Additional Thoughts

Definitions

Birdcage: a many-windowed house.

Bicycle: a tree we pedal.

Car: a building we use for transportation.

Club soda: puffed water.

Surface tension: the leather jacket that every liquid wears.

Toast without butter: toast without underwear.

Widely-advertised calculator: puffed adder.

Pieces of a broken window that cut your fingers: pains of glass.

Irrational numbers: the wind in the rigging.

The intellectual life in the humanities: a higher form of gossip[1].

Academic poetry: syntactic posturings.

Technological society: one in which today's bad problems are solved by tomorrow's worse problems.

Melody: decoration for rhythm.

The music of Anton Bruckner: an argument for sobriety.

Klesmer music: Jewish Dixieland.

Spanish music: Two chords and a bunch of ornamentation.

Human beings: stalks that walk.

Literature: what an author writes to amuse himself while he works his way through the plot.

Orchestra: what they give you for entertainment in the concert hall while you wait for the concert to be over.

Prisons: expensive birth control for the poor.

Explosion: rapid disassembly.[2]

A nap: the Midday Death.

Neighborhood (to most Americans): the wasteland that lies between their house and shopping.

Eating a cool sauce: listening to the talk in the basement.

Combing one's hair: raking the superior lawn.

Old people talking about their illnesses: organ recitals[3]

Native of Oregon who has moved to another state: Oregon transplant

Index for a list of notes about relatives: kindex.

Terms in Search of a Meaning

"moribund taxonomy"

"ontological plums"

"wistered"

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1. "...a great deal of what today passes for scholarly research is an activity no different from that of reading somebody's private correspondence when he is out of the room, and it doesn't really make it morally any better if he is out of the room because he is in his grave." — Auden, W. H., quoted in Fenton, James, "Auden's Shakespeare", *The New York Review of Books*, Mar. 23, 2000, p. 24.

2. A perhaps worthwhile revision of the laws of war might be made by the outlawing of all such rapid disassembly, this form of destruction to be replaced by slow disassembly, i.e., disassembly performed manually, with hand tools and hand-held power tools. Instead of blowing up a house, an attacking force would have to take it apart, piece by piece. Demolition squads would be supplied with claw hammers, screwdrivers, crowbars, etc.

3. Attributed to Arthur Lithgow

"preblumponc"
"purblind roisterers"
"incremental fathering"
"popsicle persistence"
"forensic hope chest"
"moral ganglia"
"semantic soulfulness"

Possibly Worthwhile Inventions

A portable device for generating electric power: a round metal hood painted black on the outside and shaped roughly like a knight's or soldier's helmet, with a small hole at the top where an air-driven propeller is mounted and connected to a small electrical generator. The lower side is flared outward and allows air to enter the hood. Dimensions of the whole are arbitary: anywhere from, say, two feet high, with flared opening two or three feet in diameter. The hood is placed in the sun on hot days, e.g., in a back yard. The air inside, being heated, escapes through the hole in the top, turning the propellor blade and thus generating a small amount of electric power. (How would the efficiency and cost of such a device compare to solar electric cells?)

Wedge-shaped table levelers that are attached to the leg or legs of the table. Or table legs with pads on each leg, so that the height of the leg can be adjusted by turning the pad. Anything to stop the having to wad up paper napkins, tip the table, causing the coffee to spill, in order to put the napkins under one or more legs. A small fortune awaits the inventor who gets this right.

Adjustable smoke barrier for fireplaces. A friend of Benjamin Franklin (Count Rumford) determined the relationship between area of the front opening, flue cross section and depth of fire box which is required to prevent smoke from escaping into the room. In the case of fireplaces that do not conform to this relationship, you can buy, at outrageous prices, pieces of metal from four to eight inches in height which you put at the top of the fireplace opening. They are held in place by a press fit against the side of the opening. However, changing temperature, humidity, barometric pressure and winds makes them sometimes fall. They also can leak smoke around the edges. What is needed is an adjustable opening, with a nice white enamel handle, and a corrugated metal sheet which can be rolled up under the opening, so that no smoke leaks through. You could then pull the sheet up or down as necessary, like a window shade.

Another possibility is the use of the Bernoulli effect in the flue opening itself: a fan would blow air across the opening, thus creating a low pressure region which would draw up the smoke yet eliminate the need to clean the fan motor and/or metal tubing.

Steel logs for fireplaces: the heat from the wood logs would heat these up so that they could then radiate their heat into the living room. Why should we be limited to the heat radiated by the back wall of the fireplace? (Tests will have to be performed to determine if steel or cast iron or some other metal is best for absorption/radiation purposes.)

Square Presto[1] logs: at present, as these logs burn, they eventually break up into disks which sometimes roll to the front of the fireplace, sending smoke up into the room. If the logs were square, this would be prevented.

A flue torch: in certain atmospheric conditions, when the paper and kindling first start to burn, an excess of smoke is produced that can flow out into the room. Fireplace lore says that, in these conditions, one should first make a torch out of twisted newspaper, light the end and hold it up in the flue for a minute or so before lighting the main fire. Much better would be to always have on hand a flue torch. It would be fueled with lighter fluid which, when the starter lever was pressed and held down, would produce a large flame at one end of a long tube. The flame could then be easily thrust into the flue. If the user released pressure on the lever, or dropped the torch, the flame would immediately go out. The tube would be bent at a 90-degree angle so that the handle could be held outside the fireplace. This would be useful in cases where the paper and kindling had already been started, but were then found to cause excessive smoke. The torch could then be thrust into the flue without risk of the user burning him- or herself, even though the paper and kindling were already burning.

A smoke compactor, thus making possible miniature portable fireplaces. All smoke from the small fire would be absorbed by the compactor, which could then be emptied later. The compactor might simply consist of a small tank from which most air had been evacuated, so that the smoke would be sucked into it.

A wireless meter or digital readout that could be placed at any prominent place in a house and that would show amount and cost of gas, electricity, and water used that month vs. the previous month and a year ago (with other comparisons being easily obtained).

Lamps that slow the speed at which incandescent bulbs are turned on, thus reducing the thermal shock and prolonging the lives of bulbs.

Shopping cart raisers for supermarkets. Consider: you take items and put them *down* into the cart, then you lift them *up* onto the checkout counter, then packers put them *down* into the cart again. There must be a better way. One obvious solution is carts whose grocery-holding area is the height of the counter, thus eliminating the need for the counter. You would simply wheel the cart through, the clerk would tally the purchases, then the packers would bag the items and put them onto a similar waiting cart for you to wheel out to your car. The trouble is that this would reduce by at least half the available space for groceries in each cart.

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1. The only worthwhile artificial log. The others, e.g., Duraflame logs, are filled with wax and chemicals to decrease the time required for them to start burning, and to satisfy the nitwit American public's need for the decoration and "improvement" of all natural products (consider, e.g., flavored coffees).

Square garden pails, so they can be laid on a side and then leaves and other organic debris easily swept into them.

Metal-coated shirts and pants for rose gardeners, so that thorns do not catch on the clothing.

Thorn-proof gloves (gardening equivalent of the "Ove-Glove" advertised on TV in the fall of 2004, which allowed the wearer to pick up hot pans, etc., without injury).

A hose-shovel: often, when we are watering a garden that has hardened soil, and doing so with an open hose (ie.., no nozzle), the water tends to just run down whatever inclination there may be in the soil. Thus little of it actually sinks into the soil. We then have to put the hose down, pick up a hoe, use it to loosen the soil, then pick up the hose again. It would be much easier if there were a shovel to which the hose could be attached. We could then dig into the soil, loosening it, while continuing to water.

Automatic gardens, specifically, sensors buried at various points in the soil in a garden, these sensors then causing nutrients and water to be emitted into the soil in accordance with the deficiencies that the sensors detect. (These are *not* hydroponic gardens.) Thus the gardener would only need to do occasional turning over of the soil, and pruning, e.g., of roses.

A clever construction around the trunk of a tree in danger of falling over. Obviously, three guy ropes can keep the tree erect. But the challenge is to make, say, a simple wooden structure that automatically exerts a counter-force when the tree leans away from the vertical.

A foldable structure that enables arborists to cut branches high up in a tree. An aluminum tripod is fundamentally stable. How high could one be made to extend, so that the arborist could climb up on it? Renting a crane to lower the arborist to the proper height for his work is far too expensive; so is a helicopter. A balloon would be too clumsy and dangerous.

A device for reaching behind furniture, for example, the headboard of a bed, or a shelf, to grasp and lift out items that have fallen behind the furniture. Obviously, there would need to be a way for the user to see down to the end of the device to locate the item, and a means of grasping small items, such as a box of safety pins, and larger items, such as a book.
The challenge of creating such a device would be worthy of any top-rank design school.

Aroma capsules, e.g., boxes about two inches on a side which you carry around and open and sniff as you please. The contents of each is the chemical source of a particular smell: strawberries, wood smoke, French food, airplane glue, cedar wood, sexual odors,...

Numerical codes for smells, so that we could say, e.g., "it was an 05-01-30 smell", etc. Eventually, these sequences of numbers would themselves become associated with the smells they represented.

Midriff warmers: young women in the early 2000s wore tight sweaters that were designed to leave several inches of midriff bare. In cold weather this certainly must have been uncomfortable. What are needed are long pieces of fluffy wool that could be tied around the bare midriffs to keep them warm.

Pre-seeded soil: take rich humus, mix grass seed in, then just spread the soil where you want seed to grow, and tamp it down. Regardless of how the humus is spread, there will always be some grass seed at just the right depth so that it will grow.

A pad for the back of a toilet so that others in the house cannot hear the sound of male urine striking the water. (For men who occasionally have female visitors, or who share living quarters with one or more women they are not having a relationship with.)

The opposite of a lubricant, namely, a friction inducer. This could be used to provide a very simple solution to the problem of doors that do not stay open at the angle they are set, but always swing to some other angle. The hard way to fix this problem is by re-hanging the doors, which means taking off all the hinges, then re-screwing in the hinges so that the door is level. Much simpler would be to apply a friction-inducing substance to the hinges so the door doesn't swing as easily. One such friction inducer is dried paint on the hinges.

Spaghetti ice cream.

Compartmented soup. Served in a bowl having compartments to hold one ingredient each, e.g., peas, carrots, beans, chicken, with the at least partially-transparent soup covering all.

A really *good* set-top signal booster for UHF TV: anyone who has tried the various complicated, expensive, powered devices for boosting the strength of UHF signals must ask themselves if there isn't a better way. Radio Shack sells a non-powered antenna in the form of a rectangular griddle with two large metal "bow ties" mounted in front. It works better than any powered

device I have come across. Can the application of everything known about antennas improve upon this model?

A hand-cranked generator built in to cell phones so that batteries could be charged anywhere.

A portable thermostat, specifically, a wireless device that you could take into any room in the house: the furnace control would then attempt to keep the temperature of that room at the temperature you set.

Tall chairs so that you can sit down while you cook at the kitchen stove.

Colored artificial snow, e.g., pink for gay skiing resorts.

A guided missile with sufficient explosive to dissipate a tornado if fired at the base of the tornado as it was starting to form. Much larger explosives to dissipate hurricanes at their beginning.

A simple, portable, flame protector for people lighting cigars and cigarettes in the wind who are unable to make such a protector using their hands alone, or by the traditional bending the paper-match cover into a cylinder and sticking the flame up inside.

A way of merging the sound of someone speaking into the sound of gurgling water, e.g., in an aquarium, so that the resulting illusion is that the water is talking.

A computer-controlled mechanical device that makes possible the precise control of marionette strings. The truth is, we still have no idea how life-like the movements of a marionette can be made. Such a device suggests an amusing sketch in which the marionette becomes aware of its strings and begins to examine them and to attempt to figure out where they come from and what their purpose is.

Ghetto blaster blasters: devices that produce a high-powered electronic beam that, when it strikes a portable stereo set, quickly melts a few of the internal components, thus putting a stop to the racket that the set was producing. (Why is it taken for granted that residents of a predominantly white area of a city must accept without complaint black persons walking through their streets with portable stereos blaring ghetto music, but it would be considered highly provocative for a white person to walk through a black ghetto with a portable stereo playing, say, Vivaldi?)

Aerosol can containing an unpleasant smell. The contents can be sprayed on places on private property where teenagers who are cutting class tend to loiter. The chemical used must be such that the smell dissipates within a few hours and must be biodegradable.

Device for vacuuming flies: an attachment for hand-carried vacuum cleaners so that flies in a room could simply be vacuumed up, whether they were flying or not. The attachment would be like the large bell of, say, a trombone or a tuba.

Intelligent fire.

Cold flames in the fireplace, to cool the house in summer

Cold (i.e., refrigerated) clothes, to keep the wearer cool in the summer.

Post-operative wrapping paper, for gifts for people who have survived a recent operation, or for persons starting pre-med or medical school. The paper would be white, with a pattern of drawings in black ink showing a patient in a hospital bed smiling up at a doctor at the bedside who is smiling down at the patient in a reassuring manner.

Un-birthday cards. In *Through the Looking Glass*, Humpty Dumpty explains to Alice that, although we have only one birthday each year, we have 364 *un*-birthdays. And so it seems surprising that greeting card stores, as far as I know, still do not carry un-birthday cards. Enterprising greeting card manufacturers take note.

A flying device shaped like the bell of a trumpet and perhaps the six or eight inches of tubing below. Experimental models could be made of tissue paper. The device should be tested to see if it has any of the useful properties of a parachute, the bell itself being uppermost, the narrow tubing extending downward. Can the rate of descent be controlled by a small propellor installed in the narrow tube?

Paste-on shoe soles: When the soles on a pair of shoes start to wear through, why is it necessary to bring the shoes to a shoe repair store and pay the store a small fortune to tear out the old soles and install new ones? Why not just buy leather material large enough to cover the holes, and paste it in place with a strong, waterproof glue? If the leather was thin enough, this could be repeated several times before it was truly necessary to remove the original sole and the pieces of leather glued onto it.

Portable weather-stripping: typically the weather-stripping along the lower edge of a door scrapes across the floor when the door is opened and closed, damaging the surface of the floor. Therefore why not portable weatherstripping mounted on, say, a piece of wood, so that the weatherstripping could simply be placed along the lower edge of the door when it was closed, and then put aside when the door needed to be opened? Even less expensive: why not keep pieces of material, say, old beach towels, near doors to the outside of a house

A device either mounted on the skis or that the skier wears that indicates how closely coordinated the skier and the skis are at each moment. It would serve somewhat the same purpose as the short length of string that is tied to a little vertical wire in front of the canopy on sailplanes to indicate the degree to which the sailplane is sideslipping through the air. If the string points directly toward the pilot, then there is no sideslipping, and the plane is flying efficiently. I argue that there is a property of the relationship between skis and skiers that measures, in effect, how near to effortlessly the skier is skiing.

Hold-downs to prevent clocks and other precious possessions from being knocked off shelves during an earthquake. It is not clear what would be the best device for this purpose: a strong tape around the base of the clock, the tape then thumb-tacked to the shelf? A strong tape with heavy lead weights? Or a glue that can be easily removed with water?

A hypnosis channel for airline travelers: it would present visual images and sounds aimed at inducing a pleasant trance for the duration of the flight.

When a city is threatened with flooding, news reports invariably show frenzied citizens filling sand bags and then piling the bags around their houses. Surely there is a better way! Why not a collapsible wooden framework, easily stored on the premises, that could be rapidly put up around each house, the framework then covered with thick plastic? A matter of perhaps two hours' easy labor by the adults in the family, as opposed to many more hours of backbreaking shoveling by many neighbors.

Or why not an inflatable back yard swimming pool large enough to go around the house? The house would be inside, where the water normally would be, the flood water would be outside, where the back yard would normally be.

Certainly these and similar ideas should be investigated for the benefit of those benighted souls who insist on living in flood plains.

A challenge to inventors: in a Berkeley restaurant, when you order a cup of tea you get: (1) a teapot, with removable lid, containing tea leaves and hot water; (2) a cup and saucer; (3) a concave screen with two handles — the contents of the pot are poured through the screen into the cup, the screen preventing the tea leaves from going into the cup; (4) a little metal cup to hold the screen after it has been used, the drops of water from the tea leaves being collected in the cup.

The challenge is to come up with a design that reduces the number of separate pieces but still performs the same function of brewing and pouring tea.

One possibility is to secure a small screen inside the spout, or over the end. In both cases, the problem of clogging by tea leaves must be dealt with. Making the screen removable for washing is one possibility.

Inexpensive accelerometer that can be mounted on or above a car's dashboard. A light will glow green when the car's acceleration is below the maximum for good gas mileage, and will gradually turn red when acceleration is beyond that maximum. An even simpler, and cheaper, possibility is a small pendulum next to a white card that is oriented parallel to the sides of the car. Pendulum and card can be suspended from the rear-view mirror. If the card has a vertical black line, then there is no acceleration if the pendulum string is parallel to the black line. The greater the acceleration, the greater the angle between pendulum line and black line.

A long wire with a sticky substance on the end, for retrieving items — e.g., screws, small pieces of paper — that fall down into places that cannot be reached by hand. The wire would retain any shape into which it was bent. Optional accessories would include a small light above the sticky substance, and, for more advanced users, a small TV camera with a separate cord running back to a small receiver that could be viewed during the retrieval attempt.

Popsicles made of frozen gazpacho or V8 vegetable juice or beet soup.

Paddlewheel for canoes: a lightweight device that would rest on the gunwales, with a paddlewheel on each side connected by a rod with two U-shaped parts, one for each hand so the wheel could be turned. An interesting question is whether such a device would be more efficient than a paddle. There would need to be a way for the wheels to be lifted out of the water, for efficient coasting.

Implementation in wood of the well-known "missing square" puzzle based on the Fibonacci number sequence, in which four quadrilaterals when assembled one way yield a square of area 64, but when assembled in another way, yield a rectangle of area 65. The implementation could consist of the four pieces and an attractive flat wooden holder, plus, of course, a booklet explaining the puzzle.

Device that a layman could use to clean grade 3 creosote (the most dangerous kind) from a chimney. It would consist of a tank containing a gas, under pressure, that contained the necessary chemicals. A hose would be attached that could be extended for at least, say, 10 or 15 feet up the flue. Attached to the side of the hose would be an electric cord to power a video camera and rotating metal brushes on the end. The user would then extend the hose, release a certain amount of

the gas, then scrape the side of the flue with the brush, all the while observing the result using the video camera, then repeat the process at different levels in the chimney.

Even if the device cost several hundred dollars, that would still be a major saving over the prices typically charged by chimney sweeps with minimal, if any, knowedge as to how to remove grade 3 creosote. In my experience, chimney sweeps who also install stainless steel liners and fireplace inserts, are not to be trusted for cleaning grade 3 creosote, since they have every incentive to tell the user that the creosote cannot be removed, which then requires a far more expensive liner (with preliminary removal of tiles inside the flue) and insert, this work typically costing the user as much as $5,000 (in Berkeley, CA.).

Advantage of an airplane: its speed. Disadvantage: as soon as its speed falls below its minimum flying speed, it falls to earth. Advantage of a balloon or dirigible: no matter what its speed, it does not fall to earth. Disadvantage: its maximum speed is very low compared to that of an airplane. So, using computer modelling, it should be possible to come up with a design for an aircraft that combines the advantages of both an airplane and a balloon or dirigible. A place to begin might be with the question: how much could the minimum flying speed of existing planes be lowered by filling the interior of the wings, tail, and fuselage (except for the pilot's compartment) with helium?

Balloons that are spheres of black plastic or other material that will absorb the sun's heat, so that, on sunny days, the air inside the balloon will become much warmer than the surrounding air, and thus cause the balloon to ascend. Could such balloons be made large enough to lift one or two human beings?

A door knob that is in the form of an outstretched hand waiting for a handshake.

A stamp that is an envelope, an envelope that is a stamp.

A large hypodermic-needle-type of device for injecting liquid fertilizers into the ground underneath shallow-rooted trees, e.g., lemon trees. If such a tree suffers from one or more illnesses, supposed experts will advise covering the ground under the leaves with pounds of this or that fertilizer, e.g., compost, then watering thoroughly each day for at least two weeks. But God only knows how inefficient this process can be in cases when, e.g., the ground is hard. Far better to get the nutrients to the roots directly and immediately.

A paint-on, or spray-on, plastic sealer for parts of bodies of old cars in which small holes in the metal allow rainwater to get inside the car. It could come in a variety of common car body colors, or perhaps just transparent.

Magnetic sealing tape: this would be tape coated with a magnetized substance so that, when placed on metal, the tape would adhere tightly. Its main purpose would be to hold down plastic sheets placed on cars, e.g., over the luggage compartment to prevent leaks during rain. The tape would block water from from getting under the edges of the sheets.

Hand-held lawn mower: grass blades do not all grow at the same rate, so, particularly for small lawns, it would be helpful to have a hand-held mower with which the property owner could mow only the longest blades, which typically grow in clumps. The mower could be manually or electrically powered.

Long Overdue Musical Composition

Concerto for Piano and Page-Turner

Or perhaps all titles of piano concertos should be of the form, "Concerto in [key] for Piano and Page Turner". (A page-turner is a person who turns the pages of the musical score the performing pianist is reading because he or she has not fully memorized the work.)

A Brilliant Idea — By the Phone Company!

The wires that connect phones in a house to the box on the outside of the house (from which other wires run to cables on telephone poles) are not just single wires. They are instead *four* wires encased in plastic insulation — in other words, they are a cable. The reason for this is that if one of the wires should cease to provide a connection from one end of the cable to the other, there is no need to replace the wire with another one, which might well involve considerable effort crawling through tight spaces so that the repairman could carefully attaching the new wire to wooden beams, etc. No! All that is required is for the repair man to choose another of the four wires in the original cable, and use that! A task requiring mere seconds as opposed to who knows how many hours? *Brilliant*.

Other Observations on Inventions

"The three fundamental inventions, made by life before the evolution of higher organisms began, were death, sex, and speciation. Death, to enable the future to be different from the past. Sex, to enable genetic characteristics to be rapidly mixed and shared. Speciation, the forming of species isolated from each other by genetic barriers, to make possible the evolution of diversity. These three inventions were all required before living creatures could have elbow room to adapt themselves in shape and behavior to fill the rich variety of ecological niches that their growing diversity was itself beginning to offer them." — Dyson, Freeman, *Disturbing the Universe*, Harper Colophon Books, N.Y., 1979, p. 221.

It is seldom realized that the telephone not only provided mankind with a way of rapidly communicating over long distances, but also solved, at least under certain circumstances, the problem of bad breath.

When you punch in someone's number on the telephone, the person's phone rings when you finish entering the number. But there is no reason why the phone company couldn't program its system so that, when you punched the first digit of the number, *all* phones having numbers with that first digit rang; then, when you punched the second digit, only those phones having numbers with those first two digits, continued to ring, and similarly through the remainder of the digits, so that, when you finished, only the phone of the person having that number, continued to ring. The only problem might be with hundreds, perhaps thousands, of people all assuming that the call is for them, and all picking up their phones unnecessarily. But this could be overcome by the system not making any connections until the full number had been entered.

Similarly, it makes no sense keeping your own credit card receipts. What you should be able to keep is everyone else's receipts, because those are the ones you want to make sure do not appear on your bill.

Possible Money-Making Businesses

Lifestyle Broker: client provides information on type of place where he/she wants to live — climate, crime-rate, cost of living, cultural amenities, etc. The Broker gives the client a list of locations that meet the client's requirements. The Broker publishes no books, provides no online information other than a description of his services, so that he does not start a stampede to quaint, quiet places. He obtains his information from any and all sources: published books, online sources, friends and acquaintances, personal travel, etc., and always makes a reasonable attempt to verify the information that comes from others.

Lifestyle Manager: knowing the preferences of her client, such a manager would systematically check for films, plays, concerts, books, restaurants that her client might enjoy, and notify the client in ample time to purchase tickets or make reservations. She would inform her client of upcoming local political meetings that the client might want to attend. She would relieve her client of the annual anxiety-ridden, tedious ordeal of buying Christmas gifts and cards, and sending the latter.. She would have a list and brief description of each of the persons for whom gifts were to be bought, and to whom cards were to be sent (the two groups of persons in all probability not being the same). She would have evolved a selection of phrases that seem to have pleased in the past, so that her client would only need to copy them onto the cards. She would remind her client about upcoming annual duties — making an appointment with the tax man; ordering firewood. She would do weekly backups of computer files and take the CDs to the safe deposit box in the bank. She would arrage for reliable persons to clean the house when her client requested it. She would do all the shopping the client dreads, e.g., shopping for new appliances, TV sets, stereo players and she would do this with skill, knowing how to find what the client describes at a reasonable price. Finally, she would carry on a daily re-prioritization of the client's To-Do lists.

Carrying out the Christmas tasks described above might become a prosperous business in itself. See below, "Greeting card message writers".

The Unshopper, for people who hate to throw things out. The firm offers lists of all possible ways to dispose of various items, plus private lists of people who want to buy things. Client has some assurance that treasured family items will go to the right people. The Unshopper saves cli-

ent the time of searching on the Internet and in other sources, and may offer the handling of sales as an additional service.

Literary Executors, Inc. See chapter of this book, "Literature and Art".

Treasured-Possessions Executors, Inc. Every old person with treasured possesssions — books, paintings, furniture — that his or her children do not want, faces the ordeal of trying to find good homes for these things after his or her death. He or she wants the books to go to people who love books, the paintings to go to people who love paintings..(Disposing of the furniture would probably be easiest, given that peresons of taste typically patronize auction galleries.)   Used book stores are an obvious answer, but many are on hard times.

The treasured-possessions executor would know how to reach potential recipients: among friends and a large number of acquaintances, by advertising on Craigs List, by skillful searching of the Internet, his advantage being that most of the items would be offered at low cost, or free, but only to the right individuals. He might have a web site that invited people who wanted to be considered as possible recipients of old books, paintings, or furniture.

If the old person were on speaking terms with his or her family, the executor would convene a meeting of the old person and his or her family, prior to the old person's death, to go over what his or her wishes were, and then, after the property had been disposed of, the executor would provide convincing evidence that the possessions had gone to the right people.

Neighborhood Experts: for use by persons who are trying to buy a house. For a fee, the Expert supplies the latest crime-statistics for a neighborbood the prospective buyer is interested in; also facts concerning presence or absence of minorities; nuisances, e.g., from loud neighbors; distances, in blocks or miles to nearest mass transportation, grocery and other stores; names of architectural styles of specific houses, and brief history of the styles; finally, flood, earthquake, tornado, hurricane risks if any. In short, all the information that realtors should have at their fingertips but never do.n

Moving Made Wonderful — A service for people who hate the ordeal of moving. An agent from the company would come to your house and go through it with a video camera as you specified your desires and gave instructions as to where things were to go in the new house. The agent would know reliable movers, would offer several hundred dollars bonus to the driver if nothing was lost or damaged. You would then give the key to your current house and to your new house to the agent, then arrive at your new house at the appointed date and find everything in place.

Internet search experts. It is astonishing that there are still (2010) no online companies — at least none that are well-known — that ordinary Internet users can pay to carry out specific searches. I say without hesitation that the average Google user is not skilled in coming up with search strings in the first place, much less in doing subsequent searches through the thousands of hits his initial search produces. I doubt if ten percent of Internet users who do searches have any-

thing remotely resembling an efficient procedure for deciding which of the various search engines to use.

The Internet user should be able to contact a company specializing in searches and then supply the information that a staff member asks for in connection with a desired search. Then the user would specify a maximum amount of money to be spent on the search, and receive a report within a day or two. Such a business would be ideally suited for people who want to work at home. Furthermore there would likely be relatively few competitors, since it would take time for staff members to accumulate the necessary search lore that would enable them to do searches efficiently.

A country house for people who want to spend a vacation in the 19th century. Every detail of daily life in, say, 1850, would be duplicated, including food, heating, illumination. There would be no radio or TV or electronic devices of any kind because there would be no electricity. Travel would be by horse-drawn carriage or on horseback.

Greeting card message writers. Patrons of greeting card stores who had difficulty thinking what to write in a card could call on one, who would be a member of the staff. She would ask a few questions about the person for whom the card was intended, and about recent events in the sender's life that the other person might be interested in, then compose a message, and modify it according to the sender's wishes.

Business Ideas That Will Probably Fail

Realistic fortune cookies: the messages inside would reflect the accident, disease and mortality statistics of the restaurant patrons: "A member of your family will soon be severely injured in an automobile crash," "You will suffer a fatal heart attack within the next twelve months," "A malignant tumor is growing in your body as you read this," etc.

Gift certificates for greeting cards. When we want to buy someone a gift, but are not sure what gift they would really like, we often give them a gift certificate instead, so they can make their own selection. We are also often unsure about what greeting card to buy for someone, e.g., what Christmas card to buy for grandma. If there were gift certificates for such cards, we could give one to the person, and let her buy the card that pleased her the most.

Simple Solutions to Otherwise Difficult Problems

To drastically reduce traffic flow down one or more residential streets: post a "No Outlet"or "Dead End" sign at the entrance to each street. Obviously, this is a solution that has to be implemented by neighbors only, since it is a little bit illegal. (I need hardly mention the importance of *not* stealing the signs from locations where they are true, but instead to make up new ones.)

To reduce water-shortages in drought-stricken states: have large plastic sheets available so that they could be unrolled and spread out in order to catch rain water. Obviously, the sheets would have to be arranged so that the water flowed to a hole at the center, under which would be a water truck or pipes to local ponds or reservoirs. Perhaps the sheets could be lifted, using balloons, and a long hose at their center could carry water down to waiting trucks.

Even without the sheets, in areas where there are hills, house gutters could drain into the street, and then the run-off from all the drain pipes under the streets could be collected.

Instead of spending huge amounts of money to develop robots that can act as servants in a house, simply train human beings to behave like robots (see Woody Allen film, *Sleeper*).

A Cure for the Common Cold

The following treatment has worked for me more than two-thirds of the time; it failed only when I had waited till the second or third day of symptoms before instituting it. I believe the success of the treatment is sufficient to justify the expense of rigorous scientific testing. The treatment is as follows ("Venienti occurrite morbo"[1]):

Within a few hours after the first symptoms appear— headache, sneezing, sore throat — take a hot bath for at least 20 minutes, so that you sweat profusely. Then get out of the tub, put on a warm robe, go to bed, and try to sleep for at least two hours. The cold will be gone by morning.

One explanation I have heard for the success of the treatment is that it raises body temperature sufficiently high to kill the cold virus, i.e., it acts like a fever. However, several people with medical training have said that the internal temperature of the body varies very little from normal during a bath like the one recommended (sweating is, in fact, one means by which the body maintains near-normal internal temperature). In any case, the treatment works most of the time. I urge the reader to prove it for him- or herself.

Two Possible Was to Reduce the Number of Coronavirus Cases?

A (retired) surgeon said the he takes large amounts of vitamin C each day (he didn't specify the amount) because vitamin C is known to block at least some viruses.

The above cure for the common cold might also stop at least some of the occurrences of the coronavirus illness.

A Possible Way to Remove Carbon Dioxide From the Atmosphere[2]

The idea is very simple: just vastly increase the quantity of organisms that already exist in the atmosphere that remove carbon dioxide.

Long before carbon dioxide from the burning of fossil fuels began to increase in the atmosphere, carbon dioxide was being removed, mainly, but not exclusively, through absorption by the oceans, which contain phytoplankton that break down carbon dioxide.

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1. "Meet the disease at the first stage." — Perseus (a.d. 34-62), quoted in *The Oxford Dictionary of Quotations*.
2. The first version of this sub-section was entered here on Nov. 13, 2014.

Aeroplankton, which is the air-borne equivalent of phytoplankton, "comprises numerous microbes, including viruses, about 1000 different species of bacteria, around 40,000 varieties of fungi, and hundreds of species of protists, algae, mosses, and liverworts that live some part of their life cycle as aeroplankton, often as spores, pollen, and wind-scattered seeds." — Wikipedia, 11/21/14, "Aeroplankton".

We are all familiar with the use of a gel in a Petri dish to grow bacteria. All we have to do is create a vaporized form of such a gel that contains nutrients for the most effective carbon-dioxide-removing organisms in aeroplankton, and spray the gel into the upper atmosphere, e.g., from rockets.

Or, we can simply genetically engineer the bacteria that already break down carbon dioxide in the atmosphere, so that they break down much more carbon dioxide.

I wrote to a scientist in the field and received the following email replies on 9/16/18:

"... I just put in a proposal with colleagues here ... for this type of activity but government funding is so limited even with good proposal reviews it didn't get funded. The major problem is not lack of interest, it is lack of government funding for this societal need (can't really ask industry to support as there is no good business model at the moment)."

I wrote back, asking why billionaire philanthropists like Warren Buffett and Bill Gates haven't funded the effort. The reply:

"Global warming is not new to either of them and they have both been briefed by many scientists and are deeply aware. They choose to invest in areas where they can make an impact without the direct need for governmental support. Government and policy will be needed with any CO2 capture tech ...".

And so we see once again the high cost, to the nation and the world, of having an ignorant buffoon for president.

Hurricane Prevention

Warm surface water in the ocean is a cause of hurricanes. Why not have a fleet of ships that, during hurricane season, and in those areas where hurricanes are most likely to arise, would merely take in ocean water, cool it significantly, then release it back into the ocean. Of course, we need to know many ships it would take to make a difference.

A Sport for the New Age

Unfishing: here, intead of taking fish out of lakes and streams and the ocean, we put them back. We can wear the same attire as before, but instead of looking for good spots to drop our bait, we look for good spots to release our fish, which we carry in appropriate containers filled with water.

The activity can be expanded to unhunting.

Proposed National Holidays

Opposite Day, during which opposites are in effect. Thus, e.g., red traffic lights mean "Go", green traffic lights mean "Stop". Vehicles must be driven on the left-hand side of the road instead of the right. "Hello" means "Goodbye", "Is not" means "is" , "Early" means "Late", and vice versa. Etc.

Mathematics

"[Funes] told me that in 1886 he had invented an original system of numbering and that in a very few days he had gone beyond the twenty-four-thousand mark. He had not written it down, since anything he thought of once would never be lost to him. His first stimulus was, I think, his discomfort at the fact that the famous thirty-three gauchos of Uruguayan history should require two signs and two words, in place of a single word and a single sign. He then applied this absurd principle to the other numbers. In place of seven thousand thirteen, he would say (for example) *Maximo Perez*; in place of seven thousand fourteen, *The Railroad*; other numbers were *Luis Melian Lafinur*, *Olimar*, *sulphur*, *the reins*, *the whale*, *the gas*, *the caldron*, *Napoleon*, *Agustin de Vedia*. In place of five hundred, he would say *nine*. Each word had a particular sign, a kind of mark; the last in the series were very complicated...I tried to explain to him that this rhapsody of incoherent terms was precisely the opposite of a system of numbers. I told him that saying 365 meant saying three hundreds, six tens, five ones, an analysis which is not found in the 'numbers' *The Negro Timoteo* or *meat blanket*. Funes did not understand me or refused to understand me."
— Borges, Jorges Luis, "Funes the Memorious", in *Labyrinths*, New Directions, 1964, N.Y., p. 65.

In high school (Euclidean) geometry, we are taught that there is only one shortest path between two points. But in so-called "Manhattan geometry", i.e., the geometry you typically use in travelling around a city which has a rectangular grid of streets and avenues, the statement is not necessarily true. Keeping in mind that a "path" in this geometry must follow streets and/or avenues, pick a point A at one street corner, and a point B at another street corner which is not on a street or avenue that runs past A. Then, as you can easily verify, there are several shortest paths from A to B.

One of the simplest ways to teach the concept of percent is by the use of an elastic ruler. The ruler is marked with a scale from 0 through 100. To find out what percentage something is of something else, draw, on the blackboard, a line at least as long as the ruler; this line represents the "something else". Then mark off, on this line, beginning at the left-hand end, the length corresponding to the size or amount of the "something". Now put the 0 point of the ruler on the left-hand end and stretch the ruler until the 100 point is on the right-hand end of the line. The percent is given by the number on the ruler which is next to the mark of the "something."

One of the simplest ways to teach some of the basic concepts of classical number theory is through rhythms. Several times a day I walk past Berkeley High School, where, on the second floor, you can hear the students playing drums. (It beats studying.) What an opportunity to teach a

few elementary concepts of number theory! The time signatures can be illustrated on the black-board. Two-four, three-four, four-four, five-four, ... Then the question can be asked: when do the accents occur simultaneously? Then, more complicated rhythms can be obtaining by superimposing simpler rhythms. Then the clock model of congruence can be introduced to show another view of these rhythms, and, incidentally, what integer division is all about.

Given that, in general, kids like games, why isn't it a common practice to have math classes in primary and secondary school compete against each other? If the criterion of victory were the largest total grade on one or more tests, then that might be an incentive for the abler kids to help the less able. The prize might be, e.g., free pizza for the entire winning class.

A palindrome is a sequence of words that are spelled the same forwards and backwards, e.g., "A man, a plan, a canal — Panama!", "Was it a bar or a bat I saw?", "Draw pupil's lip upward" (Gardner, Martin, *Perplexing Puzzlers and Tantalizing Teasers*, Dover Publications, Inc., Mineola, N.Y., 1969, p. 14). But there is no reason why we must restrict the symmetry to that of letters. One can devise "word palindromes", in which the sequence of *words* is the same when read forwards or backwards, e.g., "Dogs aren't wishes, wishes aren't dogs". But then, why not "sentence palindromes", e.g., "I have had it! You are not welcome here. You are not welcome here. I have had it!" And so on, up through "paragraph palindromes", even to "book palindromes" (two books standing on a shelf, the leftmost with the spine facing in, the rightmost with the spine facing out).

Consider the ultimate generalization of the problem: we are given a very long sequence of decimal digits, say thousands of digits long, and told that the sequence is palindromic, without being told what the palindromic units are, i.e., we are not told if the sequence is palindromic at the digit level, or at the sequence-of-digits level, or at the sequence-of-sequence-of-digits level, etc. Furthermore, as with word palindromes, the units in this latter case need not all have the same number of constituent units. In general, how long will it take us (i.e., how many trials must we make) in order to find the hidden palindrome?

So far we have dealt only with *syntactic* palindromes. What about "semantic palindromes"? These do not seem possible in natural language, because it is not possible to tell if two different sequences of words mean exactly the same thing. However, mathematics is rife with semantic palindromes, which we know by the more familiar name of "equations".

Palindromes and other instances of symmetry are discussed in Gardner, Martin, "A — Symmetry", *The New York Review of Books*, Dec. 3, 1992, pp. 33 ff.

Imagine mathematical research being done by English professors: "There are many interpretations of the fixed-point theorem. We know that, at the time of its discovery, Brouwer was having problems with his wife. In a letter to a friend he lamented... Thus some scholars have argued that the notion of a function (here interpreted as Life in the largest sense) having a fixed point, a point that is not *changed* by Life, was particularly appealing to Brouwer at this time. Others, however, have taken the opposite point of view, arguing that his purpose, in a time of his life when he *craved* change, craved escape from the confinements of a domestic relationship that had lost meaning for him, was to seek consolation in a theorem that established the conditions under

which a function (again interpreted as Life) could *not* have a fixed point, could not be "tied down" at any point."

Imagine research in English literature being done by mathematicians.

If you don't think a problem has a simple solution, then you probably won't find one.

Probability, Randomness

The most important — the most *useful* — mathematical subject for the average person is not algebra or trigonometry or geometry, much less calculus, but *probability*, and yet the average person, even if he or she goes gambling, is ignorant of even the most basic laws of probability. The best proof is to ask a person who has just bought a lottery ticket, why he or she did so. The typical answer will be something of the sort, "Well, you never know: you might get lucky," or, "Well, I heard about a guy just the other day who ..." Now ask another lottery ticket buyer the following question: "Suppose there were a serial killer who worked in the Social Security Administration. Once a week, this person selected at random a Social Security number from those of the million or so people living in his metropolitan area. He then went out and murdered that person. If you lived in his metropolitan area (and assuming you have a Social Security number), would you be worried?" Invariably, the answer will be no, even though the odds of being selected by the killer are far greater than those of winning the lottery.

Randomness can be used to detect slight disturbances in order: e.g., to determine if one or more items in a house or other building have been disturbed while you were away, throw a cloth over them that wrinkles and folds easily and take a picture of the covered objects. Comparing the photograph with the actuality on your return will reveal any disturbances, since it is almost impossible to reproduce such wrinkles and folds once they have been changed.

Similarly, abstract expressionist paintings are probably the most difficult paintings to make forgeries of, since it is almost impossible to duplicate, by deliberate effort, the result of an unpremeditated brush stroke or splash of paint.

The great jazz saxophonist, John Coltrane, once attempted to play, from a recording, one of his own improvised solos, and found that he couldn't.

Is it possible that with, say, ten or fifteen years' concentrated practice, a person might learn to throw a pair of dice in a way that would significantly change the odds of one or more numbers appearing? Would it turn out that the best approach was to carefully study the way the dice move through the air when thrown, and then try to "cause" the desired sequence of movements, or instead to simply concentrate on the number you want to appear, and then let your hand "figure out" how to achieve that goal?

Unfortunately, most gambling casinos attempt to nullify such skills by requiring, at least on the craps tables, that the thrown dice hit the felt wall surrounding the playing surface in order for the throw to be counted. Of course, the next question is, could even this obstacle be overcome with sufficient practice, aided, perhaps, by a video camera?

In gambling — outside of games like poker, in which a player's skill can affect his chances of winning — all that counts is the probabilities. There is no difference between a player pulling the handle on a slot machine and his betting on a card or a number *if* the probability of his winning is the same in all three cases. I therefore propose the Thinking Person's Gambling Casino, which would consist of nothing but a large table showing all the probabilities available for the player to bet on, and the payoffs (as a multiple of his bet) in each case. He would place his money on the probability he wanted, and wait for a computer to make the play and notify him of his winnings, if any. No flashing lights, no spinning wheels, no dice, just probabilities.

Along the same lines is the Thinking Person's Book Store, which would consist simply of computer terminals which enabled the shopper to probe a data-base containing titles, authors, and brief descriptions of all recently published books (or, for that matter, of all books in print). For example, the shopper could ask, "Tell me all the paperbacks published in the last year on the subject of Western philosophy between the years of, roughly, 300 b.c. to 100 a.d.", or, "Tell me all the books, if any, which author *x* published in the last three years". Price and availability would, of course, be included with each listing, with provisions for the shopper to place an order then and there. Frequently ordered books could be stored in a warehouse behind the store, for immediate sale. But in the store itself: no books, no book-shelves, no display tables, just information *about* books. And a good coffee shop around the corner.

Similar is the Thinking Person's Computer and Software Store, or perhaps I should say, the Computer Store for People Who Hate to Shop for Computers and Software. Again, nothing but computer terminals, with an on-line questionnaire which, upon being filled out by the shopper, would respond with a list of the products that most closely matched the shopper's criteria.

To get across the futility of gambling, tell people to imagine that, instead of the cards being shuffled, the players are shuffled. That is, every possible hand is dealt and laid out on enormously long tables. Then players are randomly selected to be the recipients of each hand.

And we have to ask why the Thinking Person's Wine Shop is not already common. Here, each wine in the database would be accompanied by a table of weightings of the common taste characteristics: sweetness/dryness, fruit, acidity, tannin, oak, smoothness, finish, etc., the weighting for each characteristic being, say, a number from 0 to 10, with 0 representing "not-detectable" and 10 representing something like "very large amount". Tasters would fill in these tables, and then the values would be entered into a local, or state-wide, or nation-wide database, along with the name of the wine, its type, price, the name of the winery, its location, etc. In the case of multiple tasters evaluating the same wine, weightings could be averaged. Computer terminals at each wine shop would allow the customer to enter any combination of identifying parameters he wished, e.g., price, type of wine, location of winery (California, France), and then view the weightings for each wine listed and, based on the customer's knowledge of his preferences ("dry, lots of oak"), he could make his choice. (Actually, the customer would keep a record of the weightings for wines he liked, then go to store and ask for wine with similar ratings.)

And similarly for the Thinking Person's Nursery. For that matter, why is there not, at this late date, a locally-oriented gardening database accessible on the Internet to all persons (if necessary, for a fee) in a given region, or microclimate? A prospective customer could then go down a

tree of choices to find the flowers or bushes he wants: given this combination of sunlight and shade, want these colors, this height for the grown plant, this period of bloom, etc. The same could be done for trees: given this combination of sunlight and shade, want tree to give this type of shade, to have this rate of growth, this shape, etc. Landscaping is no more complicated than this.

It is hard to believe that there will not actually be such computer services in the near future, especially as more and more shoppers come to realize that the daily flood of new products makes anything like an "informed purchase" all but impossible without computer assistance.

Is it possible that divination in primitive societies also served to prevent bad decisions from being continuously repeated? Suppose you have a choice of n medicines or treatments which have been handed down from your ancestors as being cures for a certain disease. Let us assume that one or two of these tend to be far less effective, perhaps even fatal, but you don't know which ones these are. Then a random choice of the medicines and treatments may in fact be the wisest course. On the other hand, it might be that the shaman in fact knows what to do in each case, since he is the inheritor of all the knowledge and wisdom that has been accumulated from all the experimentation (to use our own word for it) carried out by his ancestors; divination may then be simply an act of deference to the gods, to show them that he would never presume to claim that this knowledge comes from the tribe itself.

Poor man's random number generator: (1) Decide the range of n over which you want to randomly select numbers (must be a power of 2); (2) Flip an unbiased coin $\log n$ times, considering, e.g., heads as 1, tails as 0. The resulting sequence of 1's and 0's is a binary representation of a randomly selected number.

Better way: (1) Carry out step (1) above; (2) Pick any number much larger than n which in your opinion is random, or changes in a random fashion on a daily basis, e.g., the amount of available memory, in bytes, on a server in a computer network, or a number from the financial section of a newspaper; (3) Use your calculator to divide the number by n and find the remainder as an integer (multiply the decimal part of the quotient by n): that remainder is your random number.

The Turing Test of human-generated, vs. computer-generated, randomness: this type of test was first proposed by the mathematician Alan Turing in the early 1950's as a means of determining when it was justifiable to say that a computer was capable of thought. In the present case, the test is as follows: the person carrying out the test sits at a computer terminal and is presented with a sequence of a few, say, five, binary digits which, he is told, is the beginning of a random sequence. His task is to decide if the sequence is being generated by computer, or if it is being generated by a person who is attempting to make the sequence appear to be random, but who has no access to sequences of random binary digits. After the person has typed in each guess, the actual digit (from a computer or from the other person), which may or may not be the same as his guess, appears on his screen. The person repeats this process until he is ready to give his decision. When the digits are being generated by a person, this is also a test of the intuition of that person as to what a random sequence, particularly a long random sequence, really looks like. Does the average programmer, say, have a good intuition about such sequences?

Once I was standing in front of a bookshelf, looking for a book on entropy, when I accidentally dropped the pencil I was holding. It landed with its point stuck into the *edge* of a cardboard box on the floor. I have since tried many times to duplicate this feat of accidental marksmanship, even by holding the pencil vertically at eye-level and carefully aiming before dropping it, but have never succeeded.

"What my stick lacks is a little prehensile proboscis like the nocturnal tapir's. I should really lose my pencil more often, it might do me good, I might be more cheerful, it might be more cheerful." — Beckett, Samuel, *Malone Dies*, in *Molloy, Malone Dies, The Unnameable*, Grove Press, N.Y., 1981, p. 222.

"Sometimes [Fortune] practices medicine. Jason of Pheres, given up by the doctors because of an abscess in his chest, wished to get rid of it by death if necessary, and threw himself bodily into the thick of the enemy in a battle, where he was wounded through the body so exactly that his abscess burst and he was cured.

"Did [Fortune] not surpass the painter Protogenes in the knowledge of his art? He had completed the picture of a tired and panting dog to his satisfaction in all parts but one: he was unable to show the foam and slaver to suit himself. Vexed with his work, he took a sponge, which was soaked with various colors, and threw it at the picture to blot it out completely. Fortune guided the throw with perfect aptness right to the dog's mouth, and accomplished what art had been unable to attain." — Montaigne, "Fortune is often met in the path of reason".

Prolonged study of any subject, any idea, sooner or later makes the world seem to be full of obvious examples of the subject or idea. Students of the short story, especially budding writers, hear stories everywhere in their daily life; Marxists see the capitalist oppression of the masses everywhere; programmers see that just about everything is crying out to be programmed; physicists see the working of natural laws everywhere, etc. In mathematics, one of the most striking examples — outside of the theory of fractals — is in probability and statistics, especially for those who are new to the subject, because here it seems that we — or some students, at least — don't so much start to *see* the world probabilistically as *feel* it that way. Very high probabilities are "smooth", lower ones are "rough". Mathematics becomes tactile in these two subjects.

There is a world of difference between "possible", "probable" and "conceivable", and yet even technically-educated people often use the terms interchangeably. Thus, taking "probable" to mean "likely to happen", "having a greater than, say, 70% chance of happening", we don't know if it is probable that I will die tomorrow, although it is certainly conceivable, and also possible. We don't know if it is possible, or probable, that intelligent life exists elsewhere in the universe, but we know it is conceivable.

"Although the strict Everett interpretation [of quantum mechanics] says that anything that is *possible* does occur in some version of reality, somewhere in superspace, that is not the same thing as saying anything *imaginable* can occur. We can imagine impossible things, and the real worlds could not accommodate them." — Gribbin, John, *In Search of Schroedinger's Cat*, Bantam Books, N.Y., 1984, p. 245.

The probability of rolling a seven with a pair of fair dice is 6/36. But if *x* percent of American males aged fifty died of heart attacks last year, we cannot say that "the probability of an American male dying of a heart attack this year is *x*", or even "approximately *x*". Show me the simple events of uniform probability on which such a statement is based! All we can say is things like, "if all other relevant factors remain about the same as last year, then we expect about *x* percent of American males aged fifty to die of heart attacks this year".

"Soothed by probability": A man lives in terror of the accidents and diseases that might befall him. Then he reads a book summarizing the statistical probabilities, for a person of his age and environment, of these accidents and diseases. Suddenly he feels better because, in effect, a voice of authority has told him that things aren't as bad as he thought. Yet, in fact, nothing has changed: his chances of being a victim of one of the diseases or accidents remain what they were. His terror if he becomes a victim will probably be no less, and perhaps more, because now he will be stricken with all his defenses down, like the condemned man in the well-known Hangman Problem, who, upon being told by the judge that he will be executed within the next week on a day he does not expect, discovers by a perfectly logical argument that, in fact, he cannot be executed on any day of the week, whereupon they come for him on Wednesday.

Logic

In logic, a fundamental distinction is made between using something and mentioning, or quoting, it, e.g., between using the word "Washington" (to denote the city which is the nation's capital) and mentioning, or quoting, the word (i.e., the string of letters "W", "a", "s", "h", "i", "n", "g", "t", "o", "n"). The fundamental difference between the intellectual and artistic life on the one hand, and others types of human activity on the other, is that the former is devoted to mentioning. The novelist quotes a world to you — usually, in our time, his own, in hopes that, though his life may be worthless, its quotation may not be. In mathematics, a great step forward was the development of metamathematics, whose subject is the rules by which mathematics is done. Both the intellectual and the artist are perpetually backing up in order to encompass.

"Of the paradoxes used by Zeno to discredit the belief in plurality and motion, eight survive in the writings of Aristotle and Simplicius. They are commonly stated as follows: ... (5) Before a body in motion can reach a given point, it must first traverse half the distance; before it can traverse half the distance, it must traverse the quarter; and so on *ad infinitum*. Hence, that a body may pass from one point to another, it must traverse an infinite number of divisions. But an infinite distance (which the paradox does not distinguish from a finite distance infinitely divided) cannot be traversed in finite time. Consequently the goal can never be reached. (6) If the tortoise has the start of Achilles, Achilles can never come up with the tortoise; for, while Achilles traverses the distance from his starting-point to the starting-point of the tortoise, the tortoise advances a certain distance, and while Achilles traverses this distance, the tortoise makes a further advance, and so on *ad infinitum*. Consequently, Achilles may run *ad infinitum* without overtaking the tortoise..." — "Zeno of Elea", *Encyclopedia Britannica*, Vol. 23, Chicago, Ill., 1942, p. 945.

People who are only familiar with Paradox (6), are probably not aware that Paradox (5) actually negates the need for even *stating* Paradox (6), because Paradox (5) shows that neither Achilles nor the tortoise can even get off their respective starting lines! For, pick any point, no matter how close to either starting line — say, to Achilles' starting line. By the argument in Paradox (5), Achilles can never even reach this point. And similarly for the tortoise. But if neither can traverse an arbitrarily small distance beyond their respective starting lines, neither can get off their respective starting lines — in fact, neither can even *get to* their respective starting lines — and so their race can never even begin!

The barber paradox postulates a barber who shaves everyone who doesn't shave himself, and then asks if the barber shaves himself. If he does, then he doesn't; if he doesn't, then he does. (The paradox was Bertrand Russell's popularization of a paradox that occurs in unrestricted set theory.) Numerous proposals for resolving it have been put forth, e.g., that it simply shows that such a barber cannot exist. I offer the following:

(1) The paradox disappears as soon as we allow *time* to enter the picture, i.e., as soon as we postulate a barber who shaves everyone who has not shaved himself within the past *n* days.

(2) The paradox disappears if we introduce an idea from (appropriately) Schorer's *Shaving With Occam's Razor* (Occam Press, San Jose, Calif., 1985). Schorer argues that many paradoxes occur because they "collapse" two separate universes into one. Their resolution lies in creating a pair of complementary universes, separated by an Interface which "reverses" certain properties of entities passing through it. In the case of the barber, the complementary universes are identical, each consisting of two sets: the set containing only the barber, and the set containing everyone else, or, more precisely, every other male. In each universe, the barber shaves all and only those in the second set. When the barber in, say, Universe 1, himself wants a shave, he passes through the Interface and becomes a member of the non-barber set in Universe 2, gets his shave, then passes back through the Interface to become a barber again in Universe 1.

Questions that can never be legitimately answered with "No" include: "Did you survive the war?"

Questions that can never be legitimately answered with "Yes" include: "Are you sleeping?"

Questions that can never be legitimately answered at all include: "What is it we have promised never to talk about?"

Self-contradictory sentence: "I am speechless!"

Completely unnecessary sentence:
"If you don't receive this letter, please let me know."

Awards that can never be given include: Most Outstanding Cog of the Year (in an industrial environment).

Consider:

A is writing a paper. At some point, he quotes B's paper in its entirety, and notifies B that he has done so.

B is flattered, and so, in his paper, he now quotes A's paper in its entirety and notifies A that he has done so.

Now A must quote B's revised paper, which contains A's paper. He does this and notifies B.

B must now revise his paper to include A's paper, which contains B's paper, which contains A's paper. He does this and notifies A.

Does this process ever end?

Islamic law forbids the representation of objects in the real world. Suppose an Islamic artist creates a work of art in conformity with this law. Suppose another Islamic artist makes a copy of the work. Has he transgressed the law?

Zen Buddhism

The familiar Zen koan, "We all know the sound of two hands clapping; what is the sound of one hand clapping?", has been taken as the quintessential example of the wisdom of the East. Yet there is a reply which I think is the quintessential example of the wisdom — or, rather, the ingenuity — of the West, and which, I want to believe, was first thought up by some robustly cynical undergraduate in an American university: it consists of simply clapping the fingers of one hand against the palm of that hand.

In a Zen monastery, a monk was given the opportunity to ask the Master one and only question, with the promise that the Master would answer it. When the appointed day arrived, the monk was presented to the Master. "You may state your question," said the Master. The monk replied, "My question is this: What is the most important question I can ask you, and what is the answer?" To which the Master replied, *"That* is the most important question you can ask, and *this* is the answer."

The essence of Zen is probably best illustrated when a man attempts to will an erection. No matter how desperately hard he tries, he does not succeed. But when he forgets about the whole matter, concentrates on sexual pleasure, on the partner, real or imagined, everything works fine.

Physics and Other Sciences
General Observations

How to proceed in science: (1) in trying to solve a problem no one has been able to solve, question all assumptions; (2) in examining a claim of a new discovery, always first try to explain it using existing assumptions and knowledge.

Progress in science or mathematics is by no means solely a matter of mastering ever increasing levels of abstraction. Sometimes it is nothing more than paying attention to matters which the best minds of the age and of previous ages have deemed unimportant or even worse: as being of interest only to inferior or aberrant minds. (In intellectual fields, shame is by far the best means for discouraging original thinking.) For example, the Greeks were perfectly capable of understanding formal grammars (rules for generating "mere" strings of symbols) and of understanding Cantor's proof that the real numbers are uncountable, but strings and the infinite were not subjects that the best minds felt should be investigated.

People often say, "the experiment failed", when they mean, "the experiment yielded negative results", i.e., results they hoped they wouldn't get. The only time an experiment fails is when, at its conclusion, we have no more information than we did when we started.

We think of old scientific theories as having become outmoded, having been "proven wrong". But either the experiments originally done to establish the theory were properly carried out and reported, or they weren't! If they were, then in principle we can reproduce those experiments using replicas of the original measuring apparatus, and once again confirm the theory *in its original limited context*. Old scientific theories do not become outmoded, they are not "proven wrong". It is just that the limitations of their scope of validity are discovered.

In quantum physics, the paradox of Schroedinger's Cat refers to a cat "that has been locked up in a box containing a Rube Goldberg device that will or will not emit cyanide gas depending on the outcome of a single quantum event — the radioactive discharge of an atom. The paradox is: Suppose that the cat is in the box for a period of time wherein the probability is fifty percent that the atom has been discharged. If no one looks in the box, is the cat dead or alive?" — Wolf, Fred Allan, *Parallel Universes*, Simon and Schuster, N.Y., 1988, p. 50.

This paradox suggests a paradox in mathematics and logic, one that might be called "Schroedinger's CAT", where "CAT" refers to the command, familiar to LISP programmers, that concatenates one string of characters onto the end of another. Suppose a computer memory contained a mathematics textbook, and suppose that, when the computer was turned on, there was a fifty-percent chance that the parity of an unpredictable binary number in memory would cause the negation, i.e., contradiction, of a certain theorem in the textbook to be concatenated to the end of the theorem. If no one looks at that portion of the textbook, does the contradiction exist or not?

Which suggests another question, this one concerning the well-known coin with the statement "The statement on the other side of this coin is false," engraved on each side of the coin. The question is, If a person is not familiar with the paradox, is the statement on the uppermost side of the coin both true and false before he or she turns the coin over?

The Shooting Gallery, or, Physics in a Crowded World — In the famous double-slit experiment of quantum mechanics, when one of two adjacent slits is blocked off, the electrons passing through the other slit behave like particles, but when both slits are open, the electrons behave like

waves. (See, e.g., Feynman, Richard P., Leighton, Robert B., and Sands, Matthew, *The Feynman Lectures on Physics*, Vol. III, Addison-Wesley Publishing Co., Menlo Park, Calif., 1965, Chapter 1.)   How the electrons going through a given slit "know" whether the other slit is open or not, so that they can know whether to behave as particles or as waves, is one of the central mysteries of quantum mechanics.

Now, my question is, what about the three-slit experiment, or, in fact, the *n*-slit experiment, where *n* is any integer greater than 2? Imagine several physicists, all of them eager to probe this central mystery. Funding is tight, so there aren't a lot of slits available: the physicists have to share.   Furthermore, not all of the physicists want to do the same experiment: one wants to do a single slit experiment, his neighbor wants to do a double slit experiment, etc. How do the electrons know what experiment they are participating in? If a physicist at one end of the row wants to do a single slit experiment, and thus asks his neighbor to block off the slit adjacent to his, why don't his electrons say, in effect, "Well, it's obvious he's doing a double-slit experiment because there's another slit down the way, so we'll behave like waves."? How far apart do the slits have to be before the the electrons can easily decide "This is a one-slit experiement"? What happens in the range of distances in which it is difficult for them to decide?

"He predicted the 1906 earthquake!"
"When?"
"In 1907."

Why have biologists spent so little time trying to develop mathematical models for evolution? Or if such models have, in fact, been developed, why do writers on evolution never mention them? Of course, it may not be possible yet to model *all* of evolution as it has existed on earth, and a computer model of the same is no doubt beyond the capabilities of current technology, but it would seem that vastly simplified models of a few interacting populations of organisms are possible. Some of the finest — and most long-winded — scientific prose being written today is made up of attempt after attempt to accomplish, by verbal arguments, what should either be settled by mathematical or computer model, or, if that is not possible, then should be left alone until such models become available. [Author's note: the new type of computer program called "artificial life" renders these remarks unnecessary.]

Nature's solution to creating more surface area within a limited volume — e.g., in the human lung — is to wrinkle the tissue within that volume. Suppose that for some reason we needed more probablility space — e.g., instead of merely having a choice of probabilities 0, 1/4, 1/2, 3/4, 1 in some phenomenon, we wanted a choice of hundreds, thousands of probabilities between 0 and 1. Is there a way to "wrinkle" a probability space?

Authors of popularizations of mathematics invariably point out, when they discuss non-Euclidean geometries, that these subjects proved Kant wrong in his theory that the only geometry man could ever know was Euclidean. They never point out that what Kant might have meant was that the only geometry man can *experience* is one involving space and time. (His major philo-

sophical works appeared several decades before the discovery of non-Euclidean geometries.) It is entirely possible for us to *know*, in the sense of reason correctly about, geometries which we cannot experience. But it is difficult to believe that we can experience self-consciously any situation, no matter how fanciful, that does not take place in space and time.

The power of room temperature! You take a can of frozen grapefruit juice from the freezer, open it, and find that it requires all your strength to scoop out a single spoonful. Removing the entire contents of the can would take half a minute or more of major physical effort. So you put a funnel into the mouth of a 2-quart bottle, invert the can inside the funnel, and go up and read a book, perhaps take a nap. When you come back a few hours later, you find the can completely empty, all the juice in the bottle. Yet you haven't expended an ounce of your own energy, haven't used any gas or electricity. As much power as you possess in your arms and hands is just there, in the comfortable air all around you!

A fact which applies to the search for energy sources as well as to many aspects of human life: *where there are differences, there is hope.*
    "...the existence of energy as such is of no use to us. Energy in disequilibrium is required before it can be put to good purpose." — Davies, P. C. W., *The Physics of Time Asymmetry,* University of California Press, Berkeley, Calif., 1977, p. 29.

Or, to put it another way: edges cost! Wherever there is sudden change, be it in color or direction of a moving object or in voltage or in social patterns, large amounts of energy are being transferred.

Firewood warms us twice: once in the cutting of it, once in the burning.[1]

Let's hear it for gravity!
It never lets you down, because
It always lets you down!

"Gravity: it's not just a good idea, it's *the law*!" (T-shirt, bumper sticker slogan in the late 20th century; a satiric variation on "Seat belts: they're not just a good idea, they're the law" which became well-known when wearing seat belts first became a legal requirement for drivers and front-seat passengers)

Let's hear it for air!
It's always there, because
It's everywhere!

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1. An observation that certainly must have been made centuries ago, but which I have not yet come across in reading.

Interesting hobby: searching for differences where none are presumed to exist, or where it makes absolutely no sense to do so. For example, in manufactured products — jars, printed material, pens and pencils, paper clips, tires, ball bearings.

Teaching Science

Americans learn at an early age that it is usually cheaper to throw out broken things than to attempt to repair them. And yet attempting to repair them can be a means of learning, or teaching, the scientific method. How should we think, for example about the problem of repairing a broken clock in a car? Or about repairing a problem of intermittently-appearing horizontal lines in a TV screen (are they in any way related to the temperature of the room? is simply keeping the room above a certain minimum temperature a repair?); or about strange behavior in computer software, e.g., the seemingly unpredictable terminating of a wireless Internet connection. What is valuable in such attempts is the discipline they teach in taking data, in posing questions and then testing possible answers.

Time

" Time is Nature's way of preventing everything from happening all at once; space is Nature's way of preventing everything from occupying the same place." — (sources unknown to me)

You are explaining to someone the meaning of "dimension". You draw a straight line, tell him, "A line has only one dimension." Now you show him how to draw a line at 90 degrees to this line, and tell him that the plane so formed has two dimensions. Then you place a ruler at the intersection of the two lines, at 90 degrees to each, and tell him the space so formed has three dimensions. "Now," you say to him, "time is generally considered to be the fourth dimension." He asks you to draw a line at 90 degrees to the existing three lines, i.e., he asks you to draw a line that runs in the direction of time. What would be some good replies to this request? "We don't need to draw that line because we are all moving in the direction of time"? Would it do him any good to show him the well-known projection of a four-dimensional cube? How would we explain what time was to a being that did not experience time itself? Would it be possible for any being *not* to understand time if the being *did* understand "before" and "after", or if the being were self-conscious? Could a self-conscious being *not* understand "before" and "after"?

I don't know if there are any drugs which induce a sense of timelessness, but if there are, or when there are, I would hope that every philosopher and psychologist — and perhaps even a few physicists — would take them at least once. A temporary, and much inferior, alternative is to try to imagine ourselves experiencing timelessness. An immediate question is whether one can be self-conscious in such a state. A second question is whether the absence of pain is necessary for such a state, since nothing seems to make time more real for us than having to endure intense pain.

How fast is time passing? A way to answer this question on a person-by-person basis is to place a scroll of white paper which has some sort of a texture so that, when the scroll is unrolled horizontally by mechanical means, the movement can be observed by watching the surface of the paper. Then give the subject a control and tell him or her to adjust the speed of the scroll until, in their opinion, the scroll is moving at the current speed that time is passing. One could then determine if a given scene, e.g., a sidewalk in the afternoon in the city, or a tranquil scene in the woods, or an office in mid-week, is generally considered to have the same rate of time passage by various participants.

What sorts of replies would we get if we asked the person-in-the-street, "Where does the hour go when we set the clocks ahead for Daylight Saving Time"? This is a question similar to "Have you stopped beating your wife?", in that it tries to force us to answer a question containing an assumption which may be false. In this case, the false assumption is that the hour "went" somewhere, when, in fact, nothing has gone anywhere (except for the hands of analog clocks): the hours have simply been relabeled.

"In England it was not until 1752 that the Gregorian calendar replaced the Julian. Then a belated 11-day correction was necessary, provoking riots in the streets of London and Bristol, where several people died. Workers demanded to be paid for the days they had lost; many thought they had lost part of their lives." — Coveney, Peter, and Highfield, Roger, *The Arrow of Time*, Fawcett Columbine, N.Y., 1990, p. 43.

"An intricate relationship exists between matter, antimatter, spatial symmetry and the two directions of time. It appears in the remarkable *CPT theorem*, which is a consequence of the mathematical form of the microscopic laws of physics. The roots of the CPT theorem lie in the symmetry of these laws, which remain unchanged (invariant) if in any process particles are swopped with antiparticles, the process being exchanged with its mirror image, and the direction of time being reversed." —   Coveney, Peter, and Highfield, Roger, *The Arrow of Time*, Fawcett Columbine, N.Y., 1990, p. 139.

If we define timelessness as the absence of change, what is spacelessness? We may be able to imagine timelessness by visualizing an unchanging lunar landscape, with no movement of sun or stars in the background, but how can we imagine spacelessness? By visualing nothing at all completely surrounding us? These questions may make us want to modify the above quotations to, "Time is Nature's way of making sure that at least something happens. Space is Nature's way of making sure that not everything is the same."

"We have called time and space the principle of individuation, because only through them and in them is multiplicity of the homogeneous possible." — Schopenhauer, Arthur, *The World As Will*, section 61.

Could we create an environment or drug that induces a sense of timelessness? Anyone who has been given an anesthetic which causes very rapid, complete, unconsciousness and an equally rapid return to consciousness, knows that there are at least two meanings of the term, "timeless-

ness". One is that of being conscious, but free of pleasure or pain, in a lunar-like unchanging environment, or undergoing certain types of religious experience. The other is like the above experience under anesthetic, in which, on recovering, you have the absolute conviction of there being a discontinuity in your lie, a period in which you did not exist, didn't know you didn't exist, etc., in short, had absolutely no awareness of the passage of time.

"Suppose you travel back in time and accidentally cause the death of your grandfather before he reaches puberty. You can't be born because your mother or your father can't get born...[but in the parallel universes concept, where a separate universe branches off for every possibility that can occur at each point in time] you and your prepubescent grandfather 'resonate' quantum wave streams ending his young life; you were not born. Thus in that world you don't exist. In this world, which parallels that one, nonexistence occurs only as a fanciful thought. In that world, some other 'you' perhaps thinks of you as not existing.

"Thus all annihilation backward-through-time paradoxes are resolved by the existence of parallel worlds, universes where the originator in the future does not exist. It is much like a transfer from one train to another at a train station. You board the train in the present, go back in time and alter an event, having direct and casual bearing on the existence of yourself, and return to the future. The future where you are not is on another track.

"The only criterion for existence in all of this is self-consistency." — Wolf, Fred Alan, *Parallel Universes*, Simon and Schuster, N.Y., 1988, p. 211.

But there might have to be a second criterion, namely, what might be called t*he absence of infinity at the "local" level*, meaning at the sub-atomic, or atomic, or molecular, or human, up to, say, the solar-system level. In the case of parallel universes, it seems we face not just one infinity, but a great many of them, because if a new universe branches off for each possibility that exists at each "point" in time, then there also exists, for each of these points, the possibility that each branch universe (or, at least, the "start" of each one) is represented — in a mind or in a computer memory or in some other medium. So now we need a whole set of additional universes to cover all the *representation* possibilities. But then we must also consider the possibility of representing each representation, etc. Which implies an infinite number of universes at *each* branch point throughout history. The question is, Is physics at present able to encompass that many universes?

Argument against buying a watch: If everyone has one, you don't need one. If few or no people have one, it's probably not important to know the time.

Living With Machines

Among the many shortcomings of a public school education and of a humanities college education, one is that students are never taught how to do something that in fact they will have to do for the rest of their lives, namely, live with machines.

I think it is safe to say that most people are comfortable with machines only as long as the machines work and only as long as people do not have to change the way they have been operating their machines (e.g., as is required when a new piece of software is installed on their computer).

So the first truth about machines is that the general anxiety about dealing with them would be vastly decreased if their repair and maintenance were entirely in the hands of experts who would also be able, in a kindly, patient fashion, to instruct users in new operating procedures. This is a fact that must be part of any discussion of living with machines.

The second truth is that a major cause of our anxiety when machines stop working in the way they have been, is the belief that they are doing so on purpose — that even though no engineer or scientifically-minded person believes such a thing, there could well be a demon inside each machine and that this demon has for its main purpose to make our lives miserable. Furthermore, it is infinitely clever at doing this. For example, sometimes it will make the machine run perfectly for days, weeks, even months at a time, so that we are able to enjoy life a little, and then, just when our need for the machine is greatest, it will cause it to break down and do so in a way that will baffle even the best experts as to how to repair it. At other times, the demon will cause a breakdown as punishment for some good thing that has happened to us.

Having struggled with a severe machine phobia all my life, I cannot report any cures. But one approach to a cure that seems worth trying is to try to start making friends with machines. When the car has worked well for several weeks, we can pat the steering wheel affectionately and say, in our minds, "You're doing a great job, and I love you." When the computer crashes, we can touch the top of the cabinet and say, in our minds (though it will be very difficult), "I know you didn't do this on purpose. Don't worry. We'll get the consultant in here and he'll fix you up right away. Just rest now."

Intelligence and Creativity

In the early twentieth century, academic careers were built on the mystery — the sense of something profound and important — that arose from applying the word "meaningless" to sentences that were perfectly meaningful, in the ordinary sense of the word, but simply were incapable of being verified scientifically or logically. Similarly, academic careers and indeed an entire industry have been built on the mystery that arises from applying the word "intelligence" to what should simply be called, "ability". The importance of the distinction struck me when, after many years, I visited a business-woman I had worked with in the sixties. She and her husband had built a printing business which is now among the ten largest of its kind in the country. She began it in her garage in the mid-fifties by typing address labels. In the years I have known her, she has never exhibited any of the kind of intellectual ability we normally associate with "high intelligence": she has no unusual mathematical ability, although, as you would expect, she can rapidly perform approximate business calculations in her head. She would be the first to admit that she has no scientific or engineering talent. She seems to have a good memory for business matters — faces, names, jobs done in the past, and, presumably, amounts of money spent and earned. All that we can say is that she is very good at organizing work and getting people to work hard for her, some of her employees staying with the company for more than twenty years. And, of course, she is very good at getting people in business to want to have their printing done by her firm. The idea that I should regard her as "less intelligent" than the high-IQ technical drones I have spent my life working with, is so absurd that we have to wonder why it has taken psychologists close to a century to recognize it. (See, e.g., Howard Gardner's *Frames of Mind* (1983).)

There is no limit to the length and complexity and ultimate uselessness of the discussions that can go on over whether this or that person or type of person or animal or type of animal or machine or type of machine, is "intelligent". Or even whether the person or the animal or

machine exhibits "intelligent behavior". All there is is: abilities and the exact or inexact or currently impossible measurement of each. These abilities include abilities once considered to be marks of intelligence but which are now easily duplicated by machines. (Who is more intelligent: a person who can solve a certain class of mathematical problem rapidly using only pencil and paper, or a person who solves such problems more slowly, but who can write a computer program to solve the problems a hundred times faster than any human being can?)

Pons and Fleischmann could have avoided a great deal of humiliation concerning their possible discovery of cold fusion had they simply leaked word of it to ambitious colleagues in language of the sort, "...by the way, we seem to be on to something very interesting...but we are not at all sure of our results...the basic idea is as follows..." The leak could have been accomplished by a series of letters, it being essential, of course, that the writing of each letter and its mailing on the date specified be witnessed by persons whose word would stand up in court. Professional envy would then do the rest. Why? Because if an idea is valid each colleague knows he will look like a fool in the eyes of posterity if he doesn't acknowledge it; if the idea is not valid, each colleague will triumphantly notify the originator(s) of that fact, but be unable to shame him (them), since no public claims were made.

If I were given the opportunity to teach just one course to liberal arts undergraduates, without question it would be one titled, "Some Ways of Thinking". (Not "How to Think" because that implies there is only one way to think, and, as Howard Gardner and others have convincingly argued, that is simply not the case.)

The reason I would want to teach this course above all others is that, as a result of renting a room in my house to undergraduate woman liberal arts students at one of the nation's leading universities, I have observed firsthand how appallingly inadequate is the education in thinking that these students receive. In fact, what they really get for their money and effort is an education in recognizing deviations from Political Correctness and from the current multicultural Party line. Why isn't population control a good idea for poverty-stricken Third World countries? "Because it is Western white males interfering with the reproduction rights of oppressed women of the Third World. The global corporations should pay to keep these women out of poverty." Now there may in fact be legitimate arguments against population control as a means of lifting the Third World out of its poverty, but this is not one of them. This is not an argument at all, it is an expression of feeling.

In my course, the central theme would be the importance of distinguishing between feelings, expressions of feelings, and means — some better, some worse — of possibly satisfying these feelings.

Then I would begin with Gardner's list of kinds of "intelligence — "logical-mathematical intelligence, linguistic intelligence, spatial intelligence, musical intelligence, kinesthetic intelligence, and personal intelligence[1]" — , but I would ask my students, while they are taking the course, to replace "intelligence" with "ability". I would then modify the list as necessary to emphasize the following types of thinking: *deduction* (what is measured in part of an IQ test, what

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1. Halpern, Sue, "Evangelists for Kids", in *The New York Review of Books*, May 29, 2003, p. 22.

is used primarily in mathematics, engineering, and the hard sciences); *judgement in human affairs* (e.g., in business, politics, the law, parenting); *common sense*; and *scientific thinking*.

In the last category, I would (in the kindest, most respectful-of-my-students'-feelings, most walking-on-eggshells way I could) explain what a theory is in these disciplines and what a theory is not, and why the theory concept is useful; then I would explain Popper's concept that falsifiability is the criterion of a good theory: a theory is good insofar as it is easily falsifiable, i.e., insofar as it can easily be proven wrong if in fact it is. I would mention as an example the test of Einstein's General Theory of Relativity that was performed in 1919 by Eddington, in which it was determined that starlight is, in fact, bent by the gravity of the sun, in accordance with Einstein's theory. I would try to get across to my students that a theory that explains everything — "Everything happens as it does because it is God's will", "Everything happens as it does because of dialectic materialism" — is no theory at all, because there is no way to determine if it is right or wrong. I would (with great fear and trepidation) say that insofar as feminist theory does not set forth criteria for deciding if it is correct or not, or to what degree it is correct, feminist theory is likewise not theory at all, but rather an officializing of certain strong feelings. For similar reasons, Marxist theory is not a theory, no matter how passionately Marxists may hate the oppression of the worker and the poor. (I would give as an assignment to those students who considered themselves Marxists, the locating, in Marxist literatare, of criteria for testing whether the theory, as a whole or in parts, is correct or not.) I would point out that the argument, "The suffering of the poor in this world is outrageous and totally unacceptable; Marxism sets forth an explanation of the causes and cures of this suffering; therefore, Marxism is correct" is not valid. But that the invalidity of this argument is *not at all* the same thing as saying that our compassion for the poor is not valid! In the category of judgement, I would use examples of good vs. bad judgements among world leaders (Churchill vs. Chamberlain), among generals in the military (Allied generals during World War II vs. Hitler[1]; Schwartzkopf and his staff vs. Saddam Hussein during the Gulf War); among executives in corporations, among parents.

I would spend considerable time on goal-oriented thinking ("What are we trying to accomplish here?"), and on the fact that there are often several ways of achieving a goal, some better than others in the given circumstances, and that there are ways of deciding which these are. I would also spend considerable time on the importance of critical thinking ("Why should I believe that this is true?" "What is meant by the term ...?"), and on the importance of evidence. Throughout the course, students would be given every opportunity to write short or long papers arguing against what I say, but they would have to do so using the ways of thinking that were being taught.

(See also "How to Be Smart" in the chapter, "Education", of this book.)

One of the most powerful stimulants to creativity is the concept of the "shift" — the slight change that produces a major effect. Examples of the slight change are:

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1. It is remarkable that historians still seem to have difficulty assessing Hitler's military prowess. Because he attacked his unprepared, sound-asleep neighbors with overwhelming force ("Blitzkrieg") does not make him a military genius. Nor does his use of an astrologer to help him predict where the D-Day landings would occur (he concluded they would occur on the Pas-de-Calais, far to the north of where they actually occurred). Nor does his ignoring the lesson that Napoleon learned the hard way about the folly of fighting in Russia in the middle of winter (Battle of Stalingrad). Nor does his putting an incompetent like Hermann Goering in charge of his air force (Luftwaffe). Nor does his consistently ignoring the advice of his generals, some of whom, at least some of the time, were far better strategists than he was.

•the movement of the eye which changes a moiré pattern;

•the combining of things which are normally found "close together" but separate, as, e.g., in the Swiss Army knife, or the recliner chair;

•the slight change in the dimensions of the parts used to construct something, as when interchangeable parts were developed by, in effect, *eliminating* the slight changes that resulted when parts were hand-made;

•simply reversing the orientation of something, as in:

    Marx's "standing Hegelianism on its head";

    Nietzsche's doctrine of the error of mistaking cause for consequence, as exemplified by the mind's ability to "explain" the ringing of the alarm clock by constructing a dream at whose conclusion the alarm clock starts to ring;

    the practice, by the Machiguenga tribe in the Peruvian highlands, of spanning small rivers with bridges made out of living saplings, so that, if the lashings fail, the bridge can only fall *up*. — "The Ones Who Remain", *Sierra*, The Magazine of the Sierra Club, Nov. 1991, p. 56.

•the "shifting of the beat" described in the chapter, "Music", in which one forces oneself to hear the start of each measure at the second or third or fourth, etc., beat instead of the first;

•the shifting a melody past itself, as in a fugue or round;

•the "shifting of sense relative to sound" as described in the chapter, "Art and Literature", in which one hears, in a given sequence of spoken words, several different meanings, depending on where one starts in the sequence, and how one groups the sounds of the syllables.

• "shifting the context" (known to all inventors and comedians), i.e., of asking of any phenomenon that is "bad" (i.e., annoying, troublesome, destructive) in one context, whether it might not be "good" in another context. Consider, e.g., the fact that the remnants of milk-soaked breakfast cereal are all but impossible to remove from the bowl without being soaked in hot water for half a minute or so. The smart inventor asks himself, "In what context would such a phenomenon be desireable?" Answer: wherever we want a strong glue that is water soluble. Similarly, it has been said that the now ubiquitous yellow Postit notes were invented by someone who wondered what good a glue might be that didn't stick very well. The difficulty of re-lighting a cigar might suggest to some the possibility of a good, cheap, thermal insulator made of ash. George de Mestral, the inventor of Velcro, came up with his idea by wondering why cockleburs are so hard to remove from clothing and from dog's hair, and what good (for humans) a mechanism with such annoying properties might be.

"The problem of the planetary orbits had been hopelessly bogged down in its purely geometrical frame of reference, and when Kepler realized that he could not get it unstuck, he tore it out of that frame and removed it into the field of physics. This operation of removing a problem from its traditional context and placing it into a new one, looking at it through glasses of a different color, as it were, has always seemed to me of the very essence of the creative process." — Koestler, Arthur, *The Watershed: A Biography of Johannes Kepler*, Anchor Books, Garden City, N.Y., 1960, p. 150.

In cases where you are trying to find a way to protect something, it is sometimes useful to see if the thing itself can be made to supply the protection. An example is the stacking of firewood so that only the top layer gets wet in the rain.

Our business is not to avoid cliches, but to find out what use they might be. It takes a certain effort, a certain coming to oneself, to examine a cliche and ask, "Is there any merit to this? Could I make it work?" Business lore is an example. Time and time again start-up companies fail because managers, in their arrogance, choose to ignore basic business practices — planning, scheduling, delegation of authority, studying the marketplace, seeking out prospective customers and listening to what they have to say — on the grounds that these practices are cliches, that everyone knows about them. "That's for losers. I'm different!"

An amusing exercise that can also stimulate creativity is that of taking some everyday item and imagining a society in which that item was of central importance. For example, handles. Imagine a society in which handles were so valued that they were considered the ultimate decoration, so that even children, when they went to restaurants with their parents, would plead with the host or hostess to be seated at a table with handles. Suppose it was a sign of upper class distinction to place handles in obscure places in a house, e.g., on the underside of a shelf in a linen closet, on a beam in the attic, in a corner of the foundation. Suppose that the more handle metaphors you used in your speech, the more you were admired and respected. In addition to the metaphors that are familiar to us, e.g., "getting a handle on things", "his handle is Bill" (ham radio usage), there would be others, such as, "Well, as they say, life is a handle...", "Don't forget: you can't open a door without a handle...", "If it looks like a handle, it *is* a handle...", etc. If "handle" is defined as, say, "something to open or gain access to or control something", then all manner of things are easily seen as "handles": education (it opens doors); windows; music; therapy; art; wrenches; hammers (they open holes which are occupied by nails); screwdrivers; government; business; scalpels; crowbars, etc.

Part of every thinker's self-discipline must be to learn what was in the air when great discoveries were made. The aim is not to disparage the achievements of those who made the discoveries, but to learn something about making the most of what is around you, what is already at hand. (Even the metaphors that the great use to explain their accomplishments are not always original: Newton's statement that, if he saw further than others, it was because he stood on the shoulders of giants, was anticipated by an observation of Ambroise Paré (1509-1590) that we use the ancients as stilts, and much earlier, namely, in the twelfth century, by Bernard of Chartres' (d. 1130) statement, "We are but dwarfs seated on the shoulders of giants that we might see more further than they. Yet not in virtue of the keenness of our eyesight, nor the breadth of our vision, but alone because we are raised aloft on that giant mass." — Noble, Thomas F. X., *The Foundations of Western Civilization* (series of video tapes), Part IV, Course Guidebook, The Teaching Company, Chantilly, VA, 2002, p. 28.

"...but in [Kepler's treatise on a solar eclipse, written in 1600] he hit on something for which he had not looked: that there was 'a force in the earth' which influenced the moon's motion, a

force which diminished in proportion to distance. As he had already attributed a physical force to the sun as an explanation of the motions of the planets, the dependence of the moon on a similar force in the earth was the next important step toward the concept of universal gravity." — Koestler, Arthur, *The Watershed: A Biography of Johannes Kepler*, Anchor Books, Garden City, N.Y., 1960, pp. 116-117.

"It is therefore clear that the traditional doctrine about gravity is erroneous...Gravity is the mutual bodily tendency between cognate [i.e., material] bodies toward unity or contact (of which kind the magnetic force also is), so that the earth draws a stone much more than the stone draws the earth...

"Suppose that the earth were in the center of the world, heavy bodies would be attracted to it, not because it is in the center, but because it is a cognate [material] body. It follows that regardless where we place the earth...heavy bodies will always seek it..." — Kepler, Johannes, in his *New Astronomy*, published 1609, quoted in Koestler, Arthur, *The Watershed: A Biography of Johannes Kepler*, Anchor Books, Garden City, N.Y., 1960, p. 152.

Geniuses without genius: there are individuals who are creative in the extreme, who have an abundance of ideas, sometimes in more than one artistic or intellectual discipline, and yet who, through genetic bad luck, have not been given the skills and talents to bring these ideas into the world. They are like the person who, in his dreams, hears extraordinary music which he has never heard before and yet who completely lacks the ability to transcribe music to paper, even if he hears it replayed many times (he may not even know how to read music). The prejudice against collaborative efforts is particularly strong in some academic circles, where any sign that one is not completely capable — arrogantly capable — in one's micro-specialty, is taken as a sign of inferiority, i.e., lack of value as an intellectual commodity. Yet even in the academy, there have been outstanding disproofs of the validity of this prejudice, e.g., the long, enormously productive collaboration between the 20th century British mathematicians Hardy and Littlewood. (Although it must be said that no one doubted the extraordinary ability of each of these mathematicians in their own right.) If we could once and for all rid ourselves of our academic-bureaucrat, New-York-art-world, concept of genius, there is no telling what wonders we might behold, and what happiness we might bring to certain lost souls of today.

The French term *belle-laid* (literally, "beautiful-ugly") is used to describe a woman who is sexually appealing despite her plainness. Anyone who has spent time with artists and intellectuals has met such women. Typically, their appeal arises from the fact that they have: (1) attractive bodies; (2) fame and/or money; (3) a certain hostility toward all those who want to get close to them. An equivalent term, namely, "smart-dumb", can be applied to certain intellectuals. These have grave shortcomings in the skills normally considered to be essential to their particular discipline, but at the same time they have much better imaginations and a much better gift for asking the right questions than those who possess those skills. They often discover a better way of doing things, not because they have mastered the old ways so well, but because they are simply unable to master the old ways — or perhaps we should say, are unwilling to put themselves through a labor which they sense is unnecessary. In the best of all possible worlds, these people would be independently wealthy, and thus be able to hire others to carry out the detail work they are so ill-

suited for. In this world, they often waste the majority of their lives trying to prove to those with the skills that they too have the skills and therefore should be given a hearing for their ideas.

A physicist puts the matter this way:

> ...people who are good at asking genuinely novel but relevant questions are rare...the ability to look at the state of a technical field and see a hidden assumption or a new avenue of research is a skill quite distinct from the workaday skills that are a prerequisite for joining the physics community. It is one thing to be a craftsperson, highly skilled in the practice of one's craft. It is quite another to be a seer.
>
> This distinction does not mean that the seer is not a highly trained scientist. The seer must know the subject thoroughly, be able to work with the tools of the trade, and communicate convincingly in its language. Yet the seer need not be the most technically proficient of physicists. History demonstrates that the kind of person who becomes a seer is sometimes mediocre when compared with the mathematically clever scientists who excel at problem solving. The prime example is Einstein, who apparently couldn't get a decent job as a scientist when he was young. He was slow in argument, easily confused; others were much better at mathematics. Einstein himself is said to have remarked, "It's not that I'm so smart. It's just that I stay with problems longer." Niels Bohr was an even more extreme case. Mara Beller, a historian who has studied his work in detail, points out that there was not a single calculation in his research notebooks, which were all verbal argument and pictures. — Smolin, Lee, *The Trouble With Physics*, Houghton Mifflin Company, N.Y., 2006, p. 309.

Just as there are people who have no ear for music, or no eye for the visual arts, so there are people who have no intuition for ideas. They cannot judge an idea unless someone shows them how it can be applied (most engineers are in this category) — still less can they see how it might be applied in fields other than the one it arose in. On the other hand, people who have this intuition can smell a good idea a mile off, even if it is clothed in the most deceptive garb, e.g., in a joke, or in turgid academic prose, or in the mutterings of someone they despise. They can not easily explain just *how* they are able to recognize a good idea so instinctively; their replies are typically things like, "You just know", "It's a gut feeling", "It stops you in your tracks". For such people, the idea is everything — the idea in its raw, elemental, primordial form. *Explaining* the idea, i.e., giving more than the few hints they feel should make the whole thing obvious, much less *proving* that it is a good idea, still less implementing it, is dog work they would much rather leave to others, if such others existed.

"Even if it's wrong, it's right!"[1] A proclamation of the esthetic value of an idea. Those who cannot understand how such a proclamation could be made are probably not destined to accomplish much in the intellectual realm.

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1. "'Si non è vero, è molto ben trovato.' If it is not right, it is a happy invention. Apparently a common saying in the sixteenth century. Found in Giordano Bruno (1585) in the above form, and in Antonio Doni (1552) as 'Se non è vero, egli è stato un bel trovato'." — *The Oxford Dictionary of Quotations*, Oxford University Press, N.Y., 1966, p. 13.

One thinks of Einstein's reply to the person who asked him, after the general theory of relativity had passed an important test (the bending of starlight by the gravity of the sun), what he would have done if the theory had *not* passed the test. Einstein replied, "Then I would have felt sorry for the Dear Lord, because the theory is correct."

As far as I know, there are no intelligence tests that measure the ability to rapidly understand new ideas. Perhaps this ability can't be measured. I do know from experience that, among people in technical fields, e.g., engineering, programming, mathematics, the ability is by no means correlated with abilities that intelligence tests *do* measure, e.g., the ability to do rapid mental calculations, to rapidly find deductive arguments to prove a statement, or to visualize geometric objects in various orientations. Again and again I have been stunned at the inability of persons with these abilities to rapidly get to the heart of a new idea — I don't mean by this, to understand any or all the equations, or to understand the logical arguments supporting the idea — I mean (I have to use the metaphor again) to *smell how it goes*.

One of the best ways to judge an intellectual's potential for original thinking is by his attitude toward outsiders and crackpots. I once knew a maverick computer scientist (he was soon fired from his job at one of Silicon Valley's most highly-respected companies) who kept a pile of crackpot papers and manuscripts in his office. If he took a liking to you, he would, every once in a while, during a pause in conversation, hand you one of these papers without comment, the subject of the paper having nothing to do with the subject of the conversation. Some were mad escapades in topology, logic and cosmology, others disproofs of Einstein's theories of special and general relativity. His attitude toward these oddities was that they offered superb opportunities for him, and for those he saw fit to consider as colleagues, to exercise their critical faculties, in other words, opportunities for overlooking eccentric writing styles and an author's lack of credentials, and discovering the real flaws in an argument. Of course, he also enjoyed the flaws themselves, the magnificent leaps of irrationality. I suspect he also considered these curiosities as possible sources of good ideas.

A crackpot is *not* a person who makes mistakes; a crackpot is a person who doesn't understand the rules of the game he is playing.

Nothing marks a true-blue academic more certainly than his disdain for any idea that is not presented in the proper form by an author with the proper credentials. The slightest suggestion of amateurness, of clumsiness in writing style, much less actual errors in reasoning (especially when the subject is mathematics or computer science), and the manuscript goes into the wastebasket. And yet, as history shows again and again, good ideas come from any and all quarters: dreams, children's play, or just idly regarding some perfectly ordinary thing or event. The great Indian mathematician Ramanujan — then working as a clerk in the Port Trust office in Madras — submitted a collection of his theorems to a Cambridge mathematics professor. The professor discarded them, apparently without even bothering to examine the validity of any of the theorems. Ramanujan wrote to a second professor at the same university, was again rejected in the same

manner. The third time, he wrote to G. H. Hardy, then a rising star on the Cambridge faculty, and the rest is mathematical history. As Hardy later pointed out, "great mathematicians are commoner than thieves or humbugs of such incredible skill".

"...academic fields ... guarded with umbrella and learned periodical against the trespass of any unqualified stranger, not a whit less jealously than the game-preserve is protected from the poacher by the unamiable shot-gun." — Auden, W. H., "III: Caliban to the Audience" in "The Sea and the Mirror"

Albert Einstein, after his appointment in 1933 to The Institute for Advanced Study at Princeton in 1933, found it to be "a quaint and ceremonious little village of puny demigods on stilts"[1]. Others have also commented on the stifling, not the stimulation, of creative powers that often occurs in academic institutions of great prestige.

One of the highest costs of the indoctrination into orthodoxy which constitutes earning a PhD is the belief that one's first responsibility when confronted with a new idea is to find out what's wrong with it. In fact, on the basis of years of experience, I would say that this is *the* defining characteristic of the PhD: always able to tell you what's wrong with a new idea, but never able to tell you what's right with it.

Guideline for researchers of the future: *If you can think it, it's obsolete.*

Young intellectuals learn to dread above all the criticism that they believe is the death knell for any idea: *it is not original*. It takes years in the desert — and many do not survive the ordeal, because the loneliness either drives them to suicide or into the safety of the academy (which for some is the same thing as suicide, though they manage not to admit it to themselves) — it takes years in the desert for them to learn how to properly regard originality, and, in particular, how to regard those who are so eager to point out the supposed lack of it.   "For, mark it well, imitation is often the first charge brought against real originality." Melville, Herman, "Hawthorne and His Mosses", in *Great Essays*, ed. Houston Peterson, Washington Square Press, Inc., N.Y., 1967, p. 203.

The real test of an academic's intelligence and originality is how he or she handles a new idea — especially a new idea which arrives without the cachet of approval by other academics. It is then that you realize that in the vast majority of cases, academics have only two things going for them: knowledge and good manners (i.e., faultless writing style). But knowledge is not where it's at. A great deal of the knowledge that academics pride themselves upon, and believe separates

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1. Quoted in Holt, John, "How the Computer Exploded", review of Dyson, George, *Turing's Cathedral: The Origins of the Digital Universe*, in The New York Review of Books, June 7, 2012, p. 32.

them from the mass of humanity, is look-up-able, especially if it resides in an appropriately designed computer data base, although books are perfectly adequate for the purpose. (Indexing, not knowledge, is the important thing.)

In the humanities, you realize that underneath all the knowledge and good manners lies a naive form of reasoning that is no more sophisticated than that of the philosophers of Confucius' time.

In mathematics, you realize that underneath all the knowledge and good manners lies a basic skill at deductive reasoning that is rapidly being approached by some computer programs. I have never met a mathematician (although I believe such exist) who, when someone presents him with a new idea, says, "Well, all this notation is very impressive, and for all I know your proofs are correct, but let's put all that aside, and let's take a pencil and piece of paper and see if you can explain your basic idea to me with a few drawings and as little, as opposed to as much, technical language as you can."

"Some of the greatest discoveries consist mainly in the clearing away of psychological road blocks which obstruct the approach to reality; that is why, *post factum*, they appear so obvious." — Koestler, Arthur, *The Watershed: An Autobiography of Johannes Kepler*, Anchor Books, Garden City, N.Y., 1960, p. 148.

Maverick intellectuals like to believe that intelligence will always win out, that, e.g., if an employee consistently comes up with better ways of doing things, even the dullest boss will sooner or later recognize the fact and give the employee the rewards and recognition he or she deserves. Unfortunately not so, because, as some have had to learn through years of hard experience, it takes intelligence to recognize intelligence.

"Mediocrity knows nothing higher than itself, but talent instantly recognizes genius." — Arthur Conan Doyle.

"Democracy by nature puts a premium on mediocrity." — Dewey, John, quoted in Johnson, Paul, *Modern Times: The World from the Twenties to the Eighties*, Harper & Row, Publishers, N.Y., 1985, p. 208.

The first question to ask yourself about any intellectual, and especially about any academic, you meet is: just how important is prestige to this person? How much of the pleasure of the life of the mind for them is the pleasure of excluding others by knowing more (much more) about some subject than they do, of living in a beautiful house and having important friends, of knowing how to speak and write in an arcane language, of having unquestioned power over others, e.g., students. In proportion as the answer is "a lot", you know you are dealing with a second-rate mind. For these, a uniform, a cap, a shiny badge, and a stick are what it's really all about.

(The patience of some of us is stretched to the limit when we have to endure speeches by such persons, e.g., at commencement exercises, extolling the importance of loving the life of the mind, or this or that subject, "for its own sake".)

What strikes outsiders the most about academics is their extraordinary inability to comprehend — their extraordinary *immunity* to — ideas that are not presented in standard formats, e.g., those of academic papers and scholarly books. It is not so much that academics *reject* ideas that they confront in other formats, e.g., in the précis style of much of this book, as that they simply *cannot comprehend* ideas in these formats. This is true of mathematicians and of academics in the humanities. But perhaps the outsider shouldn't be surprised, given that the earning of a PhD is largely the laborious, years-long task of learning the subtleties of a writing style. Any molehill can be made into a mountain if the style is faultless.

Every intellectual who chooses to pursue his interests outside the university, but who sooner or later needs the approval of university professors to achieve proper credit for his work — e.g., in the hard sciences, mathematics and computer science, where research results do not exist until they are published in a refereed journal — every such intellectual should be crystal clear on the difference between, on the one hand, criticism, evaluation, of an idea, and, on the other, the techniques that professionals use to keep outsiders out.

Principal among these techniques is that of pointing out errors, no matter how trivial, or, even worse, pointing out deviations from proper writing style. The argument is essentially, "See? You have made a mistake. Therefore what possible worth can your idea be? And, even worse, you have wasted my time by forcing me to read a paper *which contains a mistake*."

But in their own research, these busy experts would be appalled, outraged, if they were treated the same way — if they said to a colleague, "You know, I've been thinking about the *x* problem, and have been wondering if there might not be an approach via ...", perhaps accompanying their words with a drawing on the blackboard or on a piece of paper, and if the colleague then replied, "I'm sorry, but I'll have to see a proof before I can understand what you are talking about." Or, "I'm sorry, but there seems to be a gap in your proposed proof, and so it can't be worth anything." Such a response would call into question the colleague's credentials. But the practice is carried out with impunity when an outsider broaches a new idea. Yet at commencement exercises, and whenever the smell of funding is in the air, these hypocrites give long, glowing speeches about the nobility of man's desire to know, man's need to ask questions, to pursue the unknown.

When someone is honestly evaluating an idea, they do not begin by looking for mistakes in the logic or style. They first try to understand the idea, in the most informal terms, possibly with a picture, or just while taking a walk. "OK: so what you're saying is that the structure might be ..., and that, if it is, then maybe a proof can be built from the fact that ..."

An academic's first question, when he or she confronts a piece of writing, is "Is it new?", because above all academics don't want to be seen wasting time on something unimportant. All is commodity. *But our business is not to be original*: *it is to find out what is true.* Of course, philosophers have taken care to provide themselves with a means of bringing forth old ideas without having to confront the shame of not being original, namely, by presenting the ideas in new language that is so difficult that by the time the reader understands what is being said, he or she is unwilling to admit that it is merely the old in new clothing, and instead concludes it must be new ("otherwise I wouldn't have had to spend that much time and effort on it!").

Another function that academics' (and others') obsession with novelty serves, is that of pro-

tection against ideas they don't want to deal with. We make cliches out of ideas we want to ignore.

Among the many naiveties of this enlightened age, one is the belief that it is possible to identify creative individuals early in their careers. The very meaning of the concept "creative" should have been enough to discourage any effort along these lines, but by now the record of grants of most of the major granting organizations, vs. the list of generally recognized innovators in the fields concerned, should convince any remaining believers. The only way to help creative individuals early in their careers is by making part-time work, at a living wage, readily available. Several of the larger corporations now do this, though not for reasons of promoting creativity. In civilized communities like Berkeley, where the desire not to waste one's life merely earning money is considered a virtue, there are part-time therapists, teachers, realtors, dental hygenists, technical writers, and others. Part-time work is the simplest, cheapest, fairest way of ensuring that opportunities exist for creative individuals to pursue their proper work.

In our time, geniuses are a dime a dozen.

We have about 10 billion brain cells by the time we reach age 20. Brain cells begin to die without being replaced when we reach age 35. From then on, we lose about 100,000 a day. But even though this may seem like a large number, by age 65 we have nevertheless lost only 100,000 times 365 times 30 = 1.095 billion, or about 11% of our original supply! (This is about 5% of the brain's weight.) If we live to be 95, we have only lost 22%! Losses that small we can make up for by learning how to think intelligently. — data from Garrison, Webb, *The Ignorance Book*, William Morrow and Company, Inc., N.Y., 1971, pp. 129-130, and the *New York Times*, Apr. 18, 1996, section C, p. 3

Lying as an intellectual exercise: apart from the fact that the ability to lie convincingly is essential for success in politics, business, and romance, it also provides a too often underrated opportunity to exercise our minds.

"It is not unreasonably said that anyone who does not feel sufficiently strong in memory should not meddle with lying...Now liars either invent everything out of whole cloth, or else disguise and alter something fundamentally true. When they disguise and change a story, if you put them back onto it often enough they find it hard not to get tangled up. For since the thing as it has become lodged first in the memory and has imprinted itself there by way of consciousness and knowledge, it is difficult for it not to present itself to the imagination, dislodging the falsehood, which cannot have so firm and secure a foothold. Likewise, the circumstances that were learned first, slipping into the mind every moment, tend to weaken the memory of the false or corrupted parts that have been added. In what liars invent completely, inasmuch as there is no contrary impression which clashes with falsehood, they seem to have the less reason to fear making a mistake. Nevertheless even this, since it is an empty thing without a grip, is prone to escape any but a very strong memory." — Montaigne, "Of Liars".

Lying well requires not only a good memory, but, even more important, the overcoming of the remnants of that morality which considers it an evil, and, more insidiously, considers it a type of behavior that sooner or later will be detected. Overcoming these superstitions is an equally good exercise for any healthy mind.

We are like children: we believe that where there is a question there must be an answer, and that if we were only smart enough, or behaved properly, we would be able to discover it.

One way of distinguishing a thinker from a non-thinker is by his attitude toward questions. A thinker enjoys questions even if he doesn't know the answers. A question like, "Why are atoms so small?", asked by Schroedinger at the beginning of his beautiful book, *What Is Life?*, is irresistible to any real thinker. A non-thinker, on the other hand, considers a question as a kind of hole which must be filled as soon as possible by an answer, any answer. Religions, including Marxism and those associated with the various psychotherapies, attempt to provide answers for all questions. You will never hear a true believer say, "That's an interesting question. I wonder what the answer is, or if there is an answer."

"The good thinker can take his time because he can tolerate uncertainty, he can stand not knowing. The poor thinker can't stand not knowing; it drives him crazy." — Holt, John, *How Children Fail*, Dell Publishing Co., N.Y., 1964, p. 72.

"...[Aristotle] was also addicted to explanation and intolerant of ambiguity, qualities not salutary in science. A physician's son, he inherited a doctor's bedside habit of having a confident and reassuring answer to every anxious question. When pressed, this cast of mind made him credulous (women, he asserted, have fewer teeth than men) and propelled him to the extremities of empty categorizing, as when he observed that 'animals are to be divided into three parts, one that by which food is taken in, one that by which excrement is discharged, and the third the region intermediate between them.' Aristotle wrote and lectured on logic, rhetoric, poetry, ethics, economics, politics, and the weather, and his thinking on many of these subjects was subtle as dewfall, but he was not a man to whose lips sprang readily the phrase, 'I do not know'. His mind was a killing jar; everything that he touched he both illuminated and anesthetized." — Ferris, Timothy, *Coming of Age in the Milky Way*, Anchor Books, Doubleday, N.Y., 1988, p. 27.

The more I think about the nature of intelligence, the more I am inclined to believe that it boils down to one thing: the ability to learn from experience.