The "Canary Effect"; Evidence of worldwide intelligence decline.

Abstract. I.Q. test data from two time periods 2006-8 and 2009-August of 2015 is compared. The I.Q. test used is the Kids I.Q. Test, which was developed by the author and modeled after the WISC-III Verbal test, with five section scores and a total score. The test scores are as reliable as those of the WISC-III. The data was gathered via the Internet on worldwide samples of 112,300 in the 2006-8 sample and 163,000 children in the 2009-15 sample. Raw scores for the second period are lower than for the first period across all five section scores and the total score across all age groups from age 6 through 16. The phenomenon is consistent also across the five largest nation samples, for the United States, Canada, the United Kingdom, India and Australia. The rate of drop is .81 I.Q. points per year worldwide and .74 points per year for the five large nation samples. If this rate persists, it is estimated that in 37 years, 2052, mean I.Q. scores for the world population will be 70 (by current standards) instead of 100.

At that point half the population will be marginally or totally unemployable and only 2 to 5 percent will have scores in the mid-average range by current standards. Collapse of society and economies as we know them are forecast unless corrective

action is taken. Evidence from numerous studies strongly suggests that international air pollution is the most likely cause of this phenomenon.

In 2001 the present author was contacted by FunEducation.com, an Internet-based company in San Diego specializing in delivering testing services to public school systems and to the general public, PSAT tests that were made available to school children. There was demand by parents for an I.Q. test that their children could take over the Internet. The author was asked to develop tests to measure verbal and spatial tests. He author developed a verbal test and a spatial test, both modeled after the Wechsler Intelligence Test for Children, Third Edition (Reference).

The verbal test, the Kids I.Q. Test, provides five section scores (Vocabulary, Comprehension, Arithmetic, Similarities and Information) and a total I.Q. score. The section scores have about 40 items each which range in difficulty from easy for 6-year-olds to difficult for 16-year-olds. The tests have reliability, similar to that of the Wechsler tests, for all section and total scores for all age levels, for both children and adults, of all ages, 6 on up.

The tests are made available free to visitors to the FunEducation.Com web site and have been quite popular, attracting children and adults from scores of nations.

One can obtain a simple report free and a more detailed one for a few dollars. Reliability has been the same for both groups.

Norms are based on those taking the tests, first on a sample of a few hundred and then on samples of thousands. The norms were updated in 2008 for over 100,000. The proportion of children of various ethnic groups was similar to that of the United States. Updating was undertaken again in the fall of 2015 for over 160,000 who had taken the tests since 2008. The statistics for this second cohort were consistent with those from the first, showing no statistical differences by gender and standard deviations very similar to those of the first cohort. Mean scores gradually increase up to about age 16, then level off through about age 40 or 50 and then a gradually decline, similar to the pattern for the Adult Wechsler Intelligence Test, Fourth Edition. Thus, the similarity of the present tests with the Wechsler tests in content, raw scores over age ranges and reliability characteristics is consistent with the intention that the present tests be dependable measures of verbal intelligence. The spatial test also has five sections of about 40 items each and has similar reliability to the Wechsler spatial I.Q. test. Sample sizes have been relatively small, as the test has been less popular. Thus, it was omitted from the present study.

One peculiar and unexpected characteristic of the 2009-15 cohort was that all of the mean raw scores for all of the tests, including the 5 section tests for Information, Similarities, Arithmetic, Comprehension, Vocabulary, and the Total Score were slightly lower than for the 2006-2008 cohort. These decreases are presented in Table 1.

[Insert Table 1 about here.]

Table 1. Decreases in Kids Verbal I.Q. Test Raw Scores. For total world samples by age and test between 2006-2008 versus 2009-2015. Sample sizes in column 1 are for the 2006-2008 and 2009-2015 groups respectively. The total samples of children between ages 6 and 16 were approximately 112,300 and 163,000 for the two samples. Decrease scores are given in raw score amount and percentage drop from original score. For example, for 6-year-olds the 2006-2008 mean score for the Information sub-test was 20.6. For the 2009-15 group it was 19.4. The drop of 1.2 points is 5.8% of 20.6.

Age and sample sizes	Informa-tion	Similar-ities	Arith-metic	Compre-hension	Vocabu-lary	Total decrease
6/7881 &3737	1.2, 5.8%	1.7 7.7%	1.4 6.7%	1.8 8.0%	1.8 8.1%	7.6 4.5%
7/5054 &8837	0.8 3.6%	1.5 6.4%	1.2 4.5%	1.2 4.5%	0.8 3.6%	5.4 4.6%
8/6261 &10,370	0.7 2.9%	1.4 5.7%	0.9 3.2%	1.0 3.8%	0.7 3.0%	4.8 3.8%
9/7142 &11,907	0.5 2.0%	1.2 4.7%	0.6 2.0%	0.7 2.3%	0.6 2.4%	3.7 2.8%
10/11,108	0.0	1.0	0.5	0.7	0.4	2.8

19,776	0%	3.9%	1.6%	2.4%	1.5%	2.0%
11/14,015 23,118	0.2 1%	0.9 3.3%	0.6 1.8%	0.8 2.7%	0.6 2.2%	2.9 2.0%
12/17,374 24,677	0.2 1%	1.0 3.6%	0.7 2.0%	0.8 2.6%	0.5 1.7%	3.2 2.1%
13/16,343 20,333	0.3 1%	0.9 3.3%	0.9 2.6%	1.1 3.5%	0.7 2.4%	3.8 2.5%
14/11,063 16,281	0.4 1.4%	1.0 3.5%	0.8 2.3%	1.1 3.5%	0.6 2.0%	3.8 2.5%
15/7214 10,500	0.6 2.0%	1.4 4.8%	0.6 1.7%	1.5 4.6%	0.8 2.6%	5.2 3.3%
16/5292 7683	0.4 1.4%	0.9 3.1%	0.7 2.0%	1.3 3.9%	0.7 2.2%	4.1 2.6%
Mean	2.0%	4.5%	2.8%	3.3%	2.9%	3.5%

This drop in scores seemed strange, especially in light of the history over the past several decades of evidence that human intelligence test scores had been *increasing* gradually, a phenomenon referred to as the "Flynn Effect" (Flynn, 1984, 1987, Neisser, 1998). Note in particular that the drop seems most prominent for the youngest age groups (ages 6-8).

There was no reason to think the latter cohort was significantly different in general makeup from the earlier cohort, as both cohorts were presented essentially the same opportunity to take the tests over the FunEducation.com web site and the site had not been changed substantially. Nor was there any reason to expect anything but perhaps a mild increase in raw scores secondary to the increasing availability of knowledge and intellectual stimulation for children during this time, as via improved educational systems and the Internet. The children who took the

test had access to the Internet, as that is the medium by which it is offered to the public. The Flynn Effect has been hypothesized to possibly reflect the effect of improved nutrition. There was no reason to think nutrition had waned worldwide during the past 14 years.

To measure whether the test score drop is consistent in different nations around the world, data for the largest nation samples was analyzed. Data for five nations, three in the northern hemisphere and two in the southern hemisphere were compared for three age groups, 6-, 12- and 16-year-olds. Data for the Arithmetic subtest and Total test raw scores were compared for the Verbal test, as presented in Table 2.

[Insert Table 2 about here.]

Table 2. Large Nation Kids Verbal I.Q. Test Raw Score Changes between Two Time Period Samples (2006-2008 (N1) versus 2009-2015 (N2)).

Country	N1	N2	Age	Arith, 2008.	Arith. 2015	% change	Total 2008.	Total 2015	% change
U.S.A.	5931	5210	6	20.44,	19.37	-5.2%	105.88	100.68	-4.9%
	12,720	14,300	12	34.08	34.30	-.6%	148.95	150.33	+.9%
	4,357	4,453	16	35.39	35.51	+.3%	159.47	160.88	+.9%
Mean						-1.83%			-1.6%
U.K	659	1164	6	19.91	20.22	+1.5%	99.97	99.53	-.4%
	1,341	3362	12	33.18	32.74	-1.3%	145.65	143.60	-1.4%
	206	992	16	34.71	33.84	-2.5%	154.92	150.63	-2.8%
Mean						-.77%			-1.5%
Canada	350	356	6	20.20	19.29	-4.5%	104.68	101.17	-3.4%
	899	1767	12	32.98	33.45	+1.4%	146.96	148.49	+1.0%
	163	471	16	35.96	35.22	-2.1%	162.66	159.54	-1.9%

Mean						-2.2%			-1.4%
Australia	274	461	6	19.38	19.25	-.6%	98.87	98.02	-.9%
	655	1221	12	33.60	33.33	-.8%	145.65	144.28	-.9%
	118	318	16	35.92	34.21	-4.8%	158.65	154.34	-2.7%
Mean						-1.3%			-2.5%
India	184	251	6	19.85	20.57	+3.8%	91.72	91.36	-.4%
	273	835	12	32.86	30.39	-7.5%	134.50	118.71	-11.7%
	57	359	16	34.09	33.10	-2.9%	133.26	129.24	-3.0%
Mean						-2.2%			-5.0%
Mean						-2.1%			-3.3%

The percent drop was consistent across the five nations for both the Arithmetic and Total Test scores. For Arithmetic the average drop was 2.1% over the 4.33 years. (The year span is calculated between the middle of the two groups.) The total test raw score drop was 3.3%. These figures are similar to those for the entire world sample (2.8% for Arithmetic and 3.5% for the Total Score, in Table 1, above). Thus, the intellectual decline appears to be consistent world-wide.

The mean Total Score decrease worldwide for these 11 age groups (Table 1) is 3.5%. This is a drop in the total raw score from which I.Q. scores are computed. This is a drop over 4.33 years on average, from the middle of the first data cohort for the years 2006-2008 to the middle of the second cohort for the years 2009-August of 2014. 3.5% divided by 4.33 yields a .81 percent drop per year in the average raw scores.

This yields a similar .81 percent per year drop in average I.Q. scores. An .81 percent per year average I.Q. drop over 37 years would result in a worldwide average intelligence of 70 by the year 2053, which is in the mild intellectual disability (retardation) range. Fully half the population would then have I.Q.s *below* 70. Persons with I.Q.s of about 70 would be marginally employable at best. Those below this would be generally unemployable.

In this scenario, persons who otherwise would have I.Q. scores currently equal to 130, in the superior range, at the 98th percentile, in 37 years will have intellectual functioning equivalent to a current I.Q. of 100. This is the middle of the current average range, which is probably too low to succeed in a robust current 4-year college curriculum. In essence, there would be virtually no college graduates 37 years from now. While that might mean no clever dictators or investment scam artists, it would also mean only marginally effective government leaders and business managers at best. And there would be only a small proportion of the population (perhaps 2 to 5 percent) with the current equivalent of only average intellectual aptitude to fill all careers requiring management and related skills, including business executives, attorneys, physicians, nurses, school teachers, engineers and research scientists. In short, society and culture as we currently know it could not exist.

Possible causes for world-wide intelligence decline.

While intelligence increases (the "Flinn Effect") over many prior decades have suggested beneficial effects from improved health care, diet, etc., the current intelligence decreases suggest universal *detrimental* effects. Literature review led to a study of Denmark military recruits over several decades that revealed moderate I.Q. increases between 1988 and 1998 but a *decline* from 1998 to 2003-4. The loss was 1.5 points over 5 ½ years, similar to the *gain* between 1988 and 1998. The gains appeared for both higher academic and lower academic men. The tests in question are described as similar in form to the Wechsler tests. The authors cite prior studies that they have conducted that showed a rise and then plateauing of I.Q. scores and a recent decline. They also cite a Norwegian conscript study that showed a similar pattern.

To explain these I.Q. decrease data, the author first speculated that perhaps for some reason the children taking the Kids I.Q. test over the Internet via the FunEducation.com web site were of a fundamentally different composition for the second group than they were for the first. However, consultation with the web site managers yielded no information to suggest the visitors to the web site had changed systematically for children worldwide between 2006 and 2015.

The author then wondered what brain toxins all humans worldwide consume in common and from the same source. We all consume food and water, but from many different sources. The one item that all humans consume from the same source is air. Air is circulated worldwide by wind.

The author knew from personal experience that air toxins can be consumed directly by breathing. Benzene is released in gaseous form from gasoline and is especially concentrated in the Northwest where the author has resided for over 40 years. Benzene can cause large b-cell non-Hodgkin's lymphoma, a type of cancer the author had contracted and been cured of. During World War II one of the author's aunts committed suicide by turning her automobile on in her closed garage. The toxin was carbon monoxide. Carbon monoxide is a component of exhaust from gasoline and diesel fuel combustion. We all breathe this exhaust, especially if we live in traffic-congested communities.

The author also knew from informal reading that toxins can be consumed indirectly from the air when airborne toxins are deposited on oceans and on crops. Coal burning releases mercury into the atmosphere, some of which is absorbed by the ocean and then enters the food chain and is more highly concentrated in larger fish, such as tuna. Humans eat the fish.

To further explore the atmosphere source of toxins, the author searched scientific publications and web site information. This resulted in a plethora of information consistent with the hypothesis that air pollution could well be causing human cognitive decline. An article in the American Psychological Association Monitor magazine (Weir, 2012) was particularly revealing. This article reports: "Researchers have known since the 1970's that high levels of air pollution can harm both cardiovascular and respiratory health, increasing the risk of early death from heart and lung diseases. The effect of air pollution on cognition and mental well-being, however, has been less well understood. Now…researchers have found that high levels of air pollution may damage children's cognitive abilities…."

This article then cites several studies that document relationships between air pollution and cognitive decline. A study in the Boston area followed more than 200 children, documenting a relationship between greater levels of black carbon (soot) exposure and lower memory and verbal intelligence test scores (Ref.). A study in Michigan documents lower graduation rates for children in schools located closer to industrial pollution sites when controlling for other possible confounding factors, such as socioeconomic level.

Studies in smog-troubled Mexico City are cited. Autopsies of dogs there show increased presence of toxin-related brain changes associated with Alzheimer's disease in humans. Children in Mexico City were compared to children in a less polluted suburban community via MRI brain scans and tests of memory, cognition and intelligence. The city children had more signs of brain pathology and lower test scores.

Also cited, at Ohio State University research mice exposed for months to doses of air pollution typical of what human commuters in and out of cities experience had more trouble learning and avoiding mistakes in completing tasks. Autopsies of the mice brains showed signs of inflammation and damage to areas involved in spatial memory.

This Monitor article reports that the U.S. Environmental Protection Agency had not considered psychological damage caused by air pollution as of 2009, but was calling for more research in this area. In another cited article, research at the University of Southern California School of Medicine shows brain pathology associated with breathing local air polluted by traffic exhaust. People living within 100 yards of a Los Angeles freeway had artery walls that were thickening at twice the average rate. Fetuses exposed in late pregnancy to pollution gases associated with combustion of hydrocarbons (oil, gas, coal, Diesel fuel) have less white

matter in their brains, which is associated with slower information processing and more aggression and symptoms of attention deficit and hyperactivity disorder.

Another article cited a study in Barcelona, Spain, which examined the effect of air pollution on 2,715 children aged 7 to 10 (Lilley, 2015). Higher levels of vehicle traffic exhaust pollution were associated with a 4% difference in working memory and two other areas of cognitive functioning over 12 months between children in the low pollution versus high pollution areas. The Monitor article also cites results from similar research around the world, associating air pollution with artery damage in the U.K. and estimated annual premature death rates of 21,000 in Canada and 53,000 in the United States.

In addition to the studies cited in the Wier Monitor article, the toxic effects of diesel exhaust on rat brains has been studied (Levesque, Surace, McDonald and Block, 2011). Neuroinflammation and neuropathology were consequences of 6 months of inhalation of exhaust gasses in 344 rats. The findings were interpreted as having implications for Alzheimer's and Parkinson's disease.

The international spread of air pollution in the form of ozone, aerosols and nitrogen oxide is documented by Akimoto (Akimoto, 2003). The MAPS (Measurement of Air Pollution from Satellite) instrument has measured air pollution globally, documenting that air pollution from industrial sources, fuel, and

biomass (wood, etc.) combustion travels worldwide, affecting residents everywhere. The atmospheric lifetime of pollutants harmful to human health, such as ozone and carbon monoxide, is long enough for these gases to be transported by winds for thousands of miles and continent to continent.

An article appeared in Scientific American is titled “Tests Find More than 200 Chemicals in Newborn Umbilical Cord Blood” (Goodman, 2009). The senior scientist from the Environmental Working Group, which commissioned the research, was particularly concerned about evidence for 21 new contaminants, including bisphenol A, associated with precancerous growth in animals and erectile malfunction in Chinese adult males. Another umbilical cord blood study found similar chemicals, leading the senior scientist to opine that human exposure to toxic chemicals is ubiquitous. Leo Trasande at the Mount Sinai School of Medicine said the results had alarming implications for the health of children.

This was the 11th study of human blood toxins commissioned by the Environmental Working Group (Cook, 2016). These studies have found 493 chemicals in human blood from newborns to grandparents, including perchlorate, a solid rocket fuel component and potent thyroid toxin that can disrupt production of hormones essential for brain development.

10 volunteer adults were exposed to diesel exhaust fumes in laboratory conditions for one hour (Cruts, 2008). Their brains were then studied by quantitative electroencephalography, which revealed increases in "median power frequency", a sign of stress on the brain.

The U.S. Department of Labor provides a partial list of toxic chemicals associated with diesel exhaust and other sources (OSHA). These include carbon dioxide, carbon monoxide, nitric oxide, sulfur dioxide, benzene, formaldehyde and numerous polynuclear aromatic hydrocarbons. A fact sheet by the California Environmental Protection Agency and the American Lung Association of California provides detailed information about motor vehicle fuel toxins (Cal/EPA). The sheet states:

"Gasoline and diesel fuels contain toxic substances that can enter the environment and cause adverse health effects in people. Some of these substances, such as benzene, toluene and xylenes, are found in crude oil and occur naturally in fuels and their vapors. Other substances, such as 1,3-butadiene and formaldehyde, are formed in engines during combustion and are only present in exhaust. Other harmful pollutants found in engine exhaust include particulate matter…, nitrogen oxides, carbon monoxide, sulfur dioxide and various hydrocarbons. Ozone, the major component of urban smog, is formed when nitrogen oxides react in sunlight

with hydrocarbons….Diesel exhaust also contains over 40 different substances identified by the California Air Resources Board (ARB) as toxic air contaminants that may pose a threat to human health [including] particulate matter that has been linked to cancer." Diesel vehicles constitute only 2 percent of the vehicles in California but emit 60 percent of motor vehicle particulate matter.

This fact sheet continues. "Just breathing the air exposes people to fuel components, especially in urban areas. People are exposed to gasoline and diesel exhaust when they drive or ride in a vehicle, jog or bike along roads or park in a public garage….People who work in or live near freeways, refineries, chemical plants, loading and storage facilities…may be exposed to higher levels of fuel components…and face higher health risks…Breathing gasoline and diesel vapors …[and] lifelong exposure can increase the risk of …cancer." The chemicals in vehicle exhaust that can cause cancer include benzene, 1,3-butadiene, formaldehyde and acetaldehyde. "Long-term exposure to particles in diesel exhaust poses the highest cancer risk of any toxic air contaminant ….about 70 percent of the cancer risk that the average Californian faces from breathing toxic air pollutants comes from diesel exhaust particles." This fact sheet reports that California has made progress in reducing toxic emissions from vehicles, but the number of vehicles keeps growing, eroding overall air pollution efforts.

Numerous reports at the United Nations World Health Organization web site publications page express concern for toxic air pollution (WHO). For example, "An estimated 12.6 million people died as a result of living or working in an unhealthy environment in 2012 – nearly one in 4 of total global deaths, according to new estimates from WHO. Environmental risk factors, such as air, water and soil pollution, chemical exposures, climate change, and ultraviolent radiation, contribute to more than 100 diseases…." Recommendations for prevention include "reducing the use of solid fuels [e.g. wood] for cooking and increasing access to low-carbon energy technologies."

And, from the London Guardian, "The World Health Organization has issued a stark new warning about deadly levels of pollution in many of the world's biggest cities, claiming poor air quality is killing millions and threatening to overwhelm health services across the globe….The latest data, taken from 2,000 cities, will show further deterioration in many places as populations have grown, leaving large areas under clouds of smog created by a mix of transport fumes, construction dust, toxic gases from power generation and wood burning in homes." (Guardian). "In Britain, where latest figures suggest that around 29,000 people a year die prematurely from particulate pollution and thousands more from long-term exposure to nitrogen dioxide gas, emitted largely by diesel engines, the government is being taken to court over its intention to delay addressing pollution

for at least 10 years." "Leading economist Lord Stern said air pollution was an important factor in climate change. 'Air pollution is of fundamental importance. We are only just learning about the scale of the toxicity of coal and diesel. We know that in China, 4,000 people a day die of air pollution. In India it is far worse. This is a deep, deep problem,' he said."

In summary, the above brief literature review reveals the presence of scores of toxins in the environment, many of which appear is gaseous form polluting air. Prominent among these is smog from motor vehicle exhaust, which is especially dense in areas of heavy traffic, such as along freeways and in cities. Children in schools near dense smog areas show cognitive deficits, including lower intelligence test scores. The toxic gasses in some forms remain potent long enough to be transported around the world via wind currents.

This air pollution compromise of human health is consistent with the author's hypothesis that international air toxins underlie international gradual erosion of human intellectual functioning as measured by I.Q. tests. Several of these studies mentioned greater pollution damage on young children and elderly adults than on young and middle-aged adults. The reader is reminded of the apparent greater drop in I.Q. scores for younger children (ages 6-8) in Table 1, above.

German chemist Fritz Haber won a Nobel Prize for inventing a process for extracting nitrogen from air. Nitrogen is used to make fertilizer and gun powder. He also invented the chlorine gas poison used by the German military in World War I. He developed Haber's Rule, a formula, C x t = k, which summarizes the effect of toxic gas. Exposure to toxic gas of low concentration(C) over a longer period of time (t) can have the same lethal effect (k) as exposure to the gas at higher concentration over a shorter time.

In essence, we humans appear to be living in a gas chamber. More to the point, we appear to be slowly *dying* in a gas chamber. We are the "canaries in the coal mine", showing signs of health deterioration secondary to environmental toxins. Worldwide erosion of human intelligence appears to be a symptom of this demise. This erosion is dubbed the "Canary effect" by the present author.

As an applied psychologist, the author offers the following suggestions for continued study and action:

1. Analyze blood samples from humans around the world to detect toxins that all share in common. If these include toxins known to lower I.Q. and related measures of cognitive functioning, then encourage nations to eliminate these toxins.

2. Eliminate air toxins that already have known detrimental effect on cognitive functioning.
3. Measure and publish environmental air toxin levels internationally. Do this monthly to monitor air toxin levels and progress in reducing them.
4. Measure average human I.Q. levels, randomly sampled, annually and internationally, to monitor loss or gain and to motivate efforts such as those above. Use the same test every year.
5. Reduce population congestion to reduce concentration of pollutants. Discourage the development of megacities of millions of residents. Instead, foster the development of sustainable, small, rural communities to disburse toxic pollutants. The World Health Organization reports on its web site that only 8% of 2,000 cities around the world recently surveyed meet clean air standards.
6. Convert heavy truck, freight train and ship internal combustion engines to non-polluting fuels, such as hydrogen.
7. Discontinue use of fossil fuels as rapidly as possible, perhaps by rationing and by outlawing their extraction and combustion. During WW II the U.S. reduced civilian gasoline use by 40% via rationing.
8. Urge replacement of special interest group governments with more democratic forms, as has been done in Norway, including transformation

of U.S. government from special interest group democracy to common good democracy (McConochie, 2014). Polls by McConochie have shown that the majority of both strong liberals and strong conservatives endorse protecting the environment. Such polls also show that persons who endorse special interest group democracy, government that serves special interest groups, are less likely to be concerned for the environment. Governments that can be controlled by wealth generated from marketing of fossil fuels and other polluting industries can be expected to resist constraining the extraction, refinement, marketing and use of these polluting products.

9. Urge reduction of human population numbers. This will reduce pressure on communities to burn all sorts of fuels that tend to pollute air, from motor vehicle and airplane fuels to wood used by families in developing nations to cook food. It will also reduce pressure on industries to burn fuels to create energy to produce goods for citizens (e.g. to run farm vehicles) and to transport them to market.

Caveats: While the present I.Q. data is on very large numbers and of international scope on the same test instrument over many years, the data was not gathered randomly and may not be representative of average human intelligence levels.

No statistical tests of significance of differences between the two cohorts were undertaken, but none seemed needed, as the probability was infinitesimally small that the scores for all 11 age groups across six tests (66 I.Q. test scores) would be higher simply by chance. By chance, one would expect half the second cohort scores to be equal to or above and half equal to or below the first cohort scores. While the six tests per age group are not independent of each other, the 11 total scores across the age groups from 6 through16 are statistically independent. The chance of 11 flipped coins coming up heads is less than 1 in 1000.

No public money was spent to conduct the present study, as its analysis was secondary to a service provided by the author in conjunction with his business affiliate, FunEducation.com.

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