPHIC MOLECULATION PROCESSES

CELLULAR
MOLECULAR MICROGEOGRAPHY

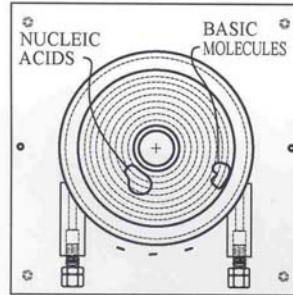


FIG. X3

CELLULAR
MOLECULAR MICROGEOGRAPHY

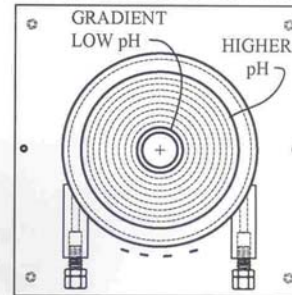
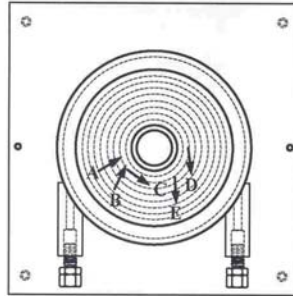


FIG. X4

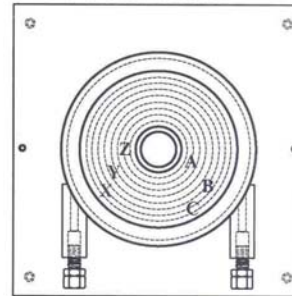
MOLECULAR COMPUTATION
(MOLECULATION)



A ~ B → C
C ~ D → E

FIG. X5

MOLECULAR MEMORY
VERSUS
CENTRAL DOGMA



DNA RNA PROTEINS
A → B → C
(CENTRAL DOGMA)

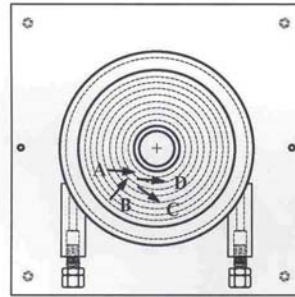
CONFORMED RNA
MOLECULE INTERMEDIATE DNA
X → Y → Z
(MEMORY - INVERSE PATHWAY)

FIG. X6

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PROTOTYPICAL MOLECULATION PROCESSES

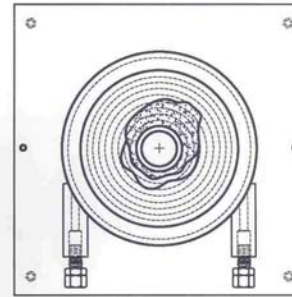
CONVERSION OF PROINSULIN TO INSULIN



A ~ B → C, D
 A= PROINSULIN C= INSULIN
 B= TRYPSIN D= C-REACTIVE PEPTIDE

FIG. X9

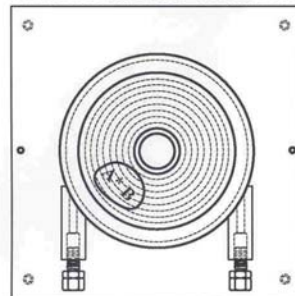
MICROGEOGRAPHY



D= DNA
 SHADED AREA REPRESENTS NUCLEUS AND HIGHLY ACIDIC ENVIRONMENT

FIG. X10

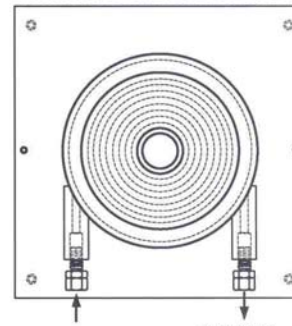
"JUST NOTICEABLE" CHEMISTRY



JUST NOTICEABLE DIFFERENCES BETWEEN MOLECULES PERMITS VISUALIZATION OF BIOCHEMICAL REACTION IN ENVIRONMENT ANALOGOUS TO IN VIVO ENVIRONMENT

FIG. X11

VARIABLE TEMPERATURE INPUT



OUTPUT TO UNDERSTAND "COLD BLOODED" CHEMISTRY

FIG. X12

Exhibit 6 – “Rivers and Currents,” by Colleen W. Platt

[C W Platt Gourds <[http://www.cwplattgourds.com/nature Rivers and Currents.htm](http://www.cwplattgourds.com/nature_Rivers_and_Currents.htm)>]



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Exhibit 7 – Proteomic (smooth) contrasted to Non-Proteomic (stippled) regions of a Genome



Exhibit 8a – Proteomic (smooth) contrasted to Non-Proteomic (stippled) regions of Chromosome A



Exhibit 8b – Proteomic (smooth) contrasted to Non-Proteomic (stippled) regions of Chromosome B



Exhibit 8c – Proteomic (smooth) contrasted to Non-Proteomic (stippled) regions of Chromosome C



Exhibit 9 – Proteomic (smooth) and Non-Proteomic (stippled) Disorders associated with a Genome



Exhibit 10a – Proteomic (smooth) and Non-Proteomic (stippled) Disorders associated with Chromosome A'



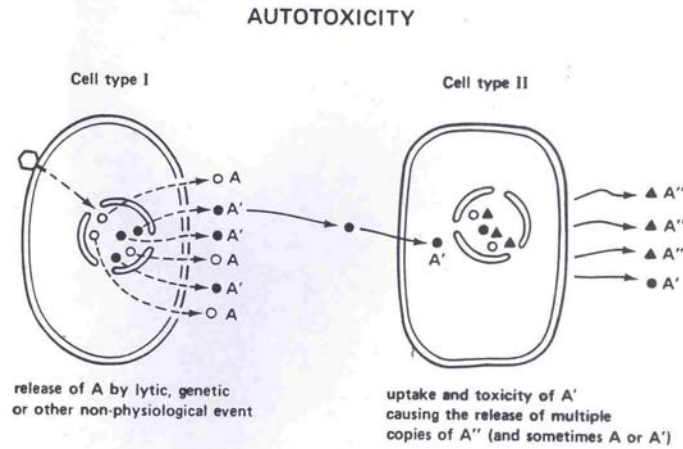
Exhibit 10b – Proteomic (smooth) and Non-Proteomic (stippled) Disorders associated with Chromosome B'



Exhibit 10c – Proteomic (smooth) and Non-Proteomic (stippled) Disorders associated with Chromosome C'



Exhibit 11 – Schematic Representation of Autotoxicity, Autovirulence, and Context-Specificity

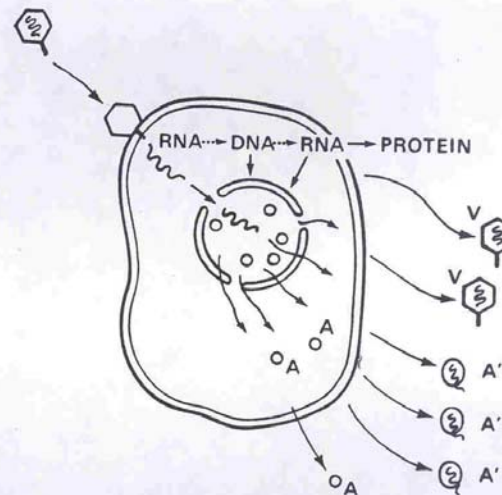


A, A' = autotoxins

Implications

1. Autotoxins are context-specific molecules which generally are ribonucleoproteins.
2. Autotoxins may be autoantigens in some autoimmune diseases.
3. Autotoxicity may mimic viral replication because of the release of multiple copies of autotoxins.
4. Experimental inoculations of autotoxins may provide false indications of natural transmissibility.
5. The Henle-Koch postulates need to take into account additional controls for autotoxins and autovirions.

AUTOVIRULENCE



V = virus
 A = autotoxin
 A' = autovirion

Implications

1. Context-specificity of autovirions generally is based on the source of the small, regulatory RNA contained within them.
2. Autovirions may be associated with some autoimmune diseases.
3. Autovirions may appear to be replicated, although the number of autovirions may depend on the transcription of some viral or other nucleic acid product.
4. Autovirions may mimic viruses both in their transmissibility and their apparent replicability.
5. "Slow viruses" may be autovirions or autotoxins.
6. Adenoviruses and Epstein-Barr viruses can produce autovirions.

Exhibit 12 – Schematic of Molecular Mimicry Associated with Aberrant Translation and Aberrant Transcription Products

SOME EXAMPLES OF DIRECT AND INDIRECT VIRAL INDUCED MUTATIONS

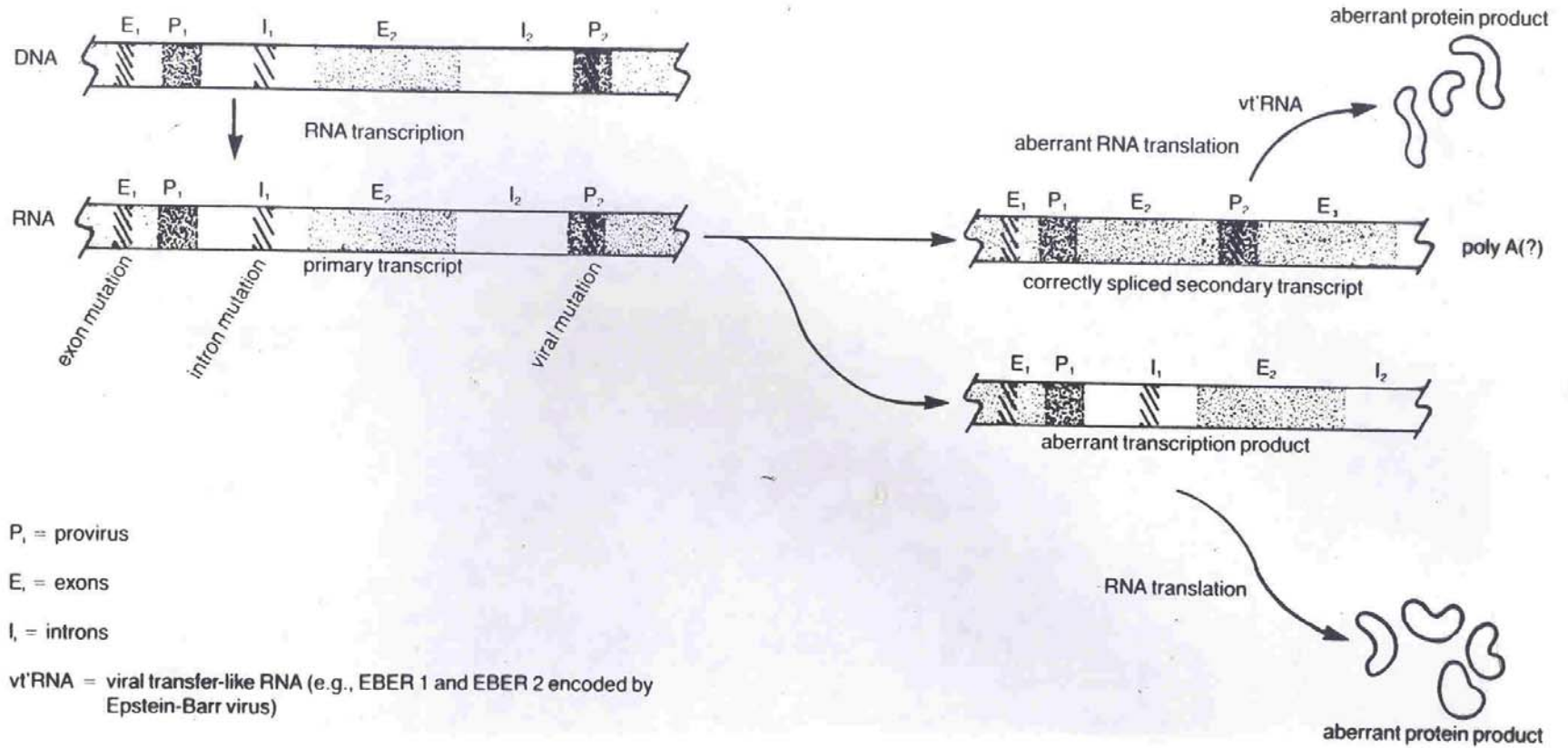
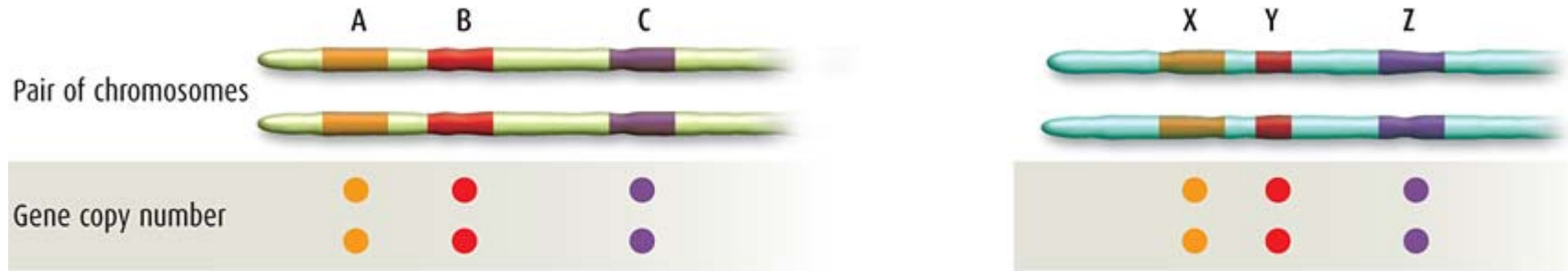


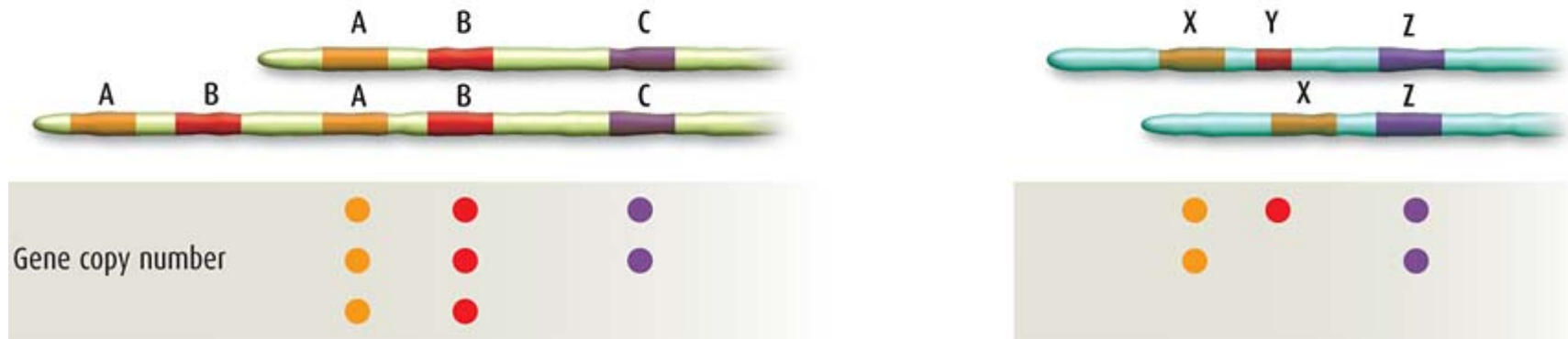
Exhibit 13 – Schematic of Mutations, Deletions and Copy Number Variations Possibly Caused by EBV

THE NUMBER OF THE GENE

The conventional view is that we have two copies of all genes except those on the sex chromosomes...

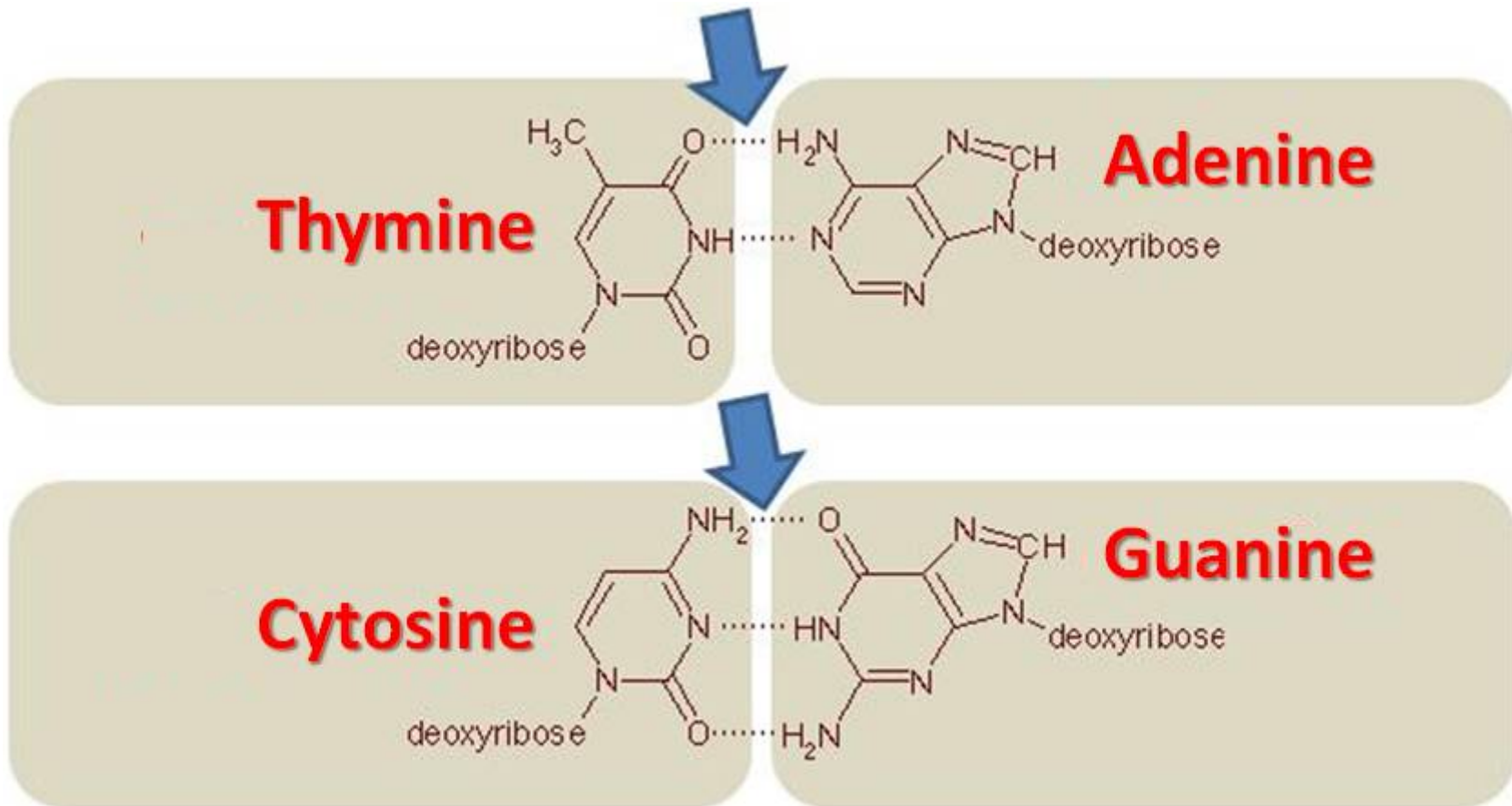


...but random duplications and deletions of large segments of DNA mean the number of copies of many genes varies



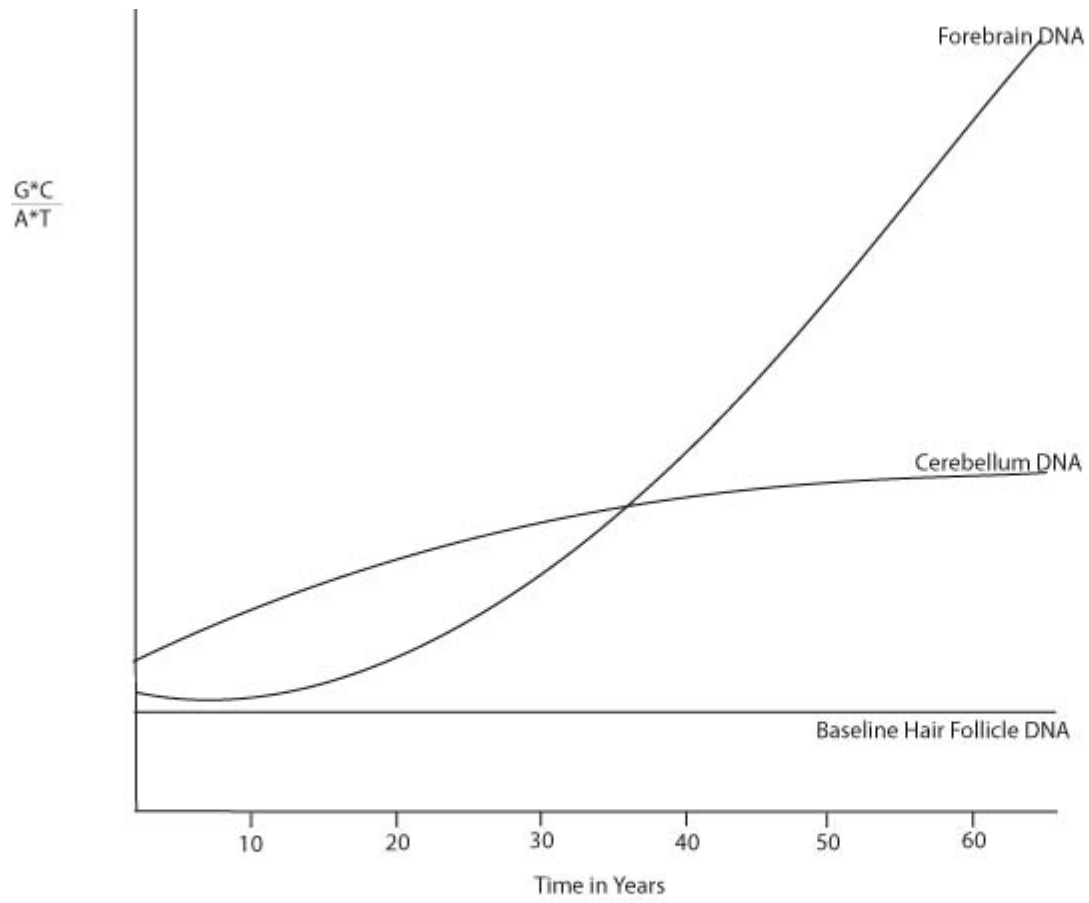
Graphic taken from *New Scientist* <<http://www.newscientist.com/data/images/archive/2546/25461301.jpg>>

Exhibit 14 – Adenine*Thymine DNA Base-Pairings and Guanine*Cytosine DNA Base-Pairings



Graphic taken from *Wikipedia* <<http://en.wikipedia.org/wiki/GC-content>>

Exhibit 15 – Anticipated Changing Guanine*Cytosine :: Adenine*Thymine Ratios over Time for Forebrain and Cerebellum



Typical GC:AT ratios for an average human being

Exhibit 16 – For Twins Raised Together, Anticipated Changing G*C :: A*T Ratios over Time for Forebrain and Cerebellum

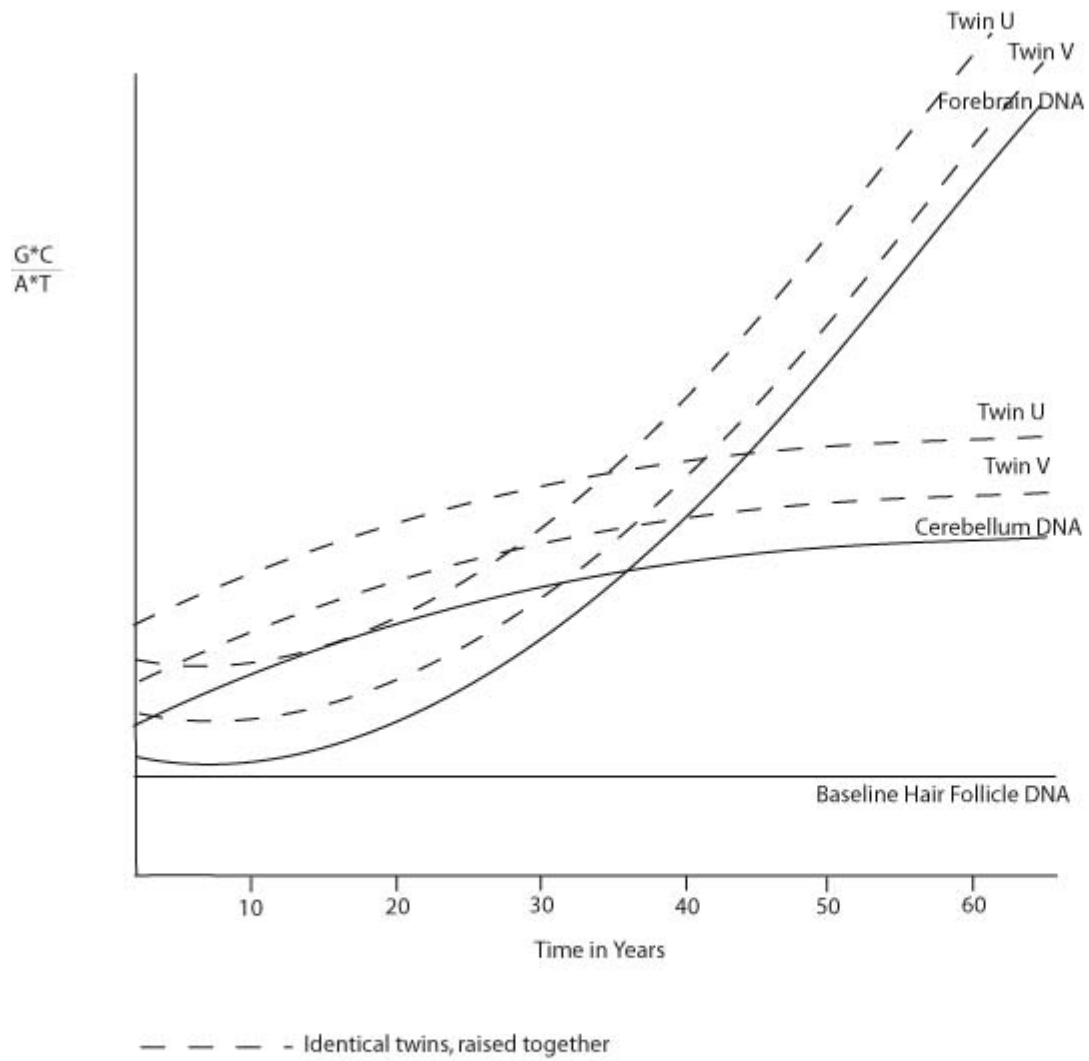


Exhibit 17 – For Twins Raised Apart, Anticipated Changing G*C :: A*T Ratios over Time for Forebrain and Cerebellum

